United States Patent

[11] 3,627,312

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[54] **RESTACKING APPARATUS**
3 Claims, 9 Drawing Figs.

[52] U.S. Cl. 271/89
[51] Int. Cl. B65h 31/38
[50] Field of Search 271/89

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ABSTRACT: Apparatus for use in an automatic copying device is herein disclosed for storing cut sheets of final support material between processing stations. A supply tray is positioned intermediate the processing stations and is arranged to receive and store cut sheets in stack configuration. Jogging members are positioned to act upon the front margin and the side margin of the individual sheets forwarded into the tray wherein the sheets are placed in registration prior to their being forwarded to the next subsequent station.

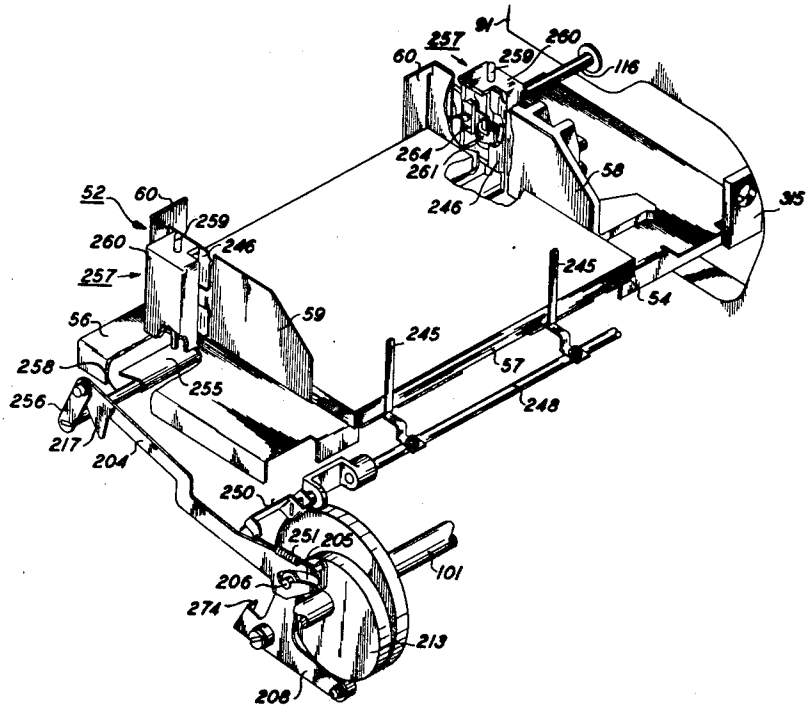
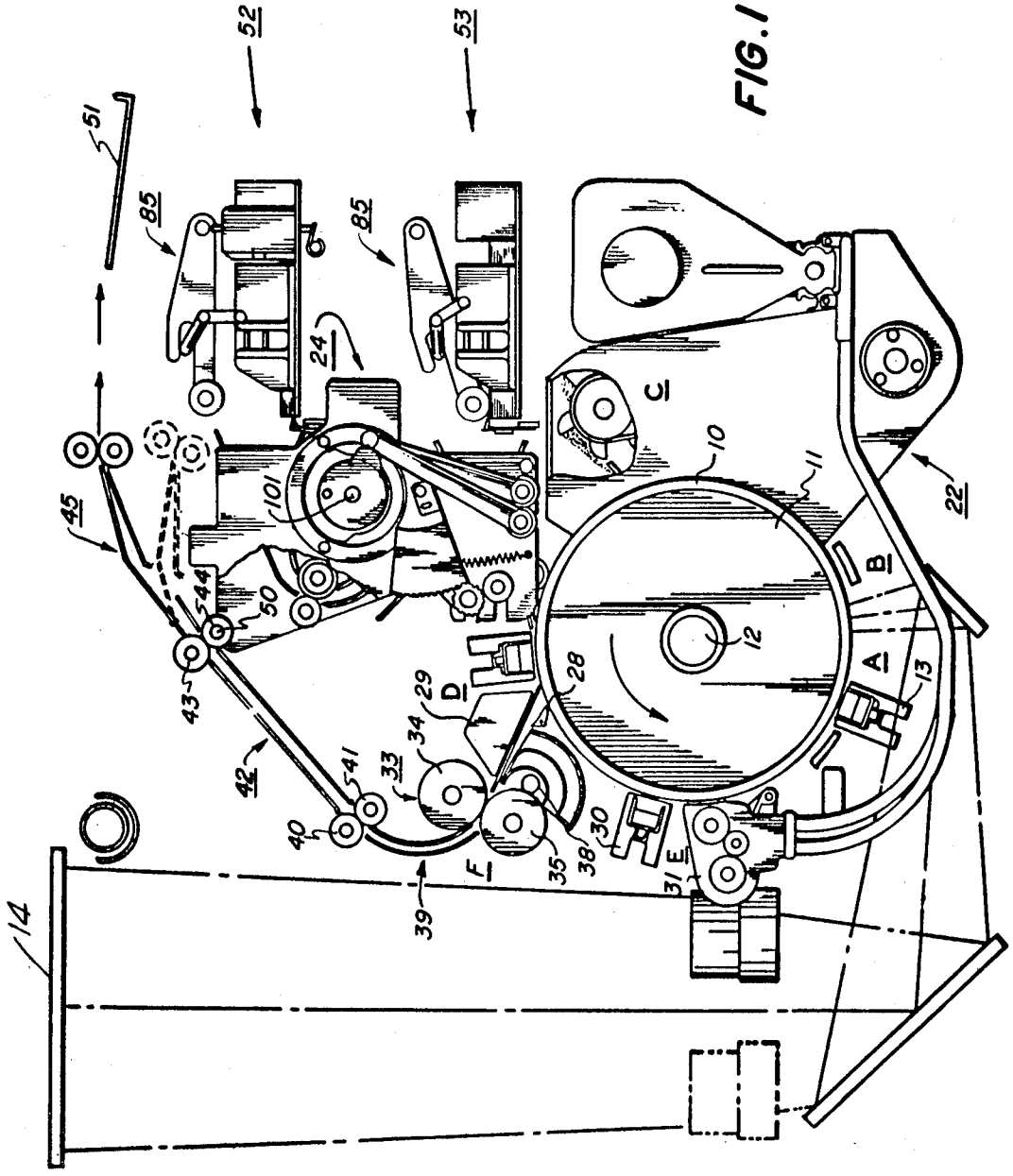


