No. 765,911. PATENTED JULY 26, 1904.

F. BALZE.

FEEDING MECHANISM FOR STAPLING MACHINES.

APPLICATION FILED SEPT. 23, 1898.

NO MODEL. 3 SHEETS—SHEET 1.

Fig 1.

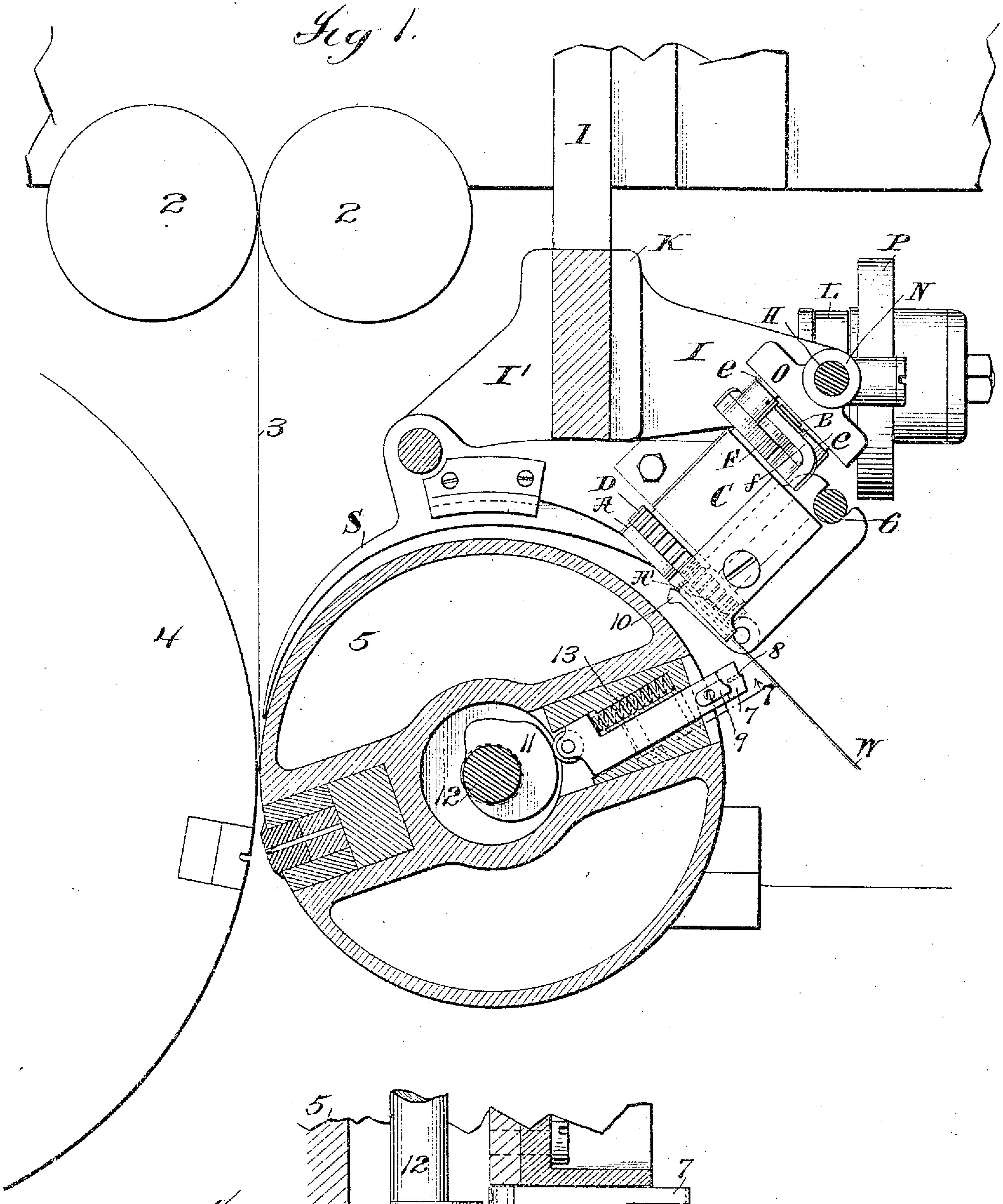
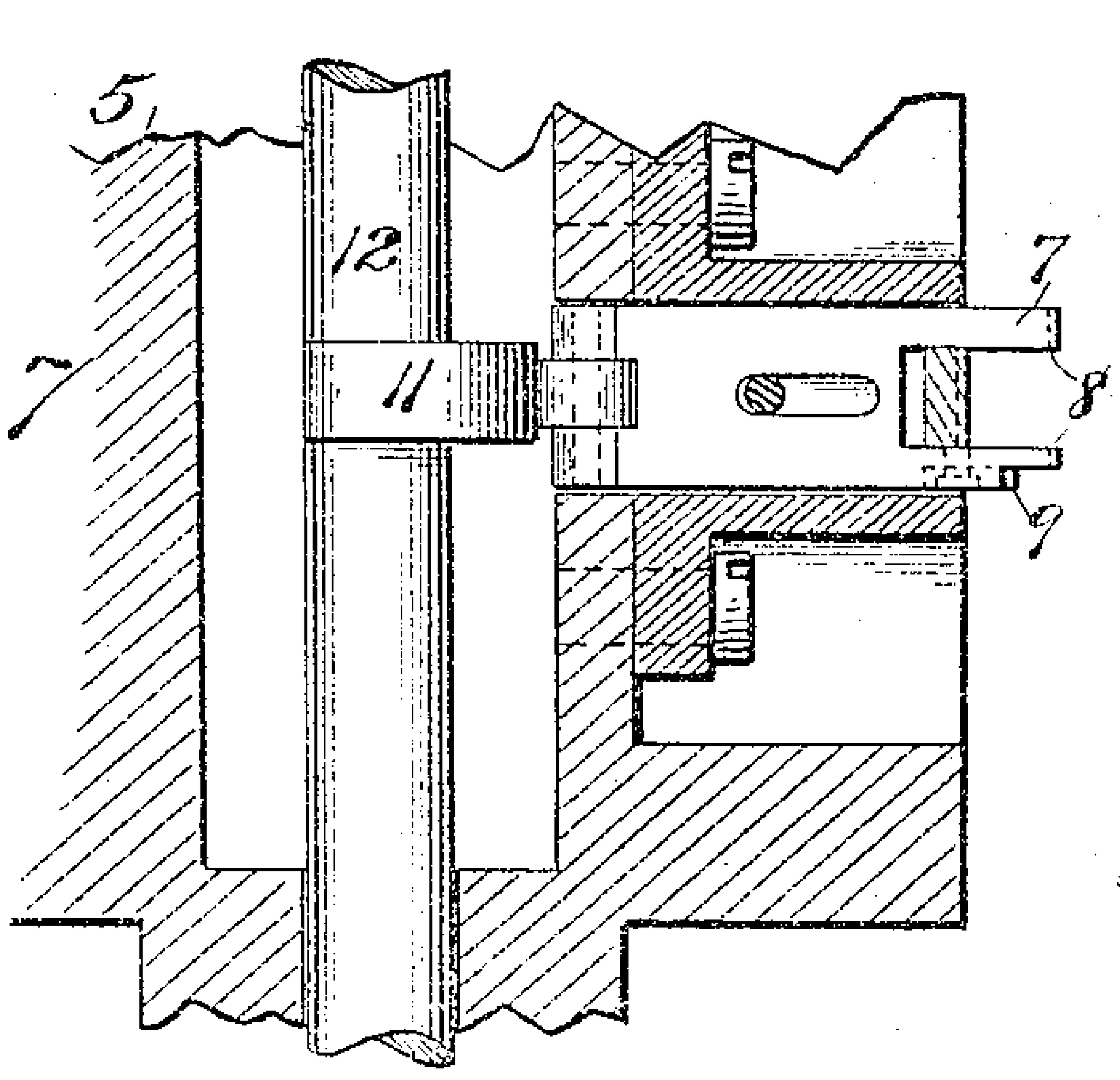


