

[54] **OVERCHUTE FEED APPARATUS FOR ROTARY PRINTING MACHINE**

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[51] Int. Cl. **B65h 3/08**

[58] Field of Search 101/232-243, 132; 271/9, 5, 11, 26

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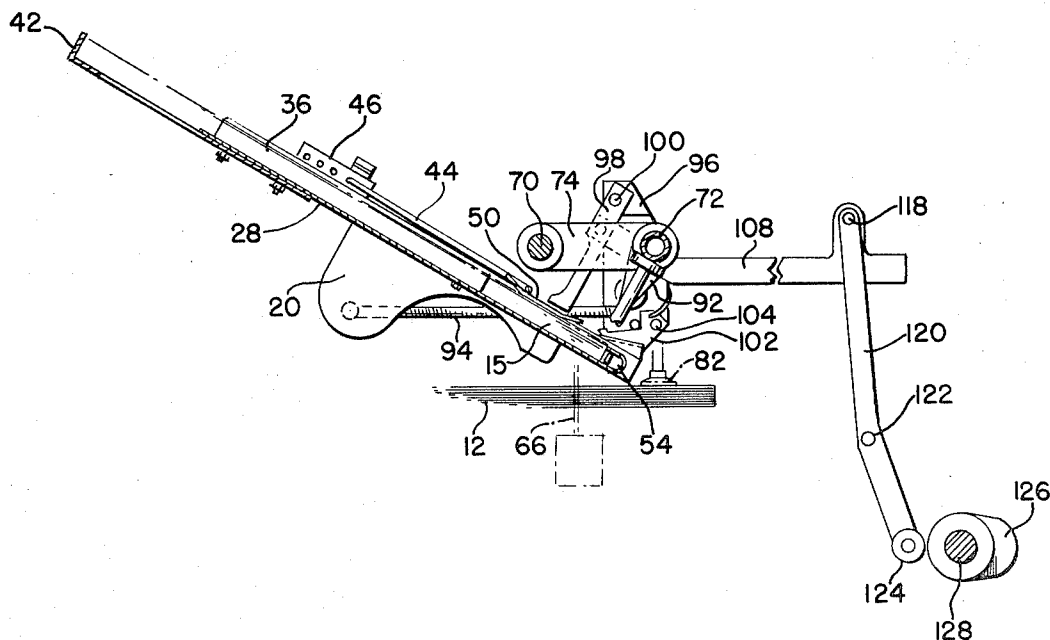
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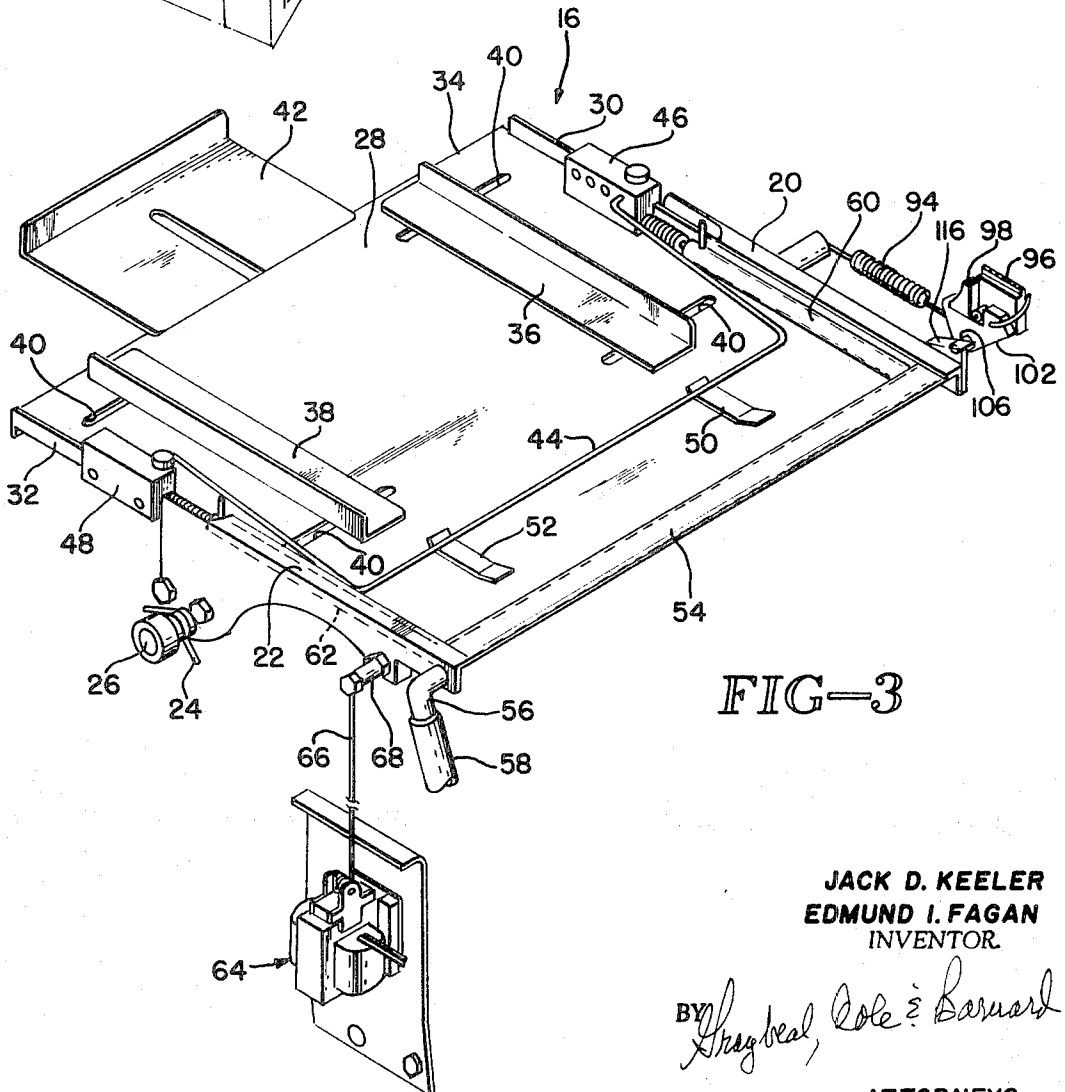
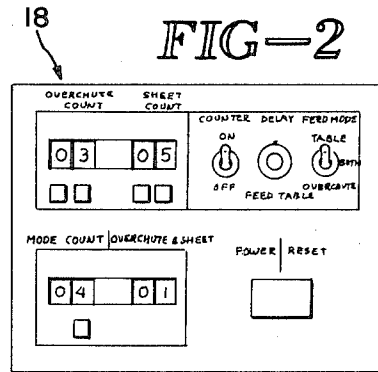
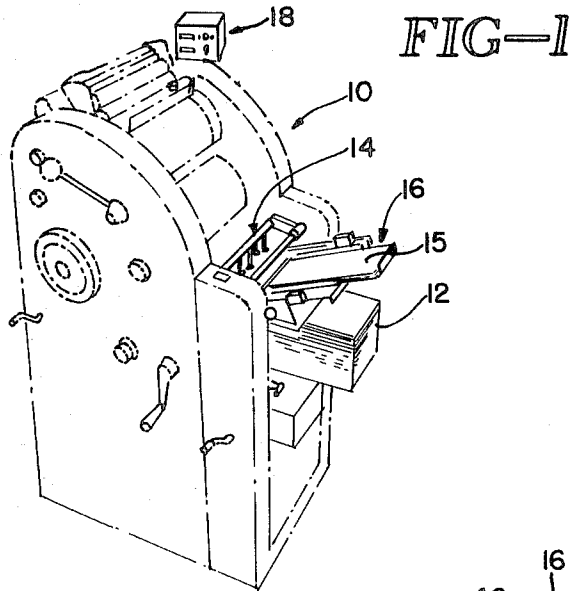
Primary Examiner—J. Reed Fisher
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[57] **ABSTRACT**

Auxiliary paper feeding mechanism for a duplicating machine in which an overchute tray with a secondary paper supply is placed above the main paper stock supply. The secondary supply of paper is fed into the duplicating machine by the same feeding apparatus as is used to feed the primary paper supply. Linkage and drive mechanisms for feeding the paper sheets from the overchute are attached to the working parts of the duplicator. Air pressure is directed to the tray to assist in separating the paper sheets for feeding. The overchute tray assembly can be removed or positioned to an inoperative condition without obstructing the normal feeding of paper from the primary supply into the machine.

