(No Model.) 4 Sheets—Sheet 1.

# F. HART.

## PAPER FEEDER.

No. 434,630. Patented Aug. 19, 1890.

Fig. 1.

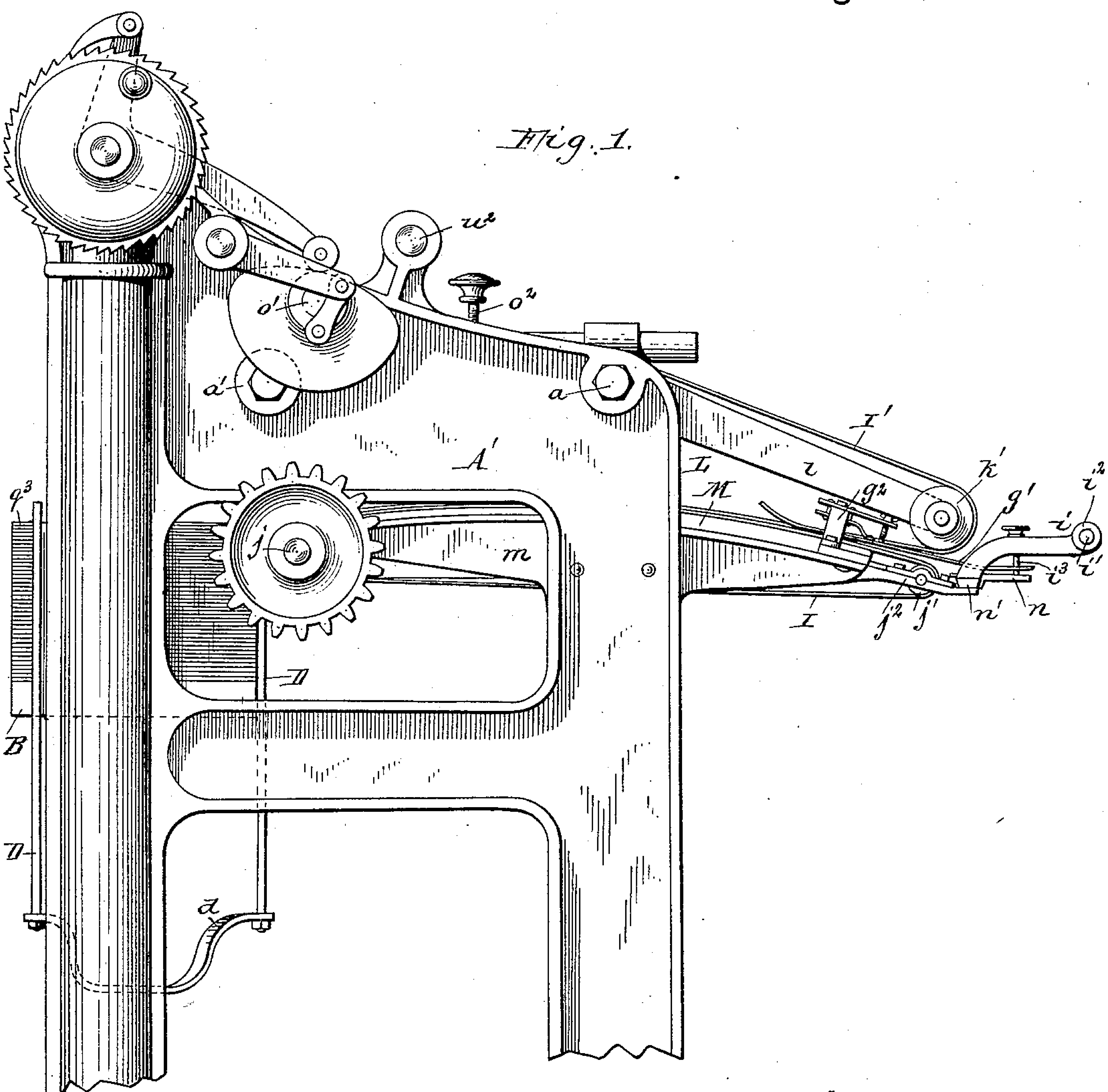



Fig. 2.

