April 8, 1924. 1,489,896

J. MURRAY

BOOKBINDING MACHINERY

Filed Oct. 28, 1921 6 Sheets-Sheet 1

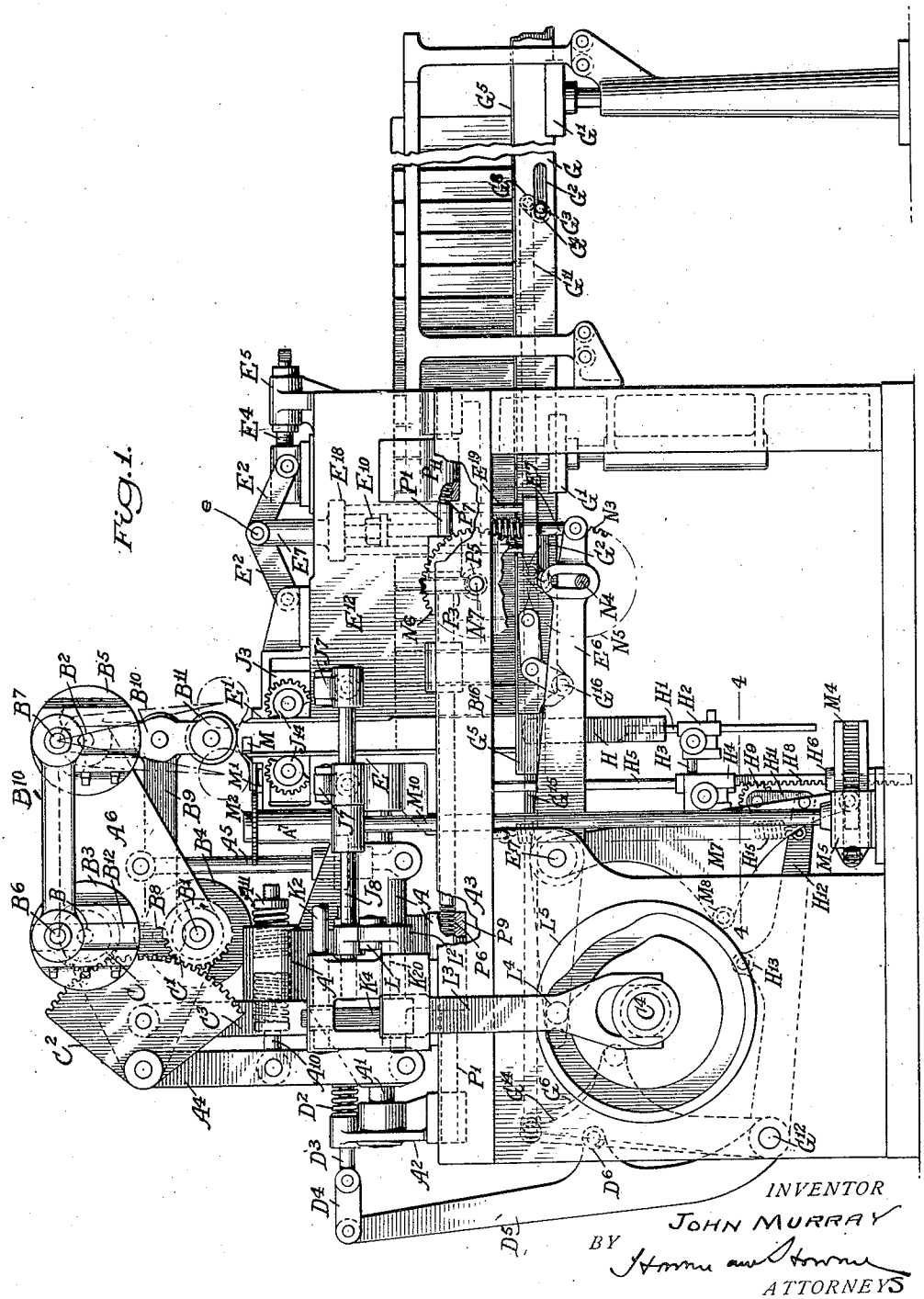


FIG. 1.

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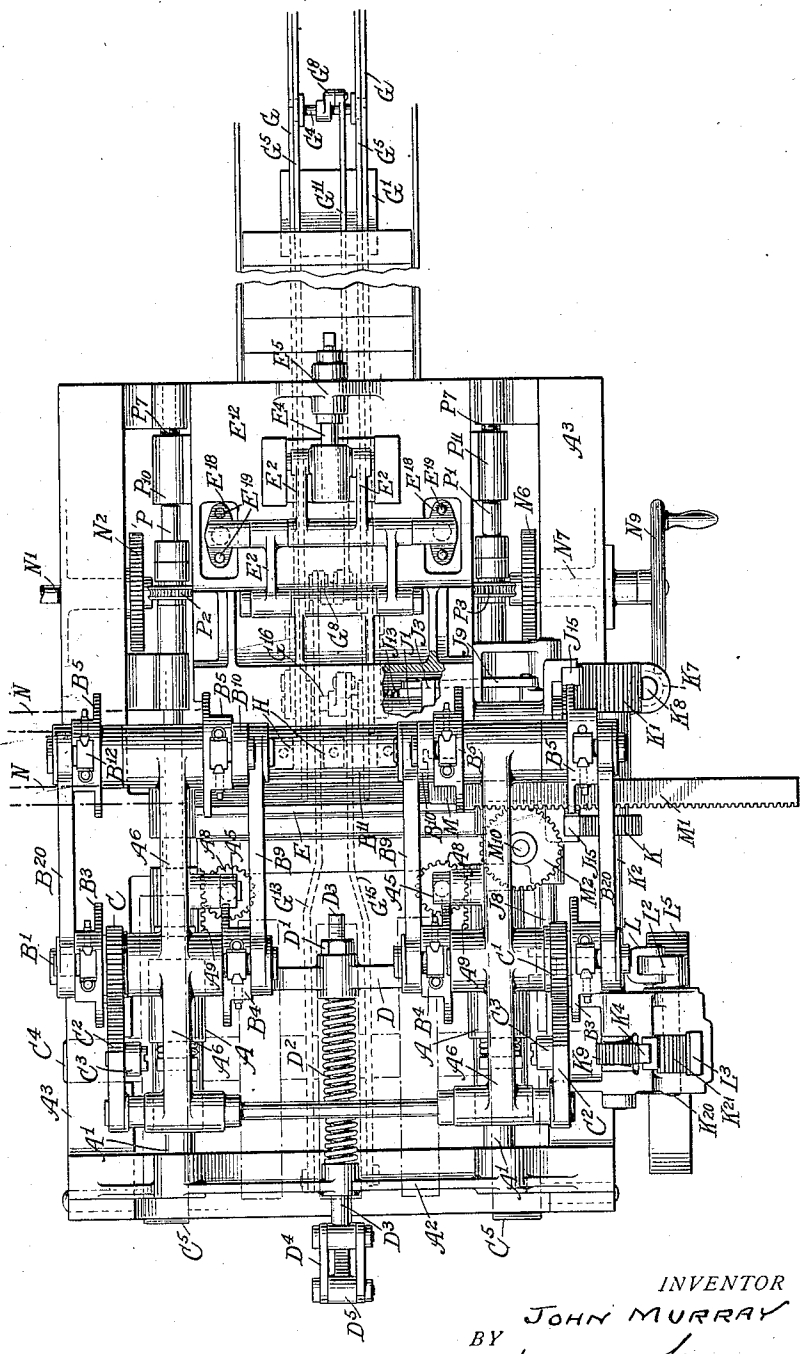
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Fig. 2.



