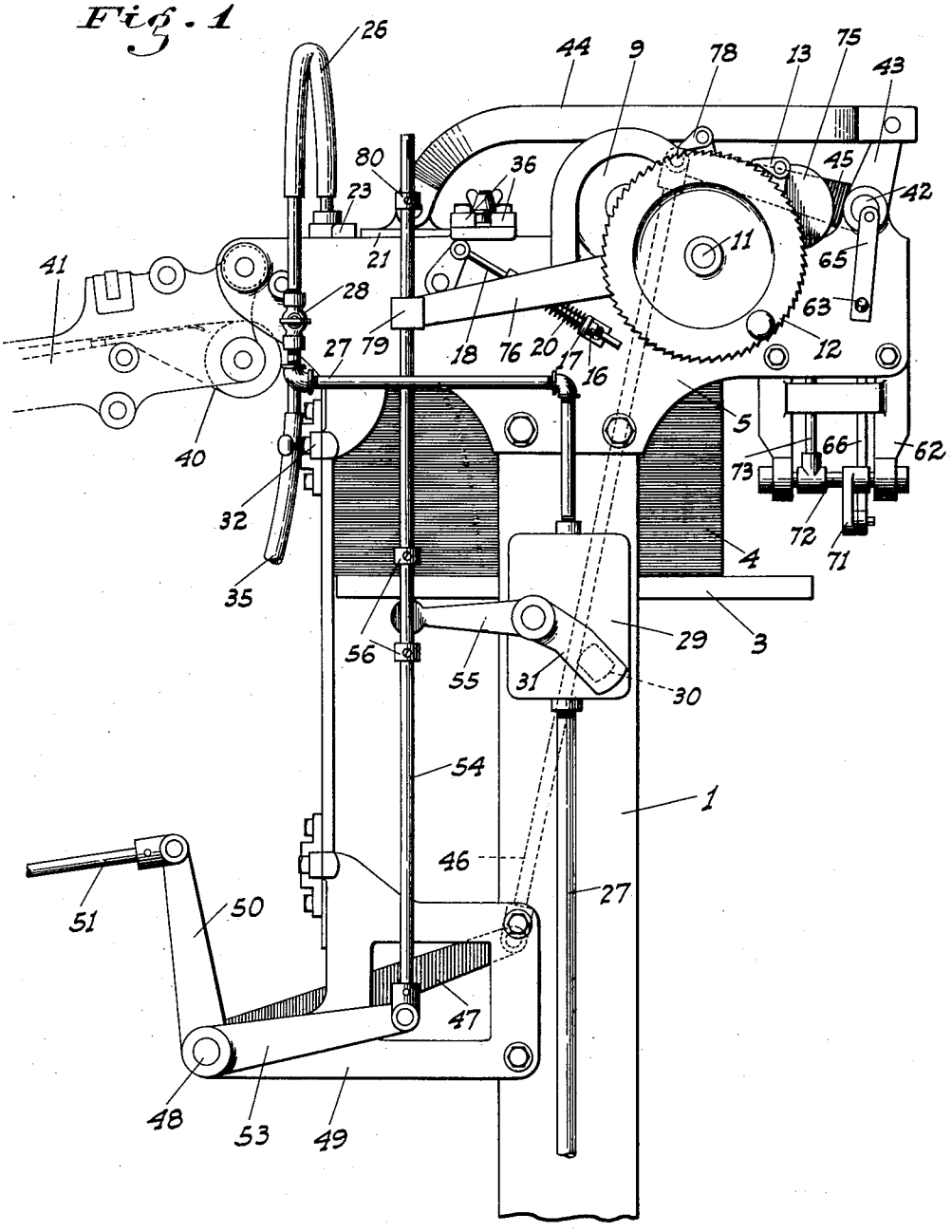
June 10, 1930. C. L. LOW 1,762,661

PAPER FEEDING AND ELEVATING MECHANISM FOR PRINTING PRESSES

Filed March 25, 1929 5 Sheets-Sheet 1

Fig. 1



INVENTOR

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BY

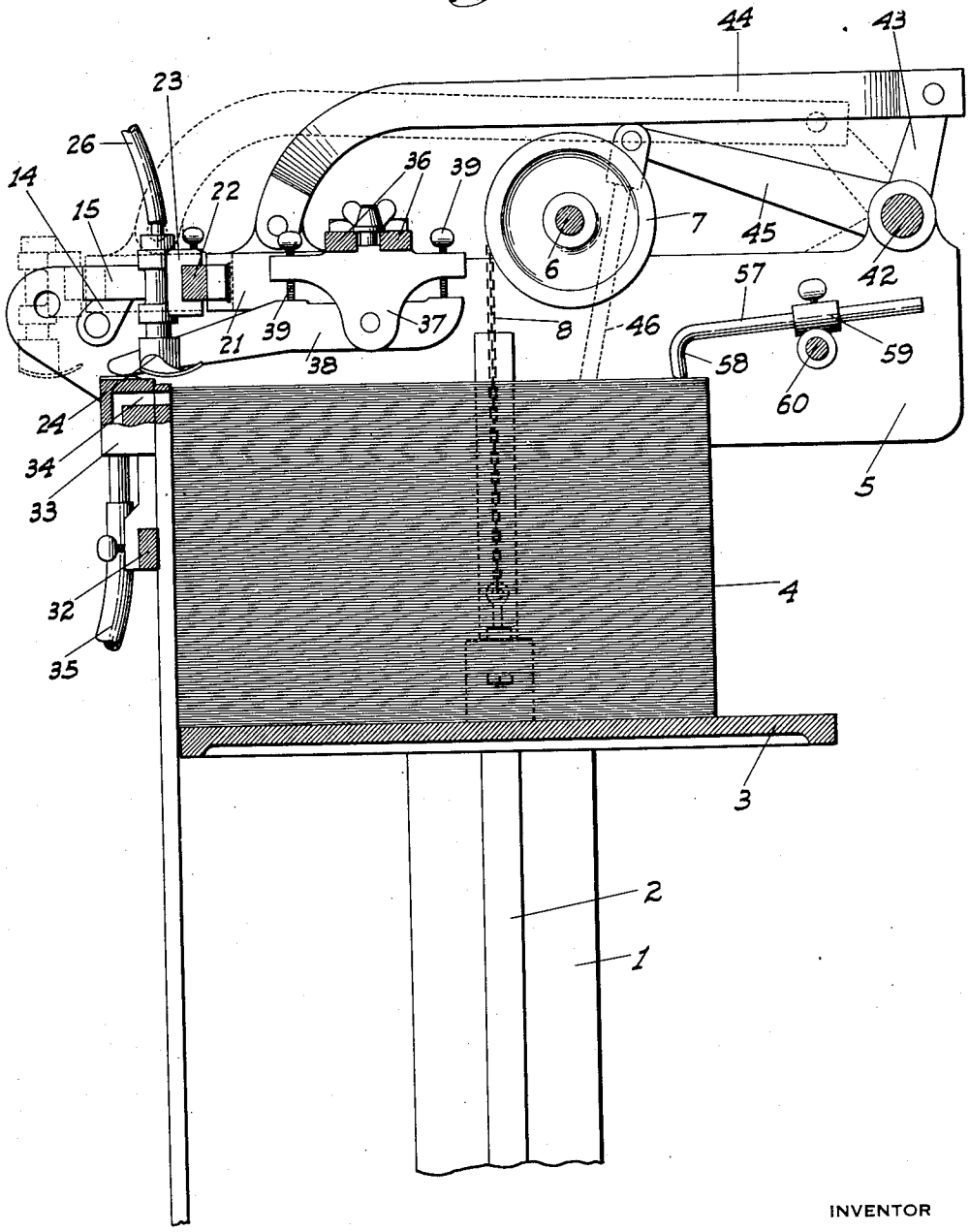
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PAPER FEEDING AND ELEVATING MECHANISM FOR PRINTING PRESSES

