No. 606,975. Patented July 5, 1898.

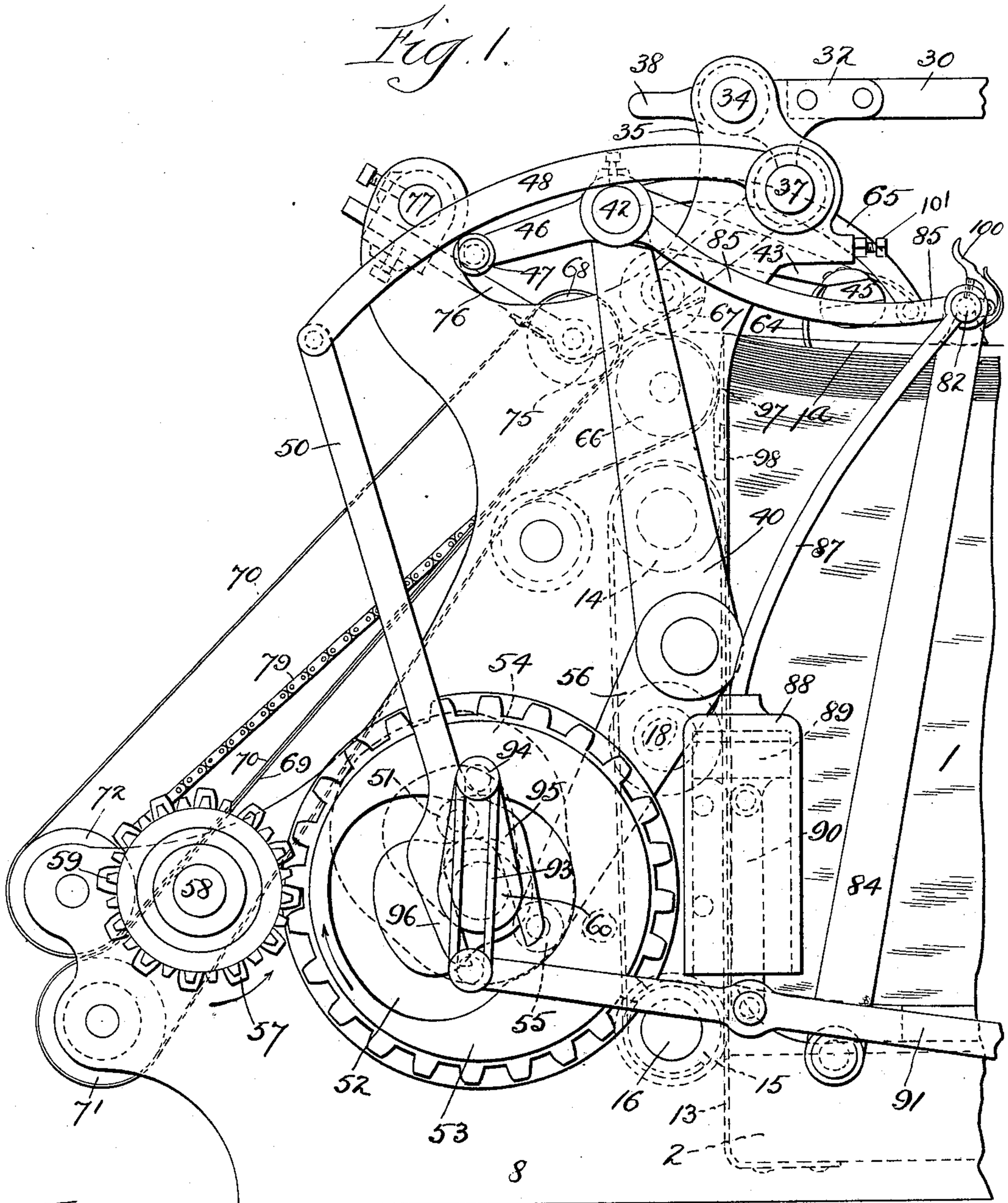
R. MIEHLE & J. W. MANSFIELD.

PAPER FEEDING MACHINE.

(Application filed Dec. 26, 1896.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



Witnesses
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(No Model.) 4 Sheets—Sheet 2.

