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Mikan et al.

[11] **3,843,253**

[45] **Oct. 22, 1974**

[54] **AUTOMATIC PAPER FEED AND CUTTING MECHANISM FOR PHOTOCOPIER MACHINE**

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[52] **U.S. Cl.** ..... **355/29,** 355/28, 355/13, 83/650, 242/58, 242/56 R, 242/55.3

[51] **Int. Cl.** **G03g 15/00**

[58] **Field of Search** ..... 355/28, 29, 16, 13; 226/110; 242/58, 56 R, 55.3; 83/203, 205, 650

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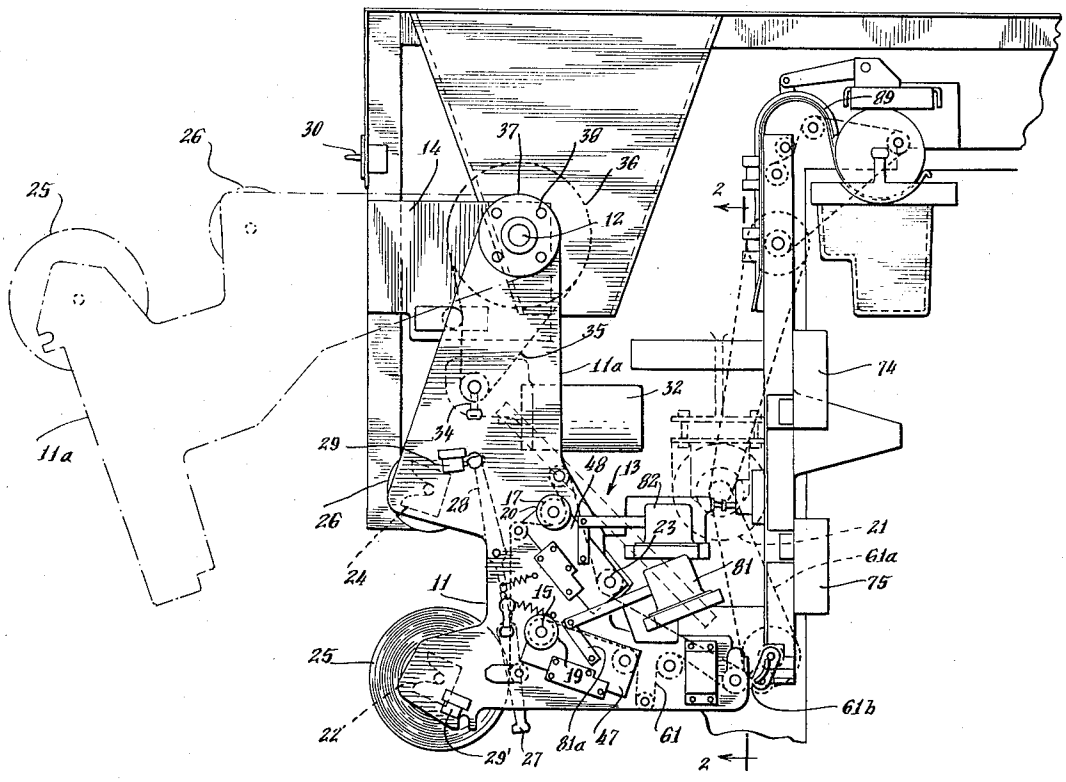
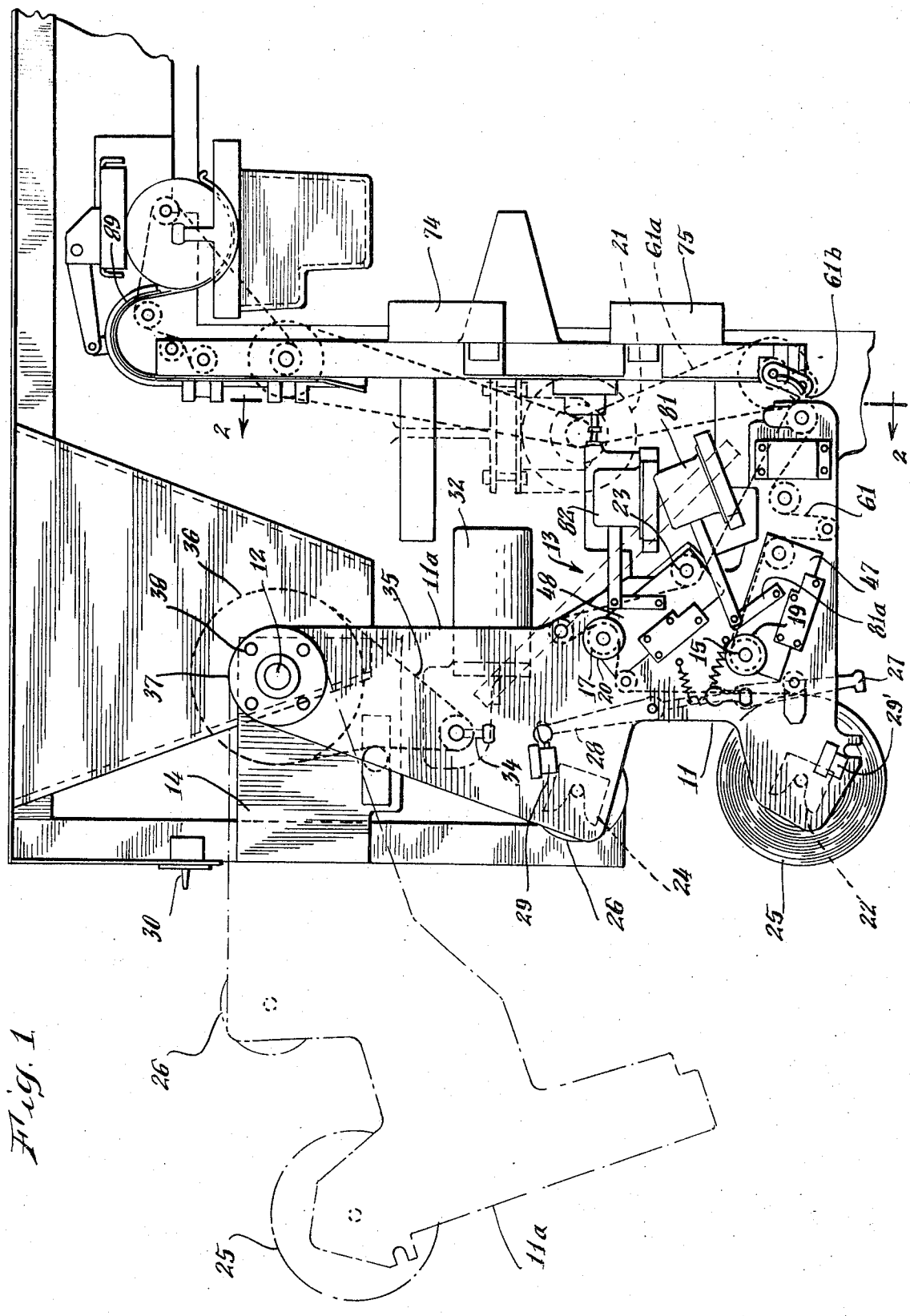
Primary Examiner—Robert P. Greiner
Attorney, Agent, or Firm—William D. Soltow, Jr.; Albert W. Scribner; Robert E. Meyer

