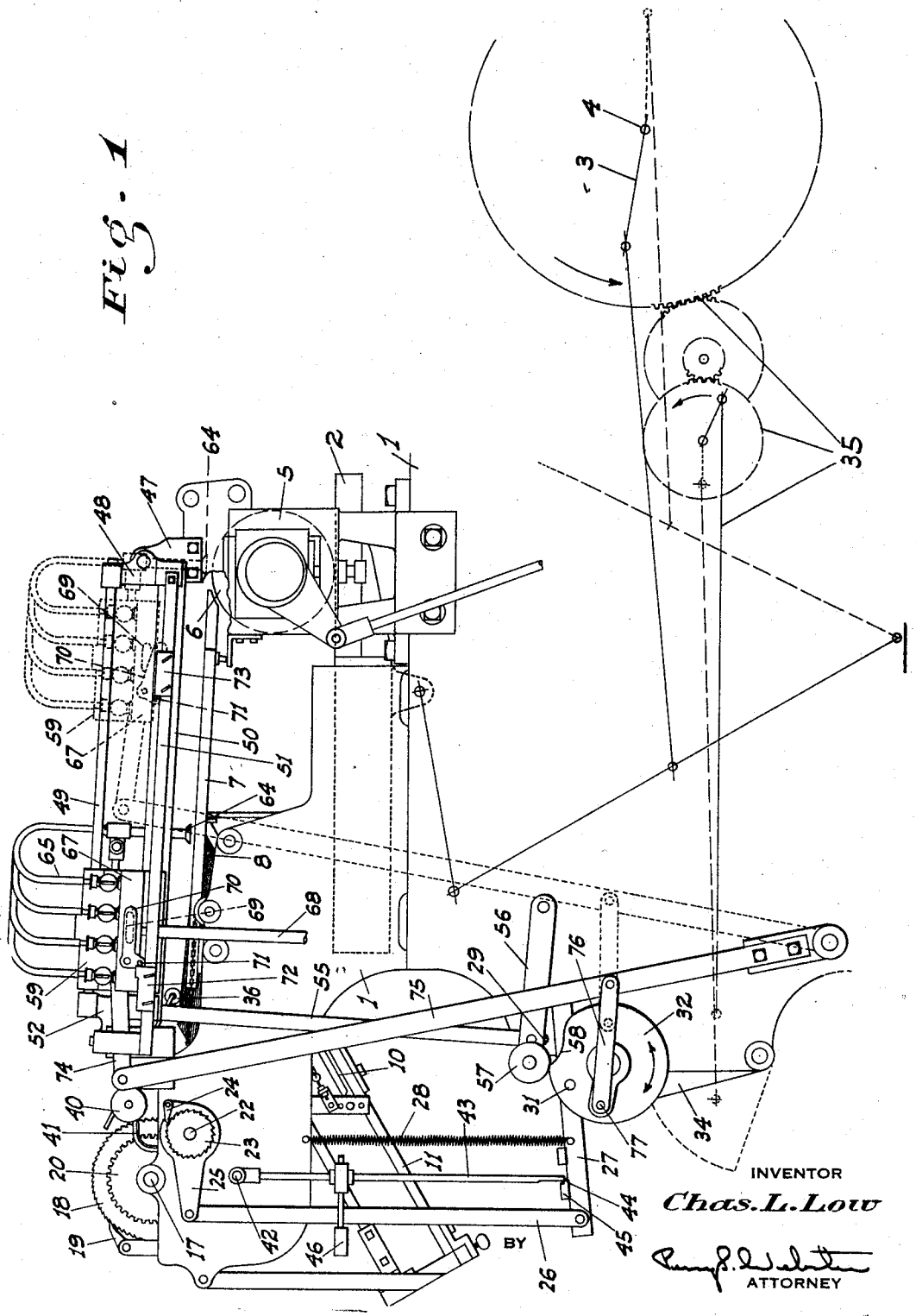
Aug. 25, 1931. C. L. LOW 1,820,469

AUTOMATIC PAPER FEEDING MECHANISM FOR PRINTING PRESSES

Filed Sept. 10, 1929 7 Sheets-Sheet 1

Fig. 1



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AUTOMATIC PAPER FEEDING MECHANISM FOR PRINTING PRESSES

