Dec. 16, 1930. C. C. HOWARD 1,785,261

MEANS FOR ASSEMBLING SHEETS AND APPLYING ADHESIVE THERETO

Original Filed March 22, 1928 5 Sheets-Sheet 1

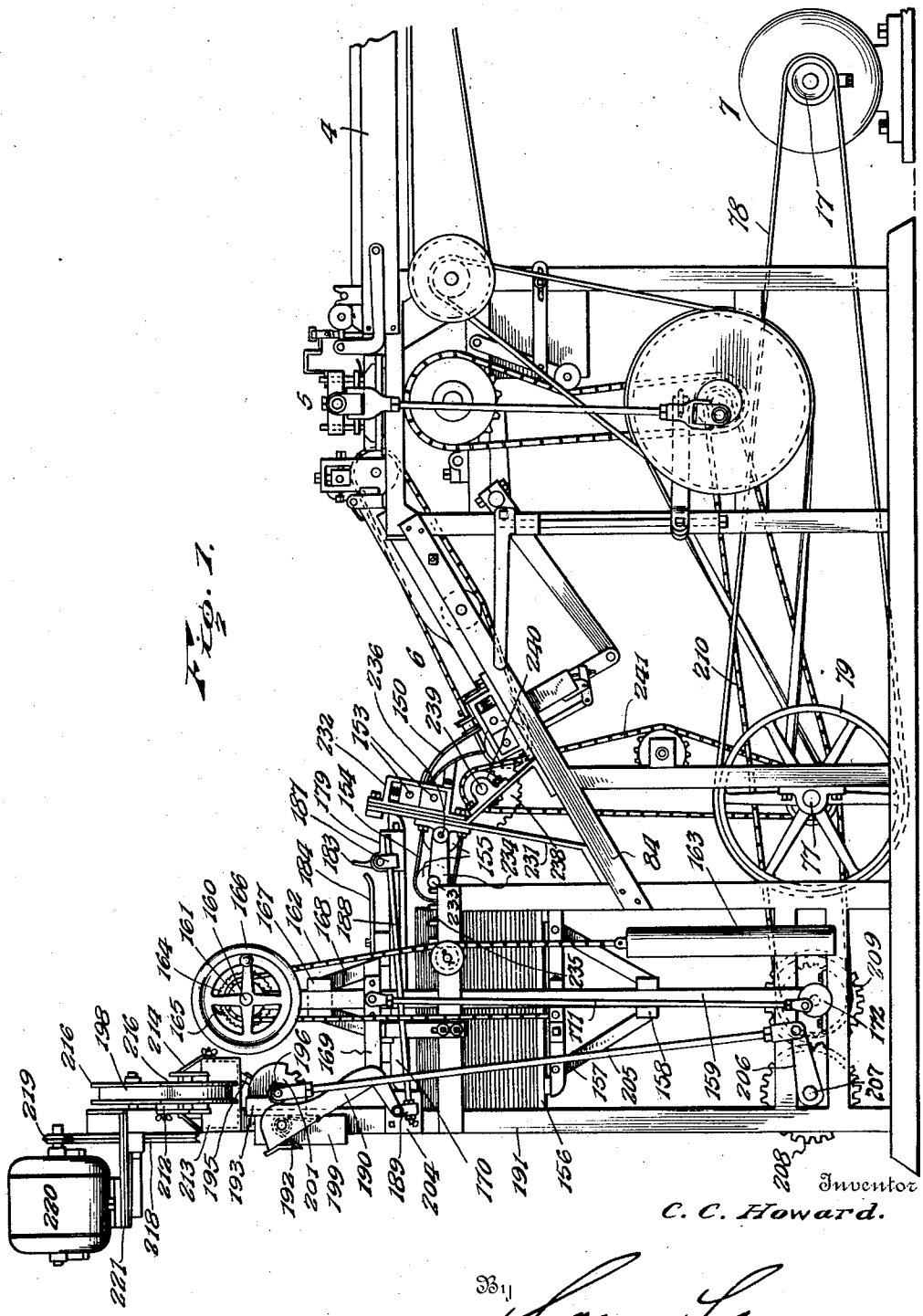


Fig. 1.

