United States Patent [19]

Kuksa

[11] **3,768,805**

[45] **Oct. 30, 1973**

[54] **PAPER FEED APPARATUS**

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[73] Assignee: **SCM Corporation,** New York, N.Y.

[22] Filed: **May 18, 1972**

[21] Appl. No.: **254,797**

Related U.S. Application Data

[62] Division of Ser. No. 821,763, May 6, 1969.

[52] **U.S. Cl.** **271/126**

[51] **Int. Cl.** **B65h 1/08**

[58] **Field of Search** 271/22, 24, 39, 61–62, 271/126–127, 170; 108/159

[56] **References Cited**

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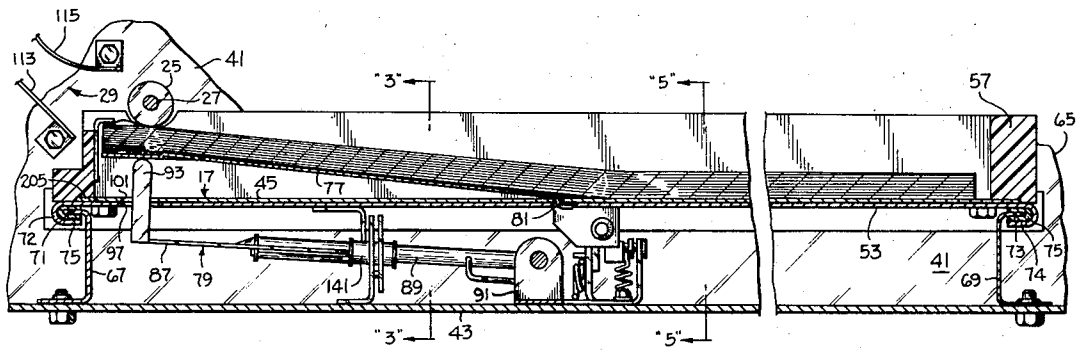
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Primary Examiner—Edward A. Sroka
Attorney—Gerald S. Schur

[57] **ABSTRACT**

A photocopying machine is provided with a paper feed arrangement wherein a stack of sheets is supported on a floor of a paper feed tray located on a shelf at an operating station beneath paper feed rollers for advancing the sheets from the tray. The forward end of the stack is supported by a plate hingedly connected to the floor, and an upwardly biased lifting member extends upwardly through openings in the shelf and the floor of the tray to lift the forward end of the stack into engagement with the feed rollers at a feeding position. The tray is provided with corner separators to separate an advancing topmost sheet from the remainder of the stack, and the stack is confined between side walls of the tray which guide the sheets being advanced by the feed rollers. The paper feed tray is movable from the operating station to a loading station outside the photocopying machine to facilitate loading another stack of sheets into the tray. To enable sheets of different widths to be used in the photocopying machine, the paper feed arrangement is provided with locating means for enabling paper feed trays accommodating sheets of different widths to be interchangeably placed on the shelf and properly positioned thereon for operation at the operating station.

