

April 28, 1931.

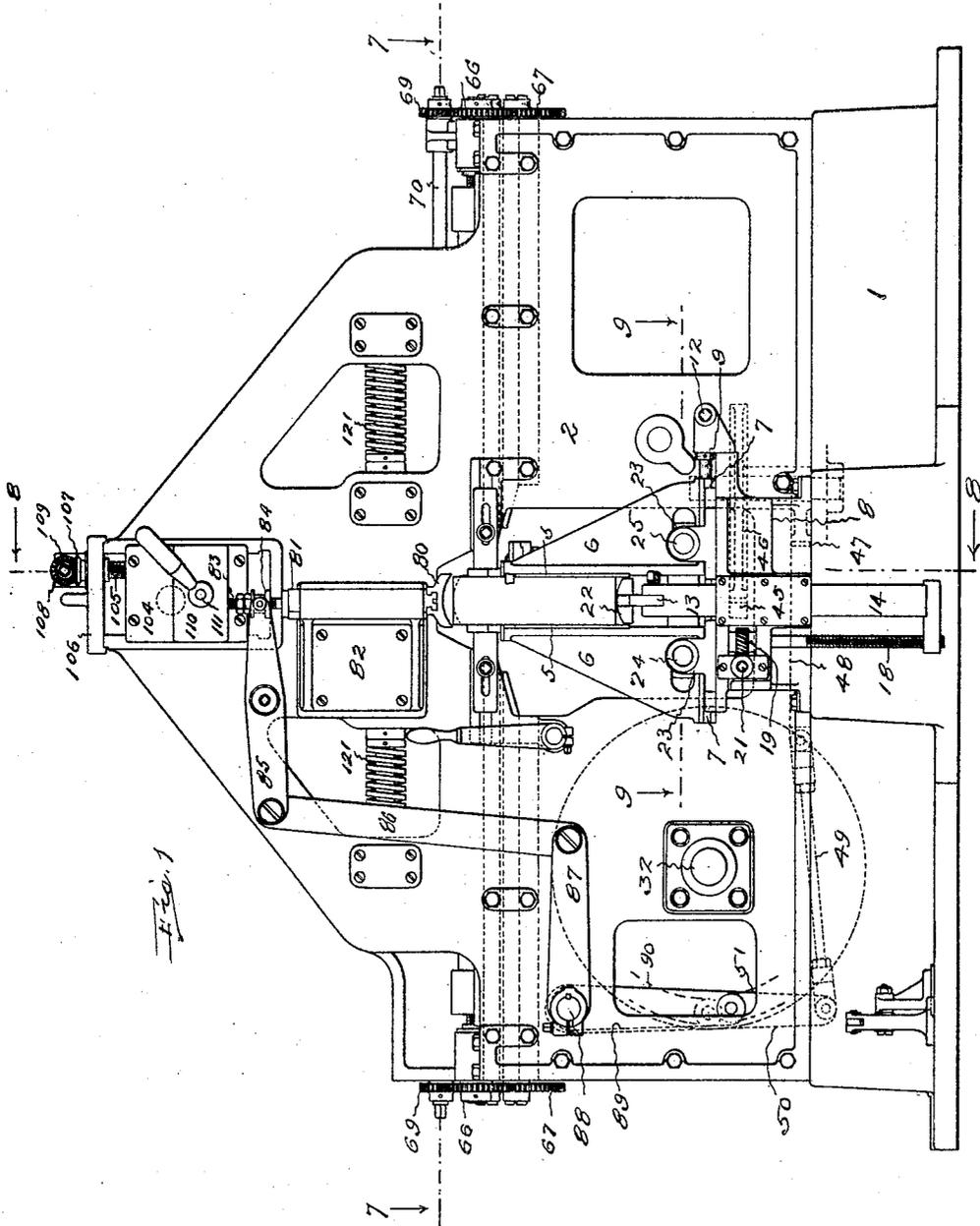
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1,802,355

