F. A. RISBERG.

BOOKBINDING MACHINE.

APPLICATION FILED JUNE 19, 1914.

1,152,907.

Patented Sept. 7, 1915.

8 SHEETS—SHEET 1.

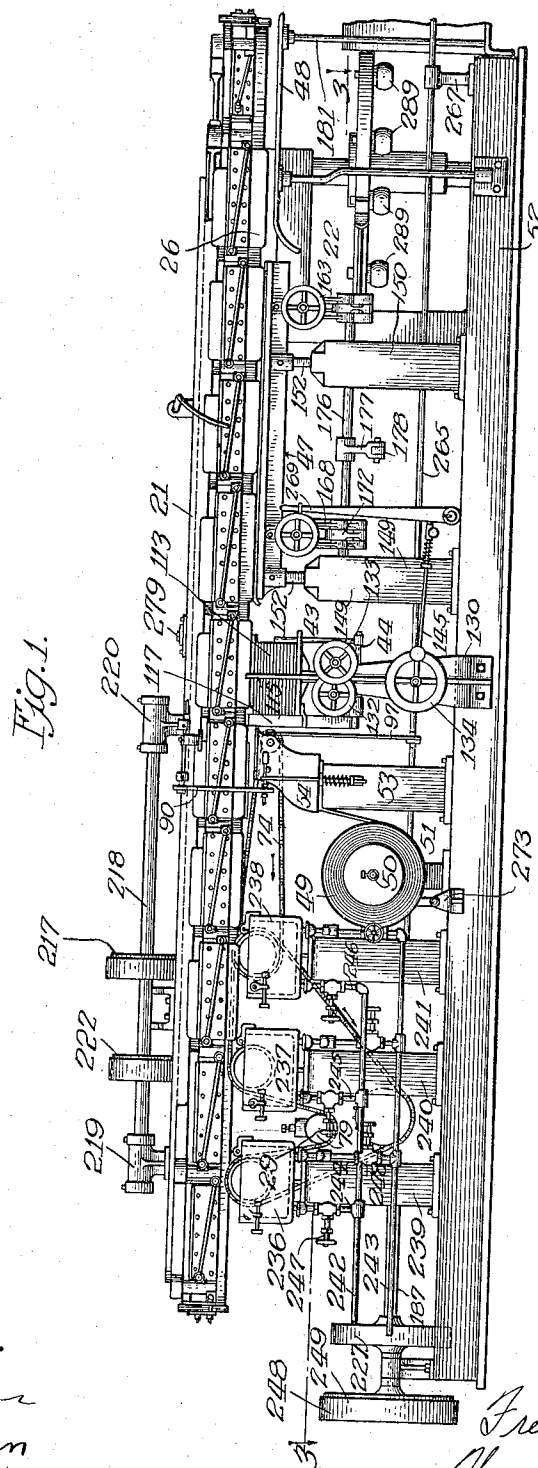


Fig. 1.

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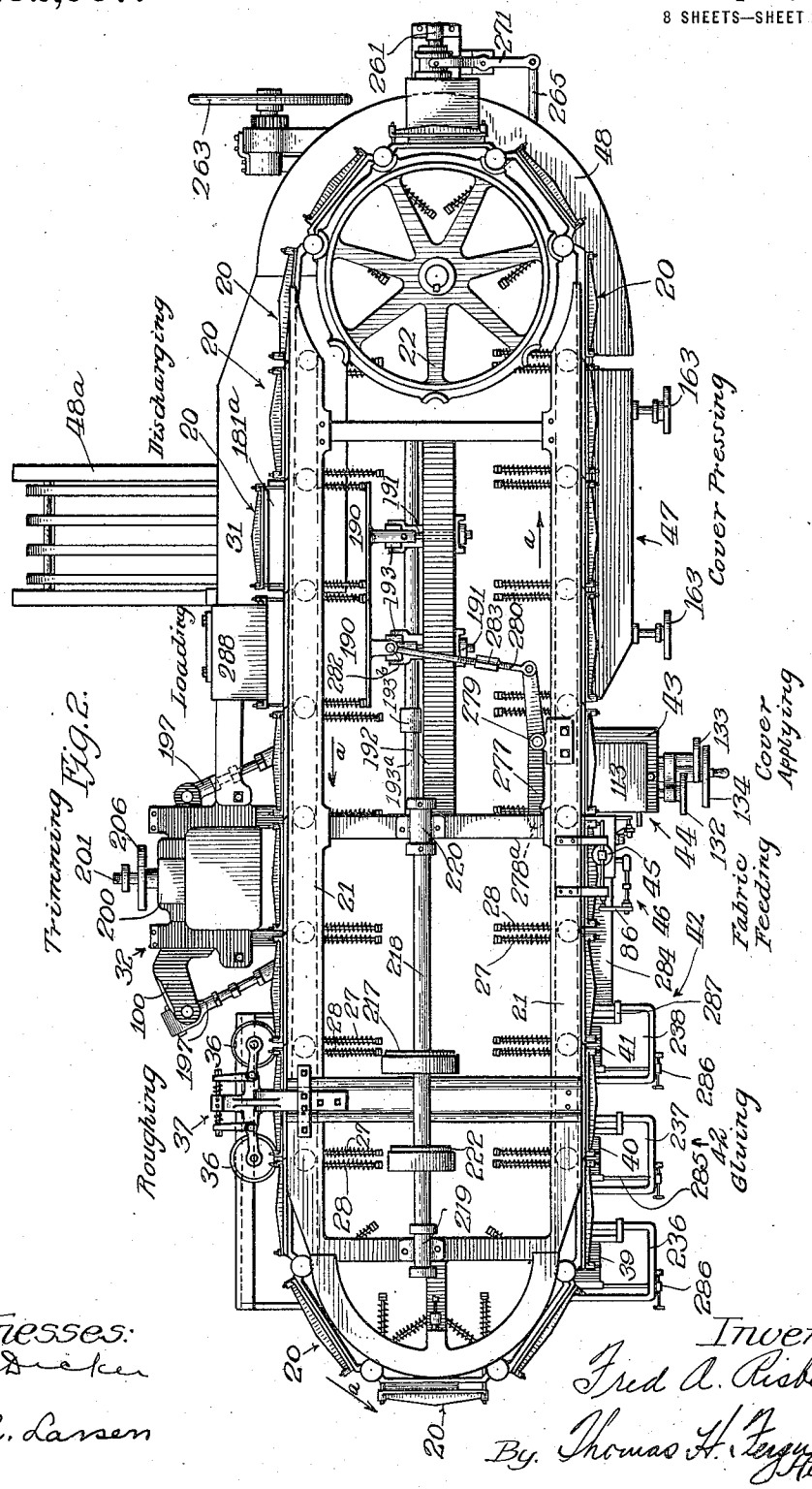


Fig. 2.