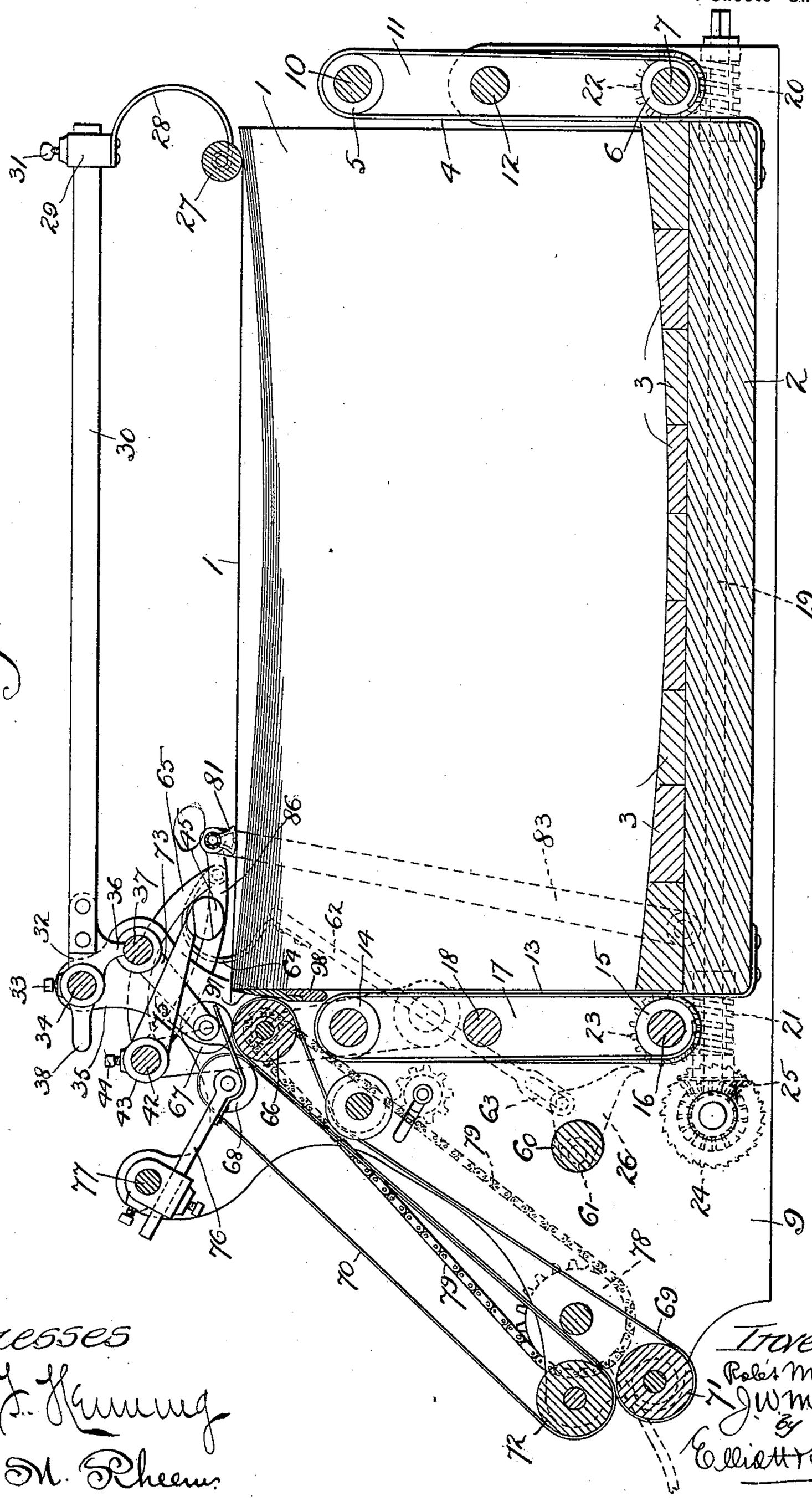

Fig. 2.

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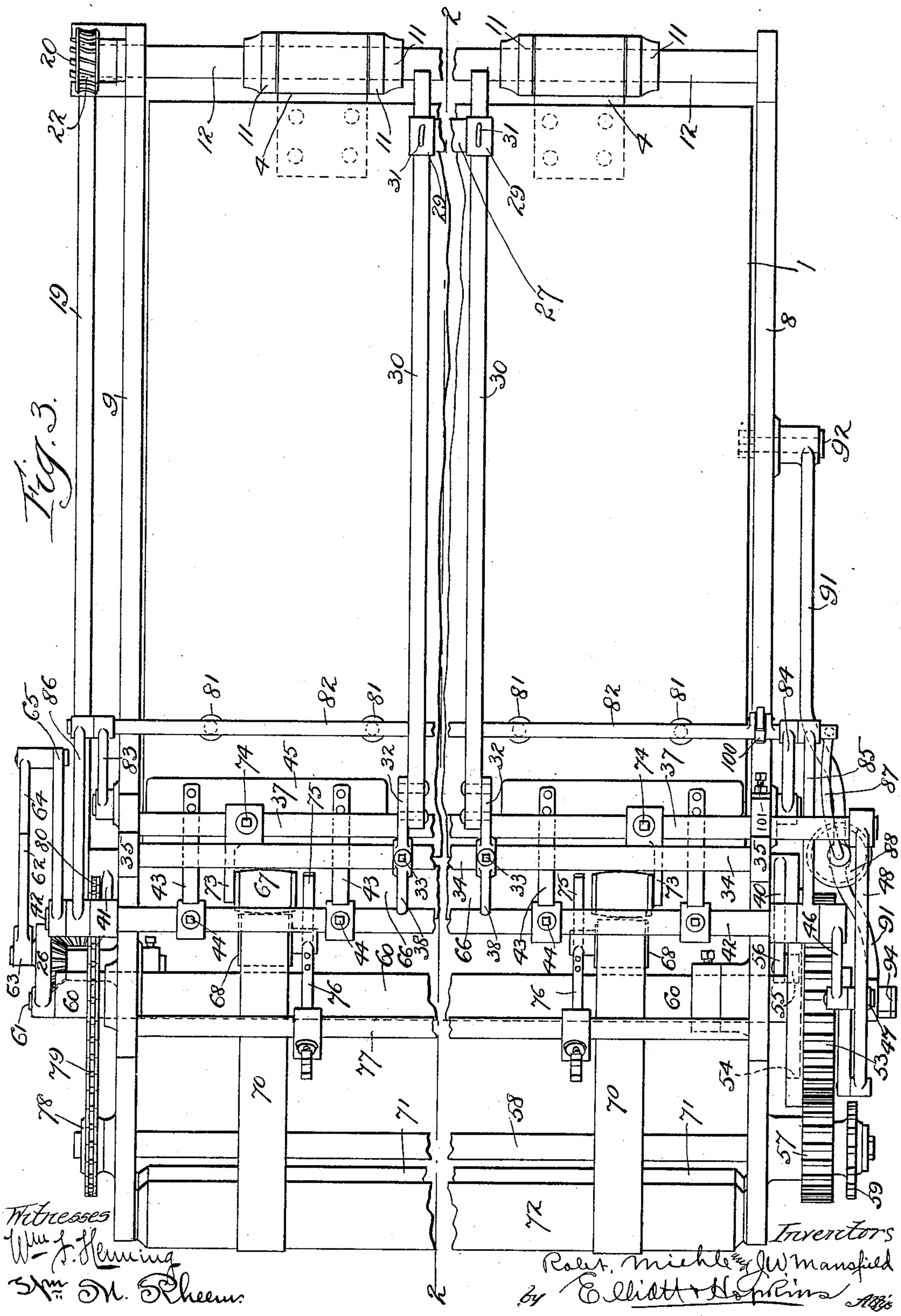
(No Model.) 4 Sheets—Sheet 3.