MACHINE FOR ROUNDING AND JOINTING THE BACKS OF BOOKS

Filed Oct. 13, 1930

6 Sheets-Sheet 1



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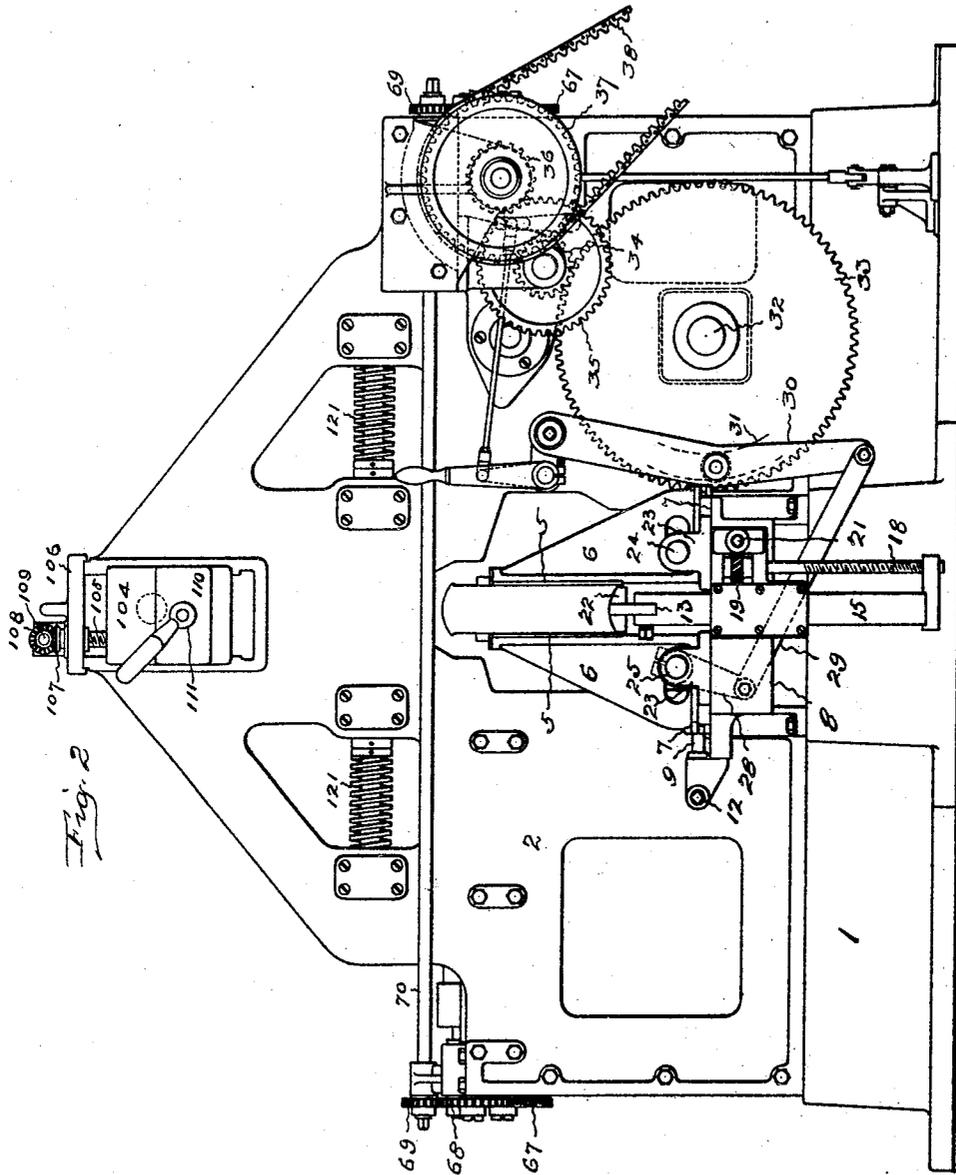
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Filed Oct. 13, 1930