3 Claims, 11 Drawing Figures





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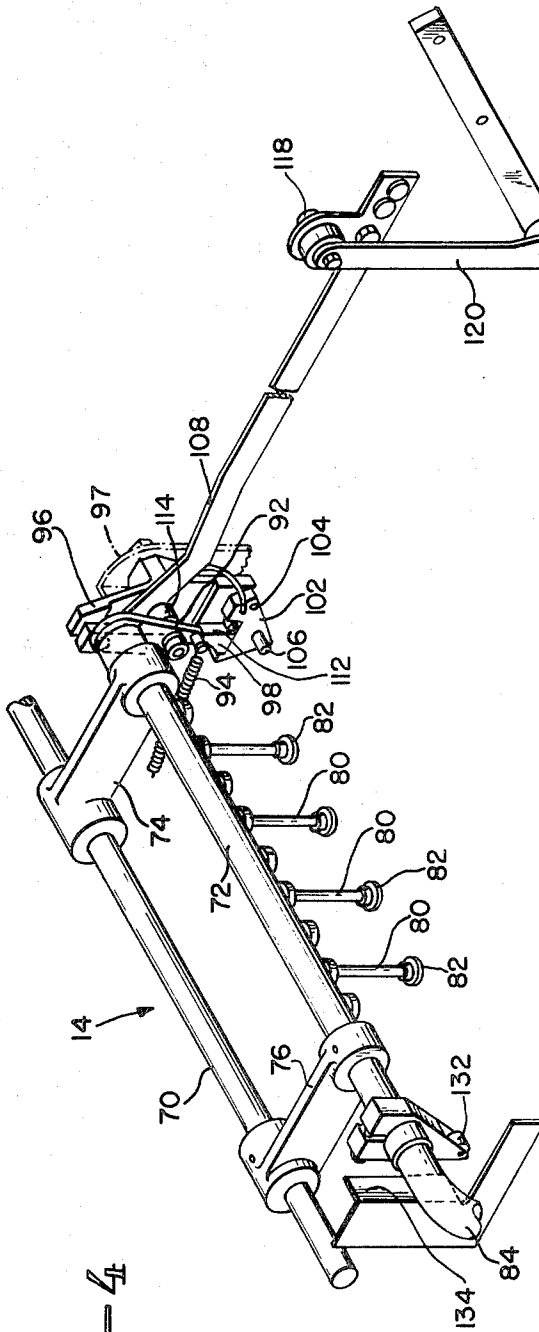


FIG-4

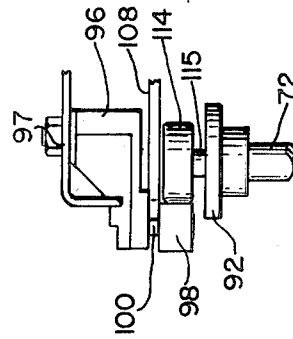
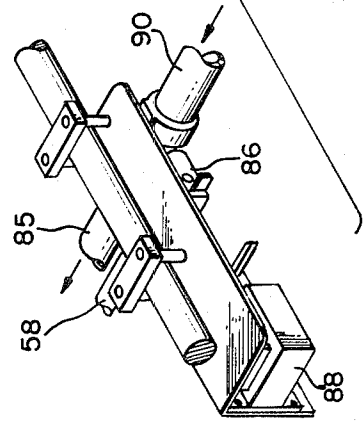


