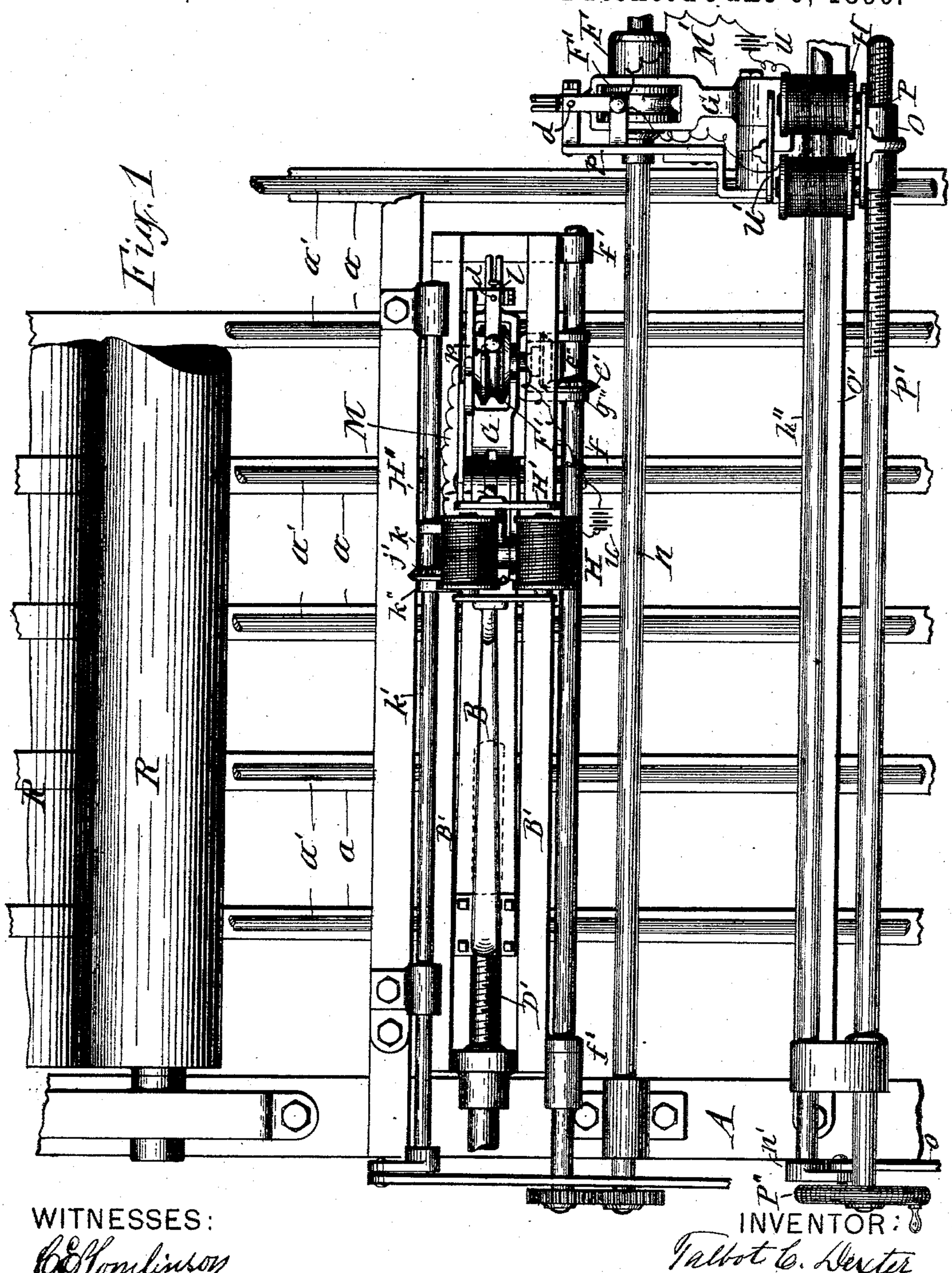
(No Model.) 6 Sheets—Sheet 1.

# T. C. DEXTER.

## MACHINE FOR REGISTERING SHEETS OF PAPER.

No. 561,771. Patented June 9, 1896.




WITNESSES:
C. E. Tomlinson
C. L. Bendixon

INVENTOR:
Talbot C. Dexter
By E. Laass
his ATTORNEY

(No Model.) 6 Sheets—Sheet 2.

# T. C. DEXTER.

## MACHINE FOR REGISTERING SHEETS OF PAPER.

No. 561,771. Patented June 9, 1896.