Fig. 7



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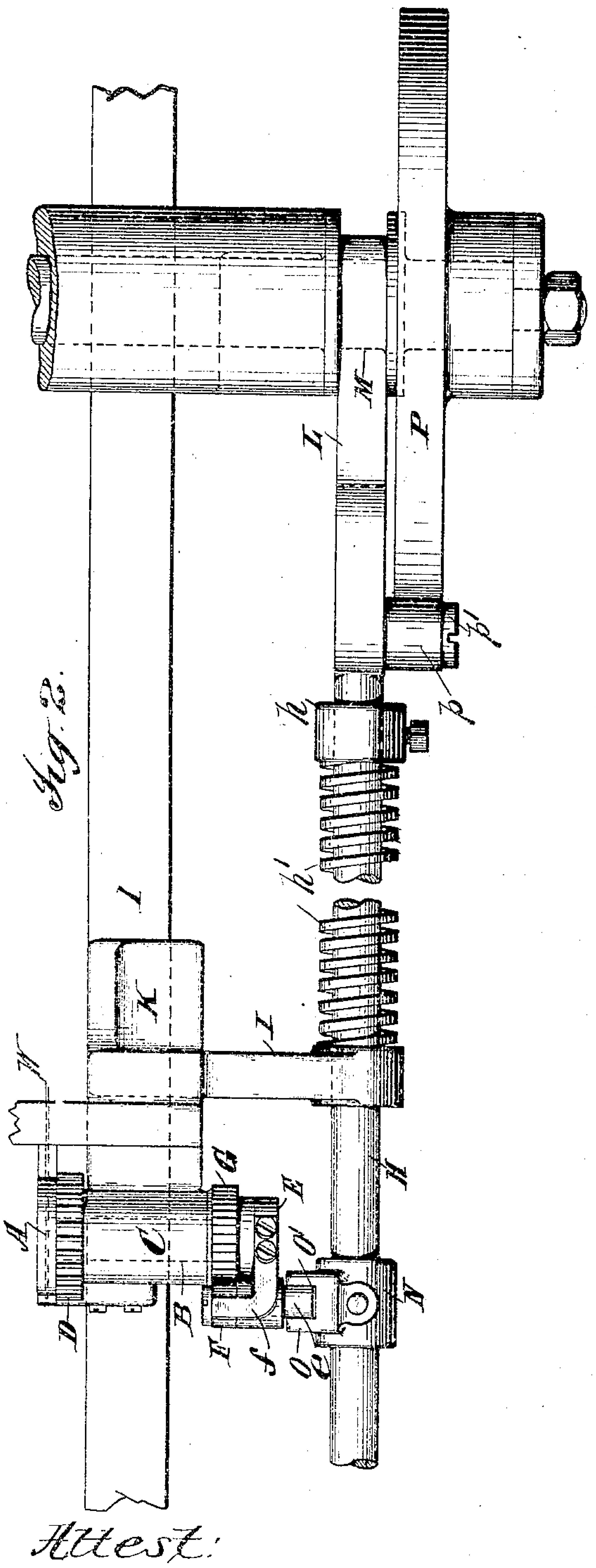

Fig. 2.