Filed Sept. 10, 1929 7 Sheets-Sheet 2

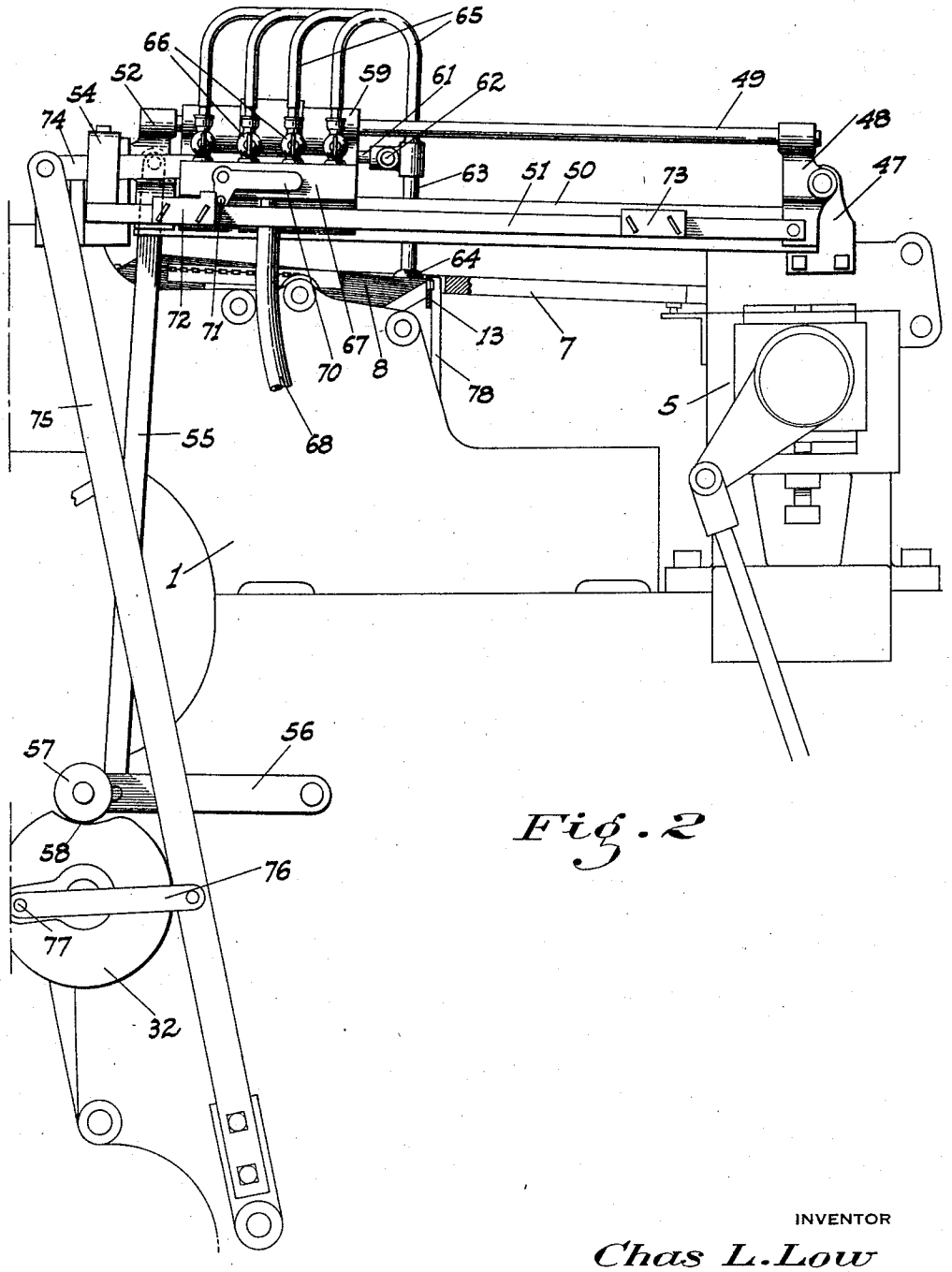


Fig. 2

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AUTOMATIC PAPER FEEDING MECHANISM FOR PRINTING PRESSES

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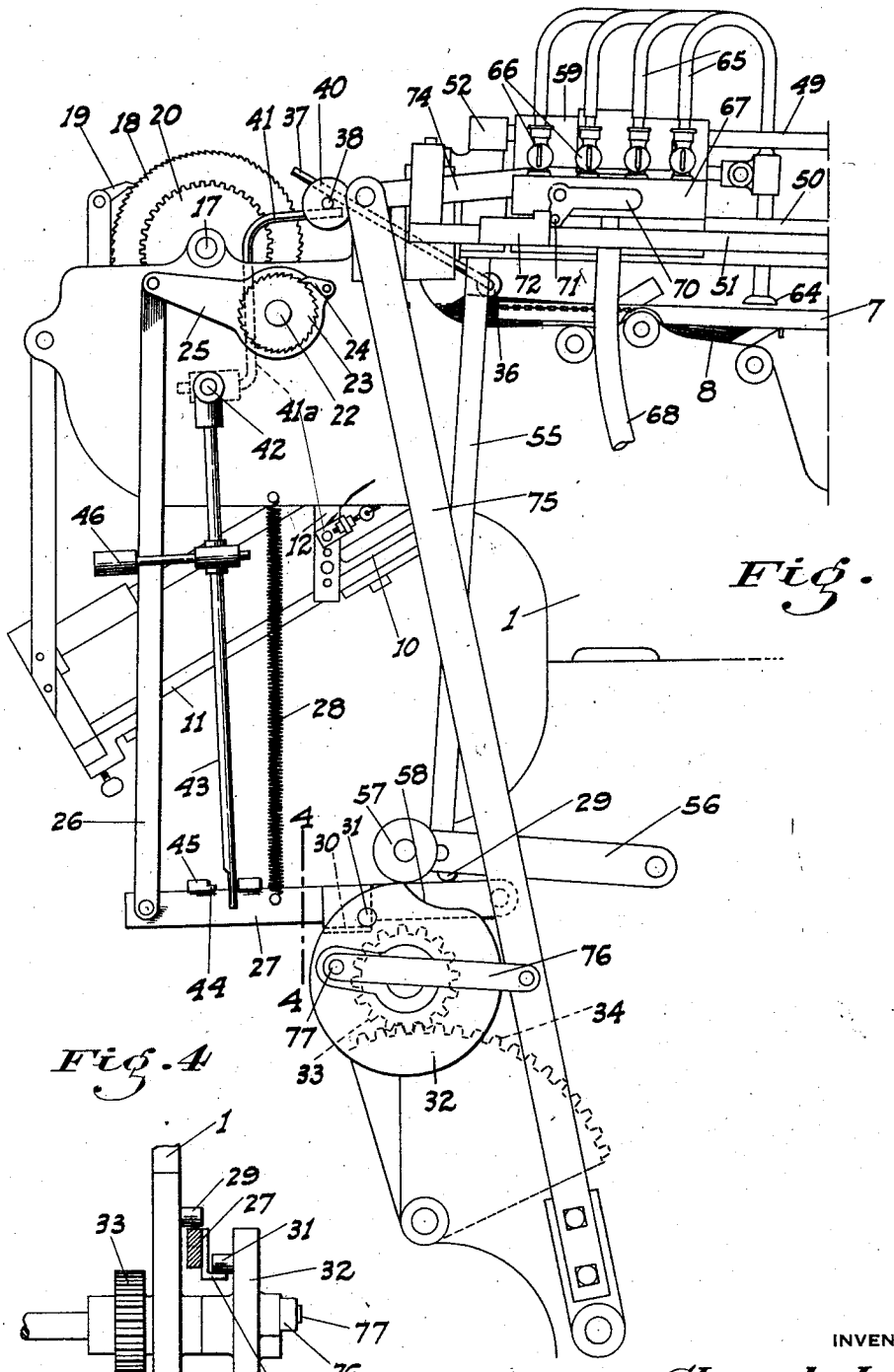