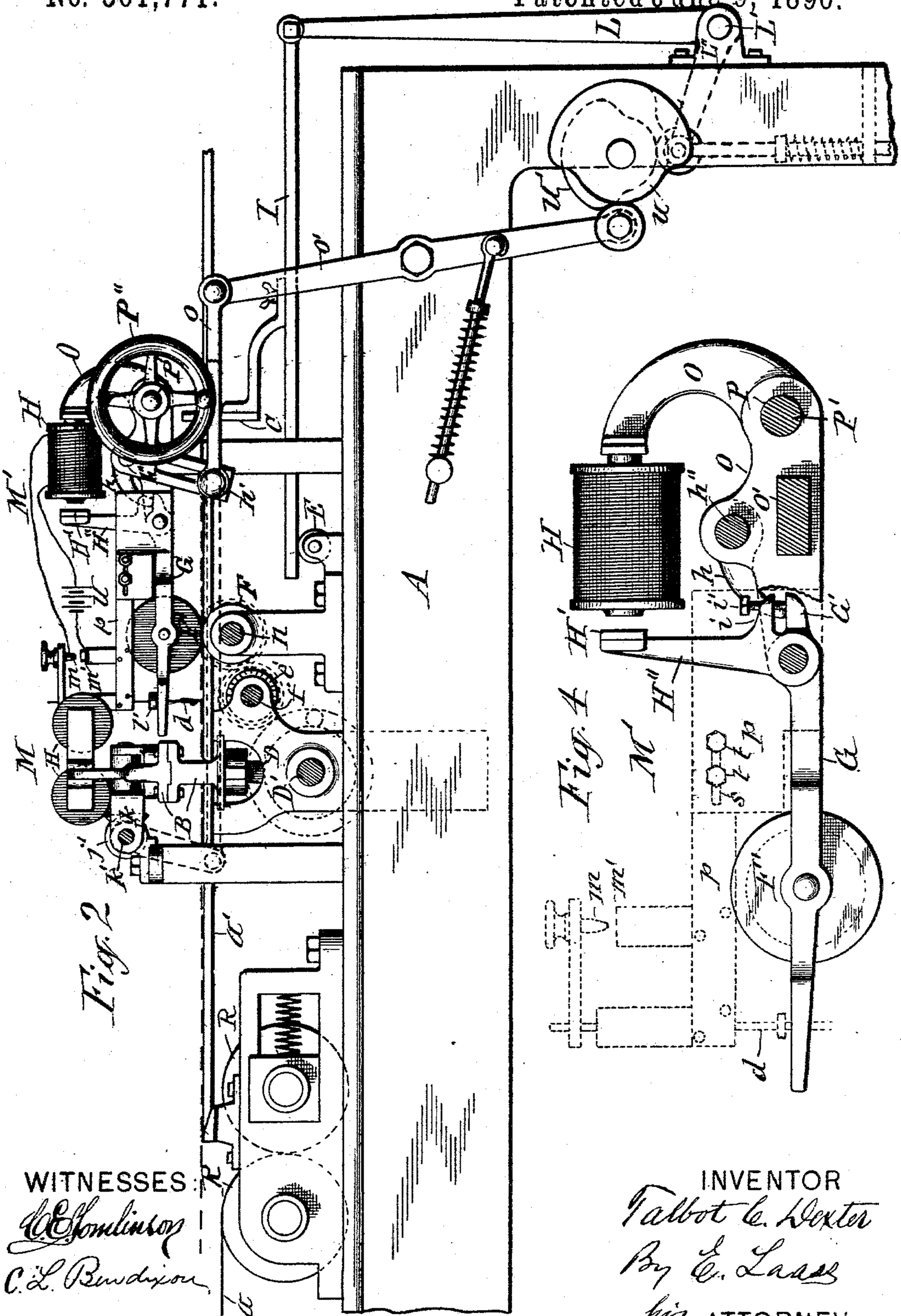


Fig. 2



Fig. 4

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C. E. Tomlinson
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(No Model.) 6 Sheets—Sheet 3.

# T. C. DEXTER.

## MACHINE FOR REGISTERING SHEETS OF PAPER.

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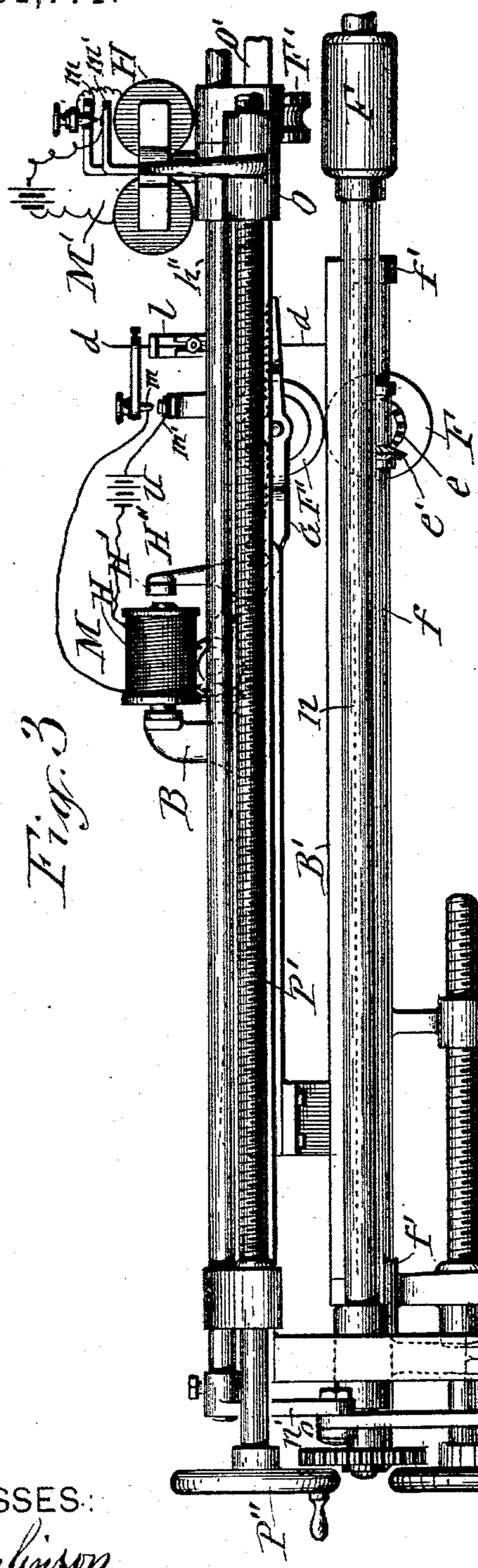

