No. 741,003. PATENTED OCT. 6, 1903.

E. GROSSE.

MACHINE FOR CUTTING THE EDGES OF BOOKS.

APPLICATION FILED JULY 16, 1900.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.

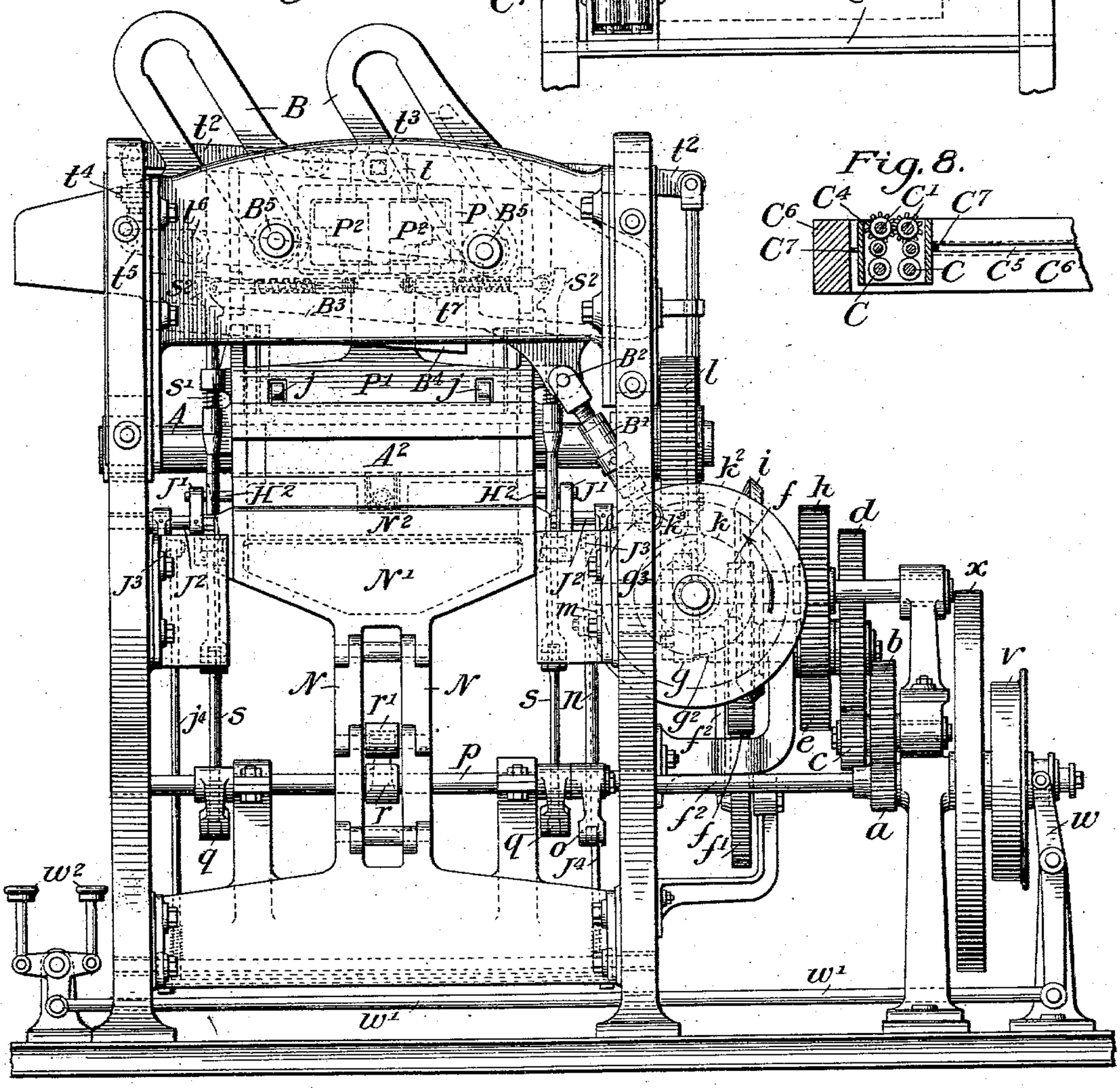

Fig. 9.

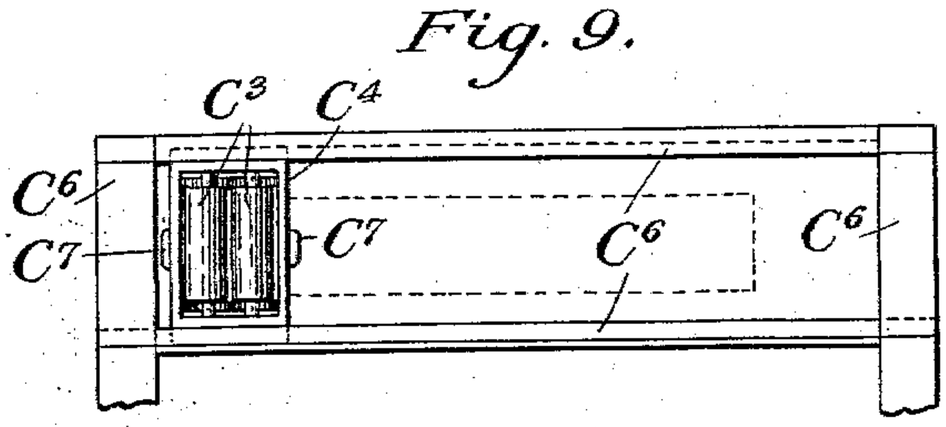

Fig. 8.

