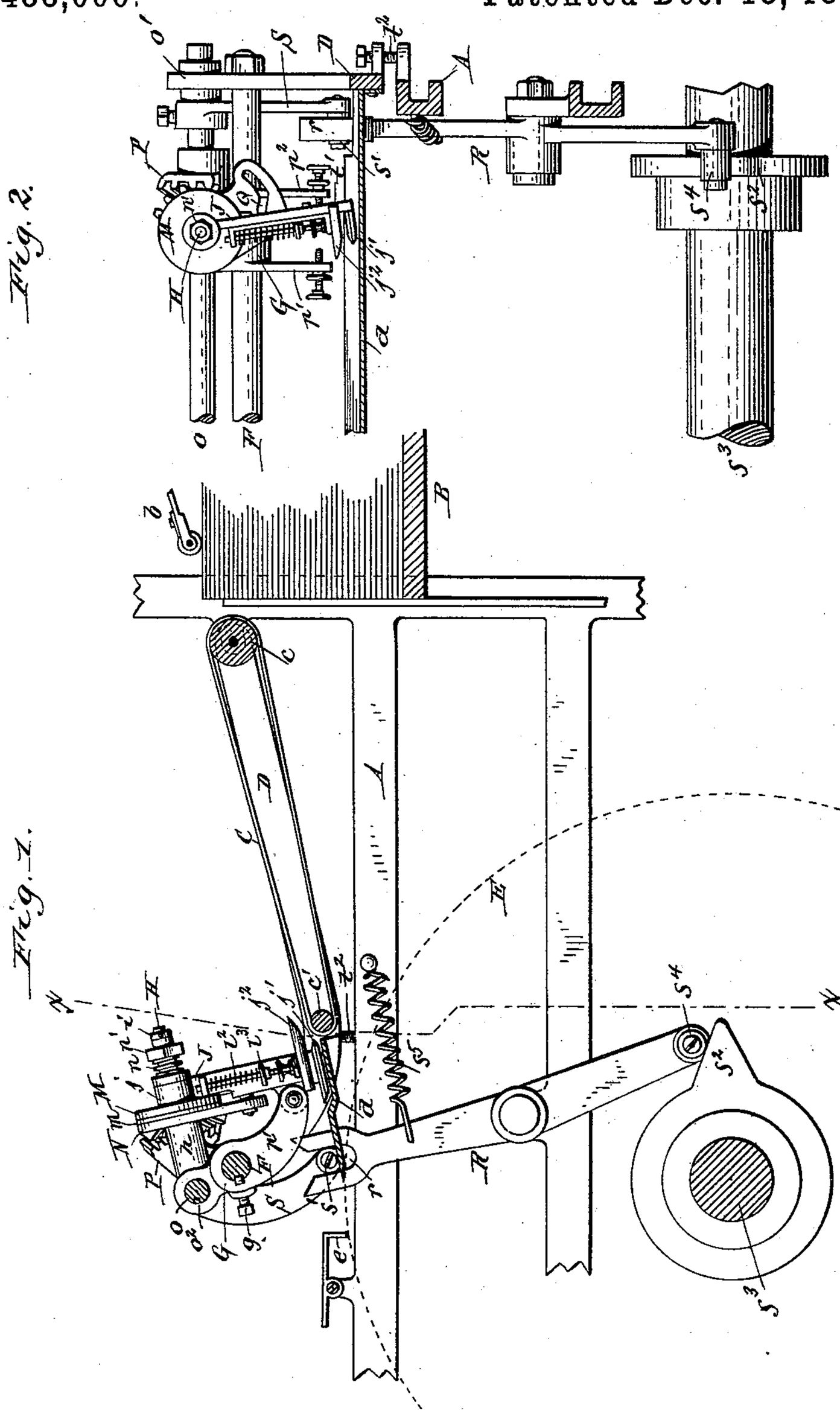
(No Model.) 3 Sheets—Sheet 1.

F. HART.

PAPER FEEDING MACHINE.

No. 488,006. Patented Dec. 13, 1892.



Witnesses:
Theo. L. Popp.
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(No Model.) 3 Sheets—Sheet 2.

F. HART.

PAPER FEEDING MACHINE.

