(No Model.) 4 Sheets—Sheet 1.

F. MEISEL.

FEEDING, CUTTING, AND PRINTING MACHINE.

No. 580,985. Patented Apr. 20, 1897.

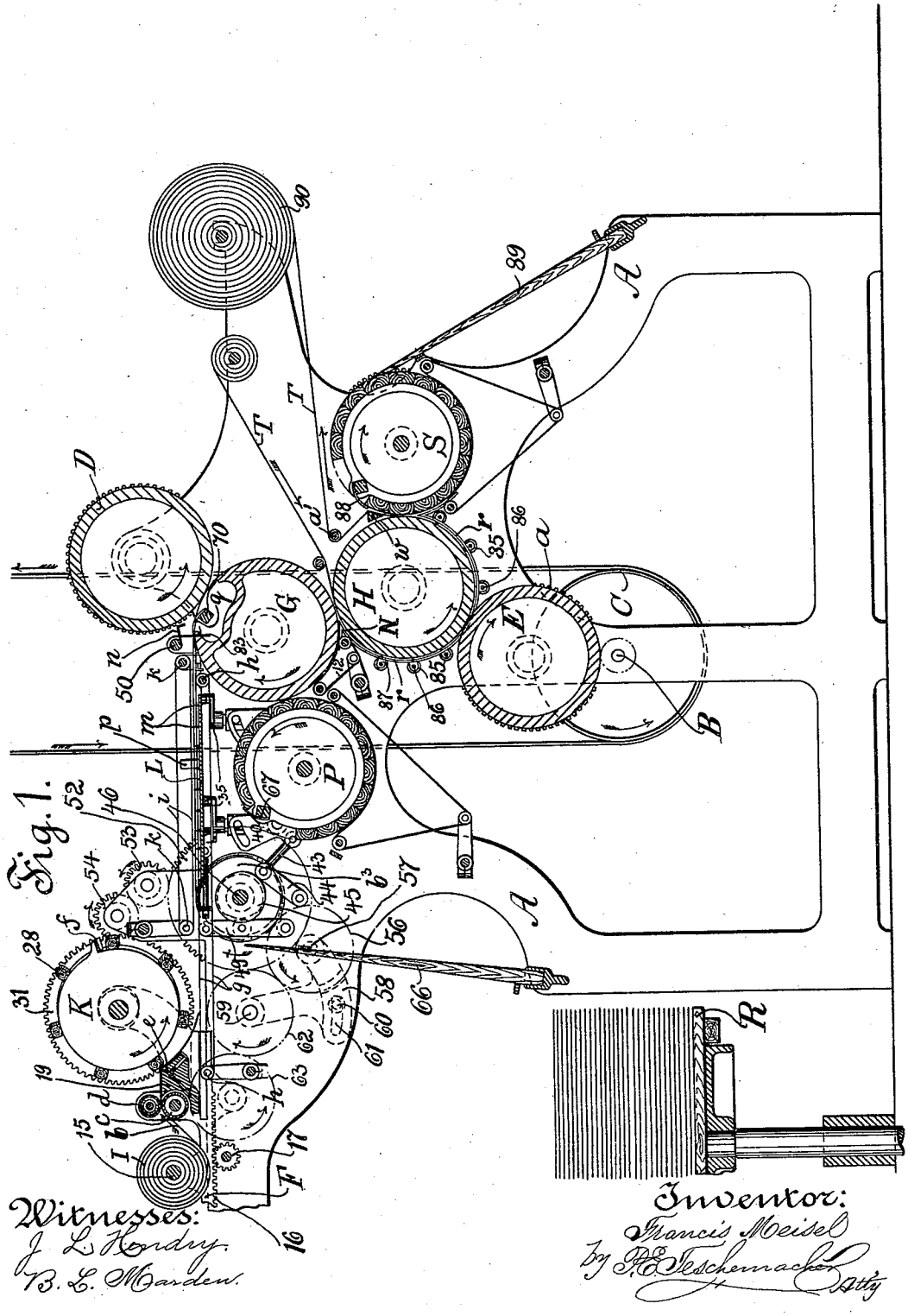

Fig. 1.