[57] **ABSTRACT**

A dual roll paper supply is elevatable by a motor drive into a position of easy access for replacement of depleted rolls and is automatically retractable into operable engagement with paper feeding and cutting mechanism within an automatic photocopier. Automatic supply sensing means effects an immediate transfer of paper feeding from a depleted roll to a second reserve roll within the machine, while an electric control circuit including relays, solenoids and microswitches effects cutting of uniform lengths of paper for the electrostatic production of master copy plates.

1 Claim, 11 Drawing Figures

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61a
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61b
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Fig. 1

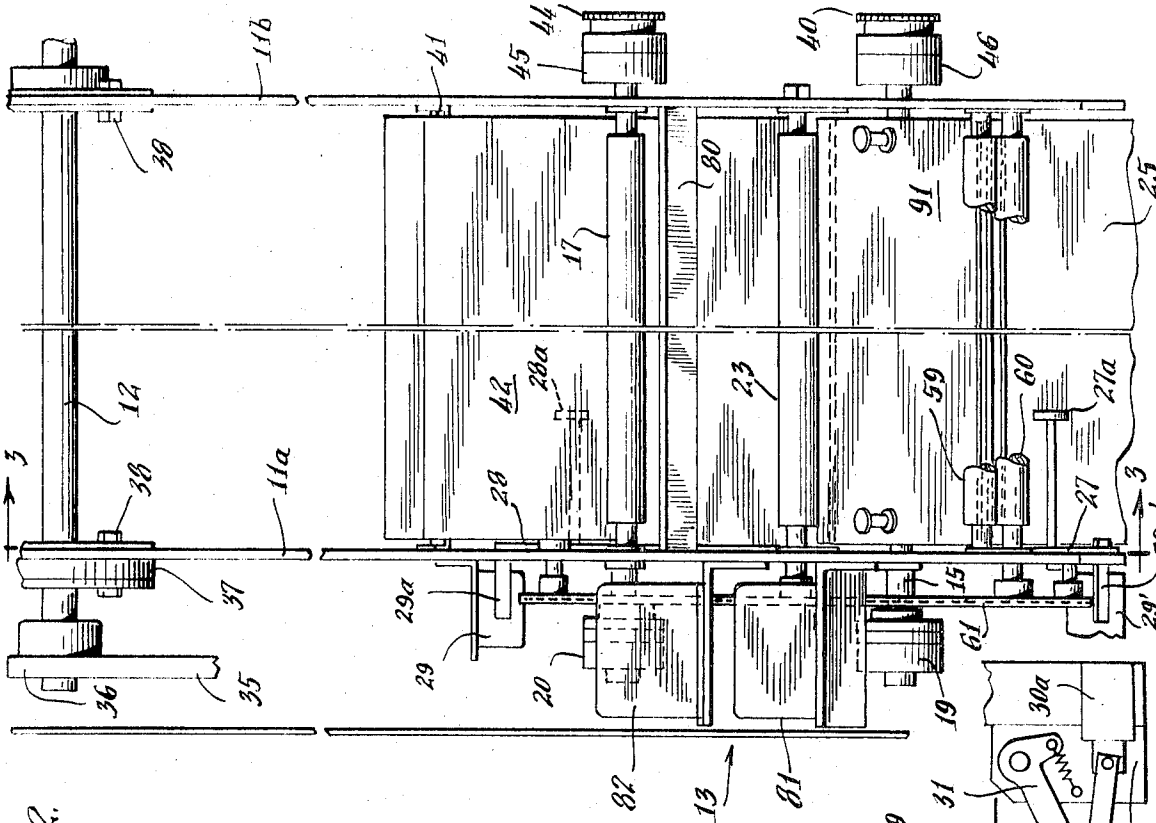

Fig. 2.