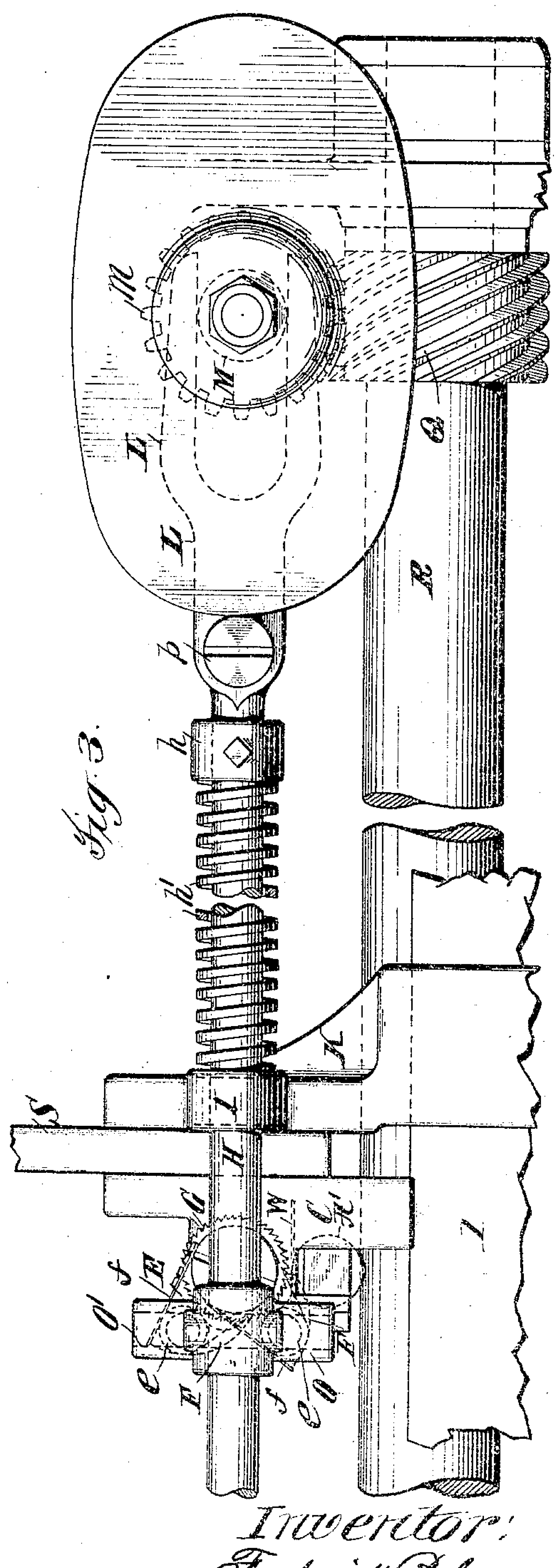

Fig. 3.

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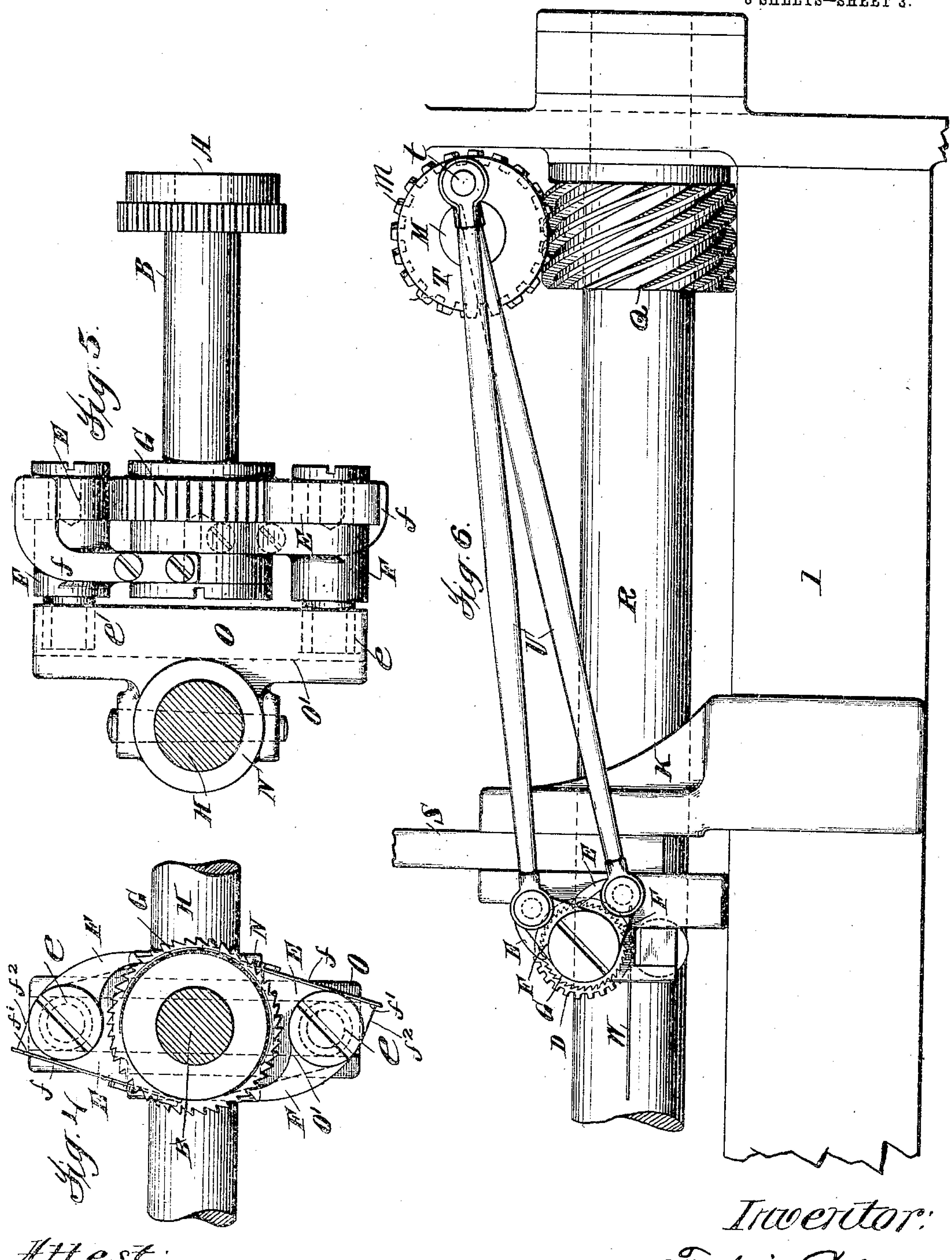
NO MODEL. 3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

