S. L. TUCKER.

PRINTING PRESS.

APPLICATION FILED JUNE 17, 1915.

1,286,153.

Patented Nov. 26, 1918.

5 SHEETS—SHEET 1.

Fig. 1.

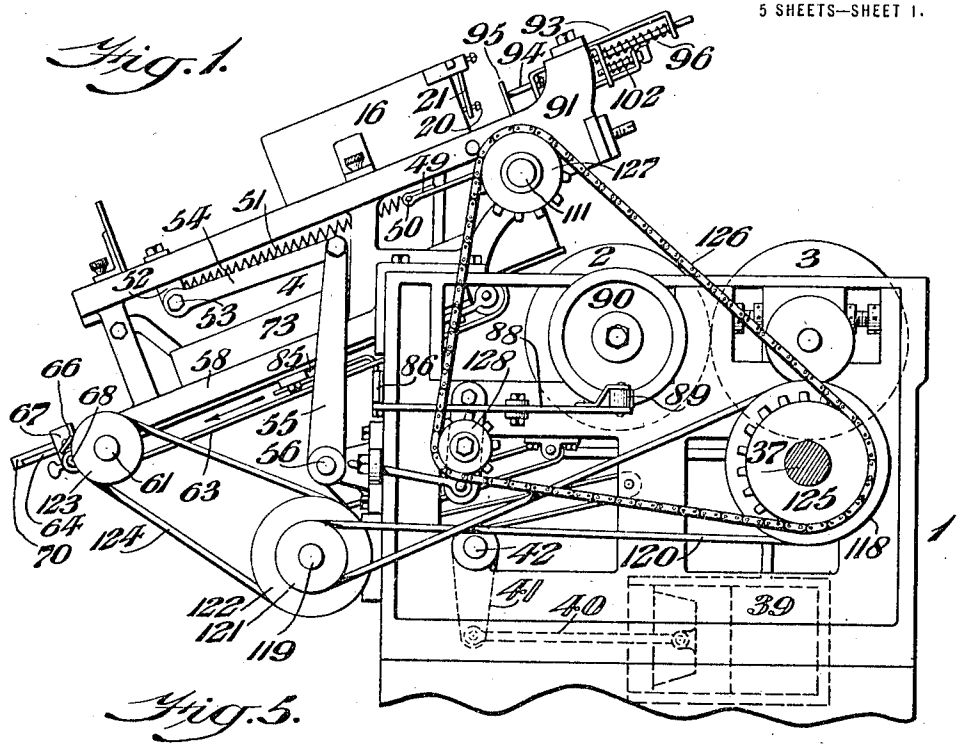
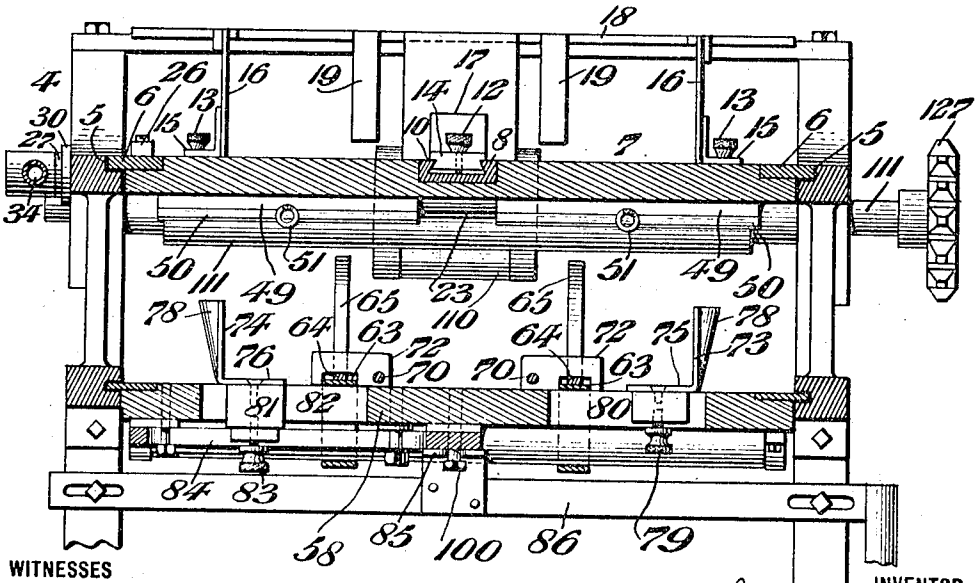


Fig. 5.



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5 SHEETS—SHEET 2.

Fig. 2.