6 Sheets-Sheet 2



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MACHINE FOR ROUNDING AND JOINTING THE BACKS OF BOOKS

Filed Oct. 13, 1930

6 Sheets-Sheet 3

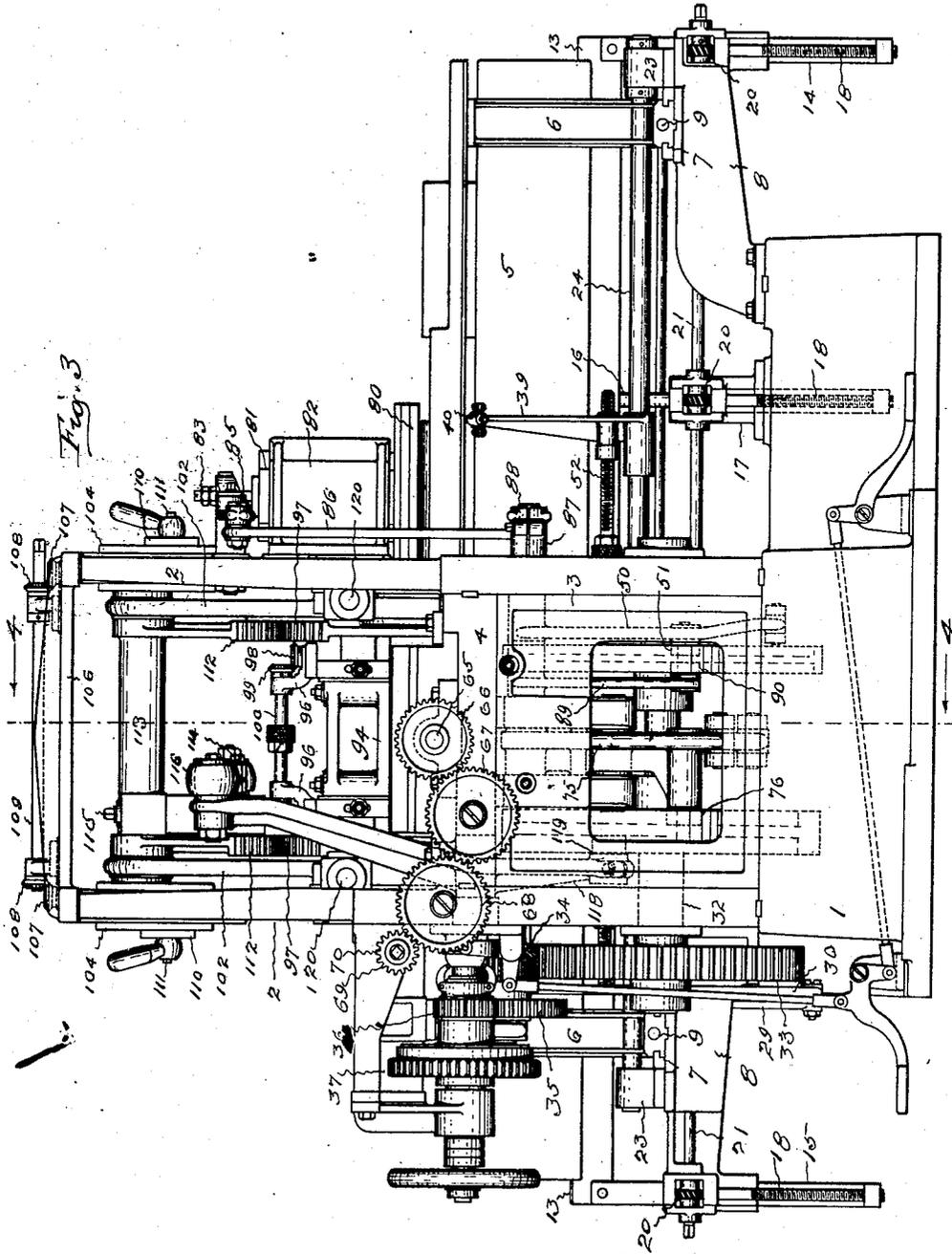


Fig. 3

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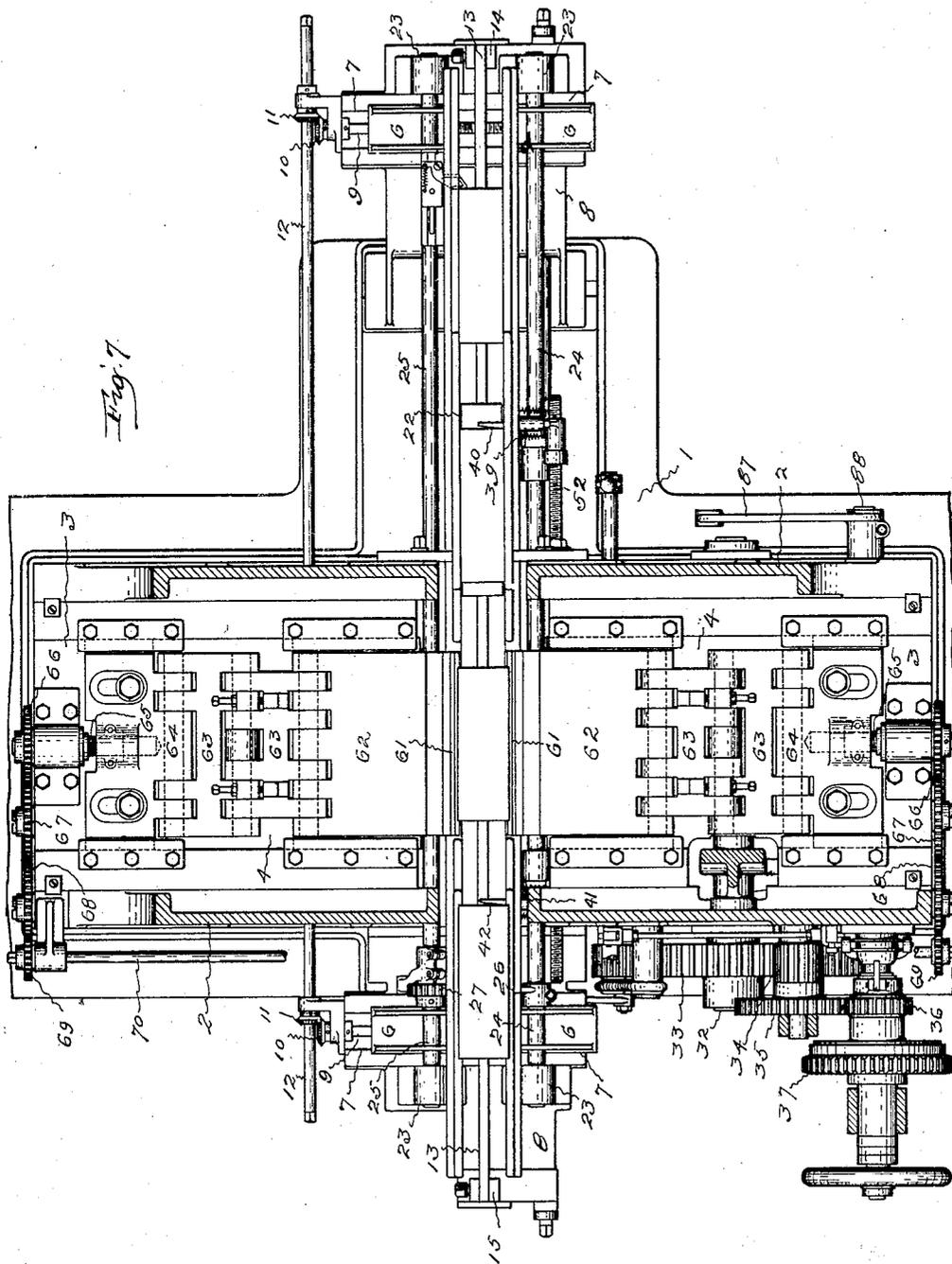
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Filed Oct. 13, 1930