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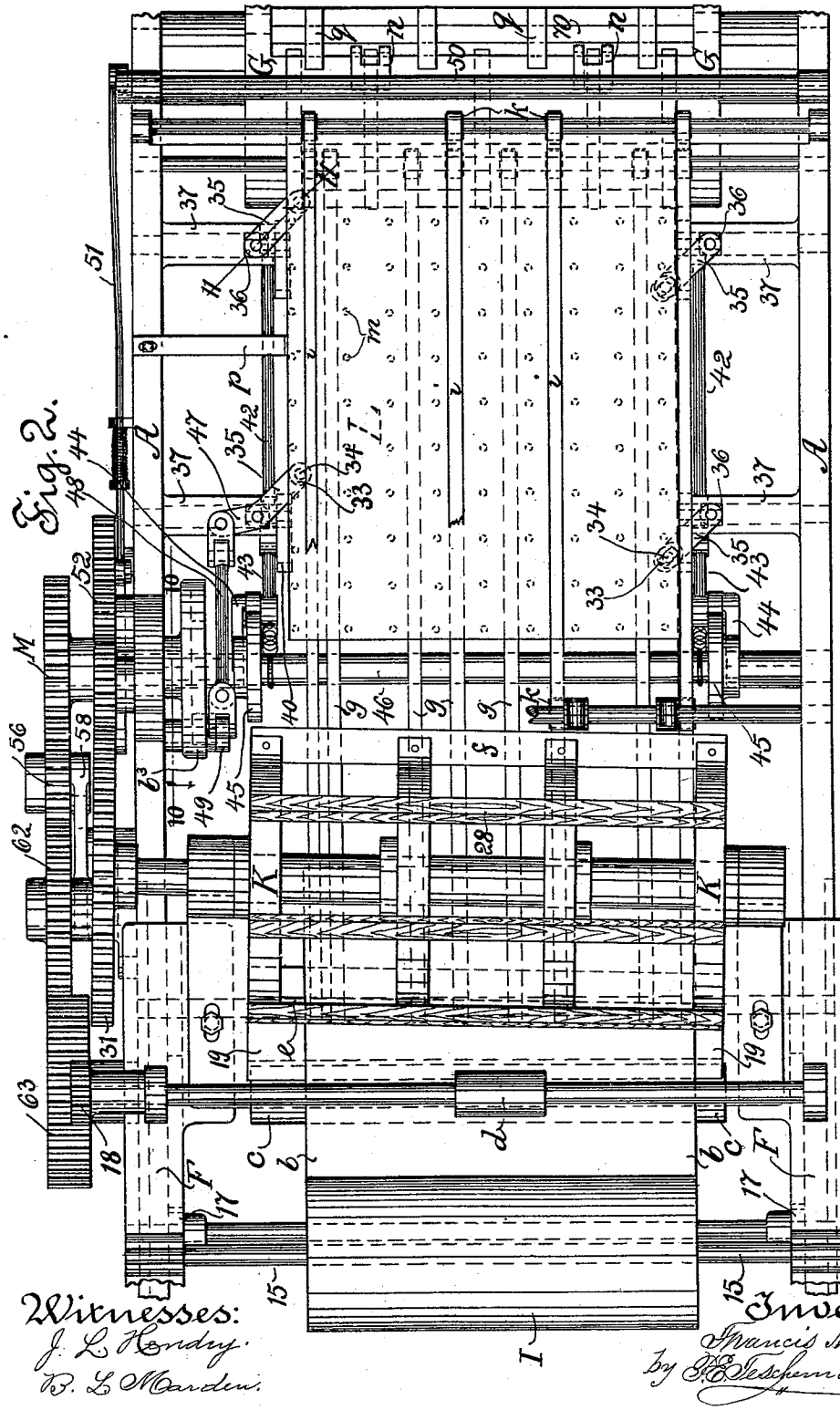
(No Model.) 4 Sheets—Sheet 2.

F. MEISEL.

FEEDING, CUTTING, AND PRINTING MACHINE.

No. 580,985. Patented Apr. 20, 1897.

Fig. 2.



