June 14, 1932. F. GITZENDANNER 1,862,676

AUTOMATIC FEEDER

Filed Feb. 9, 1931 3 Sheets-Sheet 1

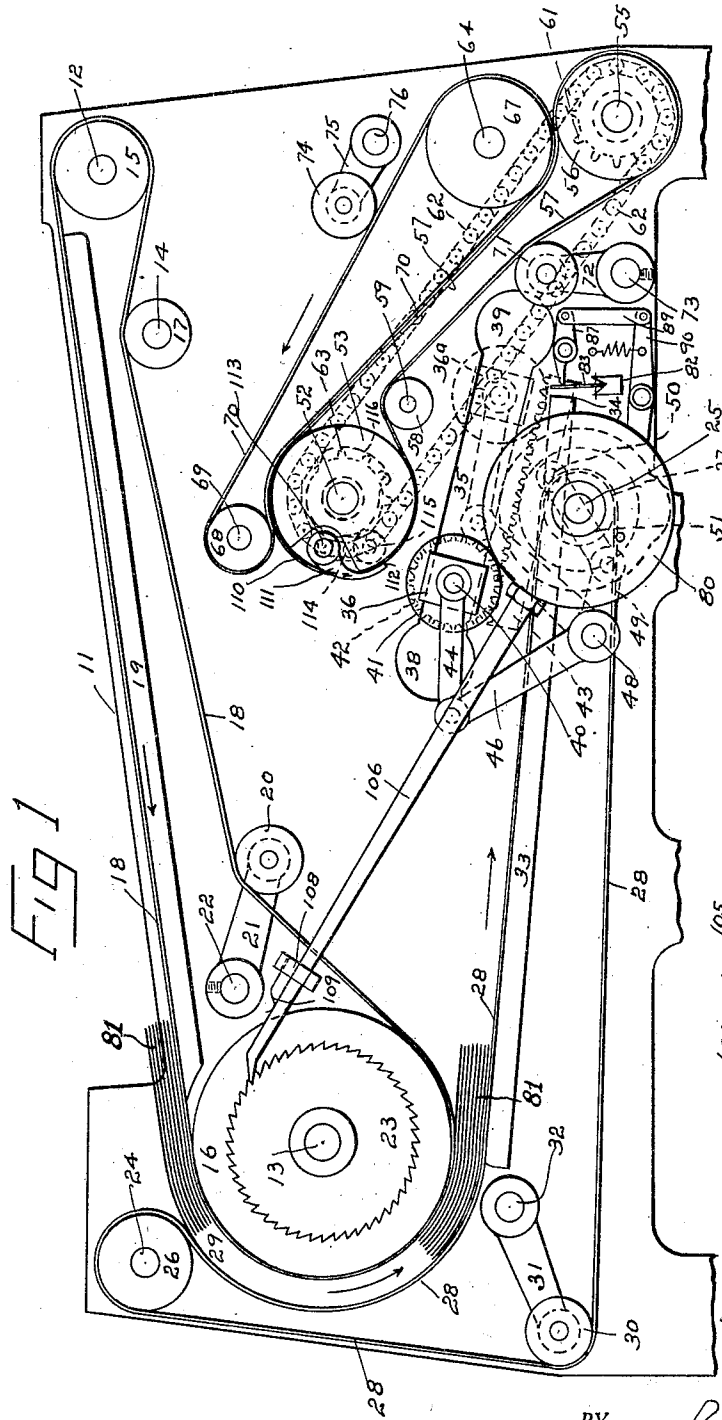


Fig 1

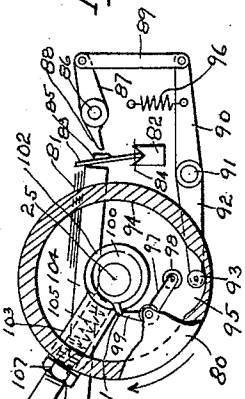


Fig 4

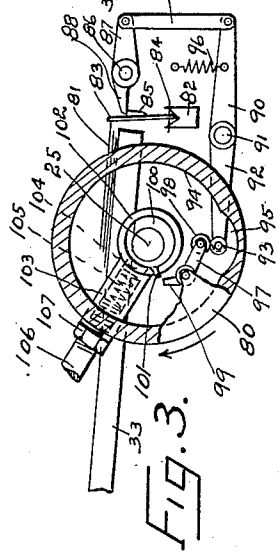


Fig. 3.

