United States Patent [19]

Hoyer

[11] **3,815,896**

[45] **June 11, 1974**

[54] **AUTOMATIC DOCUMENT HANDLER**

[75] Inventor: **August Hoyer,** Penfield, N.Y.

[73] Assignee: **Xerox Corporation,** Stamford, Conn.

[22] Filed: **May 8, 1972**

[21] Appl. No.: **250,904**

[52] **U.S. Cl.** **271/4,** 74/86

[51] **Int. Cl.** **B65h 1/26**

[58] **Field of Search** 271/4, 3, 5, 18; 74/42, 74/86

[56] **References Cited**

UNITED STATES PATENTS

2,663,567	12/1953	Rosswall	271/18 R
2,865,055	12/1958	Schumann	74/42 X
3,184,230	5/1965	Rolon	74/86 X
3,556,511	1/1971	Howard et al.	271/4
3,565,420	2/1971	Howard	271/4

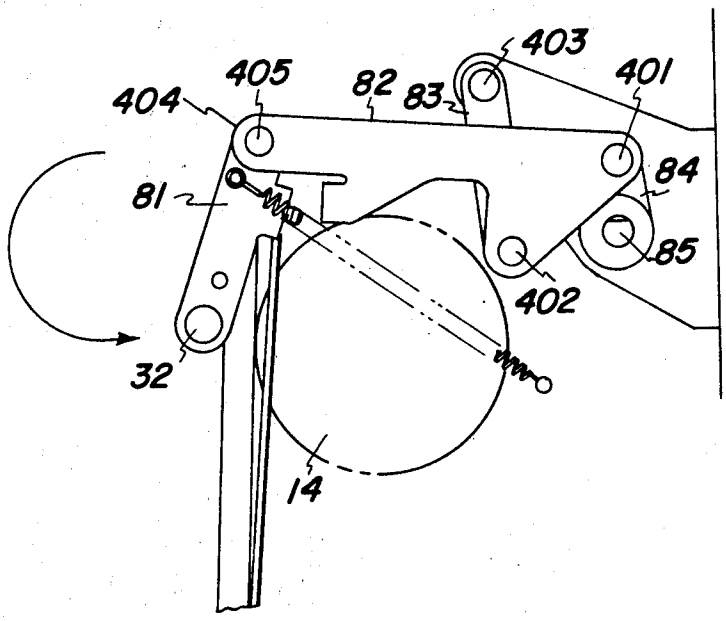
Primary Examiner—Evon C. Blunk

Assistant Examiner—Bruce H. Stoner, Jr.

[57] **ABSTRACT**

An automatic document handler for supplying documents singly to the platen of a processing apparatus such as a copying machine. Following copying, each document is returned to the document supply where the used documents are kept separated from documents awaiting copying by means of a resettable bail bar.

2 Claims, 11 Drawing Figures



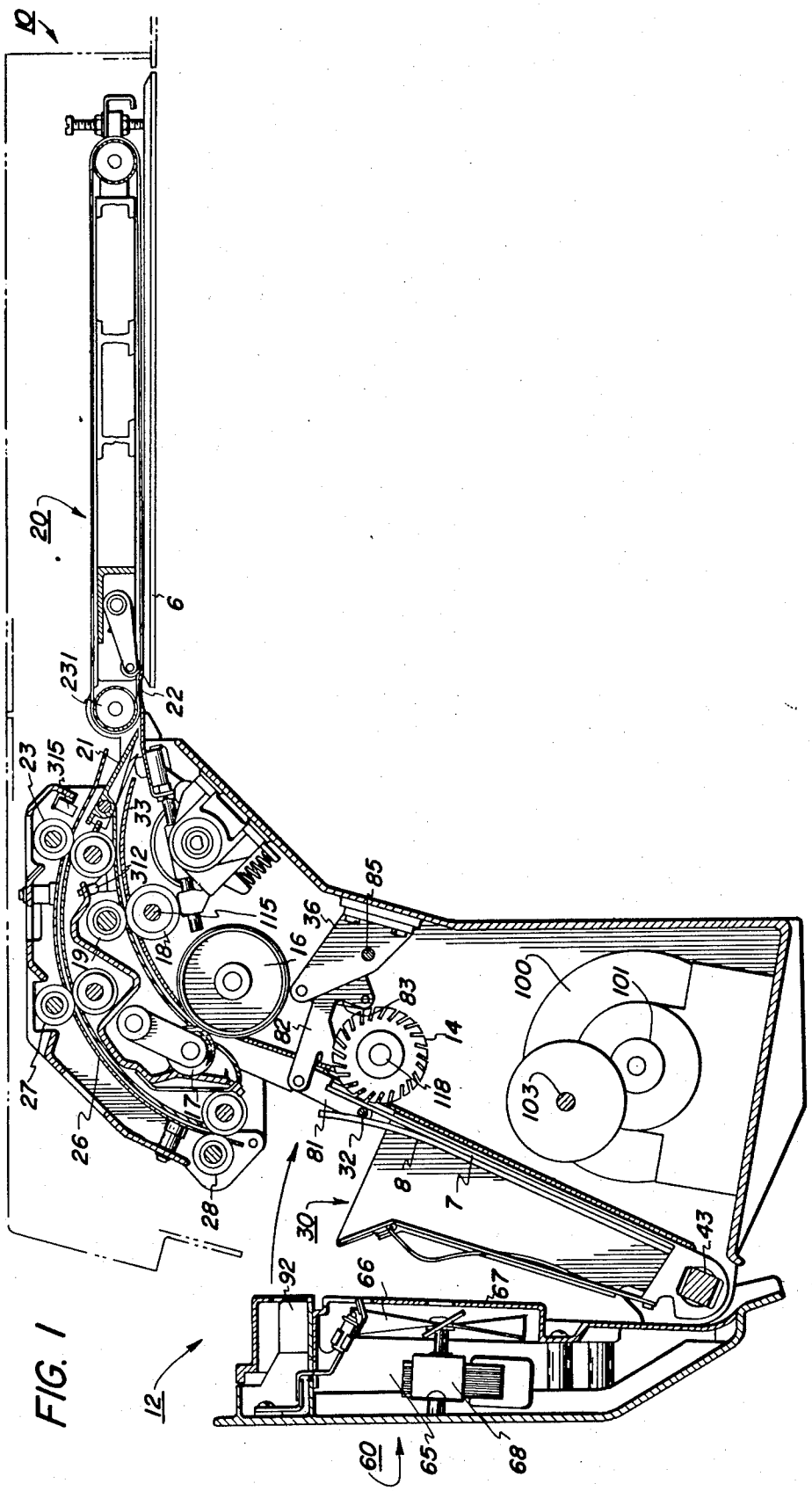

10
20
6
231
22
23
315
21
33
312
115
16
36
85
18
19
27
26
7
28
30
81
32
82
83
14
118
8
7
100
101
103
43
92
66
67
12
60
65
68