Fig. 3

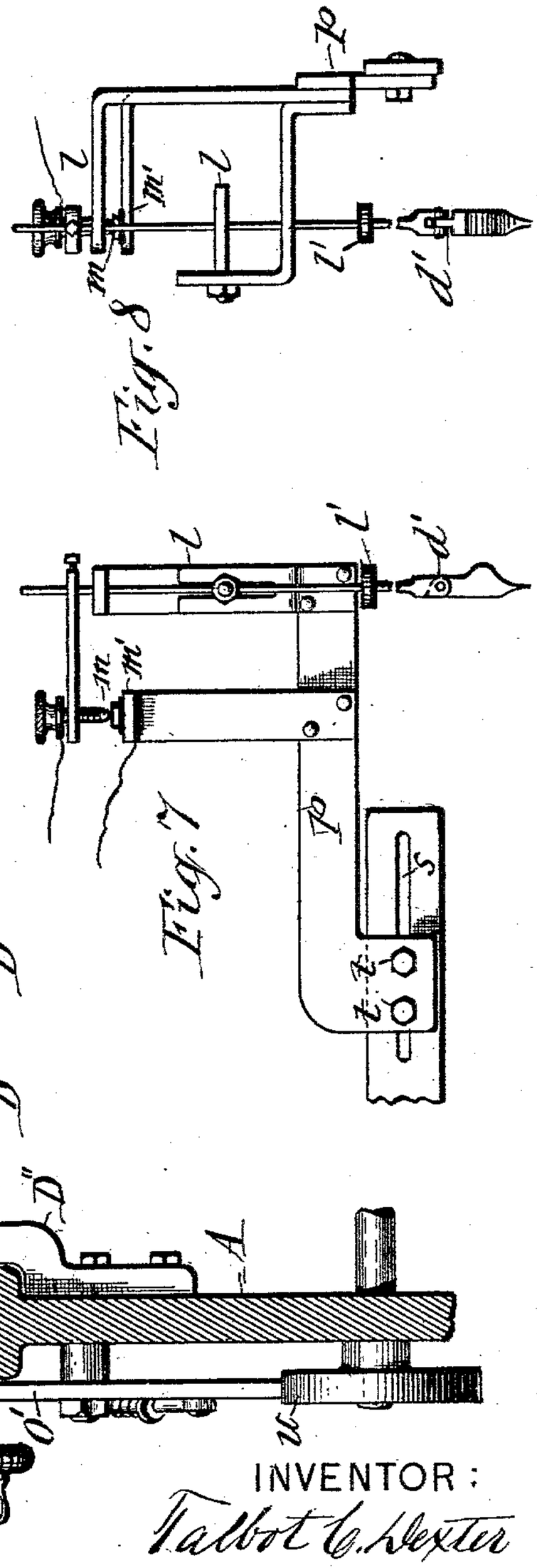

Fig. 8



Fig. 7

WITNESSES:
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(No Model.) 6 Sheets—Sheet 4.

# T. C. DEXTER.

## MACHINE FOR REGISTERING SHEETS OF PAPER.

No. 561,771. Patented June 9, 1896.

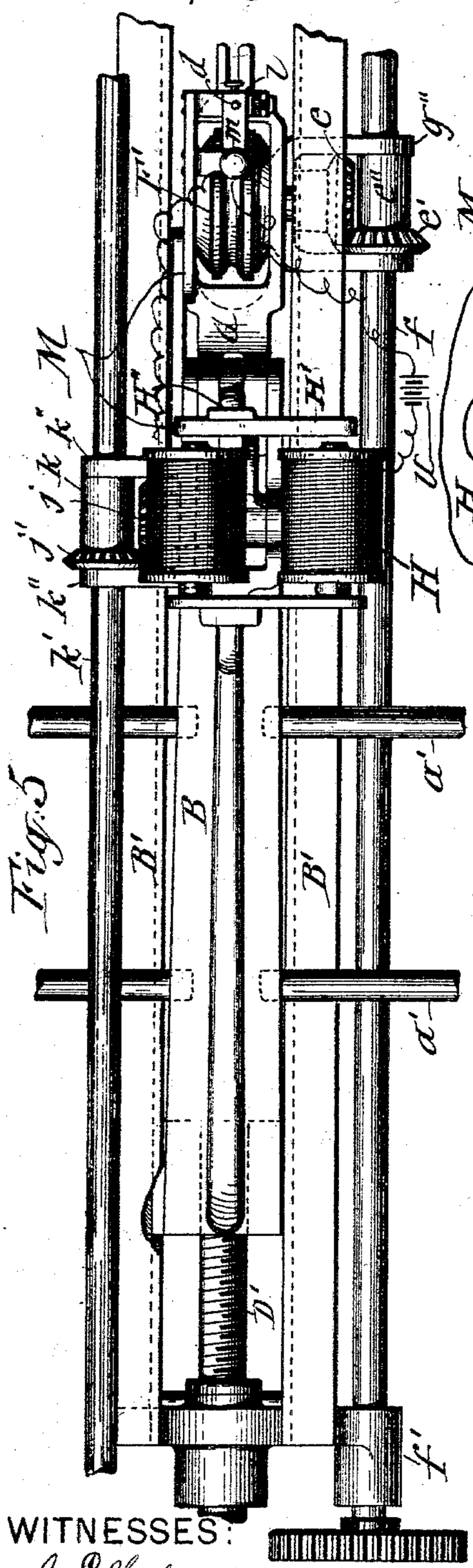

Fig. 5

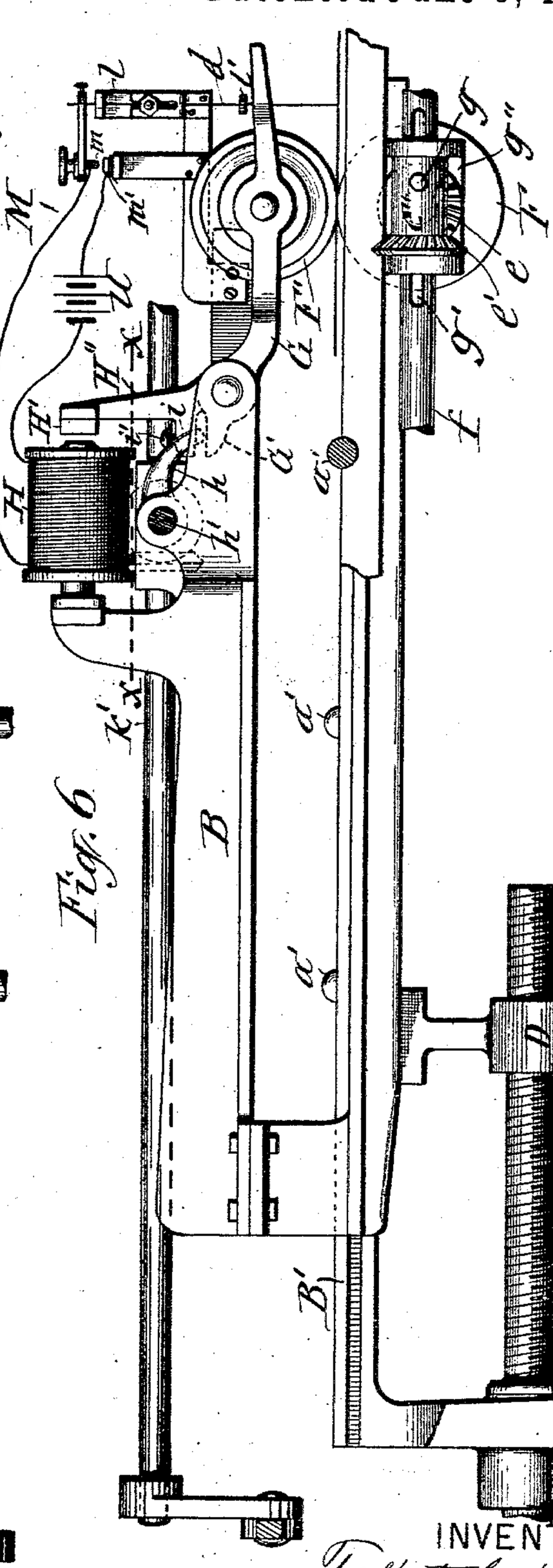

Fig. 6

WITNESSES:

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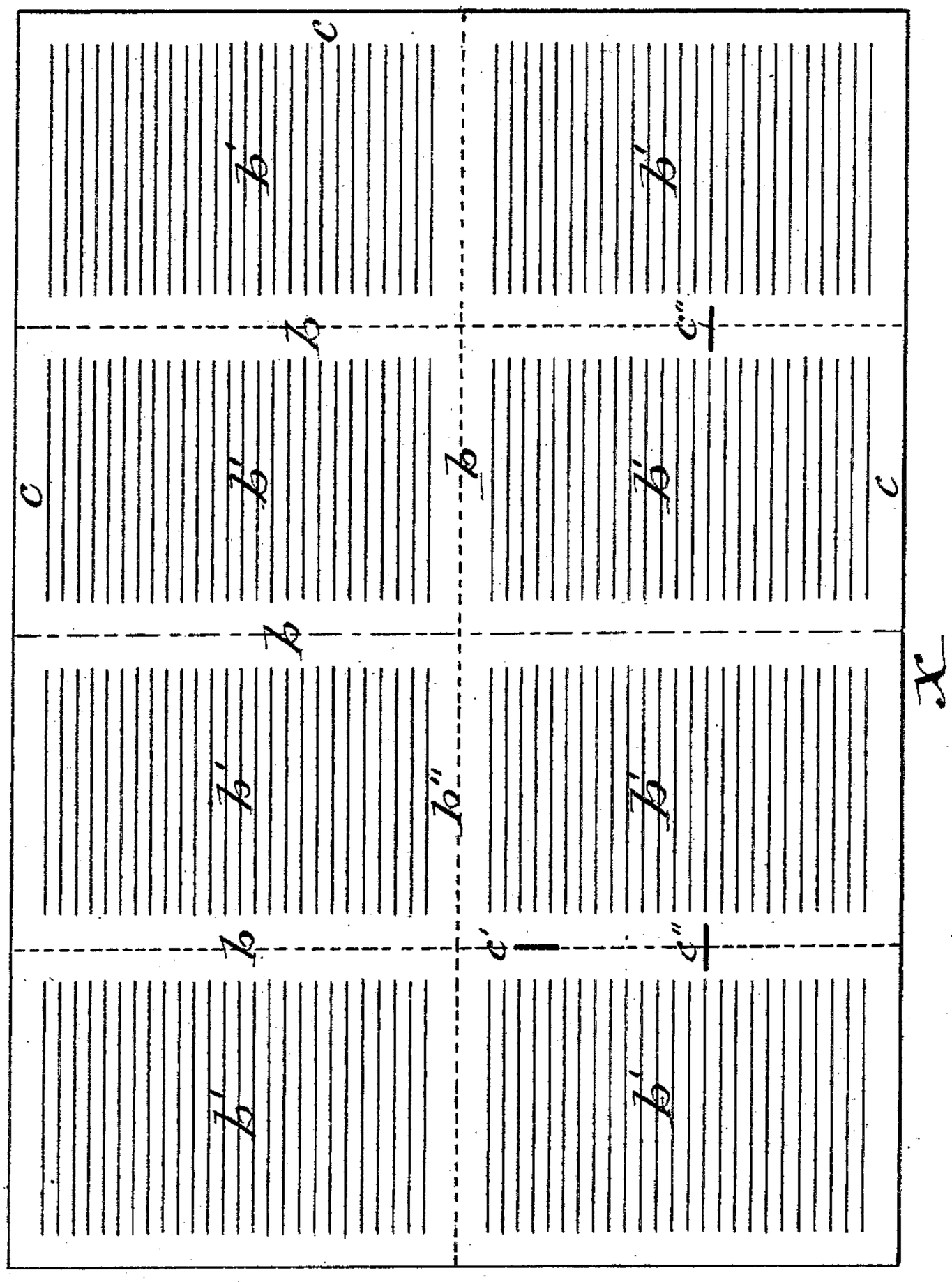
(No Model.) 6 Sheets—Sheet 5.

# T. C. DEXTER.

## MACHINE FOR REGISTERING SHEETS OF PAPER.

No. 561,771. Patented June 9, 1896.

Fig. 9.




WITNESSES:

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(No Model.) 6 Sheets—Sheet 6.

# T. C. DEXTER.

## MACHINE FOR REGISTERING SHEETS OF PAPER.

No. 561,771. Patented June 9, 1896.