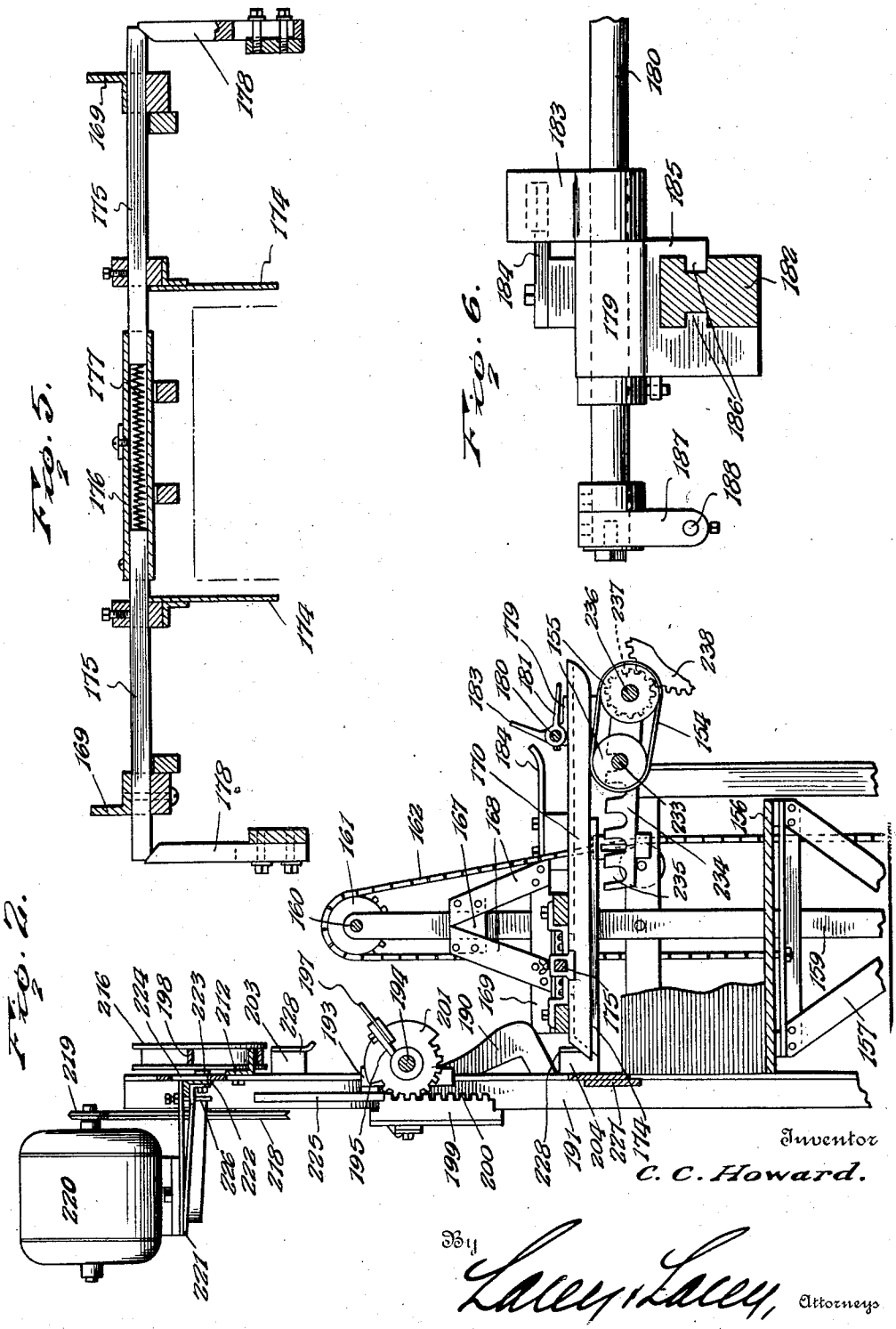
Inventor
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By Lacey & Lacey, Attorneys