FIG. 1



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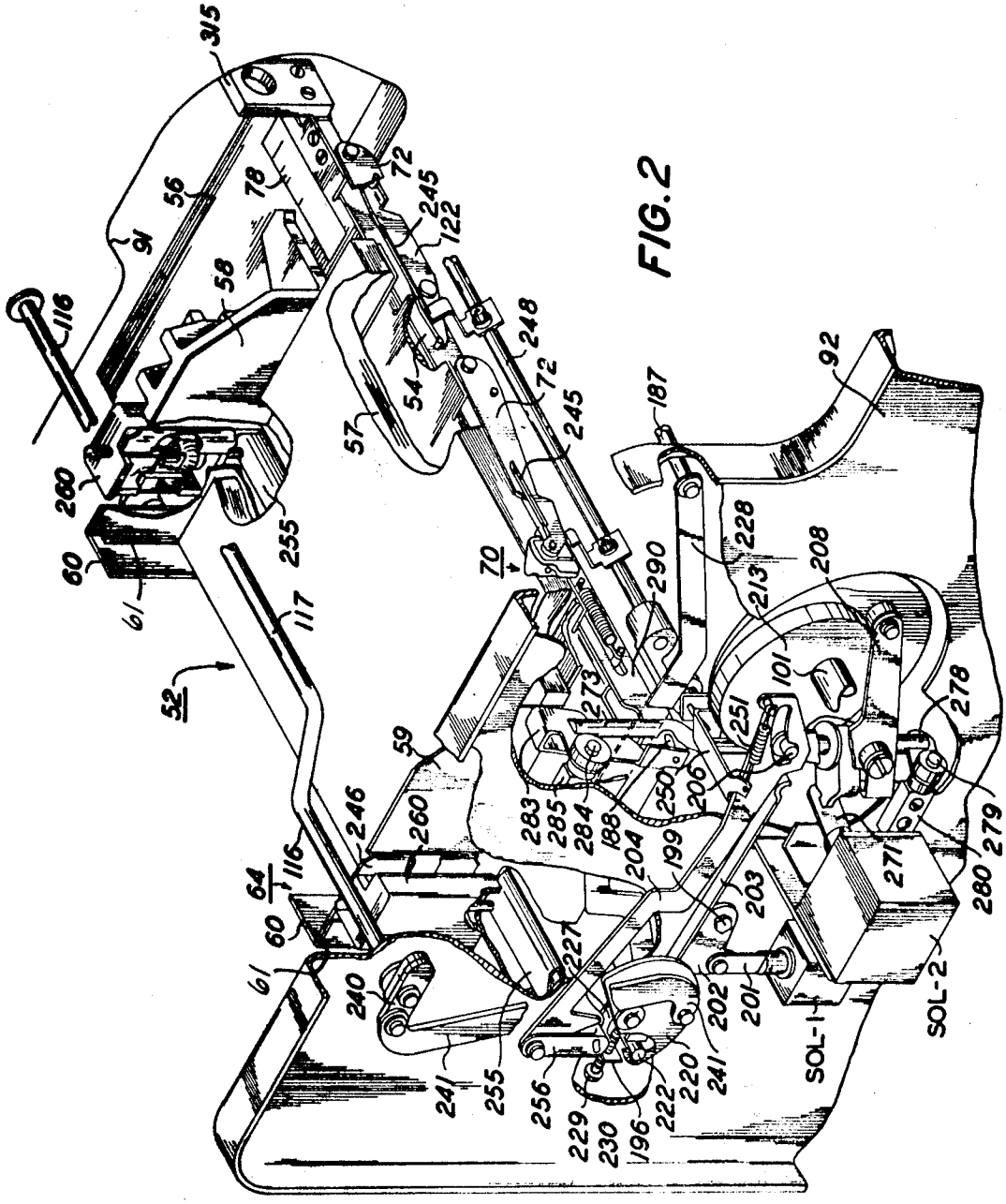
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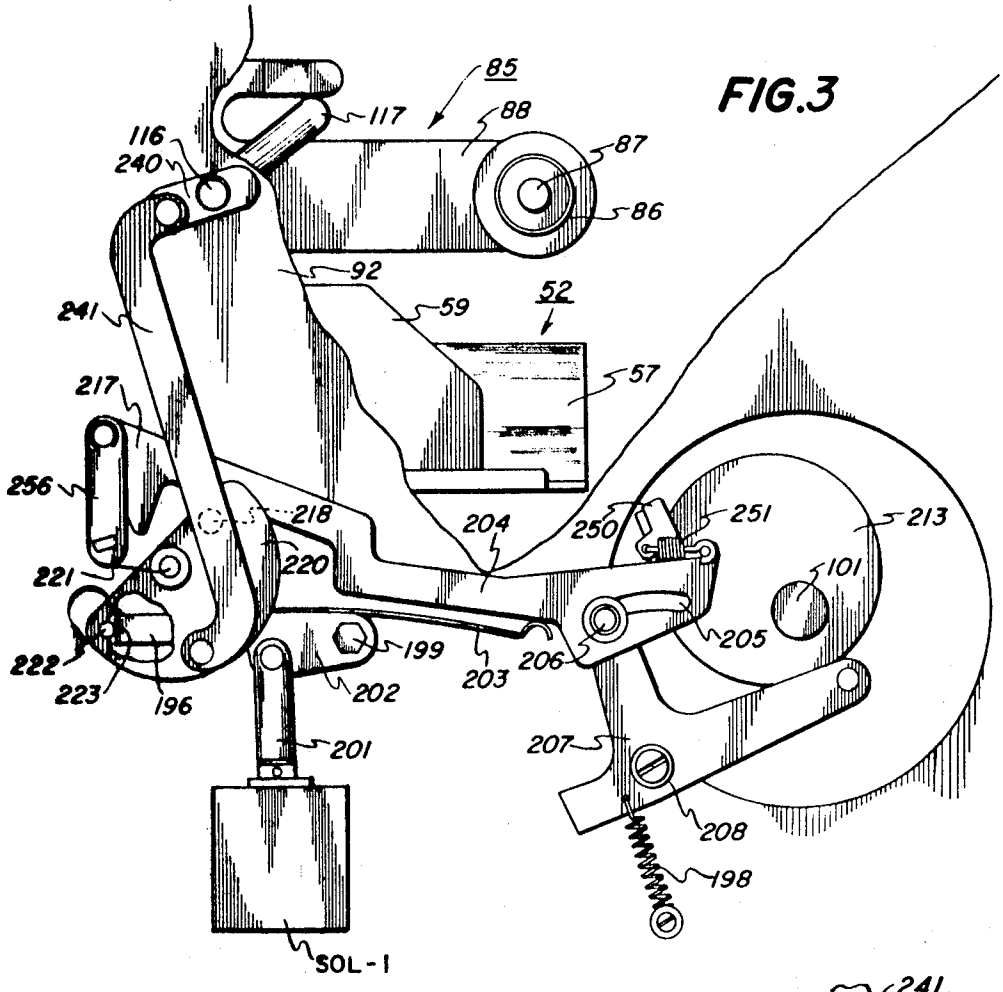
FIG. 2