FIG. 1

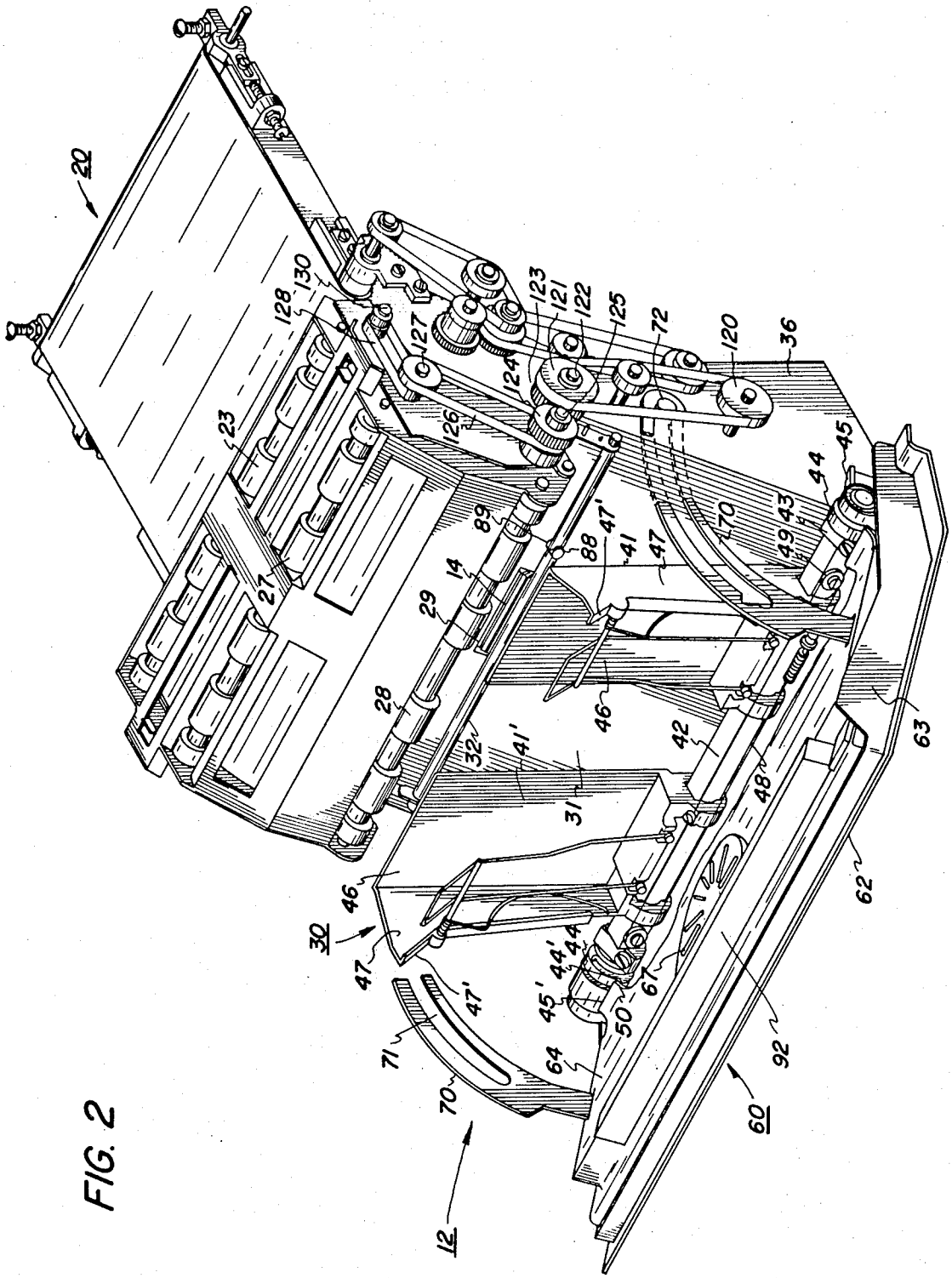

20
128
130
23
27
127
123
121
122
125
72
120
36
124
126
89
14
29
28
32
31
88
47'
41
47
46
41'
42
48
63
62
44
45
43
49
70
30
47
47'
71
70
64
45'
44'
44
61
50
92
60
12

