

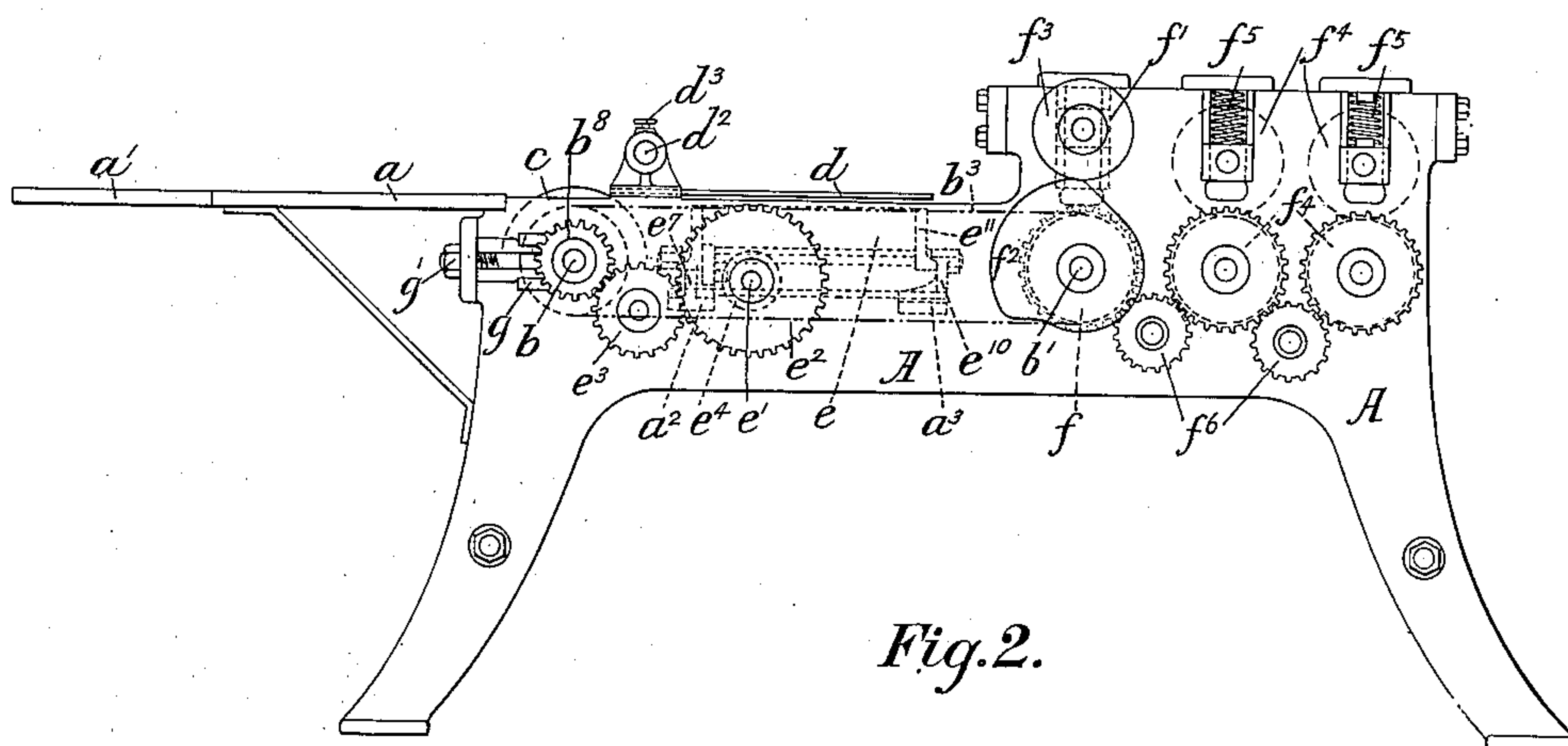
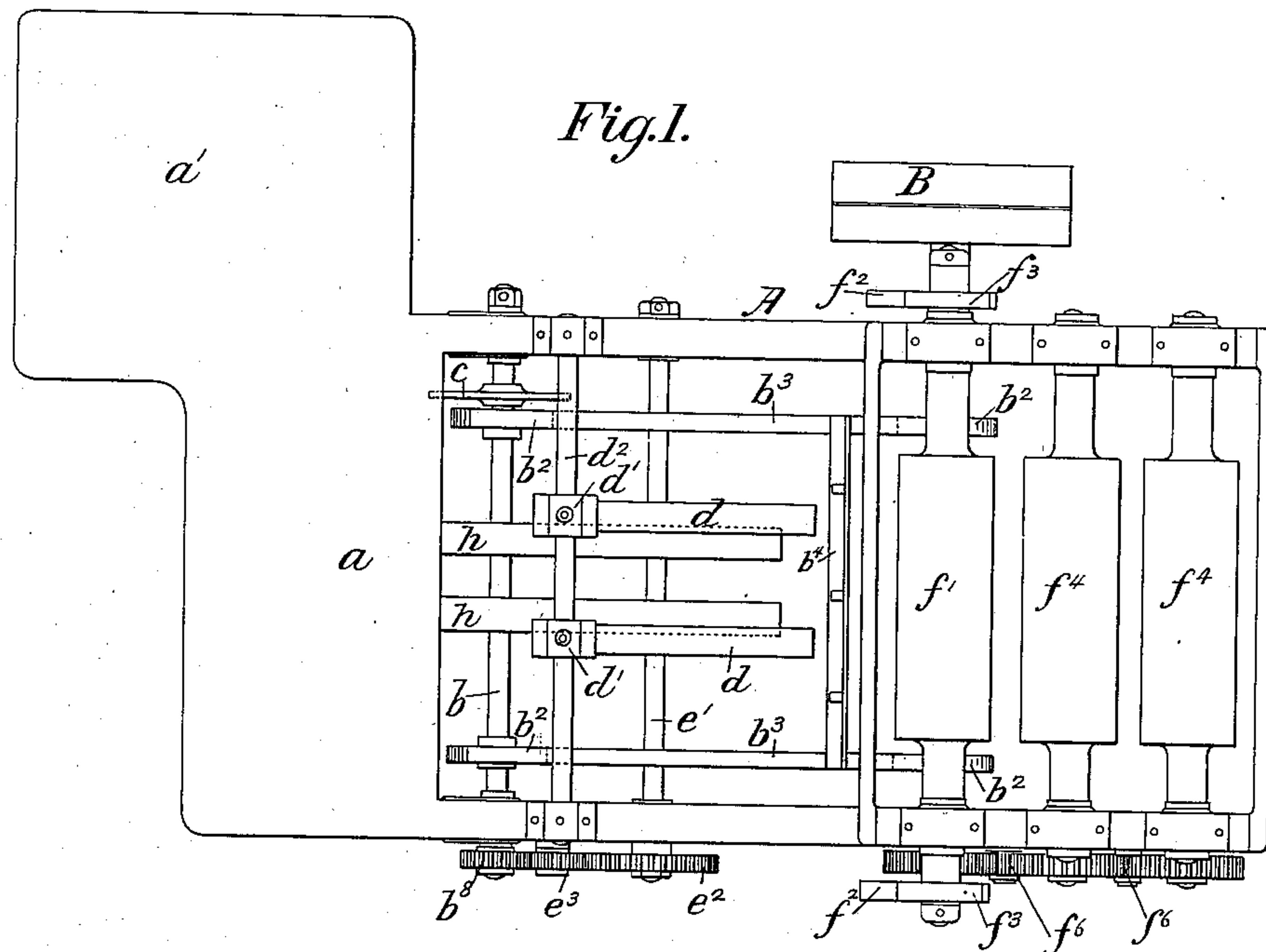
(No Model.)