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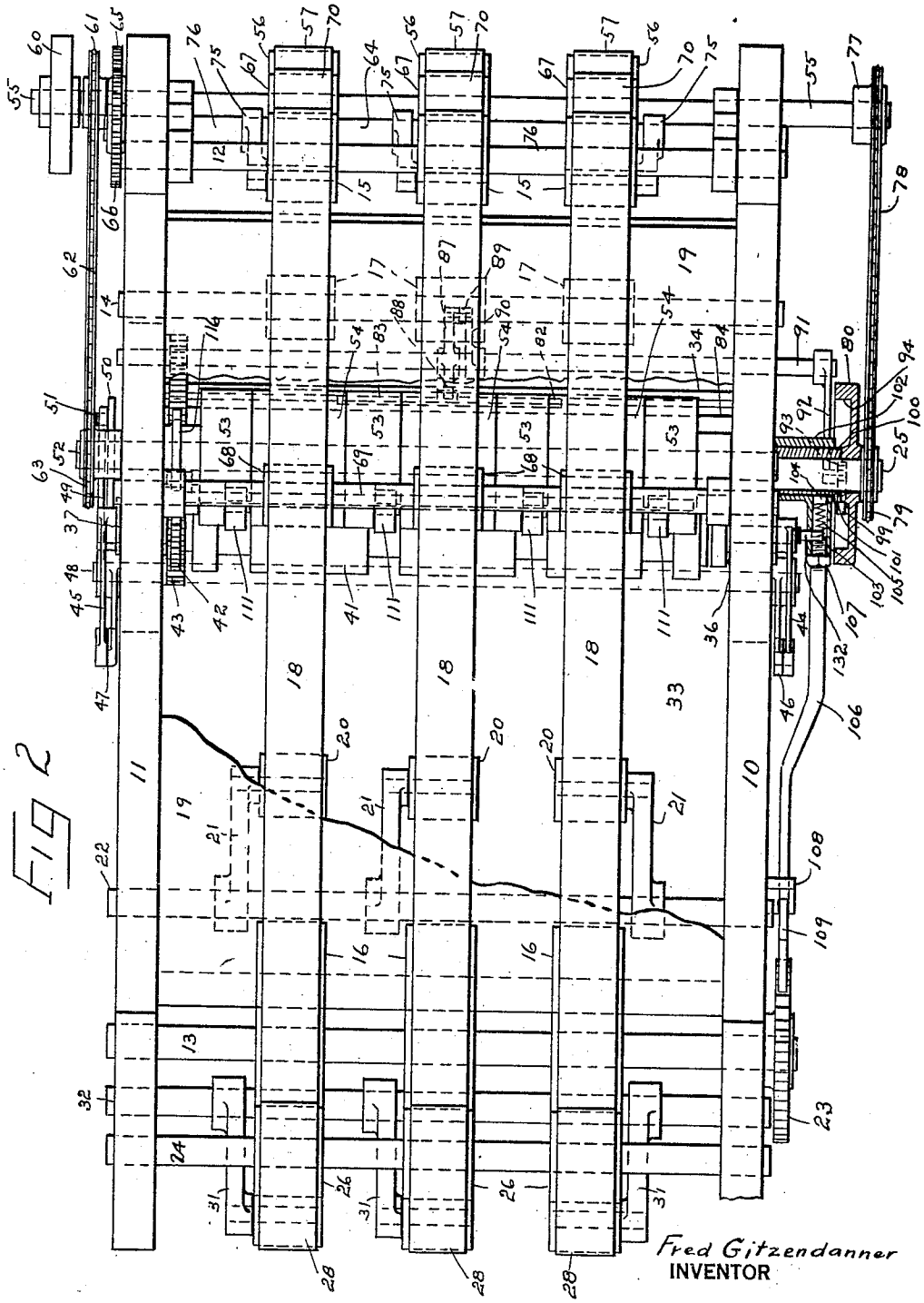