Fig. 3.



Witnesses
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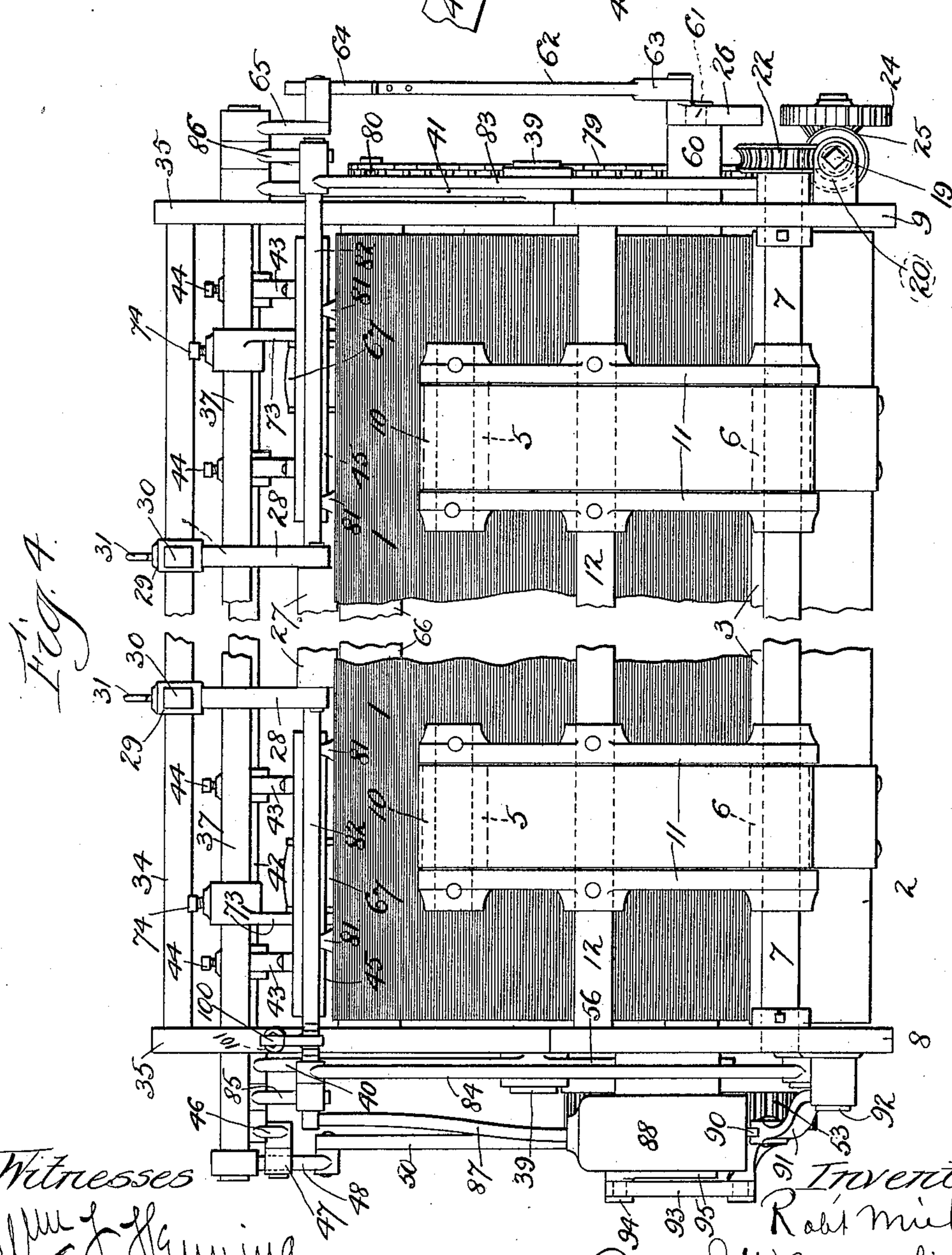
(Application filed Dec. 26, 1896.)

(No Model.) 4 Sheets—Sheet 4

Fig. 4.



Witnesses
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UNITED STATES PATENT OFFICE.

ROBERT MIEHLE AND JAMES W. MANSFIELD, OF CHICAGO, ILLINOIS.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 606,975, dated July 5, 1898.

Application filed December 26, 1896. Serial No. 617,119. (No model.)

To all whom it may concern:

Be it known that we, ROBERT MIEHLE and JAMES W. MANSFIELD, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Sheet-Feeding Mechanism, of which the following is a full, clear, and exact specification.

Our invention relates to devices for feeding paper a single sheet at a time from a stack or pile of cut sheets, and the improvements have more especial reference to means for separating the top sheet from the rest preparatory to the engagement of the feeding tapes or rolls therewith.