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Fig. 2



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PAPER FEEDING AND ELEVATING MECHANISM FOR PRINTING PRESSES

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Fig. 3

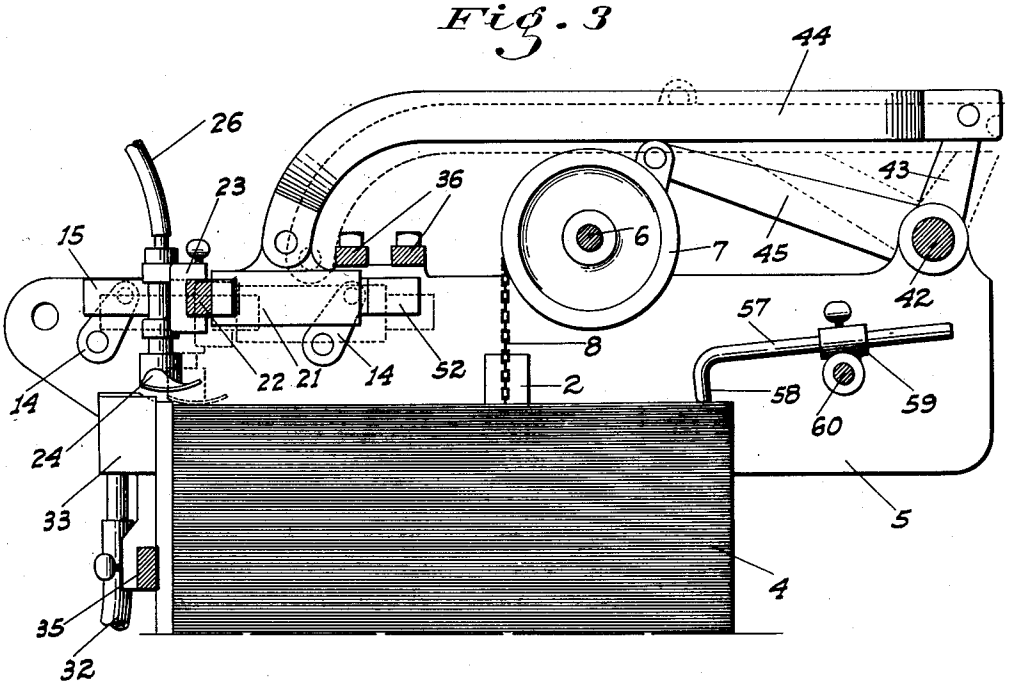


Fig. 4

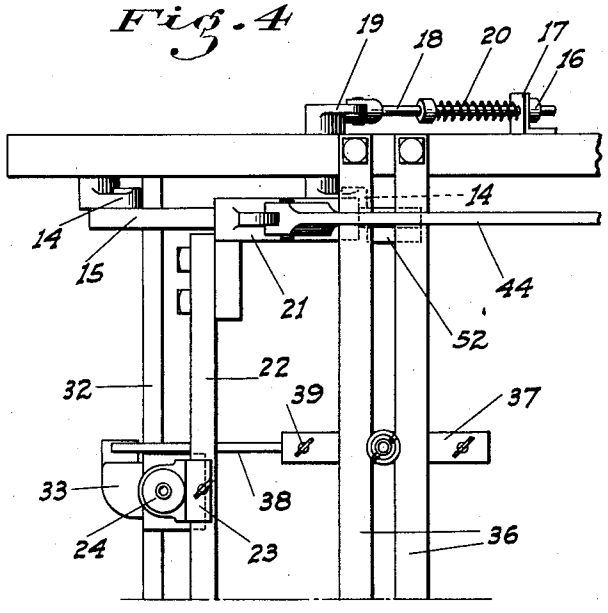
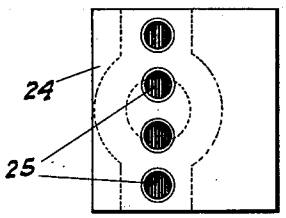


