Sept. 20, 1966 R. BARONNIE 3,273,883

PAPER FEED APPARATUS HAVING STACK SELECTING MEANS

Filed May 1, 1964

3 Sheets-Sheet 1

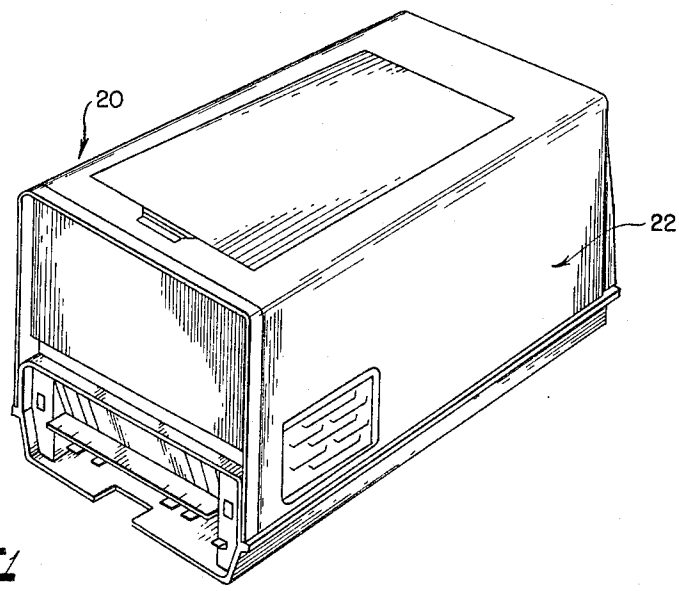


Fig. 1

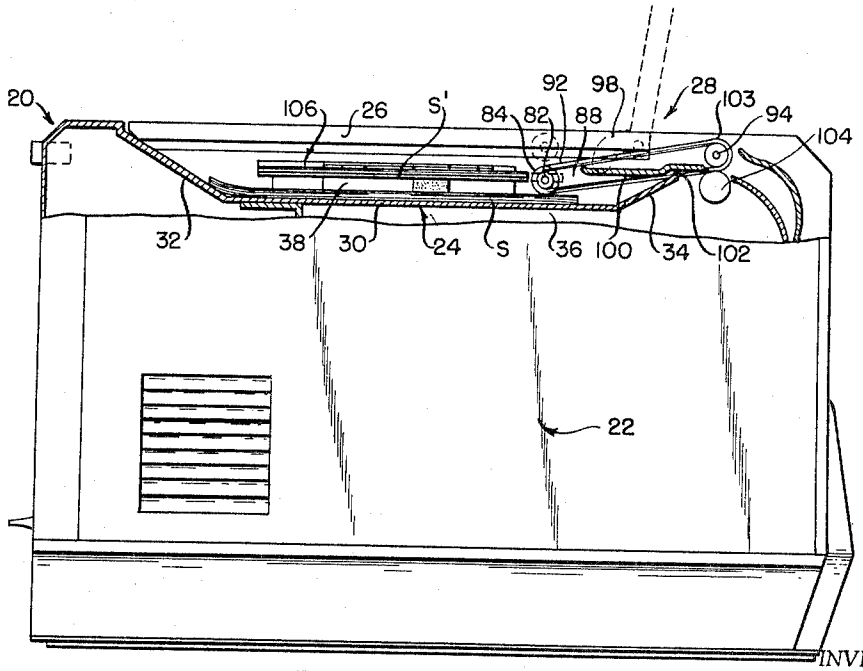


