

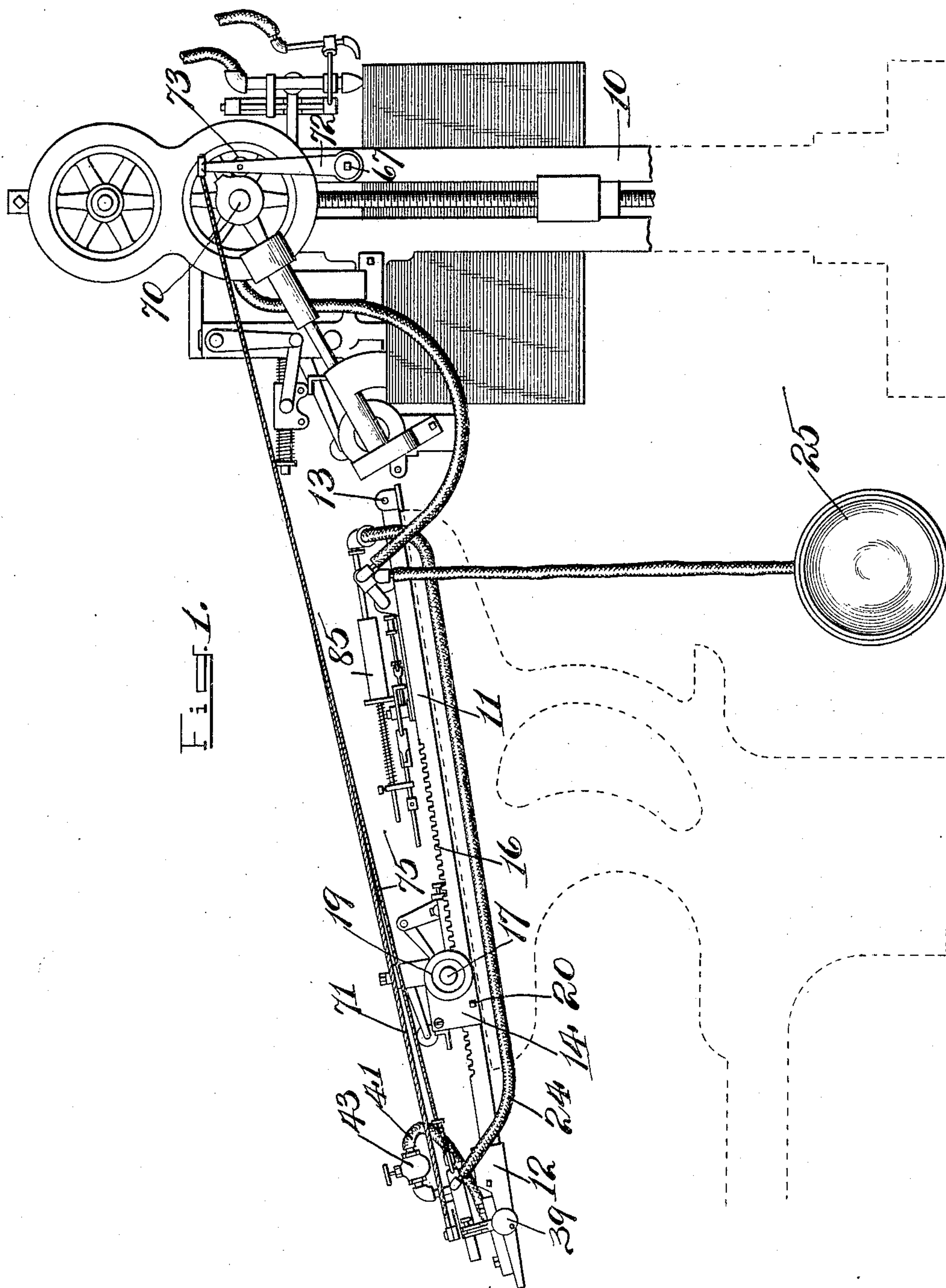
No. 789,746.

PATENTED MAY 16, 1905.

G. F. LEIGER.
PNEUMATIC SHEET FEEDING APPARATUS.

APPLICATION FILED OCT. 28, 1904.

3 SHEETS—SHEET 1.



Witnesses:

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Emil E. Wettrmann

Inventor:

George F. Leiger
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his Attys.