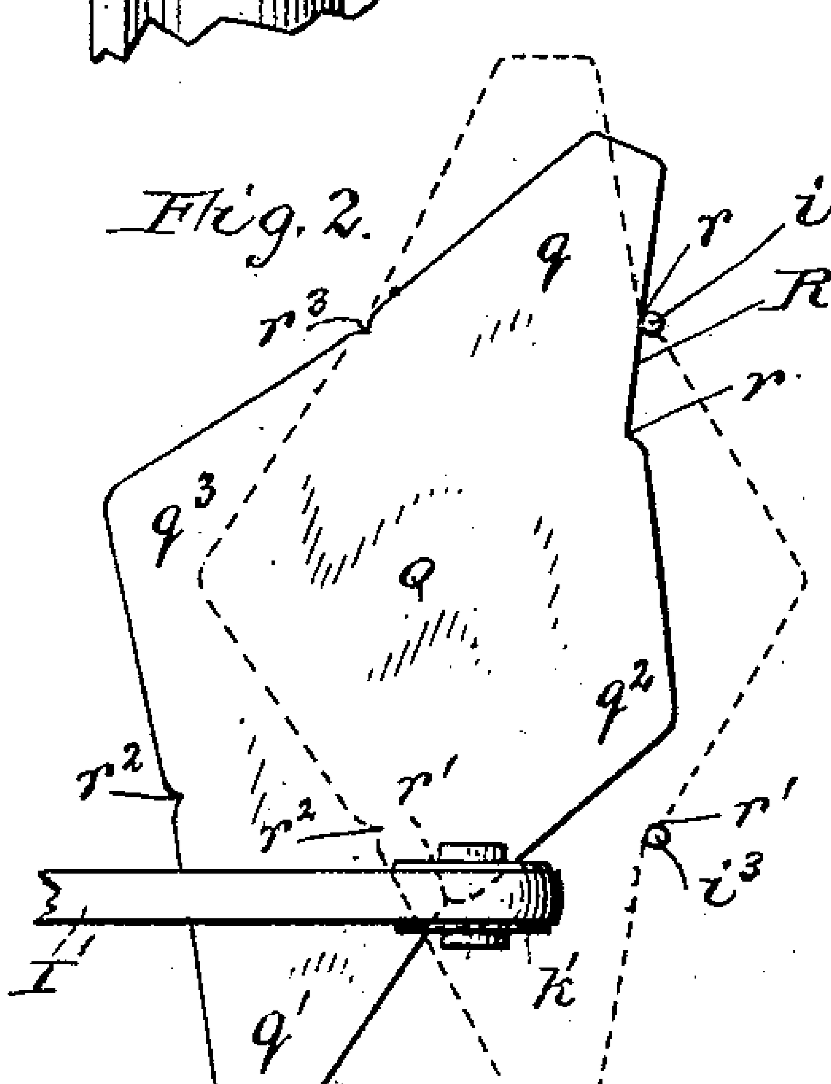
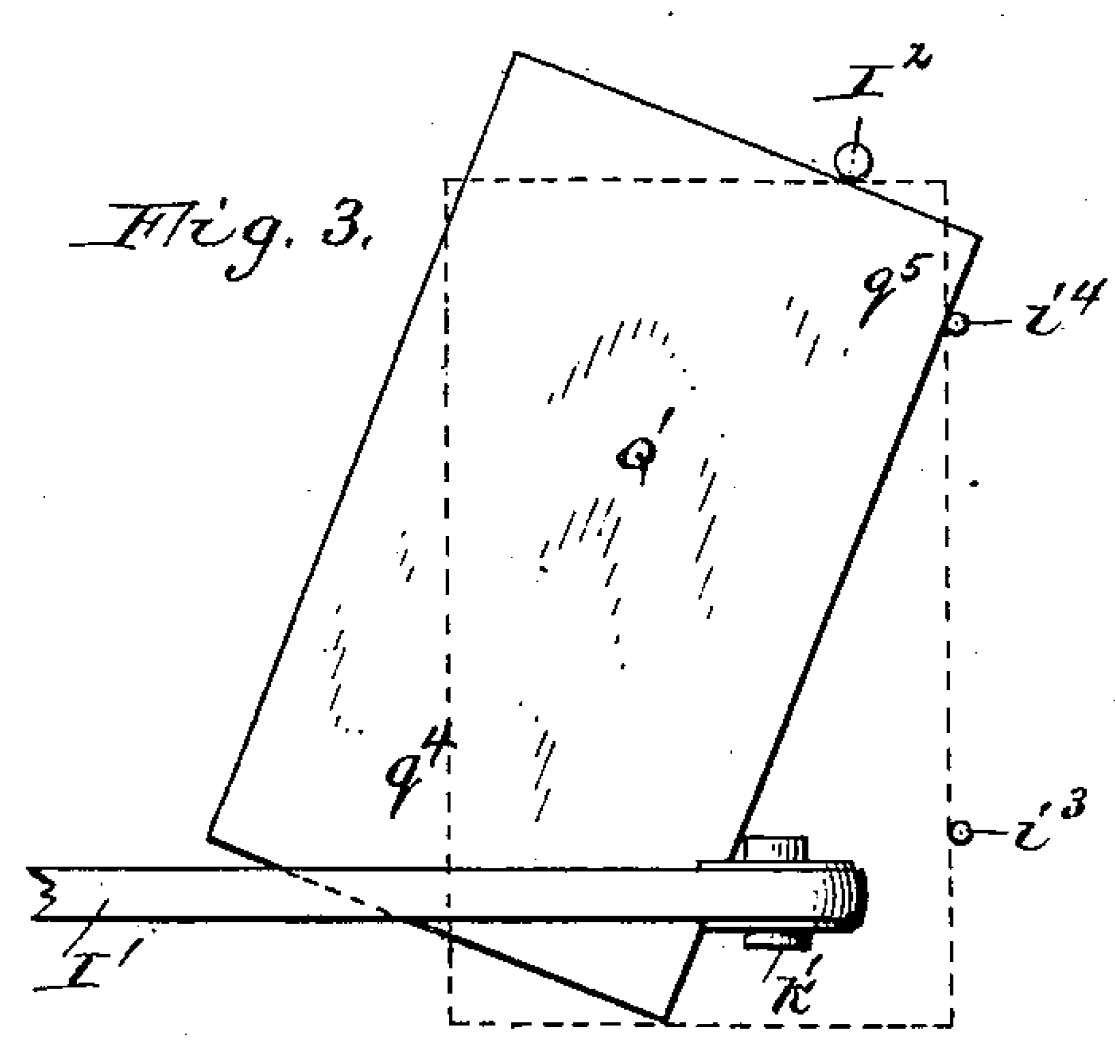



Fig. 3.




Witnesses. Theo. L. Popp. Jacob Nussenblatt.

Frederick Hart, Inventor.
By Edward Wilhelm
Attorney.