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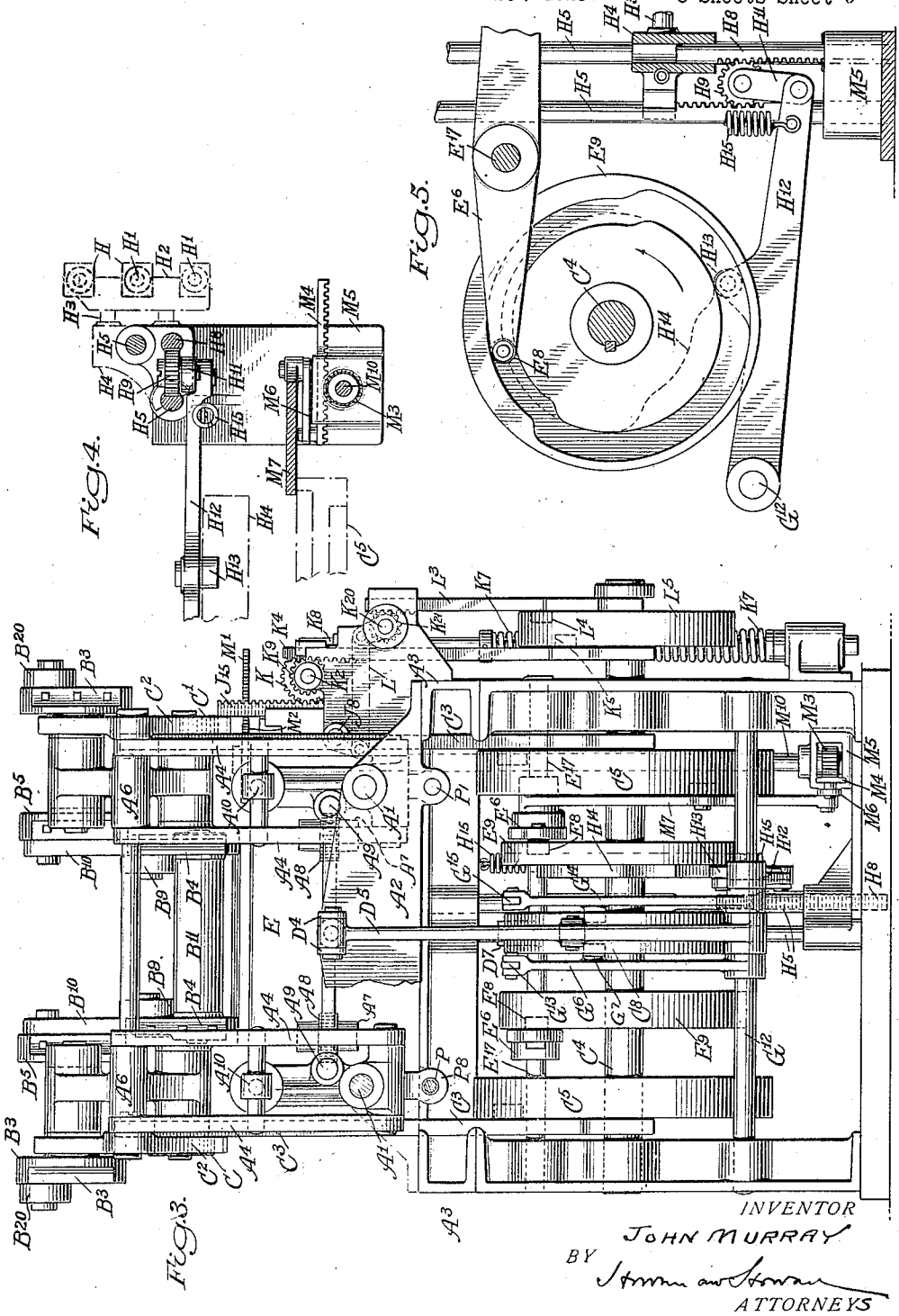


FIG. 3.



FIG. 4.



FIG. 5.

