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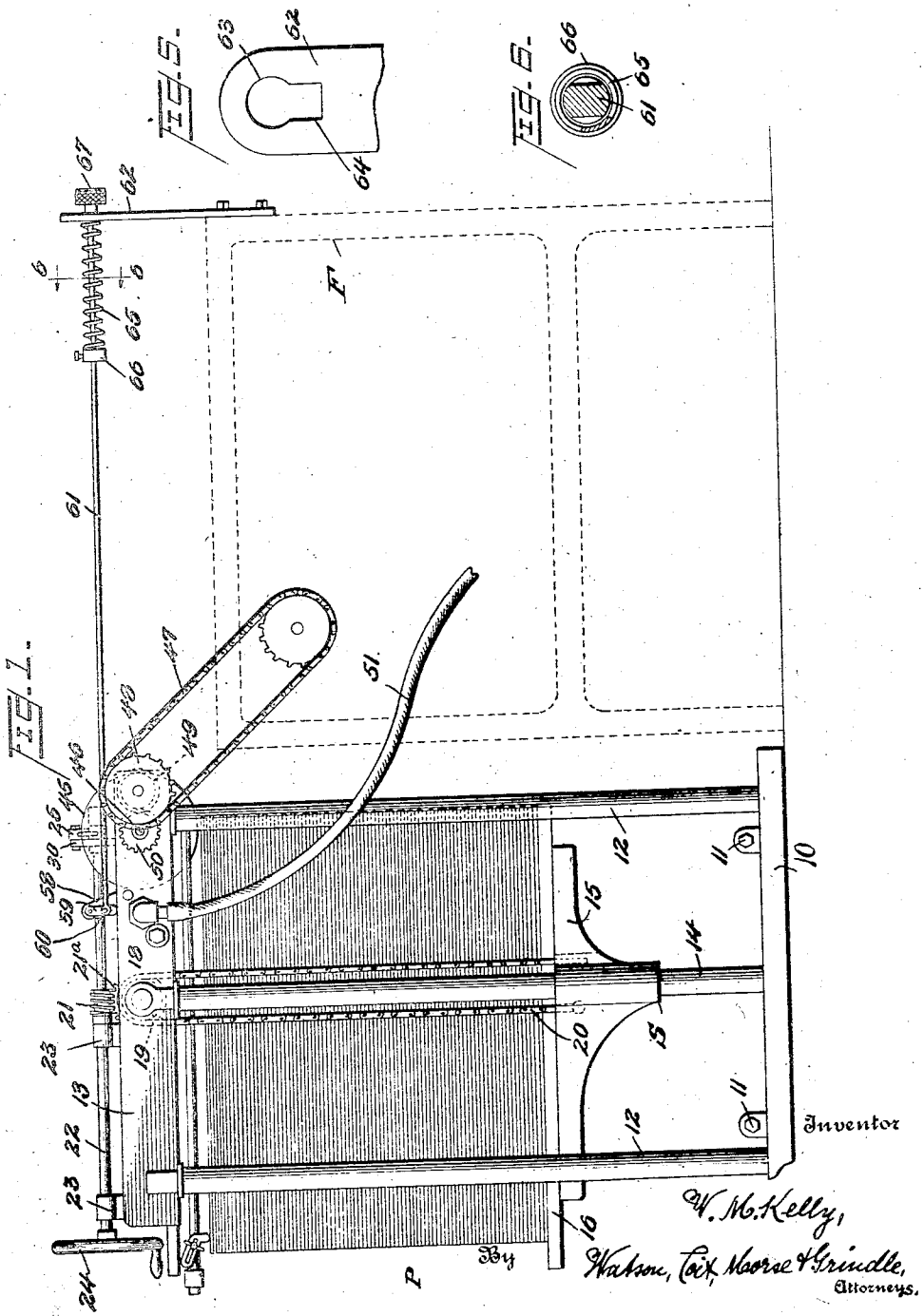
May 24, 1927.