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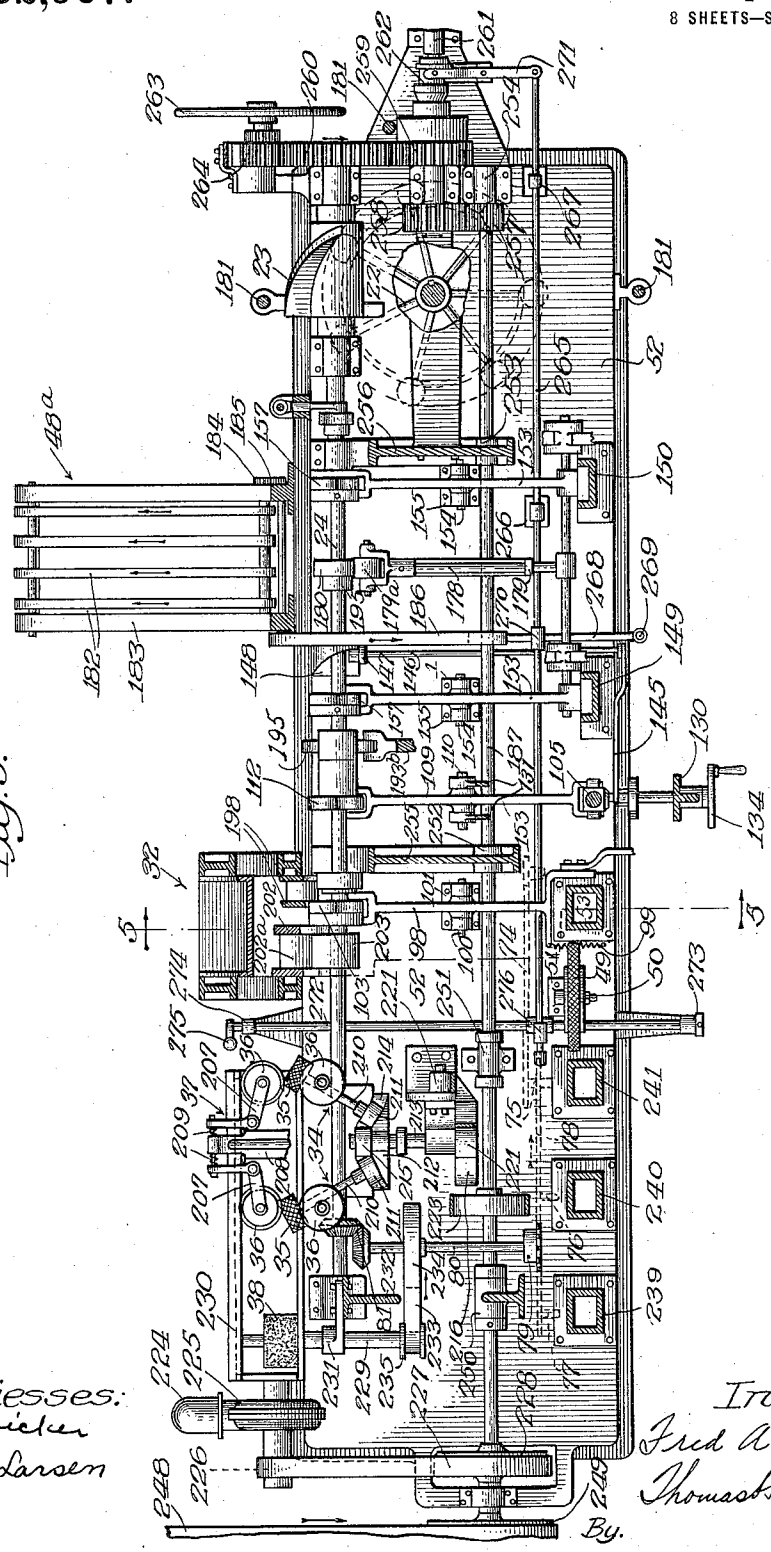


Fig. 3.

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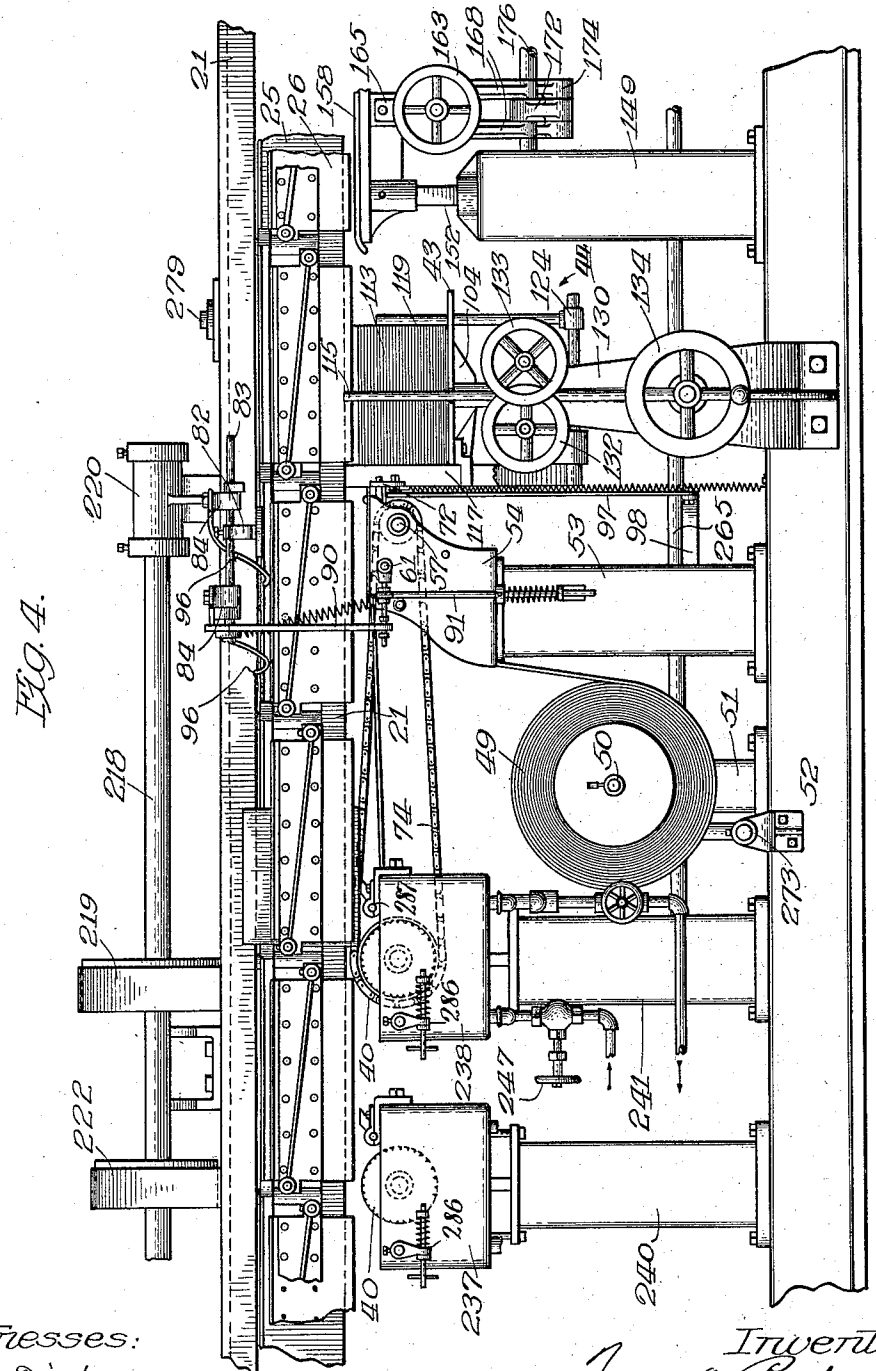


Fig. 4.

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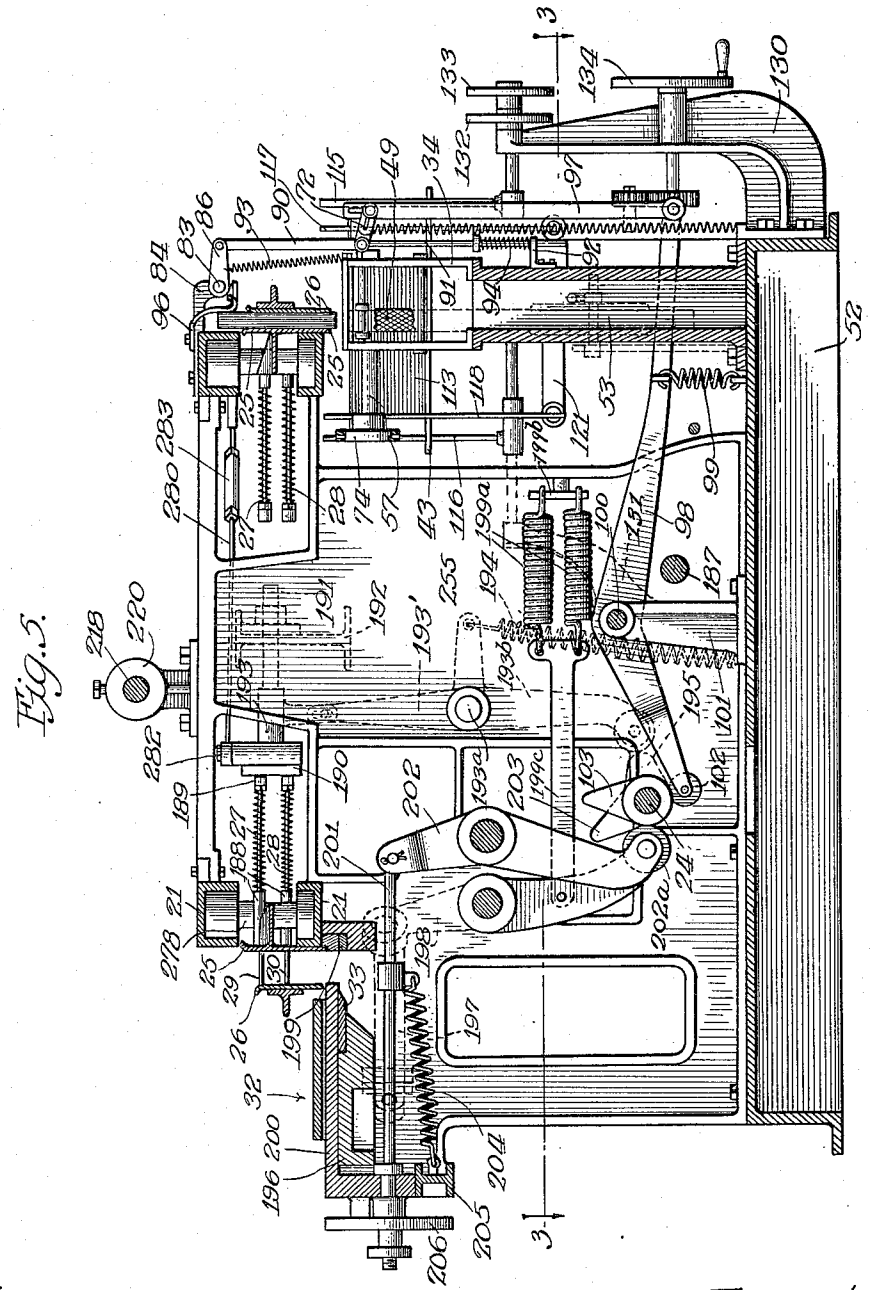
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8 SHEETS—SHEET 5.

