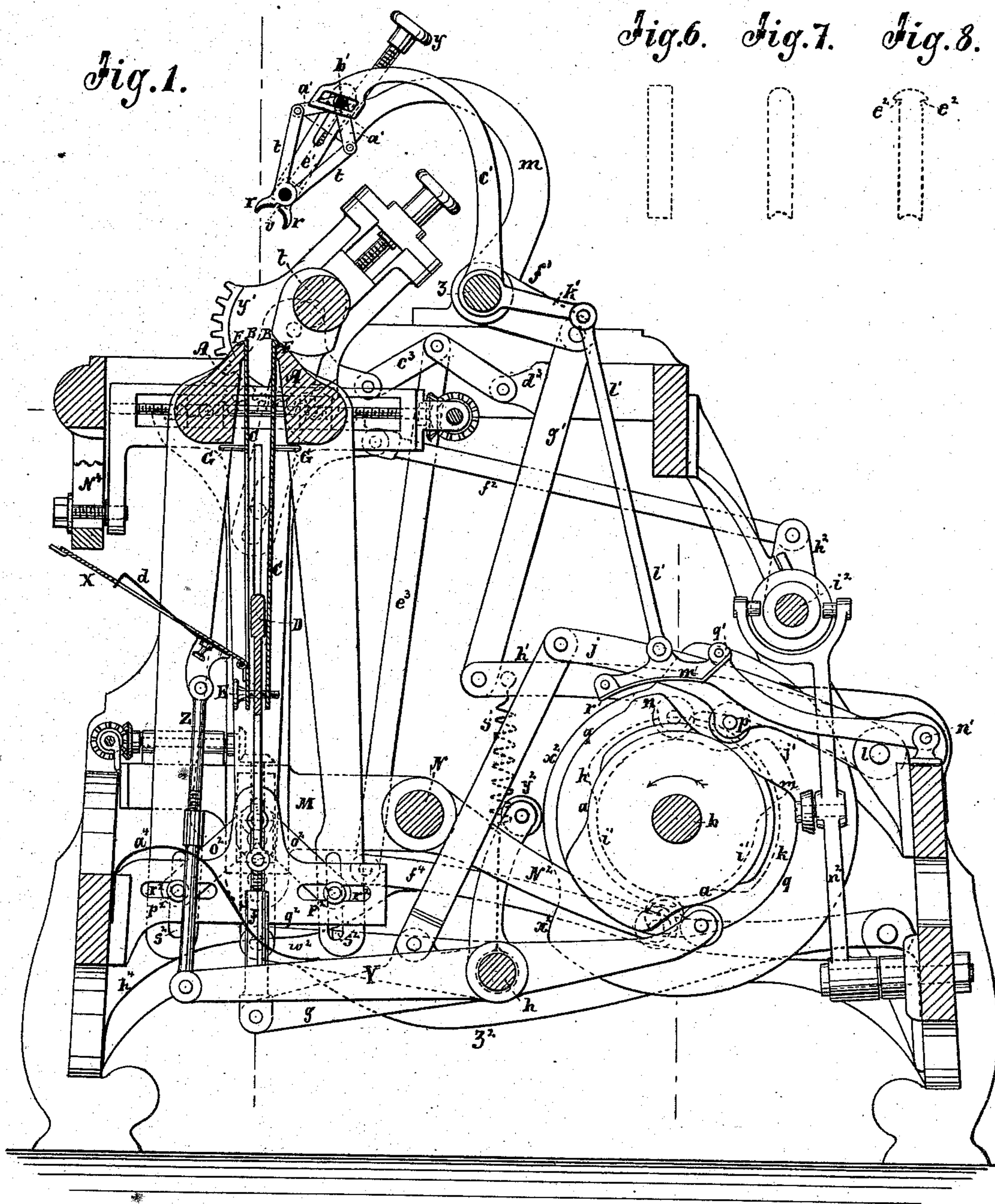


J. E. COFFIN.

Machines for Rounding and Backing Books.

No. 158,679.

Patented Jan. 12, 1875.



