

6 Sheets—Sheet 1.

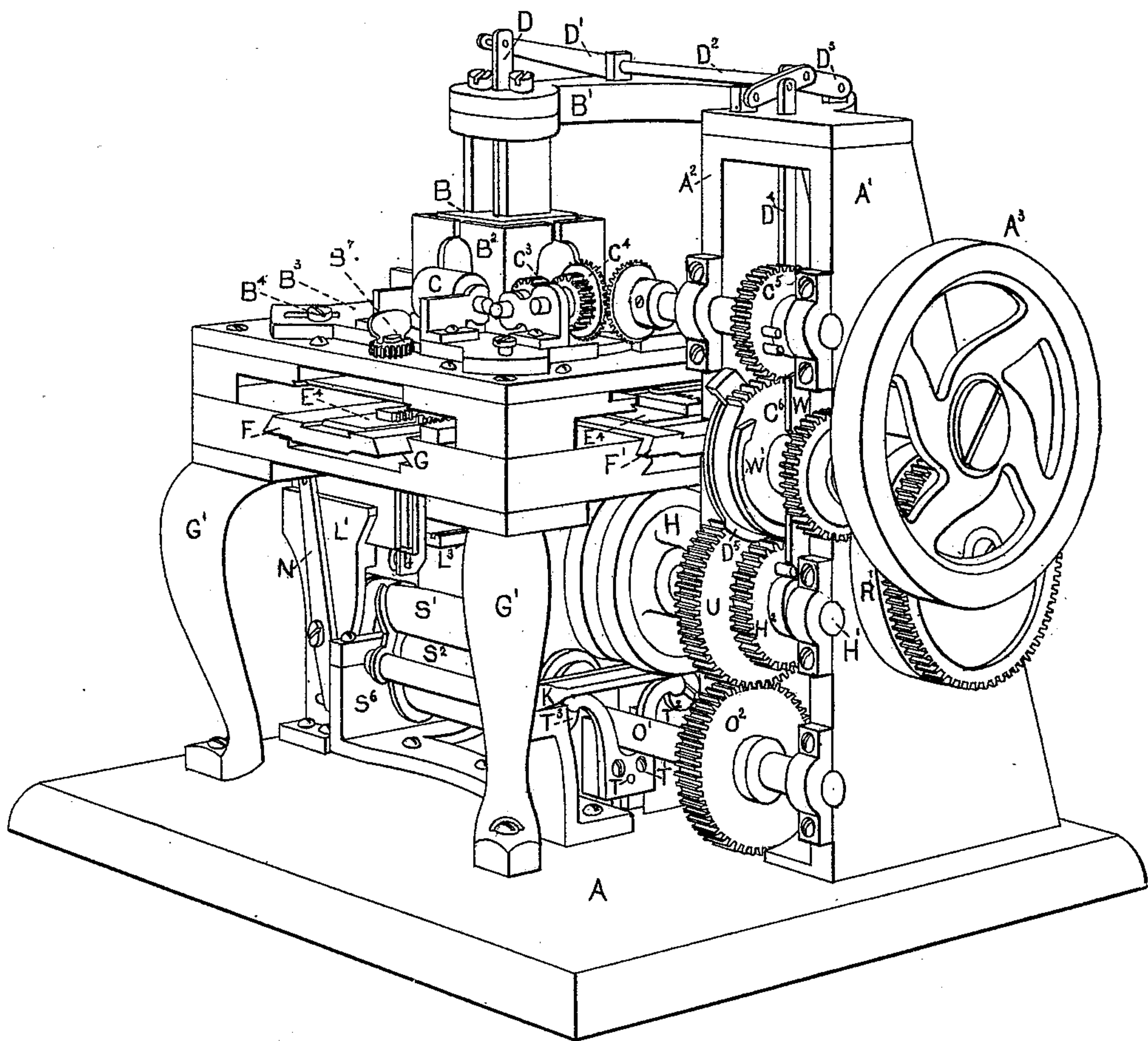
C. M. RICHARDSON & J. S. GIBBS.

PAPER-BAG MACHINE.

No. 188,953.

Patented March 27, 1877.

FIG. 1.



WITNESSES:

*John C. F. Farnsworth*  
*Charles H. Singer*

*Charles M. Richardson*  
*Jacob S. Gibbs*

INVENTORS.

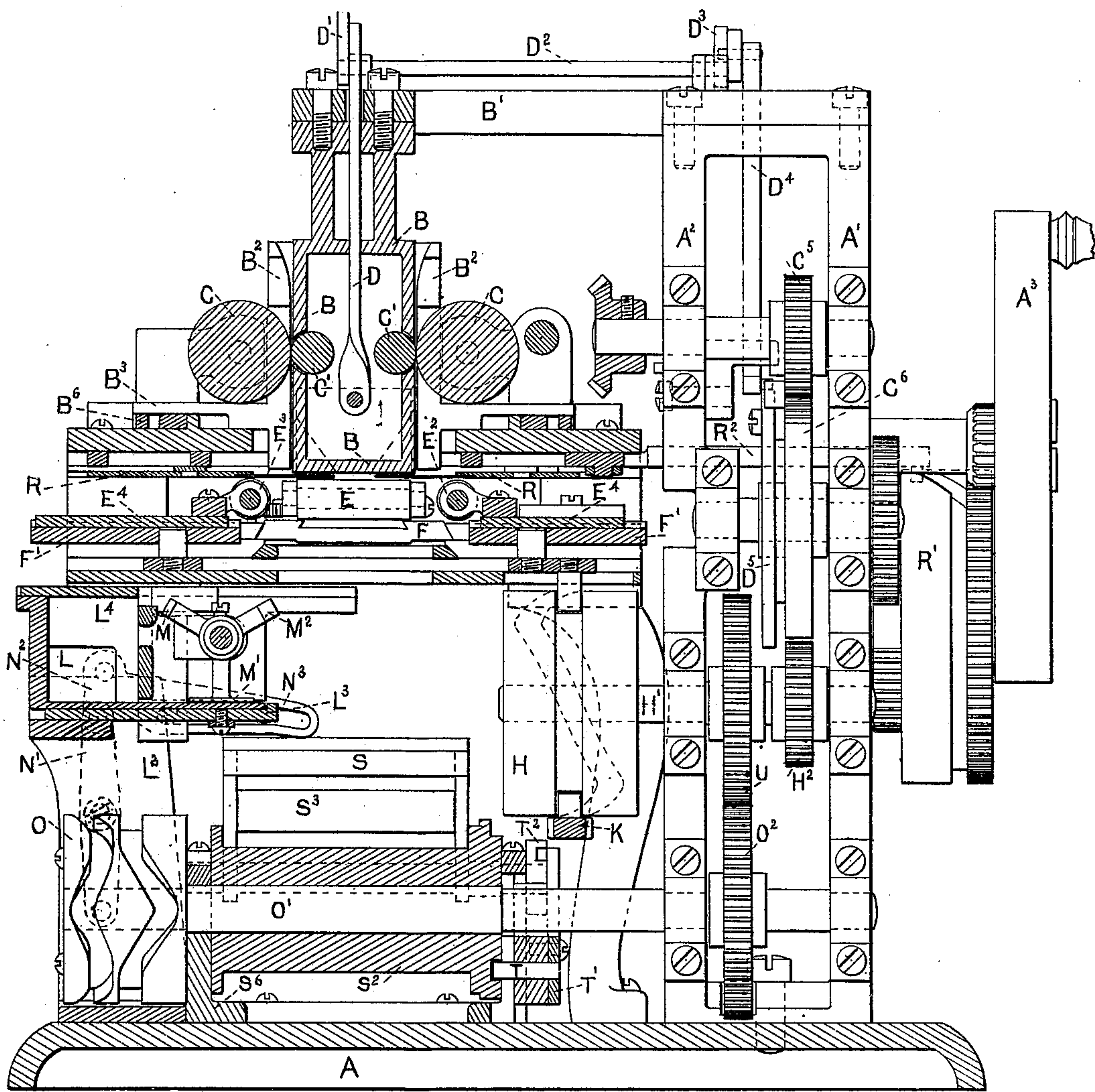
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FIG. 2.