Fig 2

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Fig 5

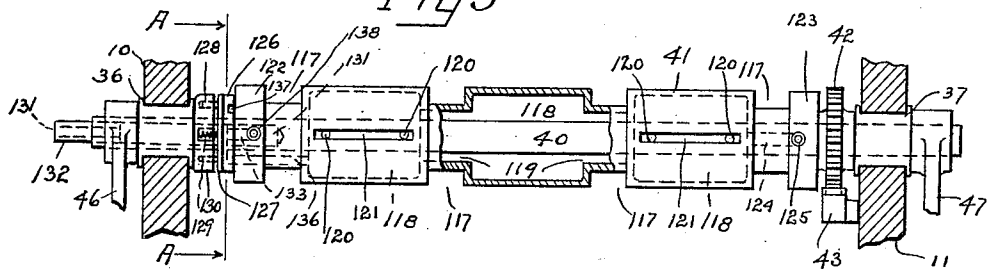


Fig 6

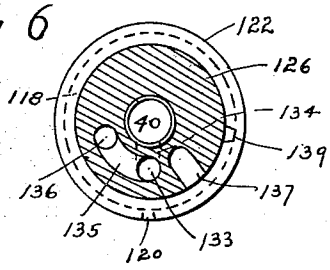


Fig 7

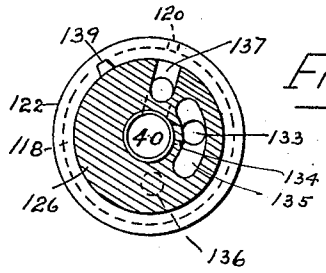
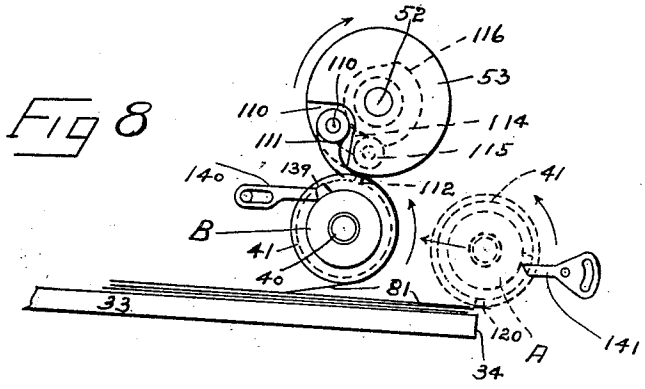


Fig 8



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Patented June 14, 1932 1,862,676

UNITED STATES PATENT OFFICE

FRED GITZENDANNER, OF NEW YORK, N. Y.

AUTOMATIC FEEDER

Application filed February 9, 1931. Serial No. 514,483.

The invention relates to devices for feeding sheet material, particularly sheets of paper, and has for its main object to provide a machine by which the material can be fed at a very high speed without any danger of more than one sheet being fed at one time. In all the devices formerly used there has always been the danger that two or more sheets might adhere together and thus be delivered from the machine at one time. The present invention effectively overcomes this defect.

Another object is to provide a machine which requires no adjustment for different thicknesses of paper, and which requires no other attention from its operator than that of supplying sufficient quantities of the material to be fed. A further object is to provide a feeder of strong and rugged construction which contains no parts which are easily worn or likely to get out of adjustment.

These and various other objects and advantages will be readily understood from the following description and from the accompanying drawings of a preferred embodiment of the machine in which, however, various modifications may be made without departing from the scope of the invention. In the drawings

Fig. 1 is a side elevation of the machine in which the side frame nearest to the observer has been removed,

Fig. 2 is a plan view with certain parts shown in section,

Figs. 3 and 4 are cross-sectional side views of certain parts of the machine,

Fig. 5 is a front elevation of the complete assembly of the suction roller partly shown in section,

Figs. 6 and 7 are cross-sectional views of the suction roller valve mechanism taken on the line A—A in Fig. 5, and

Fig. 8 is a diagram showing certain steps in the feeding of the material.

Referring first to Figs. 1 and 2, all the parts of the machine are supported on or between two side frames 10 and 11. In Fig. 1 the frame 10 has been removed to show the interior parts. Shafts 12, 13 and 14 are rotatingly mounted in the side frames. On shaft 12 three small pulleys 15 are secured, on shaft 13 three larger pulleys 16 are mounted, while shaft 14 carries three idlers 17. Three narrow belts 18 are driven on these pulleys and the upper parts of the belts are supported on a supply table 19 which is secured between the side frames. To tighten these belts, three idlers 20 are rotatingly mounted on arms 21 which are adjustably secured on a stationary shaft 22, mounted in the side frames. A sprocket wheel 23 is secured on the end of the shaft 13.