Our invention has for its primary object to create a space between the surface sheet and the one immediately below it preparatory to imparting to it the necessary force for conveying it from the pile or for completing the feeding movement, whereby the movement of the top sheet or sheet being fed forward will not be imparted to the sheet immediately below it.

With these ends in view our invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said object and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a side elevation of one end of our improved feeding mechanism. Fig. 2 is a vertical longitudinal section thereof, taken on the line 2 2, Fig. 3, on a smaller scale. Fig. 3 is a plan view with the intermediate portion broken away and the two sides of the machine brought together. Fig. 4 is a rear elevation with the intermediate portion of the machine broken away, as in Fig. 3; and Fig. 5 is an enlarged detail sectional view of a modified form of combined rubber and sucker hereinafter described.

In carrying out our invention we provide means for holding the surface of the pile of sheets bowed or sagged, so that two of its edges will be higher than its intermediate surface, and in conjunction with which means we use means for automatically keeping the surface of the pile at approximately the same level or elevation, whereby means may be employed for bearing upon or retarding the movement of the surface sheet on one side of the pile, while on the opposite side the surface sheet is given a pull to cause it to straighten out or rise above the intermediate area of the pile, so that a space is formed between the surface sheet and the next sheet below, and the edge of the surface sheet is also advanced beyond the edge of the pile within reach of suitable feeding-rolls or other devices, the air thus admitted below the surface sheet serving to prevent the latter from again settling down into close contact with the next sheet below and causing the lower sheet to move forward with the sheet being fed.

We will now describe our invention more in detail with reference to the accompanying drawings, in which—

1 represents the pile of sheets, and 2 the table or means for supporting the same. In order that the surface of the pile 1 may always be bowed or sagged, as clearly shown in Fig. 2, the surface of the table 2 is also bowed or sagged to substantially the same degree. This may be accomplished in various ways that will readily suggest themselves to the ordinary mechanic; but in order that the curvature of the table-surface may be varied with the different lengths or widths of sheets to be piled thereon this is preferably accomplished by providing the surface of the table with a number of blocks or strips 3, varying in thickness, so that when put together they will form a bowed or sagged surface of the desired curvature, and when it is desired to shorten the table or reduce its width to accommodate sheets of smaller dimensions one or more of the intermediate blocks or strips 3 may be removed and the outer ones set up to complete the curved surface, or the blocks may be manipulated in any other way to accomplish the desired end. This table 2 is supported at one end by a number of straps 4, each secured at one end to the under side of the table, as shown in Fig. 2, and pass over rollers or pulleys 5 and thence downward, and are each secured at its other end to a drum 6 on a winding-shaft 7, which extends across the rear end of the machine and is journaled at each end in the side standards or members 8 9 of the main frame. As more clearly

shown in Fig. 4, the upper rollers or pulleys 5 are journaled upon pintles 10, each mounted in the upper end of a pair of standards 11, which are supported upon the shaft 7 and held in a vertical position by a stay-rod 12, which passes through them between the folds of the straps 4. The purpose of this construction is to support the pulleys 5 at an elevated point and at the same time leave the rear end of the machine unobstructed, whereby the hand of the operator may be passed down to the table 2 when it is desired for putting in or taking out the paper. The other end of the table 2 is supported in a similar manner by a pair of straps 13, each of which is secured at one end to the table and passes over a roller or pulley 14 and thence downward to a winding-drum 15 on a shaft 16, extending across the machine and having its ends journaled in the side members 8 9 of the frame. Each of these rollers 14 is supported by a pair of standards 17, similar in arrangement and construction to the standards 11, 18 being a stay bar or rod which holds the standards 17 in an upright position in the manner the stay-rod 12 holds the standards 11, the lower ends of the standards 17 being supported by the shaft 16 in the manner before described with reference to the shaft 7 and standards 11.

Motion may be imparted to the shafts 7 16 for automatically raising the table 2 as the sheets are fed therefrom by any suitable mechanism operating in conjunction with the machine that will readily suggest itself to the skilled mechanic. A simple way of accomplishing this consists of a shaft 19, having a worm 20 21 at each end engaging, respectively, with worm-wheels 22 23 on the shafts 7 16, respectively. This worm-shaft 19 derives its motion from a ratchet-wheel 24, geared to the shaft 19 by a pair of miter-gears 25, one of which may be formed on or secured to the back of the ratchet 24. Thus it will be seen that when the ratchet is rotated the table will be raised and the worm-gearing will hold it at its elevated position without other agencies. The ratchet 24 derives its motion at the proper instant from a continuously-moving pawl 26, which is lowered into engagement with the ratchet at the proper instant when it is desired to raise the table by automatic mechanism which will presently be described.