WITNESSES:

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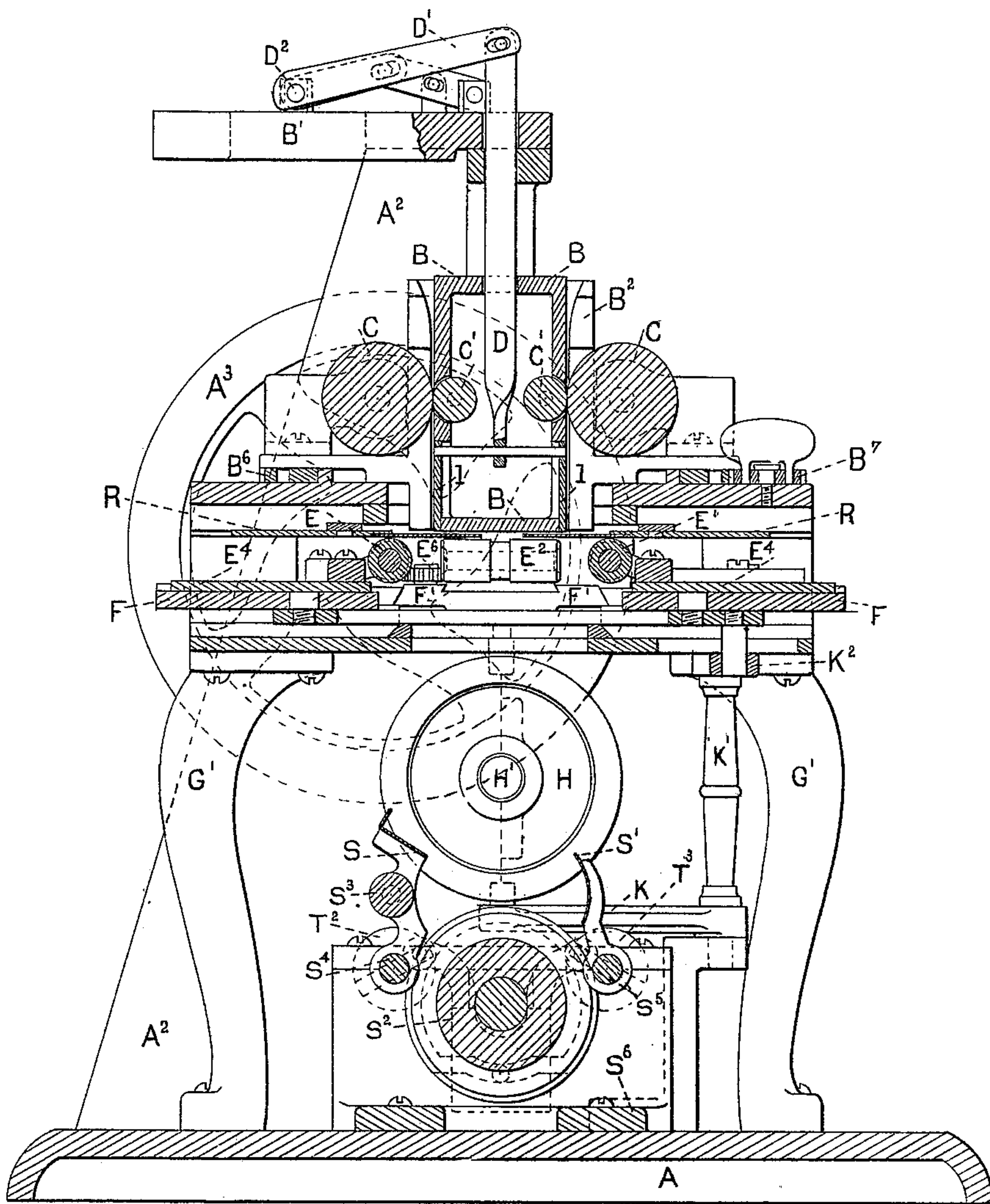
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FIG. 3.



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FIG. 4.

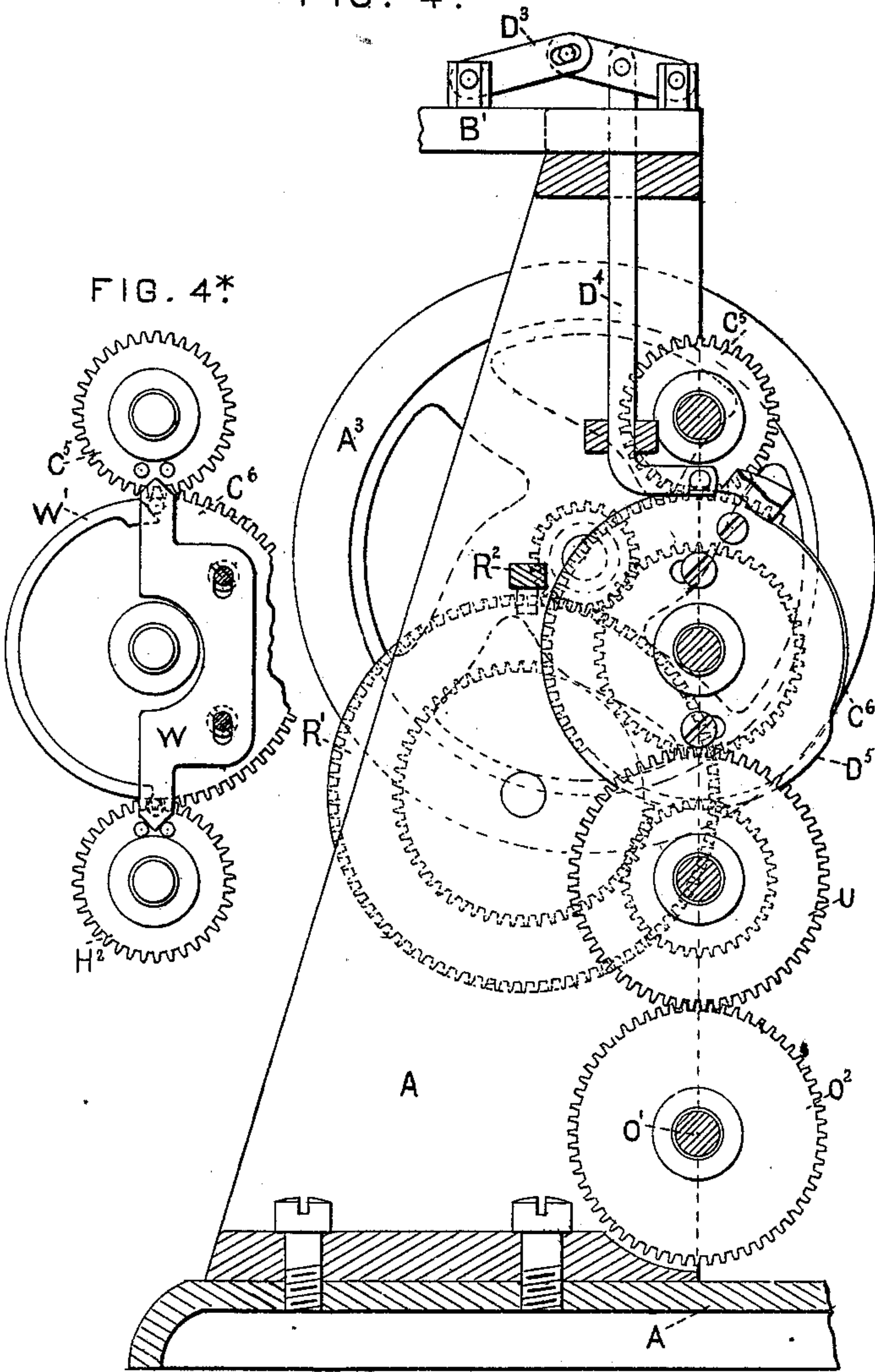


FIG. 4\*.

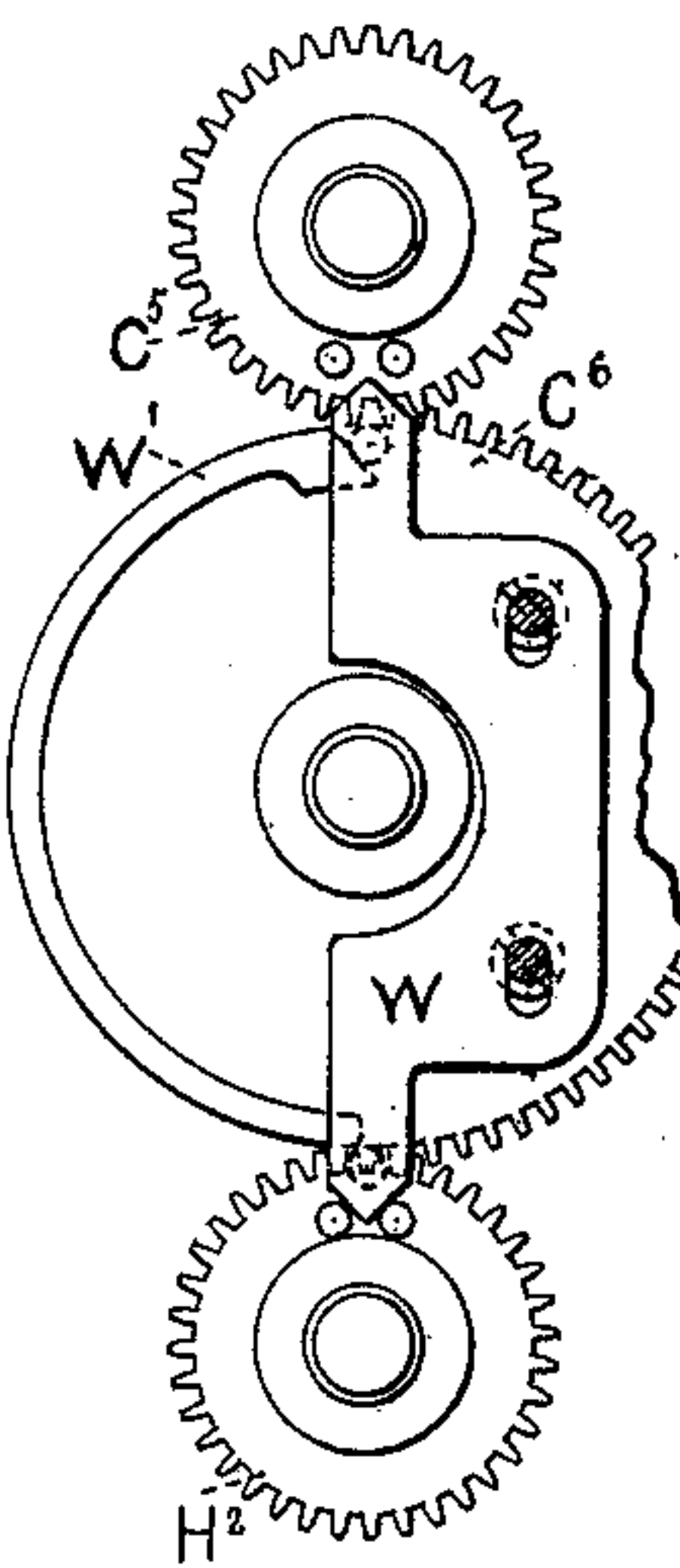


FIG. a.