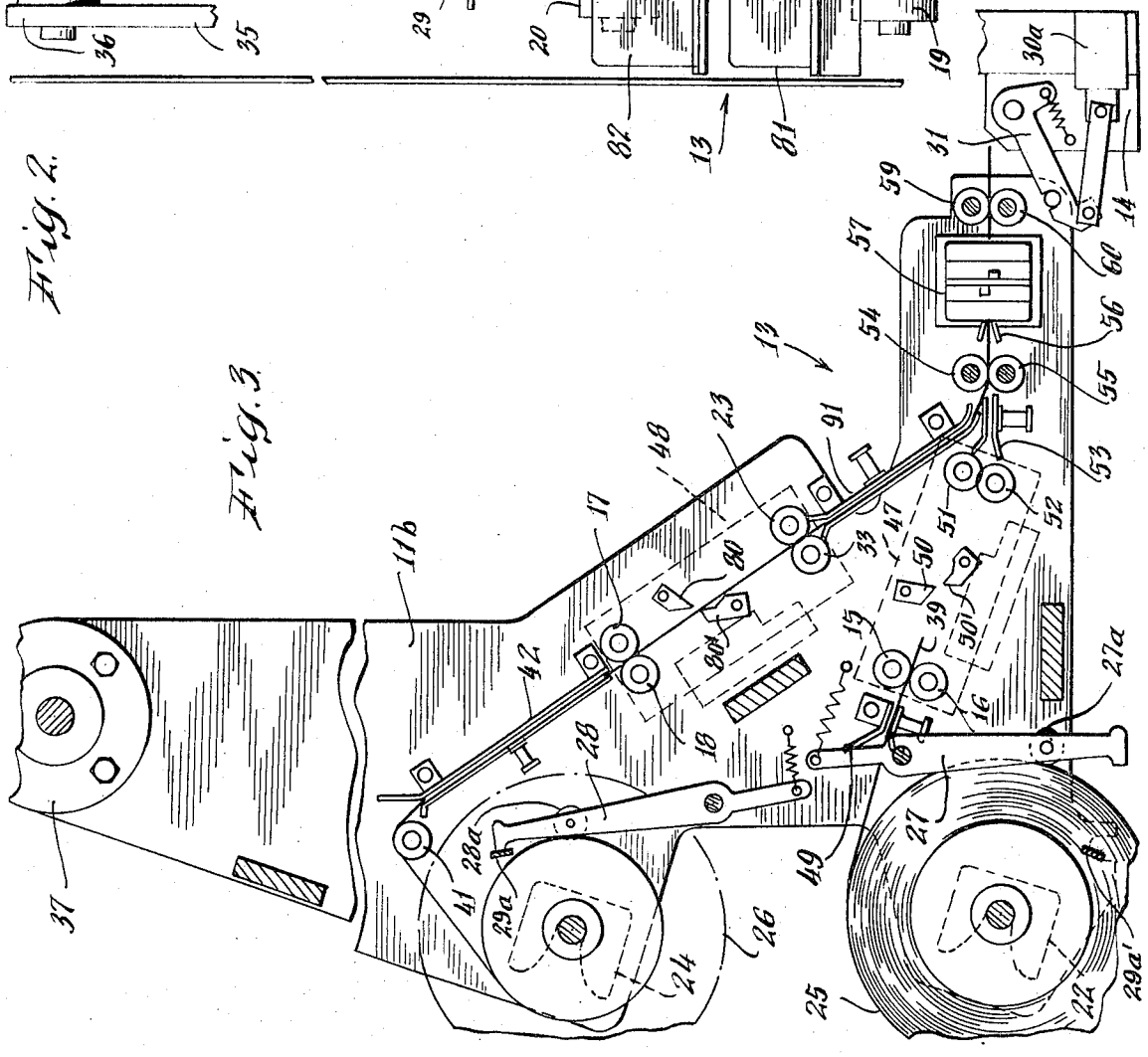

Fig. 3.

Fig. 4.

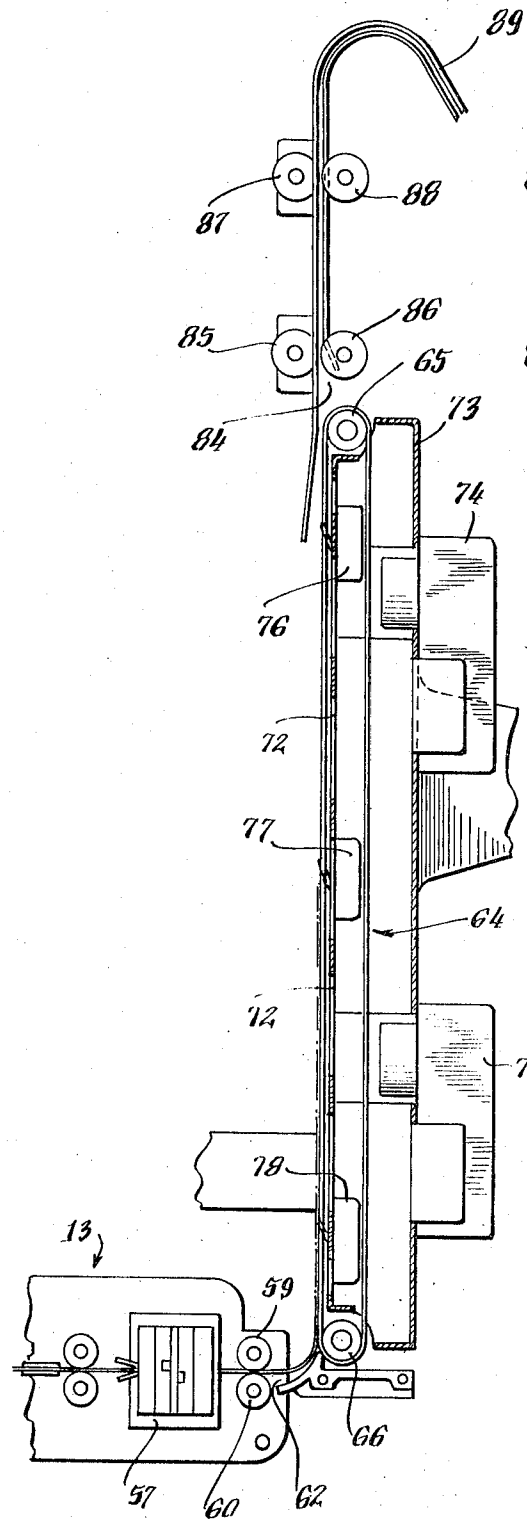
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Fig. 5.