FREDERICK BALZE, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ROBERT HOE AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

FEEDING MECHANISM FOR STAPLING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 765,911, dated July 26, 1904.

Application filed September 23, 1898. Serial No. 691,740. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK BALZE, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Feeding Mechanism for Stapling-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to wire-feeding mechanisms, and is particularly adapted and intended for use in connection with the wire-stapling devices which are used in connection with printing-machines and which are used to insert staples in running-webs. In such devices as heretofore constructed the feed mechanism has usually been continuous in its operation, and it has been so constructed in order to supply sufficient wire to the stapling devices which, owing to the fact that they are used to staple the output of fast printing-machines, necessarily run at great speed. Continuously-operating feeding devices have, however, been found unsatisfactory in some respects, and particularly in that class of machines in which the wire-length-taking device moves across the line of wire feed, because owing to the fact that since the wire is continuously fed by the feeding devices after a length of wire sufficient to form a staple had been fed to the wire-length-taking devices, which are usually the staple-forming devices, the succeeding length would be fed against the staple-forming devices while they were operating upon the first length, and notwithstanding the great rapidity with which the said devices operate the wire would buckle or bend, so as not to be fed truly.

The object of this invention is to produce a feeding device which, while it is practically continuous in its operation, so as to supply the amount of wire necessary to the wire-length-taking device, still has a slight pause or momentary dwell in its action which will give that device time to operate, and thereby avoid buckling the succeeding length of wire.

The invention consists in certain mechanisms and in certain parts, improvements, and combinations thereof, which will be hereinafter described and the novel features of which will be pointed out in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification, and in which like characters of reference indicate the same parts, Figure 1 is a diagrammatic view, partly in section, showing the drawing-off rolls of the longitudinal folders of a printing-machine, the cutting-cylinders, the stapling mechanism, and the improved wire-feeding devices. Fig. 2 is a plan view of the improved feeding device detached from the machine. Fig. 3 is a side view thereof. Figs. 4 and 5 are detail views. Fig. 6 is a view of a modification, and Fig. 7 is a sectional detail, of the staple-forming mechanism looking in the direction of the arrow on Fig. 1.