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2a.

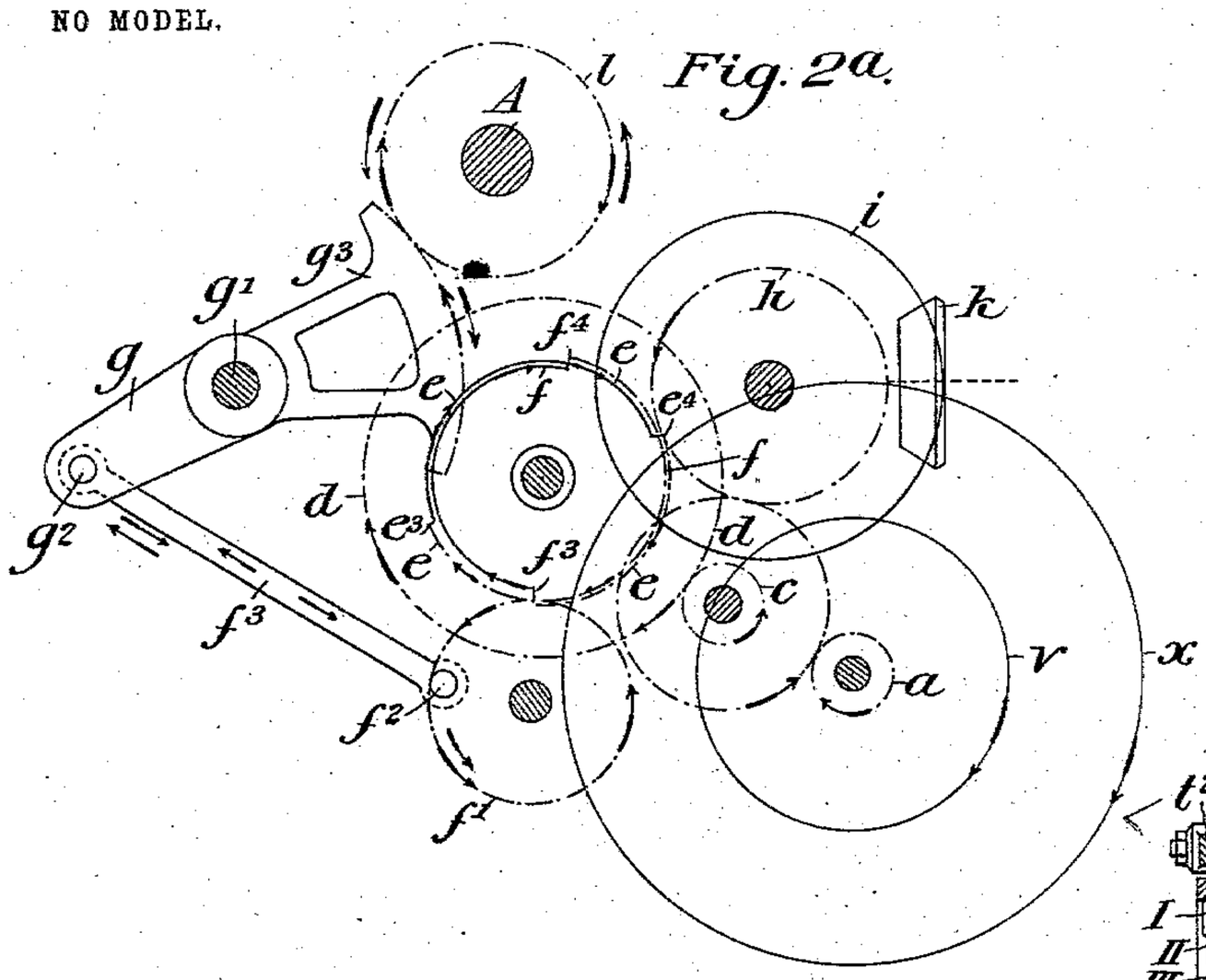
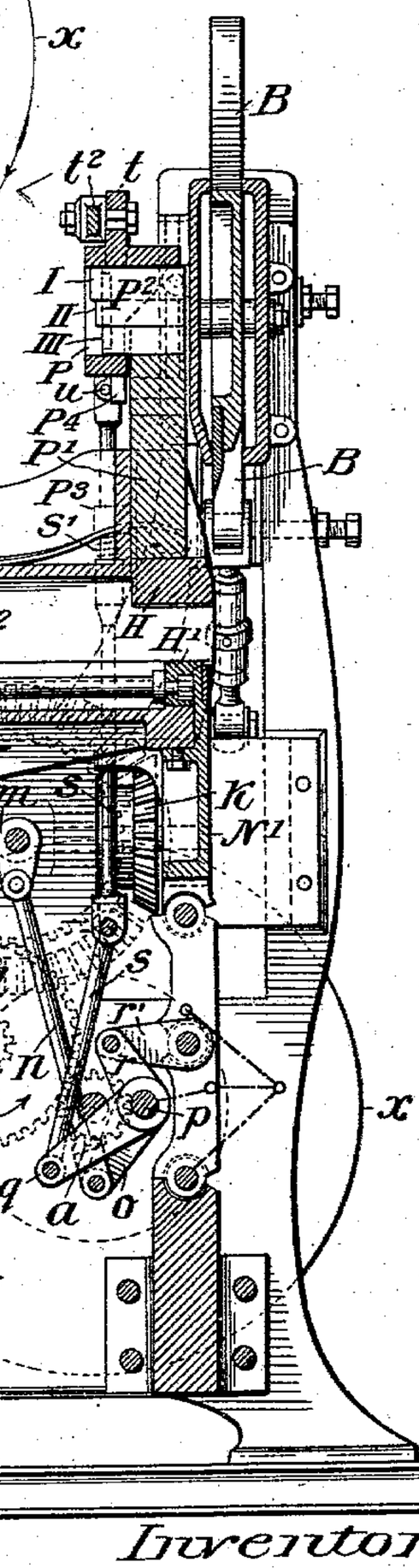