4 Sheets—Sheet 1.

J. R. KOFFENBERGER.  
MACHINE FOR MAKING PAPER BOXES.

No. 549,571.

Patented Nov. 12, 1895.



Witnesses:

Wm Morey Jr.

Geo. M. Copeland

Inventor.

Jacob R. Koffenberger.

by Arthur W. Harrison

Attorney.

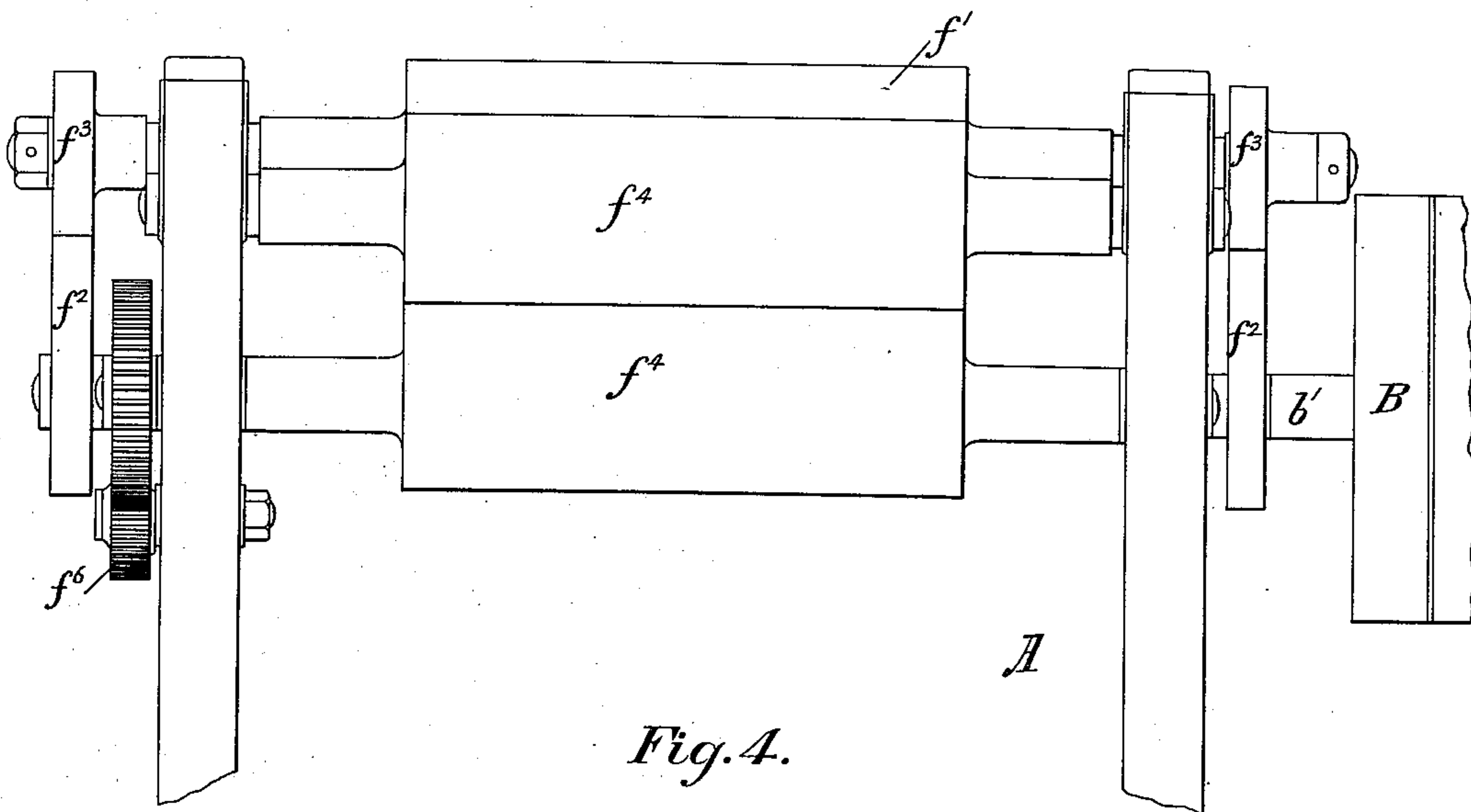
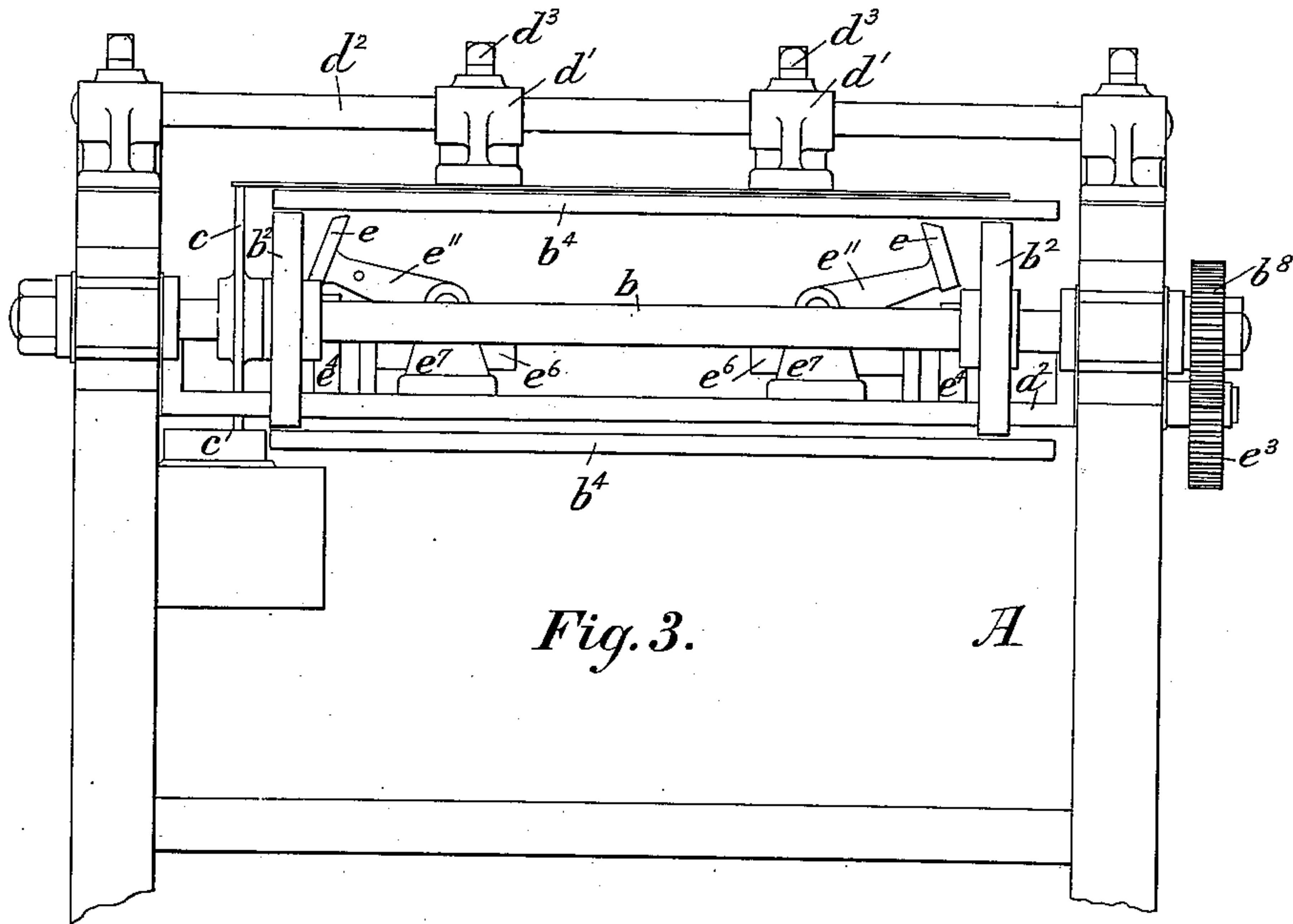
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4 Sheets—Sheet 3.