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MEANS FOR ASSEMBLING SHEETS AND APPLYING ADHESIVE THERETO

Original Filed March 22, 1928 5 Sheets-Sheet 2

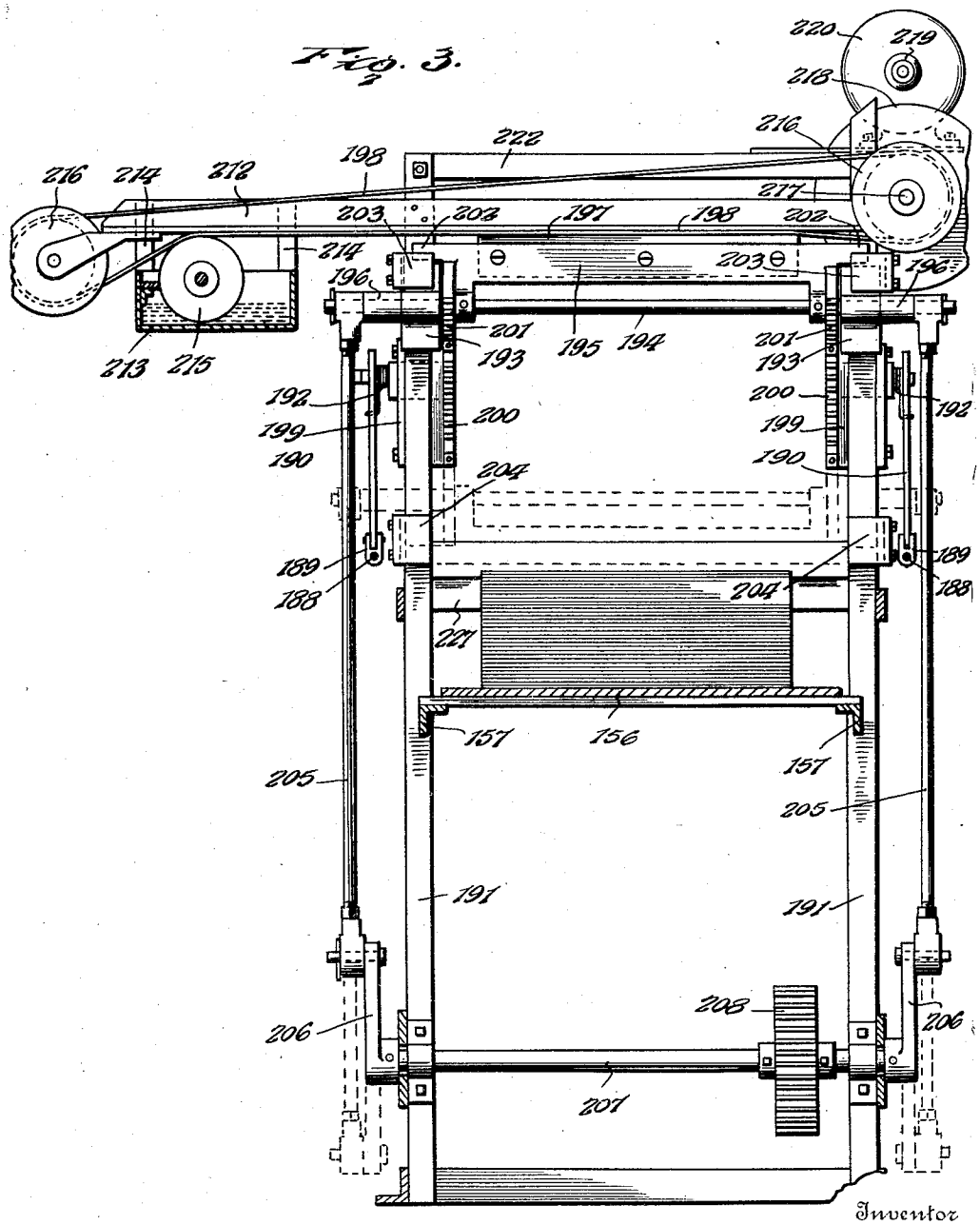


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MEANS FOR ASSEMBLING SHEETS AND APPLYING ADHESIVE THERETO

Original Filed March 22, 1928 5 Sheets-Sheet 3

Fig. 3.