Fig. 2.



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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 5.

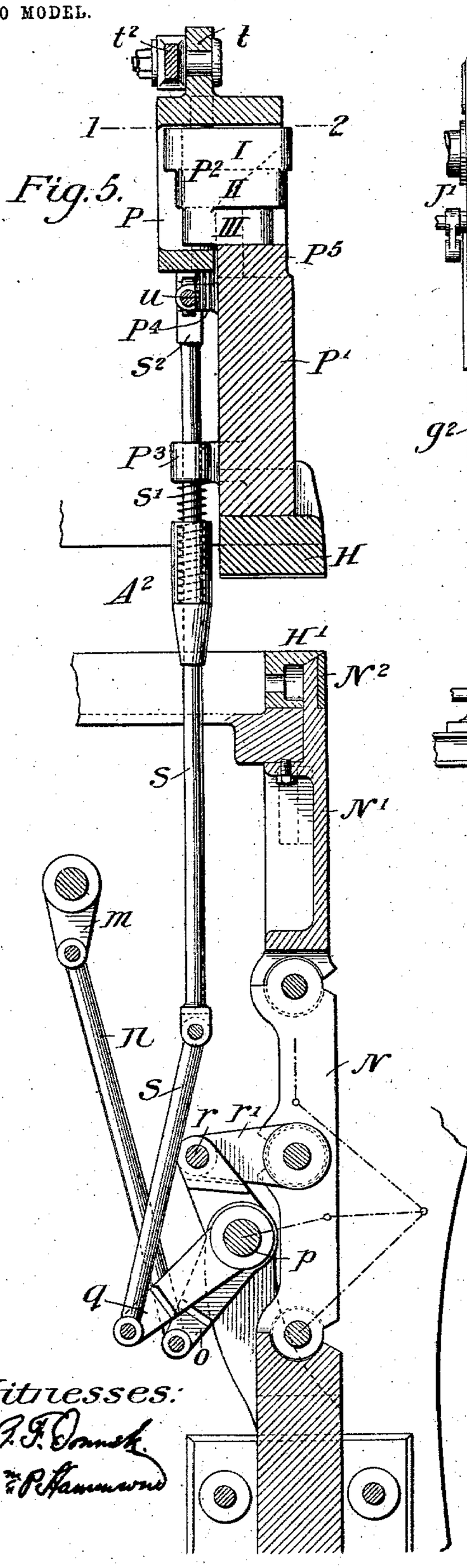


Fig. 3.