1 Claim, 13 Drawing Figures



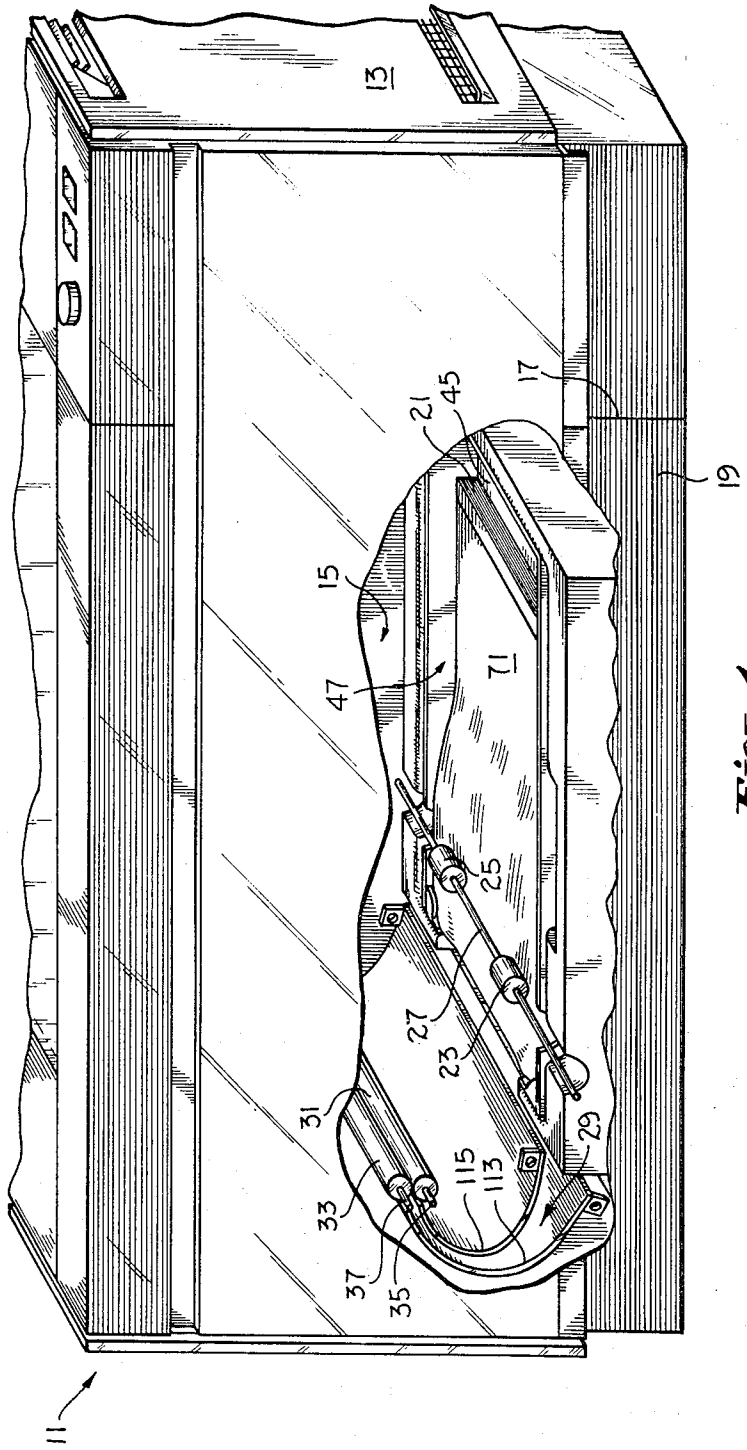


Fig. 1

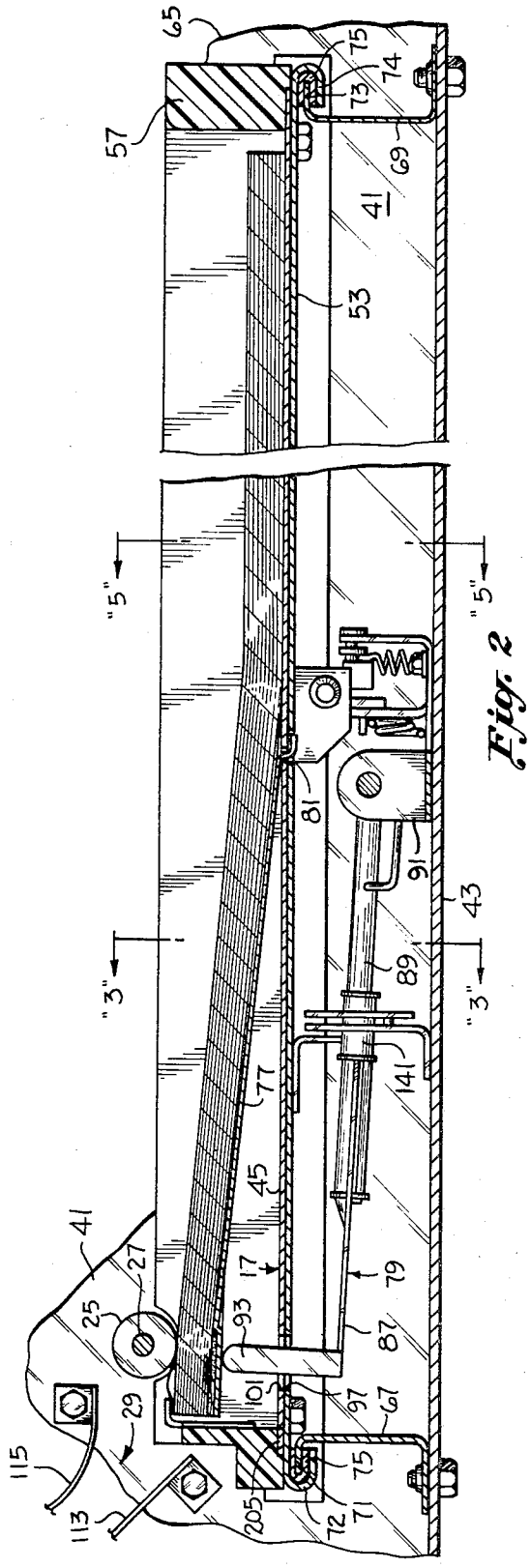

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"3"
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Fig. 2