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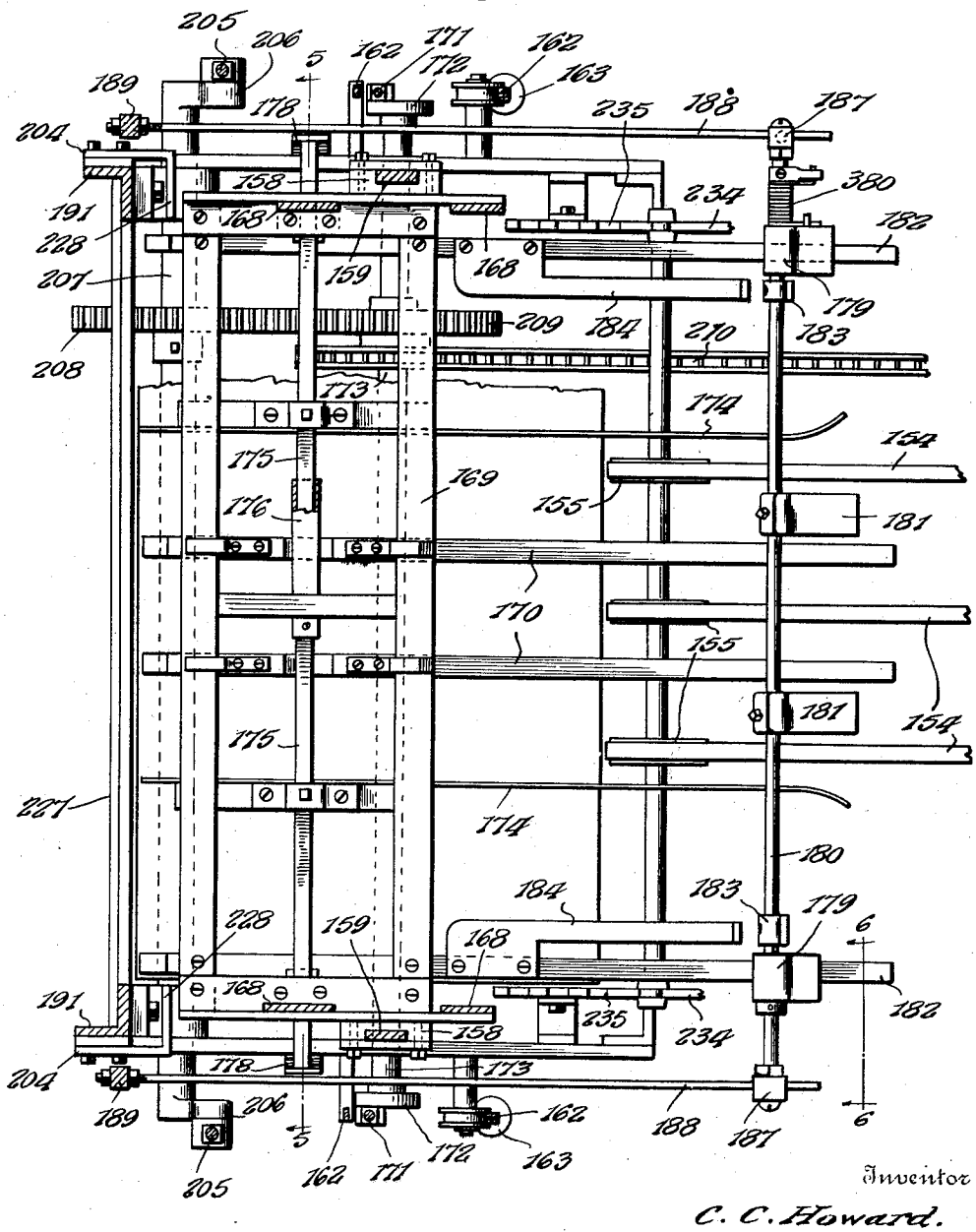
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Original Filed March 22, 1928 5 Sheets-Sheet 4

Fig. 4.



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MEANS FOR ASSEMBLING SHEETS AND APPLYING ADHESIVE THERETO

Original Filed March 22, 1928 5 Sheets-Sheet 5

Fig. 7.

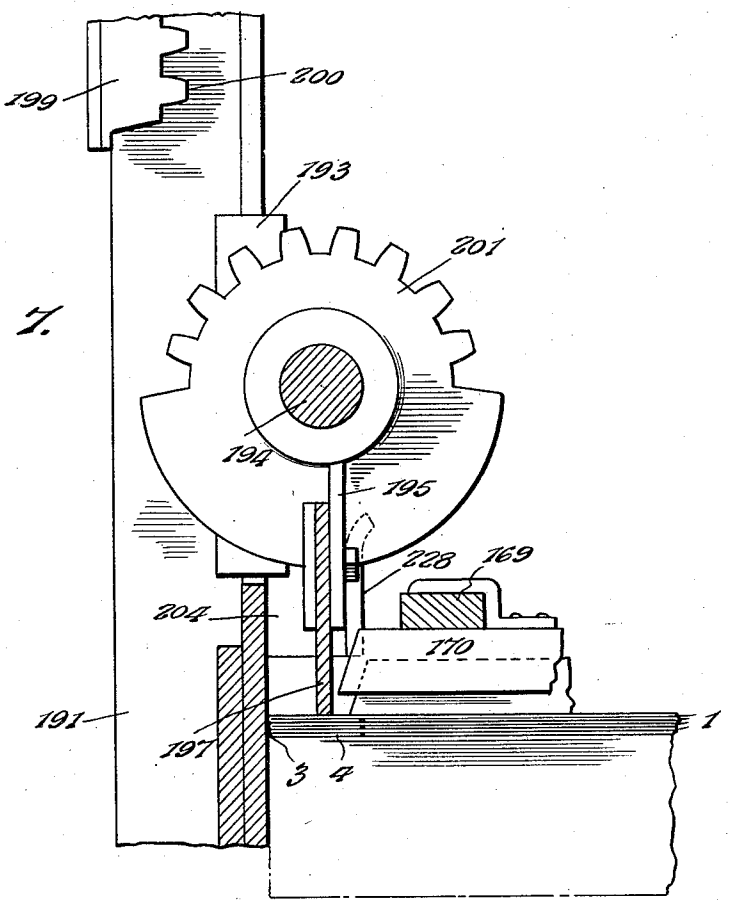
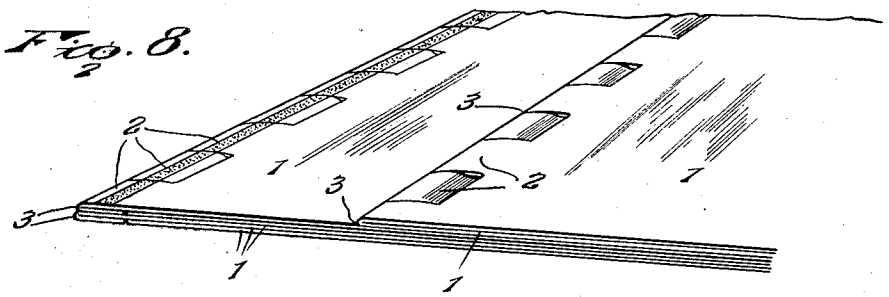


Fig. 8.