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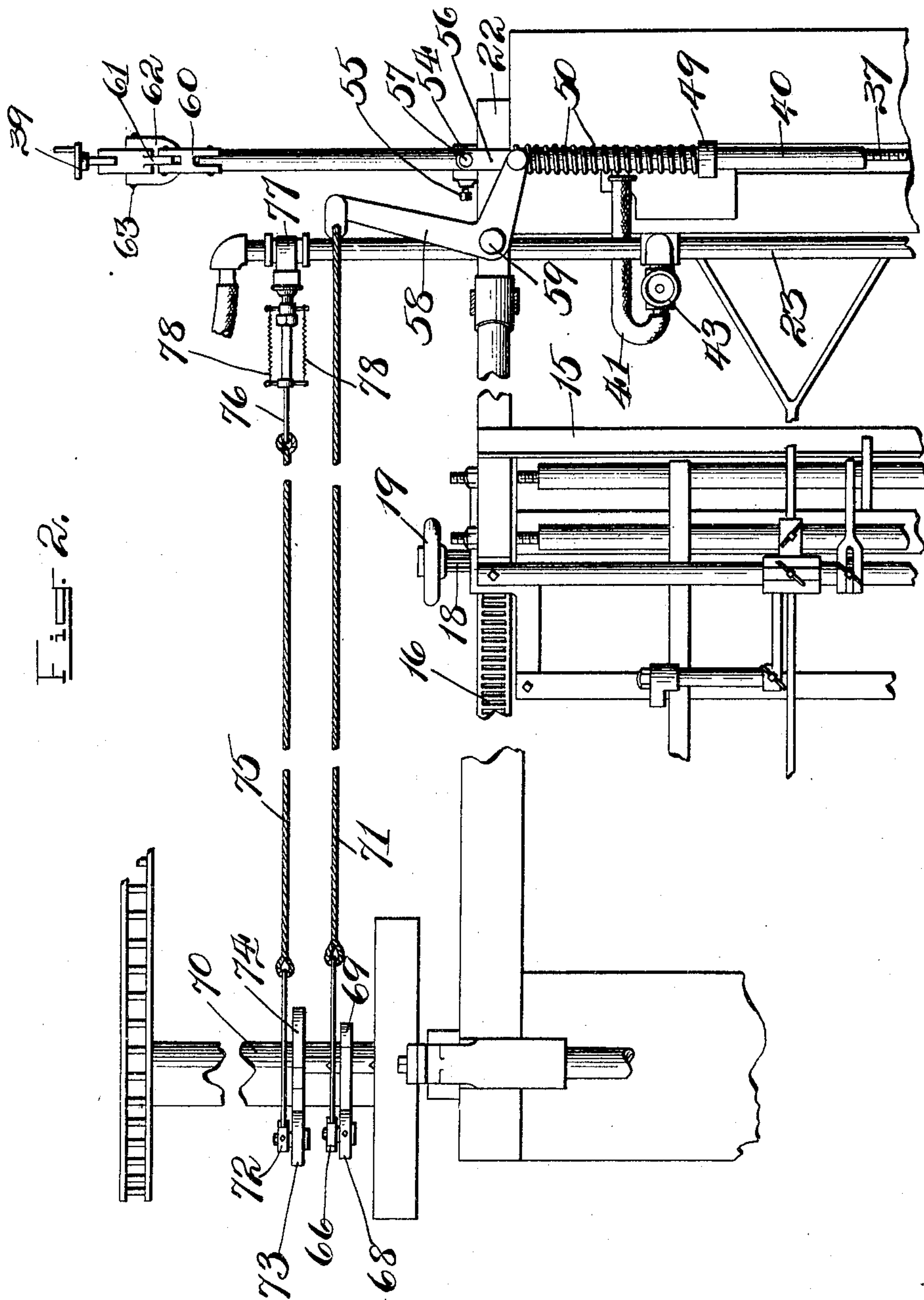


Fig. 2.