Fig. 3

Fig. 4

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BY

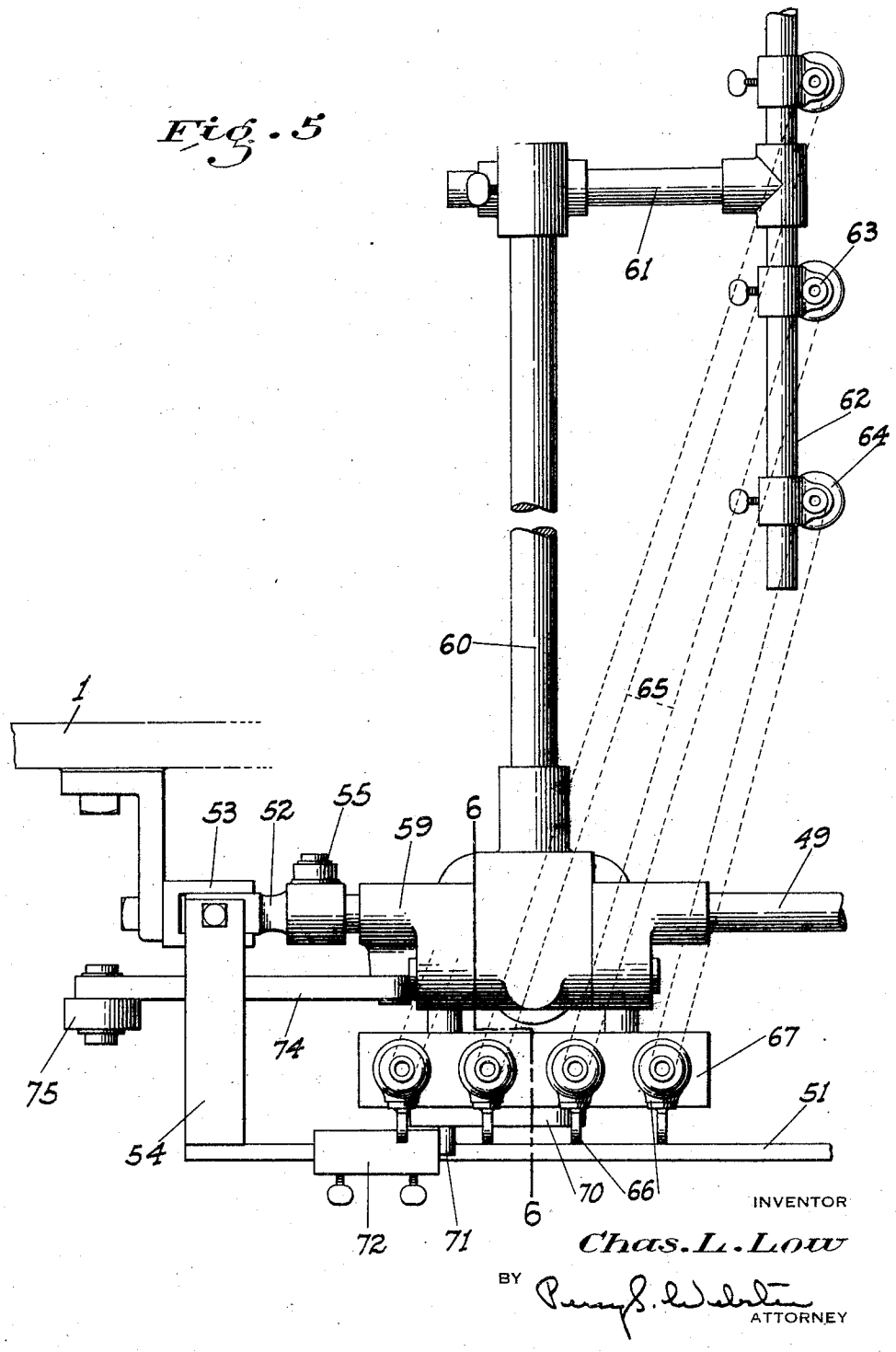
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AUTOMATIC PAPER FEEDING MECHANISM FOR PRINTING PRESSES