FIG. 2

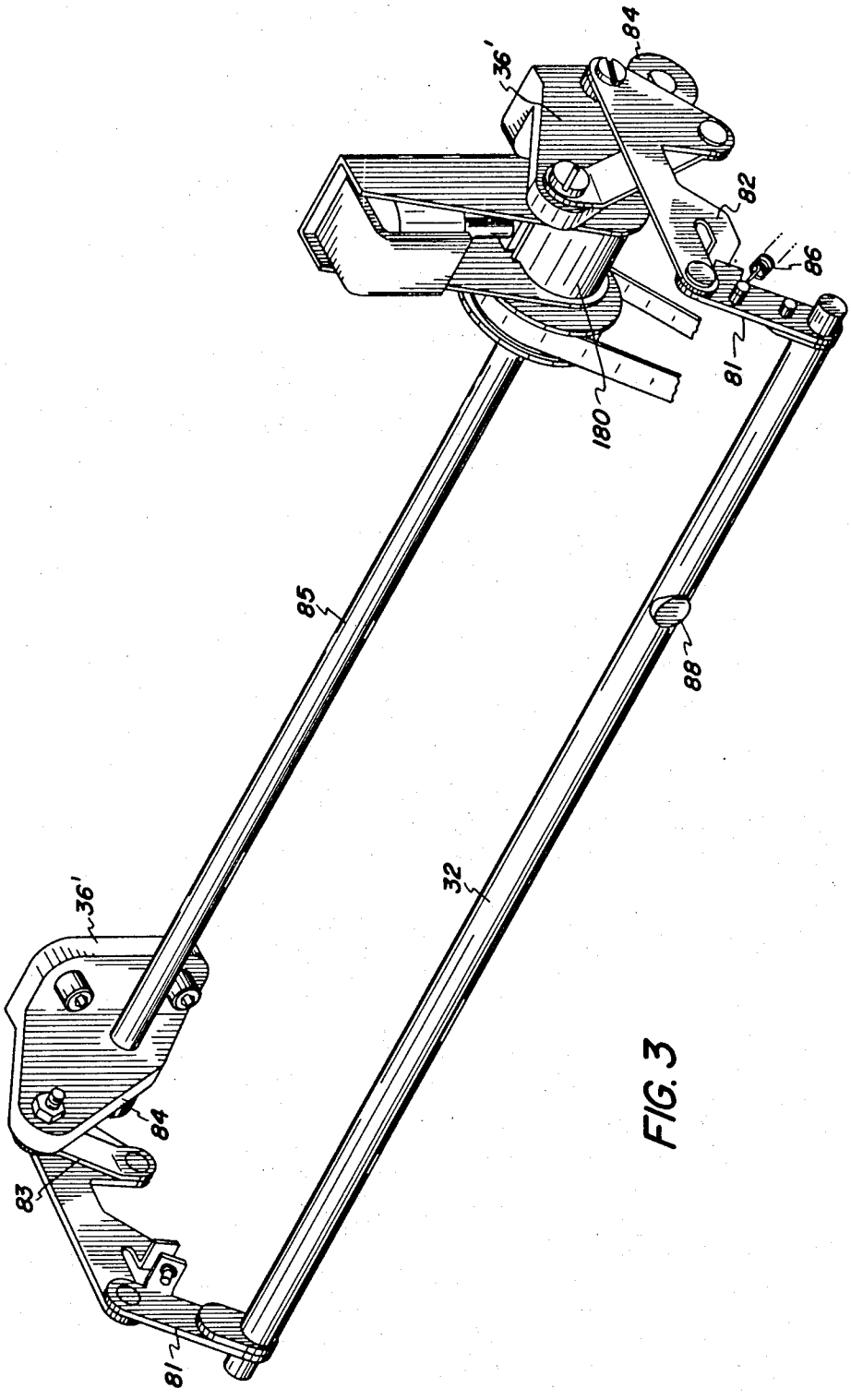


FIG. 3

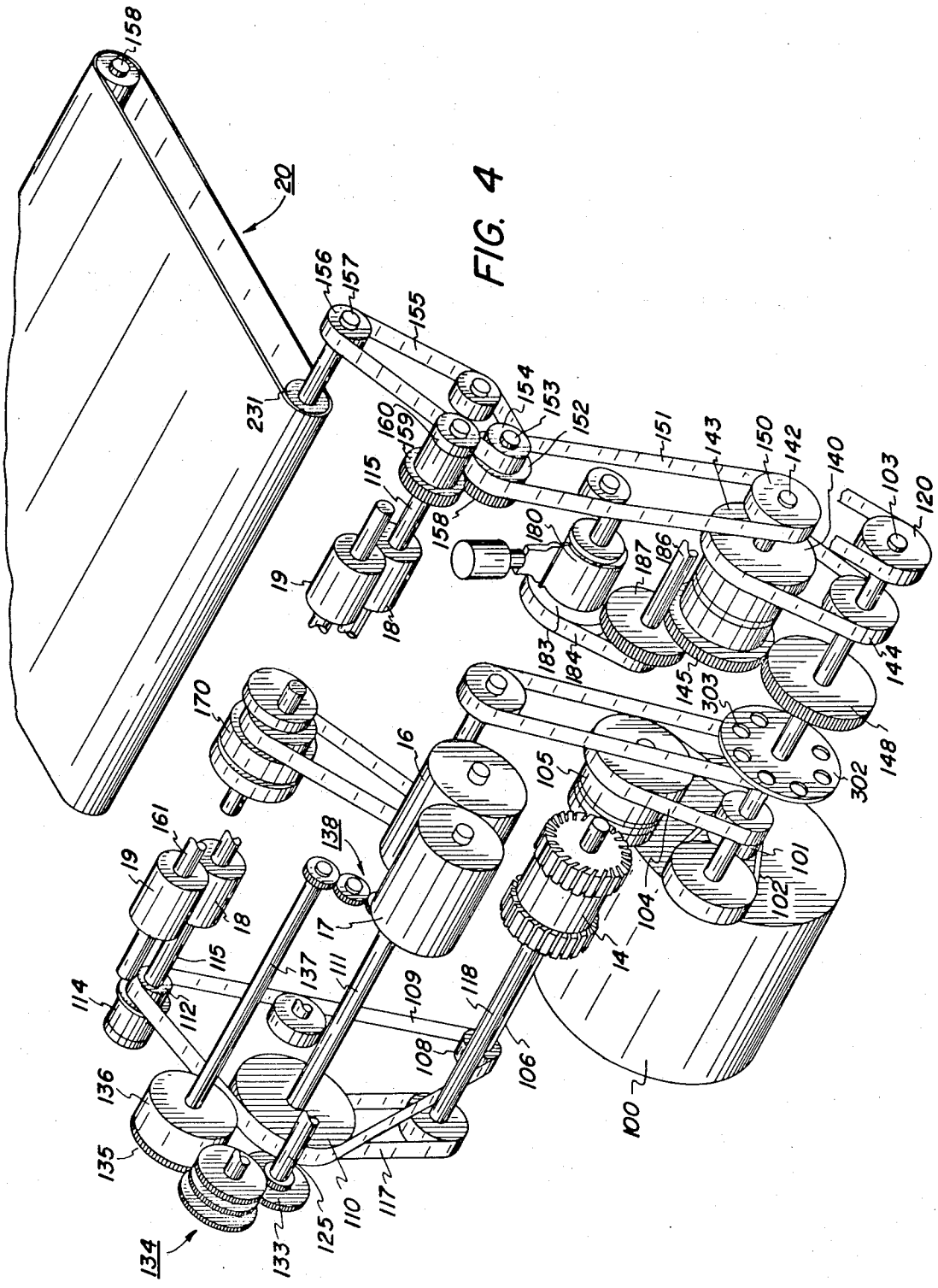

158
20
231
156
157
155
154
153
152
151
143
150
142
140
103
120
160
159
115
158
180
187
186
19
18
183
184
145
303
144
170
16
105
148
302
161
19
138
18
17
115
137
111
109
118
114
112
14
104
102
101
136
108
106
135
100
134
133
125
110
117