6 Sheets-Sheet 5



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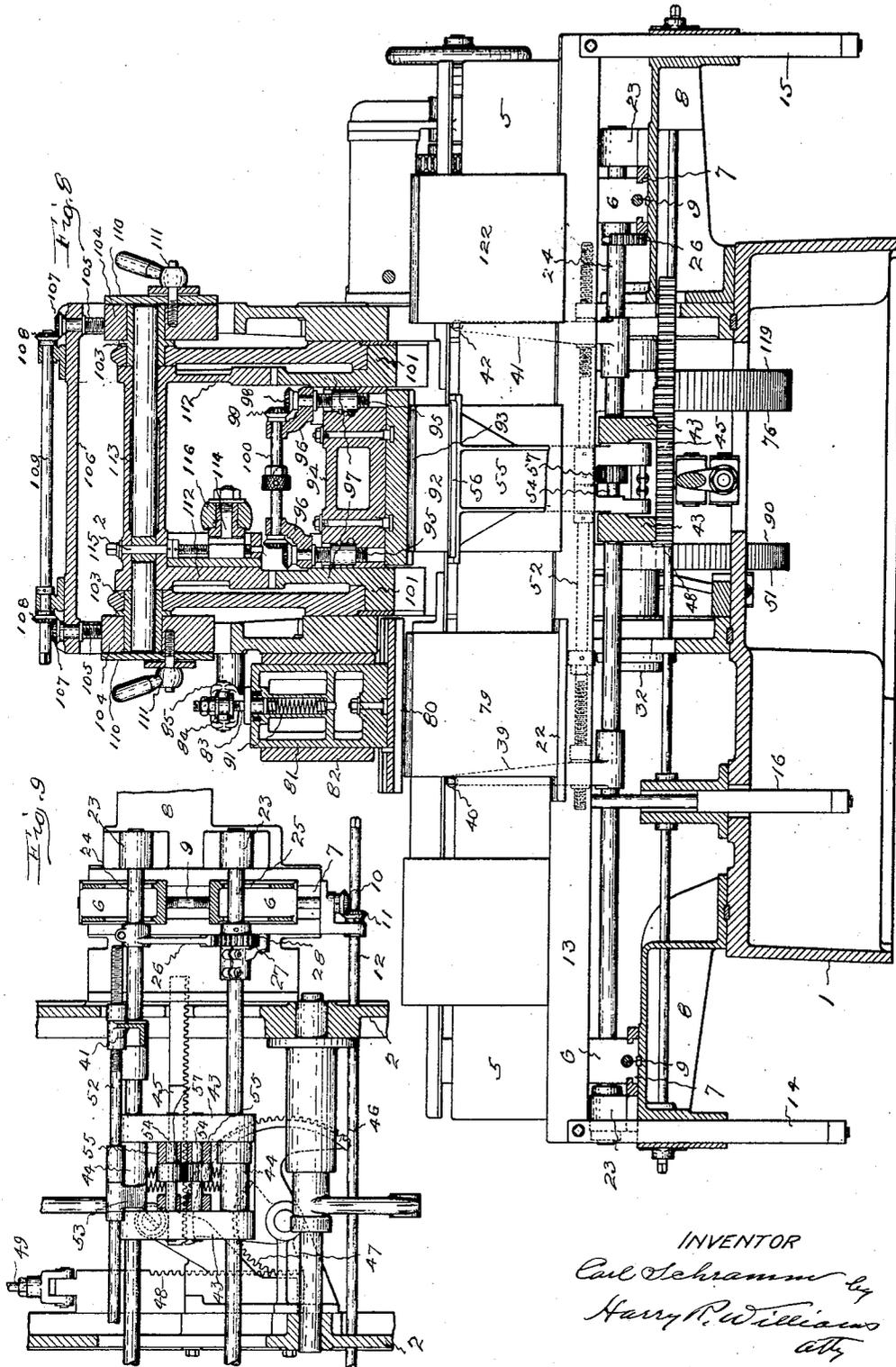
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1,802,355