Filed Sept. 10, 1929 7 Sheets-Sheet 4

Fig. 5



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AUTOMATIC PAPER FEEDING MECHANISM FOR PRINTING PRESSES

Filed Sept. 10, 1929 7 Sheets-Sheet 5

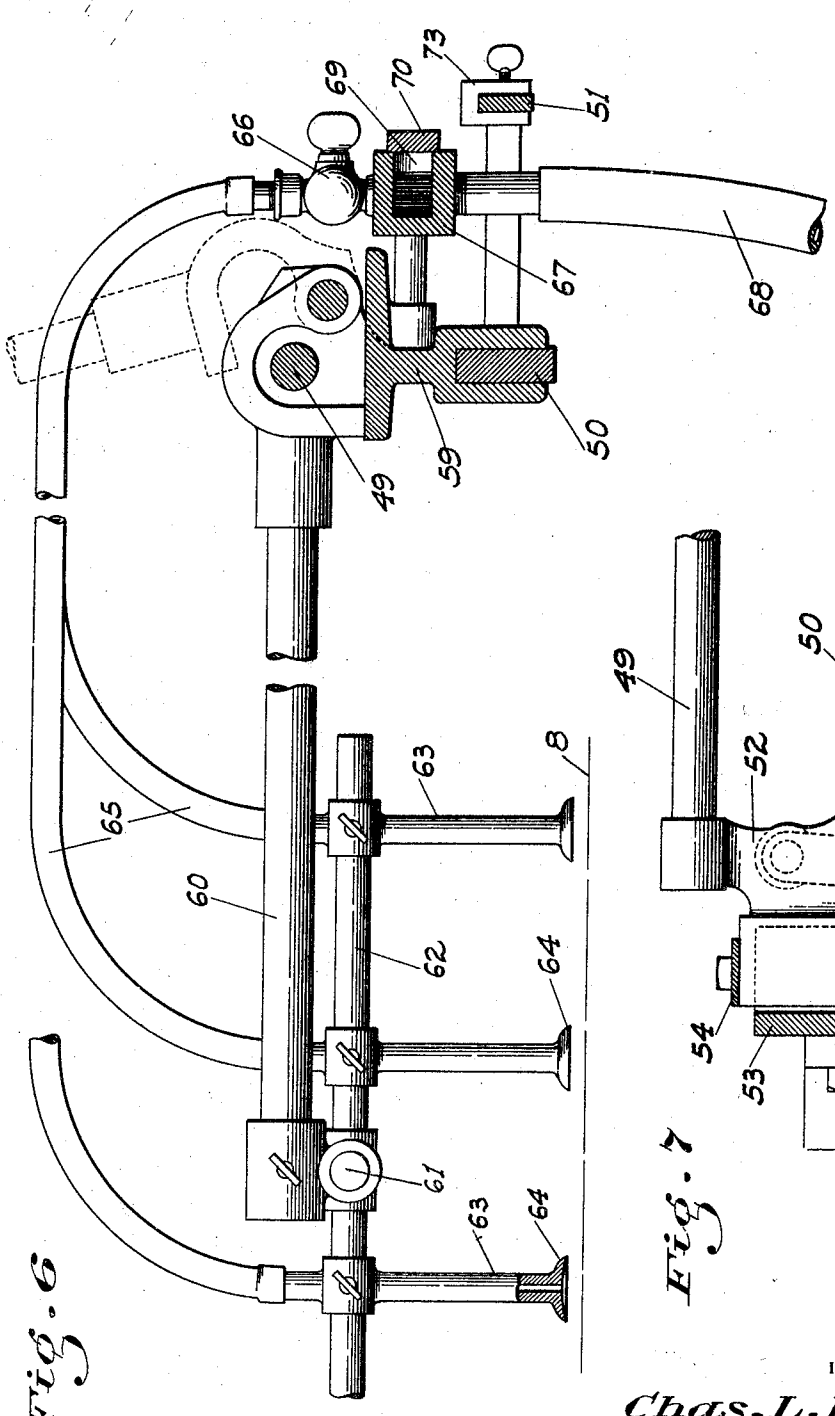


Fig. 6

Fig. 7

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Aug. 25, 1931. C. L. LOW 1,820,469

AUTOMATIC PAPER FEEDING MECHANISM FOR PRINTING PRESSES

Filed Sept. 10, 1929 7 Sheets-Sheet 6

Fig. 8

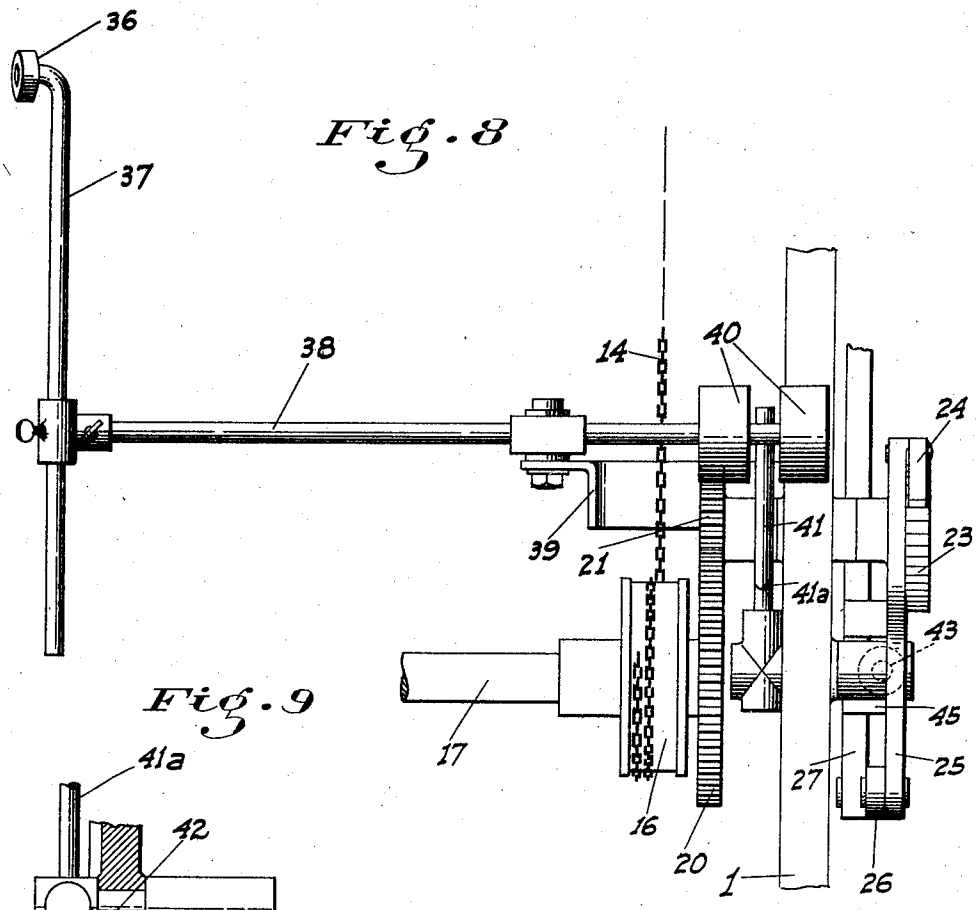


Fig. 9

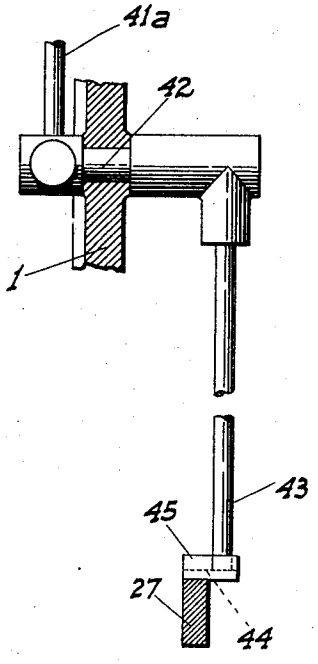
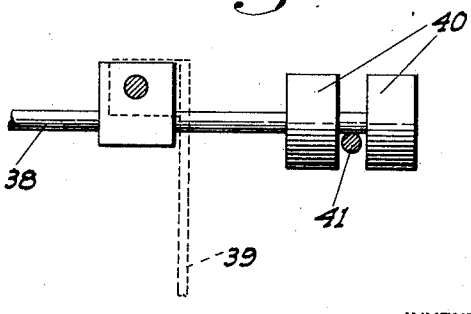


Fig. 10



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Aug. 25, 1931. C. L. LOW 1,820,469