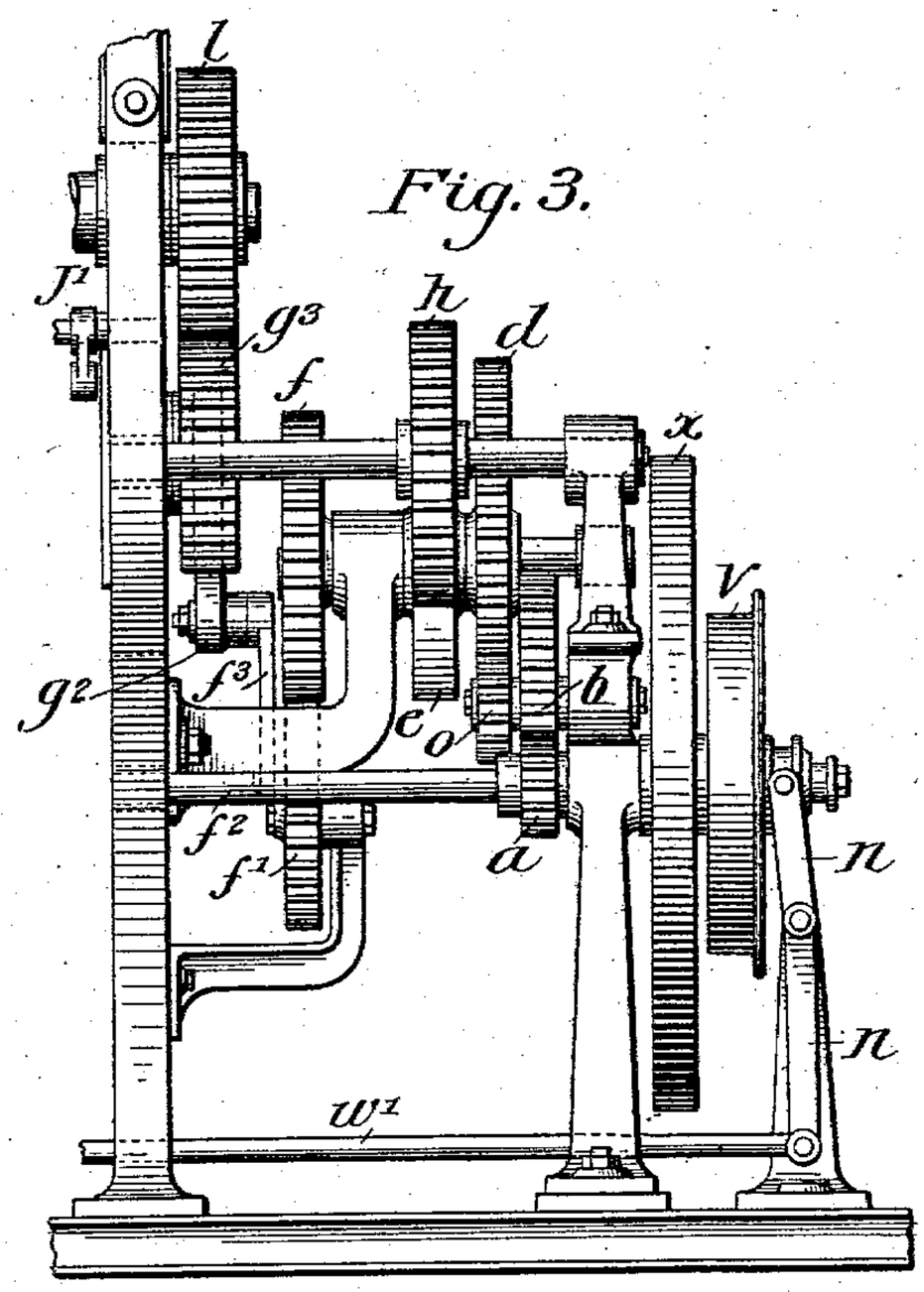


Fig. 6.

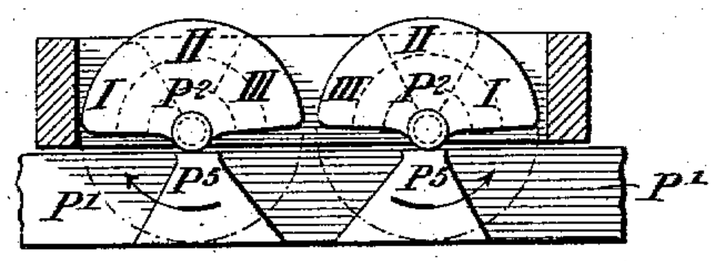
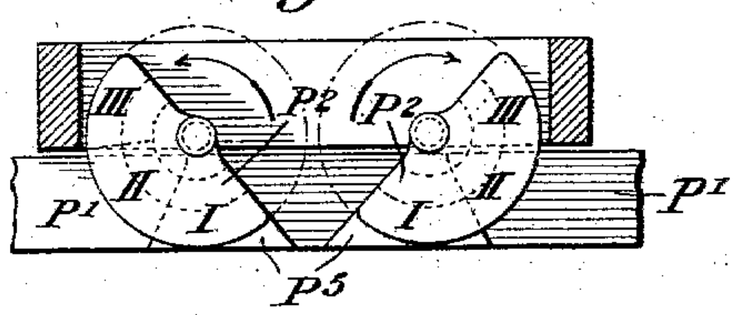


Fig. 7.



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No. 741,003. PATENTED OCT. 6, 1903.