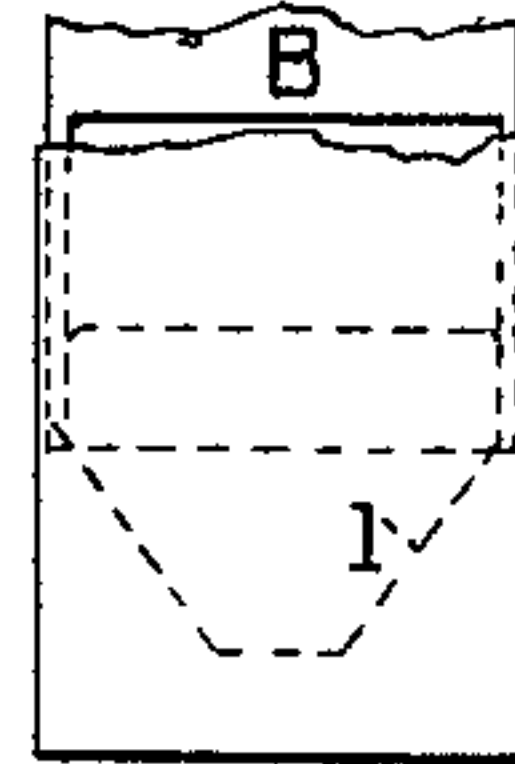


FIG. b.

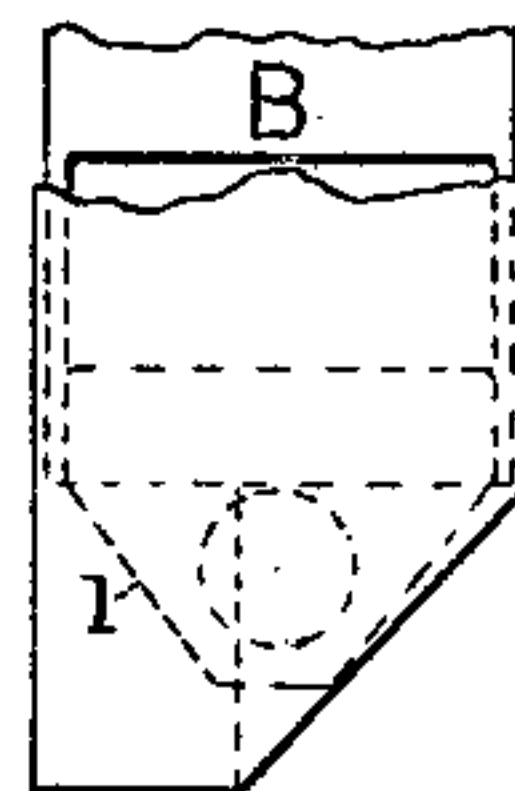


FIG. c.

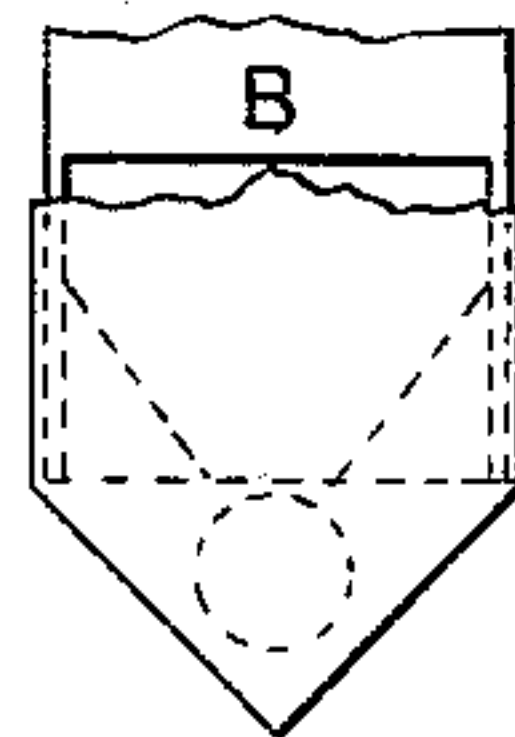


FIG. d.

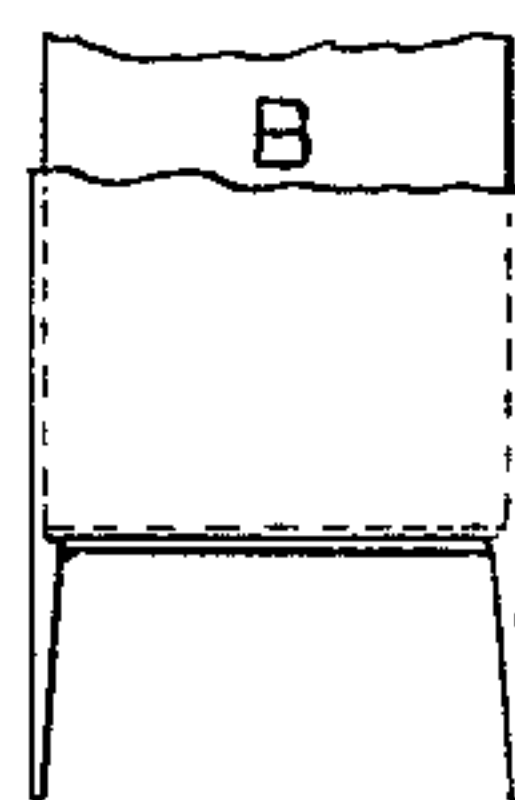


FIG. g.

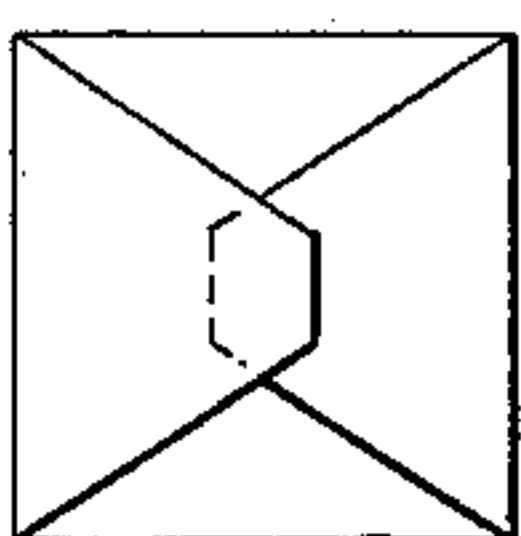


FIG. f.

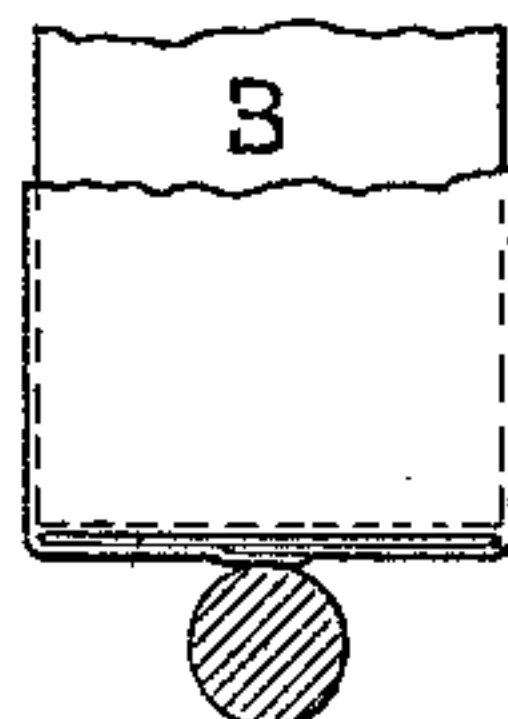
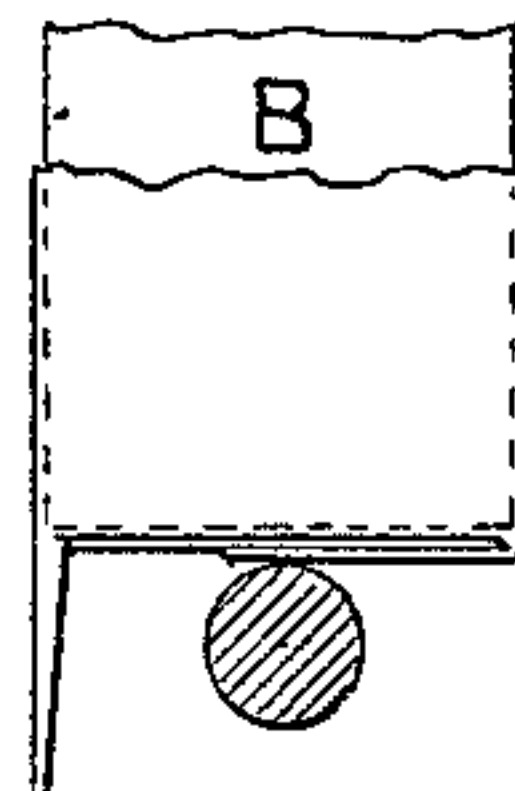


FIG. e.