In that embodiment of the invention which has been selected for illustration in the accompanying drawings, 1 indicates a portion of the frame of a printing-machine, and 2 indicates the drawing-off rolls of a longitudinal folder, the rolls being properly mounted with respect to the said frame. The web (indicated at 3) passes between a pair of cylinders 4 and 5, herein shown as cutting-cylinders, and of which the cylinder 4 may, if desired, be a collecting-cylinder.

I I′ indicate bracket-arms extending from a standard K, which is suitably connected to the frame 1 of the machine. The arm I supports a part of the wire-feeding mechanism hereinafter to be described, and the arm I′ carries the curved bending-anvil S, which assists in forming the staple.

The wire-feeding mechanism proper, which is shown in its relative position with respect to the other devices in Fig. 1, is mainly supported by a bracket C, which in this instance is secured by means of a bolt or in any other convenient way to a portion of the bending-anvil S. In addition to the bracket C this mechanism is steadied by a supporting-bar 6, which engages in a notch in one side thereof, as shown in Fig. 1.

The wire W is fed to the staple forming and presenting devices by means of a pair of feed-rolls A A′. The feed-roll A is shown in detail in Fig. 5 and in its relative position in Fig. 1, and the roll A′ is shown in dotted lines in Fig. 1, it being located behind the wire-guide.

The feed-roll A is mounted on a shaft B, which is suitably supported in a bearing in the bracket C before referred to. (See Figs. 1 and 2.) The shaft B is preferably provided with a gear-wheel D, which serves to turn the shaft of the coöperating feed-roll A′. It is obvious, however, that this operating mechanism for the coöperating feed-roll may be omitted, the roll being allowed to be turned by friction from the feed-roll A, or, if desired, the feed-roll A′ may be omitted altogether, the roll A operating in connection with a stationary feeding-surface.

The advancing devices for rotating the feed-roll A are preferably mounted upon the end of the shaft opposite to that upon which the feed-roll is mounted. These advancing devices include in the illustrated form of the invention two arms or carriers E, having hubs which loosely surround the shaft B. Each of the carriers E has pivoted thereto a pawl F. These pawls F are located on opposite sides of the shaft and engage a ratchet-wheel G, which is fast upon the shaft, and are faced so as to alternately engage the ratchet-wheel. As the arms or pawl-carriers are moved back and forth and each pawl F alternately engages the ratchet-wheel G the wheel and the shaft will be rotated, thus operating the feed-roll A. The pawls F are held to their work by means of leaf-springs *f*, which are suitably secured to the carriers and engage the tails of the pawls. The tails of the pawls are preferably provided with flat ends f' f^2, so that the springs will not only hold them to their work by bearing against the side f', but when the pawls or either of them are swung back, so as to be disengaged from the ratchet, the springs will hold them in this position by bearing against the side f^2.

The reciprocating mechanism for operating the carriers before referred to includes a sliding rod H. This rod H passes through and is supported in the arm I, which, as before described, extends outward from the standard K, suitably fixed on the frame of the machine. It is provided at one end with a fork L, which embraces a shaft M, which will be hereinafter referred to. The rod H has secured upon it, by means of a collar N or in any other suitable way, a cross-head O, provided with a groove *o*′. Each of the carriers before referred to is provided with a stud *e*, extending laterally therefrom, which stud engages with the groove *o*′ in the cross-head before referred to. As the sliding rod H is reciprocated in one direction it operates the arms or carriers E and causes them to move simultaneously, during which movement one of the pawls F will engage the teeth in the ratchet-wheel and turn it, while the other one of the pawls F will slip idly over the teeth of the ratchet-wheel and is thus put in position for a fresh take on the ratchet when the movement of the sliding rod is reversed. As the sliding rod reaches the point of reverse in its movement there will be a slight dwell in the operation of the feeding-roll between the times when one of the pawls ceases to act and the other is thrown into operation by the reversal of movement of the sliding rod. It is during this dwell that the length of wire is cut off and carried onward by the staple-forming devices, as will hereinafter appear.