Fig. 11

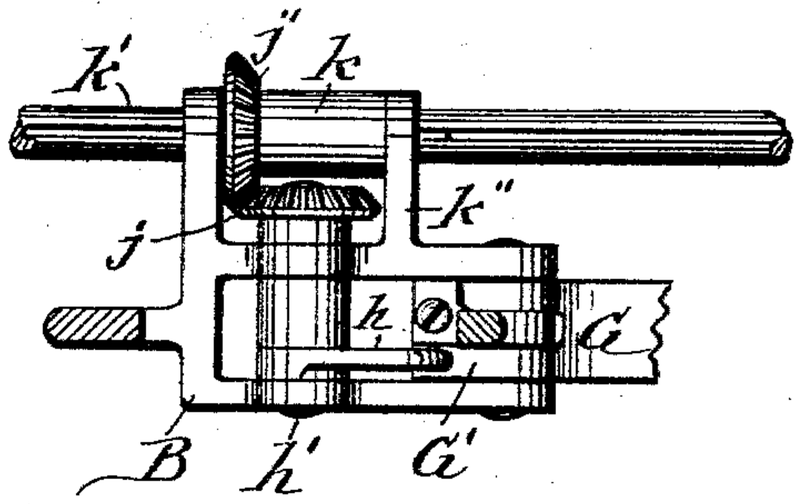
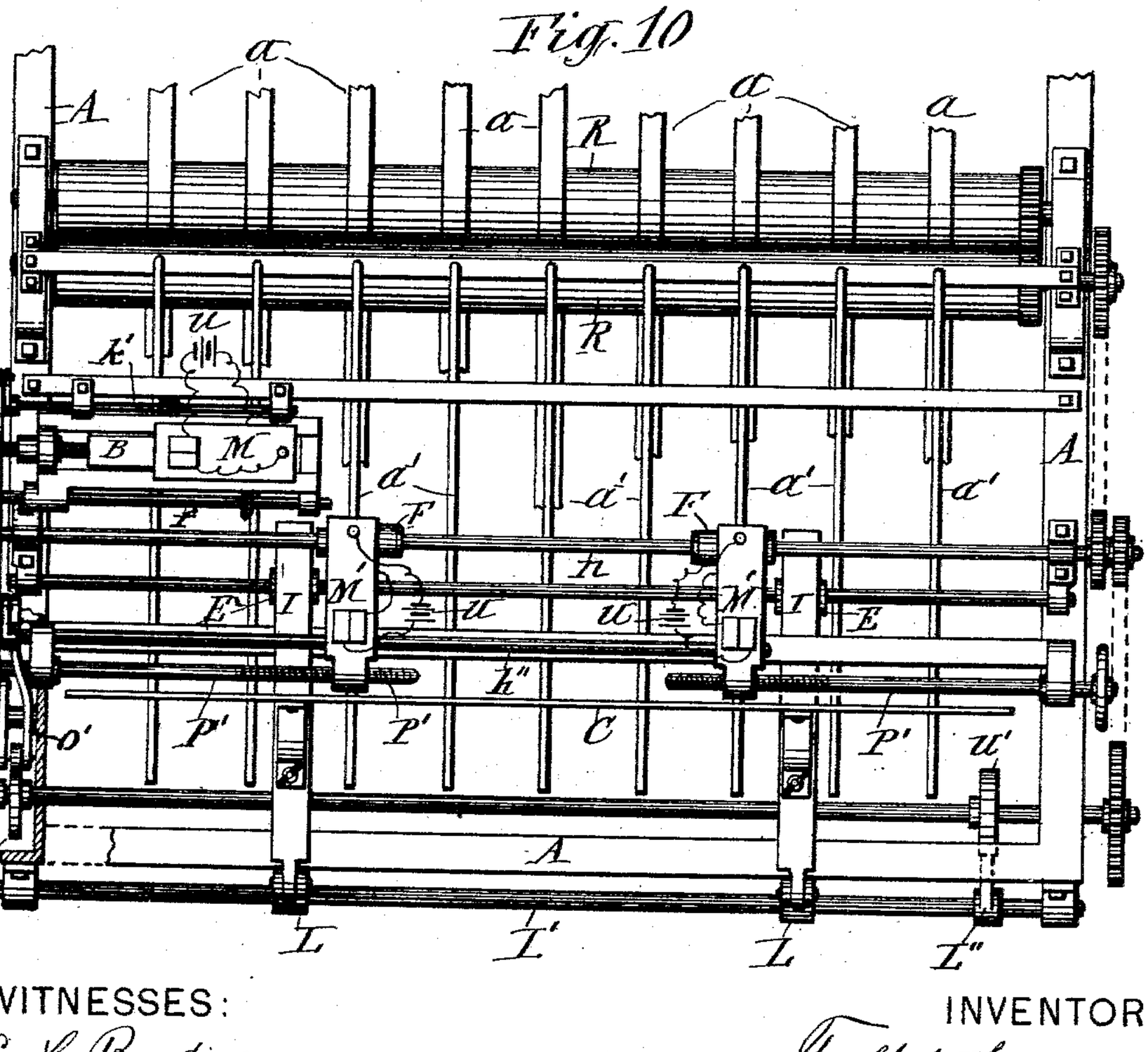



Fig. 10




WITNESSES:
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# UNITED STATES PATENT OFFICE.

TALBOT C. DEXTER, OF PEARL RIVER, NEW YORK, ASSIGNOR TO THE DEXTER FOLDER COMPANY, OF NEW YORK, N. Y.

## MACHINE FOR REGISTERING SHEETS OF PAPER.

SPECIFICATION forming part of Letters Patent No. 561,771, dated June 9, 1896.

Application filed November 22, 1894. Serial No. 529,553. (No model.)

*To all whom it may concern:*

Be it known that I, TALBOT C. DEXTER, of Pearl River, in the county of Rockland, in the State of New York, have invented new and useful Improvements in Automatic Paper-Registering Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My present invention relates more particularly to the paper-registering machine described and shown in my prior application for Patent, Serial No. 511,132, filed May 14, 1894, in which the sheet is registered by gravitating pins traversing the sheet and in their travel entering slits in the sheet, and thereby drawing said sheet to its registering position. Said slits are made at predetermined points simultaneously with the printing of the sheet. Said means of moving the sheet, however, is not always desirable, especially when the paper is thin or flimsy or of a quality which is liable to be torn by the strain received from the pin in the operation of moving the sheet as aforesaid, and therefore the registering of the sheet is not reliable in such cases.

The object of my present invention is to automatically and accurately register the sheet by gravitating feelers or pins entering the slits in the sheet without subjecting the sheet to any strain from the said feelers or pins; and to that end the invention consists, essentially, of a paper-registering machine composed of automatic electrically-controlled mechanism shifting the sheet laterally, and automatic electrically-controlled mechanism shifting the sheet longitudinally at opposite sides of the central line of the feeding of the sheet to the machine; and the invention also consists in certain novel features of the details of the registering devices, as hereinafter described, and specifically set forth in the claims.

In the annexed drawings, Figure 1 is a plan view of a section of a paper-folding machine, showing the lateral registering mechanism and one of the longitudinal paper-shifting mechanisms connected to said machine. Fig. 2 is a side elevation of the same minus the driving-gears of the registering mechanisms. Fig. 3 is a rear view of the same minus the end gage. Fig. 4 is an enlarged side view of the paper engaging and releasing devices employed for shifting the paper longitudinally in relation to the line of feed. Figs. 5 and 6 are respectively enlarged plan and side views of the mechanism for shifting the paper laterally. Figs. 7 and 8 are enlarged side and end views of one of the automatic circuit-controllers employed for electrically controlling the action of the paper-shifting mechanisms. Fig. 9 is a plan view of a sheet of paper, showing the slits made therein for the purpose of registering the sheet thereby. Fig. 10 is a diagrammatic plan view showing the relative positions of the registering mechanisms and the devices for adjusting and operating the same, and Fig. 11 is a transverse section on line $x\,x$ in Fig. 6.