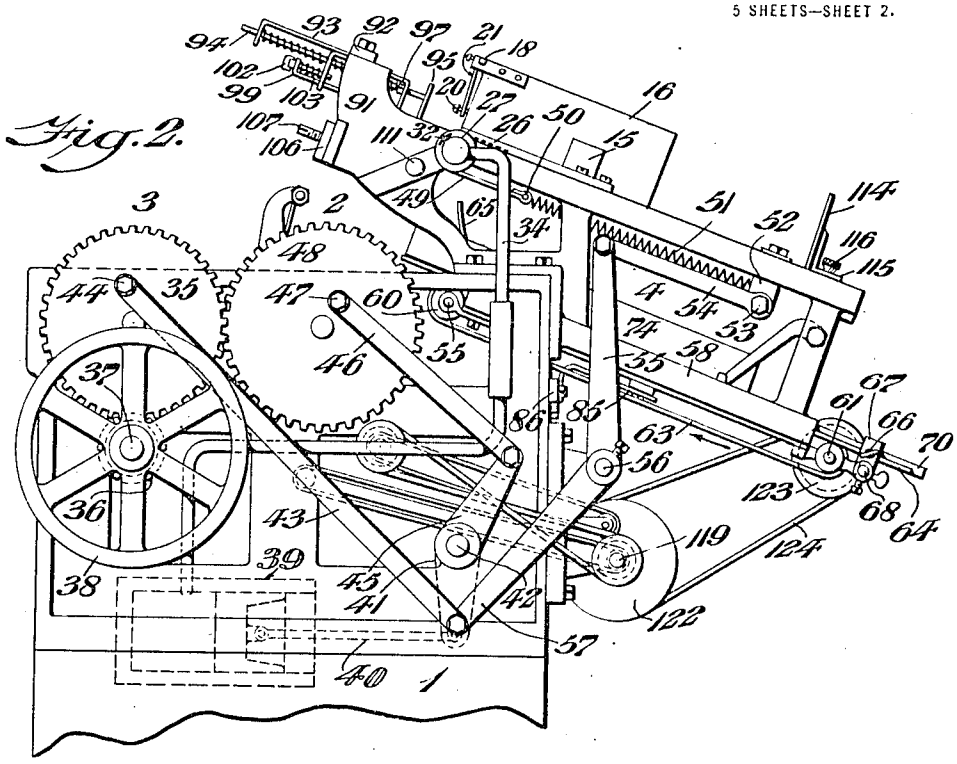


Fig. 6.

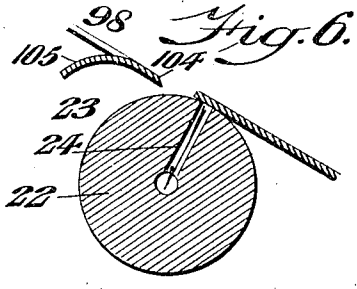


Fig. 7.

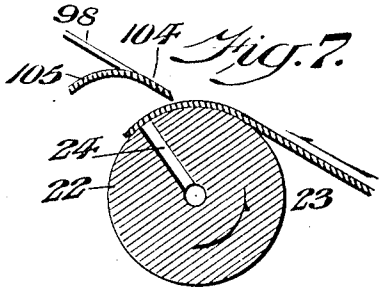


Fig. 8.

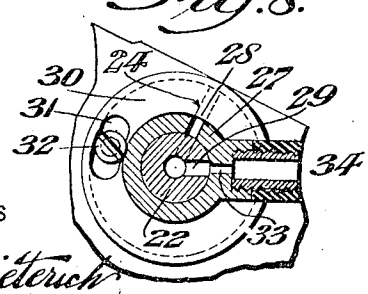
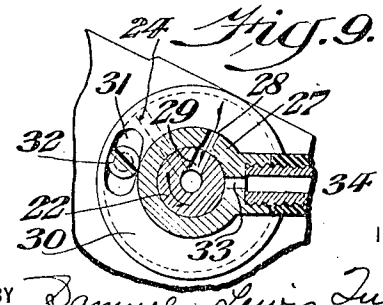


Fig. 9.



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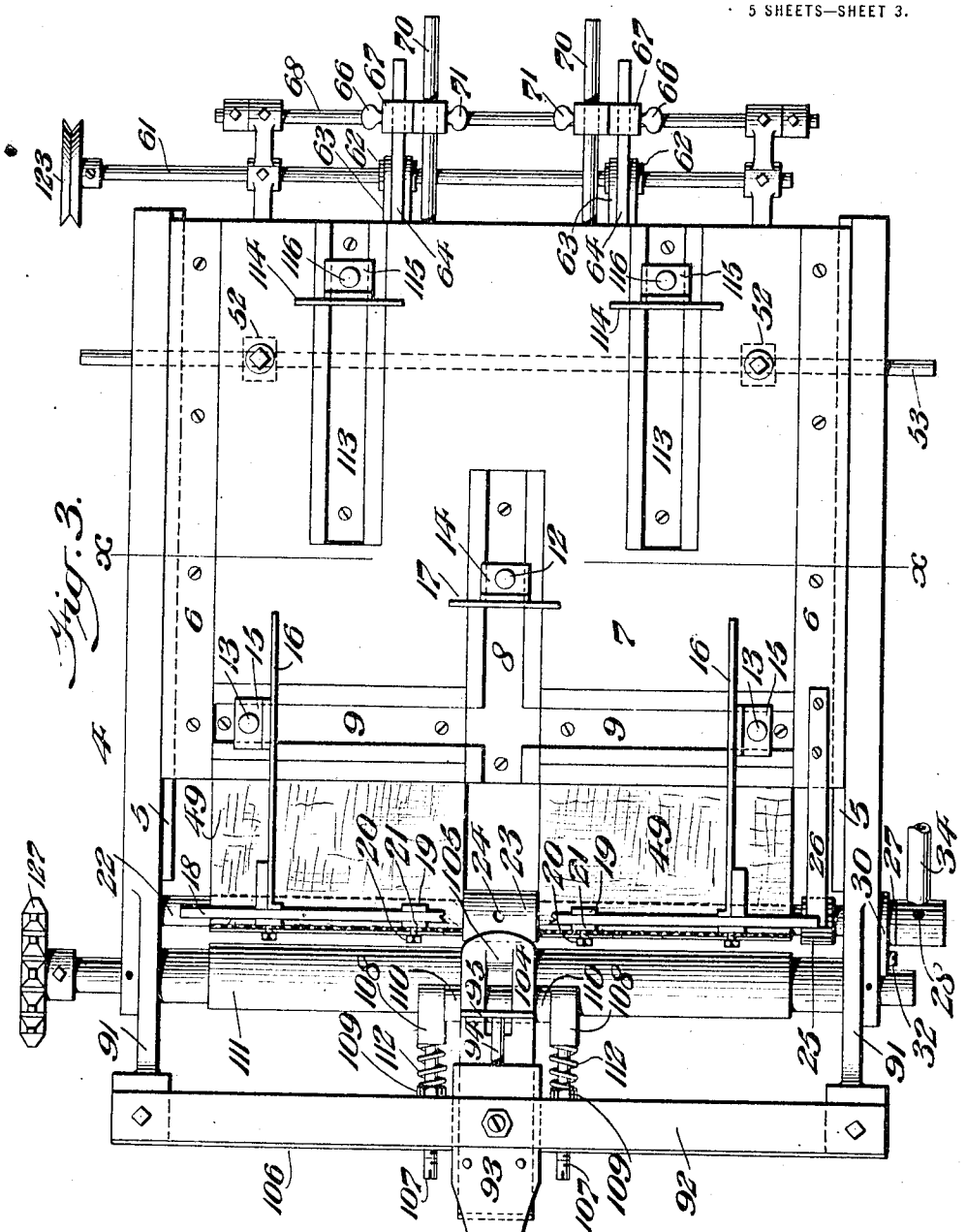
5 SHEETS—SHEET 3.