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BOOKBINDING MACHINERY

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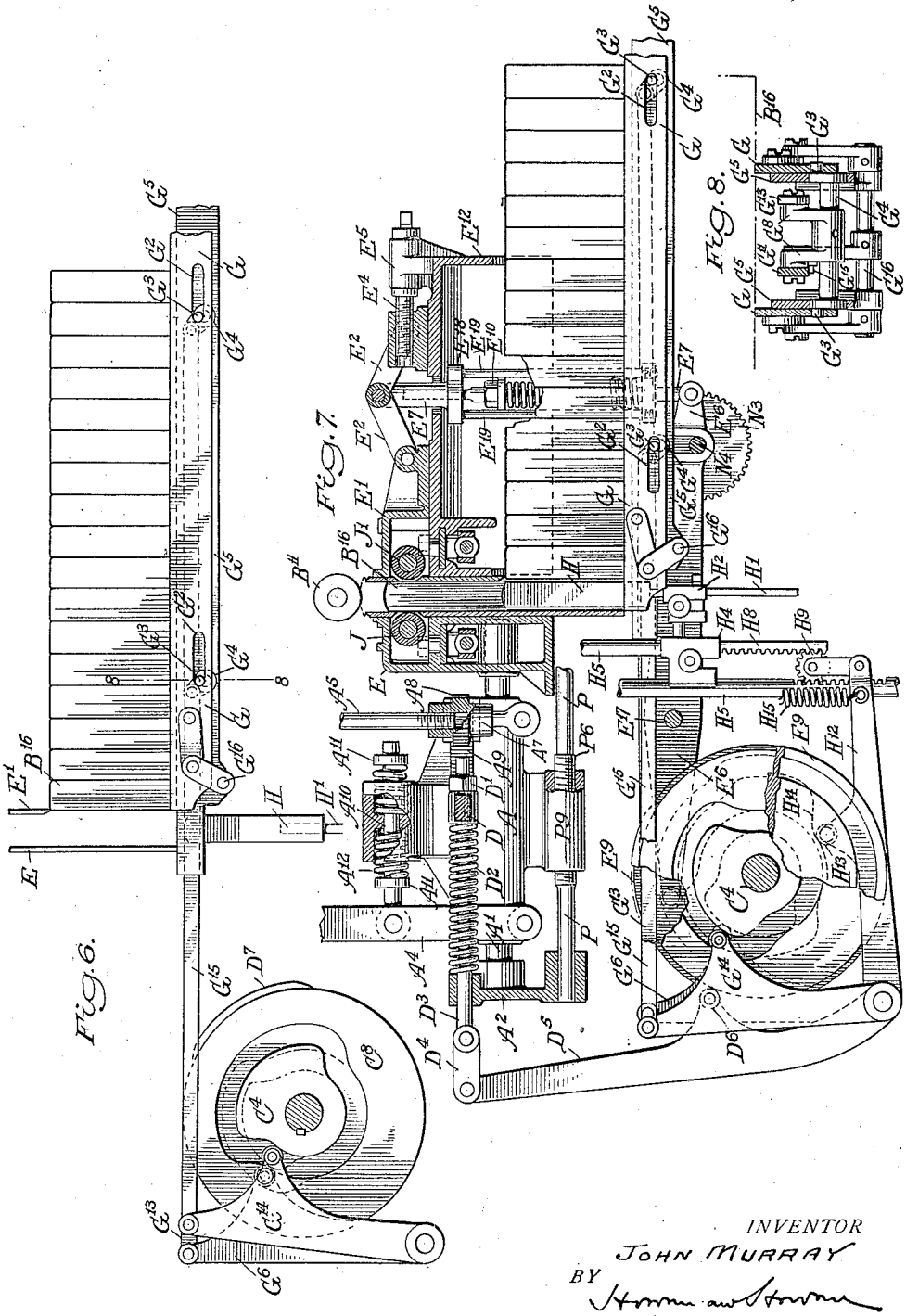


Fig. 6.



Fig. 8.

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BOOKBINDING MACHINERY

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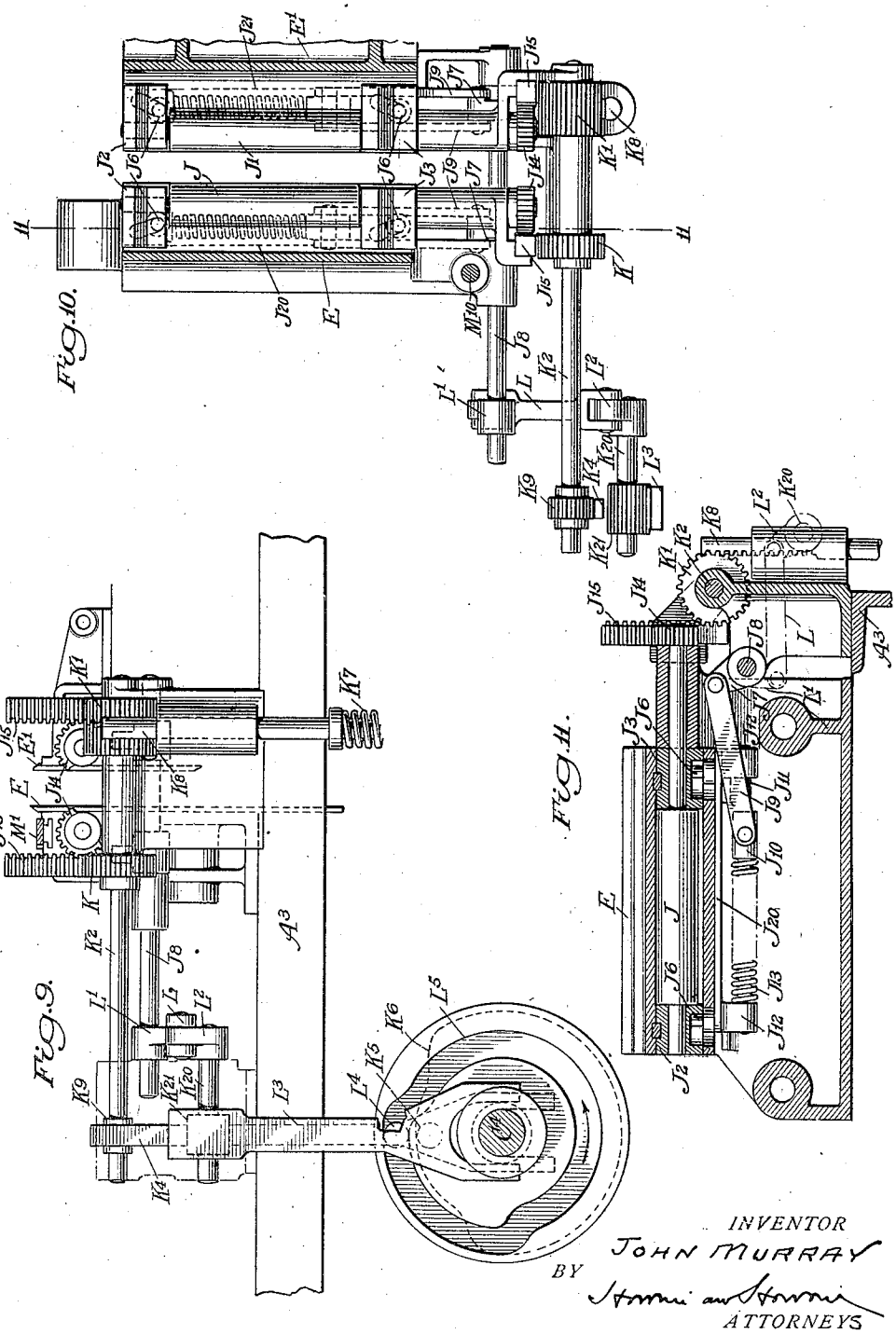