Similar letters of reference indicate corresponding parts.

A represents the main frame of a paper-folding machine, in which R R denote the folding-rollers. Inasmuch as my present invention is not limited to paper-folding machines, it is unnecessary to illustrate all the devices essential to effecting the folding of the sheets.

$a\,a$ designate the tapes which convey the sheets of paper from the usual feed-board to the folding-rollers, and $a'\,a'$ are the usual bars which carry the portion of the sheet which extends from the folding-rollers to the end gage C, sometimes termed "first fold-guide," which extends across the machine and by contact with the advance edge of the sheet arrests the longitudinal movement thereof when it has arrived at its position for being inserted between the folding-rollers which impart the first fold to the sheet. Before submitting the sheet to this folding operation it is necessary to properly aline or register the sheet, so as to bring the line of folding in the center of the blank spaces $b\,b$ of the sheet and parallel with said spaces, as indicated by the dotted line $b''$ in Fig. 9 of the drawings, in which $b'\,b'$ represent the printed portions or spaces of the sheet. This registering is readily accomplished with sheets having the margins $c\,c$ uniform and parallel with the blank spaces $b\,b$ by setting the end gage or first fold-guide in such a po-

sition as to arrest the longitudinal movement of the sheet at the proper time to bring the central line $b''$ of the blank space $b$ directly over the bite of the folding-rollers R R and at the same time square the sheets parallel to the said rollers.

In my present invention I employ the end gage C simply to arrest the longitudinal movement imparted to the sheet by the conveying-tapes $a$ $a$, which stoppage is effected by the advance edge $x$ of the sheet coming in contact with the gage C, which latter is at that time held in its nearest position to the folding-rollers and automatically recedes from the sheet after it has been arrested, as aforesaid. In connection with said movable end gage C, I employ the mechanisms M and M' M'. The mechanism M shifts the paper laterally after it has been brought to rest by the end gage C, and the two mechanisms M' M' move the paper longitudinally forward after the end gage has receded from the paper. Each of said mechanisms is equipped with the gravitating pin or feeler $d$, adapted to enter, respectively, the slits $c'$ and $c''$, made in the paper during the process of printing the same, as before stated.

The sheets are fed from the feed-board (not shown) to the folding-machine with the longer way crosswise of the conveying-tapes and in such a manner that when arrested by the end gage C the slit $c'$ is a short distance in front of the pin $d$ of the registering mechanism M and requires the latter to draw the sheet laterally to allow said pin to enter the slit. The mechanisms M' are placed in such positions as to cause their pins $d$ to come in range with the slits $c''$ after the sheet has been registered laterally, as aforesaid. Said slits $c''$ $c''$ are at opposite sides of the center of the length of the sheet for the purpose hereinafter explained.

The mechanism M is supported on a bracket B, which is mounted on a horizontal guide B', secured to the side of the frame A and extending over the paper-conveyers $a'$ at right angles thereto. Said bracket has affixed to it a nut D, which is axially parallel with the guide and has extending through it a screw D', journaled in a bearing D'', secured to the side of the frame, so as to prevent its longitudinal movement. A suitable crank or hand-wheel is to be attached to the outer end of said screw for turning the same, and thereby move the bracket and adjust the mechanism M in its position to operate on sheets of different widths.

The bracket is formed with two arms disposed one above the other. To the inner end of the lower arm is pivoted the roller F, the axis of which is at right angles to the bracket and has secured to it a miter-pinion $e$, which meshes with a corresponding pinion $e'$, fastened to a sleeve $e''$, which loosely embraces a shaft $f$, journaled in bearings $f'$ $f'$, attached, respectively, to the guide B' and side of the frame A. Said shaft receives rotary motion from the driving-gears of the folding-machine by suitable gears.

The pinion $e'$ is compelled to rotate with the shaft by means of a key or pin $g$, inserted into the sleeve $e''$ and entering a longitudinal slot $g'$ in the shaft, as shown in Fig. 6 of the drawings. Hence the roller F receives continuous rotary motion while the folding-machine is in operation. By means of a yoke $g''$, extending from the bracket B and formed with arms embracing the shaft $f$ at opposite ends of the pinion $e'$ and sleeve $e''$, said pinion is caused to move longitudinally on the shaft during the adjustment of the bracket on the guide, and thus said pinion is maintained in gear with the pinion $e$.

To the inner end of the upper arm of the bracket is pivoted the vertically-movable arm G, in which is journaled the drop-roller F', which is directly over the roller F and in the same vertical plane.

The arm G is provided with a rearwardly-projecting heel G', directly over which is a toe $h$, projecting from a rock-shaft $h'$, pivoted to the bracket B. By means of this rock-shaft the toe $h$ is caused to bear on the heel G', and thereby intermittently lift the arm G, with the roller F', to allow the paper to pass between said roller and subjacent roller during the travel of said paper to the end gage C.

The rock-shaft $h'$ receives motion by a miter-pinion $j$, attached to said shaft and engaging a suitable pinion $j'$, attached to a sleeve $k$, mounted loosely on a shaft $k'$, which is parallel with the guide B' and allows the sleeve to slide longitudinally on the shaft. A spline-and-groove connection between the pinion and shaft compels them to revolve in unison, and a yoke $k''$, attached to the bracket B and holding the sleeve and its pinion, compels the same to shift on the shaft so as to maintain the two pinions in engagement during the adjustment of the bracket on the guide. (See Fig. 11.) Upon the upper arm of the bracket B is also mounted the electromagnet (preferably twin magnets) H, the armature H' of which is fastened to a lever H'', pivoted to the arm of the bracket preferably by the same pin which pivots the arm G to the bracket. The lever H'' has on its lower portion a lug $i$, to which is connected a vertically-adjustable screw $i'$, which is directly over a portion of the heel G'. Said screw is so adjusted as to liberate the arm G from pressure of the screw when the armature is released from the magnet and to subject the heel of said arm to the pressure of the screw, and thus lift the arm G when the armature is attracted by the magnet.