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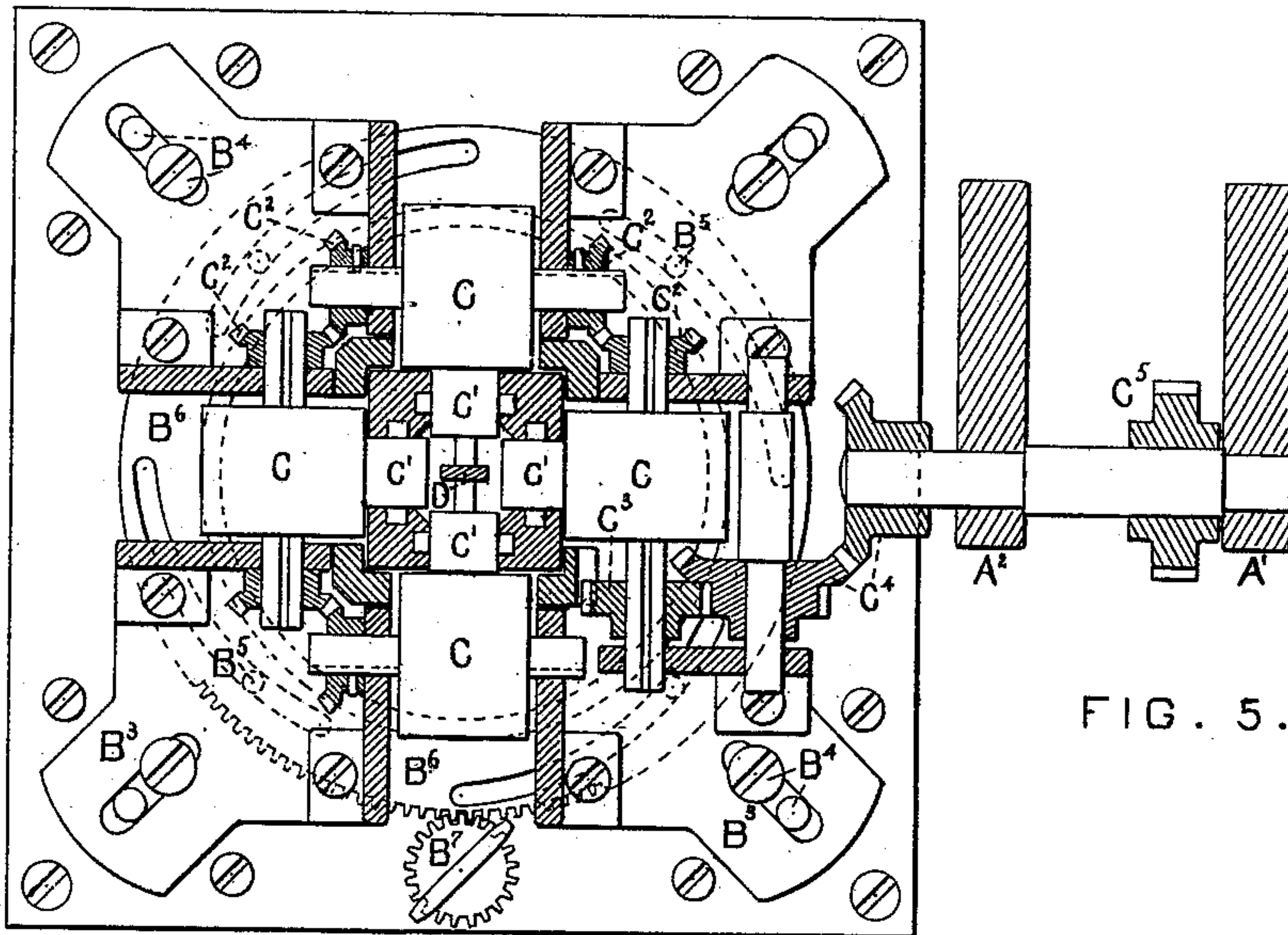


FIG. 5.

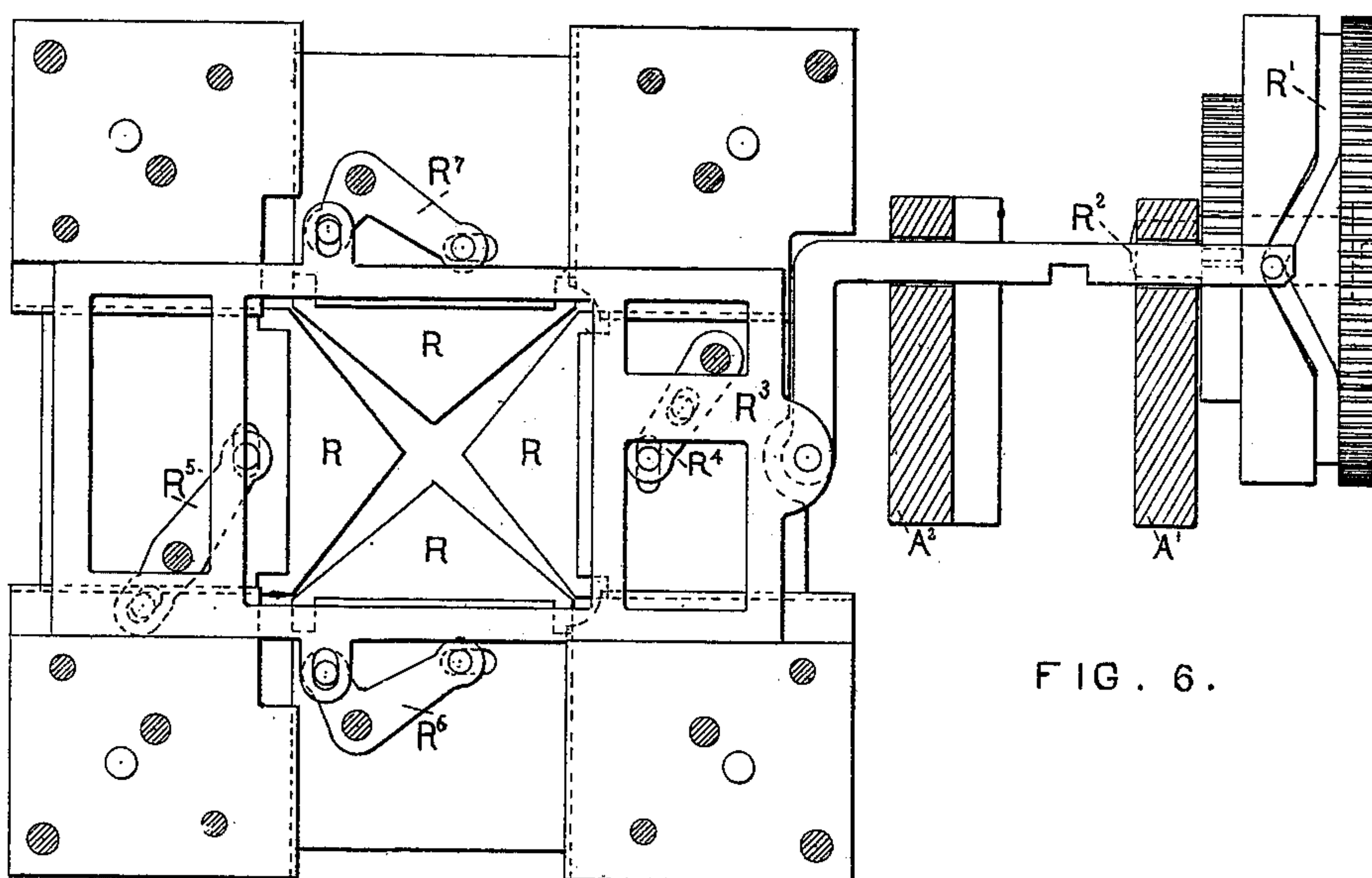


FIG. 6.