FIG.3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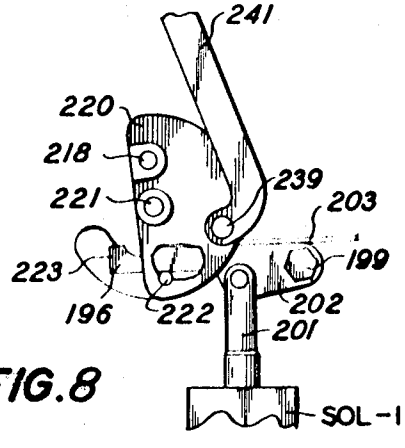
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FIG.8

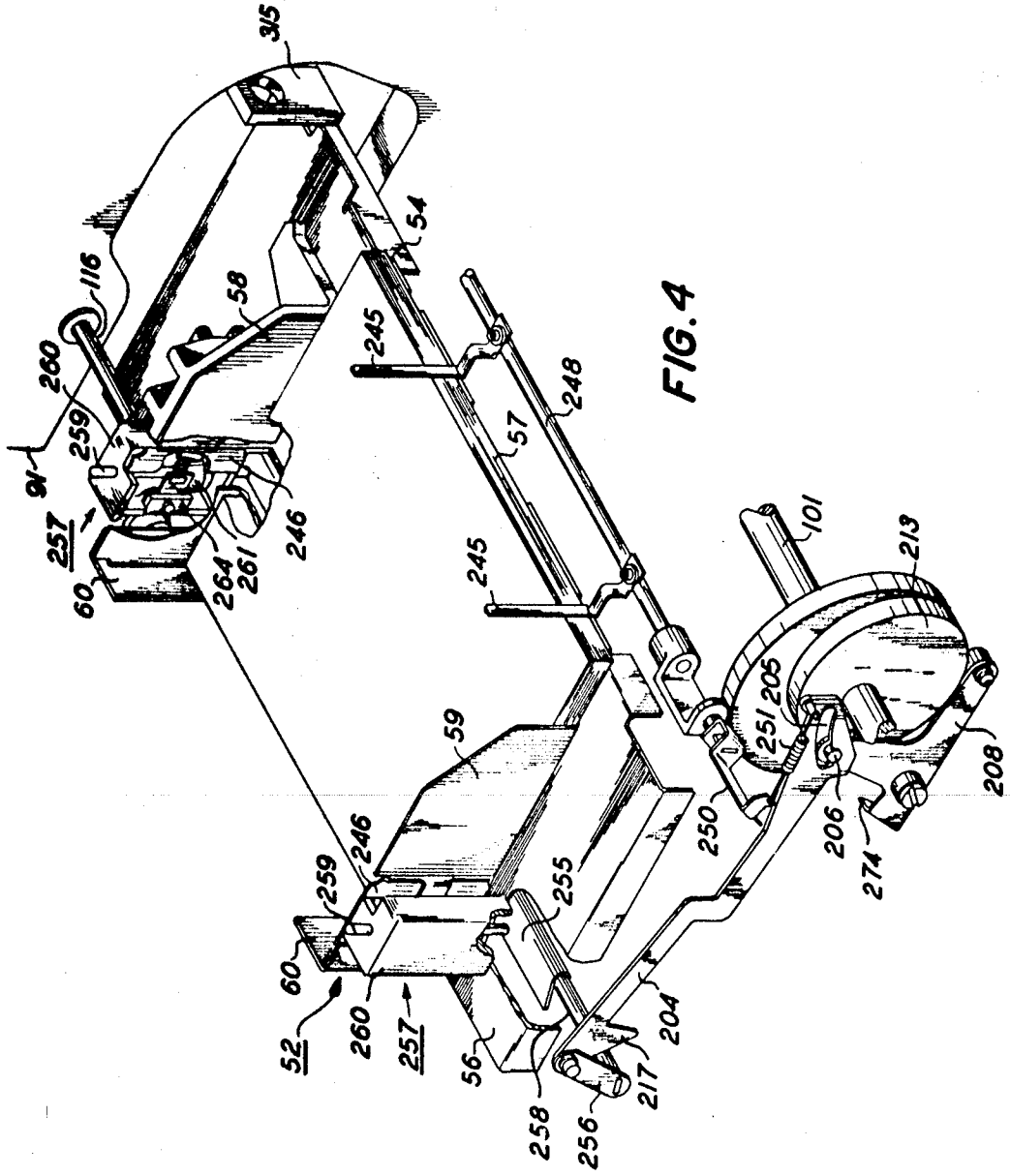
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FIG. 4