1,629,874

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AUTOMATIC PILE ELEVATING MECHANISM FOR SHEET FEEDERS

Original Filed Dec. 27. 1922 4 Sheets-Sheet 1



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AUTOMATIC PILE ELEVATING MECHANISM FOR SHEET FEEDERS

Original Filed Dec. 27. 1922 4 Sheets-Sheet 2

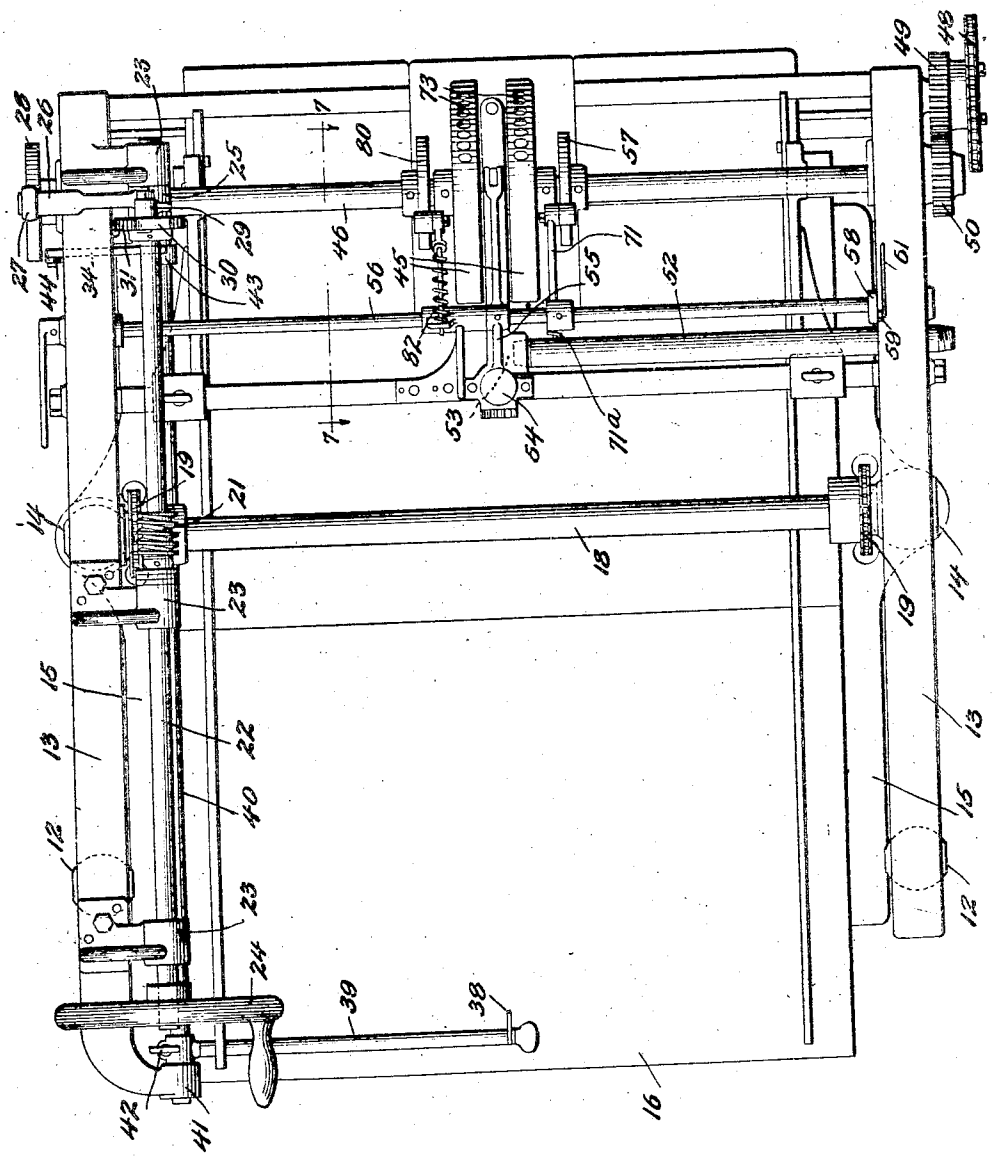


FIG. 2.