Fig. 5.



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8 SHEETS—SHEET 6.

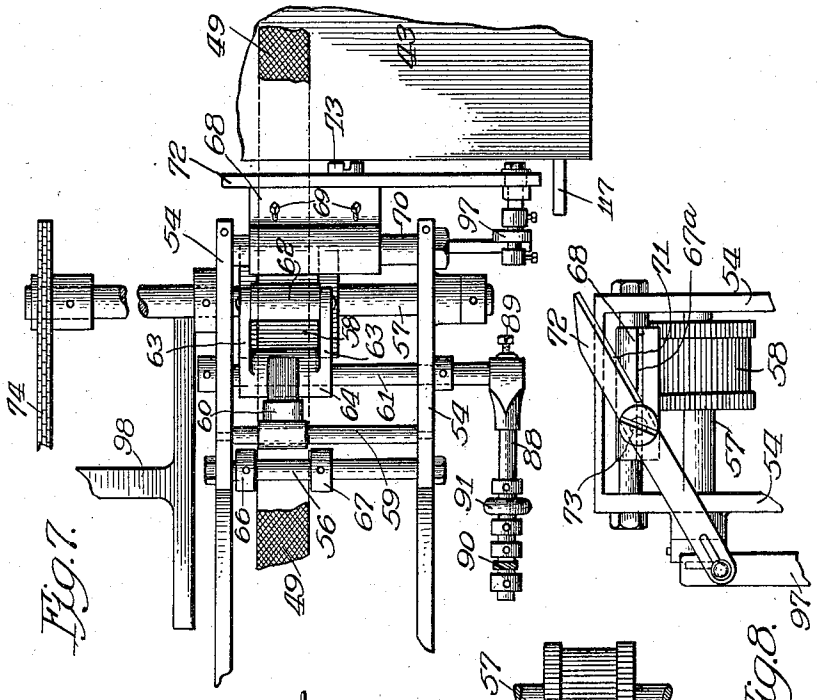


Fig. 7.

Fig. 8.

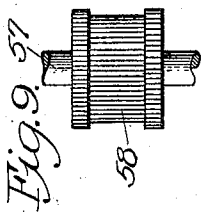


Fig. 9.

Fig. 6.

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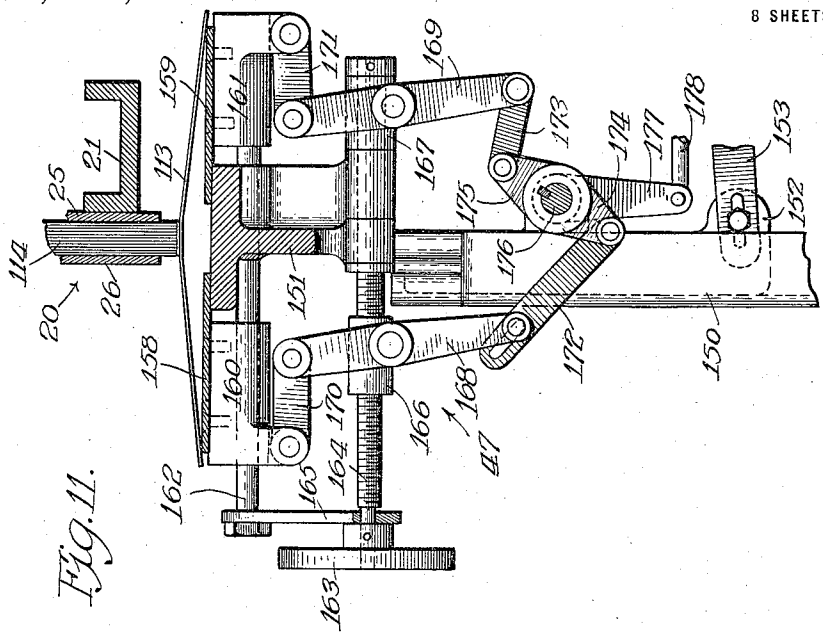


FIG. 11.

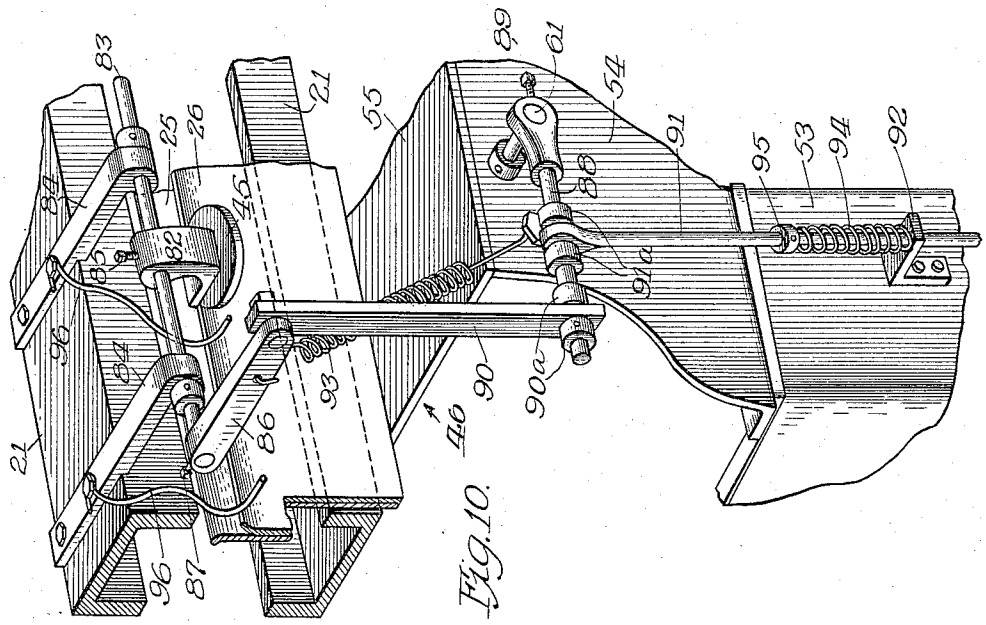


FIG. 10.

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8 SHEETS—SHEET 8.

Fig. 12.