FIG-4A



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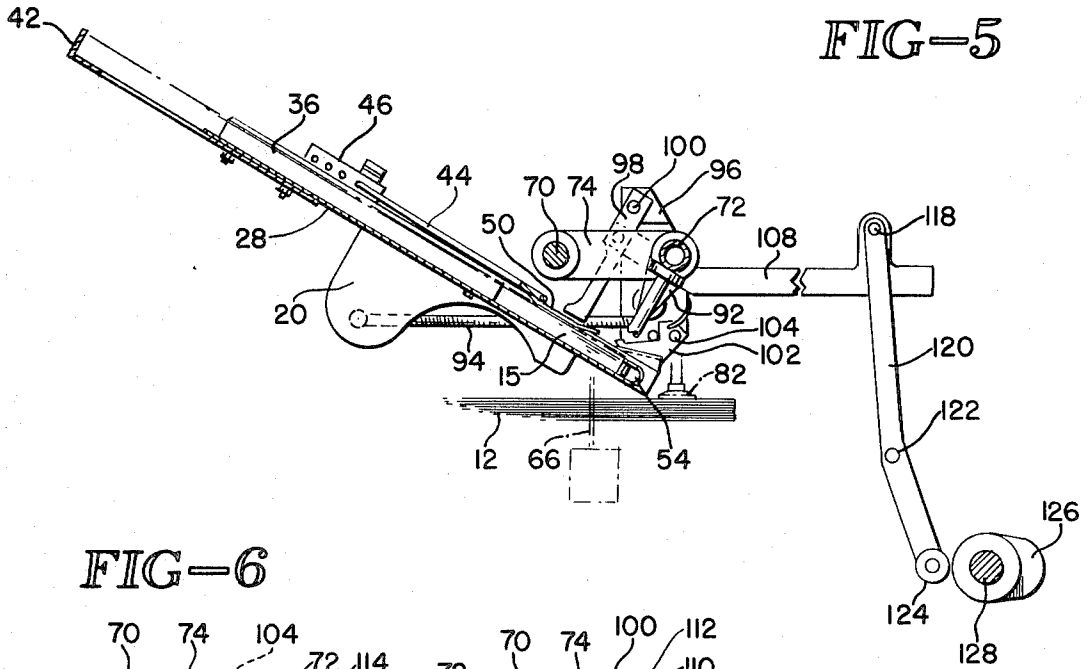


FIG-6

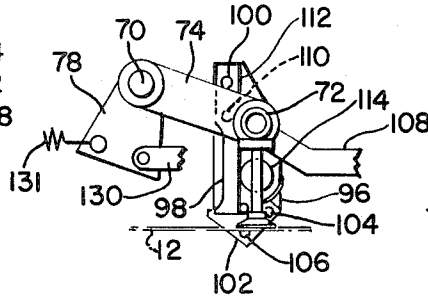
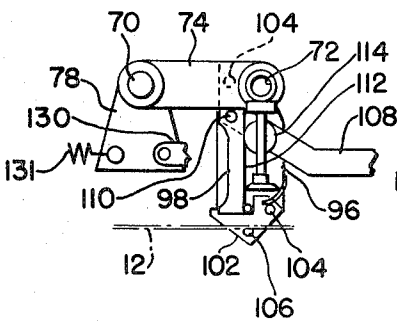


FIG-7

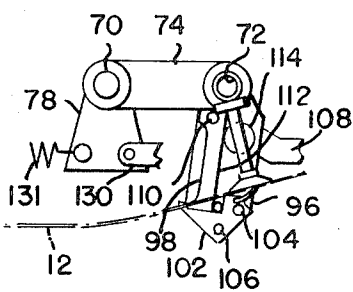


FIG-8

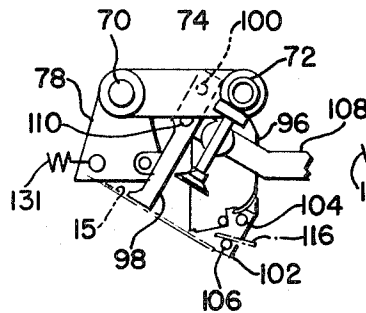


FIG-9

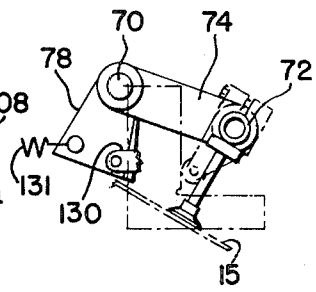


FIG-10

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OVERCHUTE FEED APPARATUS FOR ROTARY PRINTING MACHINE

BACKGROUND OF INVENTION

This invention relates generally to the art of paper feeding devices for such machines as offset duplicators, and more particularly to an overchute feeder for a secondary supply of paper to be used in conjunction with a primary supply of paper.