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AUTOMATIC PILE ELEVATING MECHANISM FOR SHEET FEEDERS

Original Filed Dec. 27, 1922 4 Sheets-Sheet 3

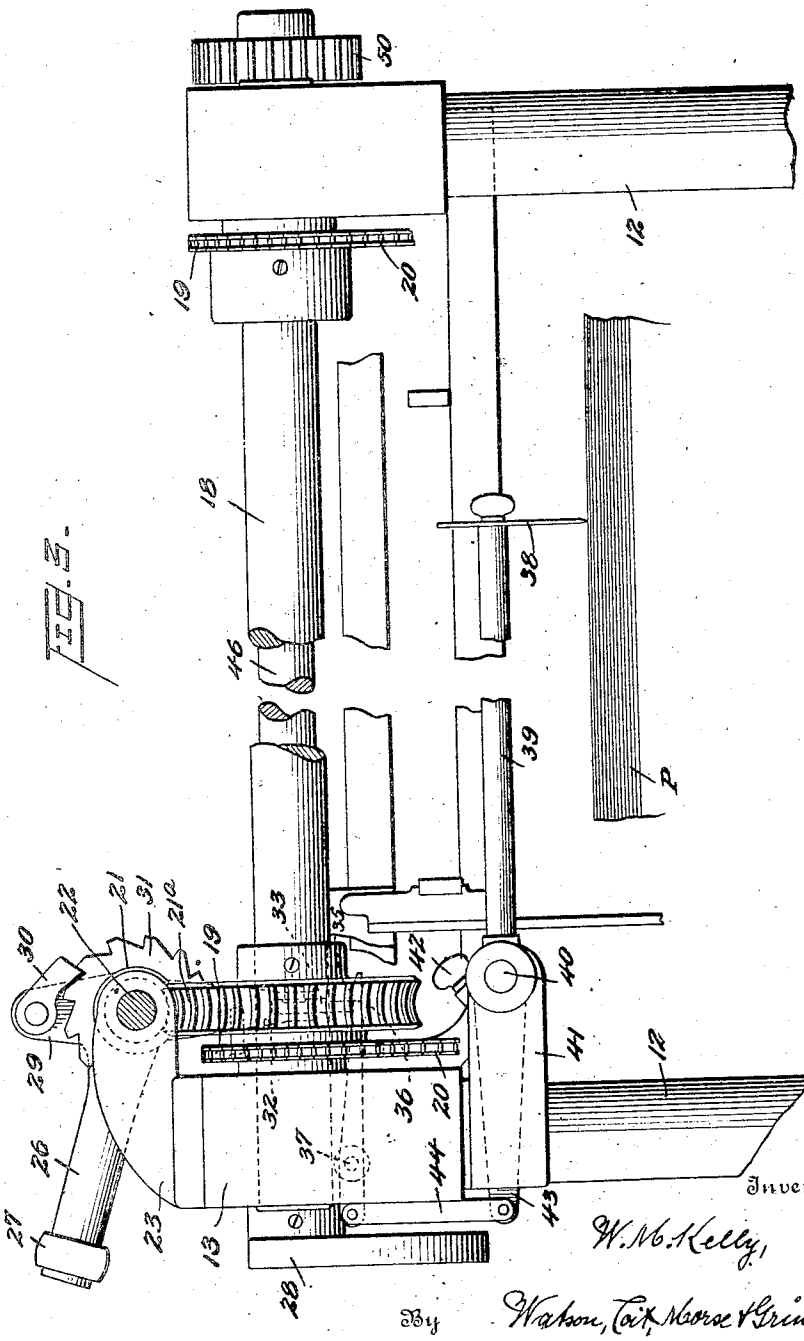


FIG. 5.