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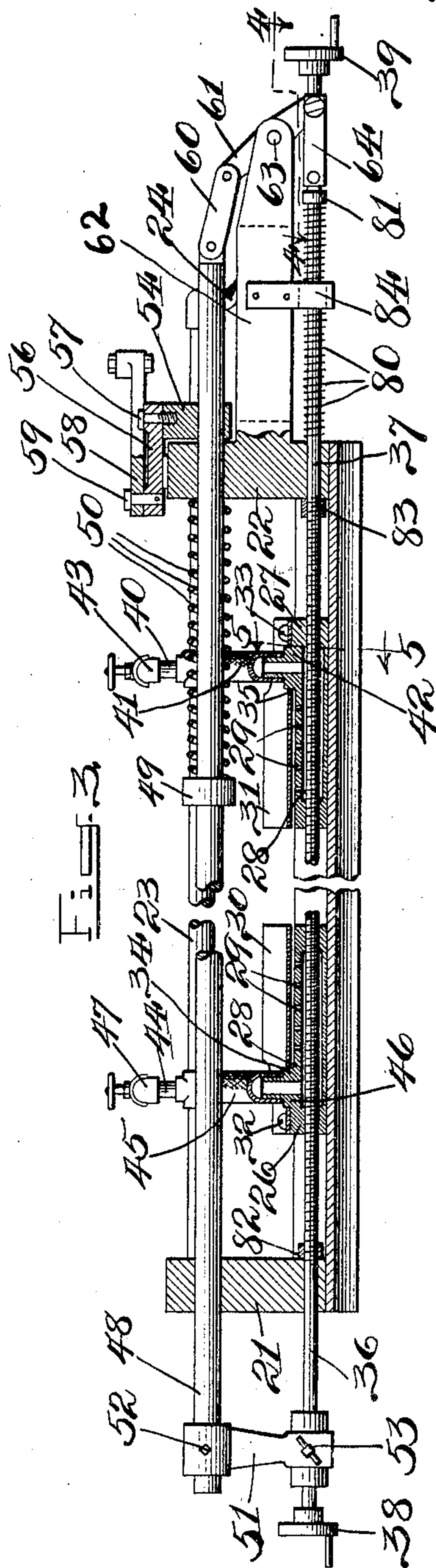
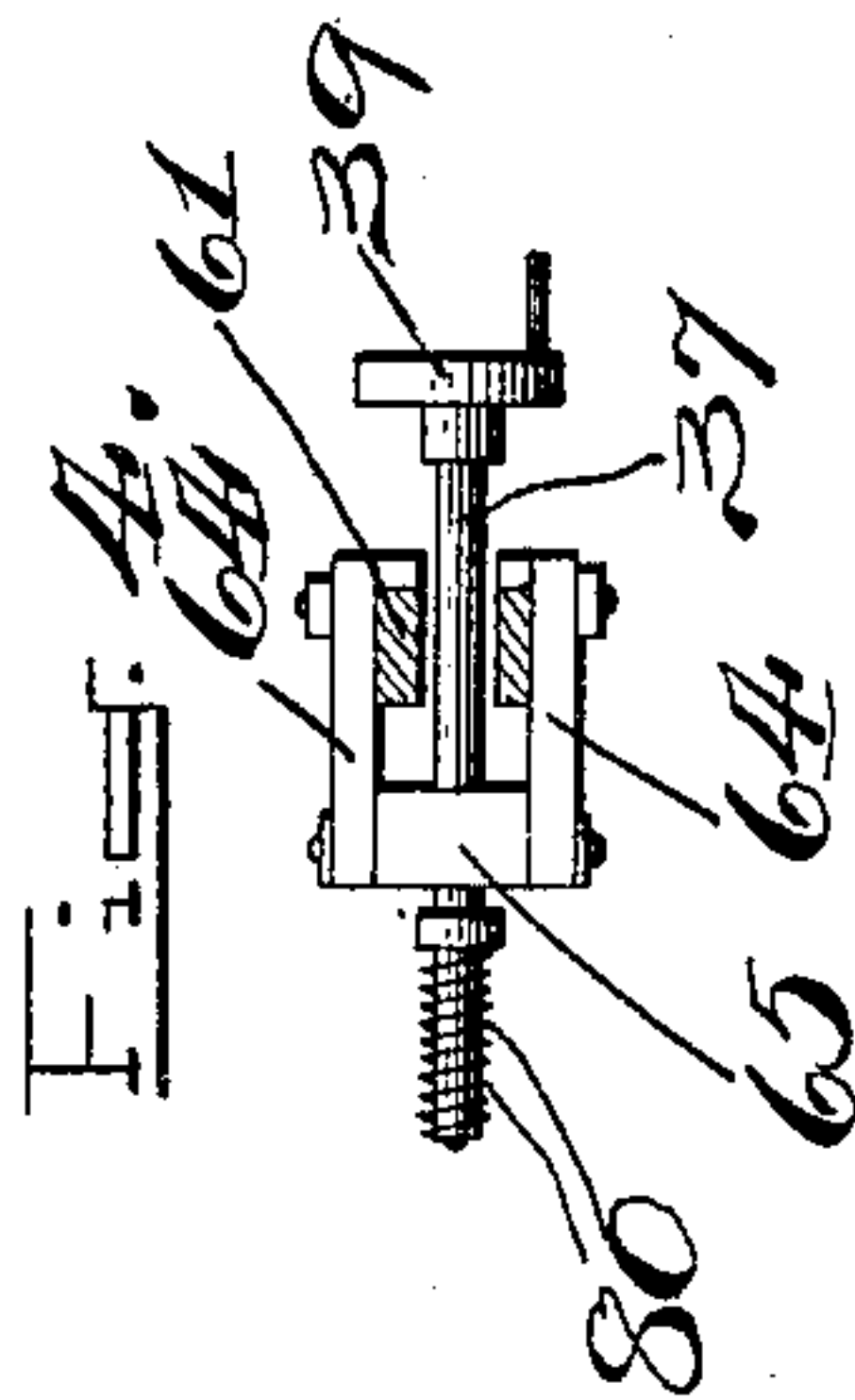