WITNESSES:

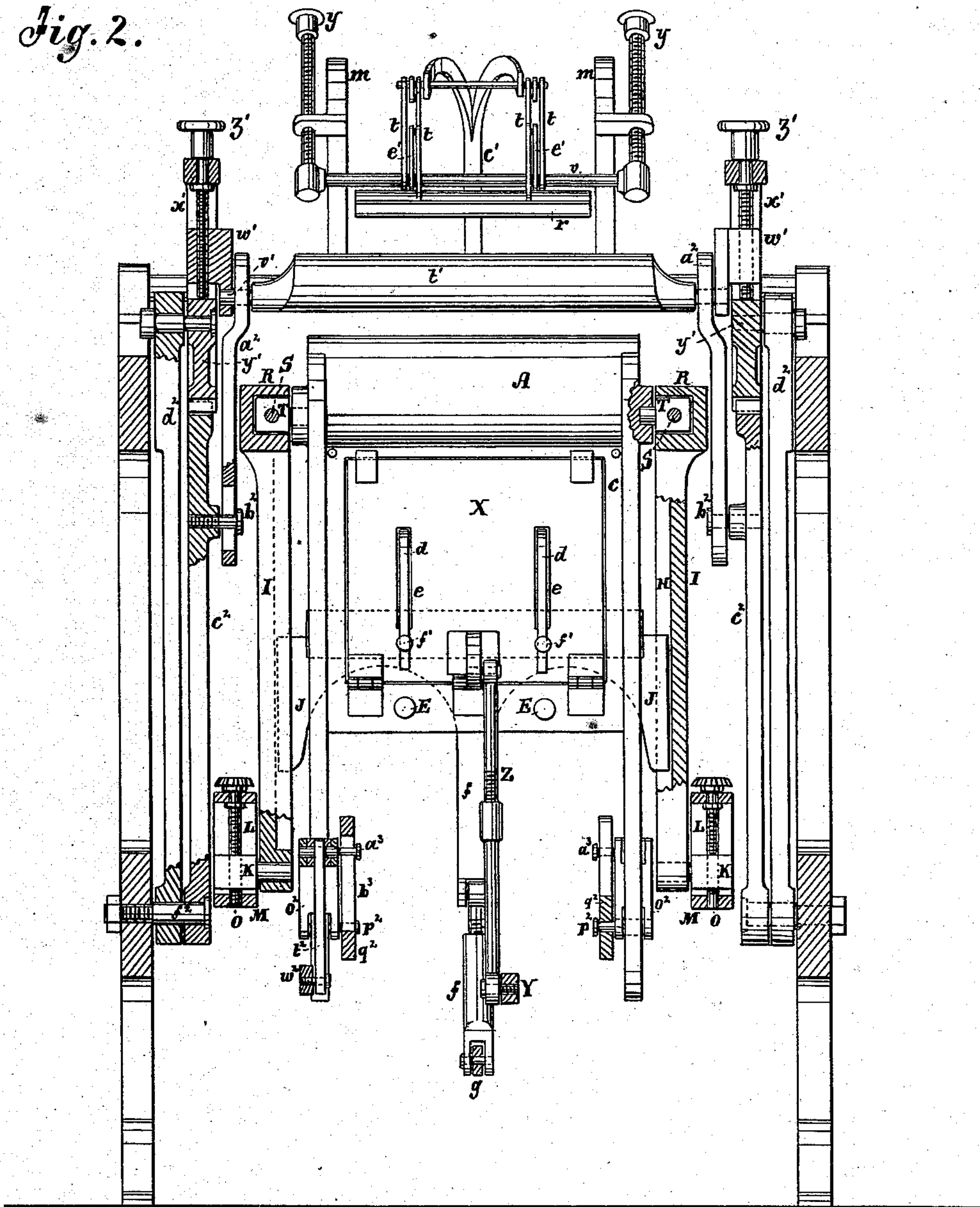
A. Bannemundorf.
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Fig. 2.