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Patented Dec. 16, 1930 1,785,261

UNITED STATES PATENT OFFICE

CHARLES C. HOWARD, OF LOUISVILLE, KENTUCKY

MEANS FOR ASSEMBLING SHEETS AND APPLYING ADHESIVE THERETO

Original application filed November 22, 1928, Serial No. 321,216. Divided and this application filed September 20, 1929. Serial No. 394,006.

This application is a division of an application filed by me November 22, 1928, Serial No. 321,216.

I have heretofore produced a book in which the several sheets or leaves are bound together in such a manner as to produce a book which will open flat, and in said book the several leaves are formed with tongues along their binding edges with the tongues of the alternate leaves relatively staggered so that the application of adhesive across the free ends of the tongues will cause the tongues on alternate leaves to be attached, relative transverse shifting of the leaves being prevented by the tongues on one leaf passing through the spaces between the tongues on an adjacent leaf. The present invention provides means whereby the prepared leaves may be expeditiously assembled, receive adhesive and be firmly secured together. The invention is illustrated in the accompanying drawings and will be hereinafter fully described, the novel features being particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a side elevation of a machine embodying the invention,

Figure 2 is a somewhat enlarged longitudinal section of the mechanism constituting the present invention,

Figure 3 is a sectional elevation of the glue-applying devices and the parts immediately adjacent and cooperating with the same,

Figure 4 is a plan view, with parts in section, of the assembling means whereby the sheets are presented to the glue-applying devices,

Figure 5 is a section on the line 5—5 of Figure 4,

Figure 6 is a section on the line 6—6 of Figure 4,

Figure 7 is a detail sectional elevation showing the glue knife in glue-applying position,

Figure 8 is a detail perspective view showing leaves adhering together.

In the operation of the machine shown in Figure 1, the sheets or leaves 1 are carried over a feed table 4 to a cutting mechanism at 5 by the action of which notches are cut in the advancing or forward edges of the sheets to form tongues 2, the tongues on the alternate sheets being staggered as will be understood by reference to Figure 8. From the cutting mechanism, the leaves pass to folding mechanism at 6 where folds 3 are formed across the free ends of the tongues, the leaves being presented to the folding elements in pairs so that the tongues on one leaf will be entered in the notches in the companion leaf. From the folding mechanism, the leaves are delivered through a guide 150 to a pair of rollers 153 which crease or flatten the folds and feed the leaves to the assembling and glue-applying devices.

All the working parts are driven by a motor 7, a belt 78 being trained about a pulley 17 on the motor shaft and a pulley 79 secured on a shaft 77 which is mounted on the lower portion of the frame of the machine.

The rollers 153 deliver the sheets onto feed belts 154 which are mounted upon suitable rollers or pulleys 155 and, in turn, deliver the sheets onto a table 156 which is so arranged that it will move downwardly as the number of sheets delivered thereto increases and will present the treated sheets to an open lower part of the supporting frame through which they may be withdrawn. This table is constructed with a reinforcing frame 157 on its under side and at the lower end of said reinforcing frame are guides 158 which slidably engage standards 159 forming part of the supporting frame of the machine so that the table will be guided and maintained in a stable condition in its movements. At the upper ends of the standards 159 is journaled a shaft 160 and upon said shaft at the ends of the same are secured sprockets 161 having chains 162 trained over the same. Each chain has one end attached to the platform 156 or its reinforcing frame while the other end of the chain carries a weight 163, the weights counter-balancing the table and resisting downward movement of the same so that it can only move downwardly at a rate corresponding to the rate of increase of the weight of the paper imposed thereon. The shaft 160 is also equipped with a ratchet wheel 164 and a pawl 165 is mounted upon the adjacent standard 159 to engage said ratchet wheel so