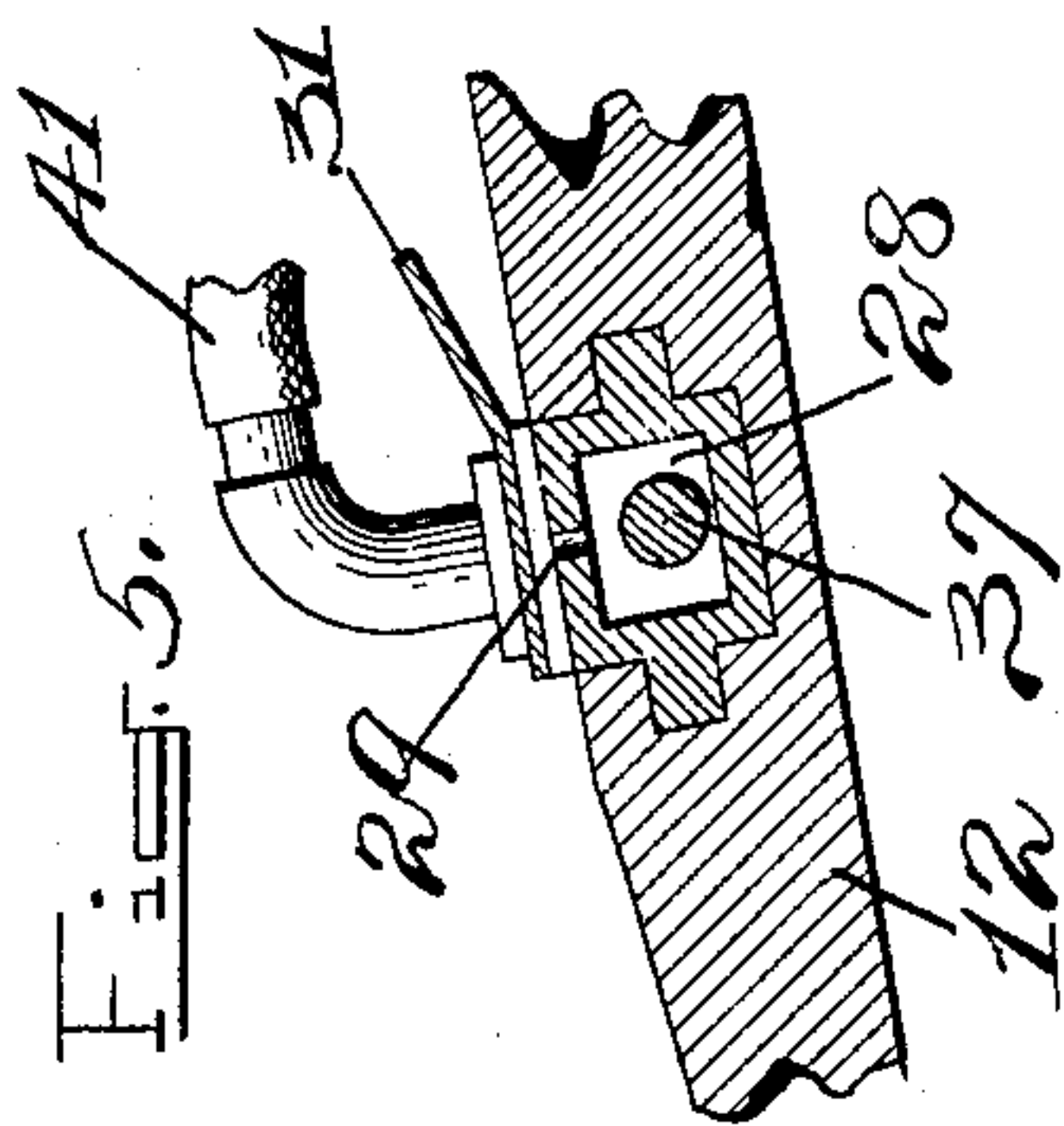
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