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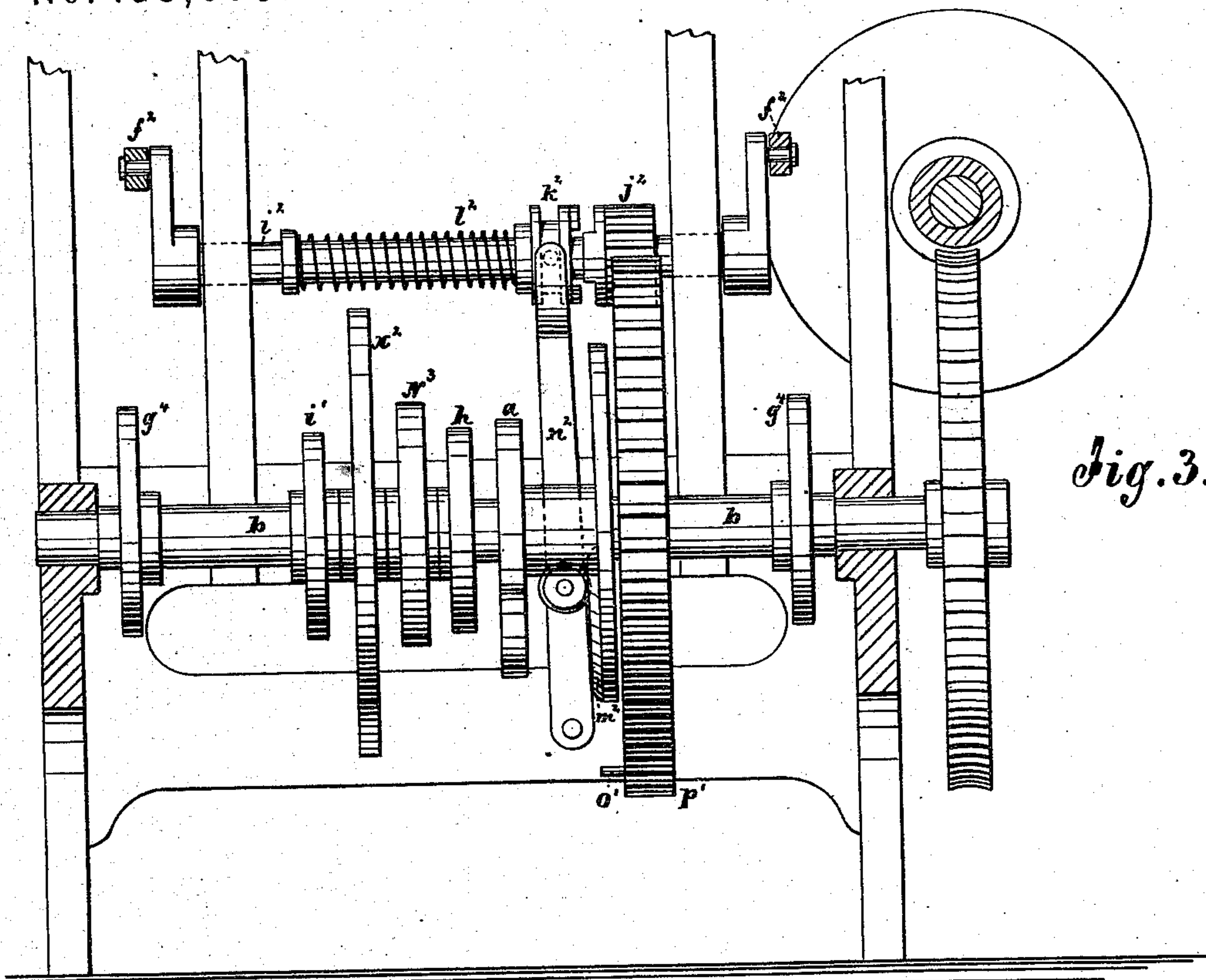


Fig. 3.