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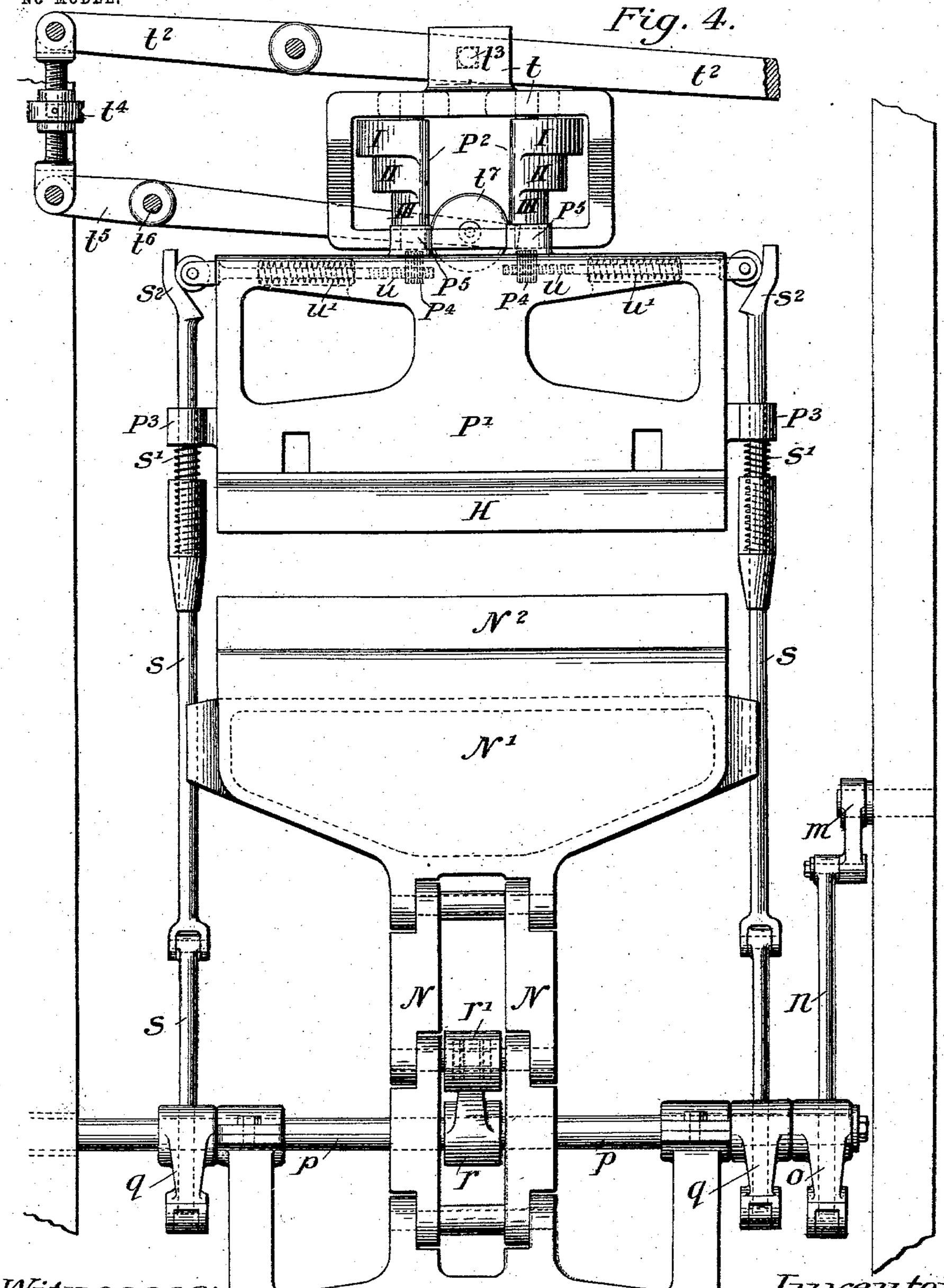
MACHINE FOR CUTTING THE EDGES OF BOOKS.

APPLICATION FILED JULY 16, 1900.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 4.



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No. 741,003. Patented October 6, 1903.

UNITED STATES PATENT OFFICE.

EDUARD GROSSE, OF LEIPZIG-VOLKMARSDORF, GERMANY.

MACHINE FOR CUTTING THE EDGES OF BOOKS.

SPECIFICATION forming part of Letters Patent No. 741,003, dated October 6, 1903.

Original application filed February 21, 1899, Serial No. 706,393. Divided and this application filed July 16, 1900. Serial No. 23,794. (No model.)

To all whom it may concern:

Be it known that I, EDUARD GROSSE, a subject of the King of Saxony, residing at Leipzig-Volkmarsdorf, in the Kingdom of Saxony, Germany, have invented certain new and useful Improvements in Machines for Cutting the Edges of Books, (for which I have applied for a patent in Germany, No. 105,339, dated August 12, 1898,) of which the following is a specification, being a divisional part of the United States application, Serial No. 706,393, filed February 21, 1899.

This invention relates to an oscillating machine for cutting the edges of books provided with mechanism for feeding the books and a device for holding the latter.

In the accompanying drawings, Figure 1 is a rear elevation of the machine. Fig. 2 is a transverse section of the same. Fig. 2^a is a diagrammatic elevation to illustrate the operation of the gearing. Fig. 3 is a detached rear elevation of the main driving-gear of the machine. Fig. 4 is an elevation of the pressing mechanism on a larger scale. Fig. 5 is a transverse section of the same. Figs. 6 and 7 are detail plan views, partly in section, on the line 1 2, Fig. 5, showing different positions of the parts. Fig. 8 is a detail horizontal section of the coloring device. Fig. 9 is a front view of the same.

The oscillating feeding device consists of a central shaft or hub A and two hollow receivers A′ and A^2, situated opposite to each other, which rotate intermittently back and forth through one hundred and eighty degrees. During the rest of the receivers—*i. e.*, after each oscillation—a book is fed into the receiver A′, opposite to the receiver A^2 and the cutting mechanism, and the book in the receiver A^2 is cut by the knife of the cutting mechanism. When the edge of the book in the receiver A^2 has been cut, the feeding device is oscillated back again, the book, the edge of which has been cut, being thus carried back to the place where the receiver A′ was situated before, while the second book is carried to the place where the receiver A^2 was before and where it is then cut.