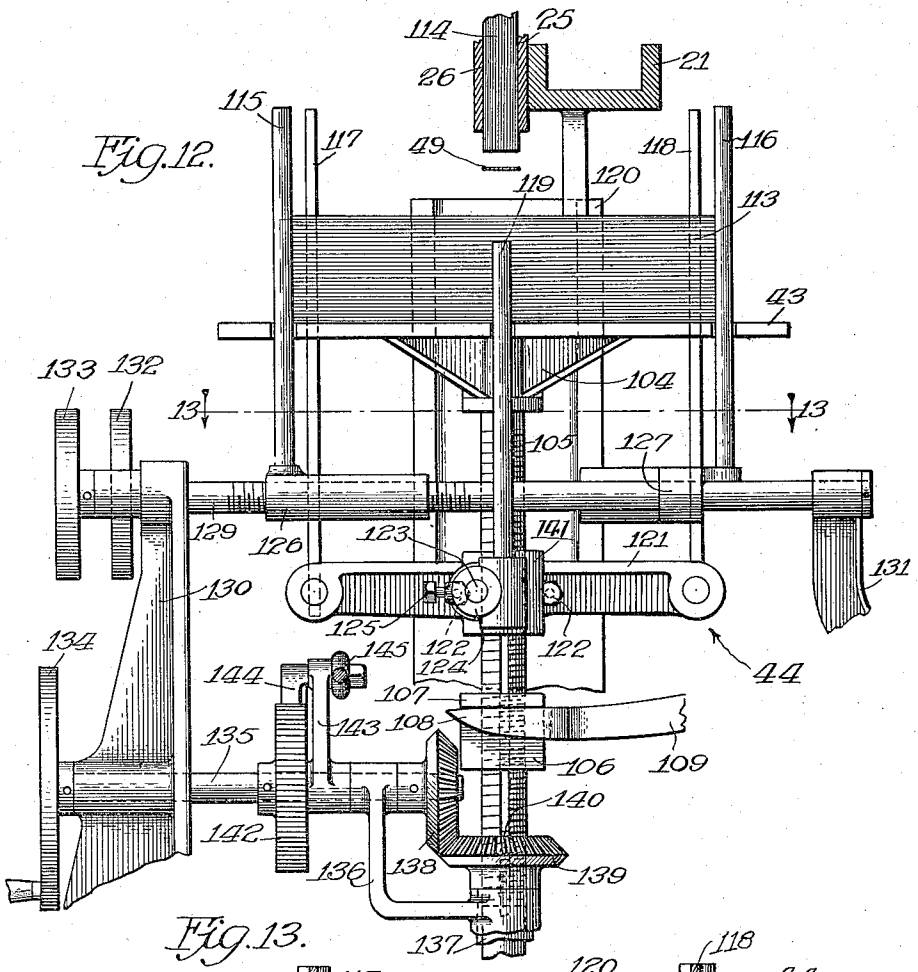
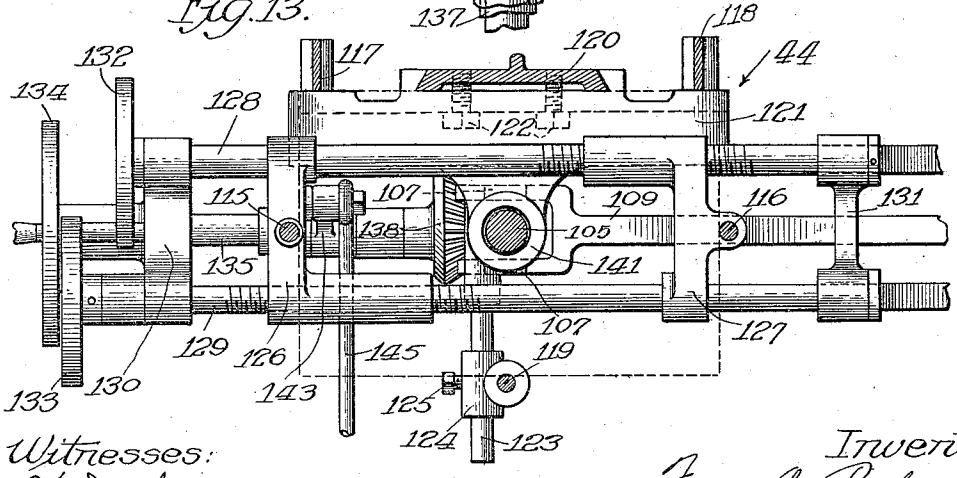


Fig. 13.



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BOOKBINDING-MACHINE.

1,152,907. Specification of Letters Patent. Patented Sept. 7, 1915.

Application filed June 19, 1914. Serial No. 846,106.

To all whom it may concern:

Be it known that I, FRED A. RISBERG, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Bookbinding-Machines, of which the following is a specification.

The present invention relates generally to book binding machines, and more particularly to machines of this class in which a strip of fabric is applied to the back of the book or other work between the book proper and the cover, to strengthen the binding of the parts.

The principal object of the invention is to provide a machine of the class indicated in which the fabric applying mechanism will operate with accuracy and reliability so as to increase the efficiency of the machine.

Other objects are to provide fabric applying mechanism by which the strip of fabric may be taken as needed from a spool, by which it may be cut off in lengths corresponding to the pieces of work to which it is to be applied, by which the absence of a piece of work from a work carriage or holder will prevent the positioning of a length of the fabric, and by which each piece of work will occasion the advance of a length of fabric suited to that particular piece of work and apply the same to it.

Other objects are to provide mechanism of this type which shall be readily accessible for repair or other treatment, and particularly adaptable to binding machines of the art.

In carrying out my invention in accordance with these objects, I have produced various features and advantages and details of construction, all of which will be more readily understood upon reference to the following detailed description taken in connection with the accompanying drawing, while the scope of the invention will be particularly pointed out in the appended claims.

In the drawing, Figure 1 is a side elevation of a book binding machine to which my invention is applied; Fig. 2 is a plan view of the same; Fig. 3 is a horizontal section of the same, the plane of section being indicated by the line 3—3 of Fig. 1; Fig. 4 is a side elevation of a portion of the machine illustrating more particularly the fabric applying mechanism; Fig. 5 is a transverse section of the machine taken adjacent to the fabric applying mechanism upon a plane indicated by the line 5—5 of Fig. 3; Fig. 6 is a vertical section of a portion of the fabric applying mechanism; Fig. 7 is a plan view of a portion of the same; Fig. 8 is an elevation of the knife and associated parts by which the strip of fabric is cut off in suitable lengths; Fig. 9 is a view of the driving roller which coöperates with a drop roll to advance the strip of fabric; Fig. 10 is a perspective view of the work-engaging member and connections by which the work actuates the drop roll to advance the requisite length of fabric; Fig. 11 is a partial sectional view illustrating the mechanism by which the cover is pressed into place upon the book and turned about the edges of the book or other work; Fig. 12 is an elevation of the cover holder and the mechanisms by which it is intermittently actuated and by which it may be adjusted; and Fig. 13 is a plan view of a portion of the same, parts being shown in section taken on a plane indicated by the line 13—13 of Fig. 12.

Throughout these views like characters refer to like parts. And in several of the views parts have been omitted for clearness.

Although my invention has to do more particularly with the fabric-applying mechanism and is applicable to machines of various types, I have chosen to illustrate the same in connection with a machine of the type in which the operations upon the work from the time it is placed in the machine until it is discharged therefrom are all automatic. In this type of machine a series of work holders 20 (see Fig. 2) are linked together in chainlike fashion and travel in guideway 21 positioned upon the upper part of the frame of the machine. These holders are driven by a sprocket wheel 22, which is intermittently actuated by a worm cam 23 upon a cam shaft 24, extending longitudinally of the machine. Each of the work holders comprises two clamping members 25, 26, which are normally forced together by springs 27, 28, acting upon rods 29, 30 and associated parts. As these work holders travel around the machine in the direction of the arrow *a* their clamping members are forced apart when they reach the discharging and loading table 31, otherwise the clamping members either engage each other or engage opposite sides of the work under

the action of their springs. At the loading position the work is manually placed in position between the clamping members, while they are separated. When ready to advance to the next position, they are forced together by their springs and securely clamp the work, which begins its circuit of the machine. As the work advances, it first meets the trimming mechanism 32 by which the knife 33 trims off the back of the work. It then passes to the scoriating or roughing mechanism 34, by which the roughening wheels 35 roughen the back of the work. At the same time the work is engaged on its opposite sides near its back or lower edge by the disks 36 of the clamping mechanism 37. Following this the back of the work is brushed off by a brush 38. The next operation performed upon the work is to apply glue or other adhesive to its roughened back, by the rolls 39, 40 and 41 of the glue applying mechanism 42. Following the application of the glue, the coated back of the work is brought to a position directly opposite the cover holder 43 of the cover holder mechanism 44. As the work makes its step into the position opposite the cover holder 43, it engages a member or part 45 which lies in its path, and thereby actuates the fabric feeding and applying mechanism 46 to project a length of fabric between the coated back of the work and the adjacent cover. As a result, when the work is brought to rest opposite the cover, a strip of fabric of the length of the work lies between the coated back of the work and the cover. The next operation is an actuation of the cover holder mechanism 44 which forces the cover and fabric up against the coated back of the work so as to press the parts together and leave them in final position under the binding action of the adhesive. Following this operation, the work passes on to what may be termed the setting and bending mechanism 47, by which the cover is set and bent around the corners of the work. This mechanism is sometimes called the compresser and breaker. Following this the work passes on over the table 48 which supports the cover, which is not included between the clamping members of the holder, until the work and cover finally reach the table 31, where the clamping members are opened and the completely bound book or other piece of work is dropped upon the conveying mechanism 48ª, which carries it from the machine. As before indicated, this general description will show the character of the particular machine in connection with which I have chosen to disclose my invention.