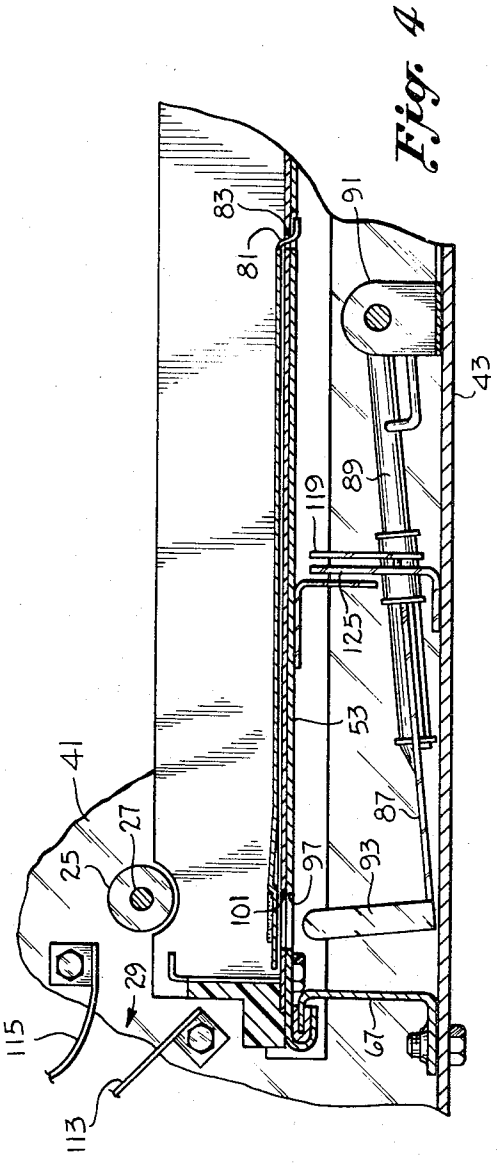

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Fig. 4

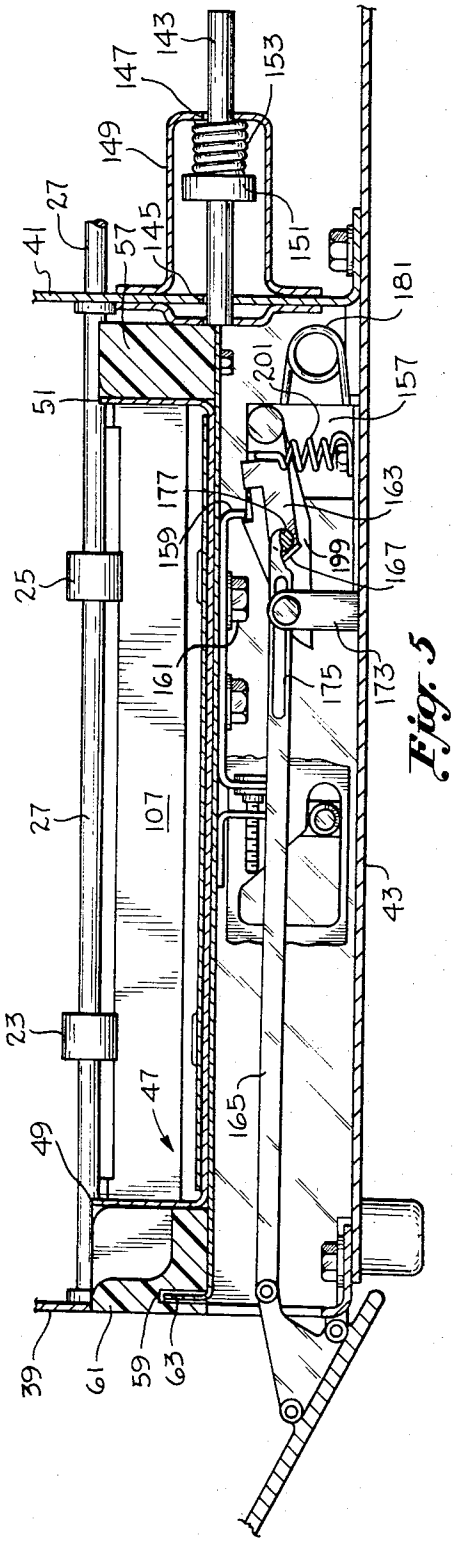

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Fig. 5

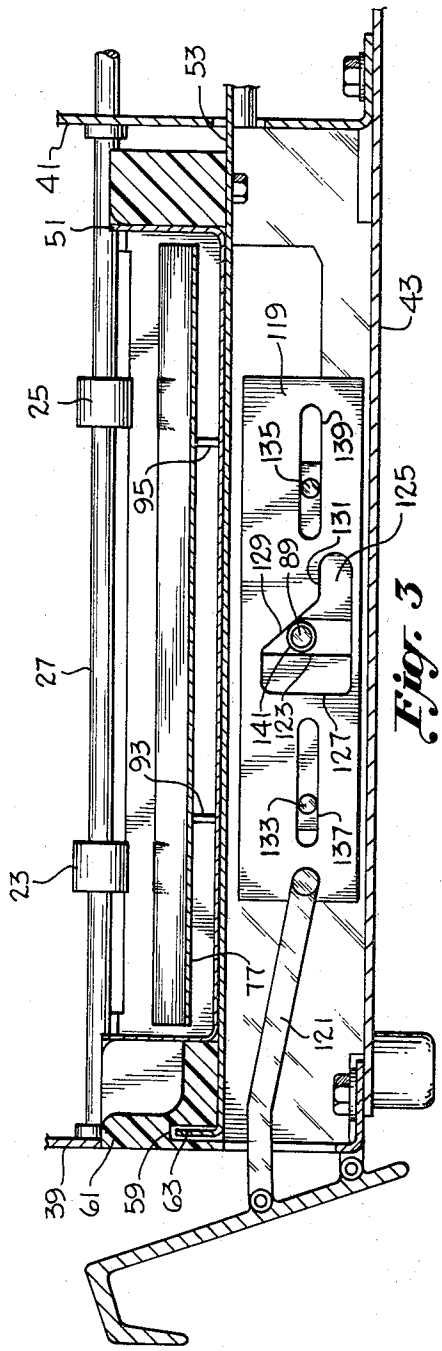

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Fig. 3

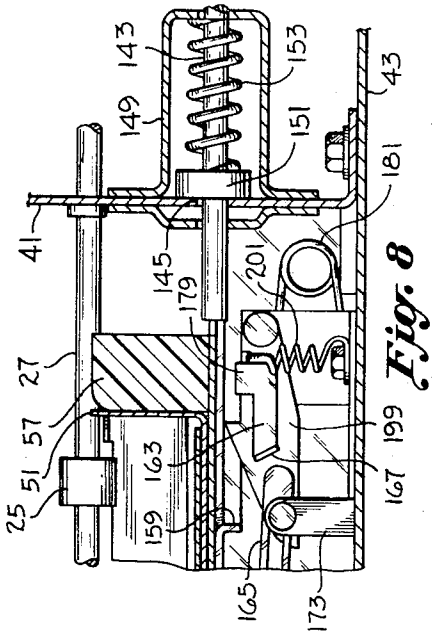


Fig. 8

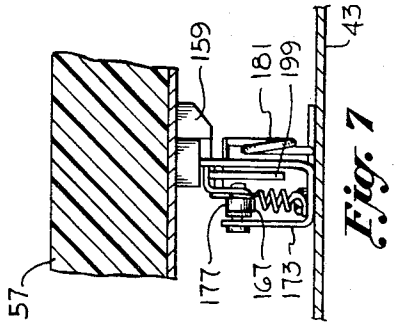


Fig. 7

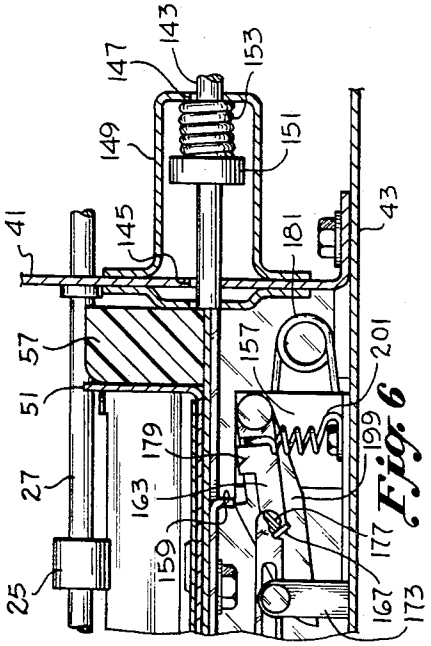


Fig. 6

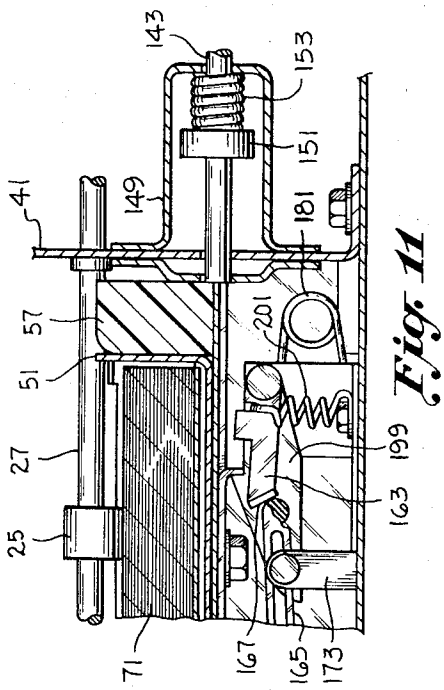


Fig. 11

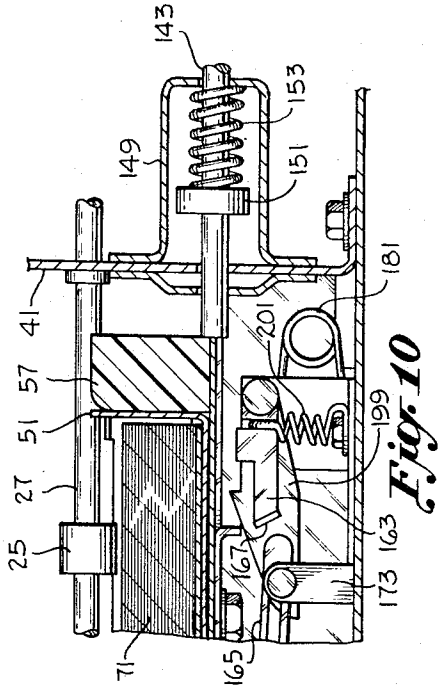


Fig. 10

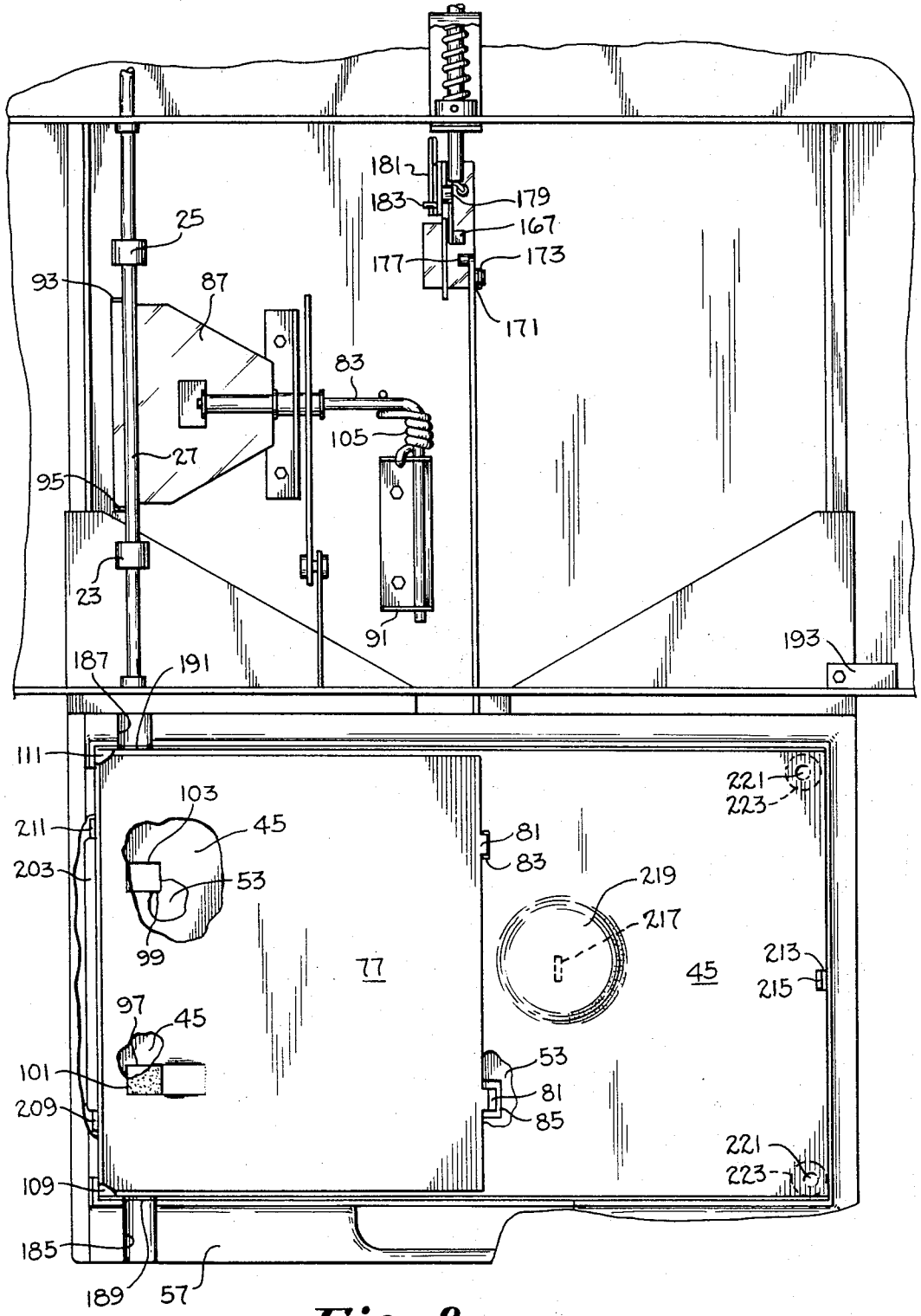

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Fig. 9

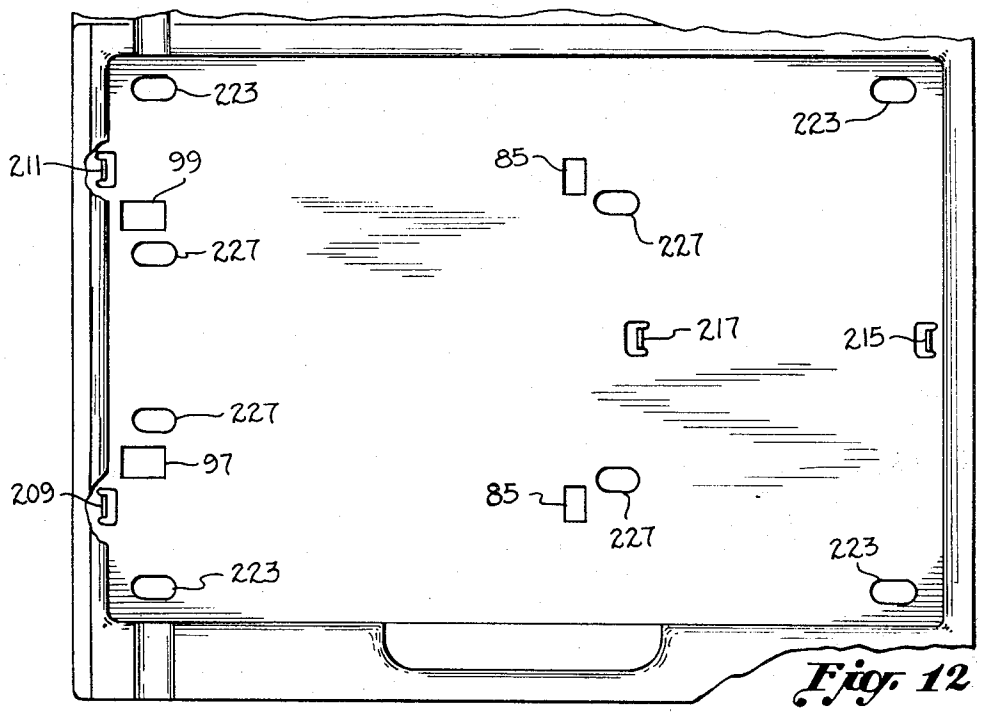

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211