The machine is first driven by a pulley *v*, which is disengaged and engaged through a friction-coupling by means of a lever *w*, a draw-bar *w′*, and a treadle w^2. (See Fig. 1.) On the shaft of the pulley *v* are keyed a fly-wheel *x* and a pinion *a*, which latter engages with spur-wheel *b*, on the shaft of which is situated a spur-wheel *c*. The latter engages with the spur-wheel *d*, on the shaft of which are segmental spur-wheels *e* and *f*. The segment-wheel *e* gears with a spur-wheel *h* and the segment-wheel *f* with a spur-wheel *f′*, which imparts oscillating motion to a crank *g* by means of a connecting-rod f^3 and wrist-pins f^2 g^2 on the wheel *f′* and crank *g*, respectively.

The wheel *e* is not provided with teeth on the whole of its periphery, but only on one-half of the same. Therefore it rotates the spur-wheel *h* only during one-half of its revolution, the rotation being then discontinued, so that the wheel *h* comes to rest and also the pressing and cutting mechanism operated by the latter while the oscillating feed device performs its movement.

The oscillating feeding device is operated by means of a toothed segment g^3, Fig. 2, on the shaft *g′* of the crank *g*, gearing with a wheel *l*, which has a radius one-half that of the segment by which it is driven and is keyed on the shaft A of the feeding device. The radius of the crank-wheel *f′* being one-half as long as the radius of the crank *g* and the radius of the toothed segment g^3 being double that of the wheel *l* it will be apparent that a half-revolution of the crank-wheel *f′*, moving the crank *g* from one extremity of its throw to the other, rotates the wheel *l* and shaft A one hundred and eighty degrees, and the next half-revolution of the crank-wheel *f′* in the same direction turns the wheel *l* and its shaft A back again one hundred and eighty degrees, and these alternating half-revolutions of the wheel *l* cause the receivers A′ and A^2 to change places by an oscillatory or back-and-forth movement.

In the diagrammatic elevation, Fig. 2^a, arrows indicate directions of motion of the respective gear-wheels and other parts.

e^3 indicates the forward end of the toothed segment of the wheel *e* and e^4 its terminal end, where it is shown just escaping from the wheel *h*.

f^3 indicates the forward end of the toothed

segment of the wheel f, which engages the wheel f' at the same moment when the toothed segment of the wheel e releases the wheel h.

f^4 indicates the terminal of the toothed segment of the wheel f.

The wheels e and f each having teeth on only one-half of its periphery and the wheels being so arranged and combined that the half of the wheel e which has teeth commences to engage with the wheel h at the moment when the toothed portion of the wheel f ceases to engage with the wheel f', and vice versa, the wheels h and f' move alternately one-half revolution each. While the wheel h is at rest the wheel f' operates the oscillating feed mechanism. While the wheel f' and the oscillating feed rest the wheel h operates the cutting mechanism, as will now be described.

On the same shaft as the wheel h is keyed a bevel-wheel i, which gears with a bevel-wheel k one-half the diameter of the wheel i, so that each of the successive half-revolutions of the united wheels h and i impart a complete revolution to the wheel k. The wheel k carries a crank-disk k^2, which effects the movement of the knife B^4, as hereinafter described, drawing it down and pushing it up again during each half-revolution of the wheel h.

The oscillating feeding device consists of a middle part and of two hollow receivers A' and A^2, situated on opposite sides of the shaft A, with which holding and pressing devices are combined. Each receiver is box-shaped.

To insure the correct insertion of the books, each receiver is provided with a sliding angle-piece, Fig. 2, against which the book is placed. The position of the sliding angle-piece G is regulated, as in known paper-cutting machines, by a screw G', which engages with a screw-thread of the projecting angle-piece G and moves the latter toward or from the holding device, according to the rotation of the screw.

The holding device consists of a movable press-beam H, pressed against the books by flat springs J, and is fixed on the receiver so that it can be carried through the machine. The pressing mechanism P supplies the additional pressure through the beam H upon the book which is necessary for cutting.

To allow of the removal of the book at A' and the insertion of another book, a gripper J' is provided, pivoted at J^2 and connected at J^3 to a draw-bar J^4, which is connected with a treadle-lever J^5. When the latter is depressed, the before-described gripping mechanism occupies the lowest position, as shown in Figs. 1 and 2. Simultaneously the gripper J' reaches over a projection H^2 on the pressing-beam and pulls the latter downward, so that the book can be removed and another inserted. When the treadle J^5 is allowed to ascend, the gripper J moves upward and away from the projection H^2 and the pressing-beam is released and presses the book under the action of the flat spring J. After oscillating through one hundred and eighty degrees the receiver A', containing the book pressed thereinto, is carried in the position of the receiver A^2, where the cutting mechanism and a second pressing mechanism are acting. The cutting mechanism is operated, as before mentioned, by the spur-wheels h and the bevel i, Figs. 1 and 2, which drives the bevel k, on which is situated a crank-disk k^2, Figs. 8 and 9. The crank-disk k^2 is connected by pins k^3 with a draw-bar B', which is attached at B^2 to a beam B^3, carrying a knife B^4. The knife-beam B^3 slides up and down in the frame and is guided at B^5, Fig. 1, in oblique slots by roller-pins. The rotation of the crank-disk k^2 is changed by the connecting-rod into a reciprocating motion, which causes the alternating ascent and descent of the knife-beam B^3 and the knife B^4. In consequence of the oblique slots B^5 the movement of the knife B^4 is diagonal to insure a better cut. The knife B^4 is arranged obliquely to the cutting-table and cuts against a lower knife N^2, situated on the cutting-support N'.