that, when the pawl is in active position, the shaft cannot be rotated under the influence of the weights 163. At one end of the shaft is also provided a hand wheel 166 whereby the shaft may be rotated to raise the table when a book has been removed therefrom and it is to be placed in position to receive the sheets for a second book. Slidably engaged with the upper portions of the standards 159 are runners or brackets 167 from which braces or hangers 168 depend to carry a frame 169 which extends across the width of the machine and has secured to its under side parallel longitudinally extending presser bars 170 which project forwardly to points immediately adjacent the feed rollers 153 so that sheets carried from said rollers by the belts 154 will be caused to pass under the presser bars 170. The frame 169 is reciprocated vertically by pitmen 171 pivoted at their upper ends to the ends of the frame and at their lower ends to crank disks 172 carried by a transverse shaft 173. The presser bars 170 are thereby alternately lifted so as to permit the passage of sheets thereunder and then brought down so as to bear upon the sheets and hold them in position to receive the glue. Guide rails 174 are secured to the under side of the frame 169 and project rearwardly therefrom parallel with the presser bars 170 and in lateral relation thereto, and the front ends of these guide rails are curved outwardly so that the sheets will be readily guided into the space between the rails. These rails are spaced apart a distance equal to the width of the sheets so that the sheets will be properly alined and in order that the sheets may be engaged by these rails and alined, even though they should be presented to the rails somewhat out of alinement, the rails are secured adjustably to a transverse reciprocatory bar 175 which is slidably mounted in bearings at the ends of the frame 169, a bar 175 being provided at each end portion of the frame and the inner ends of the bars being fitted within a coupling sleeve 176 which houses a spring 177 tending to press the bars apart. The outer ends of the bars 175 are adapted to bear against the beveled upper ends of stationary cams 178 which are vertically adjustable upon stationary parts of the supporting frame so that as the frame 169 is moved downwardly the bars 175 will be shifted laterally and the guide rails or jogger plates 174 will be moved inwardly to properly center the sheets. Slidably mounted upon side members of the main supporting frame are bearings 179 carrying a rock shaft 180 which extends across the frame above the feed belts 154 and the presser bars 170 as well as the jogger and guide rails 174. At points adjacent the presser bars and between the feeder belts, jogger arms 181 are secured to this shaft and project therefrom in such position that when the shaft is rocked these arms will impact against the rear ends of the sheets and will cause the same to be presented evenly to the glue-applying elements. The shaft 180 is reciprocated upon the frame members 182 through means which will be presently described and adjacent the bearings 179 has tappets 183 secured thereon, the tappets being normally in an upstanding position. Secured to the frame bars 182 at the rear of the shaft and its bearings are abutments 184 which are alined with the tappets 183 so that if the shaft be drawn rearwardly the tappets will be caused to impinge against the front ends of these abutments and thereby rocked, the shaft being consequently rocked in its bearings so that the jogger arms 181 will be swung against the ends of the sheets. The bearings 179, as shown most clearly in Figure 6, are constructed with guide feet 185 on their under sides which slidably engage the frame members 182 and are constructed with toes 186 engaging in grooves formed in the sides of the frame members whereby the bearings will be held in place. The shaft 180 is loose in the bearings 179 and secured upon the shaft at the ends thereof are brackets or blocks 187, in the lower ends of which are secured the front ends of pusher rods 188, said pusher rods extending rearwardly and having their rear ends secured in eyes 189 carried by the lower ends of angle levers 190 which are pivotally mounted upon the rearmost standards 191 of the main supporting frame. Normally these angle levers are in the position shown in Figures 1 and 2 and the shaft 180 is spaced forwardly from the abutments 84. When the angle levers 190, however, are rocked rearwardly, the rods 188 pull the shaft rearwardly so that the tappets 183 are caused to impinge against the abutments 184 and rock the shaft. As the return movement of the shaft 180 carries the tappets from the abutments, the shaft is rocked in the opposite direction and the tappets again set in upright position by a torsion spring 380 coiled about the shaft with one end fixed thereto and its opposite end fixed to the adjacent bearings, as shown clearly in Figure 4.

It will be noted upon reference to Figures 1 and 2 that the forward edges of the angle levers 190 are of an ogee shape and that the long arms of the angle levers project appreciably forwardly from the standards 191, a spring 192 attached to the frame at one end and having its opposite end engaged with the respective angle lever yieldably holding it in the position shown. Slidably mounted upon each standard 191 is a block 193 in which is journaled a shaft 194 carrying the glue-applying knife 195 and equipped with rollers 196 each adapted to engage and ride on one of the angle levers 190. It will be seen