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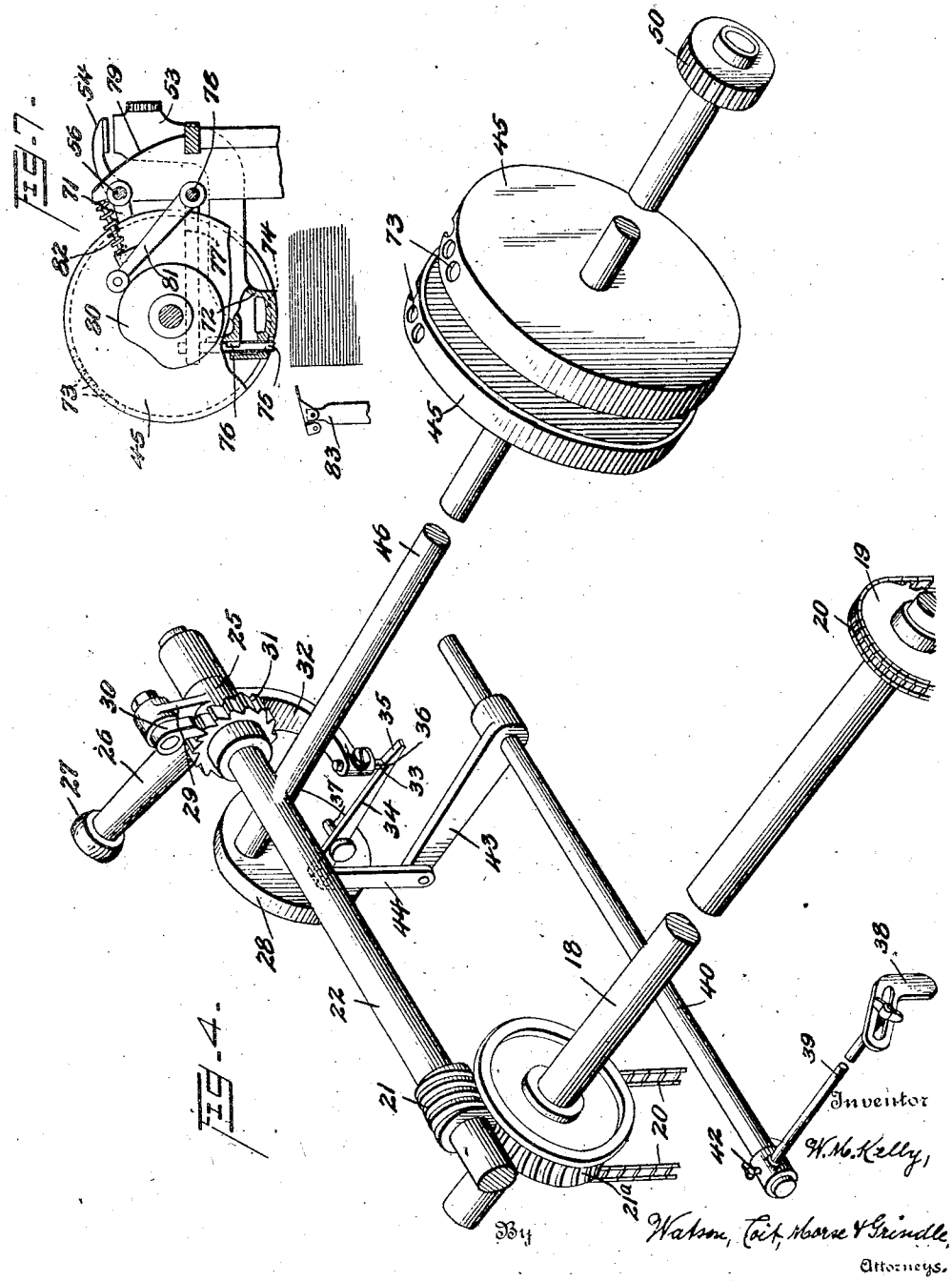
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AUTOMATIC PILE ELEVATING MECHANISM FOR SHEET FEEDERS

Original Filed Dec. 27, 1922 4 Sheets-Sheet 4



Patented May 24, 1927. 1,629,874

UNITED STATES PATENT OFFICE.

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AUTOMATIC PILE-ELEVATING MECHANISM FOR SHEET FEEDERS.

Application filed December 27, 1922, Serial No. 609,320. Renewed November 18, 1926.

The present invention relates to sheet feeders and more particularly to the mechanism for automatically raising the pile supporting table so that the top of the pile is maintained in substantially a constant relation with respect to the sheet feeding means.

The principal aims of the present invention are to simplify the pile elevating and controlling mechanism; to provide a more dependable mechanism; to provide one that can be constructed at a lower cost than heretofore; and to locate the elevating mechanism in combination with the sheet feeding device so that said mechanism can be assembled easily and will always be readily accessible for adjustment or repairs.