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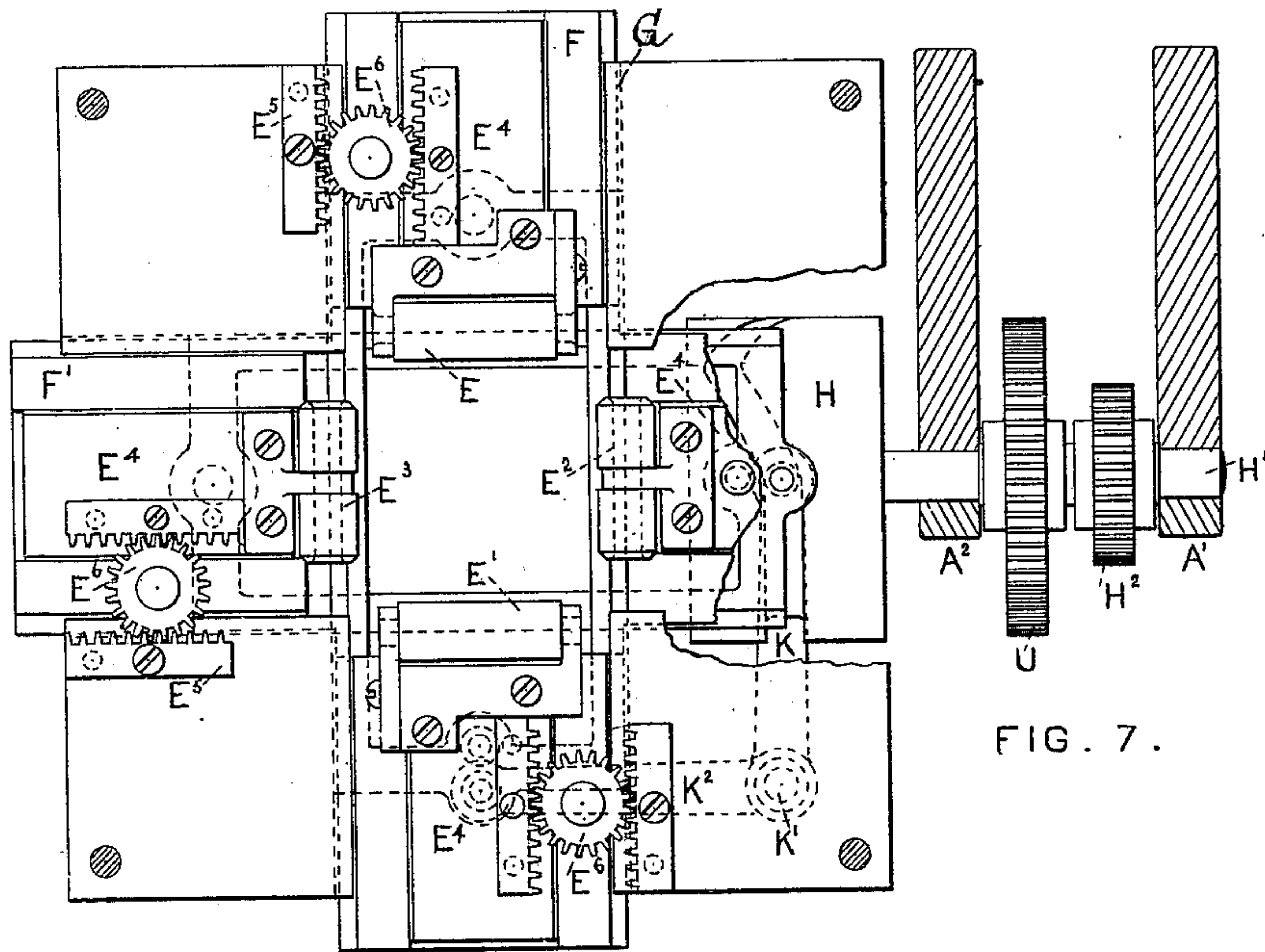


FIG. 7.

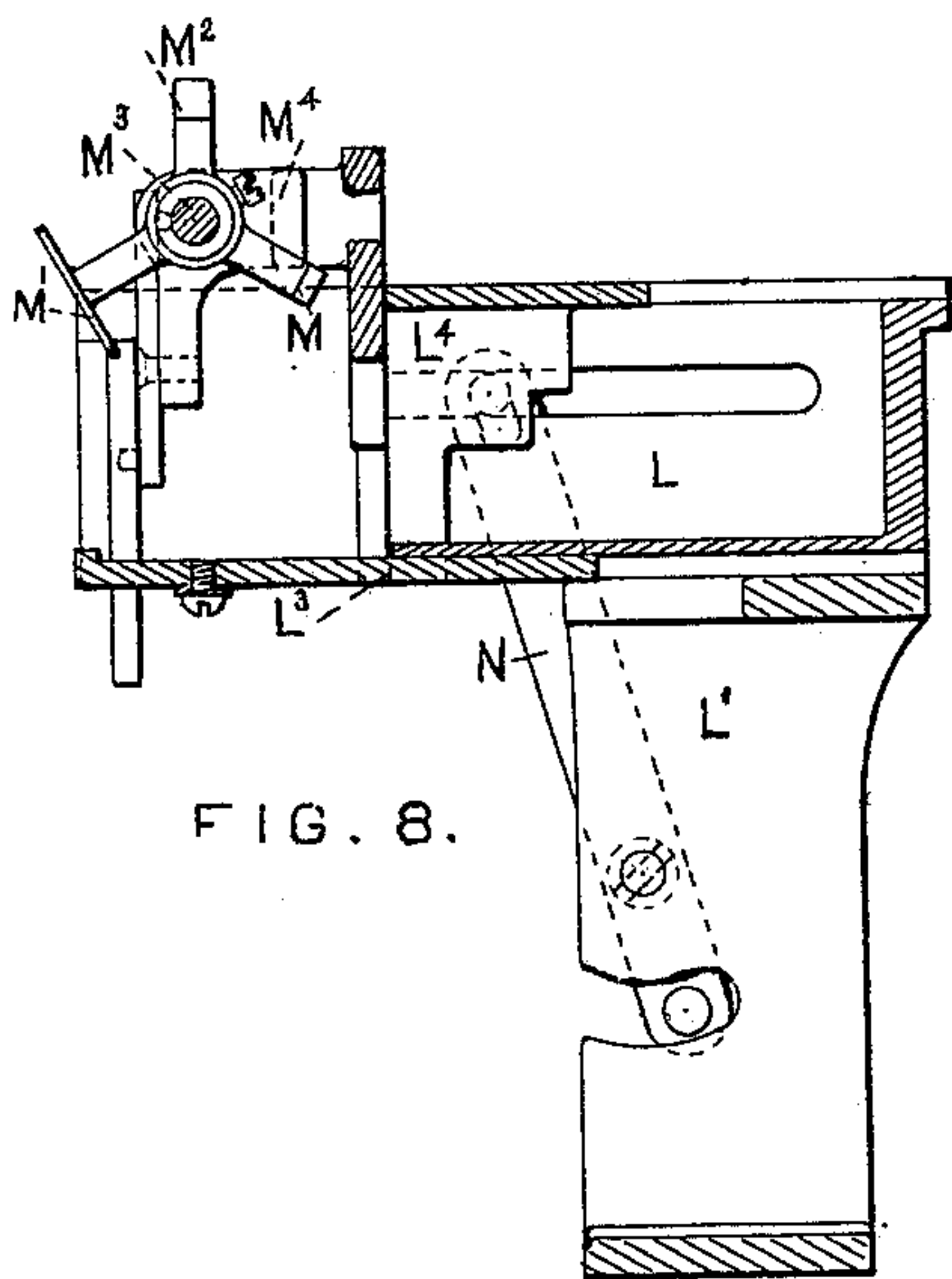


FIG. 8.

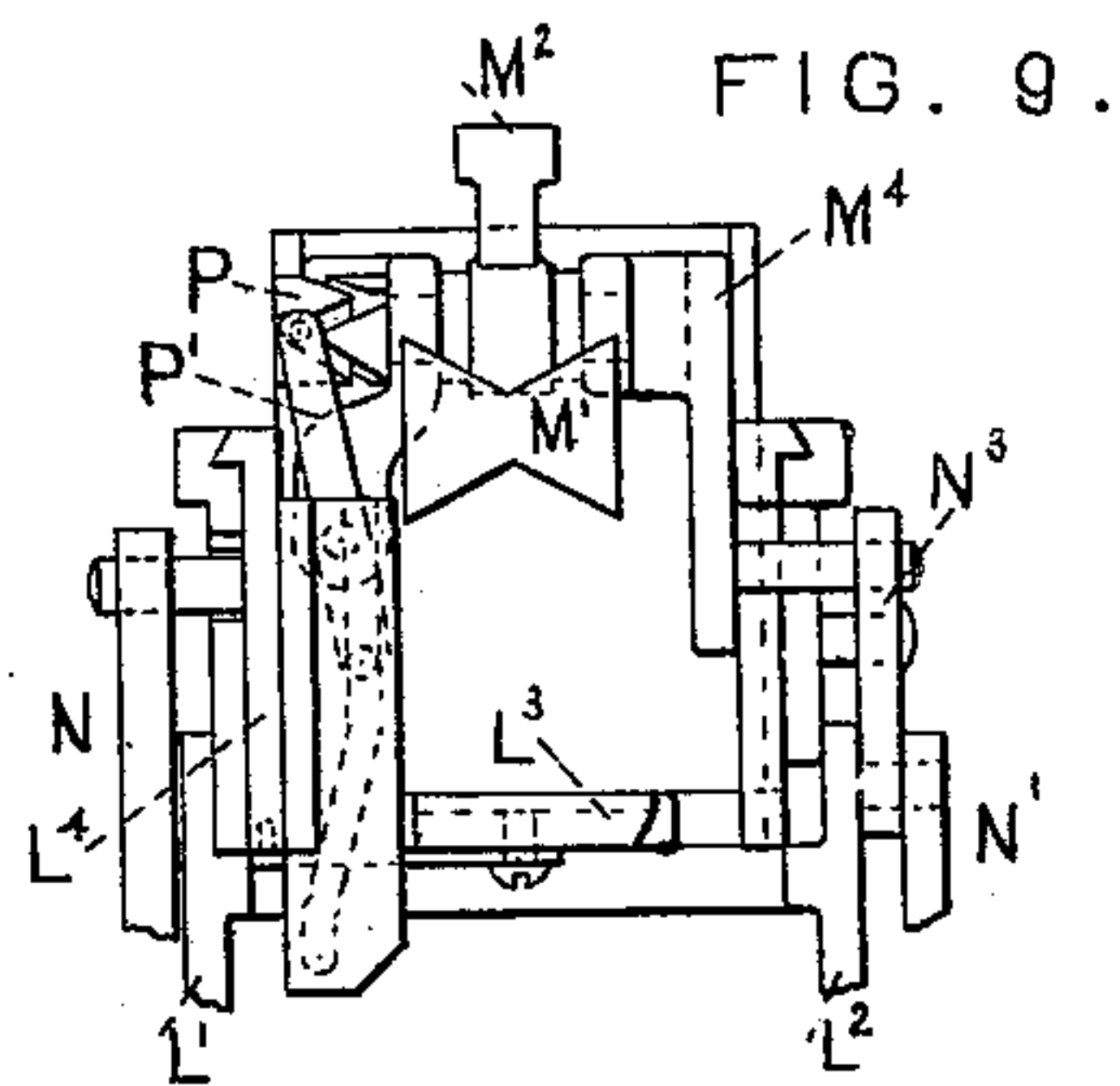


FIG. 9.