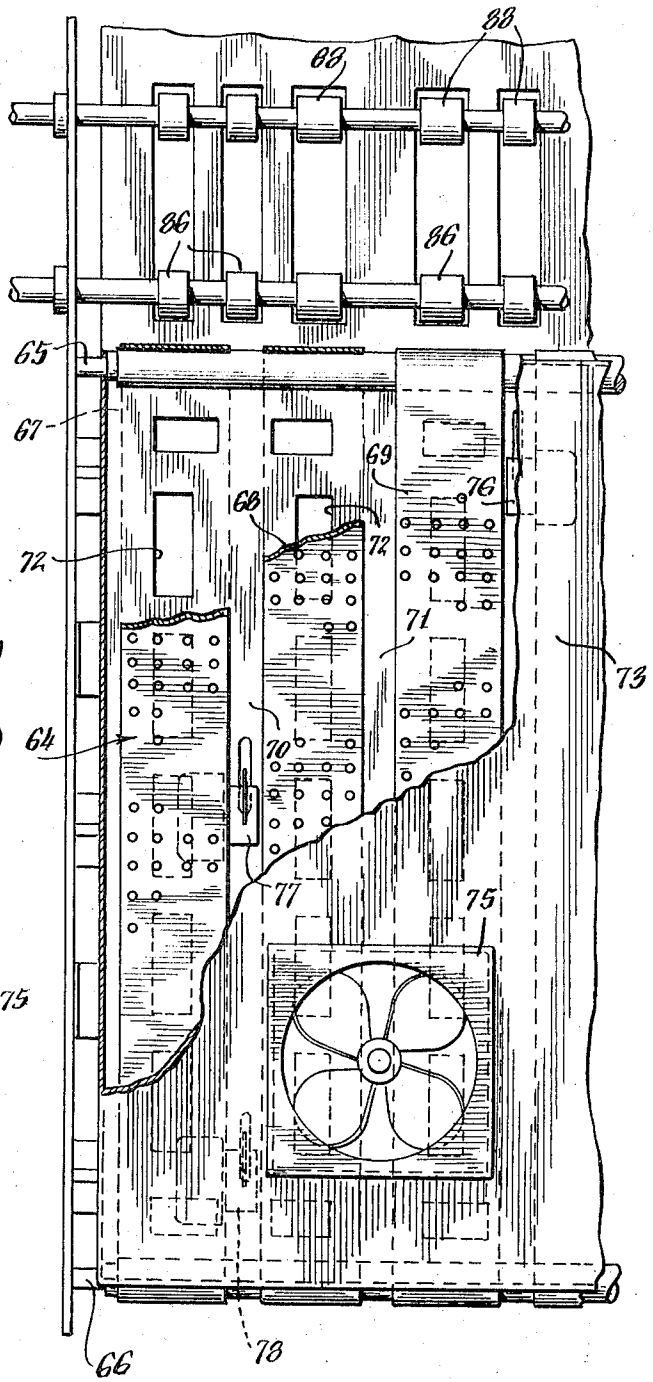
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Fig. 6.