During the cutting operation not only is it necessary to exert an additional pressure on the books by the pressing device P, but also to give a support to the receiver A^2, which is below the cutting device, to enable it to resist the pressure of the knife acting from above.

The arrangement and operation of the mechanism is as follows, (see Figs. 4 and 5:) A crank m, Fig. 5, is situated on the axle of the bevel-wheel i and effects the operation of the pressing mechanism P and the cutting-support N'. The crank m is connected by a connecting-rod n with a crank o, which is fixed to the axle p. As the crank o is longer than the diameter of the circle described by the crank m, the rotary motion of the latter is transmitted to the crank o as an oscillating motion. The axle p joins in this motion, and the cranks q and r, fixed on the axle p, oscillate also up and down in approximately a semicircle. The crank r operates the cutting-support N, and the crank q is pressing mechanism P. The cutting-support consists of the toggle-lever N and the piece N', guided in the frame and carrying at N^2 a lower knife, of steel. The toggle-lever N is connected by a lever r' with the crank r. When the crank r, operated by the crank m, oscillates up and down, this oscillating motion is transmitted to the toggle-lever N, which is alternately bent and straightened. The piece N follows its movement and descends when the toggle-lever N is bent and ascends when the latter is straightened. During its ascent it gives a free passage to the rotary feeding device, and when in its upper position it serves as a rest for the pressing-beam H of the rotary feeding device. The extra pressure for holding the book while cutting is effected by the mechanism P, which consists of a pressing-beam P', Figs. 4 and 5, which is guided up

and down by a guide in the frame and is raised and lowered by the rods s to s^2 of the pivoted pressing-blocks P^2, which are adjustable to press automatically at all levels or thicknesses of books, and of the lever mechanism t to t^7, which causes the automatic pressing. Figs. 4 and 7 show the pressing mechanism separately in plan, side view, and details. The ascent and descent of the pressing mechanism is effected by the oscillating crank q, which is connected to rods s, which pass through guides P^3 on the pressing-beam P' and carry the latter with them by means of projections s' during their ascent. Simultaneously the beveled edges s^2 of the rods s push the spring-pressed elastic racks u inward, which engage with the pinions P^4, and as the latter are fixed to the pressing-blocks P^2 these receive a turning motion and occupy a position which allows of the passage of the pressing-beam P' during its ascent. The pressing-blocks P^2 are pivoted in a frame t, situated behind the pressing-beam P', so that the latter can travel up and down in front of the frame t when the pressing-blocks P^2 are turned out of the way. The frame t is moved up and down by lever mechanism t' to t^7—say, as an example, to the extent of three centimeters. This up-and-down movement is effected by the cam K, Figs. 1 and 2, which is fixed to the bevel-wheel k. A connecting-rod t' runs by means of a roller on the cam K. The connecting-rod t' is connected to the lever t^2, Figs. 1 and 2. The frame t is suspended from the lever t^2 at t^3. An adjustable expansion-rod t^4 is jointed to the lever t^2. To the pressing-rod t^4 is joined a lever t^5, pivoted at t^6 and carrying a counterbalance-weight t^7, which effects the pressing by lever mechanism. The pressing effected by the parts t' to t^7 is only equivalent to a space of three centimeters; but the books to be inserted into the rotary feeding device may be more—say nine centimeters thick—so that a rise and fall of the pressing mechanism equal to nine centimeters is required. To equalize these differences of thickness—*i. e.*, to obtain the required additional space of six centimeters in this case—the two blocks P^2 are inserted as filling-pieces between the upper part of the frame t and the pressing-beam P. The pressing-blocks P^2 are semicylindrical, cut through longitudinally, the plane of which on one side is a semicircle and on the other side an almost straight line, with a pin to serve as a pivot. Figs. 3 and 4 show the pressing-blocks with the frame t in plan and side view. Figs. 6 and 7 show the pressing-blocks P^2 and the upper face of the pressing-beam P' with its projections P^5 in plan. The ends or pivots of the pressing-blocks P^2 turn in bearings on the frame t and occupy at one time positions as shown in plan in Fig. 7 and at another time positions as shown in plan in Fig. 6. Each pressing-block has three steps, each step being three centimeters high—that is, exactly as high as the ascent and descent of the frame t. The steps therefore fill exactly the space required to be filled for the pressing of books less than six centimeters thick. When the steps I of the blocks P^2 rest on the projections P^5 of the pressing-beam P', books can be pressed of from six to nine centimeters thickness. When the following steps II rest on the projections P^5, books from three to six centimers thick may be pressed. When the steps III rest on the projections P^5, books less than three centimeters thick can be pressed.