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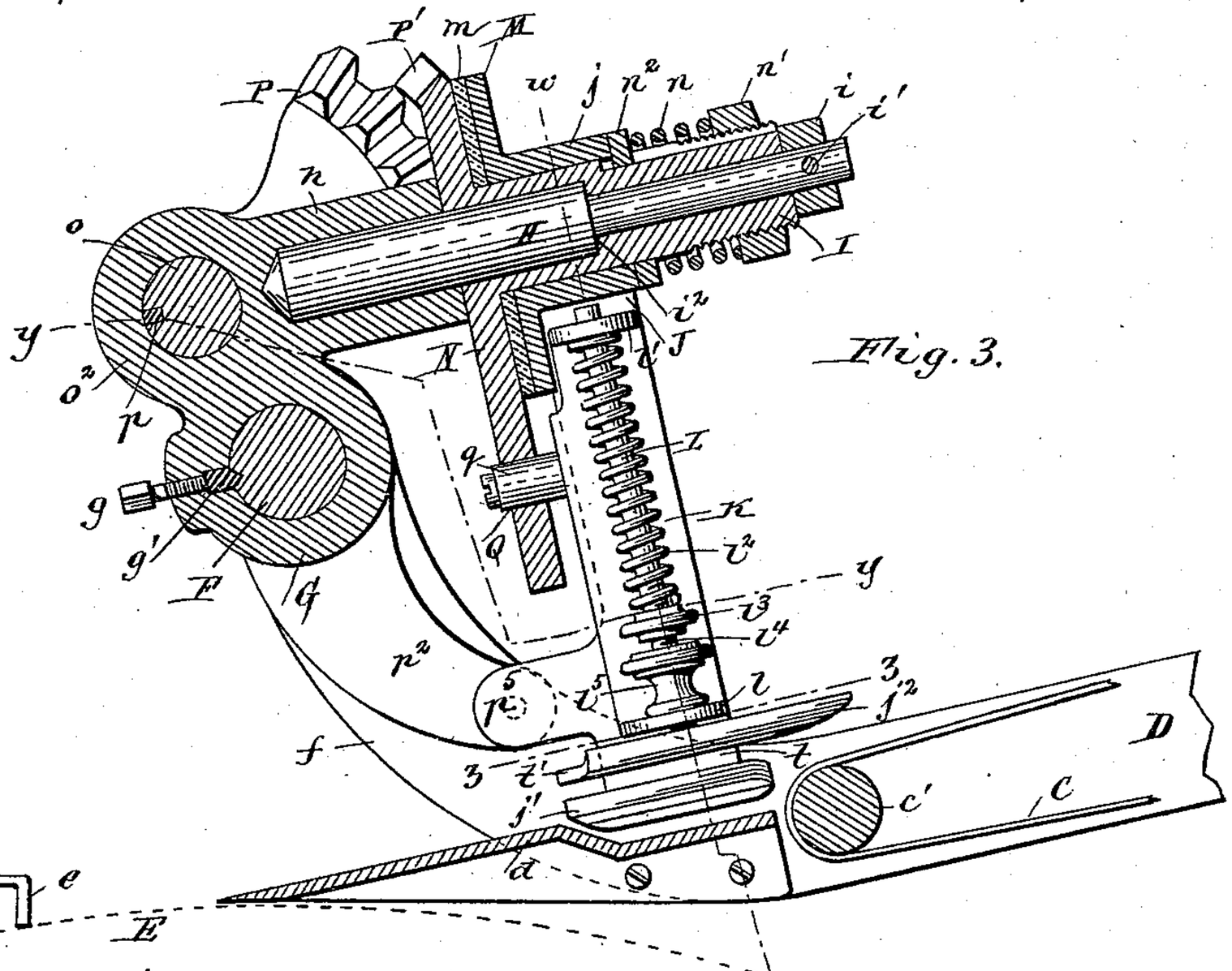

Fig. 3.

Fig. 4.