GEORGE F. LEIGER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE L. BENEDICT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PNEUMATIC SHEET-FEEDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 789,746, dated May 16, 1905.

Original application filed February 20, 1904, Serial No. 194,620. Divided and this application filed October 28, 1904. Serial No. 230,366.

To all whom it may concern:

Be it known that I, GEORGE F. LEIGER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pneumatic Sheet-Feeding Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to improvements in machinery for feeding single sheets of paper to printing-presses or other machines in which such sheets are successively lifted from a pile by means of pneumatically-operated picker-
15 fingers, the machine being of the same general type as the machines shown and described in Letters Patent No. 557,279, dated March 31, 1896, No. 588,451, dated August 17, 1897, and No. 624,228, dated May 2, 1899, and in
20 my pending application, Serial No. 194,620, filed February 20, 1904, of which said application the present application is a division.

My invention has for its object to provide improved pneumatic means for seizing a sheet
25 near its forward or leading edge and moving such sheet laterally, so that it will be brought exactly into the proper position to be delivered to the printing or other machine. I accomplish this object by the devices and combinations of devices shown in the drawings
30 and hereinafter specifically described.

Those things which I believe to be new will be set forth in the claims.

In the accompanying drawings, in which
35 like parts are represented by the same reference-numerals, Figure 1 is a side elevation of a pneumatic sheet-feeding machine equipped with my improved devices, a portion of the framework being indicated by dotted lines.
40 Fig. 2 is a detail, being a partial plan view. Fig. 3 is a cross-section taken through the delivery-frame of the machine near its extreme forward end and illustrating the devices by which the sheets of paper are shifted laterally
45 so that they will be properly delivered to the printing or other machine and showing also

the means by which these sheet-shifting devices can be moved bodily and independently to adapt them for sheets of different sizes. Fig. 4 is a section taken at line 4 4 of Fig. 3, and
50 Fig. 5 is a section taken at line 5 5 of Fig. 3.

Referring to the several figures of said drawings, 10 indicates one of the standards of the main frame, which main frame supports a pile of sheets of paper, and also the mechanism by which single sheets are successively
55 picked from the pile and fed forward to the delivery-frame. Inasmuch as such mechanism forms no part of my present invention, I have not deemed it necessary to illustrate the same in detail. Suitable mechanism for this
60 purpose will be found fully described in my said former patents and in my said application.

The delivery-frame, to which the sheets are successively delivered from the pile of paper,
65 is formed of two side bars, one of which is shown and indicated by 11, such bars being connected at their forward or delivery ends by a wide plate 12, said side bars and frame being pivoted at 13, so that the frame as a
70 whole can be raised or lowered to bring its forward end in proper position to deliver the sheets of paper to the machine that is to be operated in conjunction with my improved
75 machine.

It is to be understood that the delivery-frame will be equipped with a series of longitudinally-arranged traveling tapes for carrying the sheets forward as they are delivered from the pile of sheets; but as such tapes and
80 the rollers around which they pass may be of any suitable character and arrangement and form no part of my present invention they need no further description. It is common, of course, to employ a longitudinally-movable
85 carriage in connection with such a delivery-frame, which carriage supports suitable rollers, over which the carrying-tapes pass, and also supports projecting-arms having rollers at their forward ends under which the sheets
90 of paper are caused to pass, and it is necessary to change the location of this carriage

from time to time to accommodate the different sizes of sheets that may be passed through the machine.

14 indicates a head forming one of the 5 sides of the movable carriage referred to and having an opening through which pass one of the side-bars 11 of the delivery-frame. A corresponding head is at the opposite side of the carriage and similarly mounted upon the 10 other side bar. Between these two heads extend the several rods and bars over and around which the carrying-tapes pass and from which the arms carrying the presser-rollers are mounted, &c. Extending across the ma- 15 chine and secured to the front edges of the heads 14 is the usual angular guide 15, which is adapted to come in contact with the rear edge of the moving sheet of paper and act to present the leading edge properly as it passes 20 to the printing-press or other machine.

16 indicates a rack formed in the upper portion of each side bar 11.

17 indicates a shaft secured between the heads 14 of the carriage and suitably jour- 25 naled therein. Each end of this shaft 17 has a toothed portion 18 adapted to mesh with the racks 16, formed in the side bars 11.

19 indicates a hand-wheel fast upon one end of the shaft 17 and by which such shaft 17 30 can be turned. It will be evident that by the turning of the shaft 17 and the engagement of the toothed portion 18 of said shaft 17 with the racks 16 the carriage as a whole will be easily moved and that of necessity one 35 side of the carriage cannot be moved, even in the slightest degree, in advance of the other side. When the carriage is adjusted to the position desired, it can be locked there by means of a suitable set-screw 20.

40 As the sheet of paper passes down the delivery-frame it passes over the tape-rolls carried by the carriage and under the presser-rollers (shown in Fig. 1) that are carried by the projecting arms on the carriage. These 45 pressers-rollers cause the rear end of the sheet to drop on the angular guide 15, before referred to, at which time the forward edge of the sheet rests over and upon the wide cross-plate 12 at the forward end of the delivery- 50 frame. At this time it is absolutely necessary that the sheet be adjusted with great accuracy, so that it will be passed to the cylinder of a printing-press, if a printing-machine is receiving the sheets, in such manner that 55 the printing on the sheet will come exactly in the right place. To insure this accurate delivery of the sheet, I provide improved means for always insuring the side edge of each sheet being brought to exactly the same spot as 60 every other sheet is brought before allowing the sheet to pass to the printing or other machine, and I accomplish this by the means about to be described.