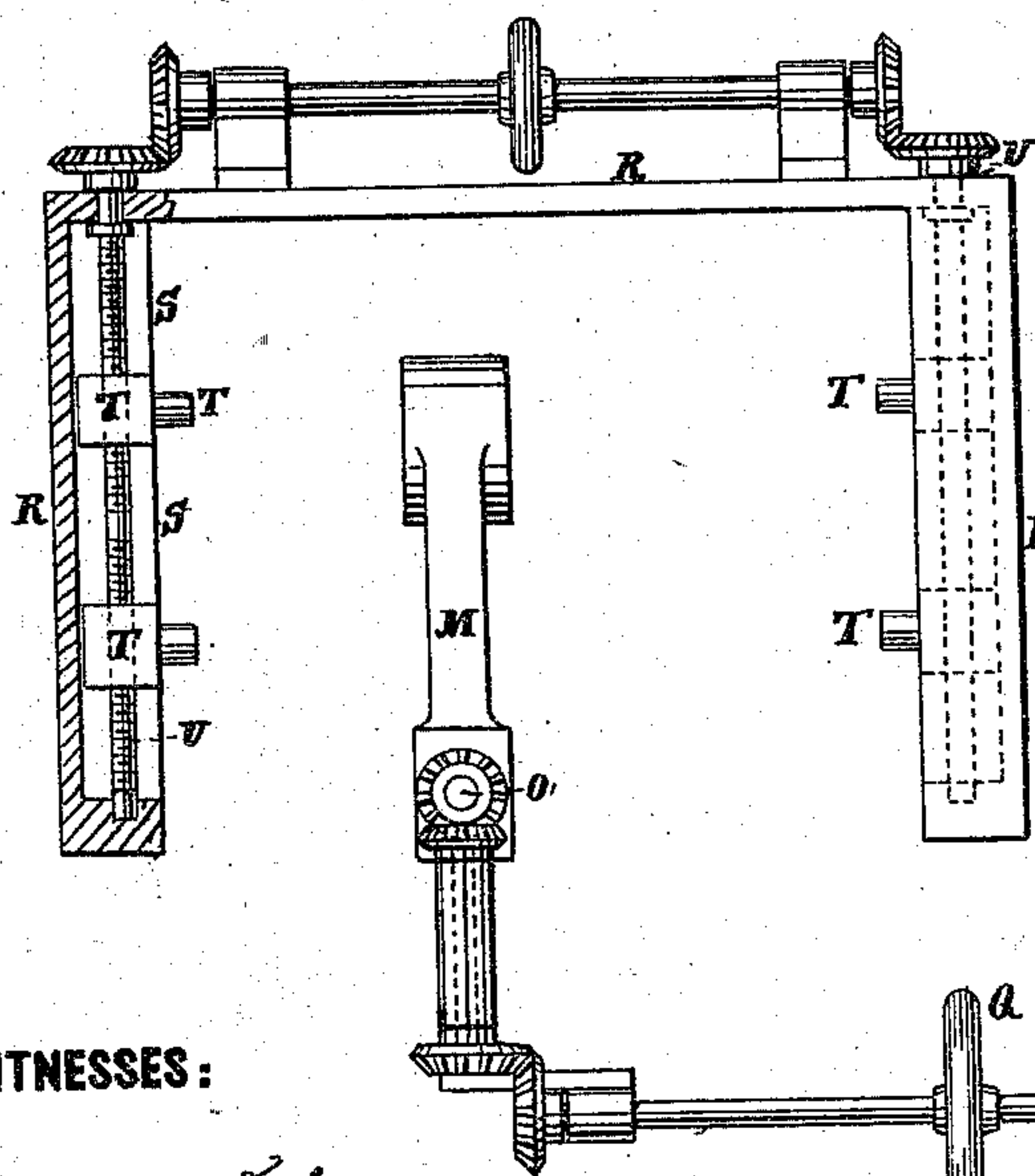


Fig. 4.

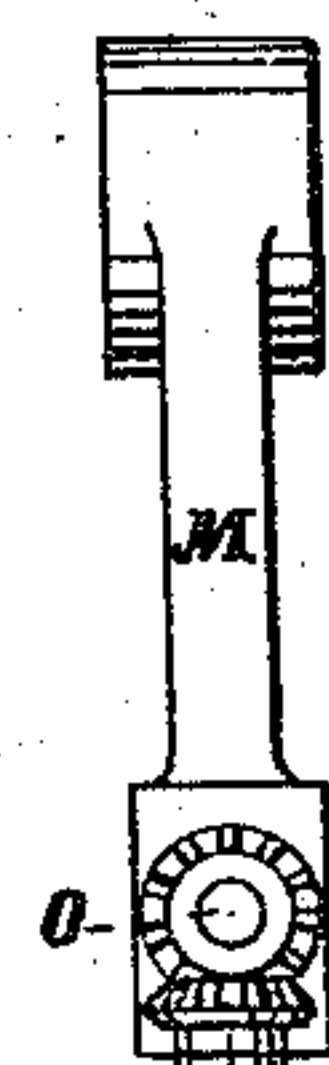


Fig. 5.

WITNESSES:

A. Benneken & Co.
A. F. Terry.

INVENTOR:

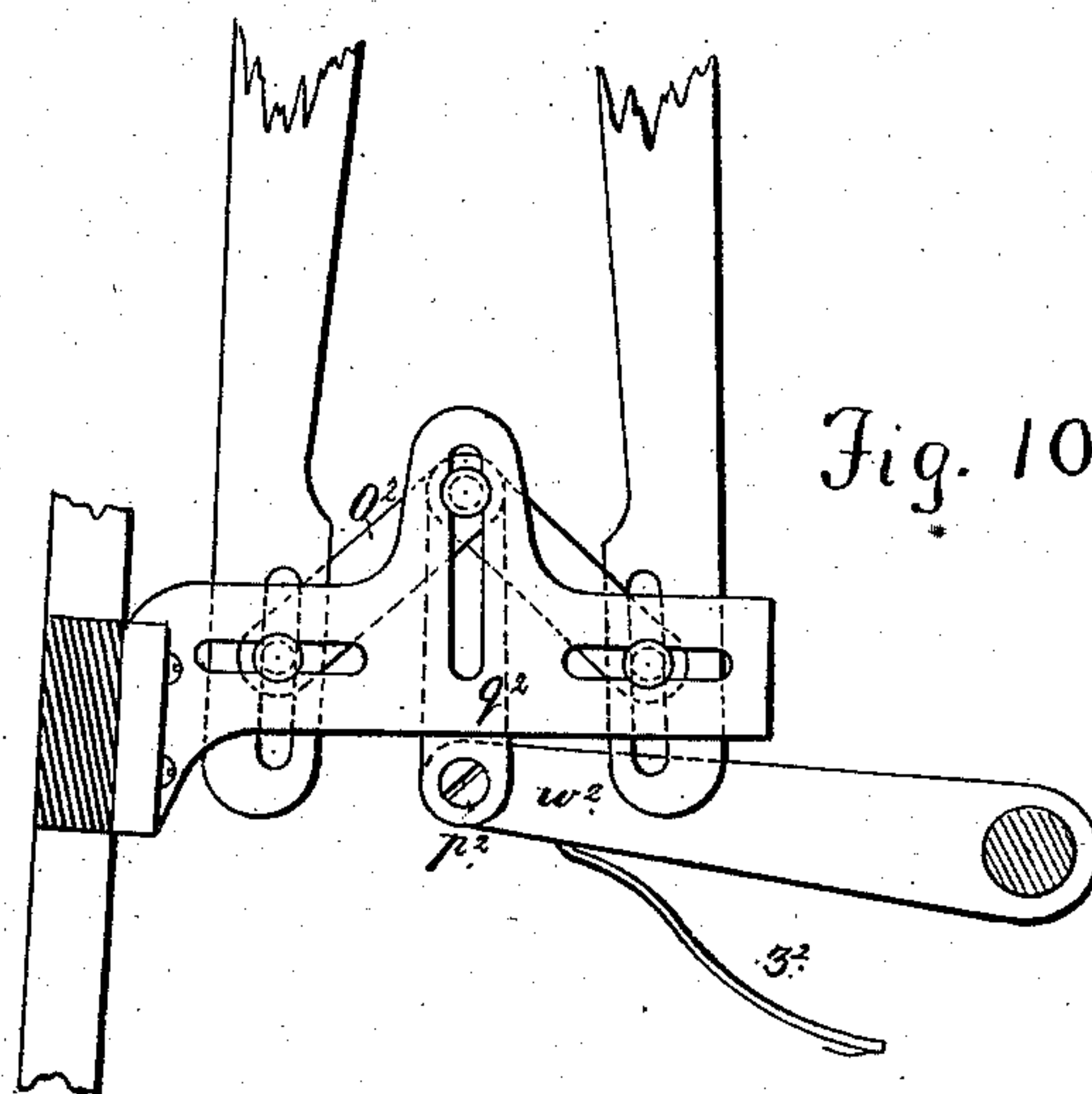
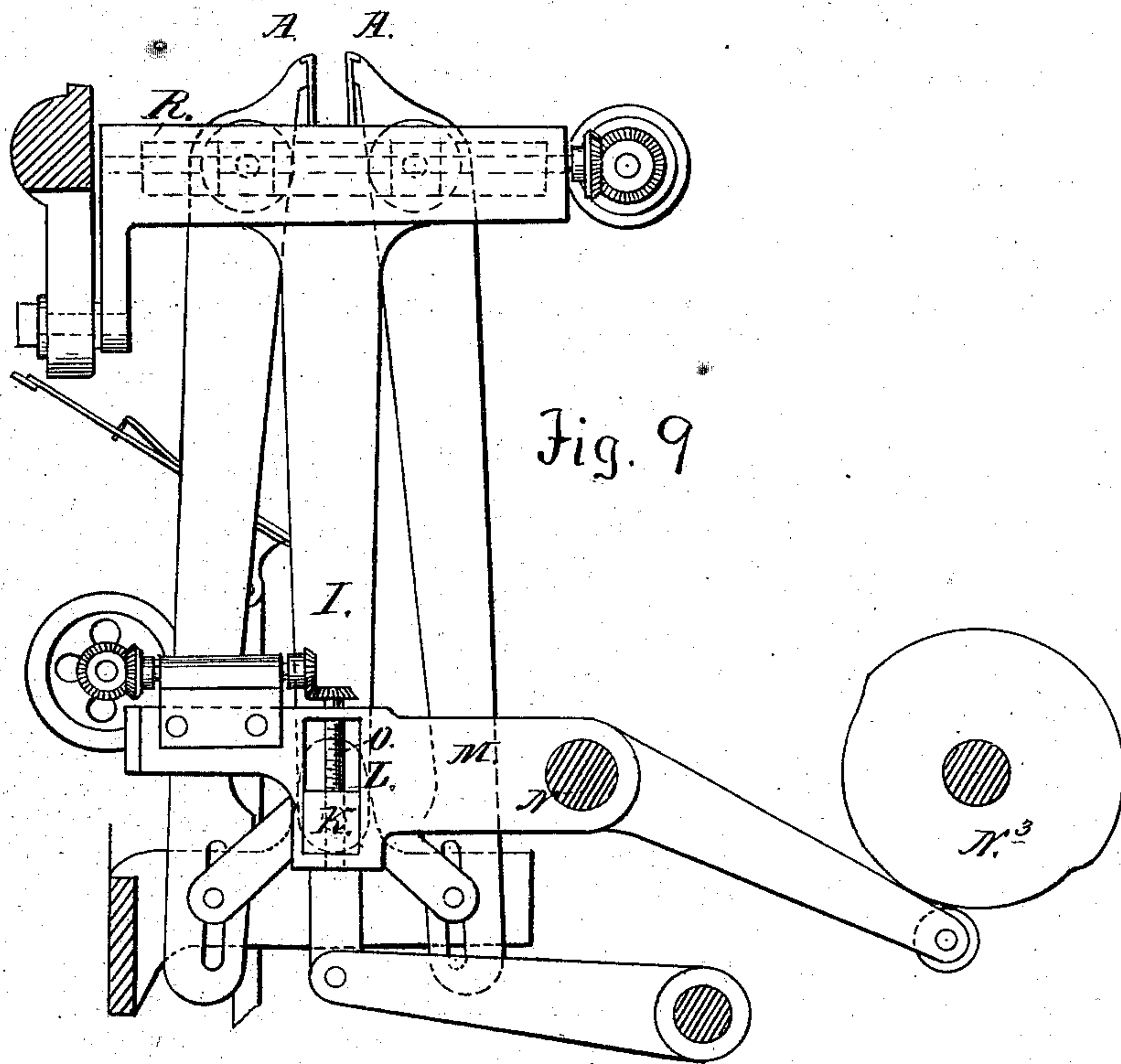
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Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN E. COFFIN, OF PORTLAND, MAINE.