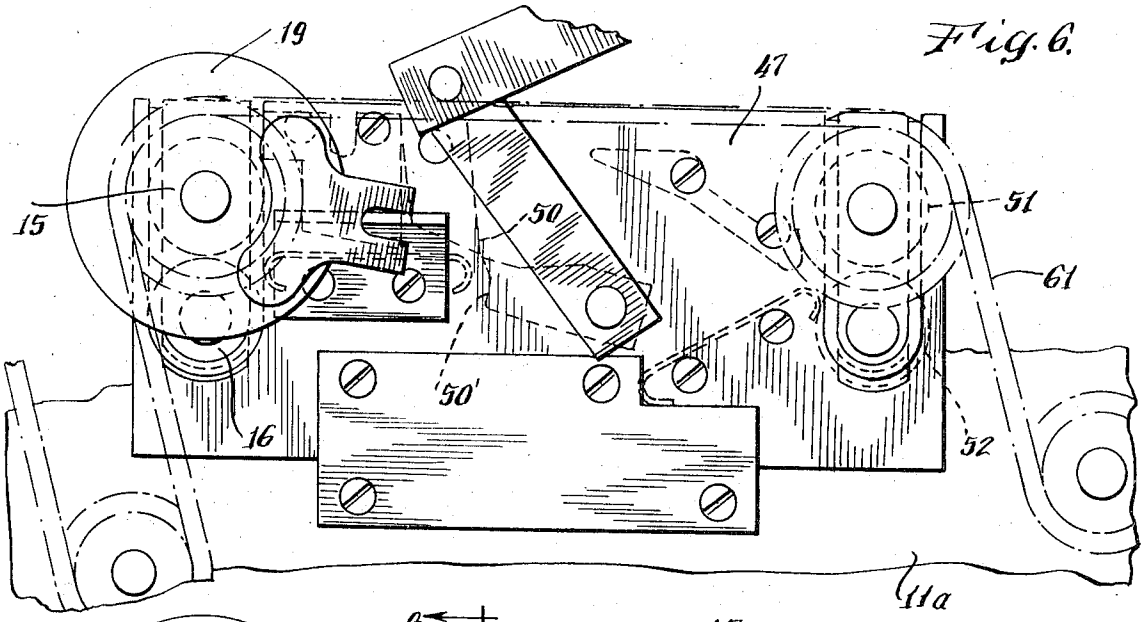


Fig. 7.

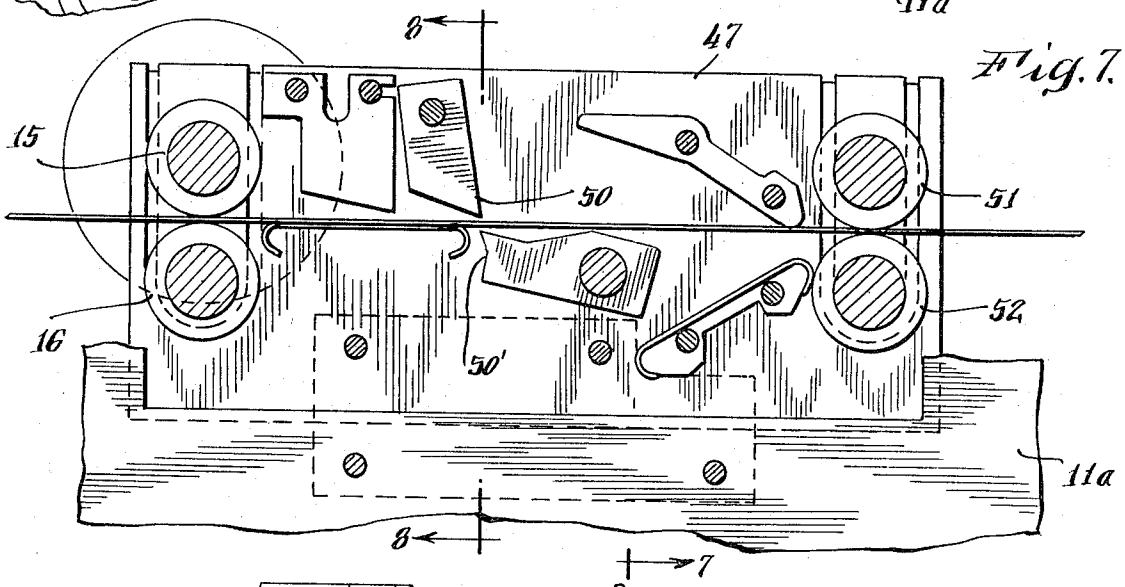
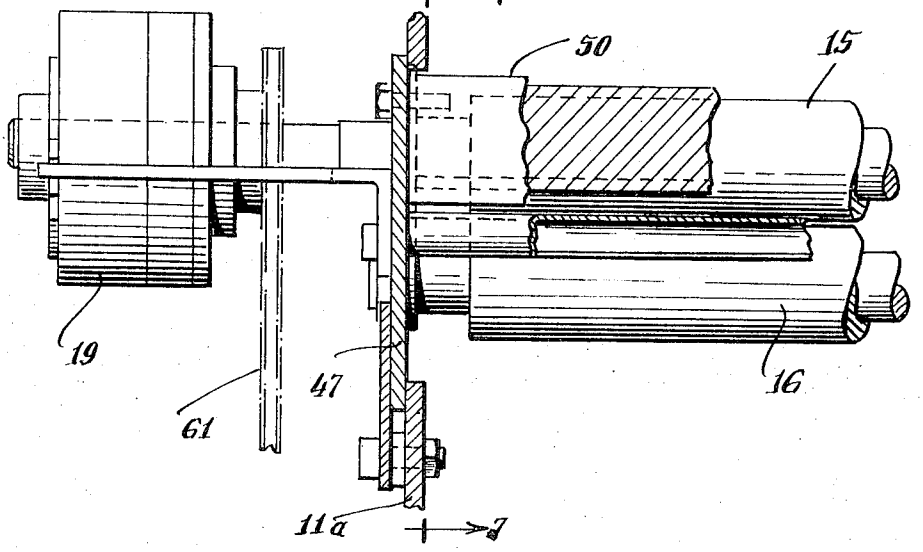


Fig. 8.