The sophistication and refinement of duplicating machinery in recent years has advanced to the point where such machinery is virtually automatic. In various types of business and industrial office duplicating uses, however, there is frequent need for dissimilar paper stock to be fed into the duplicating cycle. The dissimilarity may be in its size, type or thickness, color, or preprinted information from the main paper supply. For instance, check imprinting requires that account numbers also be printed on deposit slips which are attached to a book of checks. Thus the problem has arisen that the automatic duplicating operation must be interrupted so that the dissimilar stock can be manually fed to the machine. This defeats the purposes and advantages of automatic duplicating.

There are no accepted auxiliary devices for attaching for example to A. B. Dick offset duplicating machines to automate the feeding of dissimilar sheets. Other attempts have been made but none have been found to be successful. Friction feed for instance has been attempted but it is not positive enough and therefore it is inconsistent and unreliable.

SUMMARY OF INVENTION

The overchute feeder mechanism of this invention involves a tray assembly for holding a secondary paper supply. The tray is supported above the main paper supply and tilts into and out of operative position depending upon whether paper stock is being fed from the primary supply or whether it is being fed from the secondary supply on the overchute feed. Linkages and other actuating mechanisms are adapted to the duplicator vacuum feed mechanism and other parts so that the same vacuum feed can be used for the paper in the overchute feed assembly. The overchute feed tray is tilted into position and its actuating parts are designed to swing the vacuum feed of the duplicator out of their normal feeding position. In addition, however, the overchute assembly combines its own action with the machine's normal operation to swing the vacuum feet through a greater arc but within the same timing cycle as in normal operation. The vacuum feet can then engage the secondary paper in the overchute tray and feed it into the duplicator forwarding rolls. With controls any combination or ratio of secondary sheets to primary sheets may be fed into the duplicating machine.

Accordingly, it is among the many features, advantages and objects of this invention to provide an overchute feed apparatus which utilizes the existing vacuum feed in the duplicating machine. The overchute feed of this invention gives positive sheet separation by use of side blowers in the tray. The vacuum foot face engages the individual top sheets so that separation of the top sheet from the second sheet is enhanced. It is a further feature to provide an overchute feed mechanism which is relatively simple and novel in design and relatively inexpensive in cost. The overchute feed of this invention can be installed in the field as an adaptation to existing machines or as original equipment in new duplicators.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is an environmental view of a typical duplicator machine with an overchute feed in position;

FIG. 2 is a frontal view of the control panel for the overchute feed controls housing;

FIG. 3 is a perspective view of the overchute tray assembly showing details thereof;

FIG. 4 is a partial view in perspective showing the vacuum feet paper feed assembly and details of its actuating mechanism;

FIG. 4A is a partial top plan view of the actuating mechanism of FIG. 4;

FIG. 5 is a side elevational view of the tray assembly and feed actuating mechanism; and

FIGS. 6 through 10 are partial side elevational schematic views of the actuating mechanism which permits the vacuum feet to be used in conjunction with the main paper supply as well as the secondary paper supply in the overchute feed.

DESCRIPTION OF PREFERRED EMBODIMENT

FIG. 1 shows a typical duplicator machine 10 such as a floor model offset duplicator manufactured by the A. B. Dick Company. The duplicator will have main paper supply 12, sucker feet assembly 14, overchute tray assembly 16 and overchute control box 18 with control panel and counter.