Two other shafts 24 and 25 are rotatingly mounted in the side frames. On shaft 24 three pulleys 26 and on shaft 25 three pulleys 27 are secured. Three belts 28 are driven by these pulleys. To comprehend the path of these belts it will be necessary to briefly explain how the sheets are removed from the supply table 19. The belts 18 do not travel continuously but only at certain times, as will be explained later. A quantity of the sheets are slightly "fanned out" and placed on the table 19 in such a manner that a part of these sheets enter the passage 29 which is formed between the belts 18 and 28. This causes the belts 28 to assume the shape shown in Fig. 1. Idlers 30, which are mounted on arms 31 rotatingly mounted on shaft 32, cause the belts 28 to firmly press against the sheets contained in the passage 29 and, as the belts 28 travel in the direction indicated by the arrow, move these sheets downward through the passage and fanning them out still more. If there were no sheets in the passage 29 the weight of the idlers 30 would, of course, cause the belts 28 to engage the belts 18. A table 33 supports the slightly slanting parts of the belts 28 as these travel towards the pulleys 27. The end of the table extends to the point 34, notches being cut in the end to accommodate the pulleys and belts.

An inclined slot 35 is milled in each of the side frames and in these slots sliding bearings 36 and 37 are mounted. The openings 38 and 39 shown in the side frames are merely for the insertion of these bearings. A shaft 40 rotates in the sliding bearings and on this shaft a suction roller 41 is rigidly secured. The particular construction and operation

of this suction roller will be described later. A gear 42 is also secured on the shaft 40 and meshes with a rack 43 which is pinned and riveted to the inner side of side frame 11. Connecting links 44 and 45 connect the shaft 40 with levers 46 and 47 which are secured on a shaft 48. A rocking motion is imparted to this shaft by a lever 49 which is connected to a crank 50 by means of a connecting link 51. The crank 50 is fastened on the end of the shaft 25 and rotated by this shaft. The means by which rotation is imparted to this shaft will be explained later.

From the foregoing it will be evident that, as the crank 50 rotates, a rocking motion is imparted to the levers 46 and 47 and that this causes the bearings 36 and 37 to slide back and forth in the slots 35, or from the position shown in full lines to the position shown in dotted lines at 36*a* in Fig. 1. As the shaft 40 is mounted in these bearings and as the suction roller 41 and the gear 42 is mounted on the shaft, all these parts are moved back and forth by the rotation of the crank 50. Furthermore, the engagement of the gear 42 in the stationary rack 43 causes this gear, and consequently the shaft 40 and suction roller 41, to rotate. On a shaft 52 four gripper rollers 53 and three pulleys 54 are secured. On another shaft 55 three pulleys 56 are secured. Belts 57 travel on the pulleys 54 and 56, as well as on the three idlers 58 which are mounted on the shaft 59.

The shaft 55 is the main shaft of the machine and power is applied to a pulley 60 which is secured on the end of the shaft. A sprocket wheel 61 is secured next to the pulley and the shaft 52 is driven from this sprocket wheel by means of a chain 62 and a sprocket wheel 63 which is secured on the end of this shaft. A shaft 64 is also driven from the main shaft 55 by means of a pair of spur gears 65 and 66. These gears, while plainly shown in Fig. 2, have been omitted in Fig. 1 to simplify the drawings. Three pulleys 67 are secured on the shaft 64 and three smaller pulleys 68 on a shaft 69. On these pulleys belts 70 travel in the direction indicated by the arrow. The path of the belts 70 is such that for part of the distance they travel on top of the belts 57 as these belts turn over the pulleys 54 and hence parallel, and in contact, with these belts to the point where they are separated over their respective pulleys 56 and 67. The belts 57 are kept tight by idlers 71 mounted on arms 72 which are secured on a shaft 73, while the belts 70 are kept tight by idlers 74 mounted on arms 75 which are swingably held on a shaft 76.