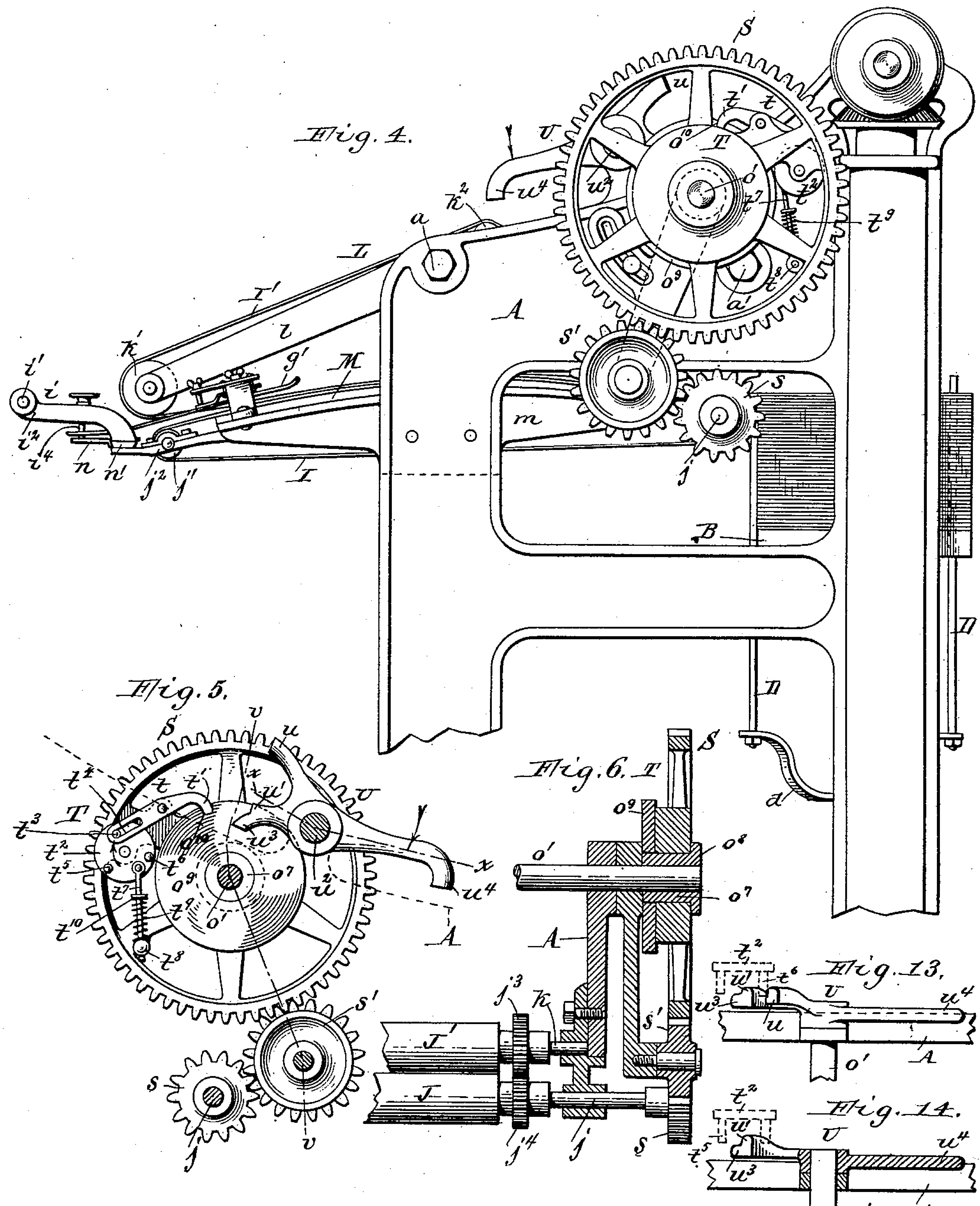
(No Model.)

4 Sheets—Sheet 2.

# F. HART.

## PAPER FEEDER.

No. 434,630. Patented Aug. 19, 1890.

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(No Model.) 4 Sheets—Sheet 3.

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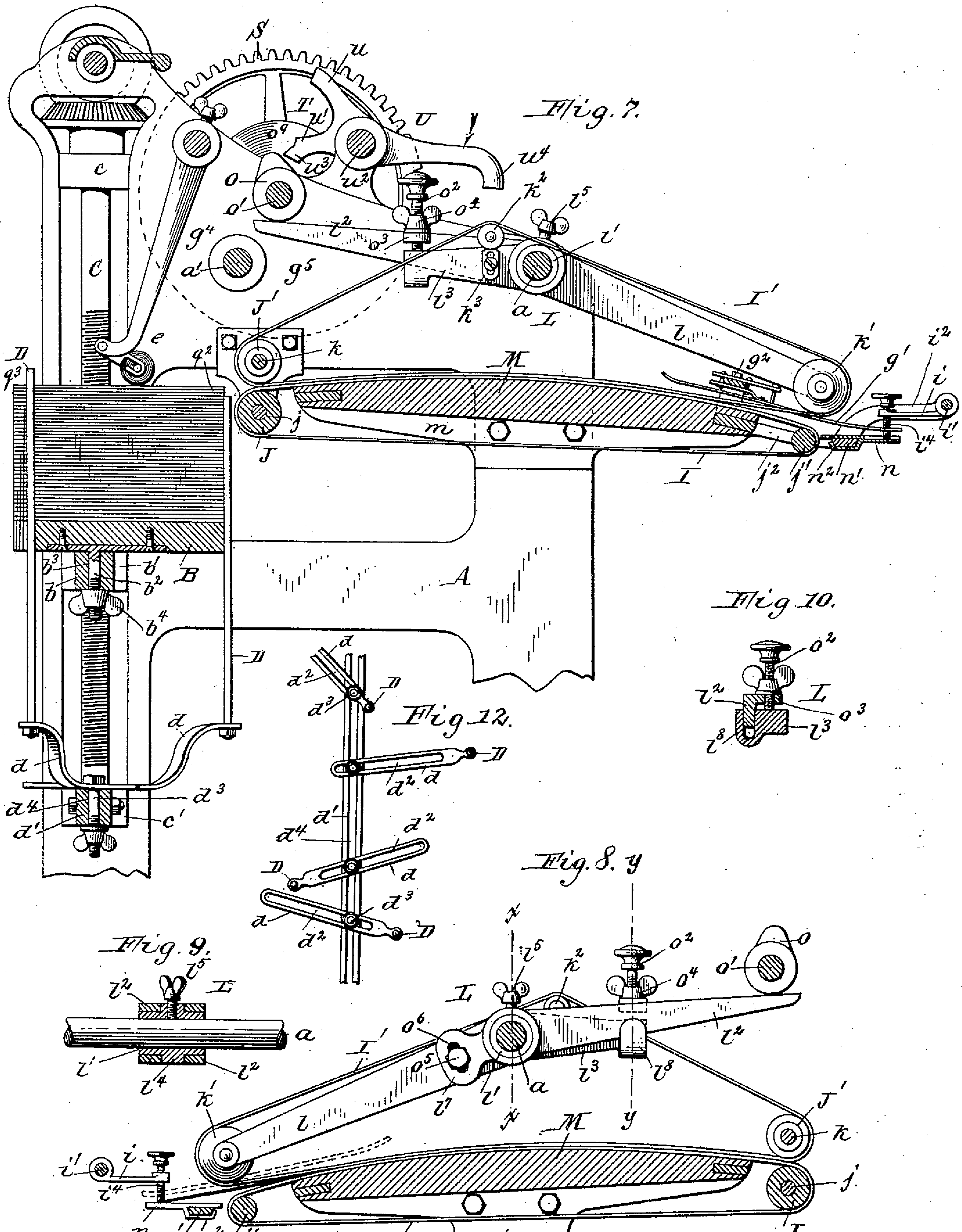
## PAPER FEEDER.