Fig. 10.

Fig. 11.

Fig. 9.

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BOOKBINDING MACHINERY

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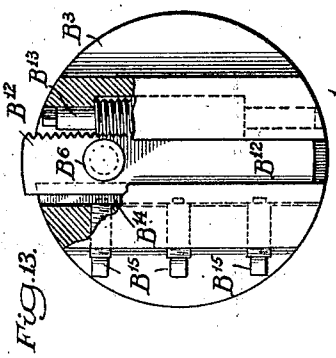



Fig. 13.

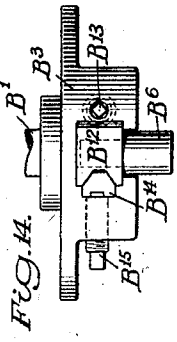



Fig. 14.

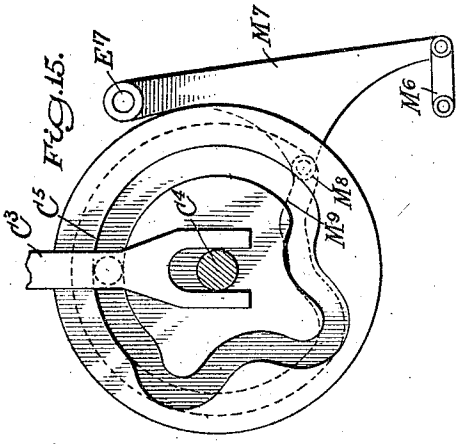



Fig. 15.

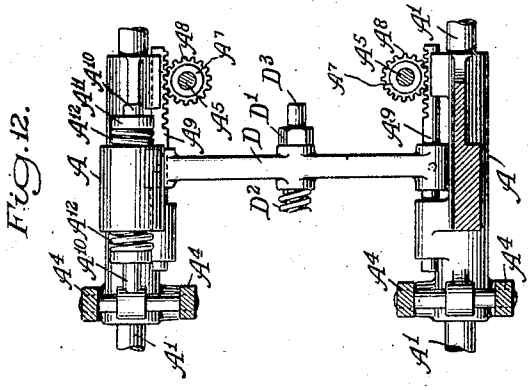



Fig. 12.

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Patented Apr. 8, 1924. 1,489,896

# UNITED STATES PATENT OFFICE.

JOHN MURRAY, OF LONDON, ENGLAND.

## BOOKBINDING MACHINERY.

Application filed October 28, 1921. Serial No. 511,091.

*To all whom it may concern:*

Be it known that I, JOHN MURRAY, a subject of the King of Great Britain and Ireland, and a resident of London, England, engineer, have invented certain new and useful Improvements in Bookbinding Machinery, of which the following is the specification.

The invention has for its object to provide a machine for performing those operations in book-binding known as "rounding and jointing", simple in construction, easily adjustable as regards thickness and other dimensions of the books upon which it operates, effective in action and capable of being operated at those high speeds necessary for it to operate in conjunction with other modern book manufacturing machinery.

A machine made according to the invention and which may be either a separate unit or be combined with another machine performing either preliminary or subsequent operations (such for example as a lining machine) comprises for the "jointing" operation essentially a roller adapted to traverse the back of the book and press and mould it after the manner of the roller used in hand operations of this kind. This roller is mounted with its axis parallel with the back of the book in a guide member so pivotally mounted and the movement of which is so controlled that the roller is constrained to oscillate bodily at right angles to its axis through an arcuate path conforming to the contour of the book back upon which it is operating. Although certain attempts have been made to perform this arcuate motion mechanically, they have usually necessitated the pivoting of the guide member at the centre from which the arc in which the roller moves is struck. This materially interferes with the lateral discharge of the book and with the means for holding it in position to be operated upon. In a mechanism made according to the invention there is no projection into the lateral path of the book beneath the roller, the arcuate movement of the roller being around a virtual and not an actual pivot; that is to say, the roller is supported from above and the whole of the linkage operating it is arranged above it.

There are many diverse means by which this virtual movement may be attained. For example, and very conveniently, the guide member may be supported directly or indirectly upon two cranks or eccentrics the axes of which are parallel or substantially so with the axis of the roller. The throws of these cranks or eccentrics are adjustable, and any convenient means are provided for oscillating them through an arc, the roller being thus constrained to oscillate bodily through a corresponding or resultant arc.