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Fig. 12

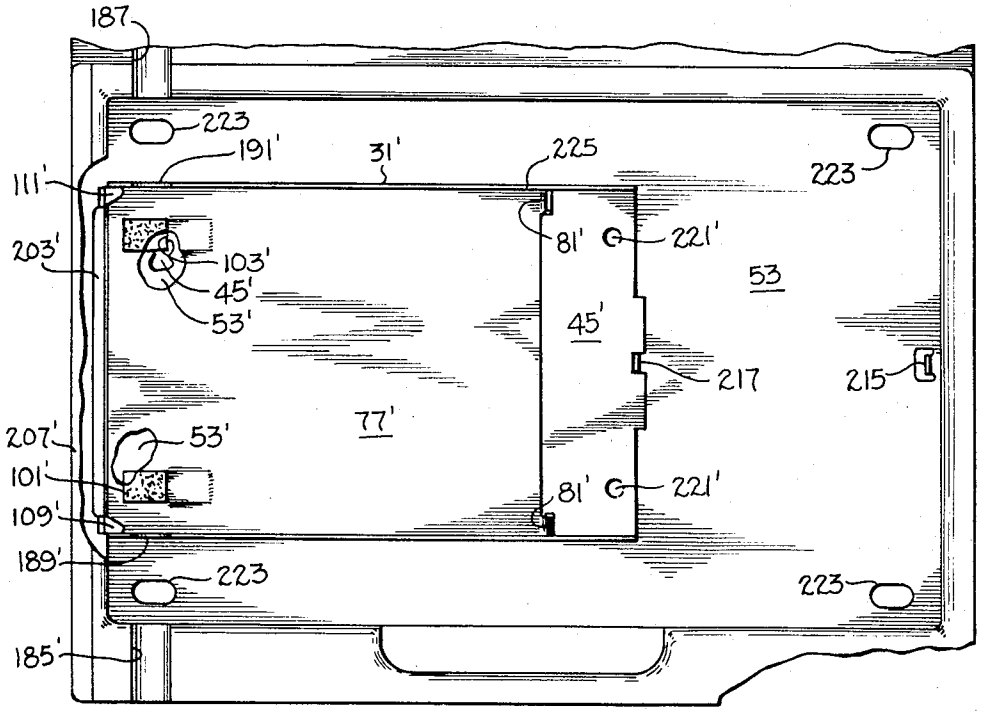

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223
191'
31'
225
223
111'
81'
221'
203'
103'
45'
53'
53
45'
217
215
77'
207'
53'
101'
81'
221'
109'
189'
223
223
185'

Fig. 13

PAPER FEED APPARATUS

This is a division of application Ser. No. 821,763, filed May 5, 1969.

This invention relates to a paper feed arrangement for separately advancing a stack of sheets from a feeding position, and more particularly to a photocopying machine having a paper storage compartment wherein the topmost sheet of the stack is separately advanced from the compartment for further processing in the photocopying machine by sheet advancing means which are fixedly located in the compartment.