Referring more particularly to the fabric applying mechanism I preferably employ a roll or spool of fabric strip 49, (see Fig. 4,) mounted upon a spindle 50 extending laterally from a vertical support 51 secured at its base in any suitable way to the base 52 of the machine. Adjacent to the spool 49 is a standard 53, which is also similarly secured to the base 52 of the machine. This standard is in the form of a column which terminates at its upper end in vertical members 54, which form lateral walls (see Figs. 6 and 7) joined together at their top by a member 55. The vertical walls 54 provide bearings for guide roll 56, the spindle 57 of the driving roller 58, the spindle 59 of the brush 60 and the spindle 61 of the drop roll 62. The latter roll is rotatably mounted between arms 63, which are secured to a boss 64, in turn secured to the spindle 61 by a set screw 65. The free end of the fabric strip is arranged to pass over the guide roll 56 between the collars 66 and 67, thence between brush 60 and the boss 64 upon the spindle 61, thence under the drop roll 62 and over the driving roller 58 and through a slot 67ª in the member 68, which is secured by set screws 69 to a spindle 70, likewise fastened at its ends to the vertical walls 54 of the standard 53. The member 68 is provided with a cutting edge 71 of steel or like material at the discharge end of the slot 67ª and in position to coöperate with the shear member 72, which is pivoted at 73 to the member 68 in line with the slot 67ª through which the fabric strip is adapted to pass. As will be pointed out hereinafter, the member 72 is actuated at intervals bearing a timed relation to the movement of the work holders, so as to clip off the outer end of the projected fabric strip when the proper length has been projected and before the cover holder mechanism 44 is operated to press the cover and severed strip against the coated back of the work. The cutting members 71 and 72 are located adjacent to the cover holder 43 so that as the projected strip is cut off it is left directly above the uppermost cover of the stack of covers upon the cover holder and directly beneath the coated back of the work to which it is to be applied.

The spindle 57 is constantly driven during the time that the machine is in operation. For this purpose it is provided at its inner end with a sprocket wheel which is driven through the agency of a sprocket chain 74 from a sprocket wheel on the spindle 75 associated with the adhesive applying roller 41. Similarly, spindles 76 and 77 are associated with the corresponding rollers 40 and 39, respectively. These spindles 75, 76 and 77 are provided with sprocket wheels which are driven by sprocket chain 78 from a driving sprocket wheel 79 located upon the shaft 80 which is driven through the agency of miter gears 81 from the cam shaft 24. Normally the fabric strip 49 rests upon this

rotating roller 58 without being advanced by the roller. However, as soon as the drop roll 62 presses down upon the upper side of the fabric, it is carried forward by the roughened surface of the roller 58 and its forward movement continues until the drop roll 62 is lifted out of engagement with it. The spindle 61 to which the drop roll arms 63 are secured, is a rocking spindle which is adapted to be rocked (see Fig. 10) by the work engaging member 45. This member is in the form of a roll pivoted upon an arm 82 adjustably secured upon a rock shaft 83 journaled in arms 84 extending from the upper member of the guideway 21. A set screw 85 is provided for securing the arm 82 and its roller 45 in different positions upon the rock shaft 83. The member 45 is positioned so as to lie above the edge of the clamping members 26 of the several work holders as they pass it. The edge of the member 45, therefore, lies in the path of the work secured in the holders. It, therefore, follows that as each piece of work passes the member 45, it will be engaged by that member and the latter will be moved out of its normal position and kept out so long as it is engaged by that particular piece of work. In other words, each piece of work will engage the member 45 and move it to its abnormal position and hold it there until the piece of work has passed by. In this way, the member 45 is held in rocked or abnormal position for a period of time corresponding to the length of the piece of work. By means of connections between the rock shaft 83 and the rock spindle 61, the movement of the member 45 by the work forces the drop roll 62 into engagement with the fabric strip and causes the latter to advance and to continue advancing until the member 45 passes out of engagement with the work and returns to its normal position. As soon as this occurs the drop roll disengages the fabric strip and the advance of the latter discontinues.

The connections between the spindle 61 and shaft 83 may vary in arrangement, but in any event should be provided with one or more springs which tend to hold the member 45 in the path of the work and the drop roll 62 out of engagement with the fabric. In the present instance the connections between the spindle 61 and shaft 83 comprise an arm 86 secured to the shaft 83, as by means of a set screw 87, an arm 88 similarly secured to the spindle 61, as by set screw 89, a link 90 pivotally connecting the outer ends of the arms 86 and 88, a guide rod 91 passing through a perforated bracket 92 secured to the standard 53, and coiled springs 93 and 94, the former connecting between one of the walls 54 and the arm 86 so as to normally throw the work engaging member into the path of the work and the latter spring 94 acting between the bracket 92 and a collar 95 secured to the rod 91 so as to yieldingly limit the movement of the drop roll 62 away from the fabric strip 49. Suitable collars 90^a and 91^a upon the arm 88, serve to properly space the connections of the link 90 and rod 91 with the arm 88. It may also be noted in this connection that yielding fingers 96 are associated with the arms 84 and project downward into position to engage the work as it passes along. The free ends of these resilient fingers 96 are employed to press or guide overhanging leaves of the work up against the main body of leaves before the work encounters the actuating member 45.

The cutting member 72 of the mechanism by which the projected strip of fabric is cut off, is provided with a pin and slot connection with a vertical actuating link 97, which is pivotally secured at its lower end to a lever 98 (see Fig. 5) which is normally retracted by a spring 99 acting between the lever 98 and the base 52 of the machine. This spring normally holds the cutting members 71 and 72 in open position. The lever 98 is pivoted at an intermediate point to a pivot 100 mounted upon a suitable standard 101 secured to the base 52 of the machine. The end of the lever 98 which is distant from the link 97 is provided with an anti-friction roller 102, which coöperates with a cam 103 upon the cam shaft 24. The worm cam 23 (see Fig. 3) which actuates the sprocket wheel 22 to advance the work holders, is also mounted upon this shaft 24. In this way a timed relation is established between the step-by-step advance of the work holders and the operation of the cutting members 71 and 72, and the latter are operated only when the work holders are at rest and after the proper amount of fabric strip has been projected.

As we have seen, the strip of fabric is projected over the cover holder mechanism 44 so as to lie above the uppermost cover upon the plate or table 43 of that mechanism. In order to force the cover and the strip of fabric up against the coated back of the work, it is necessary to provide some means for forcing the table or holder 43 upward. For this purpose (see Figs. 12 and 13) the holder 43 is provided with a bearing 104 on its under side, in which the screw 105 is adapted to rotate. A block 106 is threaded on the screw 105 and is provided with shoulders 107 which engage the bifurcated arms 108 of an actuating lever 109 which is pivoted at an intermediate point upon a pivot 110 suitably supported from the base 52 of the machine. The distant end of the lever is provided with an anti-friction roller which bears against the underside of a cam 112 on the cam shaft 24. Because of this construction the holder 43 is given an upward and

downward movement at regular intervals bearing a timed relation to the movements of the work holders and other parts. As the holder 43 moves upward the uppermost of the covers 113 carries the strip of fabric 49 up against the coated back of the work 114 which is held between the members 25 and 26 of the work holder. The result is that the cover and the fabric securely adhere to the back of the work and the carrier 43 moves downward. In case a particular work holder at any time is empty, then a cover is not applied to the work. The covers 113 are positioned upon the holder 43 by means of rods 115, 116, 117, 118, 119 and a guide plate 120. These parts are all fixed relative to the up-and-down movements of the cover holder 43. The plate 120 is part of the frame of the machine. A casting 121 is secured to the face of the plate 120 by means of stud bolts 122. This casting supports the rods 117 and 118 at its opposite ends. It also is provided with a horizontal supporting bar 123 which is provided with a collar 124 for the reception of the foot of the rod 119. A set screw 125 secures the collar in proper position. The remaining guide rods 115, 116 are mounted respectively upon members 126 and 127 which are mounted for adjustment upon the horizontal rods 128 and 129. The latter rods are journaled at one end in the upright 130 which is secured at its foot to the base 52, and at the other end to an upright 131 which forms a part of the frame structure. The members 126 and 127 are sleeved upon the rods 128 and 129. The sleeve of the member 126 which engages rod 129, has threaded engagement with said rod. Likewise, the sleeve of the member 127 which engages the rod 128, has threaded engagement with it. As a result, the rotation of the rod 128 enables the member 127 and its guide rod 116 to be adjusted. Similarly, a rotation of rod 129 enables member 126 and its guide rod 115 to be adjusted. A hand-wheel 132 on rod 128, and a hand-wheel 133 on rod 129, enable this adjustment to be brought about by hand. By shifting the collar 124 on rod 123, the position of the guide rod 119 may also be shifted.