FIG. 4

FIG. 5

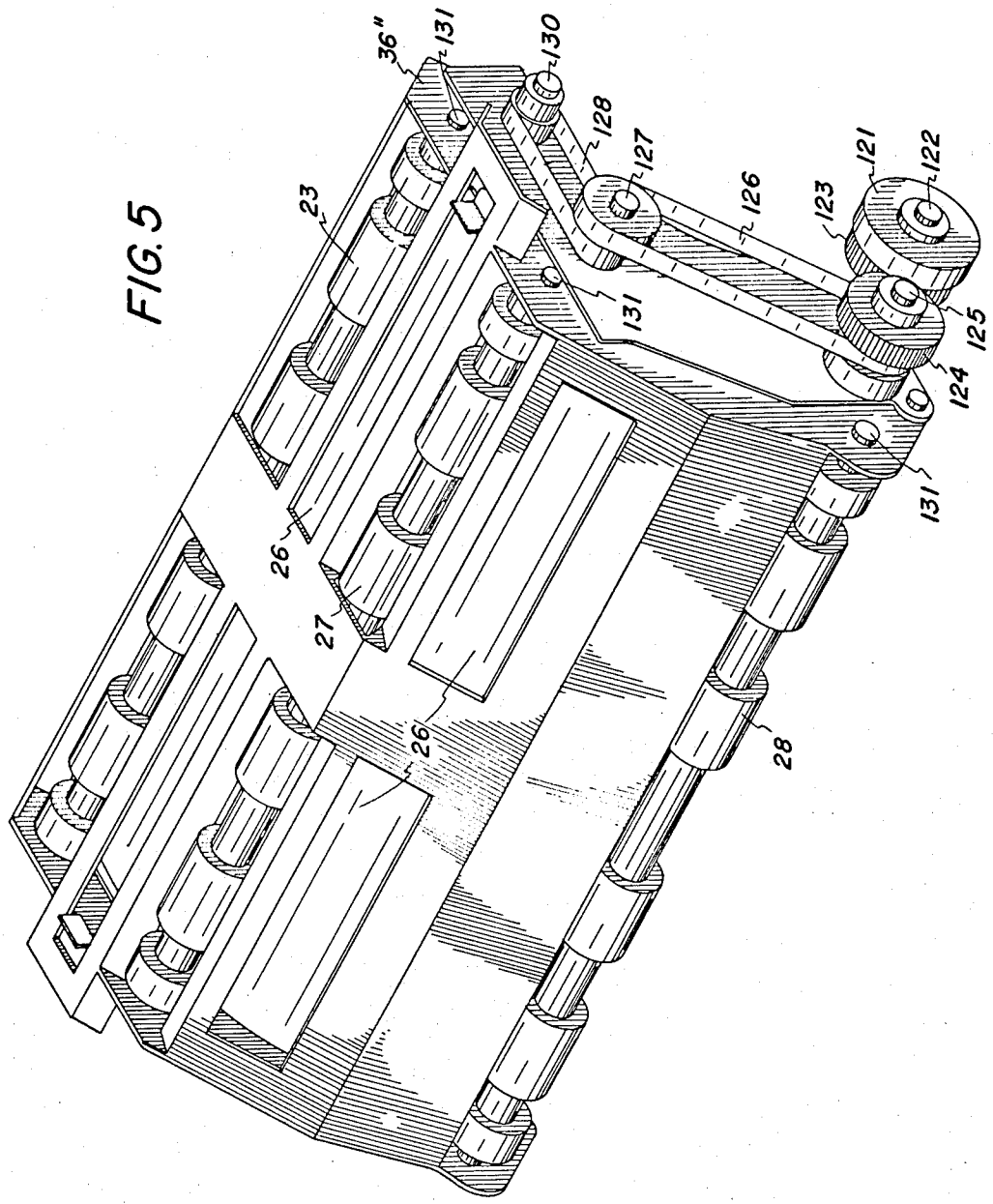
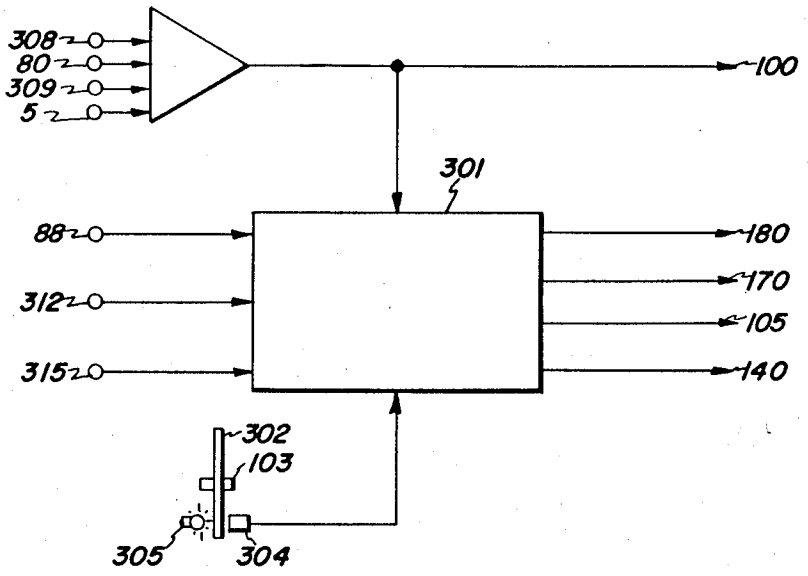