Arranged at one edge of the pile 1 and bearing upon the surface thereof are one or more rollers 27, which retard the movement of the surface sheet 1^a with sufficient force to cause such sheet to straighten out into substantially a straight line, as shown in Fig. 2, when the opposite edge of the sheet is pulled or rubbed in a direction away from the roller 27, thus admitting air under the sheet 1^a and permitting its opposite edge to be projected forwardly over the edge of the pile, whereby it may be caught and drawn off before it has opportunity to again settle into close adhesion with the sheet below. It is of course evident that a plain bar or other device might be substituted for the roller 27 if it were simply desired to straighten out the surface sheet; but by the employment of the roller it will be seen that it not only produces less friction when the surface sheet is drawn from under it, but it instantly nips or bears upon the next sheet below as soon as the surface sheet passes its vertical diameter, and hence forms a further safeguard against the movement of the second sheet along with the first one. It is also desirable that the roller 27 be movable laterally or in the direction of movement of the sheet 1^a and also in a slightly-upward direction, so that the pull upon the sheet 1^a will tend to lessen the pressure of the roller 27. This may be conveniently and effectually accomplished by mounting the ends of each of the rollers 27 in a pair of depending flexible spring-arms 28, which are sufficiently bowed or have sufficient elasticity to follow the pile downward the requisite distance as the sheets are fed therefrom. These rollers 27 are also adjustable lengthwise of the line of movement of the sheet being fed, so that they may be adjusted to bear at the proper distance from the edge of sheets of various widths. This adjustability may be accomplished by providing each of the arms 28 with a slide 29, mounted upon horizontal bars or arms 30 and having a set-screw 31 for holding them in position. The arms or bars 30 are secured at their inner ends to castings 32, keyed by set-screws 33 to a rocker-shaft 34, mounted in projections 35 of the side frames 8 9. The castings 32 are provided with heel-pieces 36, which rest upon a transverse shaft 37, and thus hold the arms 30 in substantially a horizontal position, while permitting them to be stood in an upright position or thrown back out of the way when it is desired to remove the pile from the table 2. The castings 32 are also provided with fingers 38, which also strike against the shaft 37 or any other suitable stop to hold the arms 30 in their thrown-back position.

There are various devices well known in the art suitable for imparting the requisite pull to the surface sheet 1^a at the edge opposite the roller 27. The means for doing this shown in the drawings and which we prefer to employ will now be described. Each of the side members 8 9 of the main frame is provided on its outer side with a boss 39, upon one of which is mounted an upwardly-extending crank-arm 40, while on the other is a crank-arm 41. These crank-arms 40 41 project above the main frame and carry in their upper ends a rocker-shaft 42, which extends athwart the machine and supports a number of arms 43, secured thereto by means of set-screws 44 or other suitable devices, and these arms 43 constitute the support for the rubber or pusher, which imparts the initial pull to the surface sheet 1^a and causes it to straighten out while being held by the roller 27. In this form of our invention this rubber or pusher is preferably constituted by a number of

cushions 45, each suitably secured to one or more of the arms 43, and in order that the cushions may be yielding throughout their length, so as to readily conform to any irregularities in the surface of the pile, they are pneumatic or composed of elastic bags or tubes provided with suitable means whereby they may be inflated. The rocker-shaft 42 oscillates with and supports the arms 43, but is journaled loosely in the arms 40 41, and in order that the rubbers or cushions 45 may be permitted to descend into contact with the surface of the pile and then rub or pull the surface sheet away from the roller 27, and after pulling it the requisite distance rise and finally return to their normal position and again descend against the surface of the next sheet, we provide the shaft 42 with a crank-arm 46, which has at one end a laterally-projecting stud or antifriction-roller 47 engaging under a bar 48, preferably curved concentrically with the arc described by the arm 40 and secured at one end to a transverse shaft 37, journaled in the projection or standard 35 of the main frame 8 9, while the other end of such curved bar 48 is pivoted to a pitman 50, having a lateral stud 51 projecting into a cam-groove 52, formed in the outer face of a wheel 53. The inner face of this wheel 53 is provided with a cam-groove 54, in which engages a laterally-projecting stud 55, formed on or secured to the lower end of an arm 56, which is a part of and constitutes a lever with the crank-arm 40. With this construction it will be seen that the position of the bar 48 controls the position of the rubber 45, and hence the formation of the cam-groove 52 is such that when the arms 40 carry the rubber 45 inward or over the pile by virtue of the cam-groove 54, acting upon the stud 55, the bar 48 must be raised at its outer end to permit the arms 43 to descend and bring the rubber 45 into contact with the surface of the pile. Another portion of the cam-groove 52 will now hold the bar 48 in such position with relation to the oscillation of the arm 40 that the rubbers 45 will remain in contact with the surface of the pile until the rubber has at least pulled the surface sheet 1^a sufficiently to straighten it out or separate it from the sheets below, and, if desired, the rubber may be compelled to continue this pulling movement until the edge of the sheet has projected sufficiently beyond the edge of the pile to be grasped by the feeding-rollers, hereinafter described, or other agencies for completing the feeding movement. When the arms 40 41 have carried the rubbers 45 substantially to the extremity of their outward or feeding movement, the cam-groove 54 lowers the bar 48, and thus causes the rubbers 45 to rise and to remain aloof from the paper until the arms 40 41 have returned them to the other extremity of their movement.

The wheel 53 is a gear-wheel and derives its motion from a pinion 57 on the driving-shaft 58, which in turn receives its motion from a sprocket 59 and any suitable belt. (Not shown.) The wheel 53 is mounted upon and secured to a shaft 60, journaled in the side members 8 9 of the frame and also supplying motion to the pawl 26 by means of an eccentric or crank-pin 61. The pawl 26 constitutes a detachable connection between the rubbers 45 and the table-elevating mechanism, and its position is made dependent upon the position of the rubbers 45 by any suitable operative connection between the two. Such a connection may consist of a rod 62, having slotted connection 63 with the pawl 26 and a spring or elastic connection 64 with a crank-arm 65, secured to the shaft 42, upon which the rubber-arms 43 are also mounted. When the rubbers 45 make their return movement to again engage the pawl, the arm 48 rises, permitting them to descend until they rest upon the paper. If in descending they lower the pawl 26 into engagement with the ratchet 24 before the surface of the pile is reached, the crank-pin 61 will upon its forward stroke impart movement to the shafts 7 16 through the above-described connections and elevate the table until the pawl is lifted out of engagement. The slot 63, however, permits the rubbers in the meanwhile to continue their descent until the surface of the pile is reached. Thus it will be seen that when the rubbers 45 rise and fall the rod 62 will also make corresponding movements, and consequently when a certain number of sheets have been removed the pawl 26 will be lowered into engagement with the ratchet 24, thus imparting motion to the shafts 6 16 and raising the table 2 until the surface of the pile forces the pawl out of engagement with the ratchet 24. The purpose of the spring connection 64 is to permit of more or less independent movement of the rubbers 45 after the pawl 26 has come into engagement with the ratchet 24.