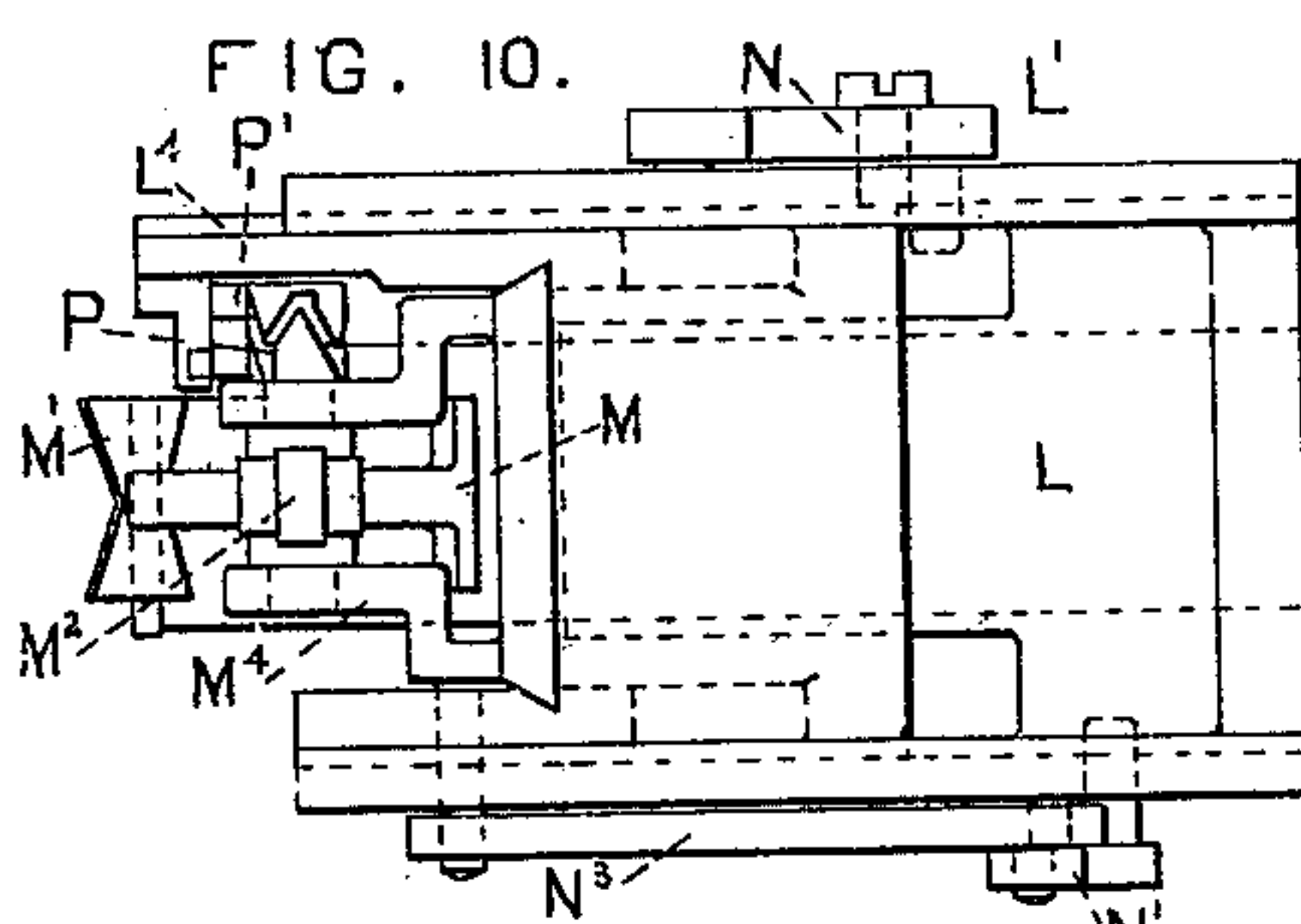


FIG. 10.

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# UNITED STATES PATENT OFFICE.

CHARLES M. RICHARDSON AND JACOB S. GIBBS, OF BRIDGEPORT, CONN.

## IMPROVEMENT IN PAPER-BAG MACHINES.

Specification forming part of Letters Patent No. **188,953**, dated March 27, 1877; application filed August 9, 1876.

*To all whom it may concern:*

Be it known that we, CHARLES M. RICHARDSON and JACOB S. GIBBS, both of Bridgeport, in the county of Fairfield and State of Connecticut, have invented a new and Improved Machine for Making Satchel-Bottom Paper Bags, of which the following is a full and correct specification, taken in connection with the accompanying drawings, in which—

Figure 1 is a perspective view of the machine. Fig. 2 is a vertical section through the line of the bag-shaping devices and parallel to the main driving-axes. Fig. 3 is a vertical section at a right angle to Fig. 2, and through the bag-shaping devices. Fig. 4 is also a vertical section at the other end of the machine, and at a right angle to Fig. 2, to show the arrangement of the gearing. Fig. 4\* is an outline of a latch for locking certain wheels during the passing of a mutilated gear-wheel between them. Fig. 5 is a transverse section through the axes of the feeding-rolls that carry down the tube of paper. Fig. 6 is a plan of the cutters and their driving mechanism, the folding devices having been removed. Fig. 7 is a plan of the folding devices and their driving mechanism to form the bottom of the bag. Fig. 8 is a vertical and longitudinal section of the paste-receptacle, and shows an end view of the pasting devices. Fig. 9 is an elevation of the same, showing an end view of the paste-box and devices for rotating the pasters. Fig. 10 is a top view of the same. Figs. *a, b, c, d, e, f,* and *g* are diagrams to illustrate the various forms of folding the paper in the process of forming the bottom of the bag.

This invention pertains to the class of machines for forming what are termed in the art "satchel-bottom bags," or those having square or rectangular bottoms, or nearly so; and the invention consists in the combination of various devices, by which the paper is taken from a roll, and guided around a rectangular shaper after paste has been applied to one of the edges of the sheet, so as to unite it to the opposite edge to form a tube, and then carrying said tube down to a series of folding devices, where the bottom is folded and pasted by a series of alternate operations, and is carried on to a sufficient distance to give the desired

length of the bag, when it is severed or cut off from the tube by four knives or cutters acting simultaneously upon the four opposite sides of the tube, after which it is seized by a second set of folders and flattened, with the bottom turned over on one side of the bag, and passed out of the machine ready for packing for the market.

The machine is so organized that before the last part of the operation is completed a second bag is being formed, and follows in close proximity to the first, so that the operation is performed as nearly continuously as possible.

As the various combinations of devices to perform the several operations of making such articles complete will form the subject-matter of the claims, they need not be recited in this part of the specification.

At *A* is represented the bed or foundation of the machine for supporting all the other parts, and upon said bed are mounted two up-rights or standards, as at *A*<sup>1</sup> and *A*<sup>2</sup>, for supporting the driving-gear and some of the cam-wheels.

At *A*<sup>3</sup> is the main driving-wheel, to which power may be applied, either by hand or belt, or in any other suitable manner, and thereby communicates motion to the other wheels mounted on axes working in bearings on the same up-rights *A*<sup>1</sup> and *A*<sup>2</sup>.

At *B* is the shaper or device for forming the paper tube, and it is suspended to a bracket, *B*<sup>1</sup>, that extends out from the top of the standards *A*<sup>1</sup> and *A*<sup>2</sup>, and is fastened thereon by screws, as shown in Figs. 1 and 2.

Around said shaper or former, and in close proximity to its sides, there is arranged a rectangular hopper, as at *B*<sup>2</sup>, that serves as a guide to the paper tube in its passage along the shaper, and both the shaper and its surrounding hopper or quadrangular sleeve are made in four parts, to be capable of adjustment to the different sizes of bags desired to be made on the same machine.

The four parts of the hopper or sleeve are fastened upon a separate plate, (best seen at *B*<sup>3</sup>, Fig. 5,) and said plates are fastened upon their bed-plate by binding-screws in slots, as at *B*<sup>4</sup>, so that by releasing said screws each plate and its portion of the hopper or sleeve may be moved out or in, as the case may be,



in a diagonal direction from the corners of the shaper B, and thereby enlarge or reduce the size of the hopper or sleeve from the corners instead of from the sides. To accomplish this simultaneously the several plates which support the four parts of the hopper or sleeve are connected by a pin in each, as at B<sup>5</sup>, in an eccentric groove in a circular plate, B<sup>6</sup>, which turns in a recess underneath the plates B<sup>3</sup>, and is operated by a pinion at B<sup>7</sup>, which engages with teeth upon the edge of the plate B<sup>6</sup>, so that by simply turning the pinion all four of the rectangular corners are moved out and in from or toward the corners of the shaper B.