Fig. 3.



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5 SHEETS—SHEET 4.

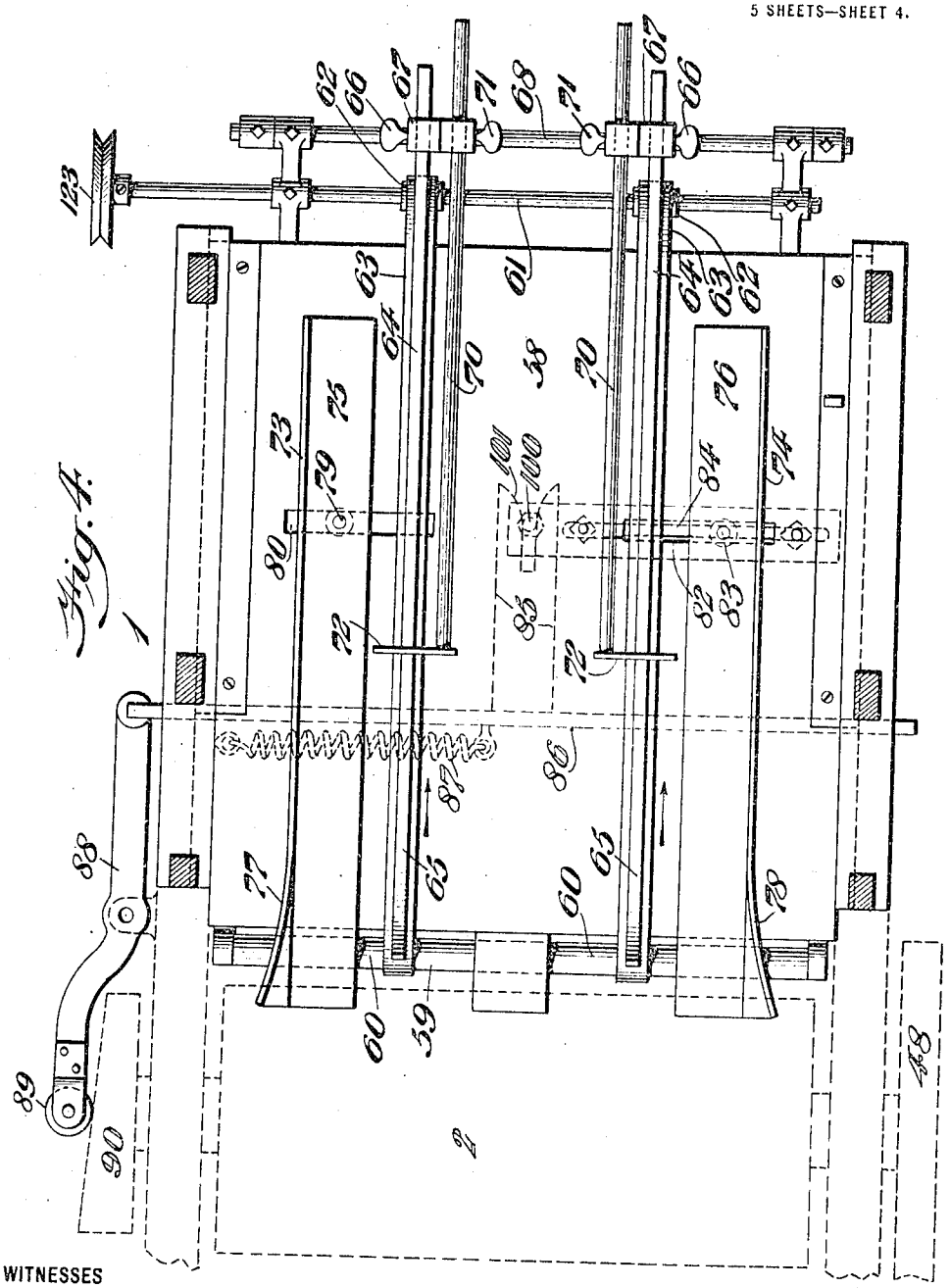

Fig. 4.