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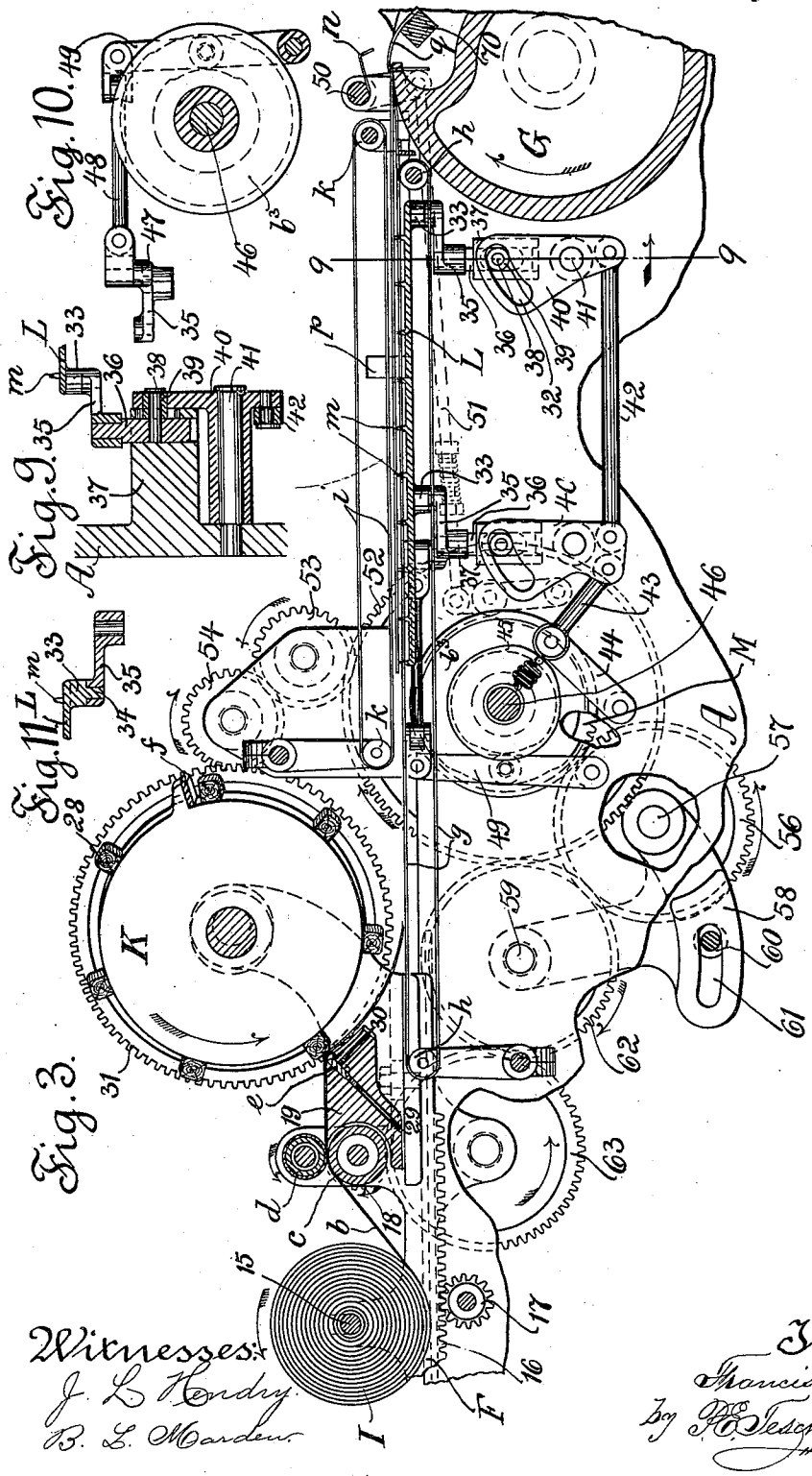
(No Model.) 4 Sheets—Sheet 3.

F. MEISEL.

FEEDING, CUTTING, AND PRINTING MACHINE.

No. 580,985. Patented Apr. 20, 1897.