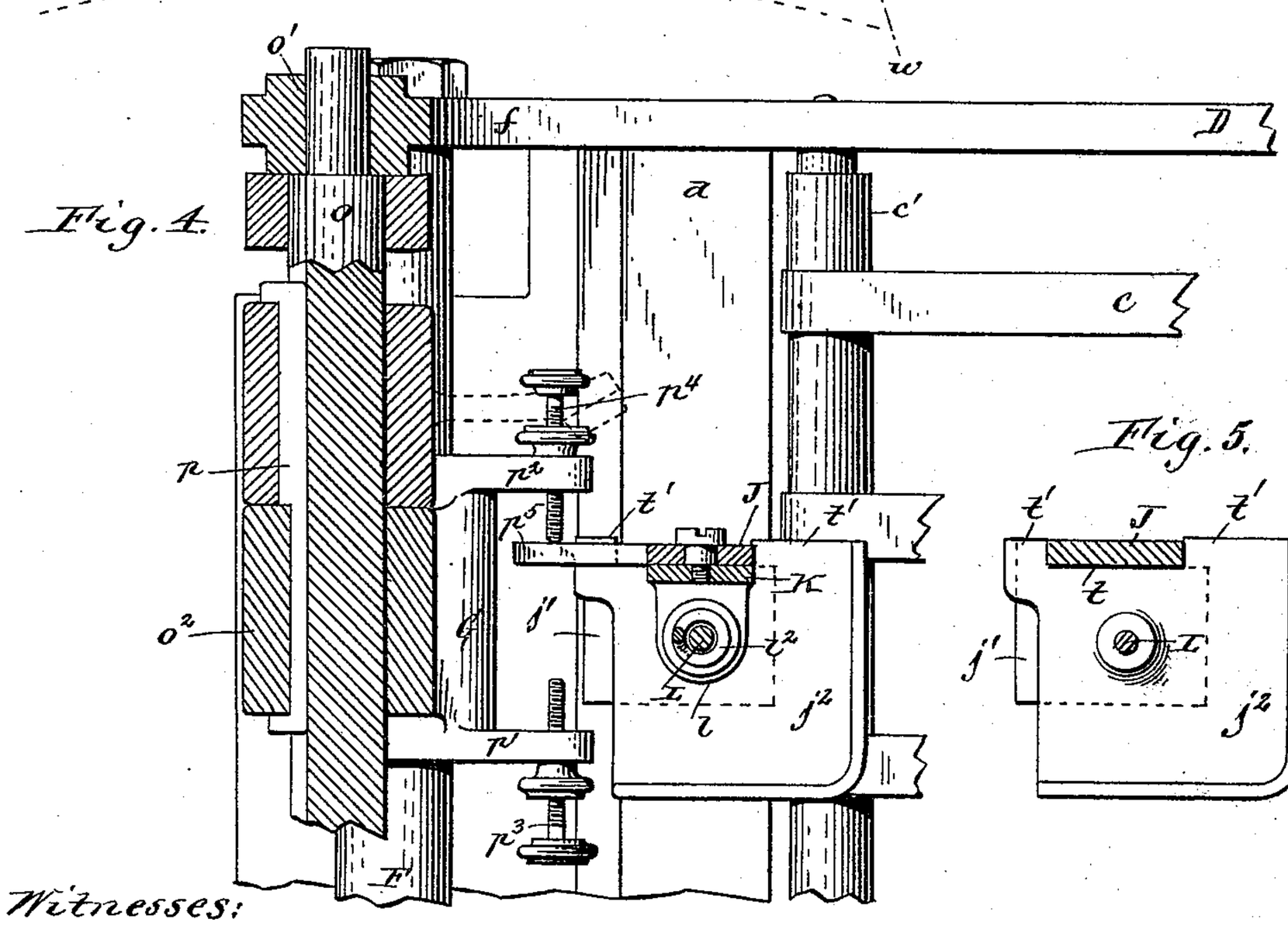

Fig. 5.

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(No Model.) 3 Sheets—Sheet 3.