Other objects and features of novelty will be apparent from the description taken in connection with the drawings in which—

Fig. 1 is a side elevation of a sheet feeder having the present invention incorporated therewith, and showing in dotted lines the outline of a machine that the feeder supplies;

Fig. 2 is a top plan view of the feeder and elevating mechanism;

Fig. 3 is a rear view, in elevation, of the top part of the feeder;

Fig. 4 is a perspective view of the mechanism for automatically elevating the pile supporting table;

Figs. 5 and 6 are detail views.

Fig. 7 is a sectional elevation taken substantially on the line 7—7 of Fig. 2 illustrating one form of pneumatic sheet feeding means.

Referring to the drawings and more particularly Fig. 1, the sheet feeder S is shown as associated with the machine F to which sheets from the pile P of the feeder are delivered. The machine F may be of any type, for example, a folding machine.

As shown in the drawings, the sheet feeder includes a frame consisting of two parallel spaced base pieces 10 connected by the bars 11. From the corners of the base thus formed four rods 12 extend upwardly to two upper side bars 13. These upper bars are held in spaced relation by certain shafts and transverse members which will be described hereinafter. In addition to the upright rods 12 there are two vertical guide bars 14, one at each side of the frame and connecting the upper and lower frame members 13 and 10 respectively. These guides 14 have mounted thereon for vertical adjustment the brackets 15 which support the table 16 on which the pile P of sheets is carried.

The means for raising and lowering this pile supporting table includes a transverse shaft 18 rotatively mounted in the top frame members 13 and adjacent said members carrying the sprocket wheels 19, said sprockets being secured to the shaft so that they rotate therewith. Chains 20 each secured at one end to one of the brackets 15 pass over the sprockets 19 and thence depend therefrom. When the shaft 18 is rotated the table will be either raised or lowered through the sprockets 19 and chains 20.

The present invention is directed more specifically to the means for automatically raising the table so that the top of the pile P is maintained in substantially constant relation to the sheet feeding means. For this purpose automatic means is provided for rotating the shaft 18 to raise the table. As shown in the drawings and more particularly Figs. 2 and 3 the shaft 18 at one end thereof, adjacent a sprocket 19, carries a worm wheel 21^a meshing with a worm 21 on a shaft 22 extending substantially parallel with the adjacent upper frame member 13. This shaft is supported in the bearings 23 carried by the frame member 13 and at one end adjacent the rear of the frame carries a hand-wheel 24. Rotation of this wheel through the worm and worm wheel will effect raising or lowering of the pile supporting table. Means is also provided for rotating the shaft 22 automatically to maintain the top of the pile at a substantially constant elevation.

For this purpose a member 25 is mounted to freely turn or rotate on the shaft 22, and is provided with an arm 26 having at its free end a cam roller 27 adapted to cooperate with the cam or eccentric 28. Rotation of the cam 28 will effect oscillation of the arm 26 and therewith member 25. The shaft 22 is rotated by this latter member, through a one-way connection, which is shown as comprising a pawl arm 29 rigid with member 25 and having pivoted at its free end a pawl 30 cooperating with a ratchet wheel 31 secured to the shaft 22.

This means for rotating shaft 22 and thereby elevating the pile is adapted to be rendered inoperative when the pile is sufficiently high. For this purpose the member 25 is provided with another arm indicated

at 32 and this arm carries a latch point 33 adapted to cooperate with a latch 34. As shown in Fig. 3, the end of the latch is formed with an inclined surface 35 leading up to a notch 36 which receives the point 33. The latch member 34 is pivoted as at 37 to the frame member 13. This latch is adapted to be turned on its pivot to release the latch point 33 and thus permit the cam roller 27 to engage the cam 28. In other words, the latch device constitutes releasable means for holding the arm 26 at one end of its movement, that is to say, holding arm 26 and its associated parts inoperative.