21 22 indicate heavy brackets bolted or 65 otherwise firmly secured to the upper surface

of the plate 12 at the forward end of the side bars 11 of the delivery-frame, such brackets 21 22 being located, as indicated in Fig. 3, at the opposite ends of such plate 12.

23 indicates a pipe securely fastened in the 70 upper ends of the brackets 21 22, such pipe having one end projecting, as indicated at the right-hand side of Fig. 3, to which projecting end is secured an air-tube 24, that is adapted to be put in communication with a 75 suitable vacuum-chamber, as 25, and which in the construction shown is in communication with such chamber through other means not necessary here to describe.

26 27 indicate two suction-blocks, each lo- 80 cated and movable in a longitudinal groove formed in the plate 12. Each of said suction-blocks has its upper surface practically flush with the upper surface of said plate 12, so that sheets of papers carried forward by 85 the tapes of the delivery-carriage will not be obstructed by these suction-blocks. Each suction-block, as best shown in Figs. 3 and 5, is cored to leave a central opening 28, and 90 through the upper face of each of these suction-blocks are a number of air-openings 29.

30 31 indicate deflectors attached one to the upper face of each suction-block, such attachment being by screws 32 33, located at the 95 outer end of each block, as shown in Fig. 3. These deflectors extend rearwardly from the blocks and are upwardly inclined, as best shown in Fig. 5.

34 35 indicate shoulders on the suction- 100 blocks 26 27, respectively, against which shoulders the side edges of the sheets of paper are adapted to come.

36 37 indicate rods screw-threaded into the blocks 26 27, respectively, and projecting be- 105 yond the ends of the heads 14, such rods being provided, respectively, with hand-wheels 38 39, by which said suction-blocks can be moved as desired in the longitudinal groove in the wide plate 12. The rods 36 37 are not 110 screw-threaded where they pass through the brackets 21 22, which is to allow free longitudinal movement of the rods within a limited distance, as hereinafter explained.

40 indicates a short section of pipe from 115 and communicating with the pipe 23, to which is connected a flexible tube 41, that communicates with a hollow nipple 42, formed with or secured to the suction-block 27.

43 indicates a valve-casing on the short section of pipe 40, containing a valve that per- 120 mits communication to be established or cut off between the pipe 23 and the suction-block 27. The other suction-block, 26, is similarly connected with the pipe 23 by parts 44 45 46 47, which correspond to the parts 40 41 42 43. 125 By operating either one of the valves in the casings 43 and 47 it will be seen that communication can be established between the air-pipe 23 and one of the suction-blocks, and at the same time communication between said 130

air-pipe and the other suction-block can be entirely closed by the other valve.

48 indicates a rod extending across the front of the delivery-frame and slidably secured in openings in the heavy brackets 21 22.

49 indicates a collar affixed to such rod 48, and between it and the inner face of the heavy bracket 22 is located a heavy coiled spring 50, which tends to normally hold said rod 48 projected to the limit of its movement beyond the bracket 21.

51 indicates an arm having an enlarged head through which one end of the rod 48 passes, said arm being secured to the rod by a suitable set-screw 52. At the lower end of the arm is formed another head, through which passes the rod 36, that is connected to the suction-block 26, and the arm and such rod 36 are securely fastened together by a set-screw 53. The rods 48 and 36 being thus secured together, it is evident that the longitudinal movement imparted by the means hereinafter described to the rod 48 will compel the rod 36 and its attached suction-block 26 to correspondingly move.

54 indicates a collar surrounding the rod 48 and securely bolted thereto by a set-screw 55, as shown in Fig. 2. To the upper face of this collar is attached a link 56 by a pivot-pin 57, to the other end of which link 56 is pivotally attached the short arm of a bell-crank lever 58, that is pivoted at 59 to the upper face of the heavy bracket 22 near the rear end of such bracket.

60 indicates a pair of links pivotally attached to one end of the movable rod 48, which links at their outer ends are pivoted to the upper end of a short lever 61, said lever 61 being forked at its lower end in the construction shown to straddle the rod 37.

62 indicates an arm secured to the outer face of the heavy bracket 22 and projecting beneath the end of the movable rod 48. The outer end of this arm 62 is forked, as seen in Fig. 2, and between its forks is secured, by a suitable pivot 63, the short lever 61. To the outer faces of the forked ends of the short lever 61 are pivotally secured the outer ends of side bars 64, which, with a short cross-bar 65, to which they are pivoted at their inner ends, constitute a movable frame, and through the cross-bar 65 of this frame passes the rod 37, through which the suction-block 27 is moved.