Various devices may be used to reciprocate the sliding rod. In one form of the machine shown it is given its movement in one direction by means of a cam P, which is suitably mounted on the shaft M. This cam P engages a projection, preferably in the form of a roller *p*, which is secured to the sliding rod by means of a screw *p*′. The sliding rod is provided with a collar *h*, secured thereto by means of a set-screw or in any other suitable manner, and between this collar and the bearing in the arm I, before referred to, is located a spring *h*′. As the sliding rod is moved in one direction by the cam this spring will be compressed and serves to move the rod in the direction opposite to that in which it is moved by the cam.

The shaft M may be rotated in various ways. It is herein shown as rotated by a worm-gear Q, mounted on a shaft R, which finds suitable bearings in the machine, the said worm-gear engaging a gear-wheel *m*, mounted on the shaft M.

The feed-rolls A A′, operated as before described, feed forward a length of wire sufficient to form a staple, and as the dwell takes place in the operation of the feeding mechanism the wire is in position to be caught and is caught by the wire-length-taking device, which in this instance is the staple-forming tool 7, said tool being carried in the machine shown on the roll 5 and moving across the line of wire feed. This staple-forming tool 7, which is clearly shown in detail in Fig. 7, has two projecting legs, which are spaced apart a distance equal to the width of the staple-bending anvil. Each of these legs is slightly cut away to form a recess 8 (see Fig. 1) to receive the length of wire from which the staple is to be formed. As the roll 5 rotates the staple-forming tool comes in contact with and catches the length of wire lying in recess 8, above referred to. As the staple-forming tool comes in contact with the wire a cam 9, which is mounted on the side of the forming-tool, operates the cutter 10, which is mounted upon the side of the wire-feeding device (see Fig. 1) to cut off a wire length. The length of wire is then carried forward and bent up into

a staple and inserted, the forming-tool retreating as the staple approaches the inserting-point. This retreating movement of the staple-forming tool is permitted by a stationary cam 11, which is mounted on the shaft 12, which supports the roll 5. This cam 11 preferably engages a friction-roller in the lower end of the forming-tool, and the said tool is forced to follow the configuration of the cam by means of a spring 13.

The operation of making and inserting the staple is, however, well known to those skilled in the art to which this invention pertains, and a fuller description thereof is deemed unnecessary. It is to be remarked, however, that while the form of staple making and inserting devices herein shown is a preferable one the feeding devices may be used with any form of stapling mechanism and, indeed, are capable of independent use in relations other than in connection with staple-forming devices. They are, however, particularly adapted and designed for use in this connection, since not only is the desirable dwell hereinbefore referred to produced and time thereby given for the operation of the cutter and the passage of the staple-forming tool, but it is possible because of the peculiarity of pawls employed to throw out one of the pawls, and thereby reduce the capacity of the feeding mechanism and to do this rapidly. This is particularly desirable when the feed is used in connection with printing machinery, because it enables the same wire-feeding mechanism to be used on machines which produce different products. For instance, when it is desired to use the cylinder 4 as a collecting-cylinder in a manner well known in the art one of the operating-pawls F is thrown back out of the way. The pawl has now no feeding action, and the capacity of the wire-feeding devices is consequently reduced one-half, thus enabling the cylinder to make two revolutions and collect two sheets before the wire-feed operates to forward a length of wire into position to be taken by the staple-forming tool. Furthermore, by changing the shape of the operating-cam the number of operations of the wire-feeding devices may be varied to almost any desired extent, and this change can be made readily and rapidly.

Various modifications may be made in the several mechanisms which constitute the machine. In Fig. 6 is shown one modification of the reciprocating devices. The shaft M instead of being provided with the cam, as in the construction before described, is provided with a crank-disk T. This disk T carries a crank-stud *t*, which is connected by two connecting-rods U to each of the advancing-arms of the devices before described. Rotation of the crank-disk will obviously cause a simultaneous movement of the advancing devices in opposite directions, and the pawls will act to rotate the feed-roll as in the other modification.

As has been before stated, modifications may be made in the several mechanisms which comprise this machine, and it is to be understood, therefore, that the invention is not limited to the particular devices which are herein shown and described nor to the particular use described, as the several mechanisms described are capable of use either separately or in combination in many other relations.