Fig. 2

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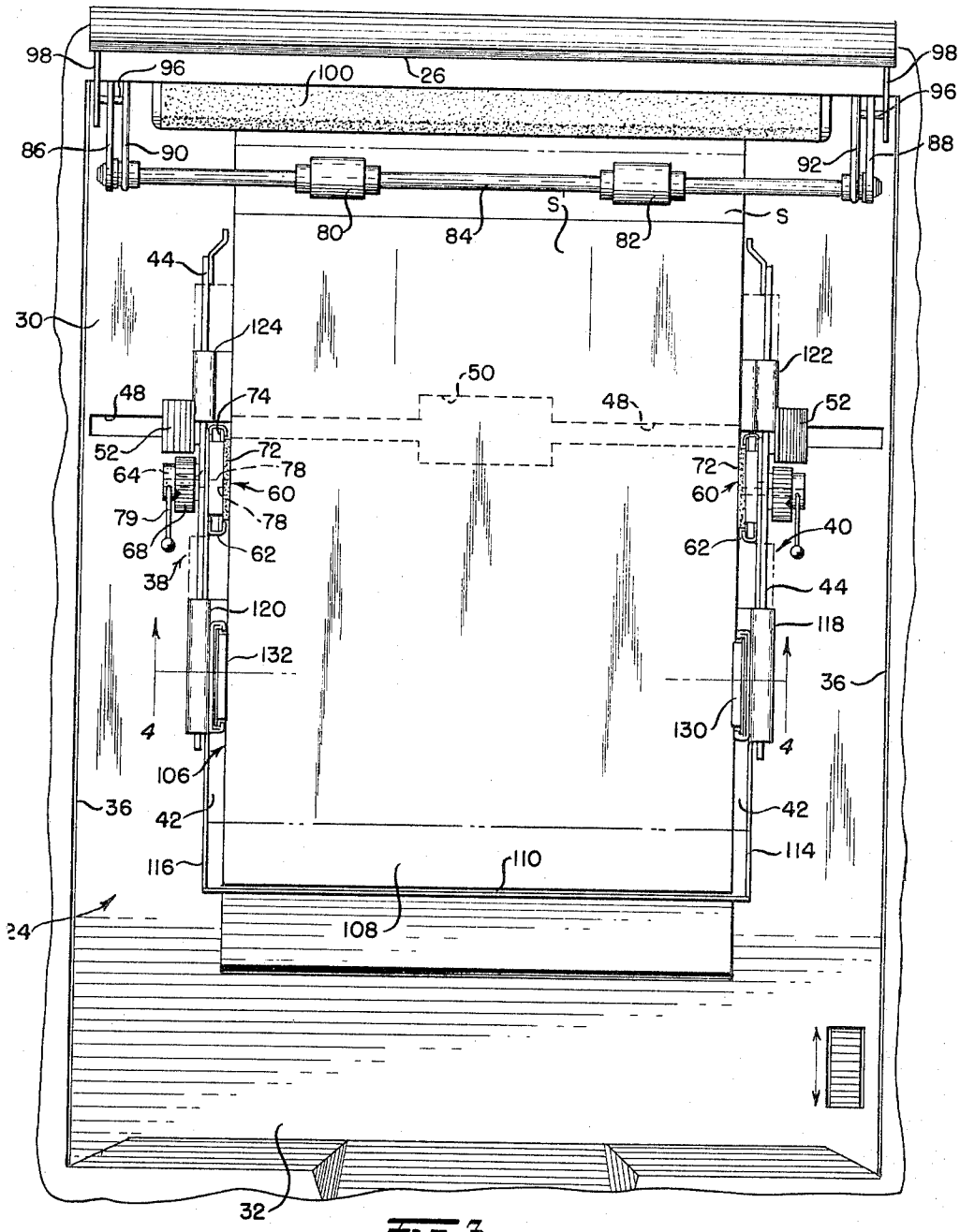


Fig. 3

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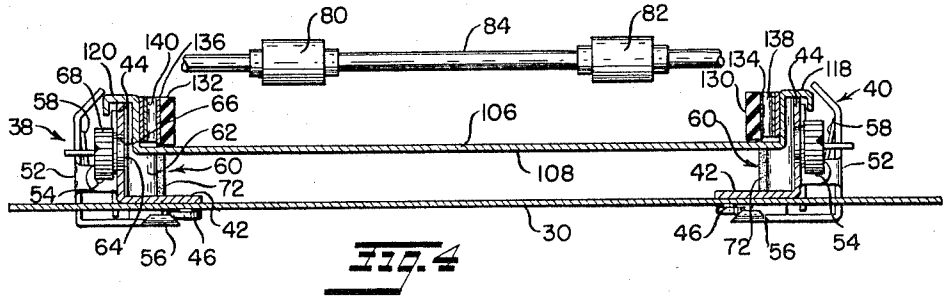