FIG. 6



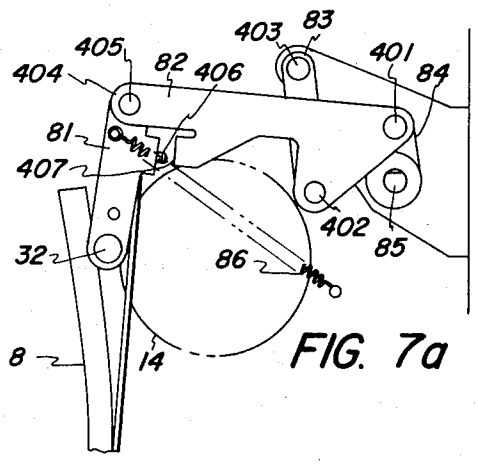


FIG. 7a

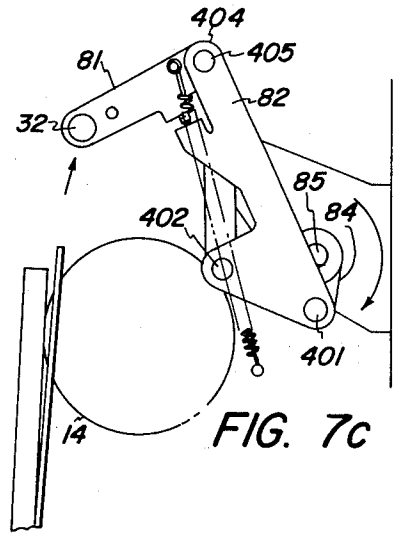


FIG. 7c

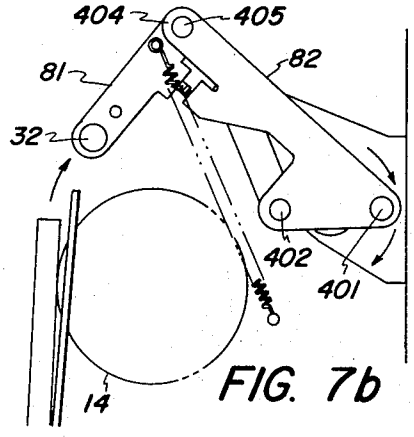


FIG. 7b

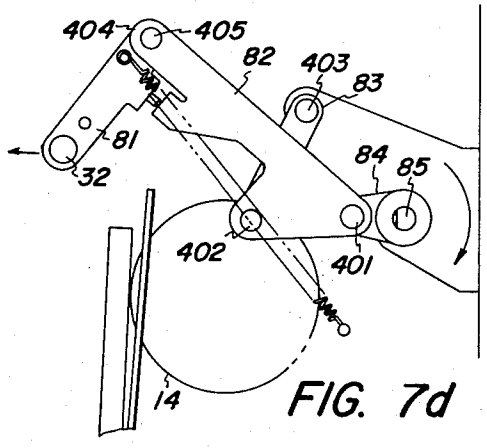


FIG. 7d

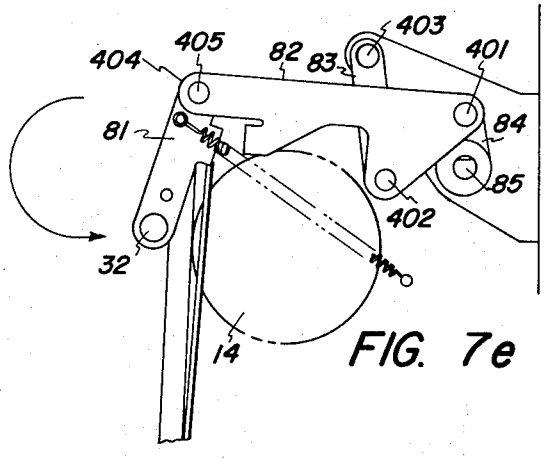


FIG. 7e

AUTOMATIC DOCUMENT HANDLER

The principle object of this invention is to provide for the separation of returned documents from those in the stack yet to be copied by a separator bar, and the automatic removal of the separator bar from the bottom of the stack and the positioning thereof on the top of the stack.

This invention relates to a document transport system comprising, in combination, means for holding a stack of documents to be transported, processed and returned; means for separating returned documents from those in the stack yet to be processed; a drive linkage for the separating means, comprising a rotary drive crank; a link pivotally connected to the crank, the separating means being connected to the link at a point remote from the crank; a pivot arm having one end pivotally connected to a fixed point and its other end pivotally connected to the link at a point intermediate the crank connection and the separating means connection, whereby rotation of the drive crank one revolution causes the separating means to traverse a circumambient path out from under a stack of documents in the holding means and then over the stack to the top thereof.

Other objects and advantages will appear from the ensuing description and drawings in which:

FIG. **1** is a side view in cross section showing a document handler incorporating the improved document transport belt of the present invention in operative association with a document copying machine;

FIG. **2** is an isometric view of the document handler shown in FIG. **1**;

FIG. **3** is an isometric view showing details of the document separating bail;

FIG. **4** is an isometric view showing the drive details for the main document transports of the document handler shown in FIG. **1**;

FIG. **5** is an isometric view showing the drive details for the return document transports of the document handler shown in FIG. **1**;

FIG. **6** is a control schematic for the document handler shown in FIG. **1**; and

FIG. *7a–e* depict a stepwise sequence of the cyclic operation of a separator bar or bail bar and its drive linkage in moving from the bottom of a document stack to the top thereof.

Referring to the drawings, there is shown the document handler, designated generally by the numeral **10** incorporating the platen transport of the present invention. Document handler **10** may be used with any suitable document processing apparatus, such as a copying or reproduction machine **5**, which has a platen **6** on which the document to be copied rests.

Document handling apparatus **10** includes a supply tray **12** for storing both documents **7** to be copied and documents **8** already copied. From tray **12**, one document at a time is advanced from the bottom of supply **7** by an intermittently operated primary feed roll **14** into the nip of retard roll pair **16, 17**. The lower roll **16** is driven in a document feeding direction while the upper roll **17** is driven in the reverse or document reject direction (as shown by the dotted line arrow in FIG. **1**) through a suitable slip coupling which normally enables the lower roll **16** to override the reverse drive input to roll **17** and thereby turn roll **17** in the document feeding direction. However, if two or more documents enter the nip of roll pair **16, 17**, the reduced friction between the overlapping documents reduces the frictional drive force between roll pair **16, 17**, permitting the slip clutch to engage and drive roll **17** in the reverse, document rejecting direction.

The document emerging from retard roll pair **16, 17** passes into the nip of intermediate roll pair **18, 19**, and from there underneath deflector plate **21** to platen transport **20**. Transport **20**, which preferably comprises a belt-type conveyor, first carries the document forward onto platen **6** until the entire document is positioned thereon. Transport **20** is then reversed to bring the document trailing edge against register **22**. Register **22** locates the document in copying position following which the copy or copies are made by the copying apparatus **5**.

When copying is completed, platen transport **20** is again started in reverse to move the document backwards off platen **6**, register edge **22** being previously retracted for this purpose. Deflector **21**, which was previously lowered, guides the returning document upwardly into the nip of return roll pair **23**. Roll pair **23** move the document along suitable return guides **26** through second and third return roll pairs **27, 28** respectively, and back into tray **12**.

To maintain copied documents which have been designated for convenience by the numeral **18**, segregated from documents **7** awaiting copying, and prevent inadvertent or premature refeeding of the returned documents **8** by feed roll **14** folowing feed of the last one of the documents **7**, a displaceable bail or separator bar **32** is provided. Bail **32** is disposed substantially opposite to and above primary feed roll **14** to prevent documents resting thereon from contacting roll **14**. As will appear, bail **32** may be reset onto the top of the documents in tray **12** when it is desired to refeed the documents to copying machine **5**.

Referring now to FIGS. **1** and **2**, document tray **12** includes a substantially flat downwardly inclined base **31** and suitable supporting frame **36** carried on copying machine **5** adjacent platen **6**. A curved guide **33** leads from base **31** to platen **6**, which in the arrangement shown is substantially horizontal. A series of openings **29** in both base **31** and guide **33** accommodate rolls **14, 16** and **18**.