The energy of the magnet is controlled by a circuit maker and breaker carried on the bracket and operated by a suitable mechanical feeler, preferably of the form of the gravitating pin $d$, which rides on the paper while being drawn laterally by means of the frictional contact of the rollers F F', said feeler being in the path of the slit $c'$, so as to drop

into the same, and thereby close the circuit which energizes the magnet H to attract the armature, and thereby cause the drop-roller F′ to be lifted from the paper, which is thus arrested in its lateral movement and side registered.

To properly sustain the feeler or pin *d* in its vertical position, I attach to the bracket B a vertical guide *l*, in which the feeler slides.

To lift the feeler from the paper simultaneously with the lifting of the roller F′, I attach to the feeler or pin a collar or stop *l′* directly over the arm G, so as to cause the latter to engage said stop when said arm is lifted by either the armature-lever H″ or the toe of the rock-shaft *h′*. To the feeler or pin *d* is attached one of the terminals *m* of the circuit-controller. The other terminal, *m′*, is secured to a plate *p*, attached to the bracket B.

The terminal *m′* is under the other terminal, so as to cause them to come in contact when the feeler *d* has dropped into the slit *c′* in the paper.

The end gage C, I mount on pitmen I, which ride with their free ends on rollers E, as shown in Fig. 2 of the drawings. Said pitmen are connected to levers L, attached to a rock-shaft L′, which receives motion by an arm L″, attached to said shaft and bearing on a rotary cam U′. Said cam is so shaped and in such position as to cause the said end gage to recede from the sheet of paper after it has arrested the longitudinal movement of said sheet. This movement of the gage is essential to the operation of the longitudinal registering mechanisms M′ M′, one of which is shown on an enlarged scale in Figs. 1, 2, 3, and 4 of the drawings. The other is of the same construction and operating substantially in the same manner, but located at the opposite side of the center of the width of the machine, as illustrated in Fig. 10 of the drawings. Each of these latter mechanisms is connected to a bracket O, mounted longitudinally movable on a bar O′, which extends across the machine and is firmly secured to the sides of the frame A. To allow said mechanisms to be adjusted in their requisite positions in relation to the slits *c″ c″*, I provide each of the brackets O with a screw-threaded orifice P, which is axially parallel with the bar O′ and has extending through it a screw P′, which is journaled in the side of the frame A and prevented from moving longitudinally. The outer end of said screw is provided with a hand-wheel P″, by which to turn the screw which causes the bracket O to be shifted longitudinally on the bar O′.

The mechanism M′ is of substantially the same construction as the mechanism M—*i. e.*, a vertically-movable arm G is pivoted to the bracket and has pivoted to its free end the roller F′. A toe *h* on the rock-shaft *h″* intermittently lifts the arm and allows the paper to pass beneath the roller F′ and to the end gage C. Said rock-shaft receives its motion by means of a crank *n′* on the end of the shaft, which crank is connected by a rod *o* to a lever *o′*, pivoted to the frame A, and oscillated by a rotary cam *u*, as shown in Fig. 2 of the drawings.

A magnet H, mounted on the bracket, has its armature H′ on a lever H″, which lifts the arm to relieve the paper from the pressure of the roller when the armature is attracted by the magnet.

The gravitating feeler *d* is carried on the end of a plate *p*, attached to the bracket, and the terminals *m m′* of the circuit-controller are connected, respectively, to the feeler and plate. The lower parts of these latter feelers *d* are provided with knuckle-joints *d′*, which are locked in one direction to prevent deflections of the feelers while riding upon the sheet during the forward draft of the latter by the rollers F. Said knuckle-joints are flexible in the opposite direction to allow the lower ends of said feelers to swing toward the folding-rollers R R and to be drawn out of the slits *c″ c″* by the paper being drawn into the bite of said rollers immediately after the drop-rollers F′ have been lifted out of contact with the paper by the magnets H. The feelers are subsequently lifted to allow the next sheet to be fed under them, which lifting is effected by the toes *h* of the rock-shafts *h′* pressing down the heels G′ of the arms G. In this case, however, I make the plate *p* adjustable longitudinally, preferably by forming it of two parts and providing one of said parts with a horizontal slot *s* for the reception of the screws *t*, which fasten the two parts together, as represented by dotted lines in Fig. 4 of the drawings. Said slot is of sufficient length to allow the outer part or free end portion of the plate to be set back or forward, as may be required, to allow the feeler *d* to enter the slit *c″* in the paper during the longitudinal movement imparted to said paper by the rollers F F′.

The roller F is fastened to a rotary shaft *n*, which extends across the machine and is elongated longitudinally or endwise sufficiently to retain a portion of its peripheral face under the roller F′ during the adjustment of the bracket O on the bar O′. The elongation of said roller is shown in Fig. 3 of the drawings.

Each of the described mechanisms M M′ is provided with a separate electric circuit to allow them to operate independently of each other, which is essential to the successful operation of the registering mechanism.

U U designate the batteries or generators of the three separate circuits.

The operation is as follows: As the sheet of paper passes from the feed-board to the end gage C the latter is held in its nearest position to the folding-rollers to arrest the longitudinal movement of the sheet, during which movement the drop-rollers F′ are elevated by the toes *h* of the rock-shafts *h′ h″* to allow the sheet to pass freely under the said rollers. As soon as the sheet is arrested by contact with the aforesaid end gage the toe

$h$ of the mechanism M releases the arm G, which then drops with its free end and causes the roller F′ to press the sheet down upon the subjacent rotary roller F, which by its frictional contact with the sheet draws said sheet laterally. The feeler or pin $d$ rides in the meantime upon the sheet until the slit $c'$ is brought under said feeler or pin, which then drops into said slit and thereby brings the terminals $m$ $m'$ in contact with each other. The circuit being thus closed causes the magnet H to be energized and attract the armature H′. This causes the armature-lever H″ to lift the free end of the arm G. The roller F′ is thereby raised from the paper and the latter is released from frictional contact with the revolving lower roller and the lateral movement of the paper ceases. The arm G at the same time lifts the feeler $d$ out of the slit $c'$. The end gage C then recedes from the paper and the toes $h$ of the rock-shaft $h''$ release the arms G of the mechanisms M′, and thereby allow the rollers F′ to press the sheet into frictional contact with the subjacent rotary rollers F, which draw the sheet longitudinally forward until the feelers $d$ drop into the slits $c''$ $c''$ of the sheet, whereby the circuits are closed and the arms G, with the rollers F′, are raised by the attraction of the armatures of the magnets. This arrests the longitudinal movement of the sheet and lifts the feelers $d$ out of the slits $c''$ $c''$. The paper is then free to be passed between the folding-rollers. Inasmuch as each of the latter mechanisms M′ operate independent of each other and engage the sheet at opposite sides of the center of its length, it is obvious that in case the sheet is fed awry to the machine one of the mechanisms M′ can continue to shift the paper to bring its feeler $d$ into one of the slits $c''$ after the other mechanism has been made to release the paper by its feeler entering the slit, and consequently the paper is perfectly registered.