Fig. 5



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PAPER FEEDING AND ELEVATING MECHANISM FOR PRINTING PRESSES

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Fig. 6

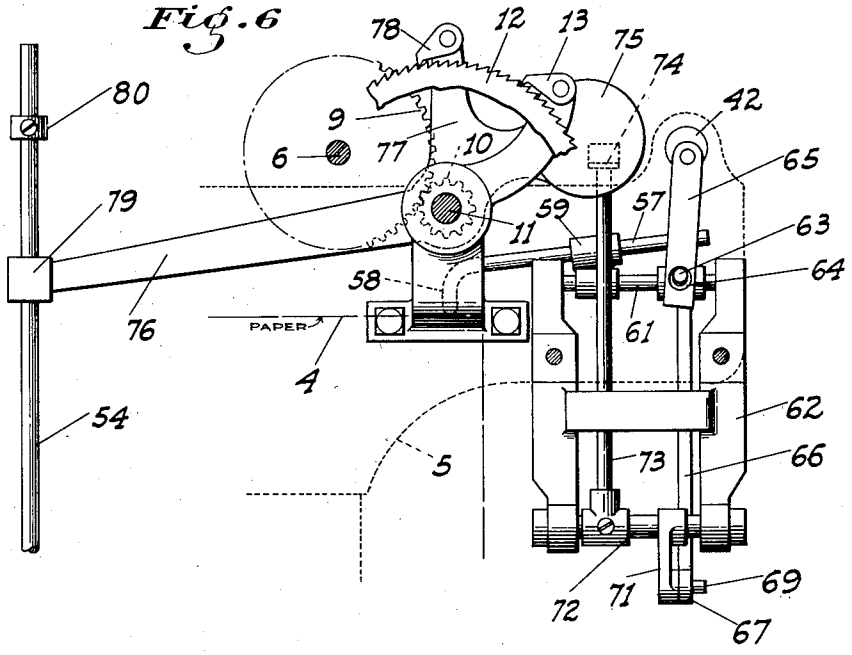
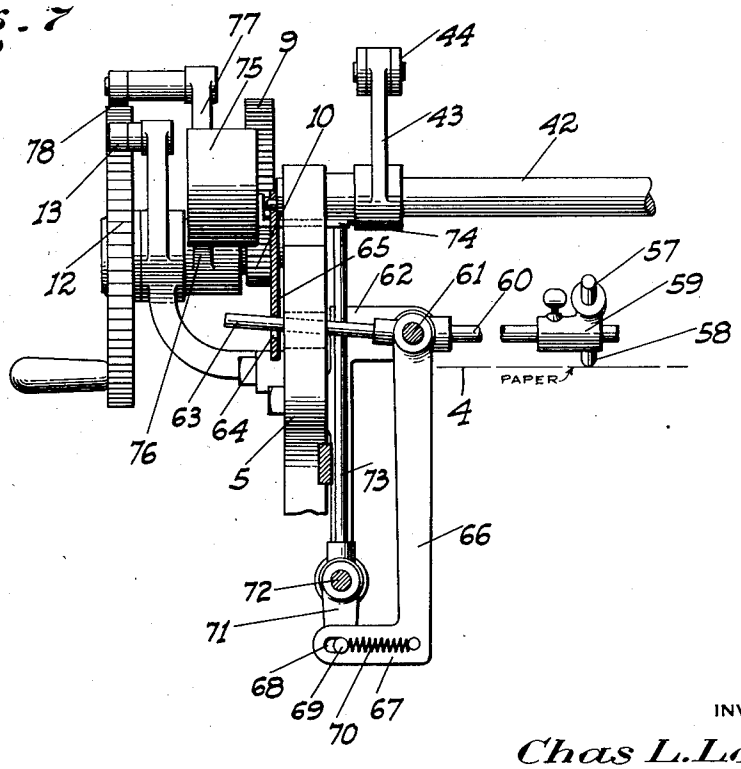


Fig. 7