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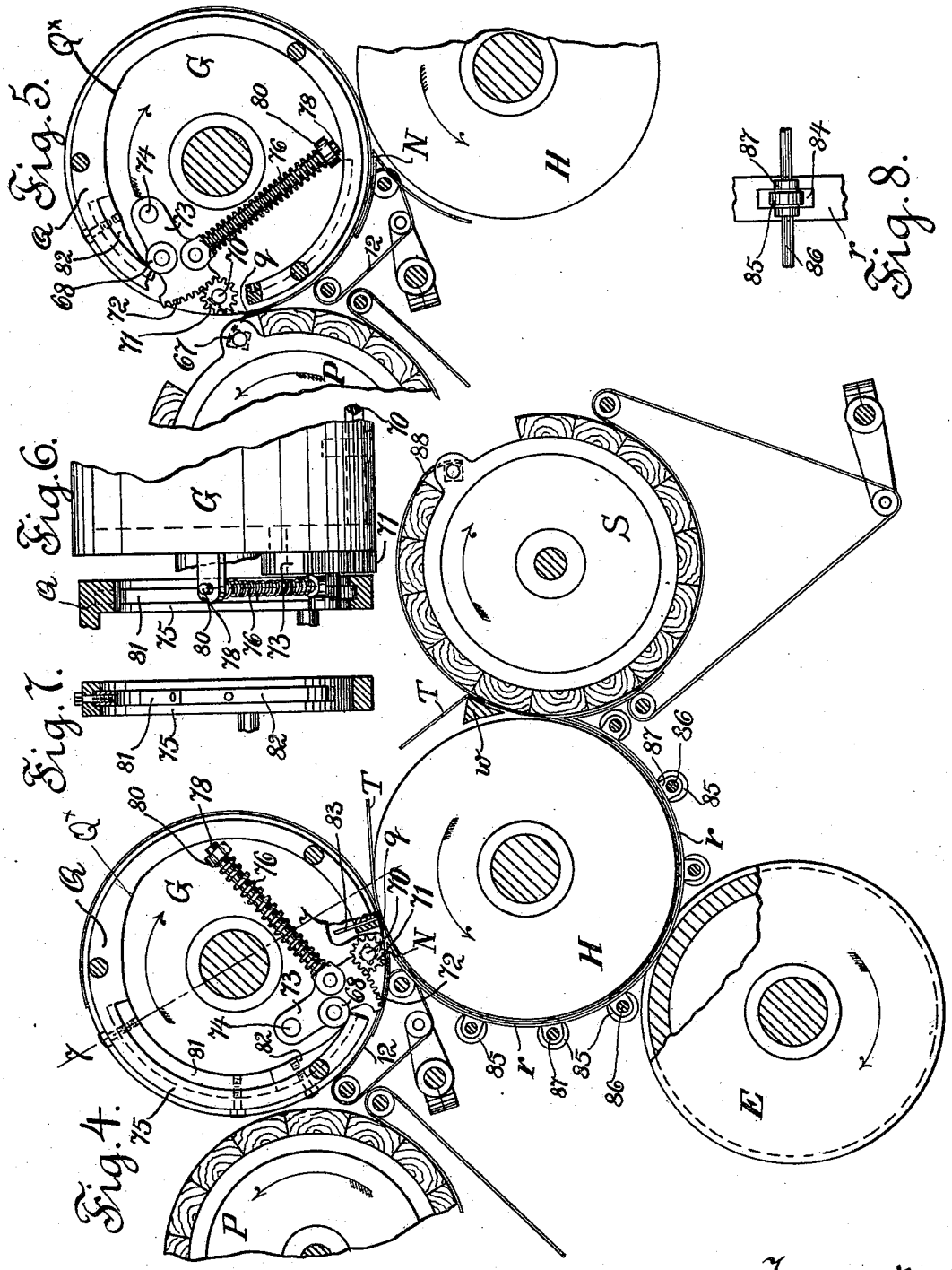
(No Model.) 4 Sheets—Sheet 4.

F. MEISEL.

FEEDING, CUTTING, AND PRINTING MACHINE.

No. 580,985. Patented Apr. 20, 1897.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

FRANCIS MEISEL, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE KIDDER PRESS MANUFACTURING COMPANY, OF SAME PLACE.

FEEDING, CUTTING, AND PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 580,985, dated April 20, 1897.

Application filed May 15, 1896. Serial No. 591,680. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS MEISEL, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Feeding, Cutting, and Printing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a vertical section through the center of a printing-machine embodying my improvements. Fig. 2 is an enlarged plan of a portion of the same. Fig. 3 is an enlarged central vertical section of that portion of the machine shown in Fig. 2. Fig. 4 is an enlarged detail showing the ends of a portion of the cylinders shown at the right-hand end of Fig. 1. Fig. 5 is a detail of a portion of the cylinders shown in Fig. 4 with the parts in a different position. Fig. 6 is an elevation of one end of the first impression-cylinder, showing the stationary gripper-cam and the annular support to which it is secured. Fig. 7 is a vertical section of the gripper-cam and its annular support, taken on the line 7 7 of Fig. 4. Fig. 8 is a detail showing a portion of one of the sheet-guides and one of the friction-rolls with which it is provided. Fig. 9 is a sectional detail on the line 9 9 of Fig. 3, looking in the direction of the arrow. Fig. 10 is a sectional detail on the line 10 10 of Fig. 2, looking in the direction of the arrow. Fig. 11 is a sectional detail on the line 11 11 of Fig. 2.

My invention has for its object to provide a printing-machine in which the web may be cut into sheets of various lengths and automatically placed against front and side gages, so that the imprint will be produced in the same position on each sheet, whereby if it should be necessary to again feed in the sheet by hand for additional imprints perfect register will be produced.

To this end my invention consists in certain novel features, combinations of parts, and details of construction, as will be hereinafter fully set forth, and specifically pointed out in the claims.

In the said drawings, A represents the framework of the machine, in suitable bearings in which runs the driving-shaft B, carrying at one end, outside the framework, a driving-pulley C, Fig. 1, and a pinion, shown dotted, which meshes with the gear *a* on the shaft of one of the plate-cylinders, from which gear *a* motion is communicated through the medium of suitable gears to various other cylinders, rolls, and moving parts of the machine, to be hereinafter described.

D represents the first or upper form-cylinder, and E the second or perfecting form-cylinder, to which the type forms or plates are secured in the usual manner, and G represents the first impression-cylinder, which coöperates with the cylinder D, and H represents the second or perfecting impression-cylinder, which coöperates with the cylinder E, as shown in Fig. 1.