No. 434,630. Patented Aug. 19, 1890.

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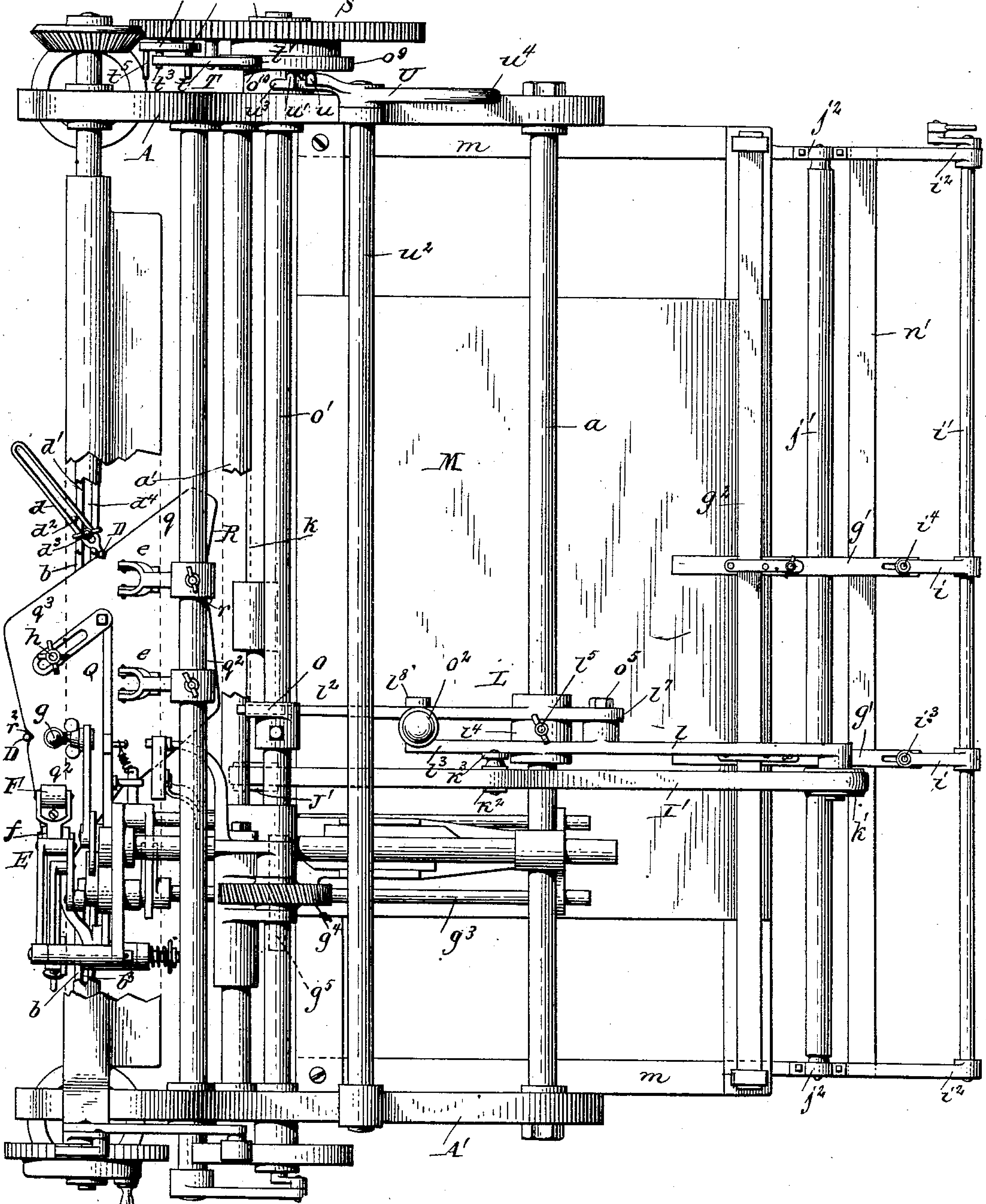
(No Model.) 4 Sheets—Sheet 4.

F. HART.

PAPER FEEDER.

No. 434,630. Patented Aug. 19, 1890.

Fig. 11.



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Witnesses:

Frederick Hart, Inventor.
By Edward Wilhelm
Attorney.

# UNITED STATES PATENT OFFICE.

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

## PAPER-FEEDER.

**SPECIFICATION** forming part of Letters Patent No. 434,630, dated August 19, 1890.

Application filed February 3, 1890. Serial No. 339,040. (No model.)

*To all whom it may concern:*

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

This invention relates to paper-feeding machines which automatically feed sheets of paper or other blanks successively from a pile to a printing-press or other machine in which such sheets or blanks are operated upon, and which are provided with means for registering the sheet before it is carried away by the nippers of the press or other machine.

The object of this invention is to provide mechanism for feeding and registering sheets or blanks having regular or irregular outlines; and the invention consists to that end of devices whereby the irregularly-shaped sheets are fed and correctly registered preparatory to entering the printing-press or other machine, as will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, consisting of four sheets, Figure 1 is a fragmentary side elevation of my improved paper-feeder. Fig. 2 is a fragmentary plan view of the carrying-tapes and registering-pins, showing the manner of registering an envelope-blank. Fig. 3 is a similar view showing the position of the registering-pins in feeding folded envelopes or sheets of rectangular shape. Fig. 4 is a fragmentary side elevation of the paper-feeder viewed from the side opposite to that shown in Fig. 1. Fig. 5 is a sectional elevation of the drive mechanism and clutch, whereby the feeding mechanism is thrown in and out of gear. Fig. 6 is a vertical section in line $v$ $v$, Fig. 5. Fig. 7 is a longitudinal section of the paper-feeder. Fig. 8 is a fragmentary longitudinal sectional elevation of the feed-board and carrying-tapes, looking from the side opposite to that shown in Fig. 7. Figs. 9 and 10 are vertical sections in lines $x$ $x$ and $y$ $y$, Fig. 8, respectively. Fig. 11 is a top plan view of the paper-feeder with a portion broken away. Fig. 12 is a top plan view of the brackets and guide-rods by which the pile of paper is held in place. Fig. 13 is a top plan view of the trip-lever. Fig. 14 is a section of the trip-lever in line $x$ $x$, Fig. 5.