What I claim is—

1. In combination with the paper-folding rollers and sheet-conveying tapes, an end gage arresting the movement of the sheet conveyed by said tapes and receding from said arrested sheet, registering mechanism shifting the arrested sheet laterally and two independently-operating registering mechanisms moving said sheet longitudinally at different points in the width thereof whereby the sheet is registered perfectly in relation to the folding-rollers as set forth.

2. In an electrically-controlled paper-registering machine designed to receive the sheets perforated at different points in the width thereof, the combination of a gage for arresting the longitudinal movement of the sheet, a plurality of independently-operating mechanisms engaging the sheet at different points in its width and shifting the arrested sheet longitudinally, electromagnets controlling the action of said mechanisms, separate circuits for said magnets, vertically-movable mechanical feelers riding on the sheet during the longitudinal shifting thereof and in the paths of the perforations in the sheet, and circuit-controllers operated by said feelers entering said perforations as set forth.

3. An electrically-controlled paper-registering machine comprising an end gage arresting the longitudinal movement of the sheet and movable to recede from the arrested sheet, a plurality of independently-operating mechanisms shifting the arrested sheet longitudinally at different points in its width, mechanical feelers riding on the sheet during the shifting thereof and in the paths of perforations in said sheet, and adjustable longitudinally in relation to the line of travel of the sheet, electromagnets controlling the sheet-shifting mechanisms, separate circuits for said magnets, and circuit-controllers operated by the aforesaid feelers entering the perforations in the sheet as set forth.

4. In an electrically-controlled paper-registering machine, the combination of a gage arresting the longitudinal movement of the sheet, a plurality of independently-operating mechanisms shifting the arrested sheet longitudinally at different points of its width and adjustable laterally in relation to the sheet, vertically-movable feelers riding on the shifting sheet and adjustable longitudinally in relation to the sheet, electromagnets controlling the action of said sheet-shifting mechanisms, separate circuits for said magnets, and circuit-controllers operated by the aforesaid feelers entering perforations in the sheet as set forth.

5. In combination with the main frame and paper-conveyers, a horizontal guide extending from the frame, a bracket mounted longitudinally adjustable on said guide, and paper-shifting mechanism, electromagnets controlling said mechanism and a vertically-movable feeler controlling the action of the magnets all carried on said bracket as set forth.

6. In combination with the sheet-conveyers, an end gage movable parallel to the line of travel of the paper, mechanism shifting the sheet laterally, independently-operating mechanisms shifting the arrested sheet longitudinally at different points of its width, vertically-movable feelers riding on the sheet during the longitudinal shifting thereof and in the paths of perforations or slits in the sheet, electromagnets controlling the longitudinal sheet-shifting mechanisms, separate circuits for said magnets, and circuit-controllers actuated by the aforesaid feelers entering the perforations or slits in the sheet as set forth.

7. A paper-registering machine consisting of a mechanism drawing the sheet laterally, two independently-operating mechanisms shifting the paper longitudinally at different points in its width, magnets controlling the actions of said mechanisms, a separate electric circuit for each of said magnets, a vertically-movable feeler for each of the aforesaid mech-

anisms, and circuit-controllers operated separately by the aforesaid feelers entering slits or perforations in the paper as set forth.

8. In combination with the sheet-conveyers, an end gage movable to recede from the arrested sheet, mechanism supported laterally adjustable in relation to said conveyers and drawing the sheet laterally, two independently-operating mechanisms supported also laterally adjustable in relation to the sheet-conveyers and shifting the arrested sheet longitudinally at different points in its width, magnets controlling the actions of said mechanisms, a separate electric circuit for each of said magnets, a vertically-movable feeler for each of the aforesaid mechanisms, and circuit-controllers operated separately by the feelers entering slits or perforations in the sheet as set forth.

9. In combination with the sheet-conveyers, paper-shifting roller under the conveyers, bracket over the same, arm hinged to said bracket, roller pivoted to said arm, an electric circuit, a magnet in said circuit mounted on the bracket, and armature lifting the arm by energy of the magnet, a vertical guide supported on the bracket, a vertically-movable pin sliding in said guide, a stop on the pin resting on the aforesaid arm to lift the pin simultaneously with the arm, and electric terminals carried respectively by the pin and by the bracket substantially as set forth.

10. In combination with the main frame, sheet-conveyers and end gage, a bar extending across the machine and rigidly secured to the main frame, brackets mounted longitudinally movable on said bar and provided with screw-threaded orifices axially parallel with the bar, adjusting-screws extending through said orifices and journaled in the sides of the main frame, and mechanisms connected to the brackets and provided with means for shifting the paper longitudinally and with feelers in the paths of the slits in the paper, electromagnets controlling said paper-shifters, and circuit-controllers operated by the feelers as set forth.

11. In combination with the main frame, sheet-conveyers and end gage, a bar extending across the machine and rigidly secured to the main frame, brackets mounted longitudinally adjustable on said bar, mechanisms connected to the brackets and provided with rollers pressing intermittently on top of the sheet, a rotary shaft under said rollers and axially parallel therewith, and paper-shifting rollers attached to said shaft and elongated endwise to remain in coöperative positions under the aforesaid pressing-rollers during the adjustment of the brackets on their supporting cross-bar as set forth.

12. In combination with mechanism shifting the paper in one direction, the feeler *d* provided with the knuckle-joint *d'* locked in said direction and flexible in the opposite direction as set forth.

In testimony whereof I have hereunto signed my name this 29th day of August, 1894.

TALBOT C. DEXTER. [L. S.]

Witnesses:
TOWNSEND JONES,
DE WITT C. WELD, JR.