The web *b* of paper to be cut into sheets is drawn from a roll I, which is mounted on a shaft 15, the journals of which rest in suitable bearings in a carriage F, sliding on horizontal ways at the end of the framework and operated by a rack and pinion 16 17, as shown in Figs. 1 and 3, said web *b* being unwound from the roll by a pair of feed-rolls *c d*, the shaft of the roll *c* carrying a gear 18, which is driven by a train of intermediate gears receiving motion from the driving-shaft.

e is a stationary cutter-blade or knife inclined at an angle, as shown in Figs. 1 and 2, said cutter-blade being made adjustable in a stock or support 19, secured to the carriage F by means of screws 29 and 30, and *f* is a rotary cutter-blade coöperating with the stationary blade *e* and secured to a cylinder K, the axis of which is parallel with the edge of the stationary cutter-blade *e*. The shafts of the feed-rolls *c d* and cylinder K run in bearings in supports rising from the carriage F, as shown in Figs. 1 and 3. In order to produce a shearing cut, the rotary cutter-blade *f* is inclined to the axis of the cylinder K, and the inclination of both of the cutter-blades, as described, causes the web of paper while in motion to be cut at right angles to the direction of its length. The cylinder K is also provided with longitudinal lags 28, arranged around its circumference, said cylinder being rotated by a gear 31

on its shaft meshing with and being driven by one of a train of gears connected with the driving-shaft.

As the web of paper is drawn into the machine by the feed-rolls *c d* it passes between the stationary cutter-blade *e* and the rotating cylinder K, the lags 28 of which, by their frictional or rubbing contact with the paper, serve to carry it forward and deposit it upon the lower tapes *g*, which run over pulleys *h* at the same surface speed as the impression-cylinder and coöperate with the upper tapes *i*, running over pulleys *k*, and as soon as the sheet is severed from the web by the cutters it is carried forward between said tapes *g i* over a table L, which is provided with a series of upwardly-projecting pins or projections *m* and is made movable vertically and also in a forward and lateral direction by mechanism to be presently described. As soon as the sheet has been carried into a position over the table L and just before it reaches the front gages *n* the said table is slightly raised, which causes its pins *m* to lift the sheet clear of the lower tapes *g*, as shown clearly in Fig. 3, but not sufficiently high to come into contact with the upper tapes *i*, which merely prevent the sheet from being raised by the air, immediately after which the table is moved forward and simultaneously swung to one side, the said combined forward and lateral movements of the table causing the sheet supported on the pins *m* to be brought with absolute certainty squarely and evenly against the front and side gages *n p* before it is seized by the grippers *q* of the first impression-cylinder G, whereby if the sheet should be afterward fed in by hand to the same or another machine for a second impression on the same or upon the opposite side perfect register would be insured, which would not be the case if the tapes were relied upon to bring the sheet up to the gages.

The mechanism by which the various movements are given to the table L will now be described, reference being had particularly to Figs. 3, 9, 10, and 11. Near each of the four corners of the table L, on the under side, is a boss or projection 33, provided with a vertical stud 34, Fig. 11, which enters a hole in a link 35, which is pivoted to swing on the upper end of a short bar 36, which is fitted to slide vertically in a bearing in a lug 37, projecting from the inside of the framework. The supporting-bar 36 is provided with a pin 38, which projects out therefrom through a slot in the lug 37 and carries at its outer end an antifriction-roll 39, fitting within a cam-slot 32 in a lever 40, fulcrumed at 41, the two levers on the same side of the table being connected by a rod 42, and one of said levers having pivoted to it a short rod 43, jointed to a link 44, pivoted to the framework, and on the pin which connects the rod 43 with the link 44 is a cam-roll which is acted upon by a cam 45 on a shaft 46, connected by gears with the driving-shaft, whereby as said cam 45 is rotated the levers 40 are rocked to raise and lower the table L at the proper times. The two levers 40 on the opposite side of the table L are actuated by similar mechanism receiving motion from another cam 45 at the opposite end of the shaft 46, as shown in Fig. 2. To an arm 47, projecting outward from one of the links 35, as shown in Fig. 2, is jointed a rod 48, which is pivoted at its opposite end to a lever 49, carrying a cam-roll which is acted upon by a grooved cam b^3, secured to the shaft 46, whereby as soon as the table L has been slightly raised to lift the sheet off the tapes *g* it is swung in a horizontal plane on its four pivoted links 35, which gives it a forward and lateral movement, thus bringing the sheet resting on the pins *m* squarely and evenly against both of the front gages *n n* and the adjustable side gage *p*, as before described, the table being returned to its normal position after the sheet has been seized and carried forward by the cylinder-grippers *q*, which are opened and closed by mechanism hereinafter described. The front gages *n* are mounted, as usual, upon a rock-shaft 50, which is actuated to lift the gages at the proper time by a rod 51, operated by suitable cam and lever connections. (Shown dotted in Fig. 3.)