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June 10, 1930. C. L. LOW 1,762,661

PAPER FEEDING AND ELEVATING MECHANISM FOR PRINTING PRESSES

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Fig. 8

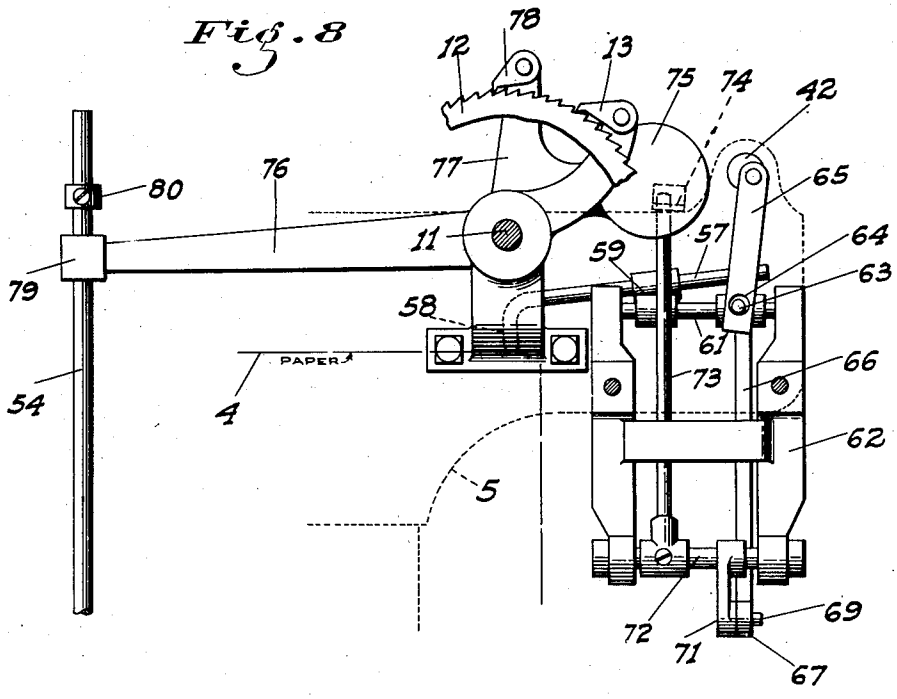
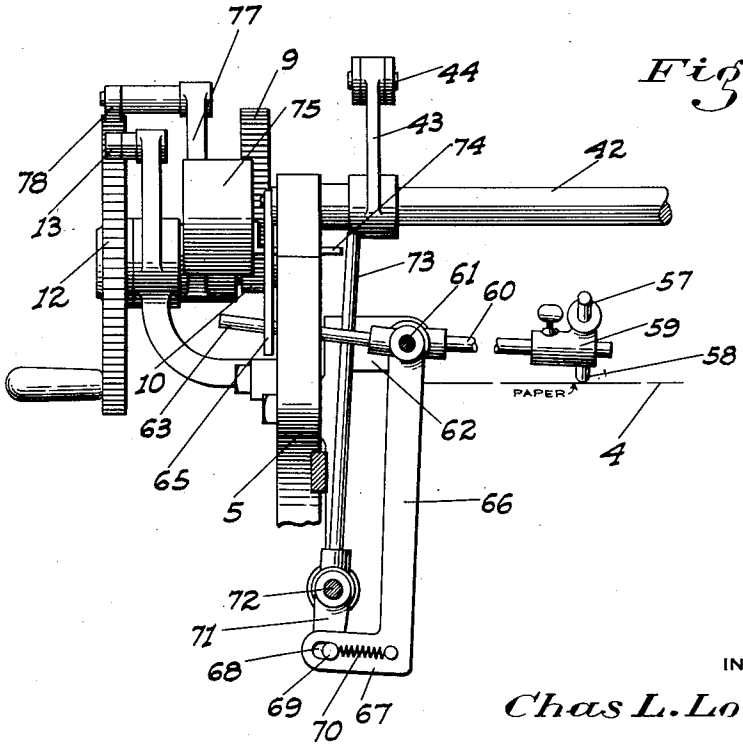