that, when the block 193 is moved downwardly, the roller 196 acting on the forward edge of the angle lever 190 will swing said lever rearwardly so that the shaft 180 will be drawn rearwardly and the described action accomplished. The glue knife 195 comprises a frame secured to the shaft 194 and extending longitudinally thereof, and a blade proper 197 secured longitudinally to the frame and adapted in one position to engage the glue-carrying belt 198 and in another position to apply the glue or other adhesive to the tongues of the sheets upon the table 156. The pivot of the angle lever 190 is fitted in a block 199 which is secured to the adjacent standard 191 and projects to the inner side thereof where it is formed into or provided with a rack 200 in the vertical plane of a pinion 201 secured upon the shaft 194 so that as the shaft is moved vertically the pinion will be caused to ride over the rack in mesh therewith and consequently, rock the shaft so that the knife will be reversed. The knife frame 195 has extensions 202 at its ends which at the respective limits of movement are engaged in keepers 203 and 204 respectively whereby the knife is caused to move in a true vertical plane in applying the glue to the sheets or receiving the glue from the supplying belt 198. Vertical movement is imparted to the knife shaft by pitmen 205 having their upper ends pivotally mounted upon the ends of the shaft and their lower ends attached to cranks or levers 206 which are secured to the ends of a transverse shaft 207, said shaft 207 having secured thereon a gear 208 which meshes with a gear 209 on the shaft 173. The shaft 173 is driven by a chain 210 trained around a sprocket on said shaft and around a sprocket on an intermediate shaft which receives motion through a belt from the shaft 77.

Above the shaft 194, a transverse beam 212 is secured upon the main supporting frame and projects laterally to one side of the same, and the glue pot or tank 213 is suspended from this beam by hangers 214. The glue-carrying belt 198 passes over a transfer roller 215 in the tank and is trained about pulleys or guide rollers 216 at the opposite ends of the beam. The guide pulley or roller 216 more remote from the glue tank has its axle or shaft 217 extended rearwardly and upon the rear end thereof is secured a friction pulley 218 which is normally in engagement with a friction pinion 219 on the shaft of a small motor 220, this motor driving the glue-conveying belt but performing no other work. The motor 220 is carried by a shelf 221 which is secured to and projects rearwardly from a beam 222 disposed above and at the rear of the beam 212 and pivotally attached at its end more remote from the motor to the adjacent standard 191 while at its shelf-carrying end it is equipped with a keeper bolt 223 playing in a slot 224 in the adjacent standard 191 so that it cannot fall away from the standard. Carried by the sliding block 193 which is below the shelf 221 is a pusher bar 225 which extends upwardly from said block and is arranged to impinge against an abutment screw 226 mounted through the beam 222 so that, when the knife is raised to engage the glue belt and take glue therefrom the motor will be shifted so that the pinion 219 will be out of engagement with the pulley 218 and the belt will remain at rest.

Carried by the standards 191 is a back stop 227 against which the sheets or leaves are caused to abut by the action of the jogger arms 181. As shown most clearly in Figure 2, the keepers 203 and 204 are brackets or plates secured to and projecting forwardly from the standards 191 and having their front ends provided with flanges 228 which are turned inwardly and may be extended and turned forwardly. Said flanges are located in spaced relation to the standards so that the extended ends of the knives will be caused to ride within the keepers and be guided into proper engagement with the glue belt or with the stacked sheets accordingly as the knife is at the upper or lower limit of its movement.

The feed belts 154 are carried by drums or rollers 155, the bearings for the forward drum or roller being mounted upon frame members 231 rising from the frame bars 84 and said members 231 carry frames 232 in which the rollers 153 are mounted, while the shaft 233 carrying the rear rollers 155 is supported in arms 234 secured to the main supporting frame and having a rack or plurality of notches 235 in its upper edge so that by setting the shaft in selected notches the tension of the feed belts may be maintained. The shaft 236 carrying the forward rollers or drums is equipped with a pinion 237 meshing with a gear 238 secured upon a shaft 239 which is mounted upon the frame between the rollers 153 and the folders so that, when the shaft 239 is rotated, the feed belts 154 will be driven in the proper direction. A sprocket pinion 240 is secured upon the shaft 239 and a chain 241 is trained about said pinion and about a pinion on the shaft 77 so that the gearing just described will be driven from the last named shaft.

It is thought that the operation of the apparatus will be understood from what has been said but it may be briefly summarized. The blank sheets or leaves are fed in any convenient manner onto the initial feed belts which carry them to the cutters and the cutters make notches in the advancing ends of the sheets, the cutters and cooperating elements being manipulated so that the tongues and notches in successive sheets will be staggered. The cut sheets are then carried to

the folder mechanism and two sheets have the free ends or tips of their tongues folded and simultaneously with the folding action are caused to advance somewhat toward the glue-applying devices. The folds are flattened by the rollers 153 which also feed the sheets onto the table 156 or the sheets already deposited on the table and the table gradually descends as the sheets are piled thereon, pressure to start the sheets downwardly being applied through the presser bars 170, and simultaneously with the engagement of the sheets by the presser bars 170 the glue knife is brought into contact with the sheets to apply glue to the upper surfaces of the folded tongues at the ends thereof. Each successive pair of sheets will be thereby pressed onto the sheet below it by the knife and the presser bars so that the tongues on alternate sheets will be joined together by the glue or other adhesive, and when a sufficient number of the sheets or leaves have been treated with the adhesive they are withdrawn from the table through the space between the standards 191 below the back stop 227 for the application of the backs and sides of the book cover. The apparatus operates very rapidly and produces a complete book ready to receive the cover very economically. No sewing of the books is necessary and while the leaves or sheets are joined only at their extreme ends they are very securely held together and the bound book will open flat and lie flat at any point.