The length of the sheet severed from the web by the cutters can be varied by changing the surface velocity of the feed-rolls with relation to that of the rotary cutter-cylinder K. This is effected by the employment of a change-wheel M, Figs. 2 and 3, which is removably secured to the shaft 46, which also carries a gear 52, which gives motion through two intermediate gears 53 54 to the gear 31 on the shaft of the cutter-cylinder K.

The change-wheel M meshes with an intermediate gear 56, rotating on a stud 57, mounted upon a supporting-arm 58, swinging on a shaft 59 and held in place when adjusted by a clamping-screw 60, passing through a slot 61, said gear 56 transmitting motion through intermediate gears 62 63 to the gear 18 on the shaft of the lower feed-roll *b*, and thus by removing the change-wheel M and substituting another having a different number of teeth the speed of the feed-rolls with relation to that of the cutter-cylinder can be varied, as desired, to change the length of the sheet cut from the web.

As soon as the sheet is seized by the grippers *q* of the first impression-cylinder G, said grippers having been opened and closed for this purpose by mechanism hereinafter described, it is carried between the cylinder G and the first form-cylinder D, receiving an impression therefrom, after which, if it is not to receive a second or perfecting impression on the opposite side, it is carried around past a wedge-shaped guide N and between tapes 12 and the cylinder G to the first accumulating-cylinder P, which is provided with a fly 66, which deposits the sheets upon a table R, Fig. 1, the grippers *q* being operated to release the sheet at the instant that it is seized by the grippers 67, Fig. 5, of the accumlating-cylin-

der P. The guide N is formed by the angular points of a series of bands *r*, which partially encircle the cylinder H and are secured to suitable supports. (Not shown.)

The cylinder P, which accumulates a certain predetermined number of sheets to be removed by a single operation of the fly 66, is of the ordinary well-known construction, which forms no part of my present invention and will not be further described.

The grippers *q* of the first impression-cylinder G are mounted on a rock-shaft 70, to one end of which is secured a pinion 71, which meshes with a sector-gear 72 at the end of a lever 73, pivoted at 74, Figs. 4 and 5, to the end of the cylinder G, said lever carrying a roll 68, which is acted upon by a cam Q, having two removable portions secured to a stationary ring-shaped support 75, attached to the frame A and located opposite and close to the end of the cylinder G, as shown in Fig. 6. As the cylinder G revolves the roll 68 is brought into contact with the cam Q, thereby moving the lever 73 to open the grippers to receive the sheets against the resistance of a spiral spring 76, encircling a rod 78, which is pivoted to the lever 73, its opposite end passing through a guide lug or projection 80, said spring serving to close the grippers on the sheets as they are fed against the front gages *n* by reason of the roll 68 passing out of contact with the cam Q at about the point $Q^{\times}$, Figs. 4 and 5. When the sheet is to be carried around by the cylinder G and delivered to the accumulating-cylinder P, the central portion 81 of the cam Q is removed and the inclined portion 82 moved into the position shown in Fig. 5, so that the roll 68 will not come into contact with the cam until the end of the sheet is in a position to be seized by the grippers 67 of the accumulating-cylinder P, but when the machine is to be used as a perfecting-press and it is desired to have the sheet pass under the guide N and around between the second or perfecting pair of cylinders E H the entire length of the cam Q is used, as shown in Fig. 4, which causes the roll 68 to be brought into contact with the point of the cam Q to open the grippers *q* just before the sheet reaches the angular points of the bands *r*, which form the guide N, the front or leading end of the sheet being then pushed out from the surface of the cylinder G to cause it to pass under the guide N by an outward thrust of a series of pins 83, Fig. 4, commonly called "shoo-fly" pins, which are operated in a well-known manner by mechanism not shown. These shoo-fly pins are intended to be thrown out of action when the sheet is not to be delivered to the perfecting impression-cylinder H. The grippers *q* can thus be arranged to open at different points by changing the cam Q so that the sheet can be released at the proper place to allow it to be seized by the grippers of the first accumulating-cylinder P when a sheet is to be printed on one side only, or so that the sheet can be released at a different place when the paper is to be printed upon both sides.