Fig. 9



INVENTOR

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Patented June 10, 1930

1,762,661

UNITED STATES PATENT OFFICE

CHARLES L. LOW, OF FRESNO, CALIFORNIA, ASSIGNOR TO LISENBY MANUFACTURING COMPANY, OF FRESNO, CALIFORNIA, A CORPORATION

PAPER FEEDING AND ELEVATING MECHANISM FOR PRINTING PRESSES

Application filed March 25, 1929. Serial No. 349,637.

This invention relates to the printing art, and particularly to a device for feeding individual sheets of paper from a pile or stack onto the feed conveyor of a printing press and for elevating the paper as the pile becomes lowered by the feeding of the topmost sheets therefrom.

The paper feeding mechanism includes a movable suction nozzle to engage each topmost sheet in turn and carry the same onto the conveyor; and one object of my invention is to provide a novel supporting and operating means for such a nozzle so that the same will have the necessary vertical as well as horizontal movement, and so that such movements will take place in proper and coordinated sequence.

Another object is to provide a novel structure for automatically causing the pile of paper to be raised as said pile becomes depleted so that the topmost sheet is always maintained within the sphere of action of the suction nozzle.

A further object is to arrange the parts of the structure so that the mechanisms for performing the above functions are arranged as a compact unit.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a side elevation of my improved paper feeding and elevating structure.

Fig. 2 is an enlarged sectional elevation of the upper portion of the mechanism showing the nozzle, calipers, flutter-head, and sundry other features.

Fig. 3 is a similar view with the calipers removed to better show the particular supporting means for the nozzle.

Fig. 4 is a fragmentary top plan view of the parts shown in Fig. 2.

Fig. 5 is a bottom plan view of the nozzle.

Fig. 6 is a side elevation of the control mechanism of the paper feeding means in the positions normally occuped thereby, or when the paper is at or substantially at a normal level.

Fig. 7 is an end elevation of said mechanism with the parts in the positions as shown in Fig. 6.

Fig. 8 is a view similar to Fig. 6 showing the positioning of the parts when the pawl lever has been tripped by the lowering of the pile to a predetermined extent.

Fig. 9 is an end elevation of the above mechanism with the parts in the positions as shown in Fig. 8.

Referring now more particularly to the characters of reference on the drawings, the structure comprises a pair of transversely spaced standards 1 having vertical guides 2 on their inner faces engaging the table or elevator 3 on which the pile of individual sheets of paper 4 is supported. Supported by the standards are spaced side frames 5 journaled on and extending across which is a transverse shaft 6.

Drums 7 fixed on said shaft just inside the frames 5 have one end of chains 8 or the like secured thereto, the other end of which chains depend to connections with the table at the sides thereof and in alinement with the guides. On one end of the shaft a fixed gear 9 meshes with a pinion 10 secured on a stub shaft 11 journaled in connection with the adjacent frame 5. Secured on the outer end of the shaft 11 is a ratchet wheel 12 engaged by a fixed pawl 13 which prevents rotation of the wheel in that direction such as would cause the table to be lowered. The manner in which the wheel is rotated in the opposite direction so as to cause the table to be raised as the pile of paper becomes lowered will be set forth later.