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5 SHEETS—SHEET 5.

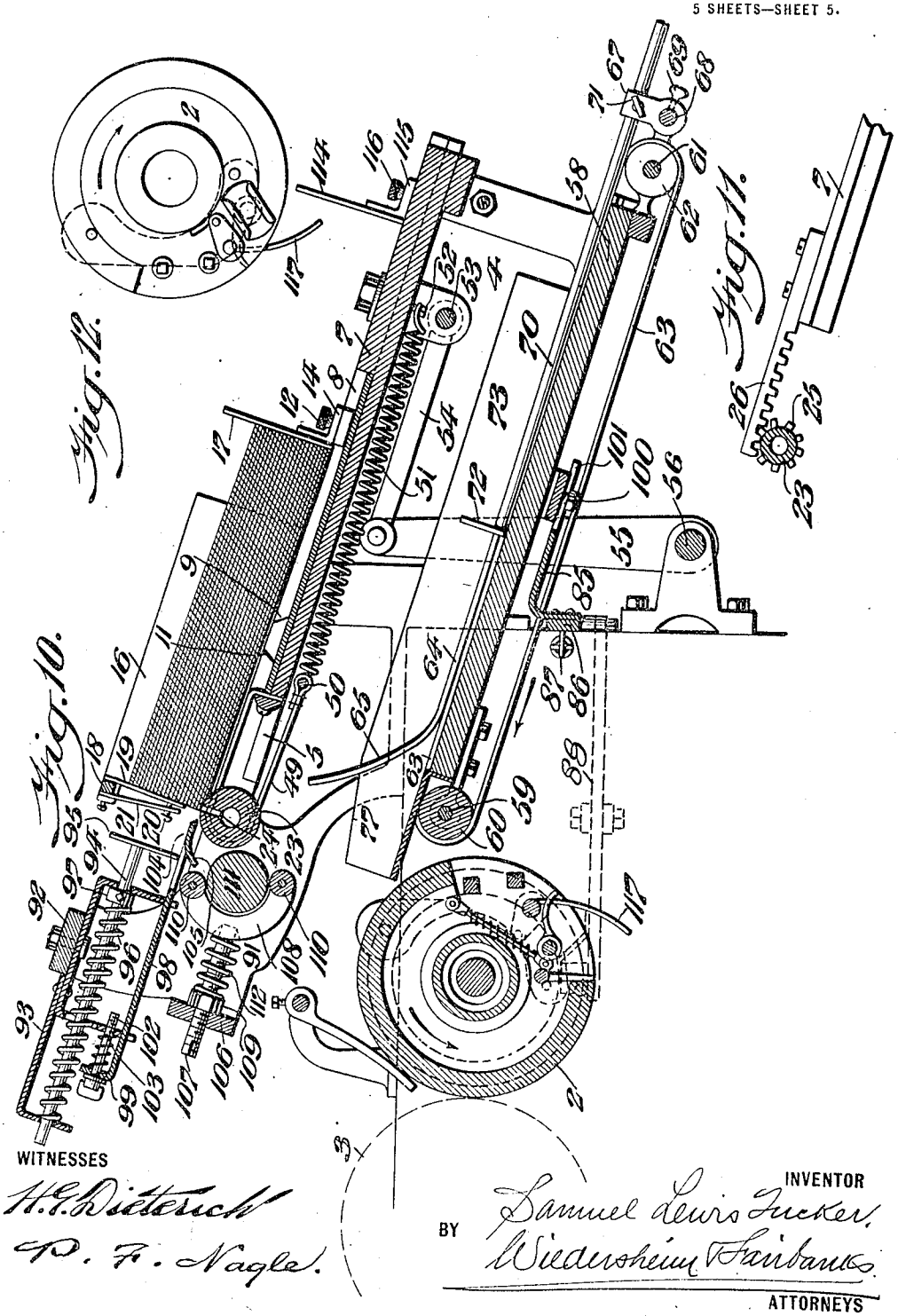

Fig. 12.

Fig. 11.

Fig. 10.

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UNITED STATES PATENT OFFICE.

SAMUEL LEWIS TUCKER, OF WOODBURY, NEW JERSEY, ASSIGNOR TO THE SPEED PRESS COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PRINTING-PRESS.

1,286,153. Specification of Letters Patent. **Patented Nov. 26, 1918.**

Application filed June 17, 1915. Serial No. 34,711.

To all whom it may concern:

Be it known that I, SAMUEL LEWIS TUCKER, a citizen of the United States, residing at Woodbury, in the county of Gloucester, State of New Jersey, have invented a new and useful Printing-Press, of which the following is a specification.

My invention consists of a feeding device for feeding sheets of paper to the press rollers of a printing press, in which such sheets are fed from a support to a feeder which receives the sheet from said support and adjusts such sheet and feeds it to the printing rollers.

It further consists of such device in which a sheet is fed by alternately moving it in opposite directions to cause the alternate strains upon the sheet to rectify displacement, buckling or other irregularities of the same in its passage through the device.

It further consists of means for presenting the sheet to the rollers in proper registering position.