As the covers are removed from the pile 113, it is necessary to raise the holder 43 so that when the lever 109 is actuated the uppermost cover will be forced into engagement with the work with a sufficient pressure to cause the cover and fabric strip to adhere to the work. This adjustment may be brought about manually by means of the hand-wheel 134, which is secured to one end of a shaft 135 which is suitably journaled in the upright 130 and a bracket 136 which is sleeved upon a sleeve 137 located upon the lower end of the screw 105, but not having threaded engagement with it. The inner end of the shaft 135 has a beveled gear 138 secured to it. This gear meshes with a co-operating beveled gear 139 which is splined upon the screw 105 by means of a spline 140. By rotating the hand-wheel 134, the beveled gears 138 and 139 operate to rotate the screw 105 which passes freely through an opening in boss 141 on the casting 121 so that as the screw 105 rotates, the holder 43 is moved upward relative to the fixed casting 121. In order to automatically produce this upward adjustment of holder 43, the shaft 135 (see Fig. 12) is provided with a ratchet wheel 142 which is fixed upon the shaft in juxtaposition to a freely movable rock arm 143 also journaled upon the shaft 135, and provided with an actuating pawl 144 at its outer end. This rock arm 143 is reciprocated by a reciprocating rod 145 which is connected at one end to said arm 143 and at its other end to a rock arm upon a transverse shaft 146 (see Fig. 3) suitably journaled in the frame of the machine. Said shaft 146 is provided with an arm 147 which coöperates with and is driven by a cam 148 on the cam shaft 24. Because of this construction, each rotation of the cam shaft 24 rocks the transverse shaft 146 to and fro and said shaft in turn reciprocates said rod 145 to and fro. Each to-and-fro movement of rod 145 advances the ratchet wheel 142 one step and the shaft 135 is rotated thereby to move the cover holder upward the requisite distance. It will be noted that as the screw 105 is rotated by the gear wheel 139, the block 106 which has threaded engagement with the screw 105 does not change its position relative to the casting 121 and to the lever 109. Consequently, the same throw is given to the cover holder 43 upon each actuation of the lever 109.

After the work passes from its position opposite the cover holder 43, the cover turning mechanism (see Fig. 11) comes into play to compress the cover against the work and turn it about the back edges of the latter. This turning mechanism, designated generally as 47, comprises two upright standards 149 and 150 which are secured to the base 52 of the machine. These standards are in the form of channels and serve as guides for the compressing and turning mechanisms which are moved upwardly against the work 114. A table 151 extends lengthwise of the path of the work holders 20 and is supported at each end upon a vertical member 152 which travels in the channel of the guides 149 and 150. This table is rigidly secured to these upright guiding members 152. The members 152 and the table 150 are forced upward by means of a pair of levers 153 which are suitably pivoted at intermediate points upon pivots 154 journaled in suitable supports 155 secured to the base 52 of the machine. One end of each of the levers 153 has a pin and slot connection

with the lower end of the member 152. The other ends are in each case provided (see Fig. 3) with an anti-friction roller which bears against the underside of a coöperating cam 157 upon the cam shaft 24. From this construction it follows that upon each rotation of the cam shaft the table 151 (see Fig. 11) is forced upward against the cover and the associated work to again press the parts together. In addition to this action the cover 113 is also bent around the back edges of the work 114 by means of laterally moving plates 158 and 159 which are mounted upon laterally movable members 160 and 161 which are sleeved upon transverse rods 162 carried by the table 151. In operation at the time the table 151 is in engagement with the cover and work, the plates 158 and 159 are forced toward each other against the work and thus turn the cover about the edges of the work. This lateral movement of the plates 158 and 159 is brought about by a series of levers and links associated with each pair of members 160 and 161. Because of the length of the plates 158 and 159, the parts 160, 161, 162, and the link and lever actuating mechanism are duplicated, one set being furnished at one end of the plates and another at the other end. This is indicated in Fig. 2 by the presence of the two adjusting wheels 163. Each adjusting wheel 163 is secured to the outer end of a threaded spindle 164, which is journaled in a portion of the frame 151 and in a member 165 depending from the outer end of the rod 162. This threaded spindle 164 does not have threaded engagement with the table 151 but is merely journaled in the same. It does, however, have threaded engagement with sleeve 166 and by rotation of the adjusting wheel 163 the position of the sleeve 166 relative to the sleeve 167 and associated parts may be varied. The sleeve 166 has a lever 168 pivoted to it. Sleeve 167 has a similar lever 169 pivoted to it. The upper end of lever 168 is connected by a link 170 with the member 160. A similar link 171 connects the member 161 with the upper end of lever 169. The lower ends of the levers 168 and 169 are connected by links 172 and 173, respectively, to cranks 174 and 175 on a shaft 176 journaled in the vertically movable guide members 152. The lever 168 and link 172 have a pin and slot connection. A crank 177 is secured to the shaft 176 and is connected at its lower end to a rod 178 which is suitably guided for reciprocating movement by a member 179 (see Fig. 3) secured to the base 52 of the machine. The distant end of the rod 178 is provided with an anti-friction roller 179[a] which coöperates with a cam 180 on cam shaft 24. By this construction the rod 178 is reciprocated at regular intervals and, by reason of the link and lever connections, forces the plates 158 and 159 (see Fig. 11) toward each other and against the cover and work to bend the former about the latter as before explained. The plates 158 and 159 extend throughout the length of three of the work holders 20 and, consequently, the work and its cover are subjected to three of these compressing operations, while the work passes through the machine after the cover has been applied to the work. As the work passes from the turning mechanism 47 (see Figs. 1 and 2) on to the position at which it is discharged from the work holders 20, the cover is not included between the clamping members 25 and 26 but is kept up in proper position by means of the circular table 48 which is located just below the path of travel of the work holders as before explained. This table is carried by standards 181 secured at their lower ends to the base 52 of the machine. When the work finally reaches the discharge position, the clamping members 25 and 26 of the work holder are forced apart and the bound book or other piece of work (see Fig. 2) is allowed to drop through an opening 181[a] in the table 31 upon conveyer 48[a]. The latter comprises a plurality of belts 182 passing over rollers at opposite ends of a suitable frame 183 extending laterally from the main frame of the machine. These belts are driven through the agency of gear wheels 184, 185, and a belt 186. The latter is driven from the main shaft 187 which extends lengthwise of the machine and is suitably journaled at different points. Immediately following the discharge of one piece of work, another piece is placed in position upon the table 31 between the clamping members 25 and 26 of a work holder, preparatory to starting on its circuit of the machine. The mechanism is so arranged that two of the work holders are simultaneously opened and closed, one being at the discharge position and the other at the loading position. As we have seen before, each holder includes clamping members 25, 26, springs 27, 28, and rods 29, 30. The rods are secured (see Fig. 5) to the outer member 26 and extend through sleeves 188 projecting from the rear of the member 25. The springs 27, 28, act between these sleeves 188 and nuts 189 upon the inner ends of the rods. Normally the springs tend to force the members 25, 26, toward each other and thus securely hold the work in place when once positioned. When the work holders are to be opened at the discharge and loading positions, the rear ends of the rods are engaged by a plate 190, which has a bearing upon two fixed rods or studs 191 mounted upon an I-beam 192, forming part of the frame of the machine. The plate 190 is provided with sleeves 193 which have sliding engagement with the rods 191. The upper ends of these sleeves are connected to vertically disposed

arms 193′ which extend upward from a longitudinal shaft 193ª which is suitably journaled in the transverse walls 255 and 256. An arm 193ᵇ extends downward from shaft 193ª and coöperates at its lower end with a cam 195 on cam shaft 24. The arms 193 and 193ᵇ are yieldingly held by one or more springs 194 so as to keep the cam roller in engagement with the cam 195. At the proper time in the operation of the mechanism these arms are operated and the tension of the spring 194 is overcome, with the result that the plate 190 is forced against the ends of the rods 29 and 30 of the two work holders at the discharging and loading positions to maintain the same in open position. After an interval, sufficient to allow the discharge of the work from one of these holders and the loading of a new piece of work into the other, the plate 190 is withdrawn from engagement with the rods 29, 30, and the work holder returns to clamping position.