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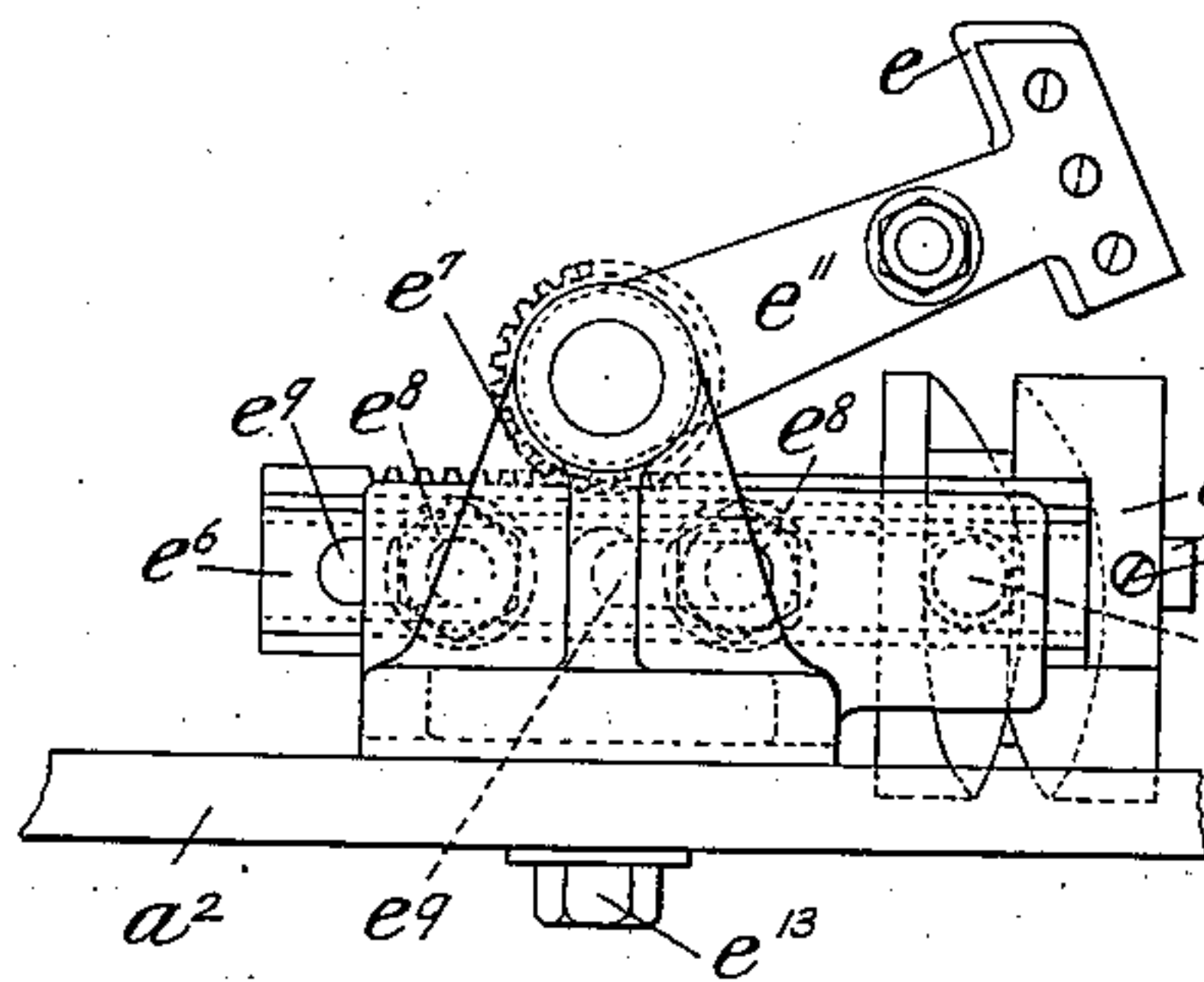


Fig. 5.