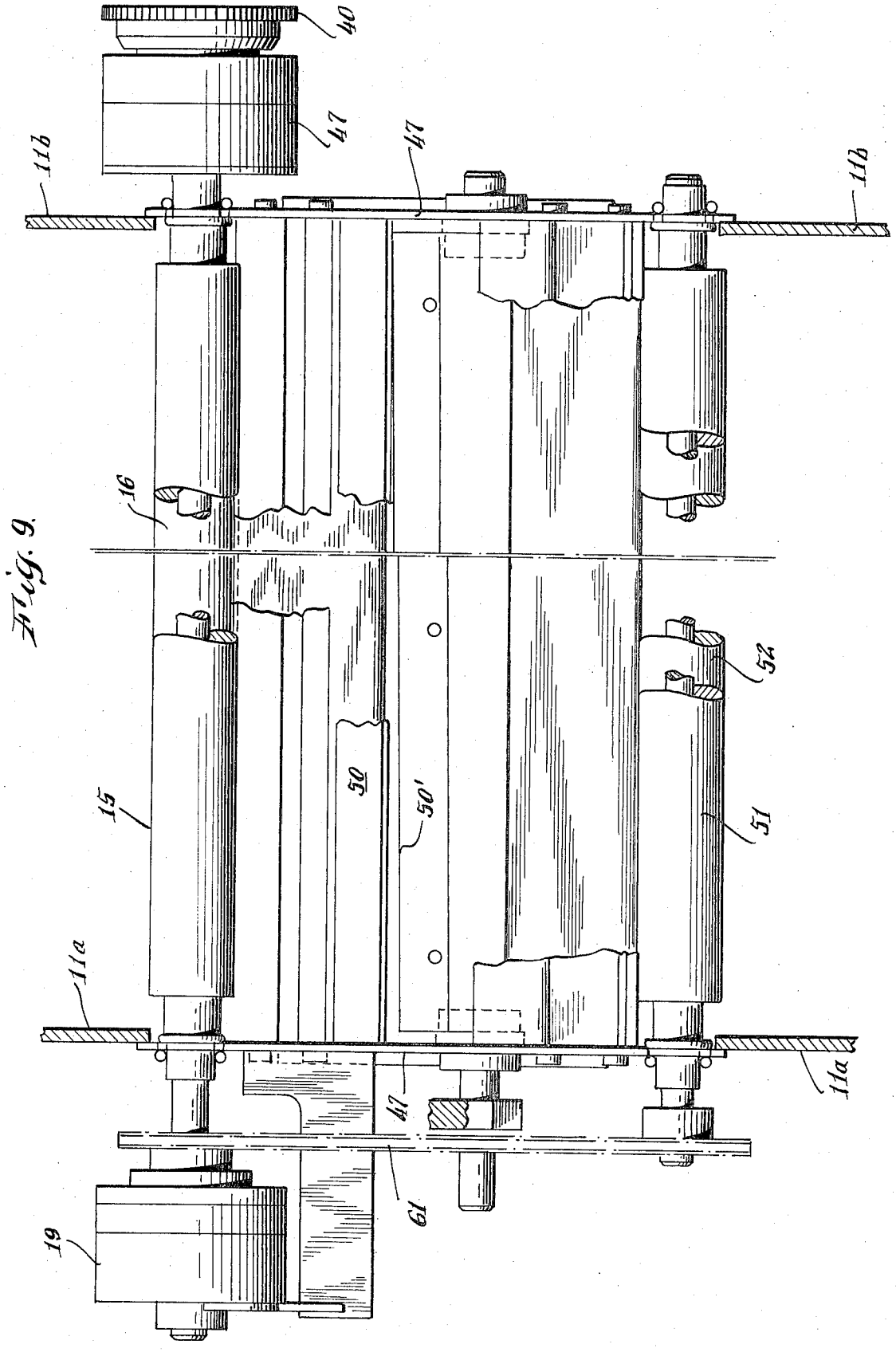


Fig. 6

Fig. 10.