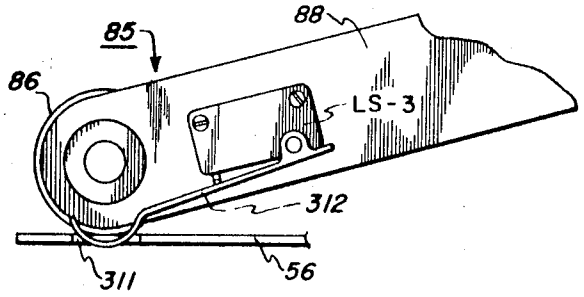


FIG. 9

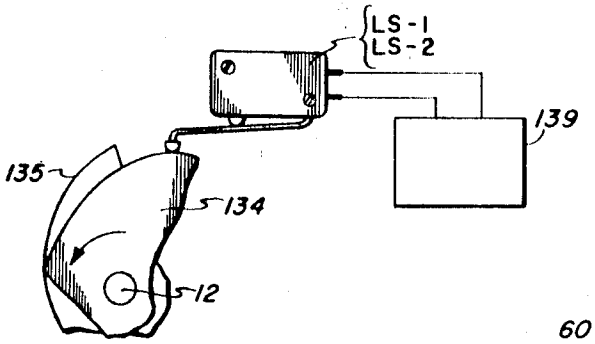


FIG. 7

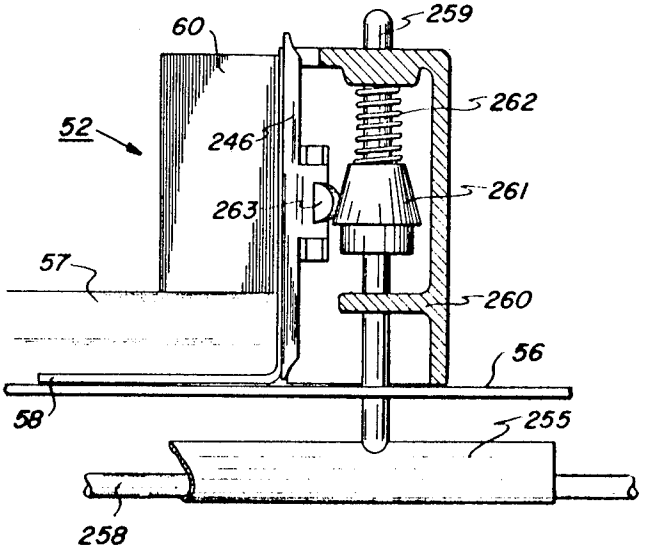
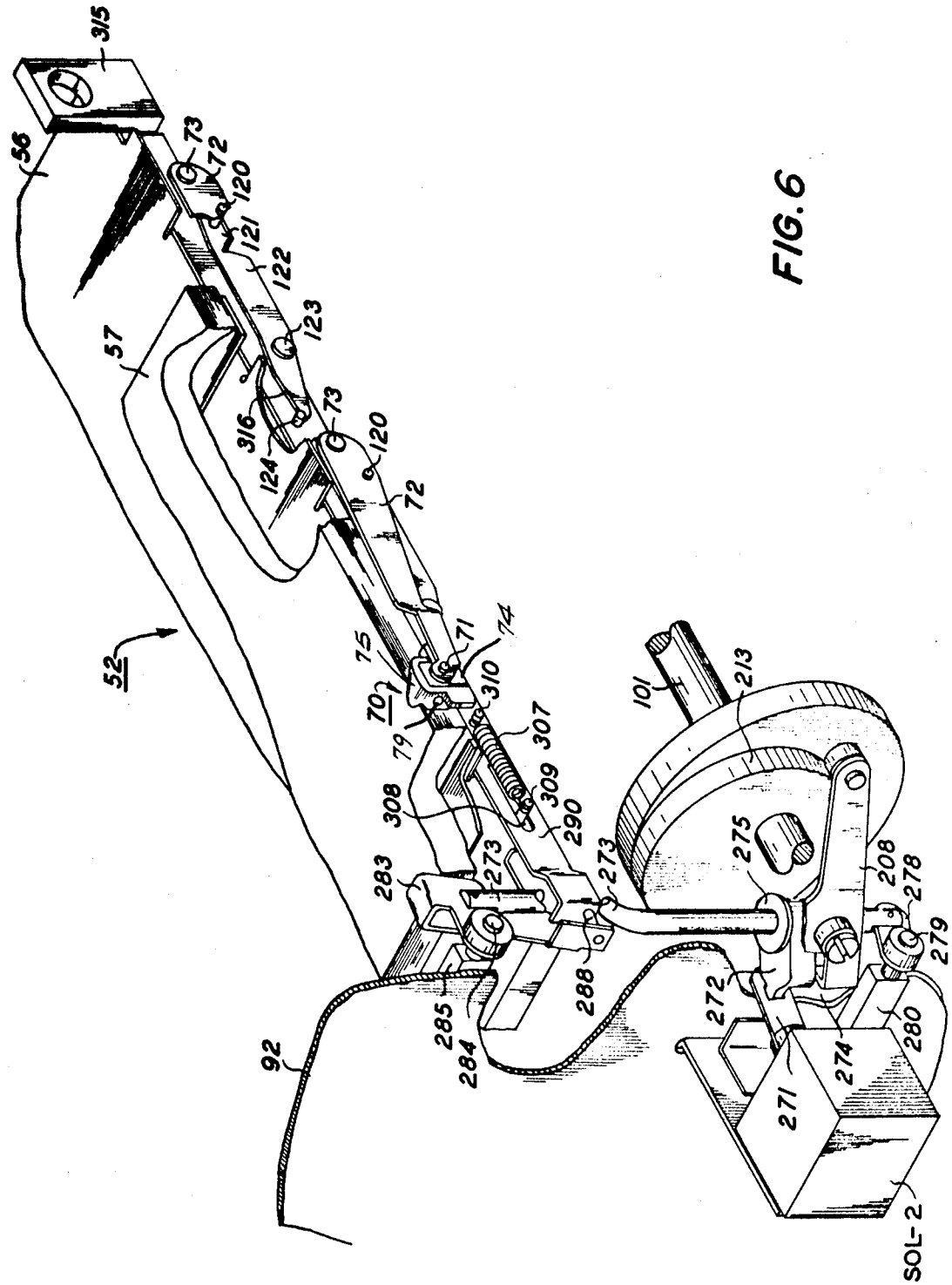


FIG. 5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SOL-2

FIG. 6

RESTACKING APPARATUS

This invention relates to sheet handling apparatus and, in particular, jogging mechanism for placing a plurality of sheets into precise lateral and longitudinal alignment.

In automatic copying machines, it has been found convenient to reproduce a replica of an original on cut sheets such as copy paper or the like. Generally, the cut sheets are aligned and packaged in stacks and the machine operator simply places the aligned stack within a supply tray from which the sheets are separated and forwarded to the automatic processing stations. In this manner, misfeeding or overfeeding of the individual sheets is avoided. As can be seen, the initial packaging and positioning of the sheets within the supply tray involves several manual steps. Because this manual operation is performed prior to the machine operations, the automatic integrity of the machine is in no way affected. However, with duplexing apparatus of the type herein disclosed, it has become necessary to accumulate and align cut sheets of material between the automatic processing operations if the machine is to be truly automatic.

It is therefore an object of this invention to improve sheet handling apparatus to automatically store and restack in alignment cut sheets of material accumulated between automatic processing stations.

Another object of this invention is to eliminate the need for manual handling of sheets accumulated in stack configuration within a supply tray.

A yet further object of this invention is to store and align between automatic processing operations individual cut sheets of support material in a manner wherein the individual sheets are not damaged.

Another object of this invention is to improve apparatus for collecting cut sheets fed seriatim into a support tray and placing the sheets in a condition to be fed in registration to a subsequent automatic processing station.

These and other objects of the present invention are attained by means of apparatus used in an automatic reproducing machine of the type wherein cut sheets of final support material are passed through a series of processing stations, the apparatus being arranged to store the cut sheets between processing stations and includes a support tray for receiving and storing said sheets of material in stack configuration, a means to forward the individual sheets one at a time from a first automatic processing station into the tray, jogging means associated with the tray to align individual sheets fed into the tray whereby the sheets are stored in a condition to be separated and forwarded in registration to the next subsequent processing station, and control means operatively associated with the sheet feeding means to actuate the joggers to align each individual sheets as they are delivered into the stack.