AUTOMATIC PAPER FEEDING MECHANISM FOR PRINTING PRESSES

Filed Sept. 10, 1929 7 Sheets-Sheet 7

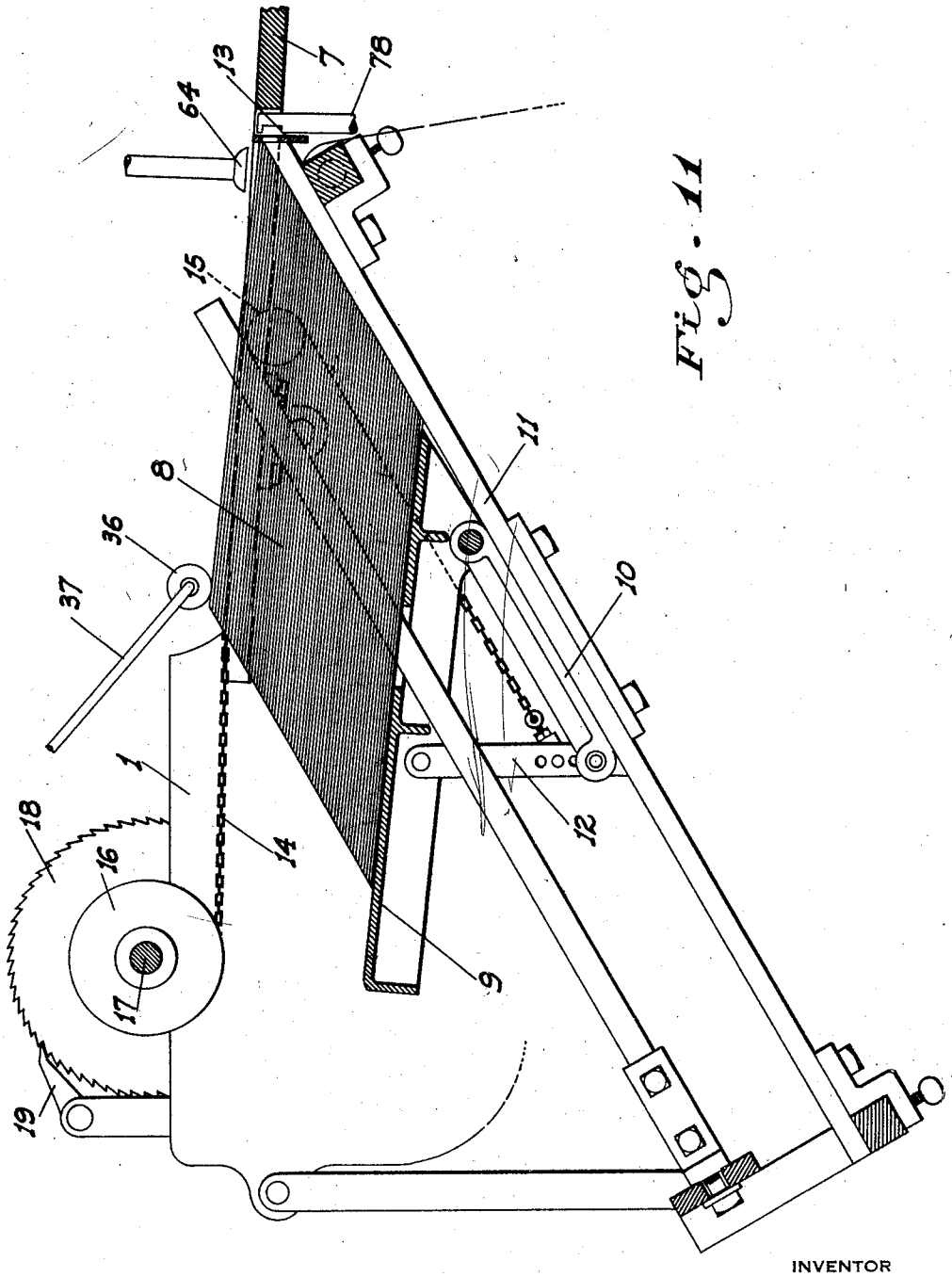


Fig. 11

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Patented Aug. 25, 1931 1,820,469

UNITED STATES PATENT OFFICE

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

AUTOMATIC PAPER FEEDING MECHANISM FOR PRINTING PRESSES

Application filed September 10, 1929. Serial No. 391,606.

This invention relates to printing presses, and particularly to one of the cylinder and flat bed type, such as for instance is shown in my Patent No. 1,587,968, dated June 8, 1926.

The present invention also particularly relates to the feeding of the paper from the stack or pile on the elevator to the cylinder, and represents improvements over the corresponding mechanism shown in my Patent No. 1,615,590, dated January 25, 1927, (which mechanism was applied to the press in said first named patent); and also represents improvements over the mechanism shown in my copending application for patent, Serial No. 349,637, filed March 25, 1929.

In the structure of said copending application, suction was employed to engage the topmost sheet on the pile and initially move the same a relatively short distance onto the tapes, which then conveyed the sheet to the cylinder. Such an arrangement necessitated, besides the suction control and operating mechanism, the tapes and driving means therefor, and a relatively complicated mechanism to properly aline the paper when on the tapes and to hold the same from further movement until the cylinder had moved to a certain definite position to receive the paper, as shown in said Patent No. 1,615,590.

The principal object of the present invention is to provide a full automatic feed structure, and one which avoids the need of the tape-feed and cooperating mechanisms by arranging a suction feed device for the sheets so that each individual sheet is taken from the pile on the elevator and delivered direct to the cylinder without any intermediate mechanism being employed or necessary. The construction is therefore simplified, the delivery of the paper to the cylinder is more easily and accurately timed, and the chance of the paper becoming misalined relative to the cylinder after it has been drawn from the pile is almost entirely eliminated.

A further object of the invention is to provide what I believe to be a novel form of elevator structure itself, and a relatively simplified means for controlling the movement of the elevator-table by the lowering of the level of the pile supported thereon.

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 the feed and elevator control mechanism, the operating parts of which are shown as diagrammatically connected to the driving mechanism of the press. In this figure the feed nozzles are shown as positioned when just ready to be lowered to engage a sheet on the pile.

Fig. 2 is a similar view showing the position of the feed nozzles and corresponding parts as said nozzles are lowered to engage a sheet.

Fig. 3 is a side elevation, with the parts of the feed structure in the same positions as in Fig. 1, but with the elevator control mechanism tripped or released by the lowering of the paper on the pile to cause the elevator table to be consequently raised to restore the level of the pile.

Fig. 4 is a fragmentary enlarged cross section on the line 4—4 of Fig. 3.

Fig. 5 is a top plan view of the movable feed nozzle unit.