Referring now also to Figs. 3 and 4, the shaft 25 is also driven from the main shaft 55 by means of a sprocket 77, secured on this shaft, and a chain 78 which drives a sprocket wheel 79 which is secured on a cam 80. This cam in turn is rigidly secured on the end of the shaft 25. While the sprocket wheels 77 and 79, as well as the chain 78, have been omitted in Fig. 1 to simplify this view, these parts are plainly shown in Fig. 2. When the machine is in operation the sheets are fed along the table 33 at a speed which will always keep several of the "fannel out" sheets projecting a short distance beyond the edge 34. A few such sheets are indicated at 81 in Figs. 3 and 4. A bar 82, having a V-shaped groove formed at its upper edge, is secured between the side frames so that it extends across the machine. In this groove a relatively short indicator bar 83 is placed and held from displacement by a transversely inserted pin 84 which is secured in the bar 82. The hole in the indicator bar, through which the pin passes, is of sufficient size to allow the bar to rock freely in the V groove. The indicator bar is provided with a detent 85.

On a shaft 86, which is also mounted in the side frames, a rocking lever 87 is rotatingly mounted. One end of this lever forms a trigger 88 which normally engages on the detent 85. A connecting link 89 connects the other end of the lever 87 with a lever 90 which is mounted on a shaft 91. On the end of shaft 91, and outside the frame 10, a lever 92 is secured. This lever carries a roller 93 on its outer end which engages on the cam face 94 in the cam 80. This cam, which is cupped as plainly shown in Fig. 2, has a depression 95 formed in the cam face into which the roller 93 may drop. A tension spring 96, one end of which is secured on the side frame, tends to keep the roller in contact with the cam face. In Figs. 3 and 4 the front of the cam 80 has been broken away to show the interior and the parts contained therein.

A bell crank 97 is pivoted on the inner face of the cam 80 and is provided with a roller 98 at one end and a trigger 99 at the other. An eccentric bushing 100, having a detent 101 engageable with the trigger 99, is rotatingly mounted on the shaft 25. An eccentric strap 102, having an arm 103, surrounds the eccentric bushing. The arm is bored out and threaded internally at its outer end. It contains a friction disc 104 which is pressed against the eccentric bushing by a compression spring 105 when the threaded end of the long pawl 106 is inserted in the end of the arm. A nut 107 locks the pawl to the arm and prevents it from turning. The other end of the pawl is guided in a slotted block 108 which is fastened on the outer side of the side frame 10. The pawl is held in yieldable contact with the ratchet wheel 23 by means of a flat spring 109 which is fastened on the slotted block.

Referring particularly to Figs. 1 and 8, the gripper rollers are each provided with a recess 110 in which a gripper 111 is placed in such a manner that the operating ends 112 of

these grippers rest on the circumference of their respective rollers. A shaft 113 passes through all the gripper rollers, as well as through all the pulleys located on the shaft 52, but this shaft does not engage in the side frames; it turns with the rollers and pulleys. On this shaft the grippers are rigidly secured as is also a lever 114, on the end of which a roller 115 is mounted. This lever is fastened on the end of the shaft 113 and the roller 115 engages on the face of a cam 116 which is stationarily secured on the inner side of the side frame 11. It actuates the lever 114, and consequently the grippers, as it revolves around it. The face of the cam is plainly shown in Fig. 8. The timing of this cam, as well as the timing of all other parts, will be explained later.

Reference is now particularly made to Figs. 5, 6 and 7. As previously stated, the suction roller 41 is rigidly secured on the shaft 40. The suction roller is provided with four parts 117 of reduced diameters to allow the gripper 111 to clear the roller while turning. It is also provided with three hollow air chambers 118 which communicate with each other through air passages 119 formed in the two reduced parts in the center of the roller. Air holes 120 lead from the chambers to the exterior and between the air holes of each chamber shallow grooves 121 are milled. These grooves do not cut through the walls of the chambers. The ends of the suction roller terminate in two solid rollers 122 and 123. An air passage 124 leads from one of the chambers to an air hole 125 drilled in the roller 123. A rotary air valve 126 is located adjacent to the roller 122 and is held in contact with the end of that roller by a pressure disc 126. The pressure disc is provided with two guide pins 128 and two compression springs all of which are inserted in the face of a collar 130 which is pinned in the shaft 40.