According to an illustrative example of the carrying out of this part of the invention, in which adjustable crank devices are used, there is provided a main bracket adjustable at right angles to the book which is preferably supported by any convenient means with the sides vertical and the back uppermost and horizontal. Vertically adjustable on this main bracket is a subsidiary bracket in which is a shaft parallel with the book back and carrying a disc or discs or the like of a slot or otherwise in which is a radially adjustable crank pin. Upon this crank pin is supported the upper end of the roller guiding member at the lower end of which is carried the roller. At or near the axis of the roller is pivoted a link which is connected to a like adjustable crank device on a shaft parallel with but beneath the first crank shaft and substantially in line with the roller. Vertically above this second shaft and in line with it and the first shaft is a third shaft carrying a crank device (which may be also adjustable) and which is connected by a link with a pin (which may be the pin engaging the upper end of the guide member) on the crank disc of the first shaft. This third shaft and the second shaft are oscillated through the desired arc by any convenient mechanism. For example, there may be on the shafts, pinions which engage a quadrant reciprocated by a cam or by other convenient means.

To operate upon a book back, the roller on its guide member is adjusted laterally by adjustment of the main bracket to bring the centre of its arcuate path into the central vertical plane of the book, and is adjusted vertically to bring it into contact with the book by adjustment of the subsidiary bracket.

Means are provided for holding the book and preferably for advancing it towards the roller to be operated upon (or the roller may be advanced to the book). According to the invention there are preferably provided, in combination with the holding means, means for performing the "rounding" operation, that is to say, for thrusting out the centre portion of the book beyond the outer portions so that its back assumes a curved form.

According to this part of the invention the books are advanced by any convenient means to the "rounding" mechanism. The "rounding" device consists of rollers as in another well known machine but in this invention they are carried in recesses in the gripping jaws. When the books are being advanced into the machine the rollers are retired into recesses so as to leave an uninterrupted path for the book. When the books have been advanced to the "rounding" position the rounding rollers are advanced equally and sufficiently to grip the book. Means are provided for rotating the rollers by which rotation the central portion of the book is made to advance further than the sides of the book in contact with the rollers so that it becomes rounded on the back and hollow at the foredge. The motion of the "rounding" rollers besides having this rounding effect on the book will advance the book into the jointing position. Means are also provided for advancing the movable jaw so that the book is firmly gripped between the movable jaw and the fixed jaw during the jointing operation. Means are provided so that the rounding rollers may adequately deal with books of different substance.

Means are further provided for discharging the rounded and jointed books and for adjusting the parts of the machine namely the jointing roller device and the gripping and rounding heads so that these parts may be adjusted one to the other and also so that books of different thicknesses may be discharged with the centre of their thickness lying in the same vertical lateral plane. Means are also provided for feeding or delivering the books successively to the elevating position. Such means are controlled and actuated to operate in proper sequence with the other working parts of the machine and cooperate therewith in carrying out certain important features of the invention.

An example of a complete machine made according to the invention is shown in the accompanying drawings, of which—

Fig. 1 is a side elevation of the machine;

Fig. 2 is a plan view thereof;

Fig. 3 is an end view;

Fig. 4 is a detail horizontal section taken on line 4—4 of Fig. 1;

Fig. 5 is a detail showing the book elevating mechanism;

Fig. 6 is a fragmentary view of the delivery mechanism showing a column of books resting on the movable rails;

Fig. 7 is a similar view showing more of the cooperating parts and a book lifted to "rounding position;"

Fig. 8 is an enlarged transverse section taken on line 8—8 of Fig. 6;

Fig. 9 is a detail elevation of the "rounding" mechanism and cooperative parts;

Fig. 10 is a plan view of Fig. 9 showing the clamping heads in section;

Fig. 11 is a vertical section taken on line 11—11 of Fig. 10;

Fig. 12 is a detail showing the mechanism for adjusting vertically the subsidiary "jointing" bracket;

Fig. 13 is a detail of the crank discs used for the "jointing" linkage;

Fig. 14 is a plan view thereof;

Fig. 15 is a detail showing the face cam for operating "jointing" quadrants and ejecting mechanism.

In the jointing device which forms part of the machine illustrated, and which device is more clearly shown in Figures 1, 2, 3 and 7, adjustable cranks are used. There is provided a main bracket A which is carried and horizontally movable on horizontal rods $A^1$ which are supported in brackets $A^2$ on the main framing $A^3$ of the machine. From this bracket A are supported by links $A^4$, $A^5$, side frames $A^6$, the links being pivoted on the bracket and frames. The links $A^5$ which are in the form of rods, are adjustable in length, each being made in two parts connected by right-and-left hand screw coupling pieces $A^7$. On the coupling pieces are pinions $A^8$ engaged by rack bars $A^9$ supported in the bracket A. The links $A^4$ are connected to buffer devices consisting of rods $A^{10}$ pivoted on the links and having nuts $A^{11}$ holding springs $A^{12}$ in compression in recesses in an extension of the bracket A through which the rods pass.

The side frames $A^6$ carry transverse shafts B, $B^1$, $B^2$, on which are mounted crank discs $B^3$, $B^4$, $B^5$, carrying crank pins $B^6$, $B^7$, $B^8$ adjustable in throw (Figures 13 and 14). The crank pins $B^6$, $B^7$ are connected by links $B^{20}$ and the crank pin $B^8$ is connected by links $B^9$ with links $B^{10}$ dependent from the crank pin $B^7$ and having mounted between them at their lower ends the backing roller $B^{11}$.

The mechanism whereby the crank pins are adjusted is shown in Figures 13 and 14. Each pin $B^6$ is formed on a block $B^{12}$ sliding in guides undercut across the face of the crank disc $B^3$. The block has part of a screw thread cut along one side and this is engaged by a screw cut on a spindle $B^{13}$

lodged in the block and by rotation of which the block is adjusted along the guides. The block is locked by a V strip $B^{14}$ engaging its opposite side and forced into engagement by studs $B^{15}$.

It will be seen that oscillation of the crank discs causes through the linkage, the roller $B^{11}$ to swing through an arcuate path in conformity with the shape of the back of the book $B^{16}$ the position of the roller and the exact form and extent of its path is varied by adjustment of the crank pins.

The crank discs are oscillated by pinions C, $C^1$, fast on the shafts B, $B^1$ on which are the crank discs $B^3$, $B^4$. These pinions are engaged by toothed quadrants $C^2$ pivoted between the frames $A^6$ and rocked by links $C^3$ pivoted on them, guided on a shaft $C^4$, and engaging cams $C^5$ on that shaft.