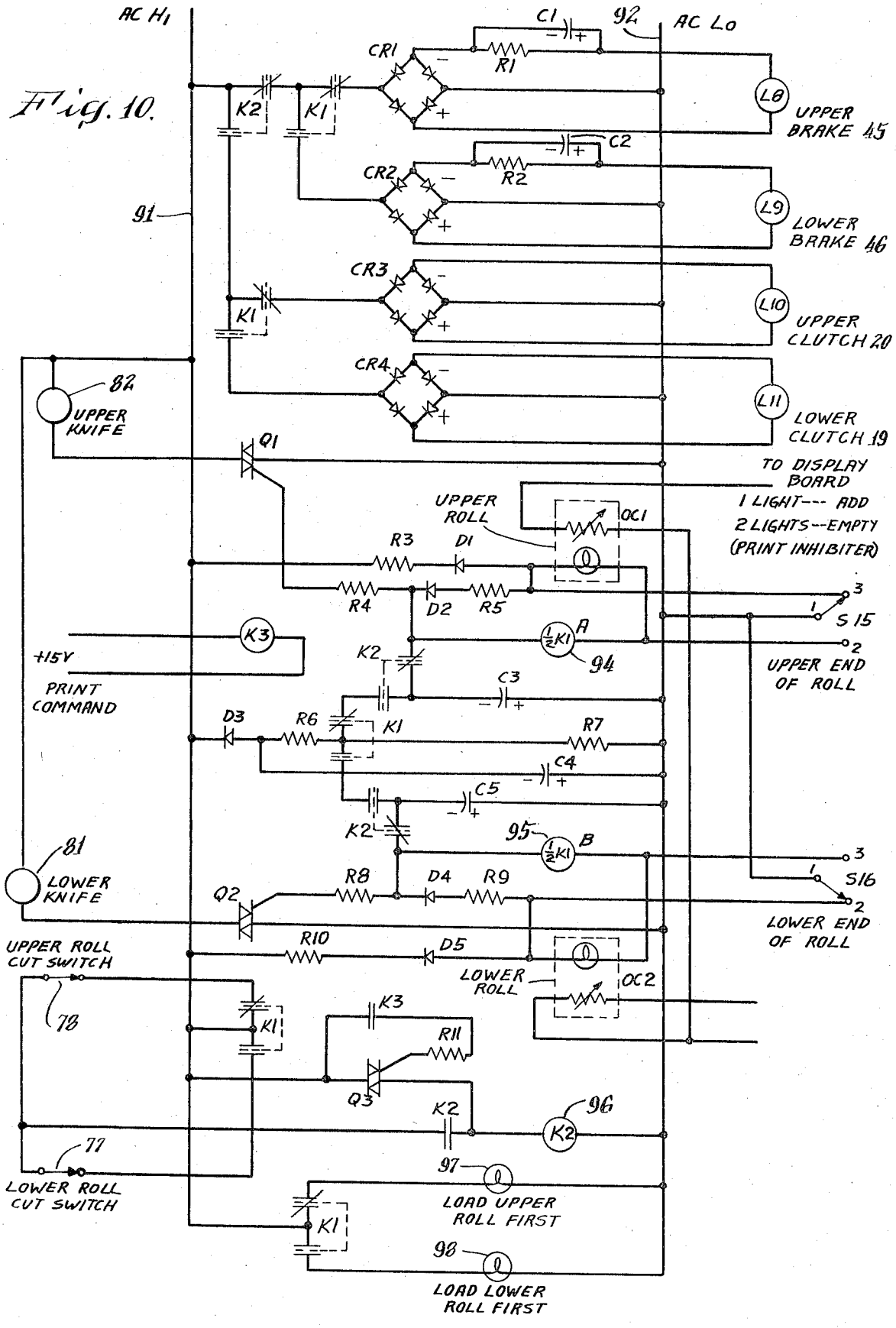
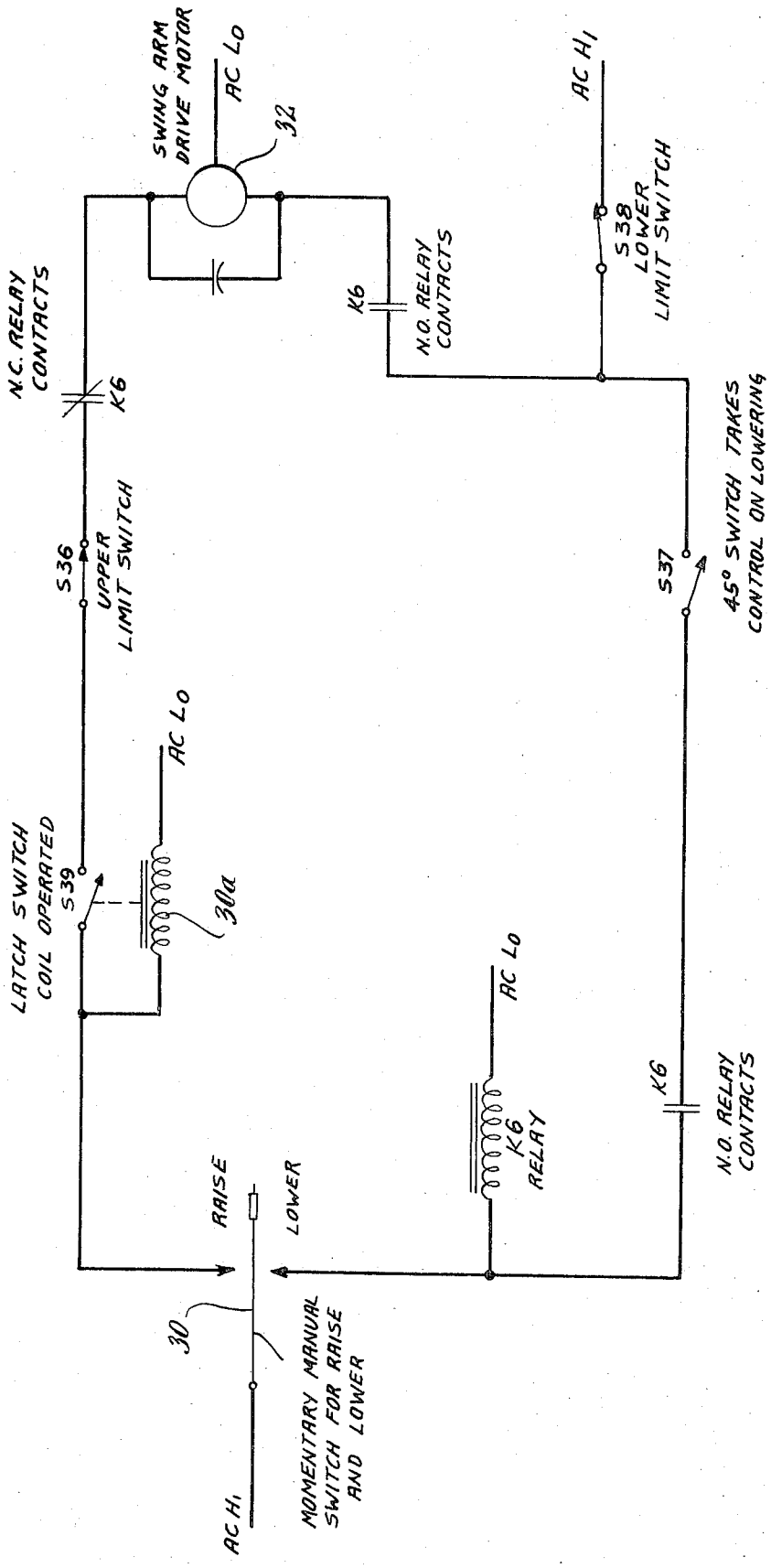