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

A A' represent the side frames of the feeder, which are connected by cross stays or rods $a$ $a'$ $a^2$.

B represents the vertically-movable table upon which the pile of paper is placed. The feed-table is supported on a cross-bar $b$, provided at its ends with laterally-projecting screw-nuts $b'$, which are guided in vertical ways formed on the inner sides of the side frames in the usual manner. The feed-table is provided on its under side with a screw-shank $b^2$, engaging in a slot $b^3$ formed in the cross-bar $b$, which enables the feed-table to be adjusted laterally on the cross-bar and held thereon by a thumb-nut $b^4$.

C C represent vertical feed-screws, which work in the nuts $b'$ of the cross-bar $b$, and which are held against vertical movement in bearings $c$ $c'$, arranged in the side frames. Suitable mechanism for simultaneously operating these feed-screws so as to automatically raise the feed-table as the sheets of paper are fed from the pile is described, shown, and claimed in a pending application for Letters Patent of the United States filed by me September 16, 1889, Serial No. 324,127, to which reference is hereby made for a complete description of such mechanism.

D represents vertical guide-rods, which are arranged on the sides of the pile of paper and prevent lateral movement of the pile as the sheets are fed from the top. These guide-rods are capable of being adjusted to any position, so as to accommodate themselves to the shape of the pile of paper. To this end the guide-rods are supported on brackets $d$, which are attached to a slotted cross-bar $d'$, secured to the side frames, as represented in Figs. 7, 11, and 12. Each of the brackets $d$ is provided with a slot $d^2$, and is secured to the cross-bar $d'$ by means of a bolt $d^3$ passing through the slot in the bracket and a longitudinal slot $d^4$ in the cross-bar, so that the guide-rods can be freely adjusted with reference to the shape of the pile of paper. The number of guide-rods and brackets depends somewhat upon the shape of the blanks which are piled. In the drawings the blank represented in Figs. 2 and 11 has four notches, and four guide-rods and brackets are employed to hold the pile in place. With a differently-shaped blank a greater or less number of guide-rods and brackets may be employed, as may be most convenient.

The outline of the feed-table is preferably made to conform to the contour of the paper which is being fed to the press, and the guide-rods are arranged in the notches or recesses usually present in irregularly-shaped paper, as represented in Figs. 7 and 11, whereby the guide-rods are better enabled to hold the pile firmly in place.

E represents the buckling mechanism, whereby the sheet of paper is buckled preparatory to being fed off the pile by the feed-fingers $e$ $e$. The buckling mechanism consists, essentially, of a buckling-finger F, pile-retaining finger $f$, preliminary holding-down finger $g$, and main holding-down finger or gage-foot $h$, all of which are described and shown in the aforesaid application for Letters Patent of the United States, filed by me September 16, 1889, Serial No. 324,127. This buckling mechanism may, however, be of any other suitable construction.

I I′ represent the lower and upper carrying or feed tapes, respectively, whereby the sheets are delivered from the pile to the drop-guides $i$ $i$ of a printing-press, as represented in the drawings, or to any other machine in which sheets are operated upon.

J represents the lower receiving-roller mounted on the shaft $j$ journaled in the side frames and arranged with its upper surface in line with the top of the pile of paper, so as to receive the sheet as it is fed from the pile. $j'$ represents the lower delivery-roller journaled in bearings $j^2$ formed on the rear portions of the side frames. The lower carrying-tape I runs around these lower rollers J and $j'$.

J′ represents the upper receiving-roller, which is arranged above the lower receiving-roller and mounted on a shaft $k$ journaled in the side frames. The upper receiving-roller is driven from the lower receiving-roller by means of gears $j^3$ $j^4$, as shown in Fig. 6.

$k'$ represents the upper delivery-roller arranged above the lower delivery-roller and mounted on the end of the rearwardly-projecting arm $l$ of a rock-lever L. The upper carrying-tape I′ is arranged above the lower carrying-tape and runs with its lower portion in contact with the upper portion of the lower tape. The upper carrying-tape runs around the upper receiving-roller, thence forwardly with its lower portion and around the upper delivery-roller $k'$, thence backwardly and obliquely upwardly and around an adjustable roller $k^2$ mounted forward of the pivot of the rock-lever L, and thence backwardly to the upper receiving-roller J′.

M represents a feed-board arranged transversely between the side frames and supported thereon by brackets $m$. The upper side of the feed-board is convex longitudinally of the machine and supports the upper portion of the lower tape, whereby the upper portion of the lower tape and the lower portion of the upper tape running in contact therewith are deflected upwardly out of a straight line, as represented in Figs. 7 and 8. This produces a firm contact between the upper and lower tapes and insures a positive grip on the sheet of paper as it is carried by the tapes from the pile to the drop-guides. The latter are adjustably mounted on a rock-shaft $i'$ journaled in bearings $i^2$ formed on the rear ends of the side frames. The vertical screws $i^3$ $i^4$ of the drop-guides serve as registering-pins, whereby the sheet of paper is registered before entering the printing-press or other machine. The registering-pins $i^3$ $i^4$ of the drop-guides rest on horizontal plates $n$, which are capable of lateral adjustment on a cross-bar $n'$ by spring-clamps $n^2$ or any other suitable means.