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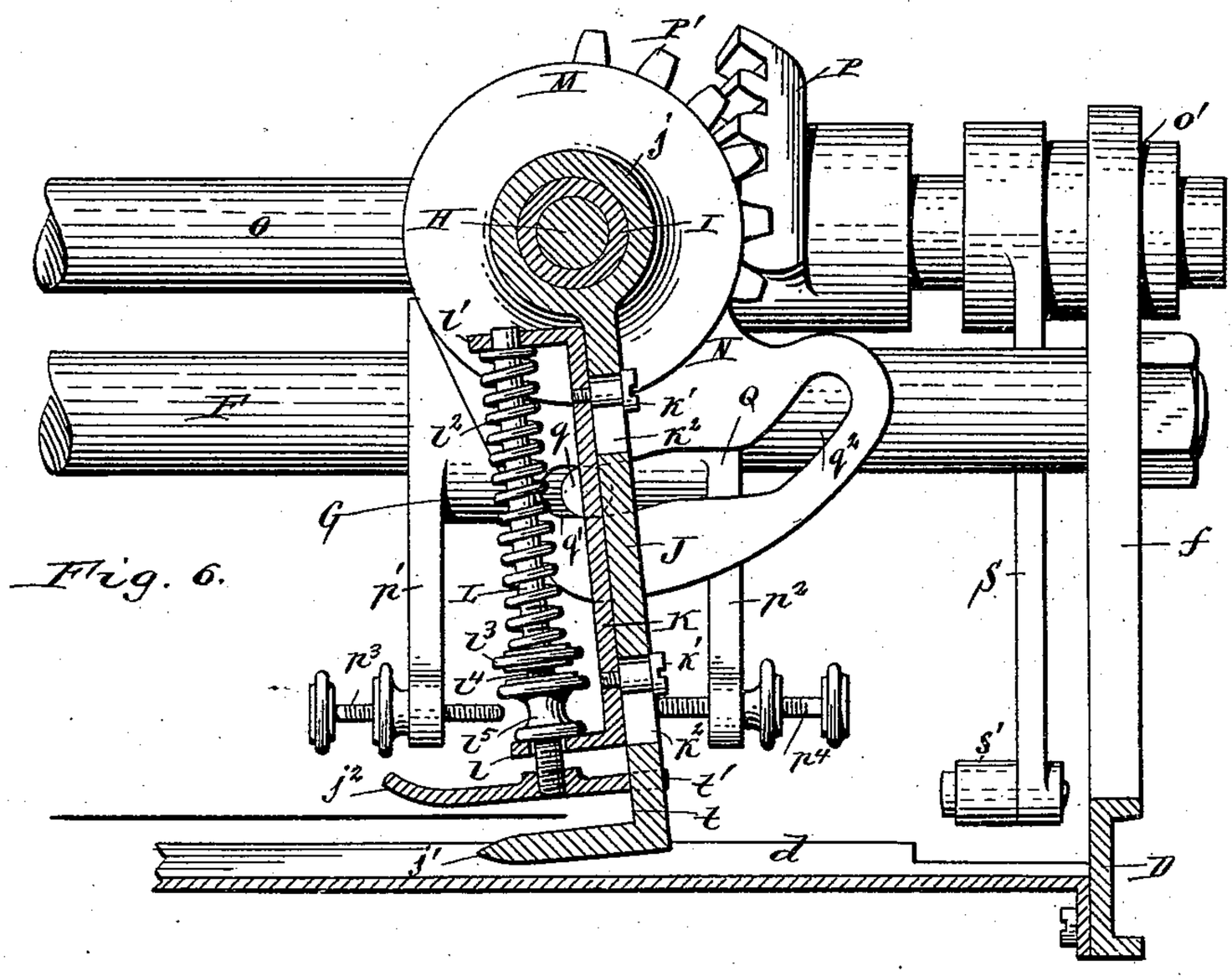
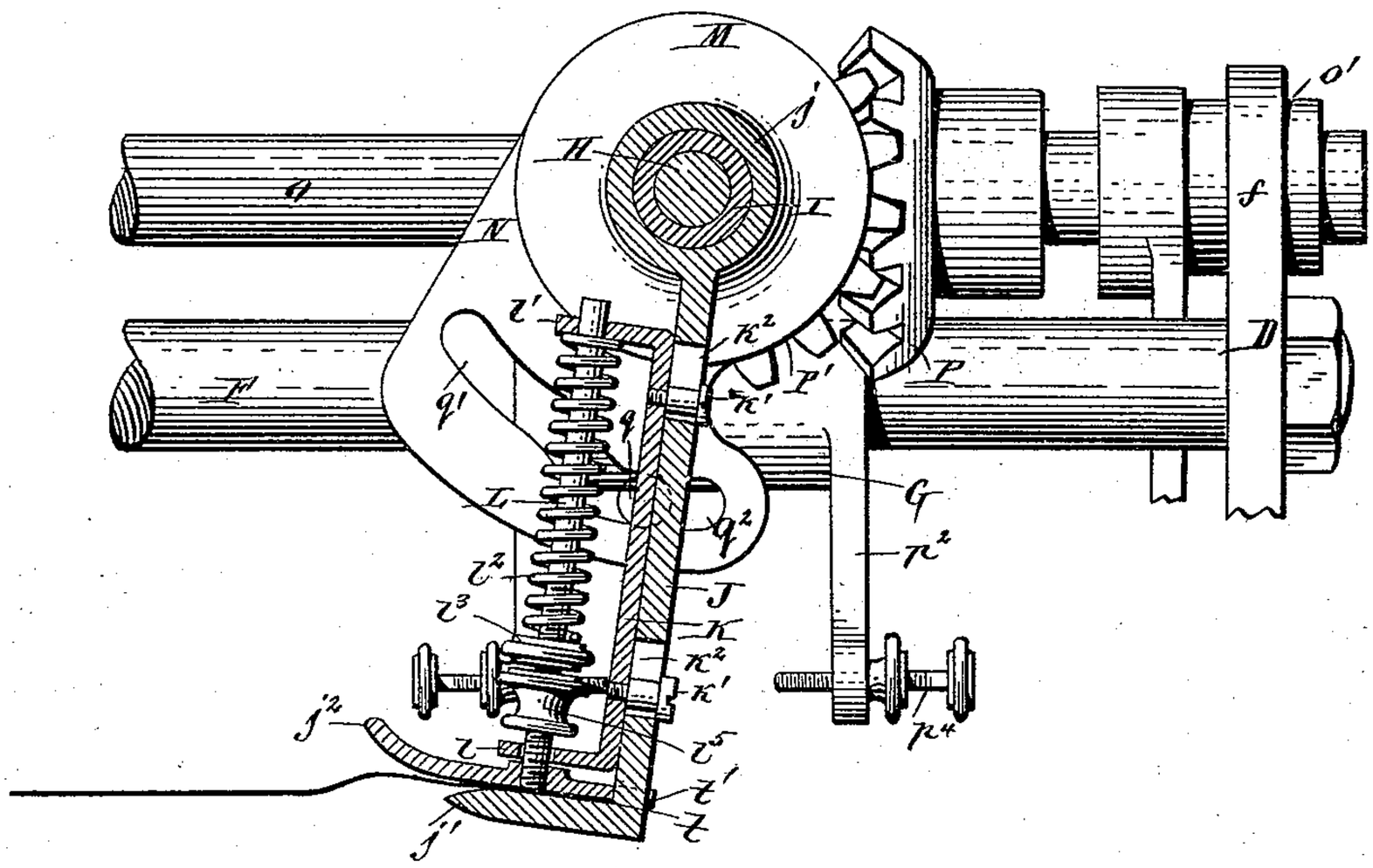


Fig. 6.

Fig. 7.



Witnesses:
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UNITED STATES PATENT OFFICE.

FREDERICK HART, OF POUGHKEEPSIE, ASSIGNOR TO D. H. BURRELL & CO., OF LITTLE FALLS, NEW YORK.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 488,006, dated December 13, 1892.