In the past, sheets of copy paper have been advanced by paper feed arrangements wherein a stack is supported on the floor of a tray and laterally confined between guides which are laterally adjustable to enable sheets of different widths to be placed therebetween. However, in the normal use of a photocopying machine, only copy paper sheets of a single width are used, whether the paper be of a conventional letter size or legal size, and to minimize the cost of the paper feed arrangement, it is desirable that the guides be fixedly mounted on the paper feed tray. Sometimes, however, it is desirable to use sheets of copy paper having a width different from that of the conventional letter or legal size paper, and consequently it is desirable to provide a paper feed arrangement in which different paper feed trays, capable of accommodating stacks of copy paper sheets having different widths, may be interchangeably placed in operating relation with the sheet advancing means and the sheet separating means.

Accordingly, an object of the present invention is to provide a paper feed arrangement wherein a stack of copy paper sheets is laterally confined between fixed side walls of a paper feed tray, and the stack is supported in the paper feed tray by means which enable the stack to be lifted upwardly between the fixed side walls.

Another object of the present invention is to provide a paper feed arrangement wherein a stack of copy paper sheets is supported in a paper feed tray having sheet separating means fixedly mounted thereon and a forward stop is provided for aligning the forward end of the stack of copy paper sheets with the sheet separating means and the means for advancing the topmost sheet from the paper feed tray.

A further object of the present invention is to provide a paper feed arrangement having locating means for locating a paper feed tray at an operating station beneath means for advancing copy paper sheets from the paper feed tray, and wherein stacks of copy paper sheets having different widths may be accommodated in different paper feed trays which may be interchangeably placed at the operating station and aligned with the sheet advancing means by the locating means.

Still other objects, features and advantages of the present invention will be apparent to those skilled in the art from a reading of the following detailed description of a single embodiment of the invention, taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a partial cut-away perspective view of a preferred embodiment of a photocopying machine having a paper feed arrangement according to the present invention, and showing a stack of copy paper sheets in a feeding position with the topmost sheet being advanced forwardly from the feeding position;

FIG. 2 is a longitudinal cross-sectional view of the paper feed arrangement shown in FIG. 1;

FIG. 3 is a sectional view taken along the lines 3—3 in FIG. 2, and illustrating the condition of the paper feed arrangement when all the sheets of copy paper have been fed from the compartment and with the door covering the compartment being pulled open;

FIG. 4 is a fragmentary view of the paper feed arrangement shown in FIG. 2, and illustrating the condition of the paper feed arrangement when the door is moved further from the opening of the compartment;

FIG. 5 is a sectional view taken along the lines 5—5 in FIG. 2, and illustrating the mechanical connections between the door and the latching mechanism which holds the paper feed tray at an operating station in the compartment;

FIG. 6 is a partial view of the paper feed arrangement in FIG. 5, and illustrating the condition of the latching mechanism as the door is moved from the opening of the storage compartment so as to release the paper feed tray for movement from the operating station in the compartment;

FIG. 7 is a partial sectional view taken along the lines 7—7 in FIG. 5;

FIG. 8 is a view of FIG. 6, and illustrating the paper feed tray being pushed from the operating station in the compartment upon the release of the latching mechanism;

FIG. 9 is a plan view of the paper feed arrangement showing the paper feed tray at a loading station outside the photocopying machine, and illustrating the lifting mechanism and the latching device mounted inside the compartment;

FIG. 10 is a fragmentary view of the latching mechanism shown in FIG. 5, and illustrating the condition of the latching mechanism when the paper feed tray loaded with a stack of copy paper sheets is moved to the operating station inside the compartment;

FIG. 11 is a fragmentary view of the latching mechanism shown in FIG. 5, and illustrating the condition of the latching mechanism when the door is moved to cover the opening of the storage compartment;

FIG. 12 is a partial view of the shelf shown in FIG. 9 with the paper feed tray 41 removed therefrom; and

FIG. 13 is a partial view of the shelf as shown in FIG. 12 with a paper feed tray 225 for accommodating a stack of copy paper sheets placed on the shelf.

Referring generally to the FIGURES in the drawings, and particularly to FIG. 1, there is shown a photocopying machine, generally indicated 11, for copying original documents onto sheets of copy paper. The photocopying machine 11 includes a housing 13 having a lower compartment, generally indicated at 15, with an opening, generally indicated 17, in the front of the machine 11 which is covered by a door 19. The compartment 15 contains a stack 21 of copy paper sheets in a feeding position, and the sheets are advanced from the feeding position by sheet advancing means in the form of two rubber feed rollers 23, 25 respectively, which are mounted on a drive shaft 27. The drive shaft 27 is rotatably driven by suitable means, not shown, to advance the sheets separately from the feeding position and through an exit throat, generally indicated 29, which guides the incoming sheets into the nip of a pair of cooperating exit rollers 31, 33 which are mounted on drive shafts 35, 37 respectively. The drive shafts 35, 37 are rotatably driven by suitable means, not shown, to remove the sheets from the storage compartment 15 for further processing in the machine 11. The means

for rotatably driving the drive shafts **27, 35, 37** have been omitted from the description, since they form no part of the present invention.

Inside the housing **13,** the drive shaft **27** carrying the feed rollers **23, 25** is rotatably supported between front and back support walls **39, 41** respectively, which are connected to a base plate **43** in the photocopying machine **11** to form the compartment **15.** Beneath the feed rollers **23, 25,** the stack **21** is supported on a floor **45** of a paper feed tray, generally indicated at **47,** which is located at an operating station in the compartment **15.** The sheets forming the stack **21** are laterally confined between front and back side walls, **49, 51** respectively, of the paper feed tray **47,** and the tray is supported in vertically spaced relation to the feed rollers **23, 25** by a shelf **53.** As shown, the paper feed tray **47** is disposed in an opening **55** formed in a box-shaped guide member **57** which serves to approximately locate the paper feed tray **47** at the operating station, and the paper feed tray **47** is positioned on the shelf **53** relative to the exit throat **29** and the feed rollers **23, 25** by locating means, as will be described hereinbelow, so that the side walls **49, 51** guide the sheets from the feeding position as they are advanced by the feed rollers **23, 25.**

As more particularly shown in FIGS. **2** and **5,** the box-shaped guide member **57** is positioned on the shelf **53** by a vertical slot **59** formed in the bottom of the front wall **61** which receives a turned-up flange **63** formed on the front side of the shelf **53,** and the guide member **57** is secured to the shelf **53** by suitable means, for example screws. The shelf extends through an opening **65** in the back support wall **41** and is supported in vertically spaced relation to the feed rollers **23, 25** by symmetrically opposite forward and rearward rails **67, 69** respectively, which are mounted on the base plate **43** and extend between the support walls **39, 41.** The rails **67, 69** have upper flanges **71, 73** respectively, which extend in laterally opposite directions and have identical bearing members **75** with U-shaped cross-sectional configurations mounted thereon to enable the shelf **53** to slide easily from the compartment **15.** The forward and rearward ends **72, 74** respectively, of the shelf **53** are turned downwardly into a U-shaped cross-sectional configuration engaging the surfaces of the U-shaped bearing members so as to guide the shelf **53** along the rails **53, 55** during movement through the opening **17** of the compartment **15.**