As best seen in FIG. **2**, a tray assembly **30** is provided for holding the documents, the tray assembly being comprised of matching right and left hand receptacles **41, 41'** respectively. Receptacles **41, 41'** are arranged in facing relationship to one another and supported by their lower ends on shaft **42**, the receptacle supporting segment of which is rectangular in cross section. Shaft **42** is journaled for rotation in bushings **43** on frame **36** adjacent the bottom of base **31**. Shaft **42** carries stop collars **44** at each end between bushings **43** and cover supports **45**, the latter serving to support tray cover **60** from shaft **42** as will appear. Cover supports **45** each include a drive lug **45'** adapted, following predetermined rotation of the cover **60** in the opening direction to engage a mating shoulder **44'** on the adjoining collar **44** and thereby drivingly couple shaft **42** and receptacles **41, 41'** thereto.

Receptacles **41, 41'** each include a base **46** and outer side **47**. The upper portion **47'** of receptacle sides **47** are preferably flared outwardly to provide a slightly enlarged entrance facilitating entry of returning documents to the tray assembly **30**. The relative narrower

sides 47 therebelow aid in aligning the document side edges with one another.

Receptacles 41, 41' are preferably supported for lateral adjusting movement along the rectangular portion of shaft 42 toward and away from one another to accommodate various size documents. For this purpose, the receptacles 41, 41' are interconnected adjacent their lower end by means of cord 48. Cord 48 is supported around pulleys 49 with one terminal end thereof secured to one tray 41 and the other to tray 41'. As can be understood, movement of cord 48 effects simultaneous movement of trays 41, 41' toward or away from one another.

Suitable detent means (not shown) may be provided to maintain the receptacles 41, 41' in pre-selected positions corresponding to conventional document widths. Torsion springs 50 bias receptacles 41, 41' inwardly toward base 31 (in the clockwise direction as seen in FIG. 1), it being understood that contact between base 31 and the bottom 46 of receptacles 41, 41' limits inward movement of receptacles 41, 41'.

To guide returning documents into the receptacles 41, 41' as well as prevent documents from falling out of the receptacles 41, 41', particularly when bail 32 is reset, a cover 60 is provided. As described, cover 60 is rotatably supported from shaft 42 via supports 45 which enable the cover 60 to be swung open for access to the tray assembly 30 during loading and unloading of documents.

Cover 60 includes an exterior wall 62, which may be suitably decorated, depending sides 63, and interior wall 64, which together form a hollow section or plenum 65. As may be seen in FIG. 2, cover 60 is substantially rectangular in shape, and sized to overlay the entire base 31 including the tray assembly 30. Interior wall 64 of cover 60 is substantially flush with the top edge of receptacle sides 47 when cover 60 is closed, the wall 64 serving as a guide to help route returning documents into receptacles 41, 41' as will appear.

A fan 66 is disposed within the cover plenum 65 opposite outlet 67 in interior wall 64. Fan 66 serves to discharge a low pressure stream of air downwardly through outlet 67 onto the documents therebelow in tray assembly 30. Fan motor 68 is housed in the cover plenum 65 and suitable air inlet openings (not shown) are provided in the cover proper for fan 66.

Cover 60 carries a depending detent and stop member 70 on each side thereof, stop members 70 being slotted at 71 to receive guide pins 72 supported from each side of the frame 36.

Referring particularly to FIG. 3, the bail 32 is carried by arms 81 which are in turn pinned to intermediate links 82. Each link 82 is pivotally supported on the frame 36 through an arm 83. Upstanding frame brackets 36' are provided for this purpose, arm 83 being in effect pinned between brackets 36' and link 82. Intermediate links 82 are also pinned to crank arms 84 carried by the transversely extending output shaft 85 of a one revolution clutch 180. As will appear more fully herein, engagement of clutch 180 turns shaft 85 and crank arms 84 through one revolution.

On rotation of crank arms 84, and due to the interrelationship of links 82 relative to supporting arms 82, 83, bail 32 moves through a generally rectangular path, initially in a forward direction generally parallel to tray base 31, then up away from base 31, then back toward primary feed roll 14, and then down toward base 31. With reference to any documents in tray 12 which rest on bail 32, bail 32 moves first forward out from under the documents, then raises up to a position above the documents, then moves back to a position above feed roll 14, and then down onto the topmost document. To provide a predetermined bail pressure, springs 86 are provided to bias arms 81 in a downward direction toward tray base 31.

With reference to FIGS. 7*a–e*, it will be observed that essentially two forces are acting on the intermediate link 82: the first is the circular drive force applied by crank 84 through pivot 401, and the second is the constraint applied by arm 83 pivotally connected to link 82 at 402 and fixedly pivoted at 403 to the machine frame. As crank 84 moves in sequence through the positions shown in FIGS. 7*a–c*, one aspect of the motion tends to pivot the link 82 about point 402 to cause the end 404 of link 82 to traverse an upward arc, with very slight motion of arm 83 as the link 401–402 passes over the rotational center 85 of crank 84. The slight motion of arm 83 that does occur is opposite to the bow in the arc motion of end 404, thereby flattening that arc to substantially a straight line. In this action, bail bar 32 follows, and therefore traverses a substantially straight line path as it moves upwardly and out from under the document stack 8. As the crank 84 moves from the position of FIG. 7*c* to that of FIG. 7*d* and then to that of FIG. 7*e*, arm 83 is forced through a substantial arcuate traverse, first to the left as shown in the Figures, and then in retrace to the right. This action causes the end 404 and the bail bar 32 to effect a substantial swing in traversing to the left of document stack 8 and then downwardly and to the right, to overlie the outside of the stack. At this point, the linkage is in the starting position of FIG. 7*a*, except the bail bar has been moved from under the stack 8 in FIG. 7*a* to over the stack in FIG. 7*e*, with the difference in bail bar location being accommodated by the resiliency of spring 86 permitting pivotal movement of arm 81 about its pivotal connection 405 to link 82. Set screw 406 bearing against stop 407 defines the limit of pivotal movement of arm 81 under the influence of spring 86.

A photocell type detector 88 is provided on bail 32. A light 89 for detector 88 is located under base 31 and opposite detector 88, base 31 being suitably apertured for this purpose. As will appear, detector 89 responds in certain circumstances to the absence of documents under bail 32 to actuate clutch 180 and reset the bail 32 as described heretofore.

To obviate buildup of static electricity on the documents, a suitable ion generator 92 is provided adjacent the entrance to the document tray assembly 30. Generator 92, which is connected to a suitable source of electrical energy (not shown), serves to ionize the air through which the documents returning to tray assembly 30 pass to help neutralize any static electric charges that may be on the documents.

Referring now particularly to FIGS. 4 and 5 of the drawings, a suitable drive motor 100 is provided. Motor 100 may be conveniently supported on frame 36 below tray base 31. Motor shaft 101 is connected by means of toothed belt 102 with main power takeoff shaft 103.