Fig. 6 is a transverse section of the same taken on the line 6—6 of Fig. 5.

Fig. 7 is a fragmentary side view showing the mounting of the movable end of the nozzle unit supporting structure.

Fig. 8 is a top plan view of a distinguisher unit showing its connection with the elevator operating mechanism.

Fig. 9 is a fragmentary end view showing the trip rod of the distinguisher mechanism.

Fig. 10 is a fragmentary transverse view of the distinguisher-rod supporting device.

Fig. 11 is a sectional elevation of the elevator structure.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes the side frames of the press slidably mounted on which in a suit-

able manner is the moving bed 2. The bed is reciprocated through a given stroke from a crank 3 on the main drive shaft 4 by suitable connections, such as those shown in my previous patent No. 1,587,928, and which, forming no part of this invention, are indicated diagrammatically only. Supported by the end bearing blocks 5 mounted on the frame is the cylinder 6 which is oscillated through a certain arc with the reciprocation of the bed. This arrangement and its operation are also common to presses of this character and form no part of this invention.

A flat sheet supporting table, supported on the frames 1, extend rearwardly from the cylinder and is substantially tangent to the upper surface of the same; said table terminating at its rear end and adjacent the forward edge of the uppermost sheet of the pile of paper 8, which is supported on the elevator table 9 thereunder. The elevator table is disposed at a slight upward angle relative to the table 7 toward its rear end and has transversely spaced slide blocks 10 pivoted at one end to and under the same, and which are supported by and slide on similarly spaced longitudinally extending bars 11 supported by the frame. These bars extend at a considerable upward angle toward their forward ends, or in the opposite direction to the slope of the elevator table. The angularity of the table 9 may be altered somewhat relative to the bars and the fixed table 7 by adjustable links 12 extending vertically between said table 9 and the free end of the slide blocks. The bars above the table terminate just below the level of the table 7, a vertical cross plate 13 extending to the level of said table 7 from the upper edges of the bars, as shown in Fig. 11.

The bars above the elevator table form stops or guides for the adjacent edges of the sheets of the pile, and since the bars are at an angle to the table the edges of the sheets are not in a common vertical plane but will be in combed relation to each other, or so that each sheet is advanced relative to the one below in the direction of the cylinder. Since the elevator table as raised and moved up will at the same time move in a longitudinal direction toward the cylinder, the combed setting of the pile is automatically maintained with any such movement of the table. Tipping of the elevator table from a horizontal plane in the direction of the cylinder tends to cause the sheets to slide toward the cylinder and to thus cause the combing to be maintained with more certainty.

The table is thus raised by means of chains 14 or the like attached to the links 12 and extending thence parallel to the bars 11 to and over pulleys 15 fixed adjacent the upper ends of said bars to the sides of the table, from which the chains extend horizontally and rearwardly (or away from the cylinder) to drums 16. These drums are fixed on a common shaft 17 journaled on top of the frames 1. This shaft at one end has a ratchet wheel 18 engaged by a pawl 19 which is arranged to prevent rotation of said shaft in a direction such as would cause the chains to be unwound from the drums, and the table to be consequently lowered. The other end of the shaft carries a gear 20 meshing with a pinion 21 fixed on a stub shaft 22 projecting through the frame 1 on one side of the press. A ratchet wheel 23 is fixed on said shaft outwardly of the frame and is engaged by a pawl 24 mounted on a relatively radial arm 25 which is turnable on said shaft and projects horizontally therefrom. This pawl and ratchet are arranged so that depression of the outer end of the arm causes the shaft 22 to be rotated, while the chains are so disposed about the drums 16 that such rotation of said shaft causes the chains to be wound on the drums and the elevator table to be raised. A link 26 depends from the outer end of the arm 25 and is connected at its lower end to the free end of a horizontal arm 27 pivoted at its opposite end on the adjacent frame 1. A tension spring 28 between said frame and the arm 27 tends to raise the latter, its upward movement being limited by a stop 29 projecting from the frame.

Projecting laterally from the arm 27 intermediate its ends is a lug 30, adapted to be engaged by a pin 31 projecting laterally from one face of a disc 32 (see Fig. 4). A pinion 33 is fixed in connection with said disc and is engaged by a segmental gear 34. This gear is oscillated through an arc sufficient to cause the disc to be oscillated through an arc of substantially 180° with each 180° rotation of the crank 3, by means of suitable link and gearing connections with the shaft 4, as indicated diagrammatically at 35 in Fig. 1.

A mechanism, controlled by the level of the top of the pile, is provided to hold the arm 27 down so that the pin 31 with the rotation of the disc will not forcibly engage the lug 30 and depress the arm until the paper on the pile is depleted somewhat and its level is correspondingly lowered.

This mechanism is arranged as follows:

Positioned to engage the topmost sheet of paper towards its end furthest from the cylinder is an element preferably in the form of a roller 36 which is mounted on one end of a rod 37 extending lengthwise of the press and away from the cylinder. This rod is supported by a transverse arm 38 which is pivoted intermediate its ends on a suitable bracket 39 fixed in connection with the frame of the press. The end of the arm 38 opposite the rod carries spaced counterbalance weight 40 so arranged that the roller will bear lightly on the paper and will tend to move down as the level of the paper is low-

ered, without exerting such pressure on the paper as to make it hard to pull the topmost sheet from under the roller. Projecting under the arm between the weights inwardly of the adjacent frame 1 is the upper longitudinally extending portion 41 of a vertical rod 41*a*, which at its lower end is fixed in connection with a transverse spindle 42 turnable in said frame 1. Depending from and fixed on the outer end of this spindle is another rod 43 disposed in a vertical plane intermediate the ends of the arm 27 and in a transverse plane just to one side of said arm. The lower end of this rod is adapted to engage a shoulder 44 formed on and projecting from a block 45 secured on and projecting laterally from the arm 27. A weight 46 mounted in connection with the rod 43 tends to turn the same on its spindle and move its lower end away from the shoulder and to raise the upper horizontal member 41 against the arm 38. The members 41, 41*a*, and 43 practically form a single continuous unit pivoted intermediate its ends on the frame, as will be evident. The parts above described are so arranged that if the paper is at its normal level and the rod 41 is bearing snugly against the arm 38, the lower end of the rod 43 will be so disposed vertically as to be in line with the shoulder 44. In turn this shoulder, when the arm 27 is positioned so that the lug 30 is barely engaged by the pin 31 at the end of the stroke or oscillation of the disc 32 in one direction, will be at such a level as to be on a level with the bottom of the rod 43 so that the latter will seat on said shoulder and thus prevent the spring 28 from functioning to raise the arm 27.