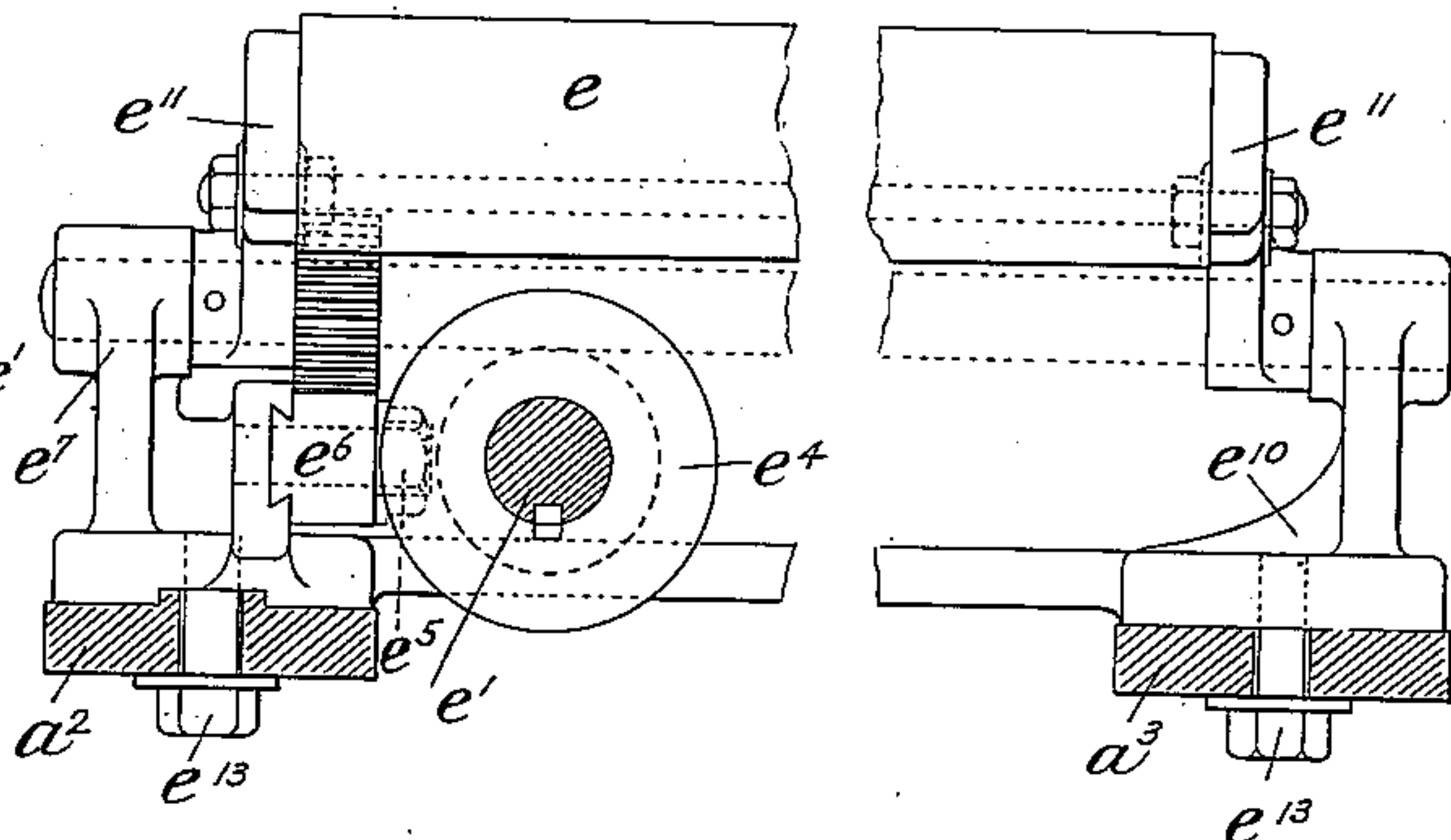


Fig. 6.