Turnably mounted at their lower ends in the frames 5 adjacent one end thereof and

above the pile of paper are longitudinally spaced and relatively short rocker arms 14 having a normal upward slope toward the opposite end of the frames. The upper ends of these arms are pivoted to and support longitudinally extending guide bars 15 parallel to the table.

Each pair of arms is prevented from raising to a vertical position, so as to prevent the bars from being raised by a stop 16 engaging a bracket 17 on the frame 5, said stop being mounted on a rod 18 slidable through said bracket and secured to an arm 19 mounted in connection with one of the arms 14 and disposed on the outside of said frame 5. The arms can move downwardly from their normal angular position but are yieldably restrained from so doing by a spring 20 about the rod 18. Slidable along the bars 15 are crossheads 21 rigidly connected by a transverse bar 22. Slidable along this bar so as to be positioned at different lateral distances relative to the frames 5 is a clamp 23, from which a nozzle 24 depends for engagement with the topmost sheet of paper on the pile in the manner common to such suction operated nozzle sheets. The bottom of this nozzle is provided with suction openings 25. A flexible suction tube 26 connects with the top of the nozzle and with a rigid pipe 27 mounted in connection with the frame of the structure on one side and which leads to a source of suction (not shown). A hand operated valve 28 is interposed in this pipe to control the suctional volume. Interposed in the pipe 27 below the valve 28 is a box 29 having an opening 30 in its outer side normally covered by a swinging valve 31 for a purpose which will be seen later.

Mounted in connection with one end of the frames 5 below the nozzle is a crossbar 32 which supports a laterally adjustable and upwardly projecting flutter head and anvil unit 33. The bottom surface of the nozzle is disposed relative to the top surface of the anvil so as to clear the latter slightly when the guide bars 15 are in their uppermost or normal positions. The flutter head has an air passage 34 therethrough open toward the paper and just below the topmost sheets, as shown in Fig. 2, said passage being connected with an air blast pipe 35 leading to a source of pressure (not shown).

Supported by the top of the frames 5 and extending therebetween are transverse bars 36, supported by and depending from which for lateral adjustment is a bracket 37 in which a horizontal caliper element 38 is pivotally mounted. One end of this element overhangs the anvil to one side of the nozzle, and the spacing of such end relative to the anvil is regulated according to the thickness of the paper on the pile by adjustment screws 39 mounted in the bracket and bearing against said caliper element on both sides of its pivot. The nozzle, anvil and calipers, all laterally adjustable between the side frames, these parts may be maintained in the necessary cooperating relation with each other and so that the nozzle will engage the paper centrally of its width, regardless of what such width may be.

Means is provided to reciprocate the crossheads through a certain distance and to also cause the same to be depressed when the nozzle is disposed back of the anvil and over the paper. Such movement of the nozzle will cause the same to be depressed to engage the paper and to be then moved with the paper engaged thereby over the anvil, so as to cause the paper to be fed onto the tapes 40 of the conveyor 41, which leads to the press (not shown).

Such means is constructed as follows: Journaled in the frames 5 at the end thereof opposite the nozzle is a transverse shaft 42 from which radial arms 43 project upwardly. Connecting rods 44 extend between and are pivoted onto the outer ends of said arms and onto the cross-heads above the guides. The shaft 42 is oscillated through a certain arc by means of a radial arm 45 from which a rod 46 depends to a connection with the outer end of a substantially horizontal radial arm 47 pivoted on a counter-shaft 48 journaled in brackets 49 projecting from the standards 1.

The shaft 48 has another radial arm 50 secured thereto, substantially at right angles to the arm 47, from which a rod 51 extends to a connection with the bed reciprocating lever or other operating member of the press, so that the parts above described will be oscillated in coordinated relation with the operation of the press.

The movement of the arm 50 is such that the cross-heads and nozzle will be reciprocated without movement of the guide-bars 15, from a position in front of to one in back of the anvil or in overhanging relation to the adjacent end of the sheets of paper. As soon as the nozzle reaches the latter position, however, the crossheads engage stops 52 projecting from the guides 15 (see Figs. 3 and 4). Further movement of the crossheads in the same direction therefore also causes the guide-bars to be depressed, the supporting arms 14 of the bars turning on their pivotal connections with the frames against the resistance offered by the springs 20. The nozzle will therefore be lowered and owing to the normal angle at which the arms 14 are disposed such lowering movement will be very sharp or sudden as compared with the accompanying horizontal movement. The nozzle therefore will almost instantly be lowered into engaging relation with the paper, so that the suction at the nozzle openings will effectively act to hold the paper against the bottom of the nozzle with the retractive movement of the parts. As soon as the nozzle is

thus depressed the movement of the arm 50 is reversed and the shaft 42 also starts to oscillate in the opposite direction. This first causes the nozzle to be instantly raised to its normal anvil-clearing lever, since the springs 20 are then free to function to raise said guide bars. The nozzle then moves in a straight horizontal path across the anvil, taking the sheet of paper with it. The paper passes between the anvil and the caliper element, which acts as a gage means to prevent more than one sheet or a sheet of greater than a predetermined thickness being fed onto the conveyor.