Application filed September 14, 1891. Serial No. 405,571. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK HART, a subject of the Queen of Great Britain, residing at Poughkeepsie, in the county of Dutchess and State of New York, have invented a new and useful Improvement in Paper-Feeding Machines, of which the following is a specification.

This invention relates to a side-registering mechanism which is designed, principally, for use in connection with an automatic paper-feeder which feeds sheets of paper successively from a pile to a printing-press or other machine in which it is desired to place sheets in correct register.

The object of my invention is to produce a registering device which is simple in construction and which is operated from the printing-press or other machine to which the sheets are fed, thereby enabling trial-sheets to be operated upon although the paper-feeder is not in motion.

In the accompanying drawings, consisting of three sheets, Figure 1 is a fragmentary longitudinal section showing my improved side-registering device applied to a paper-feeder and printing-press. Fig. 2 is a vertical transverse section thereof in line *x x*, Fig. 1. Fig. 3 is a longitudinal sectional elevation of the side-registering gripper and connecting parts, on an enlarged scale. Figs. 4 and 5 are horizontal sections in line *y y* and *z z*, Fig. 3. Fig. 6 is a vertical transverse section in line *w w*, Fig. 3, showing the gripper in its normal retracted position. Fig. 7 is a similar view showing the gripper moved inwardly and gripping the sheet.

Like letters of reference refer to like parts in the several figures.

A represents the side frames of a paper-feeder and printing-press, and B the horizontal table which supports the pile of paper and is moved upwardly between the side frames as the sheets of paper are fed from the top.

b represents the pushing-out fingers whereby the sheets are fed from the pile upon delivery-tapes C. The latter are arranged lengthwise in rear of the pile of paper and pass, with their receiving, portions around a receiving-roller *c*, arranged contiguous to the top of the pile of paper, while the delivery portions of the tapes pass around a delivery-roller *c'*. The receiving and delivery rollers are both arranged transversely and journaled with their ends in bearings formed in longitudinal side bars D D, pivoted at their front ends to the side frames of the paper-feeder concentric with the receiving-roller.

d represents a transverse feed-board connecting the rear portions of the side bars D and extending from the delivery-roller *c'* to the printing press cylinder E. The sheet is carried over the feed-board by the delivery-tapes until its front edge strikes against the drop-guides *e*, arranged above the cylinder E of the printing-press in the usual manner.

F represents a supporting-rod arranged transversely over the feed-board and secured with its ends to upwardly-projecting arms *f*, formed at the rear ends of the side bars D D.

G represents a transversely-movable sleeve which supports the side-registering mechanism and is mounted upon the supporting-rod F. The side-registering mechanism can be adjusted transversely of the machine by sliding said sleeve lengthwise upon the supporting-rod F and is held in position after adjustment by means of a clamping-screw *g*, arranged in the supporting-sleeve and bearing against a feather *g'*, arranged in a groove in the supporting-rod.

H represents an arbor, which carries the gripper mechanism whereby the side of the sheet is registered. This arbor is arranged lengthwise over the feed-board and is rigidly secured with its rear end in a boss *h*, formed on the upper front side of the supporting-sleeve.

I represents an oscillating carrier-sleeve surrounding the arbor and arranged between the boss *h* of the supporting-sleeve and a collar *i*, secured to the front end of the arbor by a pin *i'*. The front portion of the arbor is contracted somewhat, so as to form a shoulder i^2, and the bore of the carrier-sleeve contiguous to the front portion of the arbor is similarly contracted, so as to bear against said shoulder.

J represents a depending gripper-arm pro-

vided at its upper end with an eye *j*, which is hung loosely on the carrier-sleeve. This gripper-arm is provided at its lower end with a fixed gripper-jaw *j'*, arranged at right angles, or nearly so, to the gripper-arm and extending inwardly therefrom.

j^2 represents the movable jaw of the gripper, which is arranged above the fixed jaw and capable of moving toward and from the fixed jaw, whereby the sheets of paper are clamped between said jaws.

K represents a movable plate arranged on the inner side of the gripper-arm and supporting the movable gripper-jaw. This supporting-plate is secured to the gripper-arm by screws *k'*, passing through slots k^2, formed lengthwise in the gripper-arm, thereby guiding the plate and permitting a limited up-and-down movement of the plate and the upper gripper-jaw upon the gripper-arm.

L represents an upright guide-rod secured with its lower end to the upper jaw and arranged to slide with its upper portion in perforated ears *l l'*, formed at opposite ends of the supporting-plate. A yielding connection is formed between the movable jaw and its supporting-plate by a tension-spring l^2, which surrounds the guide-rod L and bears with its upper end against the upper ear *l'*, while its lower end bears against a thumb-nut l^3, arranged on the lower screw-threaded portion l^4 of the guide-rod. By turning the thumb-screw l^3 the pressure which the spring exerts upon the movable jaw is regulated.

l^5 represents a screw-nut arranged on the screw-threaded portion l^4 of the guide-rod between the nut l^3 and bearing against the upper side of the lower ear *l* of the supporting-plate, whereby the distance between the jaws of the gripper is regulated and the movable jaw is compelled to follow the upward movement of the supporting-plate.