The guide member **57** may be constructed from a suitable light weight and substantially nondeformable material, such as a rigid plastic or aluminum. The bearing members **75** mounted on the flanges **71, 73** of the guide rails **53, 55** respectively, may be constructed from a suitable material, such as a rigid vinyl plastic, to provide a smooth surface having a low coefficient of friction to enable the shelf **53** to slide easily from the compartment **15.**

As shown, the forward end of the stack **21** is lifted upwardly to a feeding position with the topmost sheet **76** engaging the feed rollers **23, 25.** The forward end of the stack **21** is supported by a plate **77** hingedly connected by suitable means to the floor **45** of the paper feed tray **47,** and the plate **77** is lifted upwardly by a lifting member. generally indicated **79.** As more particularly shown in FIGS. **2** and **9,** the plate **77** is hingedly connected to the paper feed tray **47** by tabs **81** formed on the rearward end of the plate **77** which are received through openings **83** formed in the floor **45** and bent rearwardly so as to form a hinged connection over which the copy paper sheets may easily slide. To facilitate the pivotal movement of the tabs **81** when the plate **77** is lifted upwardly, suitable openings **85** are formed in the shelf **53** through which the tabs **81** may move.

The lifting member **79** engaging the back side of the hinged plate **77** includes a finger bracket **87** swivelly supported on the end of a rod **89** which is bent to an L-shape and pivotally mounted on the base plate **43** by a suitable bracket **91.** The finger bracket **87** has two spaced upright fingers **93, 95** which extend through openings **97, 99** respectively, formed in the shelf **53** and openings **101, 103** respectively, formed in the floor **45** to engage the hinged plate **77.** The swivel connection of the finger bracket **87** on the end of the rod **89** enables the lifting pressure applied to the back side of the hinged plate **77** to be equalized between the two upright fingers **93, 95.** The lifting member **79** is resiliently biased upwardly to move the hinged plate **77** toward the feed rollers **23, 25** by means of a torsion spring **105** which is disposed about the rod **89** to urge it upwardly.

As the topmost sheet **76** is advanced from the paper feed tray **47** by the rotatably driven feed rollers **23, 25,** the adjacent sheets of the stack **21** tend to move forwardly due to the frictional contact between the sheets of copy paper. The forward movement of the stack **21** is prevented by a forward wall **107** of the paper feed tray **47** which serves as a paper feed stop. To prevent more than one sheet at a time from being fed from the feeding station, sheet separating means are provided to separate the advancing topmost sheet **76** from the remainder of the stack **21.** In the preferred embodiment, the separating means are in the form of corner separators **109, 111** which are symmetrically opposite and engage the forward corners of the topmost sheet **76.** As shown, the corner separators **109, 111** are formed integrally with the forward wall **107** of the paper feed tray **47** and have a triangular shape extending across the floor **45** from the forward wall **107** to the side walls **49, 51** respectively. However, the corner separators **109, 111** could be formed independently of the paper feed tray **47** and connected thereto by suitable means, or be formed integrally with the side walls **49, 51** respectively.

Upon advancement of the topmost sheet **76** by the rotatably driven feed rollers **23, 25,** the corner separators **109, 111** hold the forward corners of the sheet **71** to prevent them from moving and thereby cause them to buckle and bend as shown in FIGS. **1** and **2.** As is known, the forward corners of the topmost sheet **76** continue to bend until the resiliency of the advancing sheet causes the forward corners thereof to move over the corner separators **109, 111,** thereby separating the advancing topmost sheet **76** from the remainder of the stack **21.** The front and back side walls **49, 51** of the paper feed tray **47** serve as guides for the advancing sheet **76,** and upon further advancement the sheet **76** moves into the exit throat **29** which, in the preferred embodiment, is formed by forward and rearward arcuate shaped walls **113, 115** respectively, supported between the front and back support walls **39, 41.** The converging arcuate shaped exit throat **29** guides the incoming sheet into the nip of the rotatably driven rollers **31, 33** which remove the sheet from the compartment **15** for further processing in the photocopying machine **11.**

As the sheets forming the stack **21** are fed from the feeding position, the stack **21** diminishes and the upwardly biased lifting member **79** presses the hinged plate **77** upwardly to bring the succeeding topmost sheets of the diminishing stack **21** into engagement with the feed rollers **23, 25.** When the stack diminishes to only a few sheets, there is a tendency for more than one sheet at a time to be fed from the feeding position, and to prevent this from happening friction pads **117,** constructed from a suitable material, for example cork, are placed on the plate **77** beneath the rollers **23, 25.** The lifting member **79** continues to move upwardly as the stack **21** diminishes until the last sheet has been fed from the feeding position, whereupon the photocopying machine **11** must be loaded with another stack of copy paper sheets for further use.

When it is desirable to load another stack of copy paper sheets into the photocopying machine **11,** it is first necessary to move the door **19** to uncover the opening **17** of the compartment **15,** lower the upwardly biased lifting member **79,** and move the paper feed tray **47** from the operating station inside the compartment **15** to a loading station outside the photocopying machine **11** as shown in FIG. **9.** To facilitate the lowering of the upwardly biased lifting member **79,** the door **19** is hingedly connected to the wall **39,** and operating means are provided to move the relatively biased lifting member **79** downwardly to the position shown in FIG. **4** in response to the movement of the door **19** to uncover the opening **17.**

As more particularly shown in FIG. **3,** the operating means is in the form of a camming plate **119** which is connected to the door **19** by a suitable linkage **121** so as to move laterally as the door **19** is opened. The rod **89** of the lifting member **79** extends through a vertical slot **123** formed in a bracket **125** mounted on the base plate **53,** and through an opening **127** formed in the camming plate **119.** The opening **127** is partially defined by a diagonal camming surface **129** leading downwardly to a horizontal surface **131.** The camming plate **119** is supported for lateral sliding movement in response to movement of the door **19** by laterally protruding studs **133, 135** on the bracket **125** which are received in horizontal slots **137, 139** respectively, formed in the camming plate **119** on laterally opposite sides of the opening **127.**

When the door **19** is moved to uncover the opening **17** of the compartment **15,** the lateral movement of the diagonal camming surface **129** forces the rod **89** downwardly until the upright fingers **93, 95** are lowered beneath the shelf **53** as shown in FIG. **4.** To facilitate the downward movement of the rod **89** by the diagonal camming surface **127,** the portion of the rod **89** extending through the vertical slot **123** and the opening **127** may be covered by a sleeve **141** which provides an easy sliding surface and may be constructed from a suitable material, such as nylon. Upon further movement of the door **19,** the rod **89** moves downwardly beneath the horizontal surface **131** of the camming plate **119** as shown in FIG. **5,** which maintains the ifting member **79** in the lowered position as the camming plate **119** continues to move laterally in response to the continued opening movement of the door **19.**

To facilitate the movement of the paper feed tray **47** from the operating station inside the compartment **15** to the loading station, the photocopying machine **11** is provided with means to move the shelf a short distance through the opening **17** in response to the uncovering movement of the door **19.** As more particularly shown in FIG. **5,** when the paper feed tray **47** is at the operating position, the shelf **53** is being urged toward the opening **17** by moving means in the form of a plunger **143** which is located outside the compartment **15** and resiliently biased for movement toward the opening **17.** The plunger **143** is supported for sliding movement into the compartment **15** with one end thereof extending through a bore **145** formed in the wall **41,** and the opposite end extending through a bore **147** formed in a bracket **149** which is attached to the backside of the wall **41.** The plunger **143** has a collar **151** located between the wall **41** and the bracket **149,** and the plunger **143** is urged into engagement with the shelf **53** by resilient biasing means in the form of a coiled spring **153** disposed about the plunger **143** and compressed between the collar **151** and the bracket **149.**