66 indicates a lever pivotally attached at its lower end to a suitable journal 67, supported by one of the vertical side pieces of the main frame and carrying at its upper end a roller 68, held in contact with a suitable cam 69 on the main driving-shaft 70, that is journaled in the main frame of the machine.

71 indicates a connection between the upper end of the lever 66 and the outer end of the long arm of the bell-crank lever 58.

72 indicates another lever, similar to that

indicated by 66 and similarly mounted on the same journal. This lever 72 is provided with a roller 73, which is held in contact with a suitable cam 74 on the shaft 70.

75 indicates a connection similar to the connection 71 and connected at one end to the upper end of the lever 72 and at its other end to the stem 76 of a valve that is inclosed in the valve-casing 77, which valve affords means for shutting off communication between the tube 24 and air-pipe 23.

The valve in the casing 77 is normally held closed by a spring or springs. In the construction shown two coiled contractile springs 78 are employed, each of which is secured at one end to a stud projecting from the valve-casing and at its other end to a stud projecting from a collar 79 on the valve-stem 76.

80 indicates a coiled spring around the rod 37 and bearing at its ends against the outer face of the bracket 22 and a collar 81, that is made fast to such rod 37 and located a very slight distance in front of the inner end of the frame 64 65, it being located slightly away from such frame in order to permit a slight amount of lost motion as the frame 64 65 is moved on such rod in order to compensate for any wear in the moving parts.

82 83 indicate nuts on the rods 36 37, respectively, which nuts act as stops to limit the outward movement of the suction-blocks carried by said rods.

84 indicates a guiding-eye through which the rod 37 and its surrounding spring 80 pass, such guiding-eye being secured to the arm 62.

85 indicates mechanism employed for automatically stopping the operation of the machine; but as such mechanism forms no part of my present invention it needs no special description here. The flexible air-tube 24 is shown as being connected with such mechanism; but it is to be understood that such flexible air-tube has communication with a vacuum-producing device—as, for example, the chamber 25, that is illustrated in Fig. 1—so that the creation of a vacuum in the pipe 23 will be produced from time to time, as desired.

In operation as the sheets are picked from the pile and fed forward to the delivery-frame they will be successively carried by the tapes with which such frame is to be equipped forward toward the delivery end. Each sheet passes over the rollers carried by the movable carriage, so that as the rear end of a sheet passes the rollers it will fall upon the angular guide 15 just as its forward edge has passed under the deflectors 30 31, that are carried by the suction-blocks 26 27, at which time the forward edge of the sheet will come over the air-openings 29 in such blocks, which blocks will have been previously adjusted, by means of their respective rods 36 37, to a proper distance apart to accommodate the width of the sheet, the distance left between the shoulders

ders 34 35 when said suction-blocks are moved to their innermost position being intended to be the same as the width of the sheet. The mechanism is so timed that as a sheet arrives with its advancing edge over the groove in which the suction-blocks move the cam 69 will, through the lever 66 and connection 71, have drawn back the long arm of the bell-crank lever 58, which action, through the link 56, that is pivoted to the fixed collar 54 on the movable rod 48, will have caused said rod 48 to move outward against the force of the spring 50 and through the short lever 61 and pivoted frame 64 65 have forced the rod 37 in against the action of its spring 80, carrying with it, of course, the suction-block 27. At the time that this movement takes place the other suction-block, 26, is moved inward, as it is rigidly connected with the rod 48 by the arm 51, as before explained. The distance between the two shoulders 34 35 on the suction-block being when the blocks are at their innermost position the same as the width of the sheet, it follows that the sheet of paper will be pushed sidewise by one of these shoulders, so that the edges of the sheet will lie against the shoulders.

It is to be understood that only one of the suction-blocks acts as a suction device on a sheet of paper, the other block acting simply to help aline the paper. If, for example, it be desired to shift the sheets toward one side of the machine, the suction-block on that side by the opening of its valve is permitted to be intermittently brought into communication with the vacuum-producing means, while the opposite suction-block is permanently cut off from such communication by the closing of its valve. Thus, if each sheet of paper is to be shifted to the right when looking at the device as in Fig. 3, the valve 47 will be closed, while the valve 43 will be open, and thus suction-block 27 will be from time to time exhausted of its air by reason of being intermittently brought into communication with the vacuum-producing means, as hereinafter explained, while the suction-block 26 will not be so affected. This provision of two suction-blocks with means for cutting off one of them from communication with the vacuum-producing means is a great advantage, as it enables the sheet to be shifted toward either side of the machine, as may be desired, without having to change any of the connections, but simply to open one valve and close another, and the suction-block that is so shut off from communication with the vacuum-producing means is perfectly adapted to act, by reason of its shoulder abutting against the edge of the sheet, as a means for adjusting the sheet with relation to the other block that is pneumatically operated.