As the work starts upon its circuit of the machine, it first engages the cutting or trimming mechanism 32. In brief this includes a cutting knife 33 (see Figs. 2 and 5) carried by a reciprocating member 196 which is actuated through the agency of links 197, levers 198 and cams on the cam shaft 24. The knife coöperates with a strip 199 of wood or other suitable material fixed to the adjacent portion of the frame of the machine. The parts are kept in cam engaging position by springs 199ª connected at 199ᵇ to an adjacent portion of the frame of the machine and at their opposite ends to one end of link 199ᶜ which is connected at its other end to the lower arm of the lever 198. As the knife 33 is reciprocated, a clamping member 200 is advanced so as to bring its inner edge against the adjacent portion of the work, so as to hold it firmly while the knife is cutting. This member 200 is connected by a rod 201 with the upper end of a lever 202 whose cam wheel 202ª is actuated by a cam 203 on the cam shaft 24. A spring 204 acting between a fixed sleeve on the rod 201 and the portion 205 of the frame of the machine, tends to restore the clamping member 200 to normal position after the cutting operation has taken place. A hand-wheel 206 on the outer threaded end of the rod 201 serves to adjust the position of the member 200. After passing the knife 33, the back of the book is subjected to the roughening rolls 35 and to the grooving disks 36, as before explained. The clamping disks 36 (see Figs. 2 and 3) press the sheets which go to make up the work in the work holder firmly against each other as the back of the book is being roughened. Two of these disks on the inner side of the machine are suitably pivoted to a fixed portion of the machine, and the coöperating disks 36 upon the outer side of the machine are mounted upon bell crank levers 207 which are pivoted to a fixed position 208 of the machine and are yieldingly pressed toward the inner disks 36 by springs 209 acting between the portion 208 of the machine and the outer ends of the levers 207. The roughing rolls 35 are mounted upon shafts 210 which are arranged at an angle to the direction of the movement of the work, so as to improve the roughing action of the rolls. These shafts are suitably journaled in a fixed portion of the machine and are provided at their inner end with pulleys 211. Directly beneath the pulleys 211 is a driving pulley 212 which is secured to a shaft 213 suitably journaled in bearings carried by the base 52 of the machine. A belt 214 passes around the pulleys 211 and 212 and under an idler pulley 215. By this arrangement the roughening rolls 35 are driven from the shaft 213. The latter shaft is provided with a pulley 216 (see Fig. 3) which is driven by a belt running from a pulley 217 (see Fig. 1) on a counter shaft 218 which extends longitudinally of the machine and is suitably journaled in bearings 219 and 220 upon cross members of the frame of the machine. Guide pulleys 221 (see Fig. 3) properly guide the belt which is twisted as it passes from one pulley to the other. The countershaft 218 is driven by a belt extending over pulley 222, on said shaft 218, and pulley 223 on the main driving shaft 187. As the work passes to the brush 38 (see Fig. 3), the loose particles are removed and conducted from the machine through a tubular passage 224 in which a fan 225 is located. The shaft of this fan 225 is provided with a pulley 226 which is driven by means of a belt 227 from a driving pulley 228 upon the main driving shaft 187. The brush 38 is mounted upon a shaft 229 which is suitably journaled in a portion 230 of the frame of the machine and in a bracket 231 extending from an upright 232, also forming part of the machine frame. A belt 233 transmits power from the pulley 234 on the transverse shaft 80 to pulley 235 on the end of the brush shaft 229.

As we have before seen, the rolls 39, 40 and 41 apply glue or other adhesive to the backs of the pieces of work as they pass along over the glue pots or receptacles 236, 237 and 238. These receptacles (see Figs. 2 and 4) are located upon the upper ends of standards 239, 240 and 241, respectively. These standards are secured at their bases to the base 52 of the machine. The glue or other adhesive is kept at the proper consistency and temperature by steam pipes 242, 243, which lead from some suitable source of steam supply and are provided with branches 244, 245, 246, which communicate with coils or a length of pipe in

each of the receptacles 236, 237 and 238, respectively. Each of these branches is controlled by two valves 247 and 248.

The main driving shaft 187 (see Fig. 3) is driven from any suitable source of power by means of any suitable gearing, as for example the driving belt 248, which passes over the pulley 249 upon the shaft 187. The latter shaft is journaled in bearings at different points throughout its length. These include the bearings 250, 251, 252, 253 and 254. Two of these bearings, 252 and 253 are located in transverse walls or webs 255 and 256 of the frame of the machine. Power is transmitted from the shaft 187 to the cam shaft 24 through a train of gearing including the gear wheels 257, 258, 259 and 260. The wheels 258 and 259 are on the countershaft 261. The gear wheel 259 is loosely mounted on this shaft and is thrown into driving relation with the shaft by a clutch 262. A hand-wheel 263 and associated gear wheel 264 are also provided for the purpose of turning over the shafts 24 and 187 by hand whenever it is desired to change the position of the parts of the machine for repair or other purposes. The clutch 262 is controlled by a rod 265, which extends lengthwise of the machine and is slidably mounted in bearings 266 and 267 secured to the base of the machine. A transverse rock shaft 268 controlled by hand lever 269 at one side of the machine is connected at 270 to the rod 265 so as to reciprocate it to actuate the clutch lever 271 to throw the clutch into and out of engagement. A similar transverse rock shaft 272 extends transversely of the machine and is mounted in suitable bearings 273 and 274 and is provided with a hand lever 275 at the opposite side of the machine. By means of a connection at 276 this rock shaft may also be actuated to reciprocate the rod 265 for the purpose of operating the clutch 264.

In connection with the holder opening mechanism, there are also means for accurately positioning each work holder in its position opposite the cover holder. This is accomplished (see Fig. 2) by means of a lever 277 which engages the shank 278 of that portion of the holder which travels in the guides 21 whenever a holder is stopped opposite the cover holder 23. By this means the hook 278ª on the end of the lever 277, which accurately fits each of the shanks 278, causes the particular work holder which is opposite the cover holder, to be accurately positioned with reference to the latter. This is necessary in order to overcome any difference in position which might otherwise result from play between the connecting parts of the different holders, which, as before explained, are linked together in chain-like fashion. The lever 277 is pivoted at an intermediate point 279 to a bracket carried by the frame of the machine. The opposite end of the lever is connected by an adjustable link 280 to the work holder actuating plate 190. The link 280 has a pivotal connection with said plate at 282. By means of a turn-buckle 283, the length of the link 280 may be adjusted so as to cause the register device to bring about a correct register between the work and the cover holders.

By reason of the particular construction of the fabric applying mechanism, it is possible to entirely protect the fabric from the drippings of glue or other adhesive until the same is projected into its final position underneath the piece of work to which it is to be applied. In the present embodiment a plate 284 (see Fig. 2) extends from the receptacle 238 to the cover holder 43 in a position directly beneath the path of travel of the work. This plate serves to catch the drippings of adhesive from the work as it passes over it. In order to secure a proper thickness of the adhesive upon the work, each of the adhesive applying rolls 39, 40, 41, (see Figs. 2 and 4) is provided with a sort of scraper 285 which lies in proximity to the periphery of the associated roll and limits the thickness of adhesive which is allowed to remain upon it. The outer end of the scraper 285 is provided with adjusting means 286, by which it may be rocked and the thickness of adhesive which is allowed to remain upon the roll, be accurately determined. A scraper 287 is also provided upon the outgoing side of the receptacle 238 so as to clear the work of any undue thickness of adhesive which may have clung to it.