Figs. 2 and 4 show the pressing-blocks P^2 in the position in which they press books up to three centimeters thick. A plan, Fig. 7, shows them in a position in which the steps I rest on the projections P^5, so that books from six to nine centimeters thick may be pressed. Another plan, Fig. 6, shows the pressing-blocks entirely turned back from the pressing-beam—that is, in a position which allows of the complete ascent of the pressing-beam P'. This movement of the pressing-blocks P^2 is obtained by the spring-pressed racks u, Figs. 1, 2, and 4, which engage in pinions P^4. The beveled ends s^2 of the racks u, operated by the connecting-rod s, turn the blocks P^2 back behind the pressing-beam P', and they are returned again across the pressing-beam P' by means of the spiral springs u, Figs. 1 and 4. When the rods s and with them the pressing-beam P' are pushed upward, their beveled ends s^2 push the racks u, provided with rollers, inward and turn the pressing-blocks P^2 behind the pressing-beam P' into the position shown in plan in Fig. 6. The pressing-beam P' passes now the blocks P^2 and is moved upward by the connecting-rod s sufficiently high to allow of the free passage of the rotary feeding device. In order to allow the blocks P^2 being turned back at the correct time, the connecting-rod s runs empty in its guides P^3 on the pressing-beam P' until the blocks P^2 are turned back by the racks u behind the pressing-beam P'. Then the projections s' of the connecting-rod s engage under the guides P^3 and raise the pressing-beam. The springs at s are provided to draw the pressing-beam P' onto the pressing-beam H of the rotary feeding device at the descent of the connecting-rod s. When the connecting-rods s have arrived in their lowest position, the racks u are freed from side pressure at s^2, the spring u' presses them outward, and the steps of the blocks P^2 are turned over the projections P^5 of the pressing-beam P' as far as the thickness of the inserted book allows. For instance, if a book of two centimeters thickness has been inserted then all three steps pass over the projections P^5, the space between the upper part t and the pressing-beam P' has been filled, and the automatic pressing by the lever mechanism t' to t^7 commences. If a book of five centimeters thickness has been inserted only two steps pass over the projections, thickness has been inserted only the uppermost step passes. In this manner books of

any thickness are pressed by the blocks P^4 and the mechanism relating thereto in combination with the lever and eccentric mechanism t to t^7.

My edge-cutting machine for books is provided with a coloring device (not herein claimed) arranged in front of the feed at the place where the cut edges of the books are presented when they are to be removed. This device is illustrated in section and side elevation in Fig. 2 and in detail in Figs. 8 and 9. It consists of two printing or coloring rollers C, connected with two spur-wheels, which rollers receive color from the felt roller c^3 through the roller C^2 and print the color onto the edge of the book according to the patterns formed on such printing-rollers. The rollers C' C^3 are adapted to rotate in this slide C^4. The latter slides in grooves in the frame C^6. In order to print or color the edge of the book, the attendant draws the frame C^4 by the handles C^7 sidewise through the frame C^6. During this operation the printing-rollers C' pass the cut edge of the book held in the receiver A', and this prints or colors the edge of the book.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In a machine for cutting the edges of books, the combination of the oscillating receivers; gearing imparting intermittent rotation thereto; a guided cutting device operating in conjunction with said receivers; and automatic mechanism actuating said cutting device while the oscillating receivers are at rest, substantially as described.

2. In a machine for cutting the edges of books, the combination of an oscillating feeding device, having two receivers; a cutting device B; mechanism by which the receivers are alternately moved to the cutting device and back again to the receiving place by reciprocating movement; a device for holding the book when inserted into the receiver; a second device for clamping the book while the edges are being cut consisting of a pressing device situated behind the cutting device; a cutting-support, N N'; and means for moving said cutting-support into operative position, substantially as described.

3. In a machine for cutting the edges of books, the combination with the feeding devices consisting of book-receivers A' and A^2 mounted on a common shaft A, and provided with clamps H H' J, for holding the books; means for imparting intermittent rotation to said shaft so as to transpose the positions of the book-receivers at each movement; a cutting device to which the respective book-receivers are successively presented by the intermittent rotation of the feeding device; driving mechanism actuated by a common power device, communicating alternate movement to the feeding and cutting devices, whereby the cutting device is moved in the intervals between the movement of the feed device, and vice versa, as explained.

4. In a machine for cutting the edges of books, the combination of a feeding device having two receptacles for books; gearing oscillating said feeding device through a semicircle; a guided cutting device to which the books are successively presented by the oscillation of the receivers; and actuating mechanism for the cutter, operating alternately with the oscillating motion of the feeding device, so that the cutter operates while the feeder is at rest and vice versa, substantially as described.

5. In a machine for cutting the edges of books, the combination of a feeding device having two receivers; means for oscillating the same embodying a segment, a gear, and a rod connecting the segment and the gear; with a pressing device J^5, J^4, J^2 and H; and a second pressing device P having an adjusting device P^2 for clamping the books, substantially as described.

6. In a machine for cutting the edges of books, the combination of a feeding device having two receivers; means for oscillating the receivers; a pressing device J^4, J^3, J^2 and H; a movable pressing device P having an adjusting clamping device P^2 for the books; and a support N' N for the receiver, substantially as described.

7. In a machine for cutting the edges of books, the combination of two receivers; means for oscillating the receivers; with the pressing device J^4, J^3, J^2, H'; a movable pressing device P having an adjusting-stamp P^2 for the books; a support N, N', for the receiver; and cutting mechanism B, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

EDUARD GROSSE.

Witnesses:
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B. H. WARNER, Jr.