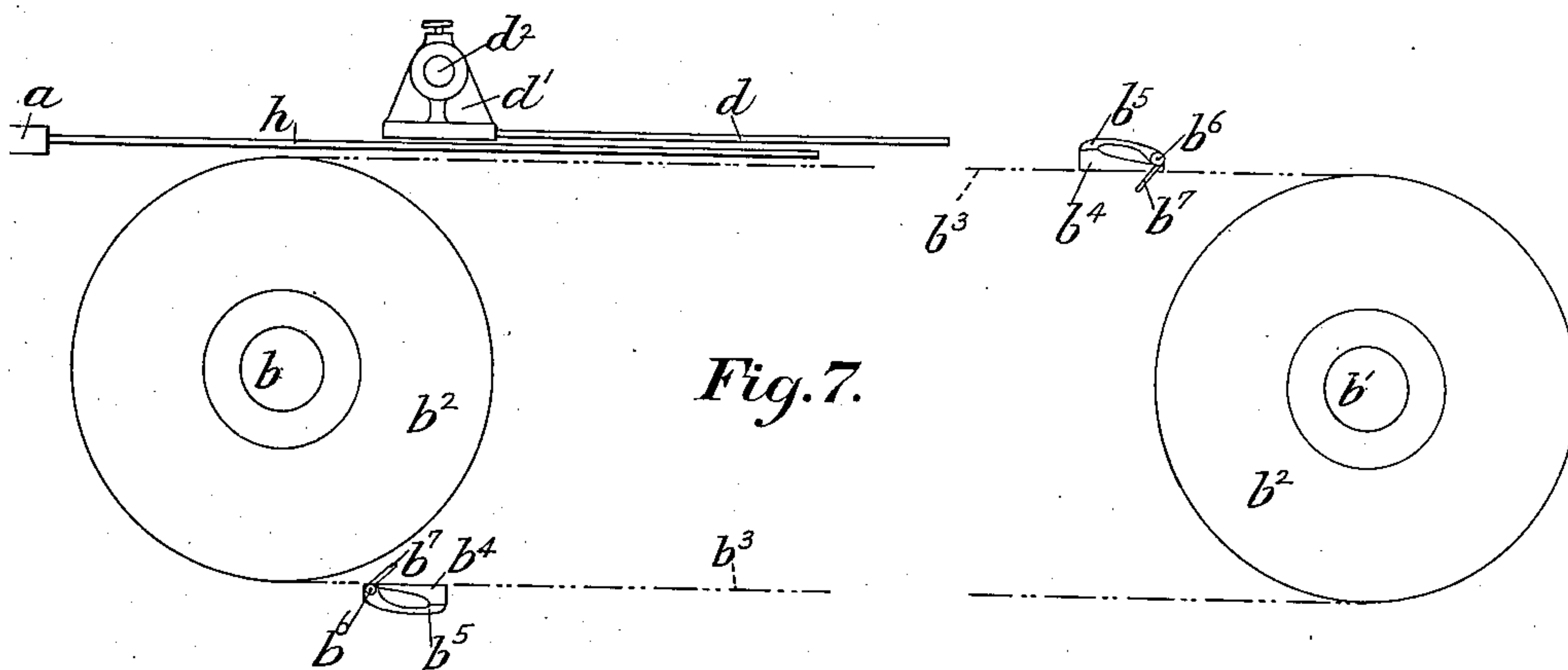
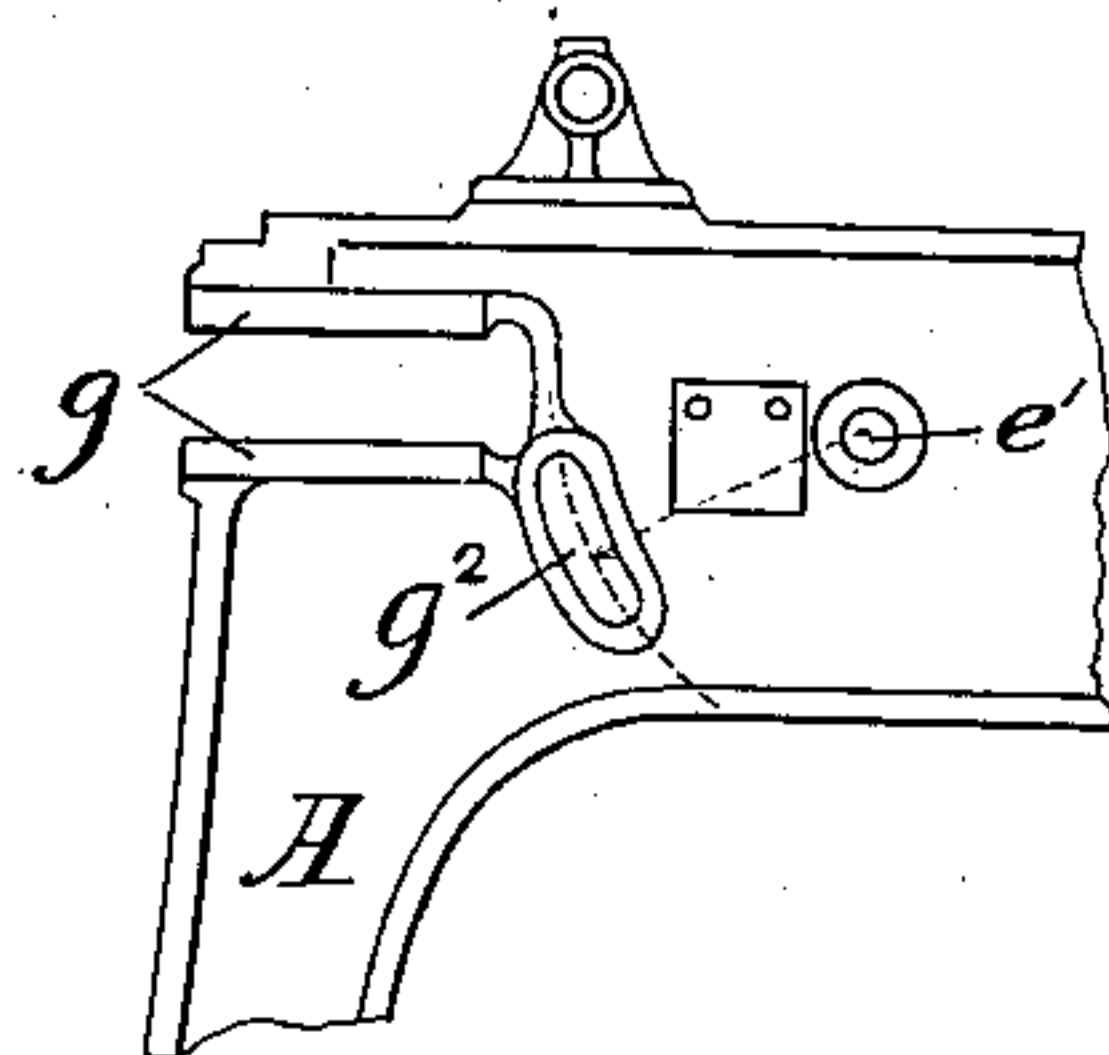


Fig. 7.

Fig. 8.



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4 Sheets—Sheet 4.