The primary feed roll 14, retard roll pair 16, 17, and lower roll 18 of intermediate roll pair 17, 18 are preferably operated at a lower speed than that of platen belt 20 and return roll pairs 23, 27, 28. To provide such low

speed drive to rolls **14, 18** and to roll **16** of retard pair **16, 17,** a toothed belt **104** drivingly connects shaft **103** with clutch **105** on transfer shaft **106.** As will be understood, clutch **105,** when actuated, couples power takeoff shaft **103** with transfer shaft **106.**

Transfer shaft **106,** which is suitably journaled in frame **36,** carries a drive pulley **108** on the outside end thereof. A toothed belt **109** drivingly connects pulley **108** with gear **110** on shaft **111** of the bottom limiting roll **16** and with toothed pulley **112** of overrunning clutch **114.** Clutch **114** is supported on shaft **115** of the bottom intermediate transport roll **18** and serves to turn shaft **115** in a document feeding direction unless the high speed drive input to shaft **115** is operational, during which period clutch **114** overruns as will later appear herein.

Primary feed roll **14** is supported by shaft **118** which in turn is suitably journaled in frame **36.** Drive belt **117** drivingly connects shaft **118** with limiting roll support shaft **111.** As will be understood therefore, actuation of clutch **105** drives primary feed roll **14,** lower retard roll **16,** and lower intermediate transport roll **18** at low speed in a document feeding direction.

Referring now to FIGS. **1, 4** and **5,** power takeoff shaft **103** carries a drive pulley **120** on the terminal end thereof. Pulley **120** is connected with pulley **121** on stub shaft **122.** Gear **123** on pulley **121** meshes with gear **124** on shaft **125** supporting the lower rolls of return transport roll pair **28.** A toothed belt **126** drivingly connects shaft **125** with shaft **127** supporting the lower rolls of return transport pair **27.** A second belt **128** drivingly interconnects shaft **125** with shaft **130** supporting the lower rolls of return transport pair **23.** The upper rolls of the return transport roll pairs **23, 27, 28** are supported upon idler shafts **132** suitably journaled in return transport sub-frame **36''.**

Referring particularly to FIG. **4,** shaft **125** carries a gear **133** on the end thereof which, in turn, drives, through intermediate gearset **134,** gear **135** of a hysteresis type clutch **136.** Shaft **137** of clutch **136** is suitably journaled in transport subframe **36''.** Gear set **138** drivingly couples clutch shaft **137** with the retard roll **17.** As will be understood, therefore, engagement of clutch **136** drivingly couples clutch shaft **137** with driven shaft **125** to turn retard roll **17** via gearset **138** in the reverse or document rejecting direction (shown by dotted arrow in FIG. **6**).

Hysteresis clutch **136** is preset to engage whenever the reverse torque applied to shaft **137** generated through contact of roll **16** with retard roll **17,** either directly or through the intermediary of one or more documents therebetween, falls below a predetermined level. This normally occurs whenever more than one document at a time attempts to pass between the retard roll pair **16, 17.** At other times, clutch **136** is effectively disengaged and retard roll **17** turns with roll **16** in the document feeding direction.

To provide the reversible relatively high speed drive to platen transport **20,** a double clutch **140** is provided on an intermediate transfer shaft **142.** As will be seen in FIG. **4,** one side of clutch **140** carries a forward drive gear **145** coupled to power take off shaft **103** by means of gear **148.** The other side of clutch **140** carries reverse drive pulley **143** coupled to shaft **103** via toothed belt **144.**

Output pulley **150** on shaft **142** is drivingly coupled by toothed belt **151** with idler gear **152** on stub shaft **153.** A second pulley **154** on shaft **153** is coupled by toothed belt **155** with pulley **156** on shaft **157** of platen transport roll **231.** Gear **158** on stub shaft **153** meshes with gear **159** of one-way clutch **160** on shaft **115** of lower intermediate transport roll **18.** One-way clutch **160** functions to drivingly connect shaft **115** and lower intermediate transport rolls **16** with transfer shaft **142** whenever clutch **140** is engaged in the forward document feeding direction to provide high speed drive to roll pair **18, 19.** On engagement of clutch **140** in the reverse feeding direction, clutch **160** disengages to prevent reverse rotation of intermediate transport roll pair **18, 19.** The upper intermediate transfer roll **19** is supported on idler shaft **161** suitably journaled in frame **36.**

The drive ratios between shaft **103** and the pulley and gear input to clutch **140** are chosen to operate platen transport **20** at a relatively higher speed than that of primary feed roll **14.** Since the lower intermediate feed roll **18** is subject to both high and low speed drive input, overrunning clutch **114** additionally serves to accommodate overruning of roll **18** when both clutches **105** and **140** are simultaneously engaged.

In summary, high speed drive from motor **100** is conducted by clutch **140** in either the forward or reverse direction to platen transport **20.** Where clutch **140** is engaged in the forward direction, intermediate feed roll pair **18, 19** are turned at high speed.

Bail clutch **180** has an input gear **183** drivingly connected by belt **184** with stub shaft **186.** Gear **187** on shaft **186** is driven from reverse drive gear **145** through suitable intermediate gears (not shown) designed to drive belt **184** at the proper speed and in the proper direction. Clutch **180** comprises a suitable solenoid actuated one revolution clutch effective when engaged to turn crank arms **84** through one revolution and thereby reset bail **32.**

In FIG. **6** of the drawings, a control arrangement for the document handler **10** is there schematically shown. In that arrangement, a suitable controller **301** is provided to integrate operation of the various components of the document handler with each other and with the apparatus with which document handler **10** is used such as copying apparatus **5.** To provide the requisite timing intervals controller **301** includes a suitable timing or counting device (not shown) driven by means of clock disc **302** on power transfer shaft **103,** there being a suitable signal generator here shown as photocell **304,** and light source **305** disposed on opposite sides of disc **302.** Note FIG. **4.** Apertures **303** in disc **302** permit light from light source **305** to intermittently strike photocell **304** as disc **302** rotates to provide a clock-like input pulse.

Starting and stopping of document handler motor **100** may be conveniently effected by means of a suitable manually operated start-stop control **308.** In the arrangement shown, operation of the document handler **10** is dependent upon enabling signals from copying machine **5,** tray cover safety switch **80** and platen transport safety switch **309,** respectively. Switches **80, 309** reflect disposition of tray cover **60** and platen transport **20** in their closed operating positions. It is understood that other contingency controls may be provided.

In operation, and referring particularly to FIGS. **1, 4** and **6,** the documents **7** to be copied are placed in tray assembly **30** trailing edge down, the document or docu-

ments resting atop bail **32.** It is understood that receptacles **41, 41'** are adjusted for proper document size.