The various parts of the distinguishing and control mechanism above described are somewhat flexible or yieldable, and as long as the level of the paper remains substantially the same or normal, the horizontal member 41 cannot raise, and consequently the rod 43 cannot swing rearwardly to clear the shoulder 44. The spring 28 therefore cannot act to raise the arms 27 and 25. With the lowering of the paper on the pile, however, the roller 36 of course moves down and the weighted end of the arm 38 is tilted up, leaving a clearance under the arm 38 for the member 41 to rise, which it tends to do owing to the weight 46. The pin 31 of the disc bears lightly against the lug 30 in an arm depressing direction with each oscillating cycle of the disc, and if the above mentioned clearance exists the lower end of the rod 43 of course swings clear of the shoulder 44 whenever the holding pressure due to the spring 28 is released by said light engagement of the lug 30 by the pin 31.

As soon as said pin 31 moves clear of the lug with the oscillating of the disc in the opposite direction, the arm 27 swings upwardly due to the pull of the spring 28, and the arm 25 likewise moves up, retracting the pawl 24 about the ratchet 23. The extent of upward movement of said arm 27 is of course limited by the stop 29. With the subsequent or return oscillation of the disc, the pin 31 engages the lug 30 and depresses said arm to its original position. This causes a rotation of the ratchet wheel 23 and parts connected thereto, causing the elevator to be instantly raised sufficient to restore the paper to its original level. The member 41 is therefore depressed by the lifting of the roller 36 to its original position and the rod 43 again swings to position over the shoulder 44, engaging the same and preventing a subsequent raising of the arm 27 when the pin 31 moves away from the lug 30. The parts are all then in the positions originally described and remain thus until the paper is again lowered, when the cycle of operations above recited is repeated.

The paper feeding mechanism itself is constructed as follows:

Fixed on top of the cylinder supporting block 5, which is on the same side of the press as the disc 32, is a bracket 47 on which is pivoted a support 48, disposed outwardly of the plane of the adjacent frame 1. To this support are secured one end of a longitudinally extending rod 49, a bar 50 thereunder, and another bar 51 outwardly of said bar 50 but on substantially the same level. These members are all parallel to each other and extend toward the rear end of the press. At their rear ends the rod and bar 50 are rigidly connected to another support 52 which is slidable vertically in a guide 53 secured to the adjacent frame 1. The corresponding end of the bar 51 is connected to the support 52 by an arched yoke 54.

A substantially vertical link 55 is connected at its upper end to the support 52 and at its lower end is connected to a horizontal arm 56 which extends adjacent and above the plane of the disc 32 and is pivoted at one end onto the frame 1. The free end of this arm carries a roller 57 which rides on the periphery of the disc. This disc is circular and concentric with its axis throughout, except for a depression 58 provided at a certain point in its extent and which is adapted to receive the roller. The length of the link 55 is such that when the roller 57 is riding on the circular portion of the disc, the rod 49 and corresponding parts will be parallel to the table.

Slidably mounted on the rod 49 and bar 50 is a block 59 from which a rigid bar 60 projects transversely of the press over the paper supporting area. The bar 60 is pivotally connected on said block in such a manner that it may be swung to a substantially vertical position if desired, as indicated in Fig. 6. Supported from the outer end of the arm 60 by a rod 61 extending lengthwise of

the press is a cross-bar 62 from which a plurality of suction nozzles, spaced transversely of the press, depend. These nozzles comprise tubular stems 63 adjustably clamped in connection with the bar 62, and relatively flat cups or dished heads 64 on their lower ends. The upper ends of the nozzle stems are individually connected by flexible tubes 65 with suitable hand valves 66. These valves are mounted on a hollow member 67 supported by the slide 59 and disposed between said slide and the bar 51. The member 67 is connected to a flexible hose 68 depending therefrom and which leads to a source of suction (not shown). The side of the member 67 facing the bar 51 is provided with an opening 69 leading to the interior of the same, and with which the various valves 66 communicate. This opening is adapted to be covered by a flap 70 pivoted on said member for movement in a vertical plane.

A pin 71 projects laterally from the flap below the pivot and into the path of longitudinally spaced stop blocks 72 and 73 mounted on the bar 51 toward its front and rear ends respectively. The purpose of this structure will be seen later.

The slide 59 and the parts connected thereto are reciprocated along the supporting bars substantially from end to end of the same or for a distance greater than the length of a sheet of paper. Also the parts of the press are proportioned so that such distance is from a point where the nozzles are just back of the stop plate 30, as shown in Fig. 3, to a point substantially central of the cylinder 6 as indicated in Fig. 1. Also the distance from said cylinder to the plate 13 is greater than the length of any sheet of paper which may be placed on the elevator. Such movement and to said extent is imparted to the slide by a horizontal link 74 connected thereto and to the upper end of a substantially vertical lever 75 which depends past the disc 32 and is pivoted at its lower end below the disc on the frame 1. Intermediate its ends this lever is connected by a member 76 with a crank pin 77 on the disc.

The crank pin is so positioned on the disc relative to the depression 58 that the slide 59 will be at the rear end of its travel, with the nozzles overhanging the topmost sheet of the paper, and with the lever 75 consequently at the corresponding end of its arc of oscillation, just before the depression 58 moves under the roller 57. The disc continues to rotate in the same direction as up to the above point before its movement is reversed, just sufficient to cause the roller to drop into the depression but not enough to affect the lever 75.

This is because the crank pin 77 is then adjacent its dead-center position relative to the axis of the disc and the point of connection of the member 76 with the lever, and the very few degrees of movement of the pin past dead-center which are necessary will not impart any appreciable movement to said lever 75. The slide 59 and the nozzles therefore remain stationary in a longitudinal direction while the roller is moving into or out of said depression. The depth of the depression is such that the slide 59 drops sufficient to cause the nozzles to engage the topmost sheet of the pile, which is maintained on a normal lever somewhat below the top of the plate 13 and the table 7, so that there is no possibility of the sheets shifting from their position on the pile onto the table 7 of themselves.