It may be pointed out that at the loading position of the machine an elevated block or shelf 288 (see Fig. 2) is arranged to lie above each work holder as it reaches the loading position. Upon this block the operator may even up the sheets which go to make up the piece of work which is about to be placed in the holder. When thus evened up, the same may be readily deposited between the clamping members of the adjacent holder. It may also be pointed out that the driving wheel 22 is provided with a series of spindles which carry depending rollers 289 which are engaged by the worm cam 23 as it rotates to transmit power to the wheel 22.

As before stated, my invention is capable of application to various types of book binding machines. It is also capable of considerable variation in construction and arrangement of parts. I, therefore, do not wish to be limited to the specific application of the invention which I have chosen to illustrate herein, nor do I wish to be limited to the exact arrangements and details of construction which I have employed, but I aim to cover by the terms of the appended

claims the varied uses of my invention and the various alterations and modifications of the construction herein set forth.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A book binding machine having a work holder, a cover holder, means for bringing said work and cover holders into adjacent positions, mechanism for projecting a strip of fabric between said work in said work holder and a cover on said cover holder when said holders are in adjacent positions, and means for causing a relative movement of said holders to press said work, fabric and cover together.

2. A book binding machine having a work holder, a cover holder, means for advancing said work holder into a position opposite said cover holder, and mechanism controlled by the work itself for projecting a strip of fabric between the work and a cover on said cover holder.

3. A book binding machine having work holders, a cover holder, means for bringing said work holders successively into a position opposite said cover holder, and mechanism controlled by the work itself for projecting a strip of fabric between a piece of the work and a cover on said cover holder.

4. A book binding machine having a series of work holders, a cover holder, means for intermittently advancing said work holders by substantially equal advances so as to bring said work holders successively opposite said cover holder, and mechanism controlled by each piece of work for projecting a strip of fabric between that particular piece of work and a cover on said cover holder.

5. A book binding machine having a work holder, a cover holder, means for advancing said work holder into a position opposite said cover holder, and mechanism controlled by the work itself for projecting a strip of fabric between the work and a cover on said cover holder and determining the length of the strip so projected.

6. A book binding machine having work holders, a cover holder, means for bringing said work holders successively into a position opposite said cover holder, and mechanism controlled by the work itself for projecting a strip of fabric between a piece of the work and a cover on the cover holder and determining the length of the strip so projected.

7. A book binding machine having a series of work holders, a cover holder, means for intermittently advancing said work holders to bring said work holders successively opposite said cover holder, and mechanism controlled by each piece of work for projecting a strip of fabric between that particular piece of work and a cover on said cover holder and determining the length of the strip so projected.

8. A book binding machine having a work holder, a cover holder, means for advancing said work holder into a position opposite said cover holder, means for coating a portion of said work with an adhesive while on its way to said position, means for projecting a strip of fabric between a cover on said cover holder and the coated portion of said work, and means for causing a relative movement of said work and cover holder to press said fabric and cover against the coated portion of the associated piece of work.

9. A book binding machine having a series of work holders, a cover holder, means for advancing said work holders successively into a position opposite said cover holder, means for coating a portion of each piece of work with an adhesive while on its way to said position, mechanism controlled by the work itself for projecting a strip of fabric between a cover on said cover holder and the coated portion of each piece of work, and means for causing a relative movement of said work and cover holder to press the fabric and cover against the coated portion of the associated piece of work.

10. A book binding machine having a series of work holders, a cover holder, means for advancing said work holders successively into a position opposite said cover holder, means for coating a portion of each piece of work with an adhesive while on its way to said positions, mechanism controlled by the work itself for projecting a strip of fabric between a cover on said cover holder and the coated portion of each piece of work and determining the length of the fabric so projected, and means for causing a relative movement of said work and cover holder to press the fabric and cover against the coated portion of the associated piece of work.

11. A book binding machine having a series of work holders, a cover holder, means for advancing said work holders successively into a position opposite said cover holder, means for coating a portion of each piece of work with an adhesive while on its way to said position, mechanism controlled by each piece of work for projecting a strip of fabric corresponding to the length of that particular piece of work between said piece and a cover on the cover holder, and means for causing a relative movement of said work and cover holder to press the fabric and cover against the coated portion of the associated piece of work.

12. A book binding machine having a spindle for holding a spool of fabric strip, a driving roller over which said strip may pass, a drop roll for pressing said strip against said driving roller to project the

free end of said strip toward the work, a work engaging part normally lying in the path of movement of the work and movable thereby, and connections whereby the movement of said part by the work moves the drop roll into position to press the strip of fabric against said driving roller.

13. A book binding machine having a series of work holders, driving mechanism for intermittently advancing said holders, means for opening said holders to receive and discharge the work, a spindle for holding a spool of fabric strip, a driving roller over which said strip may pass, a drop roll for pressing said strip against said driving roller to project the free end of said strip toward the work, a work engaging part adapted to lie in the path of movement of the work and to be actuated thereby, connections whereby the actuation of said part by the work moves the drop roll into position to press the strip of fabric against said driving roller, a knife for cutting off said strip, and means for actuating said knife in timed relation to the intermittent advances of said work holders.

14. A book binding machine having a series of work holders, driving mechanism for intermittently advancing said work holders by steps to bring said work holders successively opposite said cover holder, means for opening said holders to receive and discharge the work, a spindle for holding a spool of fabric strip, a driving roller adjacent to said cover holder over which said strip may pass, a drop roll for pressing said strip against said driving roller to project the free end of said strip between a piece of work and a cover on the cover holder, a work engaging part adapted to engage the work as it is given that advance step by which it is brought opposite said cover holder, and connections whereby the actuation of said part by the work moves said drop roll into actuating position and projects a length of the fabric strip for use on that particular piece of the work which caused that particular operation of said drop roll.

15. A book binding machine having a series of work holders, driving mechanism for intermittently advancing said work holders by steps to bring said work holders successively opposite said cover holder, means for opening said holders to receive and discharge the work, a spindle for holding a spool of fabric strip, a driving roller adjacent to said cover holder over which said strip may pass, a drop roll for pressing said strip against said driving roller to project the free end of said strip between a piece of work and a cover on the cover holder, a work engaging part adapted to engage the work as it is given that advance step by which it is brought opposite said cover holder, connections whereby the actuation of said part by the work moves said drop roll into actuating position and projects a length of the fabric strip for use on that particular piece of the work which caused that particular operation of said drop roll, a knife for cutting off said strip, and means for actuating said knife in timed relation to the intermittent advances of said work holders.

16. A book binding machine having a work holder, a cover holder, means for advancing said work holder into a position opposite said cover holder, a receptacle for holding adhesive, means for conveying adhesive from said receptacle to a portion of the work while on its way to said position, means for projecting a strip of fabric into position to be applied to said work, and means below a portion of the path of travel of the work for protecting said fabric from the drippings of adhesive from the work during its passage from the adhesive conducting means to said cover holder.

17. A book binding machine having a work holder, a receptacle for holding adhesive, means for advancing said holder, means for conveying adhesive from said receptacle to a portion of the work as it advances, a member below said work for catching the drippings of adhesive as the work advances beyond said adhesive conducting means, and means below said member for projecting a strip of fabric into position to be applied to the coated portion of said work.

18. A book binding machine having a work holder, a receptacle for holding adhesive, means for advancing said holder, means for conveying adhesive from said receptacle to a portion of the work as it advances, a member below said work for catching the drippings of adhesive as the work advances beyond said adhesive conducting means, and means below said member for projecting a strip of fabric beyond said member simultaneously with the advance of said work holder.

19. A book binding machine having a work holder, a receptacle for holding adhesive, means for advancing said holder, wheels in said receptacle for applying adhesive to the work as it advances, a cover holder, an adhesive catching member extending from said receptacle to said cover holder, and means below said member for projecting a strip of fabric over said cover holder.

In witness whereof, I hereunto subscribe my name this 15th day of June, A. D. 1914.

FRED A. RISBERG.

Witnesses:
I. E. LARSEN,
H. S. SPEDD.

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

Corrections in Letters Patent No. 1,152,907.

It is hereby certified that in Letters Patent No. 1,152,907, granted September 7, 1915, upon the application of Fred A. Risberg, of Chicago, Illinois, for an improvement in "Bookbinding-Machines," errors appear in the printed specification requiring correction as follows: Page 1, line 106, for the word "arrow" read *arrows;* page 2, line 48, for the word "compresser" read *cover presser;* page 8, line 100, claim 10, for the word "positions," read *position;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of October, A. D., 1915.

[SEAL.]

R. F. WHITEHEAD,

Acting Commissioner of Patents.