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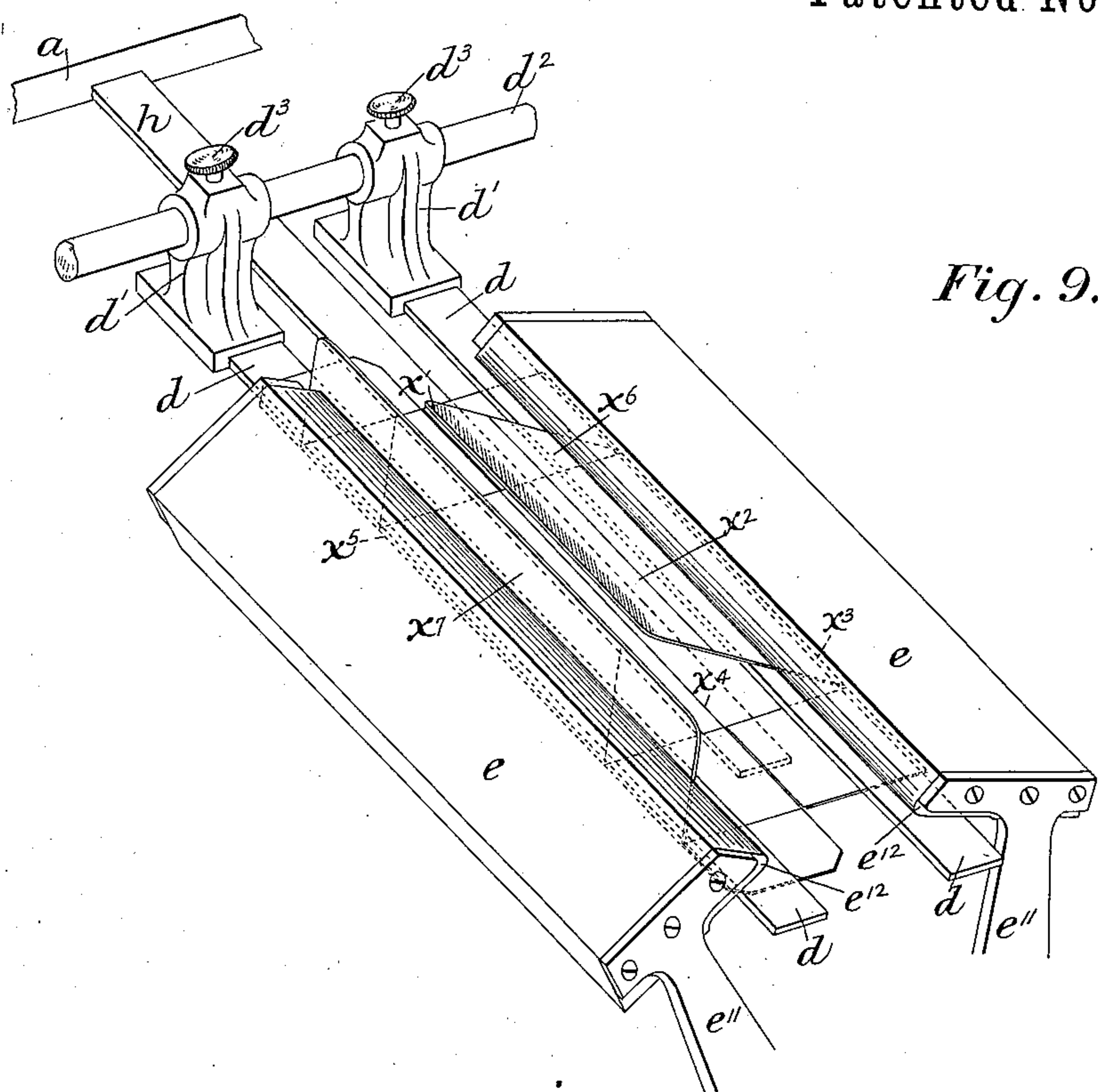


Fig. 9.

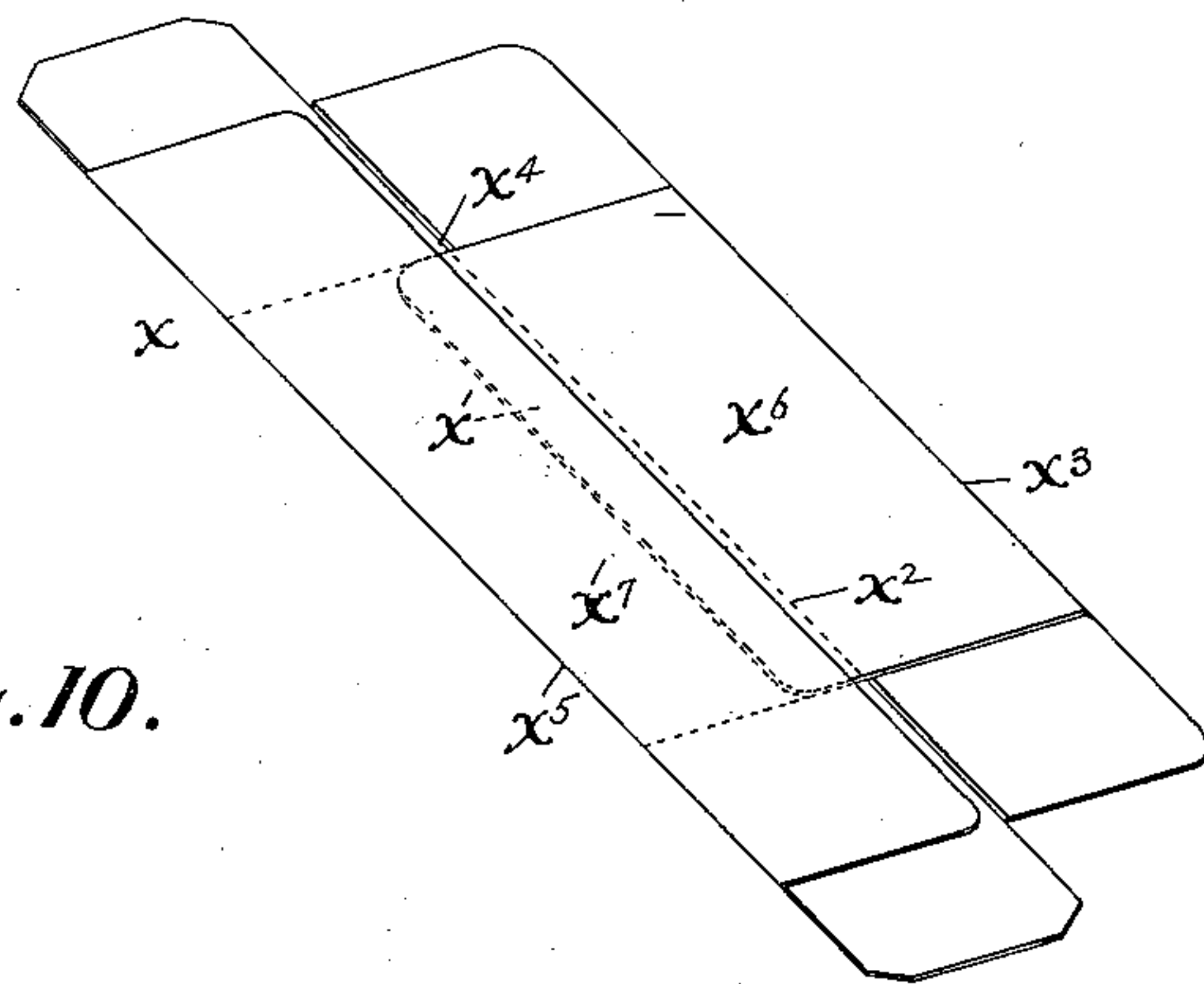


Fig. 10.

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# UNITED STATES PATENT OFFICE.

JACOB R. KOFFENBERGER, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE AMERICAN FOLDING BOX MACHINE MANUFACTURING COMPANY, OF SAME PLACE.

## MACHINE FOR MAKING PAPER BOXES.

SPECIFICATION forming part of Letters Patent No. 549,571, dated November 12, 1895.

Application filed February 14, 1895. Serial No. 538,384. (No model.)