FIG. 3 shows the overchute feed tray assembly generally designated by the number 16. The tray assembly includes channel supports 20 and 22 for supporting the tray. Since the tray must be tilted into and out of its operative position, the channel supports 20 and 22 are generally biased upwardly by tilt spring 24 attached to tilt shaft 26. The channel supports 20 and 22 will pivot around shaft 26 and such supports are interconnected by means not shown so that the channel supports will pivot together as a unit around shaft 26. Tray assembly 16 has main tray plate or base portion 28 which is slidably received in and between the channel supports 20 and 22. Main tray 28 has side edges 30 and 32, in this instance with upstanding edge wall, and also has back edge 34. L-shaped side guides 36 and 38 are mounted on the main tray 28 for variable widths of paper by being slidably mounted in adjustment slots 40 having tightening means not shown. A tray extension 42 is provided at the back of main tray 28. A holding bail 44 is mounted in tray stop blocks 46 and 48 on each side of the tray assembly. Said blocks also engage the back edge of the channel supports 20 and 22 to hold the tray in position in said channels. Bail 44 may also be provided with paper pressures 50 and 52. The tray at its front has air pipe or duct 54 connected to an inlet connector 56 and hose 58 from a diverter valve 86 shown in FIG. 4. Air is admitted to air pipe 54 which in turn distributes the air to air guide ducts 60 and 62 on each side of the tray. Air guides 60 and 62 will have small holes or outlets therein for directing an airstream across the tray. The air blowing across the tray assists separation of the paper as individual sheets are taken off. A solenoid assembly generally designated by the number 64 is located on one side of the duplicator machine and connected by pull rod 66 to connector 68 mounted on the channel support 22. Actuation of the solenoid assembly 64 results in rod 66 being pulled down which in turn moves the front end of the tray downwardly into operating position against the pressure of tilt spring 24. When the solenoid assembly is deenergized, the front end of the tray will swing upwardly into its inoperative position.

FIG. 4 shows generally details of the suction foot feed assembly 14 and its operating mechanism. The suction foot assembly includes a main support shaft 70 and a support member and vacuum header 72 for the suction feet. As can be seen, the main shaft 70 and support header 72 are generally parallel and spaced apart and interconnected by the frame members 74 and 76. Shaft 70 is fixed to the frame members 74 and 76 while header 72 is mounted for rotational movement therein. Shaft 70 is secured for nonrotational movement to a bracket member 78 shown schematically in FIGS. 6 through 10. Header support member 72 has attached thereto the depending vacuum pipes 80 and rubber vacuum feet 82 which engage the paper and pass it from the primary and secondary paper stacks into the forwarding rolls in the duplicator machine. The vacuum foot assembly thus far described is part of the original duplicator machine. A vacuum hose 84 is connected to a vacuum pump in the duplicator. A hose 85 is one of three hoses connected to a diverter valve means 86 operated by solenoid 88. A line or hose 90 connects diverter valve 86 to the duplicator blower. The hose 85 directs air to

the original location at the duplicator main paper supply. The hose 53 is attached to diverter valve 86 and as shown provides air pressure to the overchute tray. The purpose of the diverter valve is to direct air selectively to the paper supply being used. Appropriate support structure for the diverter valve and solenoid is connected to the duplicator machine and is considered to require no description for the purposes of setting forth the invention.

The mechanism for enabling the vacuum feet to pick up a sheet of paper from the paper stock piles is best illustrated in FIGS. 4 through 10. The end of header support 72 is rigidly attached at one end to an actuator lever 92 best seen in FIGS. 4 and 5. Actuating lever 92 is biased away from the machine or toward the back end of the tray by spring 94 appropriately anchored at its other end to stationary structure. The tendency of the actuating lever 92 as a result of its connection to spring 94 is to bias or pivot header 72 away from the machine. An adapter frame piece 96 is mounted on the existing feed double-forwarding lever 97 of the duplicator in such manner as to act as an adapter, in conjunction with auxiliary forwarding member 98 and catch 102, to duplicate the original motion of the vacuum feet 82 when the overchute tray is not being used. In this regard double-forwarding lever 97, before installation of the overchute mechanism, is engaged by follower 14 attached to lever 92. When the double-forwarding lever is moved towards the machine by means not shown header 72 and the vacuum feet are also rotated. See FIG. 7. Thus the adapter frame piece 96, catch 102 and auxiliary forwarding lever 98 duplicate the action.