M represents a friction-disk formed at the rear end of the eye of the gripper-arm and bearing against a cam-plate N, formed at the rear end of the carrier-sleeve surrounding the arbor. A washer *m*, of leather or similar material, is preferably interposed between the friction-disk and the cam-plate for the purpose of increasing the friction between the same. The friction-disk is firmly held in contact with the cam-plate by a spiral spring *n*, surrounding the front portion of the carrier-sleeve and bearing with its ends against the eye of the gripper-arm and a screw-nut *n'*, arranged on the screw-threaded front end of the carrier-sleeve. A washer n^2, held against rotation on the carrier-sleeve by a feather engaging in a longitudinal groove in the carrier-sleeve, is preferably interposed between the eye of the gripper-arm and the spring *n*, so as to prevent the rocking of the eye from turning the screw-nut *n'*. Upon turning the latter in the proper direction the friction between the cam-plate N and the friction-disk M can be increased or decreased, as desired.

O represents a rock-shaft whereby an oscillating movement is imparted to the cam-plate and the gripper-arm, frictionally connected therewith. This rock-shaft is journaled with its ends in bearings formed in the arms at the rear ends of the side bars. Only one of these bearings *o'* and one of the arms *f* are shown in the drawings. The rock-shaft is arranged between its ends in a bearing o^2, formed on the upper side of the supporting-sleeve.

P represents a bevel-gear segment mounted on the rock-shaft and meshing with a similar gear-segment P', formed on the upper portion of the cam-plate, whereby the latter and the gripper frictionally connected therewith are actuated. The gear-segment P is secured to the rock-shaft and to the bearing o^2 on the supporting-sleeve by a stepped key *p*, Fig. 4, whereby the gear-segment P is compelled to turn with the rock-shaft, but is capable of moving lengthwise thereon with the supporting-sleeve.

p' p^2 represent stop-arms whereby the oscillating movement of the gripper-arm carrying the gripper-jaws is limited. These stop-arms depend from the lower side of the supporting-sleeve and extend forwardly across the curvilinear path of the gripper on the inner and outer sides of the gripper-arm, as represented in Figs. 4 and 6. The stop-arms are provided with adjustable stop-screws p^3 p^4 and the gripper-arm is provided with a rearwardly-extending ear p^5, adapted to alternately strike against the adjusting-screws of the stop-arms, thereby limiting the oscillating movement of the gripper.

Q represents a cam-slot formed in the lower portion of the cam-plate and receiving a pin or roller *q*, secured to the rear side of the plate supporting the upper jaw. Upon oscillating the cam-plate the cam-slot in the latter, engaging with the roller *q* of the supporting-plate, moves the upper jaw toward and from the lower jaw. At opposite ends of the cam-slot the cam-plate is provided with concentric slots q' q^2, into which the roller of the upper jaw-plate passes and permits the cam-plate to move independent of the gripper a variable distance after the movement of the gripper has been arrested and its jaws have been opened or closed.

R represents a rock-lever whereby motion is transmitted from the printing-press to the side-registering mechanism. This rock-lever is pivoted near its middle to the side frame and provided with a bifurcated upper end *r*.

S represents a depending rock-arm secured to the rock-shaft and provided at its lower end with a pin or roller *s'*, which engages with the bifurcated upper end of the rock-lever, thereby forming a detachable connection between the rock-lever and the rock-arm S.

s^2 represents a cam secured to the revolving shaft s^3 of the printing-press cylinder and adapted to engage against a roller or pin s^4 on the lower end of the rock-lever. When the cam s^2 engages against the roller of the

rock-lever, the side-registering gripper connected therewith by intermediate connecting mechanism is moved inwardly or forwardly.

s^5 represents a spring whereby the gripper is moved backwardly or outwardly and returned to its normal position. This spring is secured with its ends to the side frame and the upper end of the rock-lever, so that it tends to draw the latter in a direction opposite to that in which it is moved by the cam s^2.

The inner upright face t, Fig. 6, of the gripper-arm adjacent to the lower gripper-jaw serves as the side-registering stop or guide, against which the side of the sheet of paper is registered. The cam s^2 moves the gripper inwardly with the jaws open, so that the side-registering stop strikes the lateral edge of the sheet and the spring s^5 returns the closed gripper carrying the sheet to its outer or registering position, thereby imparting a transversely-oscillating movement to the gripper.

t' t' represent wings formed on the outer side of the upper jaw on the front and rear sides of the gripper-arm and extending outwardly beyond the upright face t of the gripper-arm. These wings prevent the edge of the sheet from curling and creeping upwardly into the crevices between the gripper-arm and the upper jaw when the face t strikes the edge of the sheet during the forward movement of the gripper. If the edge of the sheet were permitted to pass up between the gripper-arm and the upper jaw, the sheet could not be correctly registered.

t^2, Figs. 1 and 2, represent adjusting-screws arranged vertically in the side bars of the delivery-tapes and side-registering mechanism and bearing upon the side frames of the printing-press. Upon turning these adjusting-screws the delivery and registering mechanism can be adjusted vertically with reference to the printing-press cylinder.