*To all whom it may concern:*

Be it known that I, JACOB R. KOFFENBERGER, of Baltimore, in the State of Maryland, have invented new and useful Improvements in Machines for Making Paper Boxes; and I do hereby declare the following to be a full, clear, and exact description of said invention, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to machinery for making paper or cardboard cartons or boxes, and has particular reference to that class or type of such machines in which previously cut and scored blanks are suitably gummed or pasted in the proper location and the flaps then turned over to form the box or carton.

Pasteboard boxes which are furnished to the trade in flat condition and with the bottom and top end flaps projecting as continuations of the sides, and which boxes are then opened out to rectangular form and the end flaps interlocked by the users, have generally been produced by hand-labor; and the object of this invention is the production of a simple and continuously-operating machine which will automatically apply the paste, turn or fold the flaps lengthwise of the blank, press the folded blank to set the paste, and turn out the cartons in flat condition, ready for the market.

To this end the invention may be said to consist in the construction and combinations of parts substantially as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a plan view of the machine, omitting the folding mechanism. Fig. 2 is a side elevation with the folding mechanism indicated by dotted lines. Fig. 3 is an end elevation of the machine from the front, or the position of the attendant or feeder, on a scale larger than Figs. 1 and 2, omitting the table. Fig. 4 is a rear end elevation on a scale similar to Fig. 3. Fig. 5 is a detail end elevation of one of the folders. Fig. 6 is a detail side elevation of the same. Fig. 7 is a detail side view of the carrier-belts and their grippers. Fig. 8 is a detail side elevation of a portion of the frame

of the machine. Fig. 9 is a perspective view illustrating the blank in the act of having its flaps turned, and Fig. 10 is a perspective view of the carton as it issues from the machine.

Each part appearing in different figures is indicated by the same reference-letter in all such figures.

The frame A, having suitable legs, and having bearings for the several shafts and rollers and other mechanism, has at one end, which may be termed the "front" end, a table *a* to support the blanks as they are fed by the attendant to the carrier-grippers. At one side of the table *a* an extension *a'* is formed to support a pile of the blanks. In the sides of the frame are suitable bearings for two shafts *b* *b'*, each of which has secured to it two wheels *b*<sup>2</sup> *b*<sup>2</sup>, to support and move the endless carrier, which may consist, as shown, of flat belts *b*<sup>3</sup> *b*<sup>3</sup> of suitable material, or which may be chain-link belts, in which latter case the wheels *b*<sup>2</sup> would have suitable sprockets. At intervals the belts are connected by strips *b*<sup>4</sup>, which carry spring-closed grippers *b*<sup>5</sup>, pivoted at *B*<sup>6</sup> and having studs *b*<sup>7</sup> adapted to engage suitable pins fixed in the frame of the machine to open each gripper when it is to receive the end flap of a blank and again when it is to release such blank, as hereinafter described.

The form of gripper here shown is a common one and any other kind may be substituted therefor, it being only necessary that the grippers shall take hold of the forward end flap of the blank and release it just prior to the passing of the gripper around the rear shaft *b'* and its wheels *b*<sup>2</sup>.

Near one end of the shaft *b* is a paste-applying disk or wheel *c*, the lower edge of which dips in a paste or glue box *c'* of any suitable construction and supported by one of the legs of the frame. The upper edge of the wheel or disk projects somewhat above the level of the table *a*, and is adapted to slightly lift the flap *x'* of the blank *x* as it leaves the table and apply paste thereto. As the blank leaves the table, it passes under two guides or creases *d d*, the outer edges of which coincide with scores *x*<sup>3</sup> *x*<sup>5</sup>, there being two other scores *x*<sup>2</sup> *x*<sup>4</sup>, all of said scores having been previously made in the blank



for the purpose and as is customary in making cartons of this type. The guides or creases  $d\ d$  consist of thin metallic strips secured at one end to brackets  $d' d'$ , which depend from and are adjustably secured to a rod  $d^2$ , which is supported by the frame in a position just to the rear of and above the gripping-point of the grippers  $b^5$ . The brackets  $d'$  are adjustable along the rod  $d^2$  and may be secured thereto by means of set-screws  $d^3$ , the object of this adjustment being to enable the creasers to properly coincide with the scores  $x^3 x^5$  of different sizes of blanks in order that the folders  $e$  may turn the flaps  $x^6 x^7$  of the blank over upon the upper sides of the creasers, the outer edges of which insure the proper creasing of the blank along said scores.

A shaft  $e'$  extends across the machine and has a gear  $e^2$ , driven from a gear  $b^8$  on the shaft  $b$  through an intermediate gear  $e^3$ . Near each end of the shaft  $e'$  is a cam-grooved hub  $e^4$ , the groove of which receives a pin  $e^5$ , (which may be provided with a friction-roller,) projecting from a sliding rack-bar  $e^6$ , the teeth of which are on the upper edge thereof. This rack-bar is fitted to slide in a dovetailed groove in the standard  $e^7$ , secured to the frame-brace  $a^2$ . Guide-pins  $e^8 e^8$  project from the standard and pass through elongated slots  $e^9 e^9$  and form additional means for guiding the rack-bar in its reciprocations, caused by the engagement of the pin  $e^5$  with the groove of the hub  $e^4$ . At a suitable distance to the rear is a second cross-brace  $a^3$ , which supports two standards  $e^{10} e^{10}$ . To each standard  $e^7 e^{10}$  is pivoted an arm  $e^{11}$ , and between the two arms is bolted the folding-blade or folder proper  $e$ , which is preferably of hard wood, having a rounded corner, as at  $e^{12}$ , and the under side of which wood strip is adapted to be moved to a horizontal position over and above the creasers. The hubs of the arms  $e^{11}$ , which are above the rack-bars  $e^6$ , are toothed to engage with the teeth of the said bars, whereby as the rack-bars reciprocate the arms at each side of the machine vibrate and carry the folding-boards upward from the position shown in Figs. 3 and 5, so as to engage the under sides of the flaps  $x^6 x^7$  of the blank and fold them over and carry them down on the upper sides of the creasers, as indicated in Fig. 9.

A blank drawn from the table by a gripper and having then no support but the two folders is liable to bend downward along its center when the folders turn the flaps upward over the creasers, for the reason that the scores in the blank are not usually very deep. Suitable support is therefore provided for the under side of the blank after it leaves the table. One way to afford such support may be by means of a shelf or platform extending inside the endless carrier from the side of the frame; but I prefer the means indicated in Figs. 1, 7, and 9, in which one or more thin arms  $h$  extend rearward from the table  $a$  above the

plane of the grippers and below the creasers  $d$ , said arms  $h$  being in a position to support the center of the blank, which passes between them and the creasers. As each gripper consists of a plurality of fingers such as are common in printing-presses, it is obvious that any finger which may grasp an arm  $h$  will simply slide freely over it. If desired, however, the arms  $h$  may be made adjustable laterally of the table  $a$  in a manner similar to the adjustment of the creasers, or the gripping-fingers may be similarly adjusted laterally in order that said gripping-fingers may come in contact only with the end flap or flaps of the blank and not with the supporting-fingers  $h$ .