Assuming that the point 33 is normally in the notch 36, it is desired to release the latch and permit the cam roller 27 to engage cam 28 to be operated thereby, when the top of the pile falls below a predetermined level. For this purpose a feeler 38 is provided adapted to rest on the top of the pile of sheets. This feeler is carried by an arm 39 secured to a rock shaft 40 extending lengthwise of the mechanism and carried in bearings 41 on the member 13 of the frame. The arm 39 is secured to the rock shaft 40 for adjustment along the same by any suitable means such as the thumb screw 42. This provides for adjusting the arm 39 lengthwise of the shaft 40 so that the feeler 38 may rest at the proper point on the top of the pile. Adjacent the discharge end of the feeding device this rock shaft 40 has an arm or lever 43 secured thereto and the free end of this arm is connected by means of a link 44 to the lever or latch 34. It will be observed that the arrangement is such that when the feeler falls, due to sheets being withdrawn from the top of the pile, the part of the latch member 34 in engagement with the latch point 33 will be lowered. After sufficient movement, the point 33 will be released from the latch 34, thus permitting the means for elevating the pile supporting table to become operative. As the pile is elevated, the feeler 38 will be raised and through the connections above described, the latch 34 will be returned to normal or latching position. Of course, the latch point 33 oscillates back and forth and finally the point of the latch member 34 will have been elevated sufficiently so that the latch point 33 will be again retained in the notch 36.

Although this pile elevating mechanism is adapted to be used in connection with various forms of sheet feeding or forwarding devices, in the present instance a pneumatic feeding means has been illustrated, the same being of the type described in my Patent 1,401,707. This mechanism includes two wheels 45 secured to rotate with shaft 46 which carries the cam 28 and extends transversely across the frame, being carried in bearings in the top side members 13. At the end opposite the cam 28 the shaft 46 may be driven. As shown, the sheet feeder is driven from the machine F in any suitable manner as by a chain 47 driving the sprocket 48 which through gears 49 and 50 rotates the feeding shaft 46. Of course the connection is such that the feeding of the sheets is timed with the operation of the machine F. An exhauster or suction pump (not shown) through the flexible connection 51 and the pipe 52 (Fig. 2) has communication with a chamber 53 of the pneumatic sheet forwarding mechanism. A valve 54 controls communication between the chamber 53 and the atmosphere, this valve being carried on an arm 55 secured to a transverse rock shaft 56 which in turn carries an arm 71 actuated by a cam 57 on shaft 46, the end of the arm being held in contact with the cam by any suitable means as a spring 71a. The valve 54 through this mechanism is opened and closed for each revolution of the shaft 46. The type of feeder referred to is illustrated more in detail in Fig. 7. It comprises a nozzle 72 having communication with the valve chamber 53. This nozzle is disposed between the wheels 45 and rests on the inner cylindrical surfaces of the flanges thereof. The flanges of the wheel are provided with a series of apertures 73 which extend around the periphery of the wheels only a sufficient distance to effect movement of the sheet to the folder or other machine to which the feeder is delivering. The nozzle 72 is provided with two apertures 74 adapted to register with the apertures 73 in the flanges so that when these holes are in register air is drawn in through the same producing a suction action effective on the top sheet of the pile. To positively lift the top sheet into the field of this suction effect, a tube 75 is provided slidable through the nozzle 72. This suction tube is formed with an aperture 76 which is adapted to register at certain times with the interior of the nozzle 72. The tube is reciprocated to bring the lower end close to the top sheet of the pile and to bring the aperture 76 into and out of communication with the nozzle, by means of an arm 77 secured to a short shaft 78 carried by the bracket 79 which also supports the chamber 53 and associated parts. This short shaft 78 is rocked by a cam 80 acting on an arm 81 secured to said shaft. This arm is held in contact with the cam by means such as a spring 82 interposed between the arm and the bracket 79.

The movement of the tube is such that it comes in contact with the top sheet of the pile and because the suction formed therein lifts the said sheet thereby permitting a blast of air from the nozzle 83 to enter under the sheet and separate it from the pile and at the same time to bring the same positively within the field of action of the suction

produced through the perforations 73 of the wheels 45.