What I claim is—

1. The combination with a wire-feed roll of a means cöoperating therewith between which and the roll the wire is fed and by which the wire is always gripped, staple-forming and wire-cutting devices, said staple-forming devices moving across the path of the wire feed, a reciprocating mechanism for turning the roll, and means whereby the roll is turned on both strokes of the reciprocating mechanism, whereby a practically continuous feed of the wire is secured except for a dwell when the reciprocating mechanism reverses, said dwell being arranged to occur when the staple-forming devices cross the path of the wire feed.

2. The combination with a wire-feeding roll of means coöperating therewith between which and the roll the wire is fed and by which the wire is always gripped, staple-forming and wire-cutting devices, said staple-forming devices moving across the path of the wire feed, a ratchet-wheel, means whereby the movement of the ratchet-wheel is transmitted to the roll, two pawls facing in opposite directions and located on opposite sides of the wheel, and a reciprocating mechanism for operating the pawls, whereby a continuous feed of the wire is secured except for a dwell when the staple-forming devices cross the line of the wire feed.

3. The combination with the delivery mechanism of a printing-machine, said mechanism including a cylinder adapted for use either as a collecting or non-collecting cylinder, of staple forming and inserting devices, a wire-feeding roll, means coöperating therewith between which and the roll the wire is fed and by which the wire is always gripped, a reciprocating mechanism for driving the roll, two sets of devices whereby the roll is driven on each stroke of the reciprocating mechanism, and means whereby either set of devices may be thrown out of operation, substantially as described.

4. The combination with the delivery mechanism of a printing-machine, said mechanism including a cylinder adapted for use either as a collecting or non-collecting cylinder, of staple forming and inserting devices, a wire-feeding roll, means coöperating therewith between which and the roll the wire is fed and by which the wire is always gripped, a ratchet-wheel, means for communicating the movement of the ratchet-wheel to the feed-roll, a

pivoted pawl located on each side of the wheel, said pawls facing in opposite directions, and a reciprocating mechanism for operating said pawls, substantially as described.

5. The combination with a delivery mechanism of a printing-machine; said mechanism including a cylinder adapted for use either as a collecting or non-collecting cylinder, of staple forming and inserting devices, a pair of wire-feeding rolls between which the wire is always gripped, a ratchet-wheel on one of the rolls, a pair of pawl-carriers loosely mounted on the shaft of the rolls, a pair of pawls mounted on the pawl-carriers and facing in opposite directions, said pawl-carriers and pawls being arranged on opposite sides of the ratchet-wheel, and a reciprocating mechanism for operating the pawls, substantially as described.

6. The combination with a rotating feeding member, of a ratchet-wheel fixed on the shaft thereof, two pawl-carriers loosely mounted on the shaft, a pawl on each of the carriers, said pawls being arranged to alternately turn the shaft in the same direction, a grooved cross-head, a stud extending from each of the carriers to the groove in the cross-head, and means for reciprocating the cross-head, substantially as described.

7. The combination with a rotating feeding member, of a ratchet-wheel fixed on the shaft thereof, two pawl-carriers loosely mounted on the shaft, a pawl on each of the carriers, said pawls being arranged to alternately turn the shaft in the same direction, a reciprocating rod, a grooved cross-head mounted on the rod, a stud extending from each of the carriers to the groove in the cross-head, a cam for reciprocating the rod in one direction, and a spring for returning it, substantially as described.

8. The combination with a rotating feeding member, of a ratchet-wheel fixed on the shaft thereof, two pawl-carriers loosely mounted on the shaft, a pawl on each of the carriers, said pawls being arranged to alternately operate the shaft in the same direction, a reciprocating rod, a grooved cross-head carried on the rod, a stud extending from each of the carriers to the groove in the cross-head, a shaft carrying a cam for reciprocating the rod in one direction and a spring for returning the rod, the rod being constructed with a fork to embrace the cam-carrying shaft, substantially as described.

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

FREDERICK BALZE.

Witnesses:
JAMES Q. RICE,
F. W. H. CRANE.