Upon raising the rear ends of the side bars the roller of the rock-arm S becomes disengaged from the bifurcated upper end of the rock-lever R. This permits the delivery-tapes and registering mechanism to be swung upwardly on the pivots at the front ends of the side bars, thereby clearing the space above the press-cylinder for "making ready." Upon lowering the tape mechanism the roller of the rock-arm S is again engaged with the upper end of the rock-lever. These parts form a very simple detachable connection of the side register with the shaft of the press-cylinder from which it derives its motion.

The operation of side-registering a sheet of paper is as follows: After feeding the sheet by the pushing-out fingers from the pile upon the delivery-tapes the latter carry the sheet forward so that its lateral edge passes between the jaws of the gripper, the entrance between them being facilitated by the flaring form of the receiving portion of the jaws, as shown in the drawings. After the sheet has been fed by the tapes squarely against the drop-guides e of the printing-press the cam s^2 of the press-shaft strikes the roller s^4 of the rock-lever, which causes the cam-plate to move inwardly. The cam-plate, owing to its frictional connection with the gripper-arm, carries the latter forward with it, and in so doing the registering guide or face t strikes the lateral edge of the sheet and buckles the same slightly. The cam-plate and the gripper move forward in unison until the gripper-arm strikes the inner stop-screw p'. This arrests the forward movement of the gripper; but the cam-plate continues in its course. As the cam-plate continues its movement its cam-slot forces the roller and the supporting-plate downward until the upper jaw attached thereto bears firmly on the sheet resting on the lower jaw. The upper jaw now ceases its downward movement; but its supporting-plate still continues to move downwardly, which causes the upper ear of the supporting-plate to compress the tension-spring surrounding the guide-rod, thereby increasing the pressure of the upper jaw on the sheet of paper. The final portion of the forward movement of the cam-plate causes the roller of the supporting-plate to enter the concentric slot q^2 at the outer end of the cam-slot, thereby holding the gripper in its closed position, as represented in Fig. 7. After the rotating cam s^2 releases the rock-lever the spring s^5 draws the rock-lever and the gripper holding the sheet backward, together with the cam-plate, until the gripper-arm strikes the outer stop-screw p^4. This arrests the further backward movement of the gripper; but the spring continues to draw the cam-plate outwardly and causes its cam-slot to raise the plate supporting the upper jaw, thereby releasing the sheet of paper. The spring s^5 continues to draw the cam-plate outwardly until the roller of the supporting-plate engages in the inner concentric slot q', thereby holding the jaws of the gripper in an open position, as represented in Fig. 6. The next instant the drop-guides rise and the sheet is carried away by the nippers of the printing-press in correct front and side register. The extent of the inward or forward movement of the gripper is such as to bring the lateral edges of the sheets in contact with the side-registering guide under the usual variations with which sheets are fed from the pile. The variously-placed sheets are all seized firmly and drawn laterally by the gripper into register with a definite line. The oscillation of the gripper can be easily adjusted while the machine is in operation by turning the stop-screws p^3 p^4.

By mounting the delivery-tapes and registering mechanism on a pivoted frame and providing a simple detachable connection between the moving parts of the printing-press and the side-register the latter can be easily removed from the press without disturbing any of the adjustments. By operating the

side-register from the shaft of the press-cylinder trial-sheets can be registered while the paper-feeder is not in operation.

I claim as my invention—

1. The combination, with a gripper, of a movable plate having a frictional connection with the gripper, a stop by which the gripper is arrested while the plate continues its movement, and a cam which moves with the plate and by which the gripper-jaws are opened and closed after the movement of the gripper has been arrested, substantially as set forth.

2. The combination, with an oscillating gripper, of an oscillating cam-plate having a frictional connection with the gripper, a stop by which the gripper is arrested while the cam-plate continues its oscillating movement, and a cam formed in said cam-plate and operating to open or close the movable gripper-jaw during this continual movement of the cam-plate, substantially as set forth.

3. The combination, with the gripper, of an oscillating plate having a frictional connection with the gripper, a cam which moves with the plate and by which the gripper-jaws are opened and closed, and adjustable stops arranged on opposite sides of the gripper, whereby the movement of the gripper is regulated, substantially as set forth.

4. The combination, with the gripper provided with a movable jaw, of an oscillating plate having a frictional connection with the gripper, a stop whereby the gripper is arrested, while the plate continues its movement, a cam which moves with the plate and whereby the movable gripper-jaw is opened and closed, a spring bearing upon the movable jaw, and a spring-support which is acted upon by the cam, thereby applying a yielding pressure to the movable jaw, substantially as set forth.

5. The combination, with an oscillating gripper-arm and a fixed jaw secured to the lower end of said arm, of a movable jaw arranged contiguous to said fixed jaw, a movable supporting-plate mounted on said arm, and a yielding connection between said movable plate and the movable jaw, substantially as set forth.