The suction then acts through the main hose 68 and the various individual nozzle tubes to said nozzles, causing the sheet to be suctionally clamped against the nozzles. As soon as the roller 57 has been lowered into the depression it is again and immediately raised by the reversal of movement of the disc, and the slide 59 and nozzles are again raised to their original level, together with the sheet of paper engaged by the nozzles. This level is such that the nozzles and of course the sheet are above the level of the top of the plate 13 and table 7, so as to permit the sheet being drawn past the plate 13 without any interference. As soon as the nozzles are again raised to the above position the lever 75 is oscillated in the opposite direction, causing the nozzle unit to travel toward the cylinder, or until the nozzles overhang the cylinder, which is the opposite dead-center position of the crank pin 77.

Just before the nozzles arrive at said position the pin 71 of the flap 70 engages the stop 73, causing the flap to be turned down so that the opening 69 is exposed to the atmosphere, as indicated in Fig. 1.

The suction is then of course broken between the hose 68 and the nozzle tubes, and the sheet of paper drops from said nozzles and rests on the table in overhanging relation to the cylinder. The sheet is then gripped by and rotated with the cylinder by the mechanism shown in my co-pending application for patent, Serial No. 393,404 filed September 18, 1929. Upon the return stroke of the nozzle supporting slide, the flap remains open until the pin 71 engages the forward stop 72 and is turned to a closed position, so that the suction again acts through the nozzles to engage the next sheet of paper.

To prevent the possibility of more than one sheet being taken up by the nozzles an air pressure pipe 78 is mounted just ahead of the plate 13, having a side opening which registers with a corresponding opening in the plate, as shown in Fig. 11. The air is therefore constantly blown between the sheets at the adjacent end, tending to keep the same separated. The elevator control mechanism is operated in conjunction with the nozzle operating mechanism in such relation that

the elevator will be raised if necessary as the nozzles reach the rear end of their stroke and are in position to engage a sheet.

The use of a plurality of nozzles, laterally adjustable on the press, enable sheets of varying widths to be engaged adjacent their corners, as well as at intermediate points, simultaneously. This avoids the possibility of the sheet sagging at its corners and interfering with its free passage over the plate 13 and onto the table 7. The use of individual valves for the different nozzles enables any of them to be cut out if desired or necessary, according to the width of paper being printed, so that only those actually needed will be in operation, and suctional pressure is conserved.

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 for a printing press having a supporting means for a pile of paper and a cylinder horizontally spaced from the pile, including a suction nozzle to engage the topmost sheet on the pile, a suction passage member connected with the nozzle and movable therewith, means for reciprocating the member and nozzle horizontally a distance sufficient to cause the edge of the sheet nearest the cylinder to be moved into overhanging relation to the latter, and means actuated automatically by and with the movement of the member to open said passage to the atmosphere as the sheet arrives at the cylinder.

2. A paper feeding mechanism for a printing press having a supporting means for a pile of paper and a cylinder horizontally spaced from the pile, including a suction nozzle to overhang and engage the topmost sheet of the pile, supporting means for the nozzle, including a slide block, a substantially horizontal bar extending lengthwise of the press and pivoted thereon at its end nearest the cylinder, said block being slidable along the bar, means for reciprocating the block and nozzle a distance sufficient to cause the sheet to be moved from the pile to a position overhanging the cylinder, and means connected to the bar and functioning in conjunction with the nozzle reciprocating means to cause the bar, only when the nozzle is overhanging the pile, to be depressed sufficient to cause the nozzle to be lowered into contact with the topmost sheet of the pile, and to be raised and held immovable while the nozzle is moving along the bar.

3. A paper feeding mechanism for a printing press having a supporting means for a pile of paper and a cylinder horizontally spaced from the pile, including a fixed table extending from the pile to the cylinder and being disposed on a level higher than the top of the pile, a suction nozzle to overhang and engage the topmost sheet of the pile, supporting means for the nozzle, including a slide block, a substantially horizontal bar extending lengthwise of the press and pivoted thereon at its end nearest the cylinder, said block being slidable along the bar, a lever pivoted on the press, a connection between the lever and the block to cause the latter to be reciprocated along the block with the oscillation of the lever, a disc, means for oscillating the disc through a certain arc, a driving connection between the disc and lever to oscillate the latter through an arc sufficient to cause the nozzle to travel from a position overhanging the pile to one adjacent the cylinder and vice versa, with the oscillation of the disc through said arc, a roller riding on the periphery of the disc, a horizontal arm pivoted on the press and on the free end of which said roller is mounted, and a vertical link depending from the bar to the arm; the periphery of the disc being concentric with its axis except for a depression positioned to receive the roller therein when the disc is at one end of its arm of oscillation and the nozzle is overhanging the pile; the disc, arm and link being arranged to cause the bar, when the roller is engaged with the concentric surface of the disc and the nozzle is moving lengthwise of the bar, to be maintained parallel to the table and so that the nozzle is clear of the same, and to cause said bar, when the roller is riding in the disc-depression, to be depressed at its free end sufficient to lower the nozzle into engagement with the topmost sheet of the pile.

4. A paper feeding mechanism for a printing press having a supporting means for a pile of paper and a cylinder horizontally spaced from the pile, including a suction nozzle to engage the topmost sheet on the pile, a support for the nozzle including a slide block, a substantially horizontal bar mounted lengthwise on the press and on which the block is slidable, means for reciprocating the block along the bar a distance sufficient to cause the nozzle to be moved from over the pile to a predetermined position adjacent the cylinder, suction passage means to the nozzle including a hollow member rigid with the block and having a lateral opening to communicate with the atmosphere, a pivoted flap to cover said opening, and means acting on said flap with the movement of the block along the bar to cause the flap to be moved

to uncover said opening just as the nozzle reaches its position nearest the cylinder, and to be moved to cover the opening just as the nozzle reaches the opposite end of its stroke and is in overhanging relation to the pile.

5. A structure as in claim 4, in which said last named means comprises a bar fixed with and parallel to said first named bar, the flap facing one side of said bar, a pin projecting from the flap in offset relation to the pivot thereof and longitudinally spaced blocks on said second bar to engage the pin and cause the flap to turn on its pivot in opposite directions respectively as the slide block reaches its limits of travel along the supporting bar.

In testimony whereof I affix my signature.

CHARLES L. LOW.