IMPROVEMENT IN MACHINES FOR ROUNDING AND BACKING BOOKS.

Specification forming part of Letters Patent No. **158,679**, dated January 12, 1875; application filed October 24, 1874.

To all whom it may concern:

Be it known that I, JOHN E. COFFIN, of Portland, in the county of Cumberland and State of Maine, have invented a new and Improved Machine for Rounding and Backing Books, of which the following is a specification:

The object of my invention is to produce a machine which will automatically and continuously perform those operations upon books which are technically known in the book-binders' art as "rounding" and "backing" in progressive operations, more expeditiously, cheaper, and better than the machines now in use for the same purposes, which said machine is particularly described in the following specification, and the matters which I consider of my invention set forth in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional elevation taken on the line *xx* of Fig. 2. Fig. 2 is a sectional elevation taken on the line *yy* of Fig. 1. Fig. 3 is a section of a portion of the machine in a plane of the cam-shaft on line *zz* of Fig. 2, showing the cams and driving-gear. Fig. 4 is a detail section of the adjusting device for setting the clamping-jaws for books, differing in thickness. Fig. 5 is a detail in section of the adjusting device for varying the height of the clamping-jaws relatively to the pressure-bar and the backing-bar.

The dotted figures, 6, 7, and 8, show the different stages of the book, the first representing the form of the book when put into the machine, the second the form after the rounding process, and the third after rounding and backing.

Fig. 9 is a view of the jaw-frame and operating mechanism, and Fig. 10 is a view of the toggle-levers for opening and closing jaw-levers.

Similar letters of reference indicate corresponding parts.

A represents the jaws for holding the book while being rounded, and clamping it while being backed. They are armed with metal facings B, which consist of the upper portions of wide metal plates C, which extend down half the length or more of the legs of the jaws on each side of a lifting cross-head, D,

and are connected together below it by the right and left screws E, to adjust them in the lower part to the thickness of the book, which is presented to the jaws between them. These plates are suspended from the jaws by a flange, F, upon each turned over on the top of its jaw, and they are prevented from rising up by a pin, G, projecting under the jaw. The lifting cross-head extends at each end J from between the plates into a groove in an upright, I. These uprights are pivoted at the lower end to a block, K, arranged in a vertical slot, L, in the free end of a strong arm, M, mounted on a rock-shaft, N, there being two of said arms, one to each upright, to raise the jaws and lift the book up to the backing-bar after the pressure-bar has rounded the back. The blocks K each have an adjusting-screw, O, for raising and lowering them, to adjust the jaws vertically, which are pivoted to a frame supported by these uprights at their top, and the screws are geared to a shaft, P, having a hand-wheel for turning them conveniently. R is a horizontal frame, which is carried on the top of the uprights for the support of the jaws. It has parallel grooves, S, in which shifting pivot-blocks T, to which the jaws are pivoted, are arranged; and these blocks for the two jaws are connected at each end by a right and left screw, U, and the screws are geared together with a shaft having a hand-wheel, to adjust them more or less apart for books differing in thickness. This frame is lifted by the rock-arms M, shaft N, lever N², and cam N³, and it has guides in the frame at N⁴. The front plate C has a large opening through it under the front jaw and between its legs, through which the books are to be presented and placed on the lifting cross-head, to be lifted up between the jaws. A door, X, is hinged to this plate at the bottom of the opening, and connected to the rock-lever Y by the rod Z, which is actuated by the face-cam *a* on the cam-shaft *b*, to close the door when the book is placed on it, for placing the book on the lifter and holding it there until it is lifted up and gripped by the jaws.