MACHINE FOR ROUNDING AND JOINTING THE BACKS OF BOOKS

Filed Oct. 13, 1930

6 Sheets-Sheet 6



# UNITED STATES PATENT OFFICE

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## MACHINE FOR ROUNDING AND JOINTING THE BACKS OF BOOKS

Application filed October 13, 1930. Serial No. 483,422.

Unbound books which have been stitched and trimmed have flat backs and flat front edges. Before being covered the backs of books are rounded and jointed and reinforced and backlinings applied. This invention relates to a machine for rounding and jointing the backs of books.

The object of the present invention is to provide a machine which will receive stitched and trimmed books of various sizes and automatically feed them to tamping means which rounds the backs and concaves the front edges, then carry them to a clamping press which tightly holds them while the backs are rubbed smooth and the joints along the edges of the back are formed, and finally discharge the rounded and jointed books.

In the machine illustrated as embodying the invention the books are placed with their backs up, in a runway consisting of a track and two vertical side plates that extend from end to end of the machine. The side plates are adjustable toward and from each other in order to accommodate books of different thicknesses, and the upper surface of the supporting track at the loading end is flat and for the remainder of its length is convex. The track is adjustable vertically to accommodate books of different width. A finger pushes a book placed in the runway along the flat section onto the curved section of the track and then swings out, returns and swings in for feeding a following book. When the book reaches the curved section of the supporting track a tamping iron with a concave under surface is rapidly vibrated against its back. This rounds the back and concaves the front edge. A conveyer clamp then grips the sides and carries the book to a pressing clamp that is closed against the sides and very tightly compresses the book. The conveyer clamp then opens and returns for a following book. After the press clamp is closed the back of the book is rubbed by an iron that has a concave under surface, and is moved back and forth on an arc transversely of the length of the book back. This smooths the rounded back and forms the joints at the

edges. This being accomplished the press clamp is opened and the book is pushed by a finger along the runway to the delivery end of the machine, and the finger is returned for the following book.

In the accompanying drawings Fig. 1 is an elevation looking toward the loading end of the machine. Fig. 2 is an elevation looking toward the discharge end. Fig. 3 is a front elevation. Fig. 4 is a vertical section approximately on the dotted line 4—4 on Fig. 3. Fig. 5 is a detail view of the conveyer clamp. Fig. 6 is a detail view of a feed finger. Fig. 7 is a horizontal section on dotted line 7—7 on Fig. 1. Fig. 8 is a vertical section on approximately the dotted line 8—8 on Fig. 1. Fig. 9 is a horizontal section on the dotted line 9—9 on Fig. 1.

The machine illustrated has a bed 1 on which is mounted a frame having upright side walls 2 and end walls 3 of less height than the side walls. Supported between the side walls and resting on the ends walls are two tables 4, with an opening between their inner edges. The runway walls 5 between which the books pass, are fastened to pairs of vertical arms 6, the lower ends of which are movably mounted in ways 7 on brackets 8 that extend from the bed outside of the frame side walls, Figs. 3, 7. The lower ends of the arms 6 are connected by spindles 9 having right and left threads so that the arms of each pair may be moved toward and from each other. The spindles are provided with gears 10 engaged by gears 11 on a rod 12 that when turned will adjust the runway walls the same distance apart at both ends, Fig. 7, to accommodate books of different thicknesses.

The track 13 at the bottom of the runway and on which the books move, is fastened at the loading end to the top of a post 14, Fig. 1, at the discharge end to the top of a post 15, Fig. 2, and at the tamping position to the top of a post 16, Fig. 3. The posts 14 and 15 are vertically movable at the ends of the brackets 8, and the post 16 is vertically movable in a bracket 17 on the bed. Screws 18 connected with these posts have gears 19

which are engaged by gears 20 on a rod 21, so that by turning this rod the track may be adjusted up or down to accommodate books of different widths, Fig. 3. The top of the track at the loading end is flat while the rest of the track has a convex upper surface. At the tamping station the track is provided with an anvil piece 22, Figs. 2, 8, that has a curved upper surface and is removable in order that anvils of varying widths, depending on the thickness of the books, may be substituted.