For a better understanding of these and other objects of the present invention reference is had to the following detailed description of the invention to be read in connection with the accompanying drawings, wherein:

FIG. 1 is a schematic side elevation of an automatic xerographic reproducing machine for producing duplexed copies employing the apparatus of the present invention;

FIG. 2 is a perspective view showing the control mechanism and linkage for conditioning the upper supply tray to receive and restack sheets when the reproducing machine illustrated in FIG. 1 is a duplex mode of operation;

FIG. 3 is a partial side elevation of the control mechanism and linkage illustrated in FIG. 5 showing crank arm mechanism in a latched condition;

FIG. 4 is a perspective view in partial section with parts broken away to clearly illustrate the sheet jogging apparatus for restacking sheets forwarded into the upper tray;

FIG. 5 is a partial front elevation in section illustrating the right-hand side jogger assembly of the paper restacking apparatus shown in FIG. 7;

FIG. 6 is a perspective view illustrating the front edge retaining members and the retainer positioning and control linkage associated with upper supply tray;

FIG. 7 is a partial side view showing the cam and switching apparatus to control the movement of the upper and lower feed rolls;

FIG. 8 is a partial side view showing the crank arm mechanism illustrated in FIG. 3 in an unlatched condition;

FIG. 9 is a partial side view of the feed rolls illustrated in FIG. 6 showing the sheet sensing mechanism associated therewith.

As illustrated in FIG. 1, the apparatus of the present invention is shown herein embodied in an automatic xerographic reproducing machine capable of producing either simplexed or duplexed copies from a wide variety of originals such as copy sheets, books, or three dimensional forms. Although the present invention is particularly well suited for use in automatic xerography, the sheet-feeding apparatus herein disclosed is equally well adapted for use in any number of devices in which cut sheets of material are stored in a stack and the individual sheets then separated and forwarded to a subsequent processing station. It should become apparent from the discussion below that this apparatus is not necessarily limited to its application to the particular embodiment shown herein.

The automatic xerographic apparatus illustrated in FIG. 1 includes a photosensitive plate including a photoconductive layer **10** that is placed over a conductive backing. The plate is formed in the shape of a drum **11** and the drum mounted upon a shaft **12** that is journaled for rotation in the machine frame. Basically, the xerographic drum is rotated in the direction indicated so as to pass sequentially through a series of xerographic processing stations. The photosensitive drum and the xerographic processing apparatus are driven at predetermined speeds relative to each other from a single drive system (not shown) and the operations thereof coordinated in order to produce proper cooperation of the various processing mechanisms.

The original object to be reproduced is placed upon a transparent horizontally supported platen **14** and the original scanned by means of a moving optical scanning system to produce a flowing light image of the original, on the drum at exposure station B. Prior to the imaging of the drum surface, the drum is first uniformly charged by means of a corona generator **13** positioned in charging station A. Under the influence of the flowing light image, the uniformly charged photoconductive surface is selectively dissipated in the nonimaged areas to form what is commonly known as a "latent electrostatic image."

The latent electrostatic image is carried on the drum surface from the exposure station into the developing station C. The developer material is caused to flow downwardly in contact with the upwardly moving drum surface under closely controlled conditions wherein charged toner particles are attracted from the developer mix into the image areas on the plate surface thus making the image visible.

The moving drum surface next transports the developed xerographic image to a transfer station D wherein the image is transferred to a sheet of final support material and the sheet forwarded to a subsequent fusing station.

Although a preponderance of the toner material is transferred from the drum surface to the copy sheet during the transfer process, invariably some residual toner remains behind on the drum surface after transfer. This residual toner is transported on the drum surface into a cleaning station E where it is brought under the influence of cleaning corotron **30** adapted to neutralize the electrostatic charge tending to hold the residual toner to the drum surface. The neutralized toner is mechanically cleaned from the drum surface by means of a brush or the like and the toner collected within a housing **31**.

The copy sheet, which has been removed from the drum surface after the transfer operation, is moved along stationary transport **29** into fusing station F. The fuser **33** is basically made up of an upper fuser roll **34** and a lower fuser roll **35** mounted in operative relation to each other and arranged to coact so as to support a sheet of material in pressure driving

contact therebetween. The outer surface of the lower roll is heated by means of a horizontally supported radiant heat source **38** positioned in close proximity to the roll surface adjacent to the point at which the roll contacts the image bearing support material. As the heated roll is rotated in the direction indicated, the heated surface of the lower roll is pressed into intimate contact with the image face of the support sheet. Mechanical and heat energy transported from the roll surface to the support sheet to permanently bond the toner particles to the support material.

Upon leaving the fuser, the fixed copy sheet is passed through a curvilinear sheet guide system, generally referred to as **39**, into cooperating advancing rolls **40** and **41**. The advancing rolls forward the sheets through a linear sheet guide system **42** into a second pair of advancing rolls **43** and **44**. At this point, depending on the mode of operation selected, the simplexed copy sheet is either forwarded into catch tray **51** or into upper supply tray **52** by means of a movable sheet guide **45**. As will be explained in greater detail below, movable sheet guide **45**, and it associated advancing rolls, are prepositioned by the machine logic system to direct the individual sheets into the desired paper tray.

It is believed that the foregoing description is sufficient for purposes of the present application to show the general operation of a xerographic reproducing machine embodying the teachings of the present invention.

Referring now specifically to FIGS. **2–9**, there is shown the sheet-handling apparatus of the present invention which enables a conventional xerographic machine to produce either simplexed or duplexed copies. The mechanism to accomplish this unique result includes two substantially vertically aligned supply trays **52, 53** arranged to advance copy sheets into the xerographic transfer station D and a circular sheet path adapted to operatively connect the lower supply tray **53** to the upper supply tray **52**. A movable sheet guide, generally referred to as **45**, is placed in the sheet path and is positionable, depending on the mode of machine operation selected, to direct xerographically processed sheets of material either into a final collecting station or into the upper supply tray **52**. In the simplex mode of operation, the movable sheet guide **45** is positioned as shown by the solid lines in FIG. **1** in a position to direct copy sheets into catch tray **51**.

When duplexed copies are to be produced, the movable guide is moved to the position shown by the dotted lines in FIG. **1** and the upper tray conditioned to accept and restack simplexed copy sheets. The upper tray is further conditioned to separate and forward sheets seriatim through the xerographic processing stations once again where a second image is placed on the backside of the sheet. Heretofore, the conditioning of the sheet-handling equipment to accept and recirculate simplexed copy has generally been a manual operation. However, as will be explained in greater detail below, the apparatus of the present invention now makes it possible to automatically hold and then reprocess the copy sheets between copy runs.

The individual supply trays **52, 53** are movably supported between the machine frames **91, 92** upon a set of rails **104** (FIG. **2**) and are capable of being moved in a horizontal direction between a first operative position and a second tray-loading position. In the operative position, the sheet trays are supported adjacent to the sheet-registering apparatus **24** wherein sheets forwarded from either tray are directed into a pair of sheet-registering rolls which align the sheets prior to them being forwarded into the transfer station.