It will be seen that all these parts—cranks, links, disc pinions, side frames,—are in duplicate, there being a set at each side of the machine. Thus the backing roller $B^{11}$ is very adequately supported and held up to its work.

The necessary pressure to insure proper "jointing" is imparted to the book through the "backing" roller by a slight shortening of the rods or links $A^5$ and a consequent downward movement of the bracket $A^6$ and allied parts, see Figs. 7 and 12. As before stated, the rods and links $A^5$ are made in two parts and connected by screw coupling pieces $A^7$ on which are formed the pinions $A^8$ engaged by the sliding rack bars $A^9$ which in turn are connected by the crosshead D. The latter is connected by a link $D^4$ to a lever $D^5$ pivotally mounted on a shaft $D^{12}$ and having a tappet roller $D^6$ engaged by a cam $D^7$ on the shaft $C^4$.

The rack bars $A^9$ slide in the brackets A when the crosshead D is advanced, the coupling pieces $A^7$ are slightly rotated, so slightly shortening the links $A^5$ and so slightly advancing the jointing roller towards the book. The force that the jointing roller can impart to the book is regulated by the adjustment of the nut $D^1$ on the spindle $D^3$ which compresses a spring $D^2$ through which the force is transmitted to the book.

During the jointing operation, the books are held between heads E, $E^1$, one E of which is fixed and the other $E^1$ of which is movable in guides in the framing. The movable head $E^1$ is advanced towards the head E to grip the book and retracted to free it by a toggle device consisting of two pairs of links $E^2$ pivoted to each other on a spindle *e* and pivoted at their other ends, the one set to the head $E^1$ and the other set to anchor block $E^3$ supported on an entablature $E^{12}$ and adjustable on screwed spindles $E^4$ rotatably held in brackets $E^5$.

The toggle links $E^2$ are operated by links $E^7$ $E^7$ pivoted at their upper ends on the spindle *e* and at their lower ends on levers $E^6$, $E^6$, the latter being pivoted on a shaft $E^{17}$ in the framing and having tappet rollers $E^8$, $E^8$, which engage respectively cams $E^9$, $E^9$ on the shaft $C^4$. In the link $E^7$ is interposed a buffer device consisting of a pair of cross heads $E^{18}$ connected by rods $E^{19}$ on the upper part of the link and an adjustable nut $E^{10}$ on the screwed spindle-like end of the lower part of the link. Between the nut and the lower crosshead, a helical spring is arranged in compression, the spring being of such strength that it will give under excess load.

A suitable and efficient conveyer device is provided, see Figs. 1, 2, 6 and 7, whereby the books are fed successively to the elevating mechanism. It comprises a pair of fixed rails $G^5$ arranged along and inside of a similar pair of movable rails G supported on adjustable tables $G^1$ and slotted as at $G^2$ to receive the eccentric studs $G^3$ of the spindles $G^4$ which are rotatably mounted in the stationary rails $G^5$. The said spindles $G^4$ are provided with crank arms $G^8$ and connected by the link $G^{11}$. Further connection between the forward crank $G^8$ and the operating lever $G^6$ is made by the rod $G^{13}$. This lever $G^6$ is pivoted at its lower end to the shaft $G^{12}$ and provided with the tappet roller $G^7$ engaging the recess in a suitable cam $C^8$ which is mounted on the transverse shaft $C^4$. Cooperating with the lever $G^6$ is a similar lever $G^{14}$ having a tappet roller engaging a recess in the opposite face of cam $C^8$, pivoted at $G^{12}$ and connected at its upper end to a rod $G^{15}$ which in turn is pivoted to a crank arm fastened to a third spindle $G^{16}$ also mounted in the stationary rails $G^5$. To the ends of this spindle $G^{15}$ are fastened upwardly extending arms which are respectively connected by links to the movable rails G and through these connections provide for the horizontal movement thereof. The movements of the cam operated levers $G^6$ and $G^{14}$ respectively, take place in such sequence that the rails G are first given an upward motion sufficiently to lift and support the column of books slightly above the stationary rails, and, secondly, a horizontal forward motion far enough to locate the foremost book against the elongated wall of the stationary jaw E and directly above the elevating device. The rails are then lowered below the fixed rails $G^5$ by the return motion of the eccentric studs $G^3$ and finally returned horizontally to their original position.

The elevating device comprises suitable blocks HH of selected size conforming to the thickness of the books being handled and rounded to receive the leaves or center portion of said book. These blocks are car-

ried on spindles $H^1$ vertically adjustable in a suitable clamp bracket $H^2$ which is supported on pins $H^3$ protruding from the slide $H^4$. Fixed vertical rods $H^5$, fastened at the top to the frame $A^3$ and at the bottom to bracket $H^6$ are provided to receive the slide $H^4$. Rack teeth $H^{10}$ cut in one of the rods $H^5$ are adapted to mesh with the pinion $H^9$ which also engages a depending rack bar $H^8$ fastened to the slide $H^4$. Pinion $H^9$ is carried in links $H^{11}$ on a lever $H^{12}$ pivoted on the shaft $G^{12}$ and having a roller $H^{13}$ engaging an edge cam $H^{14}$ on the shaft $C^4$. A spring $H^{15}$ holds the lever $H^{12}$ up to the cam and also serves as a safety device should the book jam.

The rounding device shown more particularly in Figures 9, 10 and 11 consists of a pair of rollers J, $J^1$ arranged in the gripping heads E, $E^1$, in such wise that parts of their peripheries can be made to project beyond the gripping faces of the heads. They are mounted in slide block bearings $J^2$, $J^3$, diagonal slots in the bases of which are engaged by studs $J^6$ attached to bars $J^{20}$ and $J^{21}$ which lie in the heads so that endwise movement of the bars in one direction or the other withdraws or protrudes the rollers from the faces of the heads. This endwise movement is caused by crank pins on cranks $J^7$ on a spindle $J^8$ connected by connecting rods $J^9$ with sliders $J^{10}$ on rods $J^{11}$ fixed to bosses $J^{12}$ on the bars $J^{20}$ and $J^{21}$, there being interposed between the sliders and the bosses, springs $J^{13}$ in compression so that spring pressure is applied to thrust the rollers J, $J^1$ into contact with the book surfaces.