Upon each of said corner-pieces there are bearings for the axes of the feeding-rolls for drawing the paper along the shaper, and said rolls are shown at C, and their peripheries extend through the sides of the sleeve, so as to come in contact with a corresponding set of rolls mounted in the shaper B, as at C<sup>1</sup>, Figs. 2, 3, and 5, between which the paper is caught and drawn as they rotate.

For the purpose of rotating them, the axes of the rolls C are connected together by a series of bevel-wheels, as at C<sup>2</sup>, which can slide to and fro on the axes, but which rotate each shaft or axis by a spline or rib on each, and one of said axes is connected with the main driving-gear by a pinion at C<sup>3</sup>, and a pair of bevel-wheels, C<sup>4</sup>, which is on a shaft mounted in the standards A<sup>1</sup> and A<sup>2</sup>, and which carries a pinion, C<sup>5</sup>, that gears into a mutilated gear-wheel, C<sup>6</sup>, by which mutilation a rest is given to the feed-rolls during the time that the bottom is being formed on the bag.

After the tube of paper has been carried by the feed-rolls sufficiently far past the end of the shaper to furnish paper enough to form the bottom, then their action ceases, and the operation of forming the bottom folds and pasting begins.

Upon opposite sides of the shaper B there are arranged V-shaped guides of thin plates of metal, as at 1, Fig. 3, which are fitted into recesses in the shaper, and are suspended or attached to a rod, as at D, which extends down through the shaper, and up through the bracket that supports the shaper, and is connected to a lever, D<sup>1</sup>, which is attached to a rock-shaft, D<sup>2</sup>, on the opposite end of which is another lever, D<sup>3</sup>, one end of which is connected with a second lever, mounted upon the cap over the two standards A<sup>1</sup> and A<sup>2</sup>; and said lever is connected to a vertical rod, D<sup>4</sup>, the lower end of which has a pin that projects out over a cam-wheel, D<sup>5</sup>, which is on the same shaft that carries the mutilated gear-wheel C<sup>6</sup>, which operates the feed-rolls, and by such a combination the V-shaped guides are projected beyond the square end of the shaper, and remain at rest while the two opposite sides of the bag are folded, and which will be best understood by a reference to the diagrams, Figs. a, b, c, and d, the figure at a representing the square tube of paper ex-

tending below the end of the shaper B, the V-shaped guide 1 being represented in dotted lines.

The second diagram, Fig. b, represents one side of the tube folded in by a folding-roll, having moved in between the two guides, the end of the roll being shown in a dotted circle, and the next diagram represents the opposite sides folded in by a roll, having moved in from the opposite side, and thereby forming two V-shaped projections on the paper tube, as in Fig. c, the edge view of which is shown at Fig. d, and which are afterward rolled in or folded by rolls working at right angles to the first, to form the folds shown at Figs. e and f, and which finally finishes the bottom to appear like the diagram at Fig. g.

During the last two folds the V-shaped plates attached to the rod D are lifted along the sides of the shaper B by the cam-wheel D<sup>5</sup>, and are held up out of the way of the folding-rolls that complete the bottom, and as soon as the feed-rolls begin to operate, they are again lowered to their first position.

The folding-rolls and their operating mechanism are best seen in plan at Fig. 7, but sections are shown in Figs. 2 and 3.

The folding-rolls E, E<sup>1</sup>, E<sup>2</sup>, and E<sup>3</sup> are each mounted in bearings on plates E<sup>4</sup>, whose edges work in V-shaped channels in a second set of plates, as at F and F', which are also recessed into V-shaped grooves in a plate, as at G, that forms a portion of the frame of the machine, and which is supported by feet G', that are fastened upon the bed-plate A.

Said second set of plates F and F' extend across the machine, and they cross each other at right angles, and receive the other four plates on their opposite ends to support the folding-rolls, and thus the rolls E and E<sup>1</sup> form a pair on one plate, and E<sup>2</sup> and E<sup>3</sup> on another plate at right angles to the first.

These second plates reciprocate to and fro, and are operated by the same cam at H on the shaft H<sup>1</sup>, which is mounted in bearings on the standards A<sup>1</sup> and A<sup>2</sup>, and which receives motion from the mutilated gear-wheel C<sup>6</sup>, the teeth of which act while the feed-rolls are at rest, as they must rest while the folding is being done against the bottom of the shaper B.

It is immaterial which folding-roll acts first; but it is preferable, on account of the appearance of the bag, to turn in the portion of the tube where the seam is formed on the side of the bag, and therefore that roll on that side should act first, as it will thereby fold the seam inside first on the bottom, and be covered to a certain extent by the other folds.

If the roll E on the one opposite the seam in the paper tube is to act first, then the plate F will act first to move the roll E toward the shaper B, while the V-shaped guides 1 on the shaper will be on the sides at right angles to the axis of the roll E; but, as the machine illustrated in the drawings is arranged, the roll E<sup>2</sup> acts first, and therefore the plate F'



moves first, and it is operated by a pin projecting down from the end of said plate into a groove in the cam-wheel H, and is thereby moved to and fro during the rotation of said wheel.

But the rolls E<sup>2</sup> and E<sup>3</sup>, being attached to the small plates E<sup>4</sup>, which slide in the plate F and F', are operated each by a rack or racks and pinion, as at E<sup>5</sup> and E<sup>6</sup>—that is, there is a rack fastened on each plate E<sup>4</sup>, and a stationary rack, E<sup>5</sup>, on the frame-plate, and a pinion, E<sup>6</sup>, working between the two, and said pinions are mounted on pins in the plate F or F', as the case may be, so that when either of the plates F or F' is reciprocated, the plates on which the rolls are mounted are moved twice the distance of the plates F and F', the intermediate pinions give a throw of two to one in their reciprocation, and, by such an arrangement, reduce the throw of the cam H one-half in its action.

The plate F is operated by the same cam H; but, as it works at a right angle to the plate F', the connection with the cam H is made on the opposite side of the cam-wheel, and it is effected by means of a lever, as at K, which is attached to a rock-shaft, K<sup>1</sup>, and which has a second lever, K<sup>2</sup>, extending out at a right angle from the first, as best seen in Fig. 7, to engage with the plate F', and thereby reciprocates it at each revolution of the cam-wheel H, and at the time the other plate F' is remaining at rest.

As it is necessary that the bottom of the bag shall be fastened by paste as well as folded, and as each fold requires paste underneath it, the pasting apparatus will now be described.

The paste is contained in a receptacle, as at L, which is supported on two uprights, as at L<sup>1</sup> and L<sup>2</sup>, fastened upon the bed A of the machine, and upon a sliding bottom, as at L<sup>3</sup>, and sliding sides, as at L<sup>4</sup>, are mounted the pasting-stamps, each of which is brought into action alternately with the folding operations.

These stamps are shown at M, M<sup>1</sup>, and M<sup>2</sup>, and they are mounted on a shaft or axis, as at M<sup>3</sup>, which has bearings in two brackets extending from a vertical plate, as at M<sup>4</sup>, Figs. 8, 9, and 10, which is arranged to slide in V-shaped grooves in the sliding sides L<sup>4</sup>, so that after the sides and bottoms are projected out from the paste-receptacle far enough to bring the stamps under the bottom of the shaper B, then the stamps can be raised to apply the paste on the bottom whenever required.

The to-and-fro movement of the pasting-stamps is produced by a lever, as at N, pivoted upon one of the uprights, as at L<sup>1</sup>, that support the paste-box L. One end of said lever is connected with one of the sliding sides L<sup>4</sup> by a pin, and the other end has a pin extending from the lever into a grooved cam-wheel, as at O, Fig. 2, on the shaft O<sup>1</sup>, upon the opposite end of which is a toothed wheel,

O<sup>2</sup>, that engages with the train of toothed wheels on the uprights A<sup>1</sup> and A<sup>2</sup>.

Said lever and its connections, with the pasting apparatus, are best seen at Fig. 8, where the lever is shown in dotted lines.

The lifting operation of the stamps is effected, on the opposite side of the paste-box, by another lever, as at N<sup>1</sup>, pivoted to the other uprights L<sup>2</sup>, and is operated by a pin projecting into another groove on the cam-wheel O; and the upper end of said lever is pivoted to a bell-crank lever, N<sup>2</sup>, the long end of which, N<sup>3</sup>, extends out horizontally, and is slotted to receive a pin projecting from the side of the stamp-carrier, so that after it is projected out under the center of the shaper B by the action of the first lever N, the second lever will lift the stamps to apply the paste upon the bottom of the bag.

The stamps are made of different forms to suit the shape of the folds—as, for example, when the first fold of the tube is made, as at Fig. b, the paste must be laid in a line across the bottom, and, therefore, the first stamp, as at M, is a straight bar, whose length is equal to the width of the bottom of the bag, or the space between the two V-shaped guides that extend beyond the shaper B, and said stamp is only wide enough to apply a layer of paste equal to the lap of the other side of the bottom fold over the first.