Both the upper supply tray and the lower supply tray are of similar construction. The trays include a horizontal support platform **56** having a dependent, downwardly turned, vertical aligned front flange **54**, a stationary side margin guide **59** and a movable side margin guide **58**. The stationary margin guide is rigidly affixed to the support platform and has a vertically extended leg thereon. The movable guide similarly has a vertical leg complimentary to that of the stationary side margin guide and is adapted to cooperate therewith to guide individual sheets forwarded from the trays along a predetermined path of travel into the sheet-registering apparatus **24**. The movable side margin guide is slidably carried upon the support platform and arranged to move laterally thereon making it possible to accommodate sheets of varying lengths upon the platform. To aid in the correct positioning of a stack of final support sheets within the tray, the tray is provided with an indexing scale **55** for laterally positioning the movable side margin guide.

An L-shaped rear retaining member **64** is affixed to each of the vertical legs of the side margin guides. The two rear retaining members associated with each supply tray cooperate to longitudinally position the stack upon the support platform. The members are basically formed of an angular plate including a rear wall **60** and a flange **61** adapted to overlay in parallel relation the vertical legs of the side margin guide members. Each of the side margin guides is provided with a stud (not shown) which protrudes through a horizontally slotted hole in the flange **61** of the rear retaining member **64** and is engaged by a thumb nut whereby each rear retaining member may be adjusted and tightened against the side margin guide.

To feed sheets of final support material one at a time from each of the individual supply trays, there is provided a sheet separating and feeding means, generally referenced **85**, consisting of a pair of driven feed rollers **86** supported in a self-aligning manner within floating bearings secured to a shaft **87**.

As individual sheets are fed from the stacks, the freely mounted, self-adjusting, feed rolls drop down into contact with the next subsequent sheet in the stack. Each feed roller is operatively connected to the drive shaft **89** by means of a clutch and pulley arrangement. The prescribed sheet-feeding motion is translated to the rollers through the clutch and pulley arrangement in proper timed relation with an image on the drum surface wherein the advanced sheets and the image arrive at the transfer station at the same time.

As can be seen, the side of each of the support platforms adjacent to the sheet-registering apparatus is unobstructed so that an uninterrupted path of travel is provided along which individual sheets of support material, which have been separated from the individual stacks, can be forwarded into the registering means. To retain the front margins of the individual stacks in alignment during sheet separation and forwarding there is provided a pair of front margin sheet retaining members **70** (FIG. **6**). Each retaining member **70** includes a main body **74** about which is rotatably mounted a hinged tab **75**. The tab is pivotally mounted in the body upon a pivot rod **79**. A torsion spring (not shown) is wound about the rod and normally biases the tab against a stop affixed to the body of the member to hold the tab in a horizontally extended position substantially perpendicular to the body of the retainer.

Each retaining member **70** is journaled for rotation in the free end of the associated lifting arm **72** upon a pin **71**. The retaining members **70** are designed so that their respective centers of gravity are located at a point wherein the freely supported member normally assumes a position with the tab normally extended in a horizontal position. As sheets are delivered into the upper supply tray, as for example during duplexing, the sheets rest on top of tabs **78**. The tabs are repositioned when the lifting arms are elevated causing the hinged tabs to swing downwardly about the upwardly moving body **74**. The tabs continue to swing downwardly until they are removed from beneath the stack. Further elevation of the lifting arms moves the tabs upwardly in contact with the front margin of the stack until such time as the top of the stack is cleared. At this time, the biasing spring acting in conjunction with the downwardly pulling weighted end **75** of the tab, forces the tab to move rapidly back into its normal horizontally extended position. As the lifting arms start downwardly through the prescribed path of motion, the extended tabs engage the top sheet on the stack. The actuator arms are allowed to continue to swing down until they come to rest once again against stops **124** so that the retaining members, and their associated lifting arms, hang in a suspended manner upon the

stack to support the stack in sheet feeding alignment as shown in FIG. 6.

In order to feed individual sheets from either of the two supply stacks, the topmost sheet in the stack is first separated from the main body of the stack by forming a separating buckle in the sheet and the sheet then forwarded to subsequent sheet-handling means within sheet-registering apparatus 24. At the beginning of each sheet-feeding cycle, the feed rollers 86 are rotated in a direction to cause the leading edge of the topmost sheet in the stack to be moved rearwardly from beneath the front edge retaining members 70. The trailing edge of the sheet, however, is held stationary by the rear walls 60 in rear retaining members 64 so that a separating buckle is formed longitudinally across the sheet. The suspended front retaining members 70, and their respective lifting arms, at this time drop down into supporting engagement with the main body of the stack. The direction of rotation of the feed rollers is then reversed and the now separated sheet driven over the top of the horizontally extended tabs 75 into sheet-registering apparatus 24. The rear surfaces of the extended tabs taper down in knife edge fashion so as to allow the forwarded sheets to pass easily thereover.

Drive shafts 89, associated with the two feed roller assemblies 85, are driven from a main programmer shaft 101 rotatably supported in the sheet-registering apparatus 24. The programmer shaft is, in turn, driven in timed relation with the xerographic drum by means of the main machine drive (not shown) to coordinate sheet advancement with the processing of an image on the drum surface wherein the image and the copy sheet move into transfer station D in synchronous timed relation.

To duplex, the operator first insures that the upper tray is emptied of all copy sheets, a first original is placed upon the platen 14 prior to the duplex mode of operation selected. Selection of the duplex mode of operation causes a solenoid SOL–1 (FIGS. 2, 3) to be energized pulling down link 201. The downward motion of the link causes the lever arm to be rotated about stud 199 forcing flexible member 203 into biasing contact with a crank arm 204. The crank arm 204 is provided with an arcuate-shaped elongated hole 205 having a notch (not shown) machined in the bottom wall thereof. A dependent arm 207 on the cam follower carried a drive pin 206 which is arranged to pass through the elongated slotted hole provided in the crank arm. Normally the pin will ride freely along the top surface of the slotted hole 205 wherein the crank arm remains relatively stationary as the follower arm is rocked by the continually rotating cam 213. However, as flexible member 203 is forced upwardly by the energized solenoid SOL–1, pin 206 is forced to ride along the bottom surface of the slotted hole. Pin 206 falls into the notch provided in the lower surface of the slotted hole and is held therein by the pressure exerted by flexible arm 203. Further motion of the cam is then translated directly to the crank arm through the follower arm 208, which is biased in a continuous contact with the cam face by spring 198, causing the crank to reciprocate back and forth in substantially a horizontal direction.