With stop-start control **308** actuated and platen transport **20** lowered, closing cover **60** starts document handler motor **100.** It is understood that return transport roll pairs **23, 27, 28,** which are directly coupled to motor **100,** are driven whenever motor **100** is energized.

At start-up, detector **88** on bail **32** signals the absence of documents therebelow. In response thereto, controller **301** engages bail clutch **180** to move bail **32** through one cycle from a position below the documents in tray **12** to a position on top of the documents in the manner explained heretofore.

With bail **32** properly positioned atop the documents **7** in tray assembly **30,** controller **301,** in response to the document demand signal of wait station detector **312** at the entrance to platen **6,** actuates clutch **105** to drivingly couple primary feed roll **14,** retard roll pair **16, 17** and intermediate feed roll pair **18, 19** with motor **100.** Rotation of feed roll **14** advances the bottommost document in tray **12** forward through retard roll pair **16, 17** which guard against feeding of double sheets, and into the nip of intermediate roll pair **18, 19** operating at low speed.

As the leading edge of the first document moves out of roll pair **18, 19** and comes opposite detector **312,** controller **301** actuates clutch **140** to couple gear **145** to drive shaft **142** and thereby operate intermediate feed roll pair **18, 19** and platen transport **20** in the forward direction to advance the waiting document onto platen **6.** It is understood that engagement of clutch **140** in the document forward feed direction drives intermediate feed roll pair **18, 19** at high speed, overrunning clutch **114** accommodating the difference in driving input speed in the event primary feed clutch **140** is engaged.

Following a predetermined interval sufficient to allow the trailing edge of the document to pass over and slightly beyond the register **22,** controller **301** switches clutch **140** from forward to reverse drive, the latter coupling drive pulley **143** with shaft **142.**

Platen transport **20** is therefore reversed and the document moved backwards on platen **6** until the rear or trailing edge thereof abuts against register **22.** Abutment of the document edge with the edge of register **22** locates the document in predetermined copying position. With document movement prevented by register **22,** belt **20** slides across the document surface until clutch **140** is disengaged. It is understood that one-way clutch **160** prevents reversing of intermediate feed roll pair **18, 19** upon reversing of platen transport **20.**

Platen transport **20** is operated in reverse by controller **301** for an interval sufficient to allow transport **20** to bring the document trailing edge against register **22,** at which point clutch **140** is disengaged and platen transport **20** stopped. With the document in copying position, copying apparatus **5** is then enabled to begin the copying cycle.

As the trailing edge of the first document moves past wait station detector **312,** controller **301** again engages clutch **105** in response to the demand signal from detector **312.** Rolls **14; 16, 17;** and **18, 19** are therefore operated to bring the next or second document forward as explained heretofore. When the leading edge of that document reaches detector **312,** controller **301** disengages clutch **105** to prevent feeding of another document. At this point therefore, the first document is in copying position on platen **6** while the second document is in a waiting position adjoining the inlet to platen **6.**

On completion of the copying cycle, controller **301** actuates register drive clutch **170** to retract register **22** and lower deflector **21.** When retraction of register **22** and lowering of deflector **21** has been completed, controller **30** actuates clutch **140** in the reverse drive mode to couple belt **144** with shaft **142.** Platen transport **20** is therefore driven in reverse to move the document off platen **6.** As the document moves off of the platen, deflector **21** routes the document into the nip of first return transport roll pair **23.** Roll pair **23** cooperate with return guides **26** and roll pairs **27, 28** to carry the document back to tray **12** where the document is deposited into receptacles **41, 41'** atop bail **32.**

As the trailing edge of the returning document passes a return document detector **315,** controller **301** actuates register drive clutch **170** to bring register **22** forward to registering position on platen **6.** At the same time, deflector **21** is raised. With register **22** in position, controller **301** actuates clutch **140** in the forward drive mode to couple gear **145** with shaft **142** and operate intermediate feed roll pair **18, 19** and platen transport **20** in the document feeding direction at high speed. Actuation of feed roll pair **18, 19** and transport **20** moves the waiting document onto platen **6** and into registered position as described heretofore. And, with advance of the next document forward from the waiting station, controller **301,** in response to the demand signal from detector **312,** engages clutch **105** to bring the next document forward from tray assembly **30** into waiting position as described.

The aforedescribed cycle of operation continues until the last document is fed from under bail **32.** On that event, controller **301,** in response to a signal from the document detector **88** on bail **32,** engages clutch **180** to reset bail **32** as described.

At this point, the last of the documents originally placed in tray assembly **30** is normally at the waiting station defined by detector **312.** If bail **32** is to be restored to its original position atop the last document of the document supply, the bail must be reset again after the last document is returned to the tray assembly **30.** To effectuate this, controller **301,** on a last document signal from copying machine **5** and following the elapse of a predetermined time interval adequate to allow the last document to reach tray assembly **30,** again actuates bail clutch **180** to reset bail **32.**

In cases where a single document cycle is desired, resetting of bail **32** may be omitted to facilitate removal of the documents from tray **12.** Similarly, resetting of bail **32** may be omitted on the last cycle of a multiple copy cycle for this purpose.

While the invention has been described with reference to the structure disclosed, it is not confined to the details set forth, but is intended to cover such modifications or changes as may come within the scope of the following claims.

What is claimed is:

1. In a document transport system having means for holding a stack of documents to be transported, processed and returned, and means for separating returned documents from those in the stack yet to be processed; the improvement of a drive linkage for said separating means comprising a rotary drive crank, a link pivotally

connected to said crank, said separating means being connected to said link at a point remote from said crank, a pivot arm having one end pivotally connected to a fixed point and its other end pivotally connected to said link at a point intermediate said crank connection and said separating means connection, said intermediate point being offset from a line between said pivotal connection of said link crank and said point remote from said crank pivotal means connecting said separating means to said link at said point remote from said crank, and means biasing the last-mentioned pivotal means in one pivotal direction whereby rotation of said drive crank one revolution causes said separating means to traverse a circumambient path out from under a stack of documents in said holding means and then over said stack to the top thereof.

2. In a document transport system having means for holding a stack of documents to be tranported, processed and returned, and means for separating returned documents from those in the stack yet to be processed; the improvement of a drive linkage for said separating means, comprising a rotary drive crank, a link pivotally connected to said crank, said separating means being connected to said link at a point remote from said crank, a pivot arm having one end pivotally connected to a fixed point and its other end pivotally connected to said link at a point intermediate said crank connection and said separating means connection, pivotal means connecting said separating means to said link at said point remote from said crank, and means biasing the last-mentioned pivotal means in one pivotal direction whereby rotation of said drive crank one revolution causes said separating means to traverse a circumambient path out from under a stack of documents in said holding means and then over said stack to the top thereof.

* * * * *