While the paper feed tray **47** is at the operating station and being urged toward the opening **17** by the resiliently biased plunger **143** engaging the shelf **53,** the shelf **53** is prevented from moving by latching means. As shown, the latching means is in the form of a latching hook **155** which is pivotally supported by a bracket **157** mounted on the base plate **43,** and engages the backside of a latching flange **159** attached to the bottom of the shelf **53** by suitable means, such as screws **161.** The latching hook **155,** in conjunction with the latching flange **159** on the bottom of the shelf **53,** determines the location of the operating station for the paper feed tray **47** mounted on the shelf **53,** and the latching flange **159** may be adjusted laterally so as to vary the location of the operating station relative to the feed rollers **23, 25.**

To enable the resiliently biased plunger **143** to push the shelf **53** through the opening **17** of the compartment **15** upon the uncovering movement of the door **19,** the latching mechanism is provided with releasing means in the form of a pawl **163** and an actuating rod **165.** The pawl **163** is supported by the bracket **157** for pivotal movement about the same axis as the latching hook **155,** and has a camming flange **167** for engagement by the actuating rod **165.** The actuating rod **165** is connected to the door **19** by a bell crank **169,** and is supported for sliding movement past the camming flange **167** of the pawl **163** by a pin **171** protruding from a post **173** mounted on the base plate **43.** As shown, the pin **171** is received into a slot **175** extending longitudinally in the actuating rod **165** and serves to guide the rod **165** during sliding movement past the camming flange **167** of the pawl **163.**

Upon further opening movement of the door **19,** the rod **165** slides laterally along the pin **171** until a stud **177** on the end of the rod **165** engages the backside of the camming flange **167** and forces the pawl **163** downwardly. As shown in FIGS. **5** and **7,** the pawl **163** has a flange **179** extending over the latching hook **155,** and as the pawl **163** is forced downwardly in response to the opening movement of the door **19,** the flange **179** forces the latching hook **155** downwardly until the latching flange **159** is released as shown in FIG. **6.**

When the latching mechanism releases the shelf **53** for movement, the compressed spring **153** pushes the plunger **143** into the comaprtment **15,** as shown in FIG. **8,** and moves the shelf **53** through the opening **17.** At substantially the same time, the continued opening movement of the door **19** moves the stud **177** on the ac-

tuating rod 165 past the camming flange 167 of the pawl 163, and the latching hook 155 is pivoted upwardly by means of a torsion spring 181. As more particularly shown in FIGS. 7 and 9, the torsion spring 181 is disposed on the forward side of the bracket 157 between the base plate 43 and a pin 183 protruding laterally from the latching hook 155. The torsion spring 181 pivots the latching hook 155 upwardly, and the pawl 163 is carried upwardly therewith by the flange 179 extending over the top of the latching hook 155.

As more particularly shown in FIG. 8, the compressed spring 153 pushes the plunger 143 into the compartment 15 and forces the paper feed tray 47 from the operating station until the collar 151 of the plunger 143 engages the wall 41. As the shelf 53 moves through the opening 17 of the compartment 15, the forward and rearward ends 72, 74 respectively, slide along the smooth surface provided by the bearing member 75 mounted on the forward and rearward rails 67, 69 respectively. As the shelf 53 moves through the opening 17, the feed rollers 23, 25 carried by the shaft 27 and the portion of the wall 39 supporting the shaft 27 are received through recesses 185, 187 formed in the upper surfaces of the guide member 57, and through recesses 189, 191 formed in the front and back side walls 49, 51 respectively, of the paper feed tray 47.

After the shelf 53 has been pushed a short distance from the compartment 15 by the resiliently biased plunger 143, the tray 47 may be manually moved the remainder of the distance to the loading station, as shown in FIG. 9. When the paper feed tray 47 reaches the loading station, a stop 193, extending laterally from a back portion of the shelf 53, engages the wall 39 to prevent further movement of the paper feed tray 47. To facilitate the movement of the paper feed tray 47 to the loading station, a handle recess 195 is formed in the front wall 61 of the guide member 57 which may be easily gripped by an operator.

When the paper feed tray 47 is at the loading station outside the photocopying machine 11, as more particularly shown in FIG. 9, it is readily accessible by an operator. The hinged plate 77 lies on the floor 45 and nothing needs to be moved before placing a stack of copy paper sheets in the paper feed tray 47. Accordingly, an operator may easily place a stack of sheets onto the floor 45 of the paper feed tray 47 between the front and back side walls 45, 47 respectively, and slide the stack forwardly beneath the rearwardly extending corner separators 109, 111 in preparation for further use of the photocopying machine 11. To facilitate the sliding movement of the stack over the pads 117 on the plate 77, a raised portion may be formed in the plate 77 adjacent to each pad 117 to serve as a ramp leading the stack of sheets onto the pads 117.

After loading a stack of sheets into the paper feed tray 47, the shelf 53 is manually moved back through the opening 17 into the compartment 15. As shown in FIG. 10, the sliding movement of the shelf 53 into the compartment along the guide rails 67, 69, pushes the plunger 143 through the bore 145 in the back support wall 41 and compresses the spring 153. The continued movement of the shelf 53 into the compartment 15 brings the latching flange 159 into engagement with a camming surface 199 formed on the latching hook 155. The latching hook 155 is pivoted downwardly until the latching flange 159 moves past the camming surface 199 whereupon the torsion spring 181 pivots the latching hook 155 upwardly behind the latching flange 159 to hold the paper feed tray 47 at the operating station in the compartment 15.

When the paper feed tray 47 is at the operating station, the forward end of the stack 21 of sheets may be lifted upwardly against the feed rollers 23, 25 by moving the door 19 to cover the opening 17 of the compartment. As the door 19 is pivoted upwardly, both the camming plate 119 and the actuating rod 165 move laterally inside the compartment 15. As shown in FIG. 5, the lifting member 79 is maintained in the lowered position by the horizontal surface 131 of the camming plate 119. Further movement of the actuating rod 165 into the compartment 15 brings the stud 177 on the end of the rod 165 into engagement with the front side of the camming flange 167, as shown in FIG. 11 and pivots the pawl 163 upwardly out of engagement with the latching hook 155. The pawl 163 is resiliently biased downwardly by a tension spring 201 connected between the pawl 163 and the base plate 43, and as the stud 177 moves past the camming flange 167, the pawl 163 pivots downwardly until the flange 179 engages the top of the latching hook 155 in preparation for another loading operation.

Upon further covering movement of the door 19, the camming plate 119 slides laterally in the compartment 15 until the diagonal camming surface 129 moves into engagement with the sleeve 141 on the rod 89. Further inward movement of the camming plate 119 enables the resiliently biased rod 89 to move upwardly with the spaced upright fingers 93, 95 being received through the openings 97, 99 in the shelf 53 and through the openings 101, 103 in the floor 45 until they engage the backside of the hinged plate 77. Continued upward movement lifts the portion of the stack on the hinged plate 77 upwardly to the feeding position and presses the topmost sheet 71 into engagement with the feed rollers 23, 25, in preparation for further use of the photocopying machine 11.