It further consists of means for feeding the sheet to the printing rollers.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

The annexed drawings and the following description set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings—

Figure 1 represents a side elevation of as much of a printing press as will illustrate the application of my invention to the same.

Fig. 2 represents a view of the other side of such part of the press and of the feeding apparatus.

Fig. 3 represents a top plan view of the feeding device.

Fig. 4 represents a horizontal section of the same.

Fig. 5 represents a cross-section on the line *x*—*x* in Fig. 3.

Figs. 6 and 7 represent transverse sectional detail views through the middle of the suction roll in position of engaging the sheet and releasing it, respectively.

Figs. 8 and 9 represent transverse detail views of the suction control valve of said roll, respectively in suction and releasing position.

Fig. 10 represents a longitudinal section of the feeding device.

Fig. 11 represents a detail view of the driving mechanism for the suction roll.

Fig. 12 represents an end view of one of the printing rollers.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, the reference numeral 1 indicates the frame of the press, in which the impression cylinder, 2, and the type-cylinder, 3, are transversely journaled and can be constructed in any preferred form and suitably rotated from a power-source. An inclined bracket-frame, 4, is secured upon the upper corner of the press-frame with its raised end above the printing rollers, and has slide-ways, 5, in which bars, 6, upon the side-edges of a feed-table, 7, are inclinedly slidable. A longitudinal groove, 8, extends from the center of the discharge edge of said feed-table and a transverse guide-groove, 9, intersects such latter slot near said discharge edge. Said grooves have beveled or overhanging edges, 10 and 11, and set-screws, 12 and 13, are threaded through bevel-edged slides, 14 and 15, to bear against the bottoms of the grooves, carrying stop-plates, 16 and 17, for holding a stack of sheets of paper in position between them. The side stop-plates 16 project beyond the discharge edge of the feed-table and have a transverse bar, 18, connecting the plates at their upper corners and flat arms, 19, are adjustably secured to said bar to project down from said bar to close the end of the support for the stack or pile of paper sheets upon the feed-table. Said flat arms are yielding and have the ends of thumb-screws, 20, bearing against their outer sides near their ends and threaded through rigid tongues, 21, adjustably secured at their upper ends to the transverse bar, 18, so that the spring arms may bear with greater or less resistance against the pile of sheets of paper. A tubular shaft, 22, is journaled transversely in the bracket-frame and has a suction-roll, 23, upon its middle and formed with a radial port, 24, through its periphery and into its axial bore. A pinion, 25, is secured upon the tubular shaft and is engaged by a cogged rack, 26, secured upon the sliding feed-table. A bearing, 27, is secured upon the frame and has one end of the rocking tubular shaft jour-

naled in its and has a port, 28, open to the atmosphere and registering with a radial port, 29, in the shaft and communicates with the axial bore in the same. The bearing has a base-disk, 30, bearing against the side of the inclined frame and has an arcuate slot, 31, through which passes an adjusting screw, 32, into the face of the frame, by means of which the relative positions of the ports may be adjusted. A suction port, 33, is formed in the bearing and can register with the radial port of the shaft, and a tube, 34, leading from the suction end of an air-pump, 39, is connected to said port. The type-cylinder 3 has a gear, 35, upon its shaft, which meshes with a pinion, 36, upon a shaft, 37, journaled in the main frame and carrying a pulley, 38, or other gear to which power is applied from a suitable power-source. The piston-rod, 40, of the suction-pump is pivoted to the lower end of an arm, 41, upon a rock-shaft, 42, in the press-frame, and an arm, 45, is secured upon this shaft and is connected by a connecting rod, 46, to a wrist-pin, 47, upon the face of a gear-wheel, 48, upon the shaft of the impression cylinder meshing with the gear on the shaft of the printing cylinder.

The suction-shaft has two belts, 49, passing around it, one at each end of the suction-roll and extending to near the side bars 6 of the feed-table. One end of each of said belts is secured to the discharge-edge of the feed-table and is then passed around the suction-shaft and secured to transverse rods, 50, having the ends of coiled springs, 51, secured to them and at their other ends to the underside of the feed-table. A transverse rod, 53, is secured in lugs 52 and has connecting links, 54, pivotally connected to its ends and to arms, 55, projecting from a rock-shaft, 56, journaled transversely upon the main frame of the press and having a radial arm, 57, connected to one end of a connecting rod, 43, pivoted at its other end upon a wrist-pin, 44, upon the face of the gear-wheel, 35, upon the type-cylinder 3.