FIG. 4

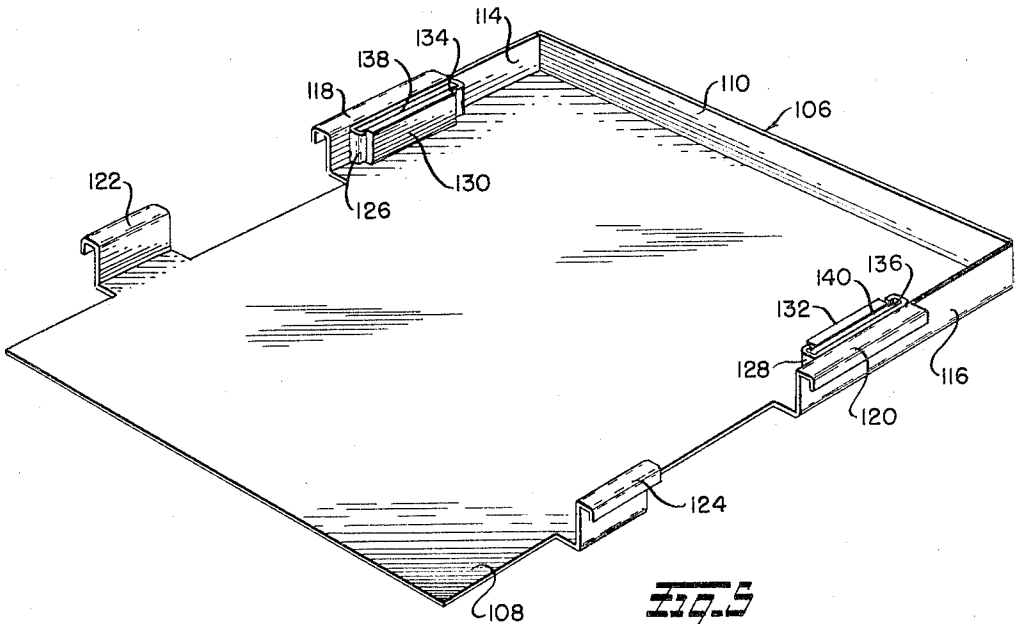


FIG. 5

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PAPER FEED APPARATUS HAVING STACK SELECTING MEANS

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5 Claims. (Cl. 271—9)

This invention relates to apparatus for feeding a series of sheets of paper from a storage compartment and more particularly to such apparatus especially adapted for use with photocopy machines.

In machines of this type the paper is stored in a magazine or paper compartment usually in stacks of 100 or more sheets. In prior machines, it has been necessary that all sheets loaded into the magazine be of the same size to assure proper operation of the feeding mechanism and to assure the delivery of a sheet of the desired size to the machines.

While the photocopy machines are capable of handling papers of a wide range of size the great bulk of copying is performed with two sizes of papers, 8½ x 11 (letter size) or 8½ x 13 (legal size). In prior machines it was necessary, in copying material of different sizes, either to use the larger size copy paper throughout or to open the copy paper storage compartment, remove the stack of copy paper and reload the machine with paper of the correct size. The use of the larger size copy paper for all copying produces copies of poor appearance and is wasteful. For example, in copying machines particularly of the electrostatic type, which require the use of coated paper, the cost of 100 sheets of the larger size paper is approximately $2.00 above the cost of the same quantity of the sheets of smaller size. On the other hand the time consumed in the annoying task of reloading the machine is such that it is common practice to use the larger paper for all copying work despite its considerably higher cost and other disadvantages.

With these considerations in mind it is the principal purpose and object of the present invention to provide, in a photocopy machine or like apparatus, a novel mechanism for storing and feeding at least two sizes of paper, the proper size being selected by the operator by a simple manual operation.

It is a further object of the present invention to provide novel apparatus of this type which is mechanically uncomplicated and which is of minimum cost.

It is also an object of the present invention to provide a novel attachment which may be utilized in existing photocopy machines without modification of the basic apparatus to render the machine capable of handling and feeding at least two sizes of paper.

In attaining these and other objects the present invention provides a mechanism for dividing the paper storage compartment to provide a plurality of levels, each level supporting a stack of copy paper of a particular size. The mechanism includes apparatus for feeding the topmost sheet in one of the stacks and means for selecting the one of the stacks to be operated on by the feed mechanism. In its presently preferred form the invention comprises a paper compartment having a fixed floor supporting a stack of paper of a given size and a shelf for supporting a stack of paper of different size over the first stack, the shelf being movable to position the second stack in or out of the path of the feed mechanism.

Additional objects and advantages will become apparent as the description proceeds in connection with the accompanying drawings in which:

FIGURE 1 is a respective view of a typical photocopy machine incorporating the subject invention;

FIGURE 2 is a side view of the machine of FIGURE 1 with parts broken away to show interior details;

FIGURE 3 is an enlarged top plan view of the paper storage compartment with the cover shown in the open position;

FIGURE 4 is a transverse section taken along line 4—4 of FIGURE 3; and

FIGURE 5 is a perspective view of the movable shelf assembly shown removed from the remainder of the apparatus.

For present purposes the invention will be disclosed as a part of an electrostatic copying machine indicated generally at **20**, which, except as indicated in detail below, is identical with the machine disclosed and claimed in Serial No. 249,248, filed January 3, 1963, now abandoned, for Electrostatic Printer. The machine **20** includes a housing **22** at the top of which is a paper storage compartment or magazine indicated generally at **24** which is normally closed by a top door **26** hinged to move from the full line position to the dotted line position shown in FIGURE 2. Since the present invention is concerned only with the paper storage compartment **24** and the mechanism indicated generally at **28** for feeding the paper from this compartment into the machine proper, additional details of the machine will be omitted. For such details and a complete description of the operation of the machine reference may be had to the aforesaid co-pending application Serial No. 249,248, now abandoned.