A hole 131 is drilled in the end of the shaft 40 and in this hole a hose nozzle 132 is inserted. An air passage 133 is drilled in the end of the roller 122 and communicates, through a second air passage 134 drilled at right angle to the first, with the hole 131 in the shaft. A concentric groove 135 is milled in that side of the air valve 126 which abuts against the suction roller. This groove is of just sufficient length to reach to another air passage 136 which is also drilled in the end of the roller 122. This passage extends into the first air chamber. In Fig. 6 the open position is shown, and it will be seen that, if a vacuum pump is connected by a hose to the nozzle 132, air will be drawn through the air holes 120 and 125, chambers 118 and passages 119, passage 136, groove 135, passage 133, passage 132 and the hole 131 in the shaft. Or, in other words, a suction will be created at all the air holes and the grooves 121, sufficient to hold a sheet of the material being fed against these holes and grooves.

In Fig. 7 the valve is shown in the closed position. In this position the passage 136 which leads to the air chambers is closed. However, as the vacuum pump operates continuously, an extra air groove 137 is milled in the air valve. This groove leads to the exterior, or circumference, of the valve. Thus, in the closed position of the valve, air is drawn through the groove 137, passage 133, passage 134 and the hole 131 in the shaft 40. An air hole 138, similar to the air hole 125, is drilled in the roller 122. A detent 139 is located on the circumference of the air valve and is used for turning the valve from its open to its closed positions. It engages against adjustable stops 140 and 141, as shown in Fig. 8. These stops are located on the inner side of the side frame 10. They will be further described in the description of the operation of the machine which now follows.

As already explained, the sheets to be fed are "fanned out" and placed on the table 19; a quantity of the sheets being pushed down the passage 29. The belts 28, while fanning the sheets out still further, convey them along the table 33 until the front sheet engages with the indicator bar 83. As the suction roller is in its lower position, as shown at A in Fig. 8, and with the air valve 126 in the position in which suction is created in the air holes and slots in the suction roller, the uppermost sheet is drawn up against the roller. As the suction roller turns in the direction indicated by the arrow, it is drawn rearward and upward by the mechanism already described. This is plainly shown in Fig. 8 where the initiate position of the roller is shown at A and an intermediate position at B. The rearmost position of the roller is shown in Fig. 1. It will be noted that not only is the front edge of the sheet 81 lifted from the sheets below, but the whole sheet is rolled back on the other sheets. This method of picking up the sheet effectively separate any sheets which might adhere together and assures the picking up of one sheet only.

As the suction roller approaches the position B, the gripper roller has turned to a position where the roller 115, which operates the gripper 111, is ready to roll off the high part of the cam 116. In the position shown at B the roller 115 has just descended to the low part of the cam and the grippers have engaged the sheet. The detent 139, on the air valve, has engaged with the stop 140 and the valve has been closed. The sheet is now transferred to the gripper roller and carried over this. The sheet is finally carried between the belts 57 and 70 and discharged from the machine.

The belts 18 do not travel continuously. As long as enough sheets are contained on the table 33 so that the indicator bar 82 is pushed forward, the belts are stationary. As soon as the sheets lack behind so that the indicator bar drops back to the position shown in Fig. 4, the action of the spring 96 causes the trigger to slip off the detent 85 and, through the link and levers 87, 89, 90 and 92, causes the roller 93 to disengage the roller 98. This drops one end of the bell crank 97 and engages the trigger 99 with the detent 101 on the eccentric bushing 100. Now, as the cam 80 turns, the eccentric bushing turns with it and imparts a reciprocating movement to the pawl 106, causing it to turn the ratchet wheel 23 as well as the belts 18. This movement of the belts crowds more sheets into the passage 29.

When the indicator bar is in the position shown in Fig. 3, the trigger 99 is disengaged from the detent 101 and the eccentric is prevented from turning by the pressure exerted by the spring 105 and the friction disc 104 against it. The shaft merely turns in the eccentric bushing. As the cam 80 turns the bell crank 97 turns with it, while the roller 93 rides on the cam face 94. After each revolution of the cam the roller 93 engages with the roller 99 and thus prevents the trigger 99 from engaging with the detent 101.