A registering table, 58, is rigidly supported beneath the feeding table and parallel to the same, and has its raised end-edge in proximity with the upper portion of the impression cylinder. A transverse shaft, 59, is journaled at the raised end-edge of the registering table and has pulleys, 60, upon it and with their peripheries in a level with said table. A shaft, 61, having pulleys, 62, is journaled at the lower end of the registering table, and belts, 63, pass around said pulleys and the pulleys upon the upper shaft and said belts have their upper portions level with the surface of the registering table. Flat strips, 64, having upwardly curved portions, 65, are adjustably secured by set-screws, 66, in clamps, 67, which are adjustable upon a transverse bar, 68, by set-screws, 69, and parallel with the shaft 61. Rods, 70, are adjustably secured in said clamps 67 by set-screws, 71, and are parallel with the curved strips, and transverse stop-plates, 72, are secured to the ends of said rods and extend laterally from the same. The curved strips extend to above the shaft and pulleys 59—60, and above the belts, so that a sheet of paper can be slipped upon said belts and beneath said strips and be moved by the belts when the machine is running. A pair of side-flanges, 73 and 74, are supported longitudinally upon the registering table by foot-flanges, 75 and 76, respectively, and have their ends, 77 and 78, extending over the impression cylinder and slightly laterally flaring. The foot-flange 75 of the side-flange 73 has a thumb-screw, 79, extending through a transverse slot, 80, in the registering table, and can thus be rigidly adjusted nearer to and farther from the median line of the table. The foot-flange 76 of the side-flange 74 is secured to a slide, 81, slidable in a transverse slot, 82, in the table and said slide is clamped by a set-screw, 83, to a slotted bar, 84, supported to transversely slide beneath the table. An arm, 85, extends longitudinally from a bar, 86, transversely slidable beneath the table and engages a pin, 100, upon the slotted bar 84 with an open slot, 101. A spring, 87, is secured to such bar and to the frame, to pull the slidable bar outward, and the outer end of the bar is pivoted to one arm of a lever, 88, fulcrumed upon the main frame and having a roller, 89, in the opposite arm bearing against the face of a cam, 90, upon the shaft of the impression cylinder.

At the raised end of the feeder frame and opposite the end of the support for the stack of paper sheets, brackets, 91, are connected by a transverse bar, 92, upon the middle of which a casing, 93, is secured and has a rod, 94, slidably supported in it, the inner end of which has a plunger-plate, 95. A coiled spring, 96, is fitted upon said rod and bears with one end against the outer wall of said casing and with the inner end against a collar, 97, upon the rod, normally pushing the latter and plate 95 inward toward and into the paper support.

The plunger-plate is capable of passing through the space between the yielding flat arms 19 to bear against the side of the stack of paper in the support opposed to it, so that said plate will yieldingly retain said stack straight in the support when the latter moves upward and the lowermost sheet is separated by following the rotating suction roll.

A flat bar, 98, is slidable in the bottom of the casing and has an upturned eye, 99, slidable upon a bolt, 102, below the sliding rod and spring, and a coiled spring, 103, cushions the sliding movement of said bar so that said bar yields to the left, see Fig. 10.

A tongue, 104, is formed at the inner end of the flat bar and has its edge overhanging the suction-roll, and a curved lip, 105, is cut in the tongue and curved downward. A transverse bar, 106, is secured upon the brackets below the casing, and screw-threaded shanks, 107, of curved yokes, 108, pass through said bar and have coiled springs, 112, between said yokes and nuts, 109, bearing against the transverse bar, 106. Rolls, 110, are transversely journaled between the ends of the yokes, and a reversing roller, 111, is journaled in the brackets 91 and extends between the rolls in the yokes to guide the sheet of paper to carry the same around it, beneath the curved ends of the strips 64 and upon the registering table.

In Fig. 3, the feeding table is illustrated with two longitudinal grooves, 113, having beveled edges and extending from the lower end of the table, and stop-plates, 114, having base-blocks, 115, have said blocks adjusted in said grooves by set-screws, 116.

The impression roller has grippers, 117, and may be otherwise constructed as required by the character of the work to be done.

The driven shaft 37 has a pulley, 118, which drives a shaft, 119, by a belt, 120, and pulley, 121. Said shaft 119 has a pulley, 122, which drives a pulley, 123, by a belt, 124, and upon the shaft 61 at the lower end of the registering table frame.

The driven shaft 37 has a sprocket wheel, 125, around which passes a sprocket-chain, 126, which passes around a sprocket-wheel, 127, upon the shaft 111 of the reversing roller, and a sprocket-wheel, 128, upon the frame of the machine.

In practice, a stack of sheets of paper is placed between the stop-plates upon the feed table, which plates are adjusted to bear against three sides of the stack according to the dimensions of the sheets of paper to be fed, and the fourth side of the stack bearing against the flat arms 19. When the machine and press is started, the reciprocating feeding table moves downward on the frame and the belts are drawn to expand the springs 51 and rotate the suction shaft and roll to oscillate the suction port in the latter toward the feeding table. On the reversal of the reciprocation of the feeding table, the rack-bar upon the table gives the suction-roll a part of a revolution bringing the port therein in operative contact with the lowermost sheet and drawing it by suction out from the bottom of the stack directs its edge beneath the curved guide-tongue and between the upper roller in the yokes and the reversing roller, around said roller and back between the lower roller and the reversing roller where the sheet strikes the upwardly curved ends of the guide-strips and enters between the latter and the traveling belts until its edge stops against the stop-plates 72. The grippers upon the impression cylinder now clasp the edge of the sheet which is released from the reversing roller and draw it between the two printing cylinders to print the sheet. The edges of the stack of sheets exposed between the flat arms 19 upon the feeding table are maintained in alinement by the plunger plate which moves in contact with such edges and follows the same by the action of its cushioning spring, when the feeding table is moved upward and the lower sheets removed.