The rubbers 45 push the sheet forward over the edge of the pile and raise it to substantially a straight or horizontal position, and, if desired, they may be made to advance it sufficiently far to bring its edge into contact with the lower tape-roll 66 and the feed-rolls 67, which grip it and advance it between the roll 66 and the upper tape-rolls 68, whereupon the tapes 69 70, running over suitable rollers 71 72 at their lower ends, carry the sheet to any desired point. The feed-rollers 67 are preferably short rollers, as shown more clearly in Figs. 2 and 3, and each is mounted on the lower end of a crank-arm 73, secured to the shaft 37 by means of set-screws 74 or other suitable devices, so that when the bar 48 is elevated to permit the rubbers 45 to pull the sheet forward over the roll 66 the feed-rolls 67 will also be elevated to admit the sheet under them, and when the bar 48 again descends to raise the rubbers 45 out of contact with the sheet the rolls 67 will also descend upon the sheet and press it into firm contact with the tapes 69, the sheet in the meanwhile having been guided down against

the roll 66 by a number of deflectors or guides 75, suitably secured to the under side of the arms 76, which adjustably support the tape-rolls 68 upon a transverse bar 77. The tape-roll 66 derives its motion from a sprocket 78 on the shaft 58, connected by chain 79 with sprocket 80 on the shaft of the roll 66, and the tapes 70 derive their motion by frictional contact with the tapes 69.

In some instances and with some grades of paper the rubbers 45 may be sufficient in themselves to convey the edge of the sheet to the rolls 66 67; but in order to avoid as far as possible any frictional contact between the top sheet and the next sheet below, which may be caused by thus compelling the rubbers to carry the surface sheet such a great distance, we prefer to employ other agencies for imparting a pull to the surface sheet after it has been separated from the sheets below. As an example of such means we show and prefer to use one or more suckers 81, of the usual or any suitable construction, with which the sheet is brought in contact by the act of straightening it out from the bowed or sagged to a substantially horizontal position. Hence it will be seen that the rubbers 45 may be employed for imparting only sufficient movement to one end of the sheet to straighten it up against the sucker or suckers 81, which after they gain control of it may advance it forward the requisite distance between the feed-rolls 66 67 without producing any pressure or material friction upon the sheet below. These suckers 81 are secured to a transverse pipe or tube 82, which is loosely journaled in the upper ends of two arms 83 84, but rigidly attached at each end to one of a pair of arms 85 86. These arms 85 86 are in turn supported at their other ends upon the extremities of the shaft 42, which revolves loosely therein, so that the movement of the arms 40 41 will carry the sucker-pipe 82 back and forth over the surface of the pile, and the pipe being rigidly attached to the arms 85 86 the under surface of the suckers will maintain a more or less parallel relation with the surface of the sheet or pile, which would not be the case if their under surfaces followed the oscillation of the arms 83 84. One end of the sucker-pipe 82 is connected by a flexible tube 87 with a suction device or cylinder 88, containing a piston 89, connected by hinged rod 90 with a weighted lever 91, pivoted at one end to boss 92 on the side of the frame member 8. The other end of this lever 91 is pivoted to a link 93, in which works a crank-pin 94, secured to the end of a crank 95, mounted on the outer extremity of the shaft 60. Thus it will be seen that when the crank-pin 94 rises the piston 89 will be raised in the cylinder and when the pin 94 descends the weight of the lever 91 and piston will cause the latter to descend and produce the requisite suction in the suckers 81. The purpose of this loose connection between the lever 91 and the crank 95 is to avoid excessive suction; but it is of course evident that a positive connection may be employed, if desired. The crank 95 also serves as means for holding the lower end of the pitman in place. Such lower end is provided with a fork 96, which straddles the shaft 60 between the surface of the wheel 53 and the rear side of the crank 95.

It is well understood that continual pressure in one direction on the surface of a pile of paper will cause more or less of the sheets at the upper end to crawl or advance in the direction of movement of the top sheet, and, if desired, any of the well-known means for preventing this may be employed in connection with our invention. We have shown for this purpose a gate 97, constructed of rubber or some flexible material and having a knife-edge arranged against the upper edge of the pile, so as to bear lightly against the under surface of the top sheet, as will be understood. This gate 97 may be in the form of a continuous strip 98, extending across the machine, or may consist of a number of gates, each supported upon a suitable standard.

In Fig. 5 we have shown a modification of the device for imparting the initial pull to the surface sheet preparatory to presenting it to the feeding-rolls. This device consists of a combination of the rubber 45 and the sucker 81; and it consists of a pneumatic tube 45^a, having suitable means of inflation and provided throughout its length with a number of hollow cross bars or pieces 99, which communicate at their upper end with a pipe 82^a, similar to the pipe 82, having suitable connection with the suction device 88 89. The lower ends of these hollow cross-pieces 99 are open, and, if desired, provided with eyelets 81^a, which constitute suckers. The advantage of this construction is that the rubber 45^a creates sufficient friction with the surface sheet to pull it forward without bearing unduly upon the sheet below.