6. The combination, with the oscillating gripper-arm provided with a fixed jaw at its lower end and with slots, and a movable jaw arranged above said fixed jaw and having a movement toward and from said fixed jaw, of a movable supporting-plate arranged upon the gripper-arm, guide-screws secured to said supporting-plate and arranged in said slots of the gripper-arm, and a yielding connection between said movable plate and the movable jaw, substantially as set forth.

7. The combination, with the oscillating arm having a fixed gripper-jaw at its lower end, of a movable jaw arranged above said fixed jaw, a movable supporting-plate mounted on said arm and provided with a perforated ear, a screw-threaded guide-rod arranged in the perforated ear of the supporting-plate and secured with its lower end to the movable jaw, a thumb-nut mounted on said guide-rod, and a spring surrounding said guide-rod and interposed between said thumb-nut and ear, substantially as set forth.

8. The combination, with the oscillating gripper-arm having a fixed jaw at its lower end, of a movable supporting-plate mounted on said gripper-arm and provided with an upper and a lower perforated ear, a guide-rod secured with its lower end to the movable jaw and arranged to slide with its upper end in the ears of said supporting-plate, a tension-nut mounted on said rod, a spring surrounding said rod and interposed between said tension-nut and the upper ear, and a regulating-nut arranged on said rod and bearing on the upper side of the lower ear, substantially as set forth.

9. The combination, with the oscillating carrier-sleeve, of a gripper-arm frictionally connected with said sleeve and having a fixed jaw at its lower end, a movable jaw arranged above the fixed jaw and adapted to move toward and from the same, and a movable supporting-plate mounted on said arm and supporting the movable jaw, substantially as set forth.

10. The combination, with the oscillating carrier-sleeve, of a gripper-arm frictionally connected therewith and having a fixed jaw at its lower end, a movable jaw arranged above the fixed jaw and capable of moving toward and from the same, a movable plate mounted on said arm, and a yielding connection between said movable plate and the movable jaw, substantially as set forth.

11. The combination, with the oscillating carrier-sleeve provided with a cam-plate, of an oscillating arm provided with gripper-jaws and mounted loosely on said sleeve, a spring whereby the arm is pressed against the cam-plate, thereby establishing a frictional connection between the gripper-arm and the cam-plate, and a cam which moves with said plate, and whereby the gripper-jaws are opened and closed, substantially as set forth.

12. The combination, with the oscillating carrier-sleeve provided with a cam-plate, of a gripper-arm loosely supported on said sleeve and having a fixed gripper-jaw at its lower end, a movable plate mounted on said arm and supporting a movable jaw, a spring pressing said gripper-arm against the cam-plate, a cam which is formed on said plate and engages with said movable plate, and stops which limit the oscillating movement of the gripper, substantially as set forth.

13. The combination, with the arbor and a sleeve surrounding said arbor and provided at one end with a cam-plate, of a gripper-arm hung upon said sleeve and provided with a disk bearing against said cam-plate, a screw-nut arranged upon the opposite end of said

sleeve, a spring interposed between the screw-nut and the gripper-arm, a fixed jaw secured to the lower end of the gripper-arm, a movable jaw arranged above the fixed jaw, a movable plate arranged upon the gripper-arm and supporting the movable jaw, and a cam formed on said movable plate, whereby the movable jaw is actuated, substantially as set forth.

14. The combination, with the oscillating gripper-arm provided with a fixed jaw, of a movable jaw arranged to move toward and from the fixed jaw, a movable plate supporting said movable jaw and provided with a pin or roller, and an oscillating plate provided with a slot which receives the pin, said slot being composed of a cam portion and a concentric portion at each end of the cam portion and stops whereby the oscillating movement of the gripper-arm is limited, substantially as set forth.

15. The combination, with the oscillating gripper-arm provided with a registering-face on its inner side and a fixed jaw at its lower end, of a movable jaw adapted to move toward and from the fixed jaw and provided with wings which extend across the registering-face, substantially as set forth.

16. The combination, with the carrier-sleeve provided with a friction-plate having a cam and with a gear-segment, of an oscillating gripper-arm frictionally connected with said plate and provided with a fixed jaw, a movable gripper-jaw which is connected with said cam, stops whereby the oscillating movement of the gripper-arm is arrested, and a rock-shaft provided with a gear-segment which meshes with the gear-segment of the carrier-sleeve, substantially as set forth.

17. The combination, with the main frame and the side bars pivoted to the main frame, of a gripper mechanism mounted upon the free ends of the side bars and provided with a rock-arm, a rock-lever detachably connected at one end with the rock-arm, and a cam engaging with the opposite end of the rock-lever and actuating the latter, substantially as set forth.

18. The combination, with the main frame, of side bars pivoted thereto, a tape-roller arranged concentric with the pivots of the side bars, a tape-roller supported on the side bars near their free ends, tapes running around said rollers, a gripper mechanism mounted upon the free ends of the side bars and provided with a rock-arm, a rock-lever having a bifurcated end with which the rock-arm is detachably connected, and an actuating-cam which moves said rock-lever, substantially as set forth.

Witness my hand this 3d day of August, 1891.

FREDERICK HART.

Witnesses:
J. S. VAN CLEEF,
WILLIAM J. KENNEDY.