Having thus described the invention, what is claimed is:

1. In a book-making machine, the combination of glue devices, and means for feeding sheets having folded ends to said devices and presenting the folded ends thereof thereto.

2. In a book-making machine, glue devices, means for presenting sheets having folded ends with the folds therein to the glue devices, and means for alining the sheets as they pass to the glue devices.

3. In a book-making machine, a vertically movable table, means for feeding sheets having folded ends thereof onto said table, and means for applying adhesive to the folded ends of the sheets as they are successively deposited on the table.

4. In a book-making machine, the combination of a vertically movable table, means for feeding sheets onto the table, means for effecting descent of the table as the sheets are deposited thereon, means for applying pressure to the deposited sheets, and means for applying adhesive to the ends of the sheets as they are successively deposited on the table.

5. In a book-making machine, the combination of a table, means for feeding sheets onto the table, and means for alining the sheets upon the table, said means comprising jogger arms mounted for oscillatory movement, means for reciprocating said arms, and means for rocking the arms as they are reciprocated.

6. In a book-making machine, the combination of a table, means for feeding sheets onto the table, means for alining the sheets on the table, glue-supplying means above the table, a glue knife adapted to receive glue from said glue-supplying means, and means for shifting the knife from said means into contact with the ends of the sheets on the table.

7. In a book-making machine, the combination of a table, means for feeding sheets successively and in alinement onto the table, adhesive-supplying means above the table, and means for transferring adhesive from said means to the sheets.

8. In a book-making machine, the combination of a table, means for feeding sheets onto the table, adhesive-supplying means above the table, a knife movable between said means and the table, and means for rocking the knife as it moves toward and from the table.

9. In a book-making machine, the combination of a table, means for feeding sheets onto the table, adhesive-supplying means above the table including a movable element, means for transferring adhesive from said means to the sheets on the table, and means controlled by said transfer means for arresting the action of the movable element in the supply means.

10. The combination of a table, means for depositing sheets on the table, an adhesive-supplying belt disposed above and transverse to the table, a vertically movable rock shaft mounted between the table and said belt, means for actuating said shaft, and a knife carried by the shaft and extending longitudinally thereof and arranged to bear at its edge against the belt in the upper position of the shaft and to bear upon a sheet on the table in the lower position of the shaft.

11. The combination of a table, means for depositing sheets on the table, an adhesive-supplying member above the table, a rock shaft, vertically slidable bearings for said shaft between the table and the adhesive-supplying member, stationary racks adjacent said bearings, pinions on the shaft meshing with said racks, a transfer knife carried by and extending longitudinally of the rock shaft to bear alternately against the adhesive-supplying member and a sheet on the table, and means for vertically reciprocating the shaft.

12. The combination of a table, means for depositing sheets on the table, jogger arms disposed above the table, an adhesive-supplying member above the table, an adhesive-applying knife between said member and the table to transfer adhesive from said member

to a sheet on the table, means for operating the knife, and operative connections between said means and the jogger arms whereby as the knife approaches the table the jogger arms will be caused to aline the sheets below the knife.

13. The combination of a table, means for depositing sheets on the table, a rock shaft slidably mounted above the table adjacent the receiving side thereof, jogger arms on said shaft, an adhesive-supplying member above the discharge side of the table, a knife disposed below said member to transfer adhesive therefrom to a sheet on the table, means for operating the knife, a lever arranged adjacent said operating means to be rocked thereby, and a connection between said lever and the slidably mounted rock shaft whereby as the knife is caused to approach the table the jogger arms will aline the sheets below the knife.

14. The combination of a table, means for depositing sheets on the table, a slidably mounted rock shaft above the receiving side of the table, jogger arms on said shaft, tappets on said shaft, abutments in the paths of the tappets, an adhesive-supplying member above the table, a knife below said member to transfer adhesive therefrom to a sheet on the table, means for operating said knife, a lever arranged to be rocked by said operating means, and a link connecting said lever with the rock shaft whereby as the knife is moved toward the table the tappets will impinge against the abutments and the jogger arms will be rocked to aline sheets below the knife.

In testimony whereof I affix my signature.

CHARLES C. HOWARD. [L. S.]