As soon as the nozzle reaches a position over the conveyor tapes the suction in the nozzle is released so as to cause the paper to be disengaged from said nozzle by the following means:—

Fixed in connection with the shaft 48 is an arm 53 from which a rod 54 projects upwardly to one side of the valve box 29 and on the same side of the frame of the structure as said box. Fixed in connection with the valve member 31 is an arm 55 which projects adjacent the rod 54 so as to be intermittently engaged by vertically spaced stops 56 on said rod. These stops are positioned relative to the movement of the nozzle so that when the nozzle overhangs the conveyor, the upper stop depresses the arm 55 and causes the valve 31 to clear the opening 30, so as to thus break the suction at the nozzle. The valve stays open until the nozzle on its return stroke approaches a position over the stack of paper, when the arm 55 is engaged and raised by the lower stop 56, thus closing the valve and restoring the suction to the nozzle to again be effective to pick up the paper. The valve member 31 and its accompanying arm 55 are arranged so as to stay of themselves in either position to which they may be moved, by making the pivotal joint between said member and the box fairly snug.

Raising of the table 3 with the lowering of the level of the paper on the pile is accomplished in connection with the operation of the paper feeding mechanism as follows: A longitudinally extending rod 57 is disposed between the frames 5 above the pile of paper and terminates in a downwardly bent finger 58 normally engaging the topmost sheet of paper adjacent the end thereof opposite the nozzle. This rod is mounted in longitudinally adjustable relation in a support 59 which is mounted for adjustment along a transverse rod 60. This rod 60 projects laterally from and is rigidly fixed in connection with a longitudinal shaft 61 which is journaled in a bracket 62 depending from and secured to that one of the side frames 5 on which the ratchet wheel 12 is located; this being the same side of the machine as that on which the rod 54 is disposed.

A trip rod 63 is secured to and projects laterally from the shaft 61 away from the rod 60 and through an opening in the adjacent frame 5. This rod also projects through a vertical slot 64 provided in a vertical strap 65 which is pivoted eccentrically on the adjacent end of the shaft 42. This eccentric connection is disposed so that when the shaft oscillates to a position at which the nozzle is depressed into engagement with the paper, the rod 63 will be depressed by a strap 65 at the top of the slot, and the finger 58 will be raised from the paper. This releases the dragging and holding back tendency of the finger on the paper and enables the nozzle to pick up and move the topmost sheet of paper from under the finger without any interference thereby.

Depending from and secured to the shaft 61 is an arm 66 which terminates at its lower end in a right angle outwardly facing extension 67 which adjacent its outer end has a longitudinal slot 68 through which a pin 69 projects. A spring 70 acts to normally hold the pin at the inner end of the slot. This pin is fixed on an arm 71 which depends from a longitudinal shaft 72 journaled in the bracket 62 below the shaft 61. A rod 73 projects upwardly from the shaft 72 and is adapted to normally pass under and engage a lip 74 projecting inwardly from a counter-weight 75. This counterweight is formed on one end of a lever member 76 which is turnably mounted intermediate its ends on the shaft 11 back of the ratchet wheel 12, said lever having a vertical arm 77 carrying a pawl 78 engaging said wheel. The end of this lever opposite the counterweight has a swiveled block 79 through which the rod 54 is freely slidable, which block is adapted to be engaged and depressed by a stop 80 on said rod above the block.

In operation the rod 63 is depressed with each oscillation of the feed control shaft 42 as above stated, raising the finger 58 from the paper but not affecting the rod 73 owing to the slot 68 which allows the arm 66 (connected to said rod 60 and the finger member) a certain freedom of movement. As the finger 58 is lowered with the lowering of the paper level as the sheets are successively removed, the increased tilting of the rod 60 and the consequent movement of the arm 66 causes the rod 73 to gradually move from under the lip 74 between successive depressions of the trip rod 63, until said rod 73 finally clears the lip. The counterweight is then free to drop a certain distance, causing the lever 76 to rock relative to the ratchet wheel and therefore causing the pawl 78 to move back around the wheel a certain distance.