An auxiliary forwarding member 98 is pivotally mounted as at 100 to the upper end of frame piece 96. Attached to the lower end of frame piece 96 is a pivotal lock or catch 102 which rotates around a pivot shaft 104 connected to said frame piece 96. A pin 106 protrudes outwardly from catch 102 to be engaged by the tray when it is in operative position so that catch 102 is forced downwardly to free auxiliary forwarding member 98. Auxiliary forwarding member 98 and frame member 96 are provided with space therebetween so that one end of a cam bar 108 can be pivotally connected to the auxiliary forwarding member 98 at pivot connection 110. It will be noted that when catch 102 is in its up position as shown for instance in FIGS. 4, 6 and 7, auxiliary forwarding member 98 is securely held with respect to frame piece 96.

The back edge 112 of auxiliary forwarding member 98 forms a cam surface for rotatable follower 114 mounted on lever 92 on the outside surface thereof by shaft 115 so that the cam follower 114 is between frame piece 96 and lever 92. The action of the cam surface 112 and the cam follower 114 is to insure that movement of the header 72 and vacuum feet 82 will be generally vertical during the rapid raising and lowering operation of the feet as paper is being fed into the duplicator. The double-forwarding member 97 is part of the duplicator and without the overshoot feed serves the same purpose as back edge 112 of member 98, namely to impart vertical direction to the up and down movements of the vacuum feet. Thus, follower 114 with the overchute feed attached rides on member 98 and not on member 97. In this regard see FIG. 4a. It will be realized that the end of header 72 and lever 92 are dependent on frame member 96, auxiliary forwarding member 98 and catch 102 by virtue of follower 114. A tab member 116 on one side of the front end of the tray is positioned to engage pin 106 on catch 102 so that the auxiliary forwarding member can be released.

Cam bar 108 and its associated parts are added as part of the overchute feed apparatus. It is pivotally connected as at 118 to lever 120 which in turn is pivotally mounted on stationary pivot point 122. The other end of lever 120 has cam follower 124 for engaging cam 126 mounted on shaft 128. Rotation of shaft 128 brings cam 126 into engagement with follower 124 to move cam bar 108 forward to feed paper forward from overchute stack 15. During feeding from the main paper stack 12, cam bar 108, lever 120 and cam 126 perform no function.

FIGS. 6 through 10, in conjunction with the other drawings, illustrate schematically the sequence of operations which take place in feeding paper either from the main paper stack 12 or from the overchute feeder paper stack 15. A connector bar 130 which is part of the original duplicator equipment is attached to bracket 78 which is as mentioned above fixedly secured to shaft 70. The purpose of connector bar 130 is to raise and lower header 72 by rotating shaft 70 through a short arc. A spring 131 biases the bracket 78 rearwardly and thus urges the header and vacuum feet downwardly. FIG. 6 shows the actuating mechanism in its ready to operate position. Catch 102 holds auxiliary forwarding lever 98 in its locked and generally vertical position. Paper is to be taken off the main paper supply 12 and fed into the duplicator. Connector bar 130 is engaged with a cam actuator not shown so that the spring 131 urges bracket 78 back as shown in FIG. 7. Since bracket 78 is rigidly connected to shaft 70, shaft 70 is rotated through a short arc to lower header 72 and the vacuum feet 82 downwardly towards the top of the paper. It will be noted that cam follower 114 rides on the back surface 112 of forwarding member 98 so that the movement of the vacuum feet regardless of angle of disposition is generally in a vertical up or down direction. The vacuum feet engage a sheet of paper in main stack 12, the vacuum is actuated and the feet pick up the paper and are raised again to begin forward movement. FIG. 8 shows that the frame piece 96 attached to double-forwarding lever 97 is pivoted toward the machine. Pivoting of frame piece 96 toward the machine moves follower 114 toward the machine thus swinging actuator lever on header 72 and pivoting the vacuum feet toward the forwarding rolls. In this way the front edge of the paper engages the forwarding rolls in the duplicator. The vacuum is released in the vacuum feet by the machine's normal operating sequence and the operation may be repeated as many times as desired. The normal machine operation swings frame piece 97, auxiliary member 98, and catch 102 back to the position in FIG. 6. Connector bar 130 keeps header 72 raised to return the vacuum assembly to the position shown in FIG. 6.