The rock-lever L, which carries the delivery-roller of the upper tape, is pivoted centrally on a sleeve $l'$, which is adjustably secured to the cross-rod $a$. A rocking motion is imparted to the rock-lever L by means of a cam O, mounted on a transverse shaft $o'$, journaled in the side frames. This cam bears against the upper side of the front arm $l^2$ of the rock-lever and depresses the same, whereby the rear arm $l$, carrying the upper delivery-roller, is raised. This causes the delivery portion of the upper carrying-tape to become disengaged from the sheet, when the latter is carried away by the nippers of the printing-press. The receiving portions of the carrying-tapes run in contact with each other; but the delivery portions are separated a sufficient distance so as to avoid carrying the sheet forward and buckling the same after it has been properly registered against the drop-guides $i$. The distance from the drop-guides to the point where the upper and lower carrying-tapes are separated is varied according to the length of the sheet, the adjustment of the upper tape being so regulated that a slight frictional contact is maintained between the rear edge of the sheet and the upper and lower tapes, so as to insure a positive feed of the sheet against the registering-pins $i^3$ $i^4$. In order to provide for the adjustment of the upper delivery-roller toward and from the lower delivery-roller, the rock-lever which carries the upper roller is constructed in two parts arranged side by side, as represented in Figs. 7, 8, and 11. One part of the rock-lever is composed of the rear arm $l$, and a forward extension $l^3$ formed on the same, and the other part is composed of the front arm $l^2$, and a rear extension $l^7$ formed on the same. The extension $l^3$ is arranged on one side of the front arm $l^2$ and the extension $l^7$ on one side of the rear arm $l$.

The regulation of the distance from the point of separation of the carrying-tapes to the registering-pins is effected by means of an adjusting-screw $o^2$, arranged in a laterally-projecting lug $o^3$, formed on the front arm $l^2$ and bearing against the top of the forward extension $l^3$ of the rear arm $l$. The front and rear arms of the rock-lever are independently pivoted on opposite sides of the sleeve $l'$, the latter being provided with a central flange or rib $l^4$, which separates the arms of the rock-lever, as shown in Figs. 9 and 11.

$l^5$ represents a set-screw which secures the sleeve $l'$ on the cross-rod $a$ and enables both arms of the rock-lever to be adjusted laterally on the cross-rod $a$. The arc in which both arms of the lever oscillate when depressed by the cam O is uniform at all times; but the relation between the upper and lower delivery-rollers which regulates the separating point at the delivery end of the carrying-tapes is varied by turning the thumb-screw $o^3$ bearing on the extension $l^3$, which raises or lowers the rear arm $l$ and the upper delivery-roller attached thereto. After the rear arm $l$ has been adjusted by the adjusting-screw $o^2$, the latter is held in place by a jam-nut $o^4$.

The rear arm $l$ of the rock-lever is provided with a screw-bolt $o^5$, which passes loosely through a segmental slot $o^6$ formed in the rearward extension $l^7$ of the forward arm $l^2$.

$l^8$ represents a hook or guide formed on the extension of the rear arm and embracing the lower side of the front arm $l^2$, whereby the front arm is guided in adjusting the same vertically.

The screw-bolt $o^5$ and the hook $l^8$ hold both sections of the rock-lever loosely together and permit a limited independent vertical movement, but compel them to move in unison when the parts are adjusted transversely.

The lower tape and its front supporting-roller are capable of transverse adjustment, likewise the cam which actuates the rock-lever. This enables these parts to maintain their relative positions when adjusted transversely in the machine.

When the upper delivery-roller is raised, it tends to strain the upper carrying-tape, which eventually would result in a slack belt. This, however, is avoided by the roller $k^2$, mounted on the forward extension of the rear arm, which descends about in the same measure that the upper delivery-roller ascends, thereby providing an amount of slack belt equal to the elongation produced by the raising of the upper delivery-roller. The roller $k^2$ is supported in an adjustable bearing $k^3$, by which the upper carrying-tape can be tightened. The upper convex surface of the feed-board M causes the carrying portions of the tapes to be curved upwardly, which enables the delivery portions of the tapes to be separated for a considerable distance for adjustment without affecting the firm contact between the receiving portions of the tapes.

The form of the envelope-blank shown in Fig. 2 consists, essentially, of the body portion Q, end flaps $q$ $q'$, side flaps $q^2$ $q^3$, and notches $r$ $r'$ $r^2$ $r^3$ formed at the points of intersection between the body and the flaps. In feeding the envelope-blanks of this form the pile of sheets is placed with its longest ends or flaps arranged transversely and obliquely in the feeder, so that the notch $r$ on the front side and farthest from the tapes will be some distance in advance of the front notch $r'$ nearest the tapes, as shown in Figs. 1 and 11. The blank in being fed off the pile is seized firmly by the tapes at the side of the rearwardly-extending end flap $q'$ of the blank and is carried over the feed-board in an oblique position until the front edge R of the advancing end flap $q$ strikes the registering-pin $i^4$ of the drop-guides. The further movement of the flap $q$ is arrested by the registering-pin $i^4$; but the tapes which still grip the opposite end flap $q'$ of the blank continue to carry the latter forward and cause the blank to move laterally by sliding and swinging with its straight-edge R on the registering-pin $i^4$ as a pivot until the notch $r$ has engaged against the registering-pin $i^3$. The slight friction still existing in this position of the blank between the tapes and the end flap $q'$ is sufficient to move it forward a short distance until the notch $r'$ engages with the registering-pin $i^3$, thereby correctly registering the blank against both registering-pins, as clearly shown in dotted lines in Fig. 2. When the blank has been properly registered against these pins, the upper delivery-roller $k'$ and the delivery portion of the upper carrying-tape are quickly raised by the cam O acting on the rock-lever L, thereby relieving the rear edge of the blank of the slight friction of the tapes. At the next instant the drop-guides are raised and the sheet is carried off the feed-board by the printing-press nippers. The upper delivery-roller is now again lowered by the weight of the rear arm $l$ after the cam relieves the front arm $l^2$ of the rock-lever L.

The registering-pins $i^3$ $i^4$ are capable of transverse adjustment, so that they can be shifted to correspond to the distance between the notches $r$ $r'$ in the front of the envelope-blank and establish a correct register. The sheet is prevented from raising at the delivery end of the feed-board by the usual guides $g'$ $g'$, which are supported on the cross-bar $g^2$.