The opposite end of the lever 76 therefore becomes raised somewhat, so that when the rod 54 is lowered to the bottom of its stroke with the operation of the paper feeding means, the stop 80 will engage the block 79

and pull the lever down the same distance that it was previously raised. This pulls the ratchet wheel around a short distance, causing the chain drums to be rotated by reason of the gearing connections therebetween, and the elevator table 3 will consequently be raised. When the lever 76 is thus engaged and fully depressed by the stop 80 the rod 73 again passes under the lip 74 so that the counterweight will be held in its original raised position when the stop moves up from the block with the return or forward movement of the rod 54; the spring 70 then acting to pull the rod 73 back into place under the lip. The operations are then repeated as the supply of paper is depleted still further, the lever 76 being only given one depressing movement for each intermittent table raising operation. As previously stated, the ratchet wheel is held from rotation in the opposite direction at any time by the fixed pawl 13 which is independent of the pawl 78.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

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

1. A paper feeding mechanism including supporting means for a stack of paper, a suction nozzle for engagement with the topmost sheet of paper, suction passage means connected to the nozzle, means for moving the nozzle horizontally and above the level of the paper for a certain distance in one direction and for then causing the nozzle to be depressed to engage the paper, and means operated in conjunction with the nozzle moving means for causing the suction passage to be opened intermediate its ends to the atmosphere for the full duration of the horizontal movement of the nozzle in said one direction.

2. A paper feeding mechanism including supporting means for a stack of paper, a suction nozzle for engagement with the topmost sheet of paper, a horizontal guide bar, a crosshead slidable along the bar, a support for the nozzle connected to the crosshead, means for reciprocating said crosshead along the bar, and means causing the bar to be lowered with the arrival of the crosshead at the end of its stroke along the bar in one direction.

3. A paper feeding mechanism including supporting means for a stack of paper, a suction nozzle for engagement with the topmost sheet of paper, a horizontal guide bar, a crosshead slidable along the bar, a support for the nozzle connected to the crosshead, means for reciprocating said crosshead along the bar, a stop on the bar at one end to be engaged by the crosshead with its movement toward said end, and means supporting the bar in a manner to cause the said bar to be lowered with a further reciprocating movement of the crosshead in the same direction and after it has engaged the stop.

4. A paper feeding mechanism including supporting means for a stack of paper, a suction nozzle for engagement with the topmost sheet of paper, horizontal guide bars, crossheads slidable along the bars, a support for the nozzle connected to the crossheads, means for reciprocating said crossheads along the bars, stops on the bars at one end to be engaged by the crossheads with their movement toward said end, and arms pivoted at one end on the bars and pivoted at the other end in a fixed position, said arms being disposed at an angle to the vertical and in such relation to the stops as to cause horizontal pressure against the stops to turn the arms in a bar lowering direction.

5. A structure as in claim 4, with spring means yieldably resisting such turning of the arms, and means positively preventing the turning of the arms in the opposite direction beyond a predetermined normal position.

6. A paper feeding mechanism including supporting means for a stack of paper, a suction nozzle for engagement with the topmost sheet of paper, horizontal guide bars, crossheads slidable along the bars, a support for the nozzle connected to the crossheads, means for reciprocating said crossheads along the bars, arms pivoted at one end on the bars and pivoted at the other end in a fixed position, said arms being disposed at an angle to the bars such that longitudinal pressure against the bars from one direction will cause the arms to swing in a bar-lowering direction, and means causing the crossheads to thus exert such pressure as they reach the end of their travel along the bars in one direction.

7. A paper feeding mechanism including supporting means for a stack of paper, a suction nozzle for engagement with the topmost sheet of paper, horizontal guide bars, crossheads slidable along the bars, a support for the nozzle connected to the crossheads, means for reciprocating said crossheads along the bars, arms pivoted at one end on the bars and pivoted at the other end in a fixed position, said arms being disposed at an angle to the bars such that longitudinal pressure against the bars from one direction will cause the arms to swing in a bar-lowering direction, and means for exerting such pressure on the bars as the crossheads near one end of the same.

8. A paper feeding mechanism including supporting means for a stack of paper, a suction nozzle for engagement with the topmost

sheet of paper, horizontal guide bars, crossheads slidable along the bars, a support for the nozzle connected to the crossheads, a transverse shaft, means for oscillating the shaft, radial arms projecting upwardly from the shaft, and connecting rods extending between and pivotally connected to the arms and crossheads.

In testimony whereof I affix my signature.

CHARLES L. LOW.