The guide-bands *r*, which lie close to the cylinder H, leaving a space for the passage of the sheet, are arranged to come opposite to the margins or spaces between the several printed forms, and each of these bands is provided with a series of apertures 84, as shown in Fig. 8, through each of which projects a guide-roll 85. The guide-rolls 85 are secured to shafts 86, extending across the machine parallel with the axis of the cylinder H and supported in bearings in lugs 87, projecting from the bands *r*, each shaft carrying at one end a small gear, (not shown,) which meshes with a large gear (not shown) inside the framework, whereby the rolls are rotated with the same surface velocity as the cylinder H and caused to carry the sheet by their friction thereon around said cylinder H to the plate-cylinder E, from which it receives a second impression upon the side opposite to that first printed, after which it is carried by the rolls 85 to the second accumulating-cylinder S, Fig. 1, similar to the cylinder P, first described, and provided with grippers 88, operated at the proper time to seize the sheet, said cylinder S being provided with a coöperative fly 89, which serves to remove the sheets after the required number have been collected on the cylinder and deposit them upon a suitable table similar to the table R. (Shown at the left-hand side of Fig. 1.)

The rolls 85 are employed to carry the sheet to the second plate-cylinder, and thence to the accumulating-cylinder S beyond for the reason that it is impossible to provide the second impression-cylinder H with grippers, as they would intefere with the offset-web T, which is operated in the usual manner by being unwound from one roll and simultaneously wound up on another, as shown in Fig. 1. The offset-web T passes over a transverse guide-bar *w*, Figs. 1 and 4, preferably of triangular shape in cross-section, as shown, and located between the accumulating-cylinder S and the perfecting impression-cylinder H, whereby a narrow throat is left for the passage of the web, which then passes from the upper right-hand edge of said bar *w* up around the guide *a'*, preferably of roller form, located above and to the left-hand side of the guide-bar *w*, whereby the direction in which the offset-web travels is abruptly changed at an angle to permit the sheet to be seized by the grippers 88, which are ready to seize it as soon as its front edge is brought above the upper edge of the guide-bar *w* at the point where the offset-web passes off at an angle to the guide *a'*, said web after leaving the guide *a'* passing directly to the roll 90, upon which it is wound up.

When it is desired to feed in by hand for a second impression on the opposite side sheets that have been previously printed on one side only, a board can be placed over the table L upon suitable supports, in which case the sliding carriage F, which supports the web, feed-

rolls, cutters, &c., is moved back out of the way, so as not to interfere with the operation of feeding in the sheets by hand.

It is obvious that any number of pairs of form and impression cylinders with grippers can be added between the first and last pairs of cylinders and that accumulating-cylinders can be attached to any or all of the pairs to take the sheet away from the impression-cylinder.

From the foregoing it will be seen that the above-described machine can be very advantageously used for very high-class work and also for that of a lower grade. For very fine work the sheets can be taken from the web and rapidly printed on one side only, as the machine can be run at a high speed, the sheets being afterward fed into the same or another machine by hand for a second or perfecting impression, while if ordinary work is required the machine can be used as a perfecting-press and also run at a high speed, advantages not combined in any one machine with which I am acquainted.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a sheet-feeding machine, the combination with front and side gages and mechanism for supporting and carrying the sheet toward the front gages, of a lifting device for raising the sheet clear of its supporting mechanism, said lifting device having a forward as well as a lateral movement, whereby the sheet is automatically placed against the front and side gages, substantially as described.

2. In a sheet-feeding machine, the combination with front and side gages and mechanism for supporting and carrying the sheet toward the front gages, of a sheet-lifting device having a compound forward and lateral movement, whereby the sheet is automatically lifted from its supporting mechanism and properly placed against the said front and side gages, substantially as described.

3. In a sheet feeding and cutting machine, the combination with mechanism for cutting the web into sheets and mechanism for supporting and carrying the sheets from the cutters toward the front gages, of a lifting device for raising the sheet clear of its supporting mechanism, said lifting device having a forward as well as a lateral movement, whereby the sheet is automatically placed against the front and side gages, substantially as described.

4. The combination, with the endless feed tapes or carriers and gage devices, of a vertically and horizontally movable lifting device to first lift the sheet from the tapes or carriers and then move it against the gage devices, and means for so operating said lifting device.

5. In a printing-machine, the combination with mechanism for feeding and cutting the paper and delivering it in sheets to the printing mechanism, of a support or table provided with pins or projections over which the sheets are carried before reaching said printing mechanism and the front gages, said table being movable upwardly to lift the sheet above its carrying mechanism, and forwardly and laterally to bring the sheet squarely and evenly into contact with the front and side gages to insure register, and means for imparting said upward, forward and lateral movements to the said lifting-table, substantially as set forth.

6. In a printing-machine, the combination with an impression-cylinder, feed-rolls, a cutter for severing the sheet from the web and means for carrying the paper from the cutter to said impression-cylinder, of a table or support arranged in front of said impression-cylinder and provided with pins or projections over which the sheets are carried before reaching the front gages, said table being movable upwardly to lift the sheet above its carrying mechanism, and forwardly and laterally to bring the sheets squarely and evenly into contact with the front and side gages to insure register, and means for imparting the said upward, forward and lateral movements to the table, substantially as set forth.