With the book in this position securely held between the rollers J, $J^1$, motion is transferred to the latter through suitable spring controlled gearing and the book fed upwardly over the slight remaining distance to stop against the "backing" roller $B^{11}$ in the "jointing" position, where it is immediately clamped between the heads E, $E^1$, while such operation is effected. The rollers J, $J^1$, are then withdrawn into their respective recesses herein before mentioned and out of contact with the book during the "jointing" and ejection operation.

The rollers J, $J^1$ are rotated to cause the rounding action by segmental pinions $J^{14}$ on their ends engaged by rack bars $J^{15}$ suitably guided and having two racks cut upon them, one gearing with these pinions and the other gearing with pinions K, $K^1$ on a horizontal shaft $K^2$, which shaft is oscillated by a pinion $K^9$ which in turn is operated by a rack $K^4$ guided by jaws at its lower end on the shaft $C^4$ and having a tappet roller $K^5$ engaged by a face cam $K^6$ on that shaft which cam acts against the pull of a spring $K^7$ acting on a rack bar $K^8$ engaging the pinion $K^1$ on the shaft $K^2$. It will be noted that the spring $K^7$ functions to rotate the rollers J, $J^1$, through said gearing and racks in order to raise the book into contact with the "backing" roller $B^{11}$ and further permits for a range of adjustments necessary to accommodate the various thicknesses of binding.

The bars $J^{20}$ and $J^{21}$ are reciprocated by a link L connected to an arm $L^1$ on the shaft $J^8$ and to an arm $L^2$ fixed to the shaft $K^{20}$ and operated by a link $L^3$ racked at the top to engage the pinion $K^{21}$, also fixed to shaft $K^{20}$ forked to engage the shaft $C^4$ and carrying a tappet roller $L^4$ engaged by the internal cam $L^5$.

After the rounding and jointing operations are completed, the book is discharged onto guide rails which engage beneath its jointed edges and on which it passes to the machine performing the next operation upon it. The discharging device consists of a finger M on the end of a rack bar $M^1$ guided in the fixed head E, and with which there engages a pinion $M^2$ on a vertical shaft $M^{10}$ carried in bearings in the framing and which has on its lower end a pinion $M^3$ engaged by a rack-slide $M^4$ guided in a fixed bracket $M^5$ and reciprocated by a link $M^6$ pivoted at one end to it and at the other end connected to a lever $M^7$ pivoted on the shaft $E^{17}$ and bearing a tappet roller $M^8$ operated by a cam $M^9$ on the shaft $C^4$.

The book is discharged onto a carrier-rail device indicated by chain lines N in Figure 2 by which it passes to the next machine—for instance, a lining machine. Varying thicknesses of book are of course, handled by the machine, and it is essential that the centre of the book, the central vertical plane that is, should remain in one position. The adjustment of the parts to this end, in a lining machine, is performed by a shaft $N^1$ (Figure 2) and in order that adjustment of both machines in this respect may be made simultaneously, the motion of this shaft is led into the present machine by way of a pinion $N^2$, on the shaft $N^1$ gearing with a pinion $N^3$ on a shaft $N^4$, passing beneath the conveyor device and which has on it a pinion $N^5$ gearing with a pinion $N^6$ on a shaft $N^7$ in line with the shaft $N^1$ and provided with a handwheel $N^9$.

Along the sides of the machine are shafts P, $P^1$, suitably journalled in fixed bearings and having on them worm-wheels $P^2$, $P^3$, engaged respectively by worms $P^5$, see dotted lines, Fig. 1 on the shafts $N^1$, $N^7$. These shafts P, $P^1$ are threaded at both ends as at $P^6$, $P^6$, and $P^7$, $P^7$, to engage respectively depending lugs $P^8$, $P^9$, on the supporting bracket A and blocks $P^{10}$, $P^{11}$, fastened to the sides of the entablature or table $E^{12}$. Since the bracket A carries the "jointing" devices and the center line of the "backing" roller normally coincides with the center line of the book, a change in thickness of

the book necessitates a corresponding adjustment of the parts. The movable jaw $E^1$ carried by the table must also be adjusted in the same direction but twice the distance of the bracket, consequently, the threads $P^7$, $P^7$, on shafts P, $P^1$, are given twice the pitch of the threads $P^6$, $P^6$. Rotation, therefore, of the shafts P, $P^1$, in either direction will move the right hand gripping jaw twice the distance of the bracket A and the proper relation of the parts is maintained at all times for any thickness of book.

The various cams and other parts are so timed that a book is delivered by the conveyor device onto the elevator block H, which then rises, lifting the book between the open heads E, $E^1$. The rounding rollers J, $J^1$ move into engagement and the book is rounded. The movable jaw is now closed and the backing roller $B^{11}$ is then advanced and performs the jointing operation. It then retires, the heads retire and the book is laterally discharged onto the rails N by the finger M.

What I claim is:—

1. In a "rounding and jointing" machine for books, the combination of a "backing" roller, operating means therefor, an adjustable supporting bracket for said operating means, a book clamping device comprising a stationary and a movable jaw, an adjustable table for the movable jaw, and means for effecting a co-relative adjustment of the said supporting bracket and table.

2. In a "rounding and jointing" machine for books, the combination of a "backing" roller, operating means therefor, an adjustable supporting bracket for said operating means, a book clamping device comprising a stationary and a movable jaw, an adjustable table for the movable jaw, and means for adjusting both said supporting bracket and table relative to the fixed jaw and relative to each other.

3. In a "rounding and jointing" machine for books, the combination of a "backing" roller, operating means therefor, an adjustable supporting bracket for said operating means, a book clamping device comprising a stationary and a movable jaw, an adjustable table for the movable jaw, and unitary means for effecting the proper adjustment of said supporting bracket and table.