Fig. 3 represents an arrangement of the registering-pins which enables folded envelopes, sheets, or cards of rectangular shape to be fed and registered. In this construction the drop-guides serve only as front registers, while a pin $I^2$ registers the sheet from the side. This side registering-pin is secured in position on the cross-bar $n'$ by a suitable clamp. The rearmost front portion $q^4$ of the obliquely-arranged folded envelope $Q'$ is seized by the tapes, and the envelope is carried forward in this oblique position until the sides of the advancing front corner $q^5$ of the same engages with the front and side registering-pins $i^4$ and $I^2$, which arrest its further forward movement. The tapes, still gripping the envelope, continue to carry the rearmost end portion of the same forward, thereby swinging the envelope around, owing to the resistance offered by the front and side registering-pins $i^4$ $I^2$, until the envelope strikes fairly against all of the front and side registering-pins, as shown in dotted lines in Fig. 3.

In feeding sheets or cards of irregular form the registering-pins are placed in such a position that they will correspond and come into engagement with definite notches formed in the blank. Usually two such pins will suffice to establish a front and side register of the sheet; but in feeding rectangular sheets it is necessary to employ three pins, as shown, for instance, in Fig. 3.

In feeding blanks or sheets straight over the feed-table, as heretofore practiced, the exactness of the register depends largely upon the tightness of the grip with which the tapes seize each blank or sheet.

In the practical working of feeding-machines it is found that the sheets are frequently pushed out of place by the buckling devices, and that the feed-tapes do not carry them as exactly and certainly as is required for nice work, so that more or less waste is the result. By feeding the blanks or sheets obliquely over the feed-table so that they strike a stop or register with their free advancing portion, and causing the tapes to continue the forward movement of that portion of the blank which has not yet encountered a stop or registering device, the sheet or blank is caused to swing or move laterally until a correct register has been produced. This manner of effecting a register permits sheets or blanks of almost any conceivable shape to be fed to a press or other machine and to be correctly registered, and permits considerable variation in feeding from the pile without producing inexactness of register.

It is obvious that a single carrying-tape may be employed to carry the sheet from the pile over the feed-board to the printing-press drop-guides. In this case the lower tape is dispensed with and the sheet carried forward by the friction between the face of the lower portion of the upper tape and the upper convex surface of the feed-board.

The longitudinal shaft $g^3$ of the buckling mechanism is rotated from the transverse shaft $o'$ by screw-gears $g^4$ $g^5$, as described and shown in my application, Serial No. 324,127, already referred to.

It is desirable in this class of machines that the buckling mechanism should not be stopped except when the buckling-finger is in a retracted or nearly retracted position, in which position of the buckling-finger the top sheet is not yet loosened. When the machine is stopped with the buckling-finger in any other position, the last sheet which has been loosened is liable to remain between the tapes, because the tapes are stopped before they have discharged the sheet, and this sheet has to be removed by hand. In order to avoid this inconvenience, I provide the machine with a clutch, which stops the buckling mechanism when the buckling-finger is retracted, but permits the tapes to run on so as to discharge the sheet or sheets which had been loosened by the buckling-finger before the latter was stopped. The construction of this clutch is most clearly represented in Figs. 4, 5, 6, 11, 13, and 14, and is as follows:

The transverse shaft $o'$ is provided at one end with a gear-wheel S, which is driven from the lower receiving-roller shaft $j$ by means of intermediate gear-wheels $s$ $s'$. The gear-wheel S is mounted loosely on a hub $o^7$, and the latter is secured to the end of the shaft $o'$ so as to turn therewith. This hub holds the gear-wheel S against lateral movement by means of a flange $o^8$ formed on the outer side of the hub and a clutch-disk $o^9$ secured to the inner side of the hub.

$t$ represents a pawl pivoted to the inner side of the gear-wheel S and adapted to engage with its free hooked end $t'$ in a notch $o^{10}$ formed in the clutch-disk $o^9$.

$t^2$ represents a trip-disk pivoted to the inner side of the gear-wheel S, and provided with a pin $t^3$, which engages in a slot $t^4$ formed in the rear end of the pawl $t$.

$t^5$ $t^6$ represent two horizontal pins formed on the trip-disk, and which are adapted to engage against lugs $u$ $u'$ formed on a trip-lever U in order to engage or disengage the pawl from the notch $o^{10}$ in the clutch-disk $o^9$. The trip-lever is mounted on a transverse shaft $u^2$, and is provided on the front side of the shaft $o'$ with a short depending stop $u^3$ and on the rear side of said shaft with a longer depending stop $u^4$. These stops are adapted to engage against the top of the side frame A and limit the swinging motion of the trip-lever in both directions.

In the position of the parts shown in Fig. 5 the clutch is in gear and compels the shaft $o'$ to rotate with the wheel S, and the trip-lever is in its normal position, in which it does not interfere with the pawl or its trip-disk. In this position of the parts the buckling mechanism and the tapes operate together in loosening and discharging the sheets.

When it is desired to stop the buckling mechanism, the long rear stop $u^4$ is depressed in the direction of the arrow in Fig. 5 until it strikes the frame. This causes the front lug $u'$ to be elevated and arranged across the path of the releasing-pin $t^6$ on the trip-disk $t^2$. The releasing-pin $t^6$ in revolving with the gear-wheel S strikes the lug $u'$, whereby it is arrested and the trip-disk is caused to revolve in the direction of the arrow until the pin $t^6$ clears the lug $u'$. The rotation of the trip-disk disengages the pawl from the notch in the clutch-disk $o^9$ and this stops the rotation of the shaft $o'$. The lugs $u$ $u'$ of the trip-lever are bent outwardly, as represented in Figs. 13 and 14, to engage against the releasing and engaging pins $t^6$ $t^5$ of the trip-disk and to permit these pins to pass by the hub portion of the trip-lever in the normal position of the latter represented in Fig. 5. The buckling mechanism being stopped, as above described, the tapes continue to move and deliver the loosened sheet or sheets. When this has been accomplished, the feeding of paper ceases, although the tapes continue to run. When it is desired to resume the feeding, the front stop $u^3$ of the trip-lever is depressed until it strikes the side frame, which causes the upper lug $u$ to stand across the path of the engaging-pin $t^5$. The latter strikes the lug $u$ and reverses the trip-disk, which throws the pawl into engagement with the notch in the clutch-disk and starts the rotation of the shaft $o'$ and the operation of the buckling mechanism.