The flat bar having the tongue 104 and curved lip 105 is cushioned by its spring to depress the lowermost sheet and guide the same without offering obstruction to the edge of the sheet and injury to the same. When the sheet has been deposited upon the registering table, the adjustable flanges will stop the edge and the transversely reciprocating flange 74 will push the sheet over against the rigid guide-flange to cause it to register with the grippers on the impression cylinder. The stop-plates or guide-flanges which form the container for the stack of sheets and the separate sheets on the registering table are adjustable to all sizes of sheets within the limits of the capacity of the feeding device and press. The fact that the sheet is clasped and drawn between the printing rollers by the edge of the end opposite to the edge clasped when the sheet is withdrawn from the feed support, and that the travel of the sheet is thus reversed, prevents the sheet from being drawn out of shape, as its reversal will straighten any irregularity during the transfer from one table to another. The transversely reciprocated guide-flange upon the registering table, which pushes the sheet upon the same against the stationary flange, insures true register of the sheet between the printing rollers.

Other modes of applying the principle of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth, respectively, in the following claims are employed.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a sheet feeding device, a suction roller, a reciprocating support having an opening at one end of its bottom above such roller, means for reversibly guiding a sheet held by said suction roller, a stationary registering table below the reciprocating support and having its receiving end at said guiding means, and an impression roller at and beneath said end and provided with gripping means for a sheet on the table.

2. In a sheet feeding device, a reciprocating paper support having an opening at one end of its bottom, a suction roller beneath such opening, guiding-means adjacent said roller to guide a sheet around the same and in a reverse direction to its discharge from said support, a stationary registering table beneath said support to receive the sheet from said roller, means for carrying said sheet in a reverse direction to that of its insertion upon said table, and printing rollers having means for gripping a sheet on its reversed motion.

3. In a sheet feeding device, a reciprocating paper support having an opening at one end of its bottom, a suction roller beneath said opening and having means for imparting rotary motion to it, guiding means arranged adjacent said suction roller to reversibly guide a sheet around said roller, a stationary registering table beneath said support having its receiving end at the delivery of said guiding means, and an impression roller having means for gripping a sheet and arranged beneath the receiving end of the registering table.

4. In a sheet feeding device, a reciprocating paper support having an opening at one end of its bottom, a suction-roller beneath said opening and having means for rocking it, means for intermittently creating suction in said roller, guiding means arranged adjacent said suction roller to reversely guide a sheet around said roller, a stationary registering table beneath the said paper support and reversing guide means and adapted to receive a reversed sheet from the latter, and an impression roller having means for gripping a sheet and arranged beneath the receiving end of the registering table.

5. In a sheet feeding device, a reciprocating paper support having an opening at one end of its bottom, a suction-roller at such opening and having means for rocking it, means for intermittently creating suction in said roller, a reversing roller adjacent said suction roller, means for reversely guiding a sheet around said roller, a stationary registering table beneath said support and roller, and an impressing roller at the receiving end of said registering table and provided with means for gripping a sheet upon said table.

6. In a sheet feeding device, a reciprocating paper support having an opening at one end of its bottom, a suction-roller at such opening and having means for rocking it, a reversing roller adjacent said suction roller, means for intermittently creating suction in said suction-roller, means for reversely guiding a sheet around said reversing roller, a stationary registering table beneath said support and roller, an impressing roller at the receiving end of said registering table and provided with means for gripping a sheet upon said table, and means for moving such sheet upon said table.

7. In a sheet feeding device, a feed-table having longitudinal guide flanges and a stop flange and an opening at the ends of said guide flanges, a bar spanning the ends of said guide-flanges, arms adjustable upon said bar to depend from the same, means for reciprocating said table, a suction device at the opening in the table, and a yielding plunger opposed to the space between said arms and adapted to be engaged by the edge of a stack of sheets upon the table.

8. In a sheet feeding device, a feed-table having longitudinal guide flanges and a stop flange and an opening at the ends of said guide flanges, a bar spanning the ends of said guide-flanges, arms adjustable upon said bar to depend from the same, means for reciprocating said table, a suction device at the opening in the table, a yielding plunger opposed to the space between said arms and adapted to be engaged by the edge of a stack of sheets upon the table, and a flat tongue yieldingly supported to engage and depress the edge of the lowermost sheet of the stack of sheets upon the table.

9. In a sheet feeding device, a feed-table having longitudinal guide-flanges and a stop-flange, means for reciprocating said feed-table, a bar spanning the ends of said guide-flanges, arms depending from said bar and having a space between them, a rod slidingly supported opposite said space and having a plunger adapted to pass between said arms to bear against the edge of a stack of sheets upon the table, yielding means acting upon said rod and plate to allow said plate to bear against the stack of sheets through the opening between the arms, and suction means below said opening.

10. In a sheet feeding device, a feed-table having longitudinal guide-flanges and a stop-flange and having a discharge opening in its bottom, a stationary suction device adapted to have said opening intermittently pass thereover, means for reciprocating said table, a yielding plunger adapted to be engaged by the stack of sheets upon the feed-table, and a flat tongue yieldingly supported to engage the edge of the lowermost sheet to deflect the same.

11. In a sheet feeding device, a feed-table having longitudinal guide-flanges and a stop-flange and having a discharge opening in its bottom, a stationary suction device adapted to have said opening intermittently pass thereover, means for creating a suction in such suction device to retain the bottom sheet of the stack of sheets upon the feed-table and withdraw it from the same, a yielding tongue at the opening in the reciprocating table to engage between the bottom

sheet and the stack of sheets above it, and means for reciprocating said feed table toward and from said suction device.

12. In a sheet feeding device, a feed-table having longitudinal guide flanges and an end-stop and having said flanges extending beyond its open edge, an oscillating suction-roll at such edge, means for intermittently creating suction through a port of such roll, belts secured at one end to the open edge of the feed-table and passing around said roll, springs connected to the other ends of said belts and to the feed-table, and means for intermittently oscillating said suction roll.