The door has spring-holders, *d*, to gage the lower edge of the book, and hold it while the door is moving it up over the lifter.

The springs are pressed against the lifter as the door closes, and are pushed back from under the back by the lifter as the book passes over it. They are secured in slots e , so that they spring back into the slots out of the way of the lifter, and the fastening-screws are adjustable up and down the slots, to shift the spring-holders according to the height of the book to be presented. The rod Z , by which the door is connected to the rock-lever Y , is adjustable, as to its length, to suit the requirements for shutting the door properly in all cases. The lifting cross-head D is connected, by the jointed and extensible rod f , with the rock-arm g pivoted on the shaft h , and connected, by the rod i , with the lever j , which rests on the face-cam k , and is pivoted to the frame at l . This cam allows, by its depression between the elevations m and n , the lifter to fall down below the spring-stops to receive the book, which is presented above it, and the door is closed while the depression is passing the point of contact with the lever j , which is the roller p . The elevation n then causes the lifter to rise, and presents the top of the book up between and above the jaws, and the circular portion q between the two elevations holds the book in that position, while the rounding presser-bar r comes down and curves or rounds the top, and, together with the lifter, which is convex on the top, produces the forms represented at top and bottom of the dotted line, Fig. 7. This presser-bar consists of two parallel concave bars, together forming a half-circle, or nearly, and they are mounted on the rock-levers t pivoted on the rod u , which is suspended from the curved bars w by the adjusting-screws y attached to the rock-shaft z . The long arms of the levers t are connected, by the toggle-bars a^1 , with the rod b^1 held in the ends of the forked curved arms c^1 pivoted on the rock-shaft z . This rod b^1 is also fitted to slide in the slotted bars e^1 toward and from the rod v , on which the arms of the presser-bar are pivoted to swing the two parts of the presser-bar toward and from each other. The rock-shaft z is connected, by arm f^1 and rod g^1 , with the lever h^1 , which rests on the small face-cam i^1 of cam-shaft b , to be raised by the elevation j^1 to swing the presser-bar down on the top of the book for rounding the latter. The arm c^1 is connected, by arm k^1 and rod l^1 , with the lever m^1 , which is pivoted to the frame at n^1 , and is lifted by the stud-pin o^1 on the wheel p^1 immediately after the presser-bar has moved down on the book, to close the presser-bar thereon and complete the shape. The arms c^1 and the rod b^1 are carried mainly by and with the arms m , but the stud-pin passes under the inclined flange at the moment the presser-bar stops and moves arm c^1 a little farther than it is carried by arms m , thus forcing the presser-bar together by the toggle contrivance. The stud-pin o^1 then passes under the curved flange r^1 , and holds the pressure-bar in the closed position for a short time; then, when

the stud frees the lever m^1 , the elevation j of cam i releases the arms m , and the spring s^1 pulls the presser-bar back out of the way, to allow the backing-bar t^1 to act for producing the form at the top of the head represented in Fig. 8. This bar, which is of round form, with the under side slightly flattened, has journals v^1 eccentric to the axis, and coincident, or nearly so, with the bottom, which are fitted in the bearing-blocks w^1 fitted in slots x^1 of the rockers y^1 , to slide up and down by adjusting-screws z^1 to adjust the backing-bar toward and from the jaws. Inside of the bearing-blocks w^1 the backing-bar has levers a^2 attached rigidly to control the oscillations of the bar, and these bars extend downward a suitable distance, where they are connected by stud-pin b^2 projecting from the rocker-arms c^2 into slotted holes in them. The rockers y^1 are pivoted to the uprights d^2 at their upper ends, and they gear, by toothed segments at the lower ends, with the segments of the upper ends of the lower rockers to be worked by them for moving the backing-bar forward and backward in a curved path over the top of the book to shape it. The levers a^2 at the same time oscillate the backing-bar, so that the pressure is made a little greater upon the outer "signatures" of the book, by reason of the flatness of the under side of the bar, than in the middle portion, thereby imparting the projecting form of said outer signatures. (Shown at e^2 , Fig. 8.)