Either of these suction devices may be provided with an automatic relief-valve 100 in the pipe 82 or 82^a, which is automatically opened by striking projection 101 when the arms 83 84 reach the extremity of their forward oscillation, thus releasing the sheet at the instant the feeding-rollers gain possession of it.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for pulling the surface sheet taut or straight, and means for drawing off the surface sheet after being so straightened, substantially as set forth.

2. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for bearing upon the surface sheet at one edge, and means for pulling upon the surface sheet at the other edge, substantially as set forth.

3. A sheet-feeding mechanism having in combination means for holding the surface of the pile normally bowed or sagged, means for stretching the surface sheet, and a suction sheet-pulling device arranged to contact with the stretched sheet, substantially as set forth.

4. A sheet-feeding mechanism having in combination means for holding the surface of the pile normally bowed or sagged, means for bearing upon the pile at one side and means comprising a suction device for pulling upon the sheet at the other side, said suction device being arranged above the normal level of the pile, substantially as set forth.

5. A sheet-feeding mechanism having in combination means for holding the surface of the pile normally bowed or sagged; means for stretching the surface sheet taut and then pulling it from the pile, comprising a suction device; and an automatic relief-valve for said suction device, substantially as set forth.

6. A sheet-feeding mechanism having in combination a sheet-pile-supporting table having its surface bowed or sagged; means for stretching the surface sheet taut or substantially straight and then pulling it from the pile, comprising a suction device; and an automatic relief-valve for said suction device, substantially as set forth.

7. A sheet-feeding mechanism having in combination a sheet-pile-supporting table having a number of sections whose combined surfaces or areas form a bowed or sagged support for the pile, and said sections being shiftable with relation to each other; and means for stretching the surface sheet taut and then pulling it from the pile, substantially as set forth.

8. A sheet-feeding mechanism having in combination a sheet-pile-supporting table having a number of sections whose combined surfaces or areas form a bowed or sagged support for the pile, some of said sections being removable and others being shiftable transversely along the table; and means for stretching the surface sheet taut and then pulling it from the pile, substantially as set forth.

9. A sheet-feeding mechanism having in combination means for imparting a pull to the sheet to be fed; a sheet-supporting table divided transversely of the line of pull upon the sheet into a number of removable sections of different thicknesses whose combined areas form a bowed or sagged surface for supporting the pile of paper, substantially as set forth.

10. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for pulling upon the surface sheet at one edge of the pile; and means for bearing upon the pile at the opposite edge adjustable lengthwise of the line of pull upon the surface sheet, substantially as set forth.

11. A sheet-feeding mechanism having in combination means for pulling upon the surface sheet at one edge of the pile; means for bearing upon the pile at the opposite edge adjustable lengthwise of the line of pull, and a paper-supporting table having a depressed or sagged surface extensible or contractible lengthwise of the line of pull upon the surface sheet, substantially as set forth.

12. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the surface sheet at one edge; and means for rubbing the surface sheet at the opposite edge and thereby pulling it straight or taut, substantially as set forth.

13. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the surface sheet at one edge; a pneumatic rubbing device arranged at the opposite edge of the surface sheet, and means for moving said rubbing device toward and from said retarding means whereby a pull is imparted to the surface sheet, substantially as set forth.

14. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the surface sheet at one edge; a rising-and-falling pneumatic rubbing device arranged at the opposite edge of the surface sheet; and means for moving said rubbing device toward and from said retarding means, whereby a pull is imparted to the surface sheet and the latter straightened or raised from the pile, substantially as set forth.

15. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; a roller bearing upon and retarding the surface sheet at one edge; and means for imparting a pull to the surface sheet at the opposite edge thereof, substantially as set forth.

16. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; a cushioned roller bearing upon and retarding the surface sheet at one edge; and means for imparting a pull to the surface sheet at the opposite edge, substantially as set forth.

17. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the surface sheet at one edge; a rubbing device arranged at the opposite edge of the sheet and having independently-yielding portions throughout its length to conform to the irregularities in the surface of the pile; and means for moving said rubbing device toward and from said retarding means, substantially as set forth.

18. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the surface sheet at one edge; a rubbing device consisting of a pneumatic cushion arranged at the opposite edge of the sheet; and means for moving said rubbing device toward and from said retarding means whereby a

pull will be imparted to the surface sheet, substantially as set forth.

19. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; a pair of hinged arms extending over the pile; a roller bearing upon the surface sheet at one edge and having an elastic connection with said arms; and means for imparting a pull to the surface sheet at the opposite edge, substantially as set forth.

20. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; a pair of hinged arms extending over the pile; means for limiting the downward movement of said arms and holding the same substantially horizontal; a roller bearing upon the surface sheet at one edge thereof and having an elastic connection with said arms; and means for imparting a pull to the surface sheet at the opposite edge thereof, substantially as set forth.

21. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the movement of the surface sheet at one edge thereof; a rubbing device arranged at the opposite edge of the surface sheet; means for moving said rubbing device toward and from said retarding means and thereby stretching or pulling upon the surface sheet; and an auxiliary sheet-pulling device arranged above the surface sheet and into the grasp of which the sheet is placed by said rubbing device, substantially as set forth.

22. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the movement of the surface sheet at one edge thereof; a hinged or pivoted rubbing device arranged to contact with the opposite edge of the surface sheet and having its center or hinge moving bodily upon an arc of a circle; a movable guide for controlling the independent oscillation of said rubbing device upon its hinge; and means for altering the position of said guide, whereby the rubbing device is caused to move into and out of contact with the sheet, substantially as set forth.

23. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the movement of the surface sheet at one edge thereof; a hinged or pivoted rubbing device arranged to contact with the opposite edge of the sheet and having its center or hinge moving bodily in an arc of a circle; a movable guide for controlling the independent oscillation of said rubbing device on its said hinge or center; said guide being curved concentrically with the arc through which the said hinge or center moves; and means for altering the position of said guide whereby the said rubbing device is caused to move into and out of contact with the sheet, substantially as set forth.

24. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the movement of the surface sheet at one edge thereof; a sheet-rubbing device arranged at the opposite edge of the sheet; hinged arms bodily movable toward and from said retarding means and supporting said rubbing device; and means for independently oscillating said arms toward and from the surface of the sheet, substantially as set forth.

25. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the movement of the surface sheet at one edge thereof; a sheet-rubbing device arranged at the opposite edge of the surface sheet; hinged arms bodily movable toward and from said retarding means and supporting said rubbing device; a projection for controlling the independent oscillation of said arms; a movable guide against which said projection bears and means for altering the position of said guide to cause the rubbing device to approach and recede from the surface of the sheet, substantially as set forth.

26. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the movement of the surface sheet at one edge thereof; a sheet-rubbing device arranged at the opposite edge of the surface sheet; hinged arms bodily movable in the arc of a circle toward and from said retarding means and supporting said rubbing device; a projection for controlling the independent oscillation of said arms; a pivoted guide against which said projection bears, said guide being curved on an arc concentric with the arc described by the bodily movement of said arms, and means for oscillating said guide and thereby causing said rubbing device to rise and descend upon the sheet, substantially as set forth.

27. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the movement of the surface sheet at one edge thereof; a sheet-rubbing device arranged at the opposite edge of the surface sheet; a bodily-movable rocker-shaft; arms secured to said shaft and supporting said rubbing device; a lever by which one end of said shaft is supported; a cam for oscillating said lever; a projection secured on said rocker-shaft; a movable guide-bar against which said projection bears and which holds said shaft from independent rocking; and a cam for altering the position of said guide-bar, substantially as set forth.

28. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the movement of the surface sheet at one edge thereof; a sucker movable to and from the said retarding means and adapted to impart a pull to the surface sheet at the

opposite edge thereof; means for moving said sucker to and fro; a weighted piston having a loose operative connection with the last said means; and a cylinder containing said piston and having air-passage connection with said sucker, substantially as set forth.

29. A sheet-feeding mechanism having in combination means for holding the surface of the pile bowed or sagged; means for retarding the movement of the surface sheet at one edge thereof; a sucker movable to and from said retarding means and adapted to impart a pull to the surface sheet; means for moving said sucker to and fro; a revolving crank-pin; a lever; a link connected to said lever and having a slot in which said pin slides; a piston connected to said lever; and a cylinder containing said piston and having connection with said sucker, substantially as set forth.

30. A sheet-feeding mechanism having in combination means for holding the pile of paper; a number of rollers arranged contiguous to the edge of the pile; guides or deflectors projecting upwardly between said rollers and across the surface plane of and toward said pile; a second roller arranged below said first rollers and in contact therewith and opposite the edge of the pile and across which said guides extend; and means for feeding the sheet to said rollers, substantially as set forth.

31. A sheet-feeding mechanism having in combination a table for holding the pile of paper; elevating mechanism for raising said table having a ratchet; a continuously-moving pawl adapted to engage said ratchet; means for removing the sheets from the pile, said means being supported by the surface of the pile, and means having sliding connection with and supporting said pawl directly from said feeding means, substantially as set forth.

32. A sheet-feeding mechanism having in combination a table for supporting the pile of paper; a frame having a standard at each side thereof; the standards 11 arranged in pairs between said first standards and each pair carrying a roller or pulley; the shaft 7 passing through the lower ends of all of said standards; the stay-rod 12 passing through all of said standards and thereby holding the intermediate standards in place; and belts secured at one end to said shaft and passing over said pulleys or rollers and secured to said table at their other ends, substantially as set forth.

33. A sheet-feeding mechanism having in combination a table for holding the pile of paper; elevating mechanism for raising said table having a ratchet; a shaft having a crank; a pawl connected with said crank and adapted to engage said ratchet; means for removing the sheets from the pile, said means being supported by the surface of the pile; and an arm having elastic connection with said means at one end and a slotted or sliding connection with said pawl at the other end, substantially as set forth.

34. A sheet-feeding mechanism having in combination a table for holding the pile of paper; elevating mechanism for raising said table having a ratchet; a shaft having a crank-pin, and being independent of said ratchet; a pawl pivoted directly to said crank-pin and being supported thereby at one end and adapted to engage said ratchet; means for removing the sheets from the pile, said means being supported by the surface of the pile; and an arm having elastic connection at one end with said means and its other end being provided with slotted or sliding connection with said pawl so as to support and operate said pawl, substantially as set forth.

35. A sheet-feeding mechanism having in combination a table for holding the pile of paper; elevating mechanism for raising said table having a ratchet; a shaft having a continuously-operating crank; a pawl connected with said crank and adapted to engage said ratchet; means for removing the sheets from the pile, said means being supported by the surface of the pile, and an arm connected to said means and supporting and having sliding connection with said pawl, substantially as set forth.

36. A sheet-feeding mechanism having in combination a table for holding the pile of paper; elevating mechanism for raising said table having a ratchet; a continuously-moving pawl adapted to engage said ratchet; means for removing the sheets from the pile, said means being supported by the surface of the pile, said means also having operative connection with and supporting said pawl for lifting the latter out of engagement with the ratchet, substantially as set forth.

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