13. In a sheet feeding device, a feed-table having guide-flanges forming a support for a stack of sheets and having a discharge opening in its bottom at its open end, means for reciprocating said table, a suction roller having means for intermittently creating suction through a port and journaled across the opening in the feed-table, means for intermittently oscillating said suction roller, a yielding flat tongue arranged to engage above the lowermost sheet upon the table in the opening in the same, a curved lip, a reversing roller below said lip, curved yokes yieldingly supported to partly embrace said roller and having rollers at their ends at opposite sides of said reversing roller, and a registering table having its end below said reversing roller.

14. In a sheet feeding device, a reciprocating paper support having an open end and an opening in its bottom, arms adjustably and yieldingly supported over the open end of the support, an oscillating suction roll in the bottom opening of the support, a yielding plunger opposed to the open end of the support and adapted to enter the same, a yieldingly sliding tongue arranged to engage above the edge of the lowermost sheet upon the support, and a revolving reversing roller below said tongue.

15. In a sheet feeding device, a reciprocating paper-support for a stack of paper sheets and having an opening at one end of its bottom, a suction device having stationary support to have a port register with such opening, means for intermittently creating suction in said suction device, means for imparting oscillating motion to said suction device to engage by suction and move the lowermost sheet in the paper-support, means for reversing and guiding a sheet from said suction device, a registering table for receiving said reversed sheet, and an impression cylinder having grippers adapted to engage the edge of said sheet.

16. In a sheet feeding device, a reciprocating support for containing a stack of paper-sheets and having an opening in one end, a flat and longitudinally yielding bar in alinement with said opening and having a tongue adapted to enter between the edges of the lowermost sheet and remaining stack of sheets in said support, a suction roller in the opening in the support beneath said tongue, a curved guide-lip for the separated sheet, a reversing roller beneath such lip, and rollers supported adjacent to the periphery of said latter roller to reverse the sheet around the same.

17. In a sheet feed mechanism for presses in combination, means for supporting a pack of sheets to be fed, a rotatable pneumatic feed roller having a suction opening for engaging and advancing the bottom sheet of the pack, means for guiding the advancing sheet so as to bring its rear edge into position to be engaged by the grippers of the press, said press including an impression cylinder having grippers for engaging the rear edge of the sheet.

18. In a printing press, in combination, an impression cylinder having grippers, means for supporting a pack of sheets to be fed to said impression cylinder, a rotatable pneumatic feed roller having a suction opening for engaging the forward edge of the bottom sheet of the pack to advance the same, a registering table adjacent to said impression cylinder, and means for guiding the sheet advanced by said roller so that the said sheet passes on to said shelf with the forward edge of the sheet disposed remotely from said impression cylinder, said grippers operating to engage the rear edge of the sheet on said registering table.

19. In a printing press, in combination, an impression cylinder having grippers, means for supporting a pack of sheets to be fed to said impression cylinder, a rotatable pneumatic feed roller having a suction opening for engaging the forward edge of the bottom sheet of the pack to advance the same, a registering table adjacent to said impression cylinder, means for guiding the sheet advanced by said roller so that the said sheet passes on to said shelf with the forward edge of the sheet disposed remotely from said impression cylinder, said grippers operating to engage the rear edge of the sheet on said registering table, and automatically movable means for shifting the sheet on said registering table to aline the same before being engaged by said grippers.

20. In a printing press, in combination, an impression cylinder having grippers, means for supporting a pack of sheets to be fed to said impression cylinder, a rotatable pneumatic feed roller having a suction opening for engaging the forward edge of the bottom sheet of the pack to advance the same, a registering table adjacent to said impression cylinder, means for guiding the sheet advanced by said roller so that the said sheet

passes on to said shelf with the forward edge of the sheet disposed remotely from said impression cylinder, said grippers operating to engage the rear edge of the sheet on said registering table, and a stop on said registering table to engage the forward edge of the sheet to limit the movement of said sheet on said registering table.

21. In an automatic sheet-feeder, the combination of a reciprocatiing feed-table, a rotative suction-roller in contact with which the pile of paper is carried by the feed-table whereby the sheets are successively separated, said suction-roller being located immediately adjacent the front end of the table when the table is in its retracted position, feed-rolls to which the separated sheet is directed by forward movement of the feed-table, and by which the sheet is directed backward below the table, and suction-releasing means acting through the suction roller to release the separated sheet from said suction-roller and permit directing it to the feed-rolls.

22. In an automatic sheet-feeder, a sheet-separating suction-roller, means for reciprocating a pile of paper thereover, said roller being in communication with a vacuum-pump and having a suction-orifice for attracting the sheet in contact therewith, and the conduit from the pump having a connection with one end of the roller provided with a plurality of ports whereby the bore of the roller serves alternately as a suction and a release port.

23. In a device of the character stated, a reciprocatory feed table, a rotative suction roller, a main feed roller spaced from said suction roller and over which the separated sheet is fed therefrom, said feed roll and suction roller being mounted to retain their same relative positions at all times with the upper surface of said feed roll in a horizontal plane above the upper surface of said suction roller, a pair of feed rolls spaced apart and both coacting with said main feed roller, and means for supporting said pair of feed rolls in constant relation to each other and in movable relation to said main feed roller.

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Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."