$t^7$ represents a sliding bolt pivoted at one end to the trip-disk $t^2$, and passing with its free end through a swivel-post $t^8$. A spring $t^9$ is interposed between the post $t^8$ and a collar $t^{10}$ on the sliding bolt. This spring-bolt is under tension continually, so that when the trip-disk is revolved in throwing the clutch in or out of gear the spring-bolt is thrown alternately from one side to the other of the center, whereby the pawl is held in or out of engagement with the notch $o^{10}$. If the pawl is thrown against the clutch-disk when the pawl has passed the notch in the clutch-disk, the pawl will travel around the periphery of the clutch-disk until it arrives opposite the notch, and will be caused to engage therewith by the tension of the spring surrounding the spring-bolt. This clutch enables the buckling and feed mechanism to be thrown out of gear precisely at the moment when the parts have completed a cycle and leaves the mechanism in a position to begin buckling a new sheet when thrown into gear.

I claim as my invention—

1. The combination, with the convex feed-board, of a feed-tape arranged above the feed-board and running with the face of its lower portion in contact with the convex feed-board, whereby the carrying portion of the tape is deflected out of a straight line and the sheet of paper is firmly seized between the tape and the feed-board, substantially as set forth.

2. The combination, with two opposing feed-tapes, of a convex feed-board which bears against the carrying portion of one of the tapes, and whereby both tapes are deflected out of a straight line and a firm contact is maintained between them, substantially as set forth.

3. The combination, with two opposing feed-tapes having their receiving portions arranged contiguously, of an intermittently-moving support whereby their delivery portions are moved toward and from each other, substantially as set forth.

4. The combination, with the feed-board and a lower feed-tape running over said feed-board, of an upper feed-tape having its receiving portion arranged contiguous to the lower feed-tape, and an intermittently-moving support whereby the delivery portion of the upper tape is moved toward and from the lower tape, substantially as set forth.

5. The combination of a convex feed-board and an upper and a lower tape having their carrying portions arranged contiguous to the convex surface of the feed-board, whereby a firm contact is maintained between the receiving portions of the feed-tapes, and an elevated support at the delivery portion of the upper tape, whereby the delivery portions of the tapes are separated, substantially as set forth.

6. The combination, with the feed-board and the lower feed-tape, of an upper feed-tape, a roller at the receiving end of the upper tape, and a rock-lever provided with a roller which supports the delivery end of the upper tape, substantially as set forth.

7. The combination, with the feed-board and the lower feed-tape, of an upper feed-tape, a roller at the receiving end of the upper tape, a rock-lever provided with a roller which supports the delivery portion of the upper tape, and a cam whereby said rock-lever is actuated, substantially as set forth.

8. The combination, with the lower feed-tape and the upper feed-tape provided with a receiving and a delivery roller, of a rock-lever supporting the delivery-roller and composed of sections made adjustable with reference to each other, whereby the distance between the delivery portions of the tapes can be regulated, substantially as set forth.

9. The combination, with the lower feed-tape and the upper feed-tape provided with a receiving-roller, of a rock-lever having front and rear arms adjustably connected, a roller supporting the delivery portion of the upper tape mounted on the rear arm, and a cam bearing against the front arm of the rock-lever, substantially as set forth.

10. The combination, with the feed-board and the upper and lower feed-tapes, of a rock-lever having a rear arm supporting the delivery portion of the upper feed-tape, a front arm actuated by a cam, and an adjusting-screw attached to one of said arms and bearing against the other arm, substantially as set forth.

11. The combination, with the feed-board and the upper and lower feed-tapes, of a rock-lever having a rear arm supporting the delivery portion of the upper tape, a front arm having an adjustable screw bearing against the rear arm, an adjustable sleeve upon which both arms are journaled, and a rod on which the sleeve is mounted, substantially as set forth.

12. The combination, with the feed-board and the upper and lower feed-tapes, of a rock-lever having a rear arm supporting the delivery portion of the upper tape, a front arm having an adjustable screw bearing against the rear arm, a sleeve supporting both arms of the rock-lever, a guide formed on the rear arm and embracing the front arm, and a bolt

secured to the rear arm and passing loosely through a segmental slot in the front arm, whereby the parts of the rock-lever are held together transversely, substantially as set forth.

13. The combination, with the feed-board and the lower feed-tape, of an upper feed-tape having a receiving-roller, a delivery-roller mounted on the rear portion of a rock-lever, and an intermediate roller mounted on the front portion of the rock-lever, whereby the front portion of the upper tape is lowered when the delivery portion is raised, substantially as set forth.

14. The combination, with the feed-board and the registering-guides, of a pair of feed-tapes arranged to seize the sheet near one side, whereby the sheet is carried in a diagonal or oblique position over the feed-board and with its free end foremost against the registering-guides, substantially as set forth.

15. The combination, with the feed-board and two front registering-guides, of feed-tapes which grip the sheet near one end and carry it over the feed-board in an oblique or diagonal position, whereby the free front end of the sheet strikes one of the registering-guides in advance of the rear portion, which is seized by the tapes, and the rear portion continues its forward movement until it strikes the other registering-guide, substantially as set forth.

16. The combination, with the buckling mechanism having a driving-shaft and the tape mechanism having a driving-shaft, of a clutch interposed between said shafts, whereby the buckling mechanism can be thrown out of gear while the tapes continue to move, substantially as set forth.

17. The combination, with the tape mechanism and its shaft $j$ and the buckling mechanism having a shaft $o'$, of the loose driving-wheel S, provided with a pawl, a tight clutch-disk $o^9$, and a trip-lever whereby the pawl is thrown in and out of gear, substantially as set forth.

18. The combination, with the buckling mechanism having the shaft $o'$ and the clutch-disk $o^9$, secured to said shaft, of the wheel S, mounted loosely on said shaft and connecting with the tape mechanism, the pawl $t$, pivoted on said wheel S, the trip-disk attached to said wheel and connected with said pawl, a spring connecting with said trip-disk, and a trip-lever U, whereby the pawl is thrown in and out of gear, substantially as set forth.

Witness my hand this 20th day of January, 1890.

FREDERICK HART.

Witnesses:
J. S. VAN CLEEF,
PER LEE A. LEE.