When it is desired to take paper sheets off stack 15 on the overchute feed tray, solenoid 64 actuates pull rod 66 and the inner or front end of the tray assembly 16 is lowered into the position shown in FIG. 5. Tab 116 on the tray engages pin 106 connected to catch 102 so that the auxiliary forwarding lever 98 is released. Actuator lever 92 is then urged rearwardly by spring 94 to be stopped by contact of roller 132 against cam surface 134 which guides the position of the vacuum feet during raising and lowering. This permits the vacuum feet to be rotated rearwardly of their normal position as illustrated in FIGS. 5 and 9. Bracket 78 is then pivoted by connector bar 130 so that the vacuum feet are lowered to the overchute paper supply 15. The vacuum is actuated in the feet 82 as shown in FIG. 10 to pick up a sheet of paper and the header and vacuum feet are raised. The machine's normal forwarding operation is imparted to double-forwarding lever 97 and frame piece 96. In addition, however, cam bar 108 then comes into operation through cam 126, lever 120, and member 98 through its action on lever 92. Cam 126 is shaped to increase the arcuate motion of the vacuum feet while retaining the original timing of the paper forwarding action. Cam bar 108 accordingly complements the forwarding action of double-forwarding lever 97 and frame piece 96.

It will be noted in FIG. 4 that header 72 at its opposite end has a cam follower 132 which engages a vertical cam surface 134. The purpose of the follower 132 and surface 134 is to stop rear motion at the desired point and to ensure again that movement of the sucker feet will be generally vertical during feeding from the overchute tray since forwarding lever 98 and its rear cam surface 112 have been released and are in the back position as shown for instance in FIGS. 5 and 9. When the controls and counter indicate that the requisite number of papers from the stack 15 has been fed into the duplicator, the tray is released by solenoid 64 and it swings upwardly out of its operative position. Thus forwarding lever 98 will return to its

normally locked position as shown in FIGS. 6 and 7 and the duplicator is then able to feed paper from the primary supply 12 as described.

What is claimed is:

1. In a duplicator-type paper printing machine which includes a rotary printing cylinder, a main paper supply, forwarding rolls for supplying paper to said printing cylinder, movable vacuum feet paper feed means for feeding paper to said forwarding rolls, and drive means for operatively driving the various components of said duplicator, an overchute feed apparatus comprising:
 - a. tray means for a secondary paper supply disposed generally above the main paper supply stack at an angle inclined downwardly and inwardly toward said forwarding rolls, the front end of said tray means being tiltable downwardly from an inoperative position for movement into an operative position which will permit said vacuum feet feed means to move over said tray means;
 - b. overchute actuator mechanism connected to said vacuum feet paper feed means and to said duplicator drive means so that when it is desired to feed paper from said secondary paper supply on said tray means into said duplicator said vacuum feet paper feed means are caused to move out of their normal path and pickup paper off said tray means and feed it to said forwarding rolls, said actuator mechanism including:

1. biasing means for urging said vacuum feet feed means away from said forwarding rolls,
2. catch means for holding said vacuum feet feed means in normal position opposed to said biasing means for feeding paper from said main paper supply stack,
3. release means for unlatching said catch means and permitting said vacuum feet feed means to move out of their normal path of travel into pickup position with respect to said secondary paper supply, and
4. cam-operated connector means operatively connected to said vacuum feet feed means and which in conjunction with the duplicator drive means moves said feed means through a greater path of travel than normal but within substantially the same time cycle as for normal movement.
2. The overchute feed apparatus according to claim 1 and wherein a tilt mechanism is attached to said tray means for selectively tilting the same into and out of its operative position.
3. The overchute feed apparatus according to claim 1 and wherein said tray means includes air duct means with air outlet means for receiving air under pressure and directing the same through said air outlet means across said tray to assist in the separation of paper sheets in said secondary supply.

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