It will be noted that the pile is raised only when arm 26 is swung upwardly and this movement is effected by cam 28. It is important, that the pile be not raised during the period when a sheet is being fed forward. In the present invention this result is attained by locating cam 28 on shaft 46 so that the forwarding of a sheet occurs while the arm 26 is falling, not when it is being raised by the cam. The suction apertures 73 in the wheels 45 are positioned with respect to the cam 28 so that the sheets will be fed as stated above.

When the valve 54 is open, no sheet forwarding operations take place because the valve being open, the suction is broken. This effect is employed in providing a device for discontinuing the sheet feeding operations, from a remote part of the machine. Thus at one end, the rock shaft 56 is provided with an arm 58 just inside the frame member 13 and a dog 59 is pivoted to the free end of this arm so that when it is in normal position such as shown in Fig. 1, the dog catches on the top of the frame member 13 and holds the valve 54 open. A stop 60 on the arm 58 prevents the dog from swinging to the left as viewed in Fig. 1. The dog 59 is normally held to the right, as viewed in Fig. 1, so that the valve may be periodically opened and closed and the sheet feeding operations take place. As shown, a rod 61 extends from the dog 59 through a bracket 62 on the machine F. The aperture 63 in the bracket for the rod 61 is shown at Fig. 5, the rectangular portion 64 of the aperture being shaped to receive a slabbed off portion of the rod, a section of this slabbed off portion being shown in Fig. 6. The remainder of the rod is round in cross section. The slabbed off portion is formed at such a point that it will engage with the slot 64 when the dog 59 is retracted. A spring 65 is provided between the bracket 62 and a collar 66 on the rod, which is compressed when the rod is held in the slot 64. The end of the rod 61 is provided with a knob 67 to aid in manipulating the same. It will be apparent that a mere upward movement of the knob 67 will free the rod from the notch 64 permitting the spring 65 to force the rod 61 toward the left, thus moving the dog 59 into its locking position.

In operation, sheets are successively fed off the top of the pile P by rotation of the wheels 45 of the pneumatic sheet forwarding device. As the top of the pile becomes lowered because of this feeding off of the sheets, the feeler 38 resting on the top of the pile is also lowered thus turning rock shaft 40 and releasing point 33 of the latch. This permits cam roller 27 to fall into engagement with the rotating cam 28 so that arm 26 is oscillated and through pawl 30 rachet wheel 31 is thus turned. Rotation of this ratchet wheel is transmitted by worm 21 and worm wheel 21^a to the transverse shaft 18 which through the chains on sprockets 19 raises the pile supporting table. This raising movement of the table of course raises the feeler 38 and thus turns the latch 34 so that finally in one of its oscillations the point 33 is caught in the notch 36 of the latch and the mechanism is thus rendered inoperative to further elevate the pile supporting table.

Although an embodiment of the invention has been described in detail, it is understood that the invention is not thus limited but includes modifications and changes which come within the scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a device of the character described, in combination, a vertically adjustable table adapted to support a pile of sheets, a shaft rotatably supported above said table, means whereby rotation of said shaft raises or lowers said table, a sheet feeding shaft in front of said first shaft and having sheet feeding means thereon, a third shaft extending at right angles to the other shafts, means rotatively connecting the first and third shafts, a member mounted for turning movement on said third shaft and adjacent said second shaft, a one-way motion transmitting device connecting said member and third shaft, means on said second shaft to oscillate said member, a rock shaft parallel with said third shaft and carrying a feeler adapted to rest on the top of the pile of sheets supported by said table, a releasable latch normally holding said member in one position, and means operated by turning said rock shaft to release said latch when the feeler falls and return it to normal position when the feeler is raised.

2. In a device of the character described, in combination, a vertically adjustable table adapted to support a pile of sheets, a shaft rotatably mounted above said table, means whereby rotation of said shaft raises or lowers said table, a sheet feeding shaft in front of said first shaft and having sheet feeding means thereon, a third shaft extending at right angles to the other shafts, means rotatively connecting the first and third shafts, an arm mounted for turning movement on said third shaft and having sufficient weight to be turned by gravity in one direction, a one-way motion transmitting device connecting said arm and third shaft, a cam on said second shaft adapted to turn said arm in the direction opposite to that by which it is moved by gravity, a rock shaft parallel with said third shaft and carrying a feeler adapted to rest on the top of the pile of

sheets supported by said table, a releasable latch normally holding said arm in one position, and means operated by turning said rock shaft to release said latch when the feeler falls and return it to normal position when the feeler is raised.