The paper storage compartment **24** has a sheet metal floor **30** having upwardly inclined entrance and exit portions **32** and **34**, respectively. The floor member **30** extends completely across the machine and at its opposite edges is anchored to vertical sidewalls **36** of the main machine housing. A stack of paper, which is supported on the floor member **30**, is confined between symmetrically opposite guide assemblies **38** and **40** shown in detail in FIGURES 3 and 4. The guide assemblies each have a base portion **42** integrally joined to an upright portion **44**.

The guide assemblies are mounted for adjustment laterally of the paper compartment to accommodate sheets of varying width. For this purpose the base members **42** carry a headed stud **46** which objects downwardly through a laterally extending slot **48** in the floor member **30**, the slot being centrally enlarged as at **50** to permit removal of the guide assemblies. The guides are frictionally held in their adjusted position by L-shaped clamp members **52** pivotally carried as at **54** on the vertical guide portions **44**. The clamp members **52** extend downwardly through the slot **48** and have a clamping portion **56** adapted to engage the underside of floor member **30** outwardly of the margins of the slot **48**. The clamp members **52** are normally biased to clamping position by springs **58**, and may be released by manually pivoting their upper portions inwardly.

The guide assemblies **38** and **40** also carry friction pad assemblies **60** which cooperate to engage the edges of the stack of sheets to position the sheets accurately and to apply a light drag to hold the sheets against undesired axial movement. The assemblies **60** each comprise a channel assembly **62** carried by a stud **64** which projects through a slot **66** in the guide member **44**, the outer end of the stud being enlarged and knurled at **68** to provide a convenient means for clamping the assembly **60** in any adjusted position along the slot **66**. A friction pad **72** of foam rubber or like material is carried by a backing plate **74** which is resiliently urged to the position shown in FIGURE 3 by a spring (not shown). A pin **78** attached to the backing plate **74** extends through the stud **64** and at its outer end is provided with an operating member **79** to permit retraction of the friction pad **72** to facilitate loading the paper.

The topmost sheet of the stack of paper positioned on the floor member **30** between the guide assemblies **38** and **40** is withdrawn from the paper compartment by a pair

of rubber covered feed rollers 80 and 82 rigid with a shaft 84, the opposite ends of which are supported on a pair of brackets 86 and 88. The shaft 84 is driven by a pair of belts 90 and 92 driven by a drive shaft 94 (FIGURE 2) connected to the main machine drive by means which have been omitted for clarity. The brackets 86 and 88 are pivotal about the axis of the shaft 94 so the brackets and shaft can be raised and lowered without disturbing the drive connection to the feed rollers 80 and 82. The brackets, shaft and rollers are raised to the dotted line position of FIGURE 2 by pins 96 carried by the door hinge brackets 98, the pins engaging the undersides of the brackets 86 and 88.

The weight of the brackets 86 and 88, the shaft 84 and the rollers 80 and 82 is sufficient to provide the necessary friction on the upper surface of the stack of paper to cause the upper sheet to advance when the rollers 80 and 82 are rotated. The remaining sheets are held in place by the friction pad assemblies 60.

As explained in detail in the aforesaid co-pending application 249,248, and upper guide member 100 is provided to form with the exit portion 34 of the floor member 30 a throat 102 which prevents the passage of more than one sheet of paper at a time into the machine. After the paper leaves the throat 102 it is engaged by rollers 103 carried by the drive shaft 94 and cooperating rollers 104 driven by suitable means not shown.

The mechanism thus far described is capable of handling sheets of a wide variety of sizes. In a typical case, sheets may be as large as 11 x 17. However, it is necessary that all sheets loaded into the machine be of the same size.

The mechanism can be adapted to handle an additional stack of paper of the same or different size by the addition of the supplemental tray assembly indicated generally at 106 and shown separately in FIGURE 5. In its simplest form the tray assembly is of one-piece construction formed from heavy gauge sheet metal. The tray has a flat floor portion 108, upturned rear rail 110, upturned side rail portions 114 and 116, the forward portions of the latter having integral U-shaped guides 118 and 120 for a purpose to appear. Forward guides 122 and 124 aligned with the rear guides 118 and 120, respectively, are also formed integrally with the tray assembly. Adjacent their forward ends, the side portions 114 and 116 carry channel members 126 and 128 in which rubber friction pads 130 and 132 mounted on backing plates 134 and 136 are received.