After this stamp has acted it is lowered by the action of the lever N<sup>3</sup>, and during the interval the opposite fold is made on the paper tube, as at Fig. c, when a second stamp, M<sup>1</sup>, is raised to apply the paste. But in the meantime the stamp-shaft is rotated to bring said stamp into working position, and this is effected by a series of zigzag grooves in one end of the stamp-axis, as at P, Figs. 9 and 10, and into said grooves a pin works, which is attached to a switch-lever, P', pivoted upon one side of the paste-carrier L<sup>4</sup>; and said lever is slotted on its inner face and engages with a pin in the paste-box, and as it is raised up with the paste-stamps, it is caused to vibrate by said pin in the slot, so as to move to and fro, and thereby rotate the paste-stamp shaft as the pin in the switch-lever traverses to and fro in the zigzag grooves, and it is similar to the movement of the inking-rolls in a printing-press.

The second paste-stamp M<sup>1</sup> is formed, as shown at Figs. 9 and 10, of two triangles, with their two acute angles united, and thereby make a stamp corresponding to the two opposite V-shaped portions of the bag shown at Figs. c and d, and one of which is folded at Fig. e, and both at Fig. f, of the diagrams; and said stamp applies the paste to fasten both sides of these two V-shaped folds over their entire surface, except where their ends overlap each other. Consequently, before the last point is folded, the last paste-stamp M<sup>2</sup>, which is merely a square-ended arm, is brought up to apply a spot of paste upon the outer



surface of the first point folded, as at Fig. *e*, and thereby serves to fasten the point of the fold, as at Figs. *f* and *g*, and thereby completes the operation of pasting alternately with the folding of the bottom.

When this portion of the operation is finished the rotation of the cam-wheel O causes the pasting-stamps to be carried back into the paste-receptacle, and out of the way of the descending bag or tube, the lower end of which has been finished, and then the tube is caused to descend sufficiently far along the shaper B to give the required length for a bag, when four V-shaped cutters, as at R, are driven in simultaneously in close proximity to the lower end of the shaper, and thereby sever the tube and permit the bag to be caught by the finishing-folders below.

A plan of said cutters and the mechanism for driving them are shown at Fig. 6, where the cutters R are represented as having completed their work, each being driven into the full extent of the throw of the cam-wheel at R<sup>1</sup>, in the groove of which cam a pin projects from the end of a sliding rod, R<sup>2</sup>, which is pivoted to a sliding plate, R<sup>3</sup>, that reciprocates in recesses formed in the plate of the frame that supports the folding-rolls, and immediately below said plate R<sup>3</sup> the V shaped cutters R are placed to work in similar recesses, and between each of the cutters and the sliding plate R<sup>3</sup> lever-connections are made, as at R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, and R<sup>7</sup>, in such a manner that each lever forces its cutter inward as the plate R<sup>3</sup> is moved in one direction by the cam-wheel R<sup>1</sup>, and they are all moved outward by the reverse action of the cam.

The operation of these levers will be easily understood by a reference to Fig. 6, where their fixed pivots are shown in section, the lever R<sup>4</sup> having its fixed point at one end and its pivoted attachment to the cutter at the other end, and its connection with the sliding plate R<sup>3</sup> between the two, while the opposite lever R<sup>5</sup> has its fixed pivot between the cutter and the sliding plate, the one being a lever of the first order, and the other of the second. The other two levers, R<sup>6</sup> and R<sup>7</sup>, are formed with a right angle, and have their fixed pivots in the angle, and their attachments at the two ends, as there shown.

It will be observed that the cam-wheel R<sup>1</sup> is on the first intermediate shaft of the train, and receives motion from the main driving-wheel; but on the other end of said shaft there is a partially-mutilated gear-wheel for giving motion to the rest of the train; and the object of this mutilation is to let all the other parts rest while the bag is being cut off.

The bag, having been severed by the cutters, then descends between two folding blades or edges, as at S and S<sup>1</sup>, that grasp the quadrangular tube and flatten it sufficiently far from the bottom as that the bottom may be turned up on one side of the flattened bag without striking the folders, and by which

operation one edge of the bottom is caught between a large cylinder, as at S<sup>2</sup>, and a small compression-roll, S<sup>3</sup>, mounted on the axes of one of the folders, as at S, and by the joint action of the two is flattened and passed out of the machine, ready for drying and packing for the market.

These folders consist of two thin plates of metal mounted on arms that are attached to rock-shafts, as at S<sup>4</sup> and S<sup>5</sup>, which are mounted in a small frame, as at S<sup>6</sup>, which is fastened upon the top of the bed A, as shown in Figs. 1, 2, and 3, and the edge of one of the folders, as at S, is turned over at a right angle to its plane, and also at a right angle to the axis of the bag; but the other folder, S<sup>1</sup>, is left flat, or only slightly curved toward the other, so that as the two come together, the tube is not only caught, but partially folded, so as to tilt the bottom over on one side, and at the same time projects the lower edge of the bottom under the small roll S<sup>3</sup>, and thereby holds it upon the cylinder S<sup>2</sup> until it is carried out of the machine.

These two folders are operated by a cam on the end of the cylinder S<sup>2</sup>, in the groove of which works a pin, as at T, which projects from a sliding plate, T<sup>1</sup>, (plainly shown at Fig. 1,) and which has upon its two upper corners horns or brackets, that carry pins which work in slotted heads, as at T<sup>2</sup> and T<sup>3</sup>, upon the rock-shafts that carry the folders; consequently, by the raising and lowering of said plate T, or by holding it at rest, the folders are closed and opened, and held at rest, as required.

The drum or cylinder S<sup>2</sup> is on a shaft that extends out to the uprights A<sup>1</sup> and A<sup>2</sup>, and it is connected by a toothed wheel, as at U, with the driving-train, as plainly shown at Fig. 1 of the drawings.

At Fig. 4\* there is represented a latch, W, for holding the toothed wheels C<sup>5</sup> and H<sup>2</sup> in their proper positions while the mutilated wheel C<sup>6</sup> is revolving, and said latch is merely a sliding bar, arranged to move up and down on the upright A<sup>1</sup>, and it is operated by a cam, as at W<sup>1</sup>, on the gear-wheel C<sup>6</sup>, said cam raising the latch to engage between the pins on the face of the wheel C<sup>5</sup>, and thereby holding it until the wheel C<sup>6</sup> has revolved a half-revolution, when the latch W is allowed to drop, and thereby bring its other end to engage between the pin on the face of the wheel H<sup>2</sup>, and hold it while the wheel C<sup>5</sup> is rotating.

This locking device insures the correct engagement of the two wheels when the machine is running at a high rate of speed.

The bottom of the paste-box is provided with a pad on the sliding bottom, upon which the stamps drop to obtain their paste, and this pad slides back and forth in the paste-receptacle, to be replenished between the folding of each bottom.

It is evident that the cutters may have ser-



rated edges instead of a single V, as here represented, and in that case need not be driven so far inward to perform their work, and they may also be arranged with a spring, to drive them forward as with a blow, instead of being moved in and out gradually by a cam.

The folding-rolls may be dispensed with, and in their place round-ended slides may be used, and may be driven by the same mechanism, and it is also evident that the pinion-wheels and racks may be displaced by having the cam throw twice as far, if desired.

The paper may be carried down to the shaper over a guide-roll suspended above, either in the same room or in one above, where the paste to form the tube may be applied by any of the well-known methods; and it is evident that a machine may be made for each size of bags desired, instead of having the parts adjustable, as here represented; and it is also evident that other arrangements of the gearing may be used without departing from the nature of our invention.

We therefore claim—

1. The adjustable four-sided sleeve, separated on the sides, and each section combined with mechanism, substantially as described, for moving the several parts simultaneously, for the object set forth.

2. The combination, with the four-sided fixed shaper B, the sleeve arranged around the same, and the vertically-movable V-shaped guides 1 1, of the laterally-reciprocating plates E<sup>4</sup> and F F', and the rollers for folding the end of the bag, mounted in bearings in the plates E<sup>4</sup>, substantially as described.

3. The combination, with the rectangular fixed shaper B, the sleeve arranged around the same, the feed-rolls C in the sides thereof,

of the laterally-reciprocating rollers for flattening the bag and folding its bottom, the folding blades or edges S S', and the delivery-drums S<sup>2</sup> and S<sup>3</sup>, as and for the object specified.

4. The combination of the folders S and S' with a rotating drum and compression-roll, for completing the folding operation and delivering the bag from the machine, as described, and for the purposes set forth.

5. The combination of the paste-receptacle L, the sliding bottom L<sup>3</sup>, and the sliding sides L<sup>4</sup> of the pasting-stamps M M' M<sup>2</sup>, mounted in the sliding sides, as and for the object specified.

6. In combination with the gear-wheels C<sup>5</sup> and H<sup>2</sup>, the locking-latch W and cam W', for operating the same, as described, and for the purposes set forth.

7. In combination with the sleeve B<sup>2</sup>, the circular cam-plate B<sup>6</sup> and pinion B<sup>7</sup>, for enlarging and closing the sleeve, substantially as described.

8. In combination with the cutters R, the plate R<sup>3</sup> and the intermediate levers R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, and R<sup>7</sup>, substantially as described, and for the purposes set forth.

9. In combination with the folding-rolls, the racks and intermediate pinions, for imparting a motion to the rolls double that of the actuating-cam, substantially as described.

10. The combination of the zigzag grooves in the axis of the paster with the slotted lever P', substantially as described, and for the purposes set forth.

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