During the first reciprocating cycle of the crank arm, downwardly extended dependent projection 217 formed in the opposite end of the crank arm moves into engagement with a stub pin 218 securely staked to movable plate 220. The movable plate is pivotally mounted in machine frame 92 upon pivot pin 221. As the crank arm, as shown in FIG. 3, is driven forward, that is, to the right, toward a fully extended position, the movable plate is rotated in a clockwise direction. During this period, solenoid SOL–1 is continually held energized and continues to exert a downward pressure on the lever arm 202. As illustrated in FIG. 15, the arm, however, is initially prevented from swinging to a full down position by a stop pin 222 affixed in the lower portion of plate 220. Further movement of the crank arm, however, forces the stop pin 222 to be moved out of interference with the extended portion 196 of lever arm 202 allowing the solenoid to pull the lever arm to a full down position. Now, as the crank arm starts back from its fully extended position, the stop pin 222 moves into contact with the vertical surface 223 on the extended arm 196 to latch movable plate 220 in a stationary position as illustrated in FIG. 6. The plate will remain in this latched position as long as solenoid SOL–1 is held energized.

This initial rotation of plate 220 to a latch position conditions the upper tray to accept and restack sheets supplied from the lower tray which have been xerographically processed to produce an image on one side thereof. First, movable guide 45 (FIG. 1), positioned in the circular sheet path, is pulled downwardly to direct sheets fed along the sheet path directly into the upper tray. Secondly, the upper supply tray feed rollers are elevated out of the sheet feed path to permit sheets to be expelled from the movable guide directly into an upper tray in an unobstructed manner. The movable guide 45 is pivotally mounted about a shaft 50 and normally held in an up position by spring means. The movable guide is driven from the normally up position to a down position by means of actuator link 228 (FIG. 2). One end of the link is freely supported in the movable guide 45 upon shaft 187 while the opposite end of the link is mounted upon stop pin 222 which is staked in rotatable plate 220. Pin 222 extends rearwardly through a hole provided in machine frame 92 and is slidably received within a slotted hole 227 in the actuator link. An adjustment screw 229, which is mounted in a vertical flange 230 on the driven end of the link, limits the length of the path of travel along which pin 222 may slide within hole 227. As the plate 220 is moved in a clockwise direction as explained above, stop pin 222 engages adjustment screw 227 pulling the link 228 towards the rear of the upper tray. This rearward motion of the link, in turn, pulls the movable guide to a full down position so that it is now in a condition to feed sheets directly into upper tray 52.

When plate 222 is moved to the latched position by solenoid SOL–1 further mechanism is activated to elevate the upper tray feed roller assembly. As seen in FIG. 2 camming rod 116 passes through machine frame 92 and the extended end thereof secured in eccentric link 240. The extreme end of the eccentric link is journaled in the top portion of a second S-shaped link 241 and the opposite end of the S-shaped link journaled for rotation in movable plate 220 upon the pin provided. As the crank arm is driven through its first reciprocating cycle, latching plate 220 is held in a latched condition against pin 222 and the S-shaped link 241 is pulled to a down position. This downward motion of the link causes camming rod 116 to be rotated in a direction raising offset 117 to an elevated position thus forcing the feed roller assembly above the top level of the upper tray. Therefore, during the first full reciprocating cycle of the crank arm 204, the movable guide 45 is moved to a down position and the upper feed rolls are elevated to allow sheets forwarded along the circular path of travel to be fed into the upper tray.

Sheets forwarded from the lower tray are registered in the register stop rolls and then passed through transfer station D to the xerographic processing stations where a first image is placed upon the copy sheet. The copy sheet advanced by means of the heretofore described sheet-advancing rolls into the upper supply tray. Delivering a simplex sheet to the upper tray, however, is not in itself sufficient to insure that the sheets will be properly stacked and aligned prior to the start of the duplexing operations. It has long been known that improperly stacked sheets are the cause of misregistration and misfeeding of sheets resulting in the paper jams and in extreme cases of machine breakage. The upper tray therefore is provided with means to receive and restack the simplexed sheets delivered from the lower supply tray.

The sheet-restacking apparatus associated with the upper supply tray 52 is shown in greater detail in FIGS. 4 and 5. The restacking fundamentally consists of two front margin aligning members or joggers 245 and side margin joggers generally referred to as 257, both of which are driven by means of crank arm 204. When a simplexed sheet has been delivered into the upper supply tray, the front joggers are moved upwardly into contact with the front margin of the sheet forcing the sheet

into registration with the backwall **60** of the supply tray. Simultaneously, two side joggers move into contact with the side margin of the sheet to laterally align the sheet within the tray.

The front joggers **245** are secured to a shaft **248** and the shaft rotatably supported in the machine frame (not shown) below the level and a bit forward of the open end of the upper supply tray **52**. The shaft is coupled to the crank arm **204** by means of an extension spring **251** pinned to the crank arm. Extension of the crank arm during any reciprocating cycle causes the spring to pull a coupling **250** in a clockwise direction rotating shaft **248** in a counterclockwise direction. The front joggers are thus raised from a near horizontal position below the level of the tray to a sheet-engaging vertical position as shown in FIG. **4** to force the sheets rearwardly into registration against the backwall **60** of the tray. In order to insure that each sheet is registered against the back of the tray, the front joggers are permitted to be moved by the crank arm a greater distance than required to move the sheet into contact with the rear wall **60**. As can be seen, however, the pressure imparted by the cam system is regulated by the dampening action of the spring so that the spring is deformed before any damaging forces are transmitted to the copy sheets.

The rear end of the crank arm **204** is operatively connected to a bail **255** which is journaled between the machine frames upon shaft **258** and which extends horizontally beneath the upper supply tray **52**. As shown in FIG. **4**, the left-hand end of the bail shaft is affixed to a link **256** and the link rotatably secured in the crank arm **206** wherein the bail swings upwardly as the crank moves to its fully extended position. Riding in contact with the top surface of the bail are two vertically extended rods **259** slidably supported within individual housings **260**. The housings are mounted adjacent to the side margin guides in the cutouts provided upon the supply tray platform **56**. The vertically extended rod is arranged to pass through both the housing and the support platform and rides freely in contact with the bail carried beneath the tray platform.

FIG. **5** illustrates the internal arrangement of the rod within the individual housings **260**. The rod is supported within the housing frame and has an inverted truncated member **261** affixed to the center portion thereof. A compression spring **262** is secured between the top of the housing and on the truncated member and acts to hold the vertical rod in biasing contact with the bail **255**. A flexible bar **263** is locked at one end to the housing by means of a clamp **264** (FIG. **4**) and carries a vertically extended side margin jogger **246** on the free end thereof. The flexible bar rides in contact with the truncated member and is flexed inwardly towards the side margin of the upper supply stack as the rod is raised by the bail. The two side joggers are adapted to move in concert into contact with the sheets to position the sheets therebetween in proper sheet feeding alignment. Here again, the restacking force is transmitted through a flexible member which prevents sheet-damaging forces from being imparted from the drive mechanism to the copy sheets.