From the foregoing, it is apparent that copy paper sheets of only one width may be fed from the paper feed tray 47, because it is necessary for the forward corners of the topmost sheets to engage the corner separators 109, 111 and be guided by the front and back side walls 49, 51 respectively, as they are advanced from the feeding position by the feed rollers 23, 25. However, oftentimes it is desirable to use sheets of copy paper having a width narrower than the width of the sheets of copy paper which may be accommodated by the paper feed tray 47. Since the paper feed tray 47 cannot be laterally adjusted to accommodate sheets having a narrower width, it is necessary to provide a paper feed arrangement for the photocopying machine 11 wherein other paper feed trays for accommodating sheets of copy paper having narrower widths may be interchangeably placed on the shelf 53.

However, irrespective of the particular tray being used in the photocopying machine 11, it is necessary that the stack of copy paper sheets be centered beneath the feed rollers 23, 25 so that the sheets may be advanced from the feeding position without being skewed. Furthermore, the trays must have openings corresponding to the openings 97, 99 formed in the shelf 53 so that the upright fingers 93, 95 of the lifting member 79 may move upwardly therethrough into engagement with the hinged plates. Also, the plates must be hingedly connected to the floors of the trays at the

same spaced location relative to the paper feed rollers so as to provide a common lifting angle enabling all of the sheets to be fed from the paper feed trays. Furthermore, the corner separators must have the same vertical spacing relative to the feed rollers **23, 25** to enable the topmost sheet of a stack supported by the hinged plates to be separated from the remainder of the stack upon advancement from the feeding position by the feed rollers **23, 25.**

As previously mentioned, the tray **47** is positioned on the shelf **53** by locating means so that the front and back side walls **49, 51** respectively, guide the sheets from the feeding position as they are advanced by the feed rollers **23, 25.** As more particularly shown in FIGS. **2, 3** and **9,** the paper feed tray **47** is generally located on the shelf **53** by the opening in the box-like guide member **57,** and the forward end of the paper feed tray **47** is more precisely located on the shelf **53** by a lip **203** extending forwardly into a recess **205** formed in the bottom of the forward wall **207** of the guide member **57** and between two spaced locating tabs **209, 211.** The tabs **209, 211** protrude upwardly from the shelf **53** into the recess **205,** and the lip **207** engages the tabs **209, 211** to laterally position the tray **47** on the shelf **53.**

To prevent the paper feed tray **47** from pivoting laterally about the forward locating tabs **209, 211,** a slot **213** is formed in the rearward end of the floor **45** which receives a locating tab **215** protruding upwardly from the shelf **53.** Another tab **217** for positioning a smaller tray on the shelf **53** protrudes upwardly from a central portion of the shelf **53** and is covered by a raised relief **219** formed in the floor **45** to enable a stack of sheets to slide into the tray **47** during a loading operation. As shown, the lip **203** may be formed by bending a portion of the forward wall **107** of the tray **47** downwardly, and the tabs **209, 211, 215** and **217** may be formed by bending portions of the shelf upwardly. In addition, the paper feed tray **47** is located on the shelf **53** by downwardly extending nipples **221** formed in the corners of the floor **45** which are received into corresponding openings **223** formed in the shelf **53.**

When it is desired to use sheets of copy paper in the photocopying machine **11** with a width different from that which may be accommodated by the paper feed tray **47,** the tray **47** may be removed from the shelf **53** and replaced by another paper feed tray which will accommodate sheets of copy paper of the desired width. To remove the paper feed tray **47** from the shelf **53,** the rearward end of the tray **47** is lifted upwardly and at the same time the lip **203** is moved from under the recess **205** formed in the bottom of the forward wall **207** of the guide member **57,** thereby uncovering the shelf **53** shown in FIG. **12.**

After the paper feed tray **47** has been removed from the shelf **53,** another paper feed tray **225** for accommodating sheets of copy paper having the desired narrower width may be placed on the shelf **53** at a centered position. Although a paper feed tray having the same length as the tray **47** could be used, as shown the paper feed tray **225** is narrower and shorter than the paper feed tray **47,** but in other respects is generally identical to the tray **47** and accordingly similar reference numerals have been placed on similar portions thereof. As shown in FIG. **13,** the tray **225** may be placed on the shelf **53** by inserting the forward lip **203'** into the recess **205** between the locating tabs **209, 211,** and the rearward end of the tray **225** may be lowered onto the shelf **53** with the tab **217** being received in the slot **213'** formed in the floor **45'** of the tray **225.** In addition, the tray **225** has downwardly extending nipples **221'** formed in the floor **45'** which are received into corresponding openings **227** formed in the shelf **53.**

With the paper feed tray **225** properly positioned on the shelf **53,** the tabs **81'** forming the hinged connection for the plate **77'** are received into the openings **85** formed in the shelf **53,** and the openings **97, 99** in the shelf **53** are aligned with corresponding openings **101', 103'** respectively, formed in the floor **45'** of the tray **225** to enable the upright fingers **93, 95** of the lifting member **79** to move upwardly therethrough into engagement with the hinged plate **77'.** In addition, recesses **189', 191'** formed in the front and back side walls **49, 51** respectively, of the paper feed tray **225** are aligned with the recesses **185, 187** formed in the side walls of the guide member **57** so as to enable the shelf **53** and the paper feed tray **225** mounted thereon to be moved into the compartment **15.**

Accordingly, a stack of copy paper sheets having the desired narrower width may be inserted in the paper feed tray **225** in the same manner as previously described in connection with the paper feed tray **47.** The shelf **53** may then be moved into the compartment **15** until the paper feed tray **225** is located at the operating station, whereupon the latching hook **155** engages the back side of the latching flange **159** to hold the shelf **53** in the compartment **15.** The door **19** may then be moved to cover the opening **17,** thereby enabling the upwardly biased lifting member **79** to move upwardly with the upright fingers **93, 95** being received through the openings **101', 103'** to lift the hinged plate **77'** upwardly and press the topmost sheet of the stack into engagement with the feed rollers **23, 25** in preparation for subsequent use of the photocopying machine **11.**

While only a single embodiment has been illustrated and described, it will be apparent to those skilled in the art that various modifications and improvements may be made without departing from the scope and spirit of the invention. Accordingly, it is to be understood that the invention is not to be limited by the illustrative embodiment, but only by the scope of the appended claims.

What is claimed is:

1. A paper feed tray comprising a floor for supporting a stack of sheets, a side wall connected to said floor for aligning the side of a stack of sheets on said floor, a corner separator connected to said floor adjacent to said side wall for separating an advancing topmost sheet from the remainder of the stack, said corner separator being vertically spaced above said floor and located adjacent said side wall, a plate mounted on said floor for supporting the portion of the stack beneath said corner separator, said plate being movable upwardly to move the portion of the stack supported thereon into operating relation with said corner separator, said plate being substantially nondeformable relative to the sheets supported thereon, and said floor having an opening formed therein beneath said plate to enable a lifting member to move upwardly therethrough and lift said plate upwardly to bring the topmost sheet of the stack thereon into operating relation with said corner separator.

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