In order to permit the folding mechanism to be adjusted when the creasers are adjusted, the feet of the standards  $e^7 e^{10}$  are secured to the braces  $a^2 a^3$  by bolts  $e^{13}$ , which pass through elongated slots in said braces, and the hubs  $e^4$  are splined on the shaft  $e'$  and are adjustably secured thereto by set-screws  $e^{14}$ . The timing of the folding operation is such that the flaps are engaged just as the blank has been moved by the carrier far enough so that the said flaps will clear the brackets  $d'$ , and this is done while the blank is still moving, there being no stoppage of the operation of any part of the machine, and the timing of the operation of the two folders relatively to each other is such that the flap  $x^6$ , to the under side of which paste has been applied, is turned over and down on its creaser slightly before the flap  $x^7$ , so that the latter will be pasted to the former. The carton is now in the form shown in Fig. 10, and passes to the pressing-rolls in order that the paste or glue will be set and the carton ready for the user.

As many pairs of pressing-rolls may be employed as may be considered necessary. The drawings indicate three pairs of such rolls. The lower roll  $f$  of the first pair is secured to the shaft  $b'$ , and the upper roll  $f'$  of this pair is weighted and is adapted to move vertically by having its journal-boxes held in suitable vertical guideways in the frame. In order that the upper roll may be lifted to permit the grippers to pass, the shaft  $b'$  carries a cam  $f^2$  at each end, on which rest wheels  $f^3$ , one at each end of the roll  $f'$ , the timing being to cause the roll  $f'$  to be lifted each time a gripper is to pass and lower it to rest on the folded carton as the gripper releases it.

The shaft  $b'$  has a belt-wheel  $B$ , by which power is applied to the machine, and as the rolls  $f f'$  grasp a carton they press and feed it to the two pairs of pressing-rolls  $f^4$ , the upper ones of which have their bearings in vertically-movable journal-boxes operated upon by suitable springs  $f^5$ . The shafts of the lower pressing-rolls have gears which are connected by suitable intermediate gears  $f^6$ , so that said lower rolls will rotate in the same direction to press and carry the completed carton out of the machine.

In order to compensate for stretching or wear of the carrier belts or chains, the shaft



*b* is adjustable to tighten said belts or chains. The journal-boxes of this shaft are fitted to horizontal ways *g*, (see Figs. 2 and 8,) and are adjustable along said ways by means of screws *g'* in a manner well known. In order that the gear *b*<sup>8</sup> may drive the gear *e*<sup>2</sup> of the shaft *e'* when the shaft *b* has been adjusted, as described, the intermediate gear *e*<sup>3</sup> is adjustable to preserve the driving connection. For this purpose the stud or shaft on which the gear *e*<sup>3</sup> revolves may be adjusted up or down the curved slot *g*<sup>2</sup>, which is concentric with the axis of shaft *e'*, as indicated in Fig. 8.

The invention having been described in connection with the drawings which illustrate one form of its embodiment, it is to be understood that many modifications may be made which fall within the scope of mechanical skill without departing from the spirit or principle of said invention.

I claim—

1. A machine for making paper boxes comprising in its construction a pair of endless belts or chains having means for moving box blanks, a stationary former located one side of the plane in which the blanks move, and movable folders the line of movement of which cuts the said plane between the two belts or chains.

2. A machine for making boxes comprising in its construction an endless carrier for the blanks having grippers at intervals, said carrier consisting of two belts or chains, a pair of creasers or guides past which the blanks are moved by the carrier, and a pair of movable folders the line of movement of which cuts the plane of movement of the blanks between the belts or chains, said folders being adapted to operate on the flaps of each blank to fold them over the creasers or guides.

3. A machine for making boxes comprising in its construction an endless carrier for the blanks, said carrier consisting of two belts or chains having grippers at intervals, a pair of creasers or guides adjustable toward and from each other, and a pair of movable folders also adjustable toward and from each other, the line of movement of said folders being adapted to cut or intersect the plane of movement of the blanks between the belts or chains, and to fold over the flaps of the blanks.

4. A machine for making boxes comprising in its construction a continuously movable endless carrier having a series of grippers for

the blanks, a pair of creasers or guides past which the blanks are moved by the grippers, means for adjusting the creasers or guides toward and from each other, and two folders also adjustable toward and from each other, the said folders being pivoted below the plane of movement or the level of the grippers and adapted to cut or intersect the said plane of movement between the grippers.

5. A machine for making boxes comprising in its construction an endless carrier for the blanks, said carrier having a series of grippers at intervals, guides and folders adapted to shape the blanks into doubled flat condition, and pressing rolls between which the folded blanks are passed, one of said rolls having means for automatically separating it from its companion to permit the grippers to pass.

6. A machine for making boxes comprising in its construction an endless carrier having grippers, a paste applying device, guides and folders adapted to shape the blanks into doubled flat condition with the edges pasted together, a roll located inside the carrier, a second roll outside the carrier opposite the first mentioned roll and movable toward and from it, and means for lifting the movable roll as each gripper passes under it.

7. In a machine for making boxes, the combination with the frame having a blank table, of the stationary guides or creasers *d d* depending from a rod *d*<sup>2</sup>, the arms *e*<sup>11</sup> carrying the folders *e* and pivotally supported below the plane of the creasers, the hubs of two of the arms *e*<sup>11</sup> being toothed, a shaft *e'* having grooved hubs *e*<sup>4</sup>, and the sliding rack bars *e*<sup>6</sup> engaging the toothed arms and each having a pin entering the groove of its respective hub *e*<sup>4</sup>.

8. In a machine for making boxes, the combination with the endless carrier having grippers and a pressing roll *f'* movable toward and from the carrier at the rear end thereof, of the table *a* having supporting arms *h*, the creasers or guides *d* above the plane of the said arms, and the oscillating folders *e* pivoted below the plane of the arms and creasers, and adapted to fold portions of a box blank around the creasers while the central portion of the blank is supported by said arms.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

JACOB R. KOFFENBERGER.

Witnesses:

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A. KINGSLEY LOVE.