The friction pads 130 and 132 are biased outwardly by spring straps 138 and 140, respectively.

The tray assembly 106 is installed for use by first adjusting the guide assemblies 38 and 40 to proper lateral spacing and then slipping the guides 118–124 over the upper edges of the upright portions 44 of the guide assemblies 38 and 40. When so positioned the upper tray assembly 106 is capable of limited movement axially of the paper compartment 24.

When it is desired to load the paper compartment with two sizes of paper, for example, 8½ x 14 and 8½ x 11 a stack S of the larger paper is placed on the lower floor member 30 between the guide assemblies 38 and 40 with the front edge of the paper in position to be engaged by the drive rollers 80 and 82. The tray assembly 106 is then put in position and loaded with a stack S′ of the smaller paper. If it is desired to feed the larger sheets of paper the upper tray assembly 106 is moved to the full line position shown in FIGURE 2 to place the forward edge of the stack S′ out of the path of the drive rollers 80 and 82 when the door 26 is closed. The apparatus will then feed the sheets from the stack S one at a time in the usual manner. When it is desired to feed the smaller sheets the tray assembly 106 is advanced to the dotted line position shown in FIGURE 2 to place the leading edge of the stack S′ in the path of the rollers 80 and 82 as they are lowered when the door 26 is again closed. The drive rollers 80 and 82 will then feed the smaller sheets of paper leaving the larger sheets completely undisturbed.

It will be appreciated that the flexibility of the apparatus can be further increased by providing tray assemblies 106 of various sizes and length. Alternately the tray assembly may be divided to provide for lateral adjustment in essentially the same manner as the lateral adjustment of the main side guides 38 and 40.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by Letters Patent is:

1. Apparatus for storing and feeding paper sheets comprising a paper storage compartment having a floor and an exit slot, feeding means normally adapted to engage and move through said slot the topmost one of a first stack of paper supported on said floor, shelf means movably mounted for supporting a separate second stack of paper within said compartment above said first stack, said shelf means being movable to selectively position said second stack in position to be engaged by said feed means or permit said feed means to engage said first stack.

2. Apparatus for storing and feeding paper sheets comprising a paper storage compartment having a floor and an exit slot, vertically movable feed means gravity urged towards said floor, said feed means normally engaging the top of a first stack of paper supported on said floor, and shelf means movably mounted within said compartment adapted to selectively dispose a second stack of paper in position to be engaged by said feed means to thereby prevent engagement of said feed means with said first stack of paper.

3. Apparatus for storing and feeding paper sheets comprising a paper storage compartment having a floor; a hinged door and an exit slot, driven feed rollers within said compartment, means supporting said feeding rollers for vertical movement within said compartment, said feeding rollers being gravity urged toward a position for engagement with a first stack of paper supported on said floor, means operative when said door is opened to raise said rollers to a pre-determined height above said floor, shelf means for supporting a separate second stack of paper within said storage compartment over said first stack, said shelf means being movable to selectively dispose said second stack in position to be engaged by said feed rollers when said door is closed or to permit said rollers to engage said first stack of paper.

4. Apparatus for storing and feeding paper sheets comprising a storage compartment having a surface supporting a first stack of paper sheets of a first size, means including vertically extending guide members on opposite sides of said stack of paper, shelf means supported for longitudinal movement on the upper portion of said guide members and adapted to be moved to different positions without interference with the sheets in said first stack, a second stack of paper sheets of a size other than said first size supported on said shelf means, a vertically movable sheet feed means adapted to engage the topmost sheet of said first stack of paper when said shelf means is in one of its positions and adapted to engage the topmost sheet of said second stack of paper when said shelf means is in another of its positions to thereby selectively feed sheets from one or the other stacks without removal of either stack of paper from said storage compartment.

5. Apparatus for storing and feeding sheets of light sensitive paper from a paper storage compartment having a floor, a hinged door opening at the top of said compartment and an exit slot at one end wall thereof, a first stack of said sheets having a first size, a pair of vertically extending guide rails supported on said compartment floor

on opposite sides of said first stack, driven feed rollers located in said compartment, and adapted to move to a position for engagement with the topmost sheet of said first stack, means operative when said door is opened to raise said rollers to a predetermined height above said floor, shelf means mounted on said guide rails for movement along said rails and over said first stack of paper, a second stack of paper having sheets of shorter length than the sheets of said first stack mounted on said shelf means and movable when the door is open into a position over said first stack to cause the topmost sheet of said second stack to be engaged by said rollers when the door is closed.

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