The operation of the machine is so timed that as the forward portion of the sheet is adjusted to lie between the two shoulders 34 35

when the suction-blocks are in their innermost position the lever 72 will be forced back by the cam 74, thus momentarily causing the opening of the valve in the casing 77, which puts the pipe 23 into communication with the vacuum-producing means and of course causes suction in that suction-block whose valve is open, and by reason of the exhaustion of the air from the central opening 28 in such block the sheet of paper lying over the openings 29 in that block will be caused to adhere firmly to the surface of the block. As soon as this is accomplished the cam 69 is moved, so as to allow the spring 50 by its pressure against the collar 49 on the rod 48 to so move such rod as to draw the two blocks 26 27 toward the side of the machine, they being stopped at the proper time by the contact of the nuts 82 83 against the brackets 21 22, respectively, and at this instant the cam 74 is so moved as to allow the springs 78 to force in and close the valve in the casing 77, thereby destroying the vacuum in the pipe 23 and the suction-block that communicates therewith and allowing the sheet of paper that has been moved laterally by reason of its temporary adhesion to one of the blocks to be fed forward and be delivered at exactly the proper point on the cylinder of a printing-press or to such other machine as is employed in connection with this apparatus.

The independent movement that can be given each block through its screw-threaded rod is of considerable value, as it is possible to adjust the blocks, or either of them, without stopping the machine.

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

1. In a sheet-feeding machine, the combination with a delivery-frame over which sheets are adapted to pass toward the delivery end thereof, of two blocks one of said blocks being hollow and having an opening through its upper face, means for reciprocating said blocks toward and from each other in a line at right angles to the direction of movement of the sheets, and means for creating a vacuum in said hollow block at one portion of its movement and destroying such vacuum at another portion of its movement, substantially as described.

2. In a sheet-feeding machine, the combination with a delivery-frame over which sheets are adapted to pass toward the delivery end thereof, of two hollow suction-blocks each having openings therethrough communicating with the interior, means for reciprocating said blocks toward and from each other in a line at right angles to the direction of movement of the sheets, and means for creating a vacuum in one of said blocks at one portion of its movement and destroying such vacuum at another portion of its movement, substantially as described.

3. In a sheet-feeding machine, the combi-

nation with a delivery-frame over which sheets are adapted to pass toward the delivery end thereof, of two hollow suction-blocks each having openings therethrough communicating with the interior, means for reciprocating said blocks toward and from each other in a line at right angles to the direction of movement of the sheets, means for creating a vacuum in one of said blocks at one portion of its movement and destroying such vacuum at another portion of its movement, and means for separately adjusting such blocks farther from or nearer to each other, substantially as described.

4. In a sheet-feeding machine, the combination with a delivery-frame over which sheets are adapted to pass toward the delivery end thereof, of two sliding suction-blocks one of which is hollow and provided with openings therethrough, means for moving the same simultaneously toward and from each other, each of said blocks being provided with means for engaging one of the side edges of a sheet, and means for creating a vacuum in said hollow block at one portion of its movement and destroying such vacuum at another portion of its movement, substantially as described.

5. In a sheet-feeding machine, the combination with a delivery-frame over which sheets are adapted to pass toward the delivery end thereof, of a pair of hollow suction-blocks each having openings through one face, a rod extending from each block, an operating-rod parallel with the rods secured to said blocks, a system of levers, said operating-rod being rigidly connected at one end to one of said pair of rods and at the other end connected to the other of said pair of rods by said system of levers, means for moving said operating-rod longitudinally to cause said blocks to approach and recede from each other, and means

for intermittently creating and destroying a vacuum in one of said blocks, substantially as described.

6. In a sheet-feeding machine, the combination with a delivery-frame over which sheets are adapted to pass toward the delivery end thereof, of a pair of hollow suction-blocks each having openings through one face, a pair of screw-threaded rods one of which is connected to each of said blocks and by means of which said blocks can be independently adjusted toward or from each other, an operating-rod parallel with the rods secured to said blocks, a system of levers, said last-mentioned rod being rigidly connected at one end to one of said pair of rods and at the other end connected to the other of said pair of rods by said system of levers, means for moving said operating-rod longitudinally to cause said blocks to approach and recede from each other, and means for intermittently creating and destroying a vacuum in one of said blocks, substantially as described.

7. In a sheet-feeding machine, the combination with a delivery-frame over which sheets are adapted to pass toward the delivery end thereof, of a pair of hollow movable suction-blocks each having openings through one face, an operating-rod and means for reciprocating the same, connections between said rod and said suction-blocks for causing said suction-blocks to move in opposite directions with each movement of said operating-rod, and means for intermittently creating and destroying a vacuum in one of said blocks, substantially as described.

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