Having described my invention and its operation, what I claim as new and wish to protect by Letters Patent is:—

1. In a feeding device of the class described, a table for supporting a plurality of the sheets to be fed, a suction roller for separating the uppermost sheet from the remaining sheets, a valve for automatically controlling the suction of said roller, means for rolling said suction roller rearwardly over the remaining sheets, and a roller having cam-operated gripping fingers for removing each sheet from the suction roller and discharging it from the device.

2. In a feeding device of the class described, a table, means for constantly supplying sheets to said table, a suction roller for separating the uppermost sheet from the remaining sheets on the table, a valve for automatically controlling the suction of said roller, means for rolling said suction roller rearwardly over the remaining sheets, and a roller having cam-operated gripping fingers for removing each sheet from the suction roller and discharging it from the device.

3. In a feeding device of the class described, a table for receiving a plurality of the sheets to be fed, a second table, means for conveying sheets from the first table to the second and along the top of said second table, a suction roller for separating the upper and foremost sheet on said table from the remaining sheets, a valve for automatically controlling the suction of said roller, means for rolling said suction roller rearwardly over the remaining sheets, and a roller having cam-operated gripping fingers for removing each sheet from the suction roller and discharging it from the device.

4. In a feeding device of the class described, a table for receiving a supply of the sheets to be fed, a second table, means for feeding sheets along said second table, means associated with the second table for causing sheets to be fed to it from the first table at intervals as needed, a suction roller for separating the upper and foremost sheet on said table from the remaining sheets, a valve for automatically controlling the suction of said roller, means for rolling said suction roller rearwardly over the remaining sheets, and a roller having cam-operated gripping fingers for removing each sheet from the suction roller and discharging it from the device.

5. In a feeding device of the class described, a supply table for receiving the sheets to be fed, pulleys located at each end of said supply table and carrying belts which travel over the top thereof, another set of pulleys carrying a second set of belts the paths of which are such as to carry them around and in contact with the sheets passing over the discharge pulleys of the supply table, a second table over the top of which the second set of belts also travel and over which the sheets are conveyed, an automatically controlled suction roller for removing one sheet at a time from the sheets conveyed along the second table, and means for removing each sheet from the suction roller and discharging it from the device.

6. In a feeding device of the class described, a supply table for receiving the sheets to be fed, pulleys located at each end of said supply table and carrying belts which travel over the top thereof, said belts having an interrupted motion, another set of pulleys carrying a second set of belts the paths of which are such as to carry them around and in contact with the sheets passing over the discharge pulleys of the supply table, means for holding said belts in tight contact with said sheets, a second table over the top of which the second set of belts also travel and over which the sheets are conveyed, an automatically controlled suction roller for removing one sheet at a time from the sheets conveyed along the second table, and means for removing each sheet from the suction roller and discharging it from the device.

7. In a feeding device of the class described, a supply table for receiving the sheets to be fed, pulleys located at each end of said supply table and carrying belts which travel over the top thereof, said belts having an interrupted motion, another set of pulleys carrying a second set of belts the paths of which are such as to carry them around and

in contact with the sheets passing over the discharge pulleys of the supply table, means for holding said belts in tight contact with said sheets, a second table over the top of which the second set of belts also travel and over which the sheets are conveyed, means associated with said second table for actuating a mechanism for imparting motion to the first-mentioned belts when the supply of sheets on the second table requires renewal, an automatically controlled suction roller for removing one sheet at a time from the sheets conveyed along the second table, and means for removing each sheet from the suction roller and discharging it from the device.

8. In a feeding device of the class described, a supply table for receiving the sheets to be fed, pulleys located at each end of said supply table and carrying belts which travel over the top thereof, said belts having an interrupted motion, another set of pulleys carrying a second set of belts the paths of which are such as to carry them around and in contact with the sheets passing over the discharge pulleys of the supply table, means for holding said belts in tight contact with said sheets, a second table over the top of which the second set of belts also travel and over which the sheets are conveyed, means associated with said second table for actuating a mechanism for imparting motion to the first-mentioned belts when the supply of sheets on the second table requires renewal, an automatically controlled suction roller for removing one sheet at a time from the sheets conveyed along the second table, a gripper roller to which the sheets are transfered from the suction roller, and a series of additional belts to which the sheets are delivered from the gripper roller to be delivered to the discharge point of the device.

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