4. In a "rounding and jointing" machine for books, the combination of a "backing" roller, operating means therefor, an adjustable supporting bracket for said operating means, a book clamping device comprising a stationary and a movable jaw, an adjustable table for the movable jaw, and means for adjusting said supporting bracket and table simultaneously relatively to the fixed jaw and relatively to each other.

5. In a "rounding and jointing" machine for books, the combination of a "backing" roller, operating means therefor, an adjustable supporting bracket for said operating means, and means for setting said supporting bracket in different operative positions.

6. In a "rounding and jointing" machine for books, the combination of a "backing" roller, operating means for moving said roller in an arcuate path, an adjustable supporting bracket for said operating means, a clamping device for the book, and means for adjusting said supporting bracket relative to the clamping device to adapt the "backing" roller to cooperate with books of different thicknesses.

7. In a "rounding and jointing" machine for books, the combination of an adjustable clamping device, an adjustably mounted "backing" roller, and connections between said parts whereby the adjustment of one effects a corresponding adjustment of the other.

8. In a "rounding and jointing" machine for books, the combination of a clamping device, a "backing" roller, and unitary means for effecting a relative adjustment between said parts.

9. In a "rounding and jointing" machine for books, the combination of an adjustable clamping device, an adjustably mounted "backing" roller, and means for adjusting simultaneously the clamping device and "backing" roller.

10. In a "rounding and jointing" machine for books, the combination of an adjustable clamping device adapted to hold books of different thicknesses during the "jointing" operation, a "backing" roller, means for operating said "backing" roller, a supporting bracket for said operating means, and means for adjusting the clamping device and automatically adjusting the said supporting bracket in order to maintain a fixed operative relation between the "backing" roller and the book to be acted upon.

11. In a "rounding and jointing" machine for books, a device for gripping and rounding, consisting of a pair of jaws having vertical faces between which the book is gripped, recesses in the face of the jaws, rounding rollers arranged in the recesses with their axes parallel with the book, means for causing parts of the adjacent peripheries and the rollers to protrude and engage the book, and means for rotating the rollers to cause a rounding action.

12. In a "rounding and jointing" machine for books, a device for gripping and rounding, consisting of a pair of jaws having vertical faces between which the book is gripped, recesses in the face of the jaws, rounding rollers journalled in blocks slidably arranged in said recesses, means connected to said blocks for projecting said rollers into and out of peripheral contact with the opposite faces of a book, and means for

rotating said rollers to effect the rounding action and raise the book to the jointing position.

13. In a "rounding and jointing" machine for books, the combination of a "backing" roller, operating means therefor, a main supporting bracket for said operating means, a subsidiary bracket adjustably supported by the main bracket, discs carried by said subsidiary bracket, pins radially adjustable in said discs, link connections between the "backing" roller and said pins, gearing for oscillating the discs and a cam for the control of said gearing and operating in proper sequence with similar controlling devices.

14. In a "rounding and jointing" machine for books, the combination of a clamping device comprising a stationary jaw and a movable jaw, an adjustable table on which the movable law is mounted, means for adjusting the table to set the movable jaw at different distances from the stationary jaw to accommodate books of different thicknesses and means for moving said movable jaw relative to said table to perform the clamping operation.

15. In a "rounding and jointing" machine for books, the combination of a clamping device having a movable and a stationary jaw, a conveyer to accommodate a column of books, the gripping face or wall of said stationary jaw being extended to cooperate with books upon the conveyer and operating means for said conveyer by which the said books are delivered successively flat against the extended portion or wall of the stationary jaw.

16. In a "rounding and jointing" machine for books, the combination of a clamping device having a movable jaw and a stationary jaw, a book conveyer comprising a pair of movable rails and a pair of cooperating stationary rails, and means for operating the movable rails relative to the stationary rails in order to present a book against the stationary jaw of the clamping device and in proper vertical alignment therewith.

17. In a "rounding and jointing" machine for books, the combination of a clamping device comprising a stationary and a movable jaw between which a book is delivered, a pair of "rounding" rollers located within respective recesses in said jaws, means for projecting said rollers under spring pressure into peripheral contact with the opposite faces of the book, and means for rotating said rollers to effect the "rounding" action.

18. In a "rounding and jointing" machine for books, the combination of a clamping device, comprising a stationary and a movable jaw, a "backing" roller, operating means therefor, located above a book in the jointing position and by which the roller is moved about an imaginary axis, located below a book in the jointing position.

19. In a "rounding and jointing" machine for books, a device for gripping and rounding, consisting of a pair of jaws having vertical faces between which the book is gripped, recesses in the face of the jaws, rounding rollers journalled in blocks slidably arranged in said recesses, diagonal slots in the under side of said blocks, bars underlying the blocks and having pins engaging the said slots, means for imparting an endwise movement to said bars by which the rounding rollers are projected into and out of peripheral contact with the book and means for rotating said rollers, for the purpose described.

20. In a "rounding and jointing" machine for books, the combination of a "backing" roller, operating means therefor, and a supporting bracket for said operating means, the said operating means consisting of a parallel motion device located above the path of movement of the "backing" roller.

21. In a "rounding and jointing" machine for books, the combination of a "backing" roller, operating means therefor, an adjustable supporting bracket for said operating means, and a book clamping device for holding a book in operative relation to the "backing" roller, the said operating means including a parallel motion device by which the said roller is constrained to move about an imaginary axis, located below the back of the book.

22. In a "rounding and jointing" machine for books, the combination of a "backing" roller, a book clamping device for holding a book in operative relation to said roller, and means for moving the roller about an imaginary axis, located below the back of the book.

23. In a "rounding and jointing" machine for books, the combination of a "backing" roller, a book clamping device for holding a book in operative relation to said roller, and means for moving the roller about an imaginary axis, located below the back of the book, said means consisting of a parallel motion device, located above the back of the book.

24. In a "rounding and jointing" machine for books, a conveyer device, consisting of a pair of fixed horizontal rails on which a column of books normally rests, a pair of movable rails, arranged to cooperate with said column of books, and means for imparting an elliptical motion to the movable rails for advancing the books in the manner set forth.

In testimony whereof I have signed my name to this specification.

JOHN MURRAY.