3. In a device of the character described, in combination, a vertically adjustable table adapted to support a pile of sheets, a shaft rotatably supported above said table, means whereby rotation of said shaft raises or lowers said table, a sheet feeding shaft in front of said first shaft and having sheet feeding means thereon, a third shaft extending at right angles to the other shafts, means rotatively connecting the first and third shafts, a member mounted for turning movement on said third shaft, a one-way motion transmitting device connecting said member and third shaft, means to oscillate said member, a rock shaft parallel with said third shaft and carrying a feeler adapted to rest on the top of the pile of sheets supported by said table, a releasable latch normally holding said member in one position, and means operated by turning said rock shaft to release said latch when the feeler falls and return it to normal position when the feeler is raised.

4. In a device of the character described, in combination, a vertically adjustable table adapted to support a pile of sheets, a shaft rotatably mounted above said table, means whereby rotation of said shaft raises or lowers said table, a sheet feeding shaft in front of said first shaft and having sheet feeding means thereon, a third shaft extending at right angles to the other shafts, means rotatively connecting the first and third shafts, an arm mounted for turning movement on said third shaft and having sufficient weight to be turned by gravity in one direction, a one-way motion transmitting device connecting said arm and third shaft, means adapted to turn said arm in the direction opposite to that by which it is moved by gravity, a rock shaft parallel with said third shaft and carrying a feeler adapted to rest on the top of the pile of sheets supported by said table, a releasable latch normally holding said arm in one position, and means operated by turning said rock shaft to release said latch when the feeler falls and return it to normal position when the feeler is raised.

5. In a device of the character described, in combination, a feed table adapted to support a pile of sheets, a shaft mounted above said table, means actuated by said shaft for raising said table, a second shaft mounted in front of said shaft having means thereon for feeding sheets from said pile, a third shaft at right angles to said first shaft having means for driving said first shaft, a ratchet on said third shaft, a pawl engaging said ratchet, a pivoted member on which said pawl is mounted, means for actuating said member in the direction in which said pawl drives said ratchet, gravity actuated means tending to move said member in the opposite direction when said actuating means is inactive, a stop normally opposing said gravity actuated means, a feeler adapted to rest on the top of the sheet pile, and means actuated by said feeler for rendering said stop inoperative when the feeler falls, and returning it to normal position when the feeler is raised.

6. In a device of the character described, in combination, a feed table adapted to support a pile of sheets, a shaft rotatably supported above said table, means whereby rotation of said shaft raises or lowers said table, a sheet feeding shaft in front of said first shaft and having sheet feeding means thereon, a third shaft extending at right angles to said first shaft, having a rotary connection therewith, a feeler adapted to rest on the top of the pile of sheets on said table, means for actuating said third shaft step by step in one direction when said feeler is below a predetermined level, and means controlled by said feeler for rendering said third shaft actuating means inoperative when the feeler is raised above the predetermined level.

7. In a device of the character described, in combination, a feed table adapted to support a pile of sheets, a shaft mounted for rotation above said table, sprockets on said shaft, chains for said sprockets connected to said table whereby the table is raised or lowered as said shaft is turned, a second shaft parallel to said first shaft mounted in front thereof and also above said table having means thereon for feeding sheets one by one from said pile, a third shaft at right angles to said shafts above the plane of said first shaft and having a worm thereon meshing with a worm wheel on said first shaft, a ratchet on said third shaft, a member pivoted adjacent said ratchet having a pawl thereon adapted to engage said ratchet, said member being weighted so as to tend to swing about its pivot in the direction in which said pawl clicks over said ratchet without driving it, reciprocating means tending to drive said member in the opposite direction, a stop for preventing the gravitational action of said member, a rock shaft having a feeler adapted to rest on the top of said pile of sheets, and means whereby said rock shaft releases said stop when said feeler falls below a predetermined level, and restores said stop when the feeler again rises to the desired level.

In testimony whereof I hereunto affix my signature.

WILLIAM M. KELLY.