This pressure-bar will, in practice, have upon its upper convex edge, and at the extremities of the arc thereof, two shoulders, to afford a support for the outer signatures and prevent them from being pressed down out of place during the rounding. These signatures will be held in place by the jaws during the backing. The lower rockers are pivoted at f^2 to the frame, and at the upper end are connected by the rods f^2 with the cranks h^2 of the revolving shaft i^2 , to be worked forward and backward for working the backing-bar. This crank-shaft is geared by the loose pinion j^2 and clutch k^2 with the wheel p^1 of the cam-shaft, so as to have several revolutions to one of the cam-shaft, and thus work the backing-bar several times for every book. The crank-shaft is put in gear at the proper time by the spring l^2 , which throws the clutch in, and it is stopped when the backing-bar has performed its work by the cam m^2 , which throws the clutch out by the lever n^2 ; but just before the backing-bar is set in operation the jaws are to be closed to clamp the book firmly after it has been adjusted and rounded by the presser-bar. For this purpose the jaws are connected together at the lower ends of their legs by the toggle-bars o^2 , which are also connected by the same pivots p^2 that connect them to the legs with the stationary bars q^2 of the frame, the said pivots being arranged in the slots r^2 of said bars to allow the toggle-bars to draw the jaw-legs toward and from each other. They are also connected to bars q^2 by their

joint-pivots a^3 in vertical slots b^3 , to guide the bars in opening and closing the jaws, and the legs have a slot, s^2 , to allow them to rise and fall on the pivots as they are adjusted toward and from the backing-bar by the frame R. The toggle-bars are connected by a rod, t^2 , with a rock-arm, w^2 , of the shaft h , to be forced down for closing the jaws by the face-cam x^2 , acting on the lever y^2 of the shaft. The toggle-bars are thrown up again to open the jaws by the springs z^2 . The upper rock-ers, to which the backing-bar is pivoted, are pivoted in the top of the uprights d^2 for the purpose of being swung back out of the way of the presser-bar when it moves down to act on the book. These uprights are connected by the toggle-bars e^3 with the frame d^3 , and the toggle-bars are connected by rod e^3 with the levers f^4 , which are pressed down to swing the backing-bar forward to the working position by the cams g^4 , and they are forced up to draw it back by springs h^4 . The cams g^4 come into action and move the backing-bar forward just before the clutch k^2 is thrown in and the rockers set in motion, and they hold the backing-bar in position, while it works and releases it at the moment when the clutch is thrown out, when the springs h^4 immediately throw up the toggle-bars and swing the backing-bar back out of the way again. As soon as the jaws have been pressed together and the book clamped for the backing-bar to act, the door is freed by the cam a , and the spring a^4 presses down the lever Y and opens the door to receive another book while the one in the jaws is being backed. The door remains open until the book is completed and removed, and then swings up again, as before, to deliver another book. The completed book is taken out of the jaws at the top, being raised a little after the jaws have relaxed their pressure by the elevation n of cam h , to allow the attendant to take hold of it readily above the jaws. The backing-bar and the pressure-bar both swing back far enough to allow of lifting the book out in this manner.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the holding-jaws A, of an eccentric rocking backing-bar having an oscillating motion on its own axis eccentric to the rocking motion imparted by the rock-ers, substantially as specified.
 2. The combination of an expansible and contractible concave rounding pressure-bar with the holding-jaws, substantially as specified.
 3. The plates C, suspended from the jaws, and having adjusting-screws, substantially as specified.
 4. The adjustable holding-springs d , combined with the slotted door x and the lifter, substantially as specified.
 5. The jaws A, frame R, uprights L, rock-arms M, shaft N, and cams N^3 , combined and arranged substantially as specified.
 6. The jaw-supporting frame, connected adjustably to the arms M by arms I pivoted to blocks K and screws O, in combination with the pressure-bar and the backing-bar, substantially as specified.
 7. The combination of the jaw-legs, toggle-bars o^2 , stationary arms q^2 , and the lever w^2 , the legs and the stationary arms having slots for the connecting-pivots p^2 , as described.
 8. The combination, with the backing-bar, pivoted eccentrically to the rockers y^1 , of the arms a^2 , connected to the lower rockers c^2 , substantially as specified.
 9. The pressure-bar, composed of end parts r , with levers t jointed to rod v to open and close said bar, substantially as specified.
- The combination of rock-arm c^1 , cam-shoe q^1 , levers k^1 , l^1 , rod b^1 , and bars a^1 and e^1 with the divided pressure-bar r , levers t , and the rock-arms m , substantially as specified.

JOHN E. COFFIN.

Witnesses:

EDWARD W. FOX,
CHARLES P. MATTICKS.