Supported by bearings 23 on the brackets 8 and extending parallel with each other and with the runway, are shafts 24 and 25. Fastened to the shaft 24 is a toothed segment 26 which engages a gear 27 on the shaft 25. Fastened to the shaft 25 is an arm 28 that is connected by a link 29 with a lever 30 which is actuated by a cam 31 on the cam shaft 32. The cam shaft is supported by bearings in the side walls of the frame and extends parallel with shafts 24 and 25.

Fastened to the cam shaft is a gear 33 which is engaged by a pinion 34 connected to a gear 35 which meshes with the pinion 36 that is connected with a great 37 driven by a belt 38 from a suitable motor, Fig. 2. This mechanism causes the shafts 24 and 25 to, at the proper times, oscillate coincidentally.

Turning with, but movable along the shaft 24 near the loading end is an arm 39, at the upper end of which is a feed finger 40, and turning with, but movable along the shaft 24 near the delivery end is an arm 41 with a feed finger 42, Fig. 8. Movable along the shafts 24 and 25 is a box comprising two side plates 43 with connecting sleeves 44, Fig. 9. Attached to the under side of this box is a rack 45 that is engaged by a segment 46 which is attached to a segment 47 that is engaged by a rack 48, Figs. 8, 9. The rack 48 is connected by a link 49 with a lever 50 that is actuated by a cam 51 on the cam shaft, Fig. 1. The feed finger arms 39 and 41 are adjustably connected to each other by a rod 52, Fig. 8, and this rod is connected with the box by an arm 53 so that the reciprocation of the box will carry the feed fingers back and forth longitudinally of the runway.

Between the side plates 43 of this frame and turning on axles 54 supported thereby, are arms 55 which at their upper ends have the conveyer clamp jaws 56.

These arms are provided with inter-meshing segments 57 so that they will oscillate together. Springs 58 tend to close the conveyer clamp jaws. One of the conveyer clamp arms is connected by a link 59 with a rocker 60 fastened to the shaft 25, Fig. 5. The feed fingers and the conveyer clamp jaws by the mechanism described are simultaneously oscillated for swinging the fingers into and out of the runway and for closing

and opening the conveyer jaws, and they are simultaneously reciprocated longitudinally of the runway for feeding a book from loading position to tamping position, conveying a book from tamping position to jointing position, and from jointing position to the delivery end of the machine.

The press clamp jaws 61, over the top edges of which the backs of the books are ironed to form the joints, are fastened to the inner edges of plates 62 that are movable horizontally toward and from each other in ways on the tops of the tables 4, Figs. 4 and 7. The outer edges of these slide plates are connected by toggle links 63 with backing blocks 64. The backing blocks are adjustable horizontally on the tables by means of screws 65 in order to accommodate the press plates to different thicknesses of books. These adjusting screws are provided with gears 66 engaged by gears 67 meshing with gears 68 which are engaged by pinions 69 on a rod 70 that extends across the machine, Figs. 3, 4, 7. By turning this rod the backing blocks, toggle links, slides and press clamp jaws may be moved in or out. The joints of the toggle links are connected by links 71 with angle levers 72 that are connected by a link 70, Fig. 4. The link 720 has a lug 73 which is connected with a link 74 jointed to the lower end of a lever 75 that is oscillated at the proper times by a cam 76 on the cam shaft, Figs. 3, 4. A spring 77 is arranged on the link 74 between the lug 73 and nuts 78 in such manner as to cushion the closing movement of the toggles, Fig. 4. When a book is brought by the conveyer clamp jaws into jointing position the press clamp jaws are, by this mechanism, tightly closed against the book with their upper edges just below the back of the book.

A book placed by the operative on the track and between the runway walls at the load end of the machine is engaged by the finger 40 and pushed along the track onto the tamping anvil 22, (the position of the book 79 in Fig. 8), where it is subjected to the action of the tamping iron 80. The tamping iron has a concave under surface and is detachably fastened to the lower end of a plunger 81 that is vertically movable in a bracket 82 fastened to a side wall of the frame, Figs. 1, 8. Extending upward from the plunger is a threaded stem 83 on which is a grooved collar 84 that is engaged by a lever 85 which is rocked by a link 86 connected with a rocker arm 87 that is fastened to a shaft 88, Fig. 1. Fastened to the shaft 88 is a lever 89 that is, at the proper times, oscillated by a cam 90 on the cam shaft, Fig. 3. This cam is formed to cause the tamping iron to reciprocate several times during one cycle of the machine and pound the backs of the signatures down

upon the anvil. As the upper surface of the anvil is convex and the under surface of the tamping iron is concave, the back of the book is rounded by the pounding action of the tamping iron. There is a spring 91 arranged between the plunger and its stem 83, Fig. 8, for cushioning the blows of the tamping iron upon the back of the book.