7. In a printing-machine, the combination with an impression-cylinder, feed-rolls, a rotary cutter for severing the sheet from the web and means for carrying the paper from the cutter to the impression-cylinder, of a table or support arranged in front of said impression-cylinder and provided with pins or projections over which the sheets are carried before reaching the front gages, said table being movable upwardly to lift the sheet above its carrying mechanism, and forwardly and laterally to bring the sheets squarely and evenly into contact with the front and side gages to insure register, and means for imparting the said upward, forward and lateral movements to the table, substantially as set forth.

8. In a printing-machine, the combination with an impression-cylinder, feed-rolls, coöperating rotary and stationary cutter-blades for severing the sheet from the web, and means, as tapes, for carrying the paper from the cutters toward the impression-cylinder, of a table provided with pins or projections over which the sheet is carried before reaching the front gages, said table being pivotally mounted upon links swinging on vertically-movable supports, means for raising and lowering said supports, whereby the table is raised to lift the sheet out of contact with its carrying mechanism, and means for swinging the table in a horizontal plane on its supporting-links, whereby it is simultaneously moved forwardly and laterally to bring the sheet into contact with the front and side gages, substantially as set forth.

9. In a rotary perfecting printing-machine in which the paper is taken from the roll, cut into sheets of the desired length and automatically fed to the printing mechanism, the combination with a series of pairs of form

and impression cylinders, the impression-cylinder of the first pair being provided with grippers, of two accumulating-cylinders, the grippers of the first impression-cylinder being provided with means, whereby the time of opening to release the sheet may be changed according as the sheet is to be delivered to the first accumulating-cylinder after receiving a single impression or passed to the perfecting impression and form cylinders and thence to the second accumulating-cylinder, substantially as set forth.

10. In a rotary web-perfecting printing-machine in which the paper is taken from the roll, cut into sheets of the desired length and automatically fed to the printing mechanism, the combination with two pairs of form and impression cylinders, the impression-cylinder of the first pair being provided with grippers actuated by a changeable mechanism whereby the time of opening to release the sheet may be changed, of two accumulating-cylinders provided with grippers and so located that the first accumulating-cylinder may take sheets after the first pair of form and impression cylinders only have printed upon them, and the second accumulating-cylinder may take the perfected sheets, frictional forwarding and guiding mechanism coacting with the second impression-cylinder to carry the sheet from the first impression-cylinder into a position to be seized by the grippers of the second accumulating-cylinder, and means whereby the leading edge of the sheet from the first impression-cylinder is caused to pass under the control of the frictional forwarding and guiding mechanism, substantially as set forth.

11. In a rotary perfecting printing-machine, in which the paper is taken from the roll, cut into sheets of the desired length and automatically fed to the printing mechanism, the combination with two pairs of form and impression cylinders, the impression-cylinder of the first pair being provided with grippers actuated by a changeable mechanism, whereby the time of opening to release the sheet may be changed, of two accumulating-cylinders provided with grippers, a wedge-shaped guide placed between the first and second impression-cylinders, guides extending partially around the second impression-cylinder to the second accumulating-cylinder, frictional guide-rolls mounted upon revolving shafts and adapted to carry the sheet after it is released by the grippers of the first impression-cylinder, into a position to be seized by the grippers of the second accumulating-cylinder, and means for pushing the leading edge of the sheet outward to enable it to pass beneath the guide and into contact with the revolving guide-rolls, substantially as set forth.

12. In a rotary perfecting printing-machine, the combination with an impression-cylinder for receiving sheets just printed upon that side which faces toward the surface of said impression-cylinder, of an offset-web running over the surface of the same, an accumulating or take-off cylinder provided with sheet-retaining devices, a guide placed in close proximity with said take-off cylinder, whereby the offset-web acts to direct the leading end of the sheet around the take-off cylinder, said offset-web abruptly changing its direction and thereby giving earlier opportunity, after the leading end of the sheet becomes free from the control of the impression-cylinder and offset-web, for the sheet-retaining devices to seize the sheet without fouling said impression-cylinder or offset-web, substantially as set forth.

13. In a rotary perfecting printing-machine, the combination with a perfecting impression-cylinder, of an offset-web running over the surface of the same, an accumulating or take-off cylinder provided with sheet-retaining devices, a guide placed in close proximity with said take-off cylinder, to leave a narrow throat for the passage of the offset-web and sheet, the direction of said web being changed at said guide to permit the sheet to be seized by the grippers of said take-off cylinder, substantially as set forth.

Witness my hand this 9th day of May, A. D. 1896.

FRANCIS MEISEL.

In presence of—
P. E. TESCHEMACHER,
A. R. ELLINGWOOD.