In practice, the programmer shaft moves through one complete revolution for each xerographic processing cycle and each sheet feeding cycle. The crank is also controlled by the programmer shaft motion so that one reciprocating cycle of the crank is produced for each rotation of the programmer shaft. Because the motion of the individual joggers is physically linked to the crank arm the joggers will act to align each individual sheet fed into the upper tray during duplexing operations thus insuring that the resultant stack is properly maintained in a condition wherein sheets are able to be once again fed through the xerographic processing stations.

When the upper tray is cleared prior to duplexing the retaining members are automatically repositioned in the bottom of the upper tray. The simplexed sheets delivered into the tray are simply restacked directly above the extended tabs.

Upon completion of the restacking operation, cam **213** is permitted by the machine logic to make at least one more complete revolution. As the cam follower passes the low point in its motion, a second solenoid SOL–**2** is energized pulling the floating arm **271** (FIG. **6**) inwardly towards the solenoid body. A universal member **272**, passing through the floating arm, is rotatably mounted in a fixed position on vertical shaft **273**. As can be seen, when the solenoid is energized the universal member is pulled in a counterclockwise direction towards the solenoid. One end of the follower arm **208** is provided with a flange **274** which is moved downwardly as the follower traces the low side of the cam profile. When the flange is in the low position, the universal member **271** is able to be pulled over the flange by the solenoid. As the follower starts back in an upward direction during a subsequent rise portion of the cam cycle, the flange is brought into contact with the bottom of the universal member. Further upper movements of the flange causes the universal to push against a fixed bushing **275** secured to shaft **273** lifting the shaft.

The bottom of the vertical shaft **273** is pinned to a link **278** which, in turn, is pivoted about a stub shaft **279**. The stub shaft is held in a stationary position in mounted block **280** which is secured to the machine frame. The other end, or top of the vertical shaft **273** is pinned to an actuator arm **283** and the arm rockably supported by stub shaft **284** secured in mounting block **285**. As the shaft is raised, actuator arm **283** is swung in a clockwise direction as shown in FIG. **6** forcing a dowel pin **288** secured thereto into contact with a horizontal slide member **290** slidably supported in the upper tray.

Slide member is slidably mounted in the downwardly turned front flange **56** of the upper tray platform below the level of the stack and is adapted to reciprocate in a horizontal direction. When the tray is in an operative position, the slide **290** is biased into contact with dowel **288** secured in arm **283** by means of an extension spring **307**. A pin **309** is staked to the upper tray platform flange and passes through a slotted hole **308** provided in the slide. A second pin **310** is similarly staked to the slide member and the extension spring supported therebetween in a working position so as to urge the slide member against dowel **288**.

Two actuator arms **122** are supported in the front of the upper tray and normally rest against stops **124** affixed to slide member **290**. As can be seen, as shaft **273** moves upwardly, dowel pin **288** is forced against slide **290** causing the slide to move in a horizontal direction against the biasing force of spring **307**. As the slide moves in the horizontal direction, stops **124** are moved over the cam surfaces **316** of the actuator arms **122** causing the arms to swing in a clockwise direction. Slide **290** is moved far enough in a horizontal direction to displace pin **124** sufficiently to cause the lifting arms to raise retaining members **70** as described above to an elevation above the top level of the tray. As the cam **213** passes the rise portion of the cycle and returns toward the low portion thereof, the slide returns to its home position. At this time, the retaining members carried by the lifting arms are brought into engagement with the top of the stack proprietary to sheet feeding operations. A manual slide actuator **315** is provided at the opposite side of each tray which is affixed to the slide. If for some reason the retainer fails to engage the stack properly, the operator simply pulls the actuator laterally to recycle the retainers into proper alignment.

At the completion of the automatic restacking and retainer positioning operation, both solenoids SOL–**1** and SOL–**2** are deenergized. Deenergization of solenoid SOL–**1** allows pin **206** to once again ride in contact with the top surface of slotted hole **205** in the crank arm. At this time arm **202** is moved upwardly unlatching movable plate **220** and the plate allowed to return once again to its normal home position thus placing the upper feed roll assembly in contact with the top of the stack and returning the movable sheet guides to the up position wherein sheets are capable of being fed from the upper tray through the circular paper feed directly into catch tray **51** (FIG. **1**). At this time, the operator places a second original on the copyboard and starts the upper tray sheet feed operations. The simplex sheets are passed through the regis-

tration system and the xerographic processing stations wherein a duplexed image is placed on the backside thereof and the duplexed copy exhausted exterior the machine in catch tray **51**.

A limit switch **LS–3** is carried on one of the upper tray feed roll support members **88** and has a sensing arm **310** thereon capable of riding in contact with the top of the stack. When the last simplexed sheet is fed from the upper tray the actuator arm **312** is allowed to fall through opening **311** in the upper tray platform sending a signal to the logic system that the duplexing operations are completed. This signal is then used to program the mechanical drive system to terminate the machine operations.

While this invention has been disclosed with references to the structure described herein, it is not to be confined to the details as set forth, and this application is to cover all modifications and changes which may come within the scope of the following claims:

What is claimed is:

1. Apparatus to jog and align the margins of a stack of cut sheets supported within a substantially horizontal supply tray including

a pair of housings each positionable adjacent to the individual side margin of the stack,

a vertical rod slidably mounted in a vertical direction within each of said housing,

a truncated cone-shaped member secured to each of said rods in axial alignment therewith,

an elongated flexible member affixed in a substantial horizontal direction at one end to each of said housings and having a vertically aligned jogger supported in the free end thereof, said flexible member being positioned between said rod and said stack and being biased into contact with the outer surface of said truncated cone,

a bail positioned below the level of the tray and arranged to operatively engage the bottom surface of the two vertical support rods,

control means to periodically raise and lower said bail wherein the flexible members are simultaneously moved into and out of contact with the side margin of said stack for the jogging and alignment thereof and

means to mount at least one of said housings and rods relative to said bail to permit the jogging and alignment of various sized documents.

2. The apparatus of claim **1**, further including front margin joggers mounted adjacent to the front of the tray and being operatively connected to said control means so as to move into aligning contact with the front margin of the individual sheets in said tray to register said sheets against the rear wall of said tray as said flexible members are moved into and out of contact with the side margins of said stack.

3. The apparatus of claim **2**, wherein said front margin joggers are resiliently coupled to said control means to regulate the pressure exerted by said front margin joggers on the stack.

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