After the back of the book has been rounded by the tamping iron the conveyer clamp jaws 56 close upon the sides and the book is carried to jointing position, the position of book 92 in Fig. 8. At the same time the finger 40 pushes another book into tamping position. When a book reaches jointing position the press clamp jaws are closed firmly against its sides by the powerful toggle mechanism described, and then the back of the book is subjected to the ironing action of the rounding and jointing iron 93, Figs. 4, 8. The jointing iron 93 has a concave under surface and is detachably fastened to a vertically adjustable block 94 that by screws 95 is connected with arms 96 which are attached to or form a part of toothed segments 97. The screws 95 have gears 98 engaged by gears 99 on a rod 100 that may be turned for raising and lowering the jointing iron with relation to the segments 97, Fig. 8. The toothed segments 97 turn on journals 101 which are carried in bearings in the lower ends of arms 102. The axis of the journals 101 are slightly above the curved under surface of the jointing iron. The arms 102 are pivotally supported by bushings 103 mounted in blocks 104 that are vertically adjustable in the side frames of the machine. Screws 105 pass through a cap 106 on the top of the frame and enter the blocks for adjusting them vertically. These screws have gears 107 engaged by gears 108 on a rod 109 which may be turned so as to raise or lower the blocks together, Figs. 4, 8. Plates 110 and clamp screws 111 are provided for locking the blocks after they have been adjusted.

The toothed segments 97 are engaged by toothed segments 112 that are fastened to a shaft 113 which extends through the bushings 103. A crank pin 114 is adjustably connected to one of the segments 112 by a screw 115, Fig. 8. This crank pin is connected by an adjustable link 116 with the upper end of a lever 117, the lower end 118 of which is engaged with a cam 119, Figs. 3, 4. The edges of the arms 102 are engaged by rods 120 which are pressed against the arms by cushioning springs 121, Fig. 4. The action of the cam 119 through these connections swings the arms so they carry the jointing iron from side to side over the back of the book, and at the same time the segments cause the jointing iron to turn and crush the edges of the book over the upper edges of the jaws of the press clamps

and thus form the joints along the back of the book.

After the joints have been formed the press clamps are opened by the toggle mechanism and the finger 42 pushes the rounded and jointed book to discharge position, the position of book 122, Fig. 8. At the same time a following book is carried by the conveyer clamp jaws from tamping position to jointing position, and another book is pushed by the finger 40 into tamping position. The feed fingers and the conveyer clamp jaws are swung out and in and reciprocated together so that the books are simultaneously transferred from one station to the other, and while one book is being tamped and roughly rounded another book is being ironed and jointed.

The conveyer clamp jaws grip the book after it has been tamped and hold it from getting out of shape while they convey it from tamping position to jointing position and until the toggles have closed the press clamp and the jointing jaws are tightly pressed against the sides of the book. The toggles moving equally on both sides hold the books central so that the joints on each side are formed uniform.

The invention claimed is:

1. A machine for rounding and jointing the backs of books which comprises a tamping iron for rounding the book backs, mechanism for reciprocating the tamping iron against the backs of the books, a jointing iron, mechanism for oscillating the jointing iron against the backs of the books, a press clamp with jaws over which the backs of the books are rounded by the jointing iron, mechanism for opening and closing the press clamp, and mechanism for feeding books from loading position to tamping position, from tamping position to jointing position, and from jointing position to discharge position.

2. A machine for rounding and jointing the backs of books which comprises a tamping iron for rounding the book backs, mechanism for reciprocating the tamping iron against the backs of the books, a jointing iron, mechanism for oscillating the jointing iron against the backs of the books, a press clamp with jaws over which the backs of the books are rounded by the jointing iron, mechanism for opening and closing the press clamp, and mechanism for simultaneously feeding a book beneath the tamping iron and feeding a book between the press clamp jaws.

3. A machine for rounding and jointing the backs of books which comprises a tamping iron for rounding the book backs, mechanism for reciprocating the tamping iron against the backs of the books, a jointing iron, mechanism for oscillating the jointing iron against the backs of the books,

a press clamp with jaws over which the backs of the books are rounded by the jointing iron, mechanism for opening and closing the press clamp, and mechanism for simultaneously feeding a book from beneath the tamping iron and feeding a book from between the press clamp jaws.

4. A machine for rounding and jointing the backs of books which comprises a tamping iron for rounding the book backs, mechanism for reciprocating the tamping iron against the backs of the books, a jointing iron, mechanism for oscillating the jointing iron against the backs of the books, a press clamp with jaws over which the backs of the books are rounded by the jointing iron, mechanism for opening and closing the press clamp, a finger for feeding a book from loading position to tamping position, a conveyer clamp for carrying a book from tamping position to jointing position, a finger for removing a book from jointing position to discharge position, and mechanism for oscillating and reciprocating said fingers and conveyer clamp.

5. A machine for rounding and jointing the backs of books which comprises a runway having horizontally adjustable side walls and a vertically adjustable track rail, a tamping iron for rounding the book backs, mechanism for reciprocating the tamping iron toward and from said runway, a jointing iron, mechanism for oscillating the jointing iron transversely of said runway, a press clamp having jaws over which the backs of the books are rounded by the jointing iron, mechanism for reciprocating the press clamp jaws toward and from said runway, and mechanism for simultaneously feeding books along the runway from loading position to tamping position, from tamping position to jointing position, and from jointing position to discharge position.

6. A machine for rounding and jointing the backs of books which comprises a tamping iron for rounding the book backs, mechanism for reciprocating the tamping iron against the backs of the books, a jointing iron, mechanism for oscillating the jointing iron against the backs of the books, horizontally movable slides carrying jaws over which the backs of the books are rounded by the jointing iron, toggle mechanism for opening and closing said slides, and mechanism for feeding a book beneath the tamping iron and feeding a book between the press clamp jaws.

7. A machine for rounding and jointing the backs of books which comprises a tamping iron for rounding the book backs, mechanism for reciprocating the tamping iron against the backs of the books, a jointing iron, mechanism for oscillating the jointing iron against the backs of the books, mechanism for adjusting the pressure of the

jointing iron against the backs of the books, a press clamp with jaws over which the backs of the books are rounded by the jointing iron, mechanism for opening and closing the press clamp, and mechanism for feeding a book beneath the tamping iron, and feeding a book between the press clamp jaws.

8. A machine for rounding and jointing the backs of books which comprises a tamping iron for rounding the book backs, mechanism for reciprocating the tamping iron against the backs of the books, a jointing iron, mechanism comprising swinging arms, inter-meshing toothed oscillatory segments, one segment being pivoted at the free ends of said arms and carrying the jointing iron and the other segment pivoted at the axis of said arms, and means for oscillating the latter segment, a press clamp with jaws over which the backs of the books are rounded by the jointing iron, mechanism for opening and closing the press clamp, and mechanism for feeding a book from beneath the tamping iron to and from the press clamp jaws.

9. A machine for rounding and jointing the backs of books which comprises a tamping iron for rounding the book backs, mechanism for reciprocating the tamping iron against the backs of the books, a jointing iron, mechanism for oscillating the jointing iron against the backs of the books, a press clamp with jaws over which the backs of the books are rounded by the jointing iron, mechanism for opening and closing the press clamp, oscillatory shafts, means for oscillating said shafts, feed fingers and a conveyer clamp oscillated by but free to move longitudinally of said shafts, and mechanism for moving said fingers and clamp along the shafts, for feeding books from loading to delivery positions.

10. A machine for jointing the backs of books which comprises a jointing iron, mechanism comprising swinging arms, inter-meshing toothed oscillatory segments, one segment being pivoted at the free ends of said arms and carrying the jointing iron and the other segment pivoted at the axis of said arms and means for oscillating the latter segment, a press clamp with jaws over which the backs of the books are rounded by the jointing iron, mechanism for opening and closing the press clamp, and mechanism for feeding a book to and from the press clamp jaws.

11. A machine for rounding and jointing the backs of books which comprises a runway along which the books are fed, a finger for feeding books along the runway from loading end to tamping position, a tamping iron, mechanism for reciprocating said tamping iron against the backs of the books, a conveyer clamp for gripping and holding

the books from distortion after they have been tamped and carrying them to jointing position, a press clamp for gripping the books in jointing position, mechanism for opening and closing the press clamp, a jointing iron, mechanism for oscillating said jointing iron against the backs of the books held by said press clamp, and a finger for removing the books from jointing position to the discharge end of the runway.

12. A machine for rounding and jointing the backs of books which comprises a runway along which the books are fed, a finger for feeding books along the runway from loading end to tamping position, a tamping iron, mechanism for reciprocating said tamping iron against the backs of the books, a conveyer clamp for gripping and holding the books from distortion after they have been tamped and carrying them to jointing position, a press clamp for gripping the books in jointing position, toggles for opening and closing the press clamp, a jointing iron, mechanism for oscillating said jointing iron against the backs of the books held by said press clamp, and a finger for removing the books from jointing position to the discharge end of the runway.

13. A machine for rounding and jointing the backs of books which comprises a runway, means for feeding books intermittently along the runway, jaws movable horizontally toward and from each side of the runway for clamping the books, toggle mechanism for moving said jaws against the sides of the books, a jointing iron, and mechanism for oscillating said iron against the backs of the books and rounding them over the clamping jaws for forming the joints.

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