AC H1
AC Lo
92
91
C1
R1
CR1
K2
K1
L8
UPPER BRAKE 45
C2
R2
CR2
L9
LOWER BRAKE 46
CR3
L10
UPPER CLUTCH 20
CR4
L11
LOWER CLUTCH 19
82
UPPER KNIFE
Q1
TO DISPLAY BOARD
1 LIGHT--- ADD
2 LIGHTS--EMPTY
(PRINT INHIBITER)
UPPER ROLL
OC1
R3
D1
R4
D2
R5
3
1
S 15
2
UPPER END OF ROLL
K3
+15V
PRINT COMMAND
A
94
C3
D3
R6
R7
C4
C5
95
B
81
LOWER KNIFE
R8
D4
R9
Q2
S16
LOWER END OF ROLL
R10
D5
UPPER ROLL CUT SWITCH
78
LOWER ROLL
OC2
R11
Q3
96
77
LOWER ROLL CUT SWITCH
97
LOAD UPPER ROLL FIRST
98
LOAD LOWER ROLL FIRST

Fig. 11.


SWING ARM DRIVE MOTOR
AC LO
32
AC HI
N.C. RELAY CONTACTS
K6
K6
N.O. RELAY CONTACTS
S38 LOWER LIMIT SWITCH
S36
UPPER LIMIT SWITCH
S37
45° SWITCH TAKES CONTROL ON LOWERING AFTER 45°
AC LO
LATCH SWITCH COIL OPERATED
S39
30a
AC LO
K6 RELAY
K6
N.O. RELAY CONTACTS
RAISE
LOWER
30
AC HI
MONENTARY MANUAL SWITCH FOR RAISE AND LOWER

AUTOMATIC PAPER FEED AND CUTTING MECHANISM FOR PHOTOCOPIER MACHINE

BACKGROUND OF THE INVENTION

The invention relates to improvements in electrostatic photocopier machines, and more particularly to an improved supply, feed and cutting mechanism whereby an entire day's supply of photo master paper may be easily installed by an office worker, such as a secretary or inexperienced clerk, simply through placing two light-weight rolls of paper into a motorized carrier which is automatically raised to a convenient waist-level height for loading and then automatically retracted into the machine where it locks itself into proper position for automatically feeding paper on command from first one roll and, if and when that roll is used up, the mechanism automatically switches to feeding paper from the second, or reserve, roll. Upon switchover to the reserve roll, sensors automatically change the cutting sequence time to assure continuous cutting of uniform lengths of paper masters regardless of differences in path length of the paper web from the first and second supply rolls.

OBJECTS OF THE INVENTION

A general object of the invention is to provide improved means for rapid and automatic production of offset master plates in an electrostatic copier machine.

Another object of the invention is to provide means for continuously delivering a web of photosensitive paper into a photocopier, cutting the web successively into uniform lengths for platemaking, and transporting the exposed plates to a developing station.

A more particular object of the invention is to provide a plurality of supply rolls of photocopy paper in a mechanism whereby upon depletion of one roll another roll immediately and automatically feeds paper to the copier to provide an uninterrupted supply.

An ancillary object of the invention is to provide means for automatically cutting the paper web into predetermined uniform lengths regardless of differences in the path length over which the paper is fed from the several supply rolls.

An additional object of the invention is to provide power driven means for extracting the paper supply from the copier, raising the supply mechanism to a convenient position exterior of the copier for ease of replacing paper rolls, and then retracting the supply into locking operative engagement with the paper feeding and cutting means.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front elevation of the mechanism of the invention with the raised position of a dual paper roll holder shown in broken lines;

FIG. **2** is a vertical sectional view taken along the line 2—2 of FIG. **1**;

FIG. **3** is another vertical sectional view taken along the line 3—3 of FIG. **2**;

FIG. **4** is an enlarged vertical view of the paper feed and control apparatus, seen generally in the right hand portion of FIG. **1**, showing in greater detail the paper path, paper hold, and control microswitches;

FIG. **5** is a vertical end view of the apparatus of FIG. **4**, partially cut away;

FIG. **6** is an enlarged side view of the paper cutter for the upper feed roll as shown generally in FIG. **3**;

FIG. **7** is an enlarged side view of the paper cutter for the lower feed roll as shown in FIG. **3**;

FIG. **8** is a detail of the clutch drive and stationary knife blade;

FIG. **9** is a top plan view of the apparatus shown in FIG. **6**;

FIG. **10** is a schematic diagram of the control switches and related circuitry; and

FIG. **11** is a schematic diagram of the swing arm control for loading and locking the paper supply system.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Referring now in greater detail to FIGS. **1**, **2** and **3** of the drawings, a parallel pair of vertically disposed swingable arms **11***a*, **11***b* are pivotally supported on a horizontal shaft **12** mounted on a rigid structure frame indicated generally at **14**. In and between the arms **11***a*, **11***b* is mounted a first driven pressure roller **15** in frictional engagement with a first idler roll **16**, and a corresponding second driven roller **17** engaged with a second idler roll **18**. Driven rollers **15** and **17** are each connected, respectively, through electromagnetic clutches **19** and **20**, chains **61**, **61***a*, and a gear train **61***b* to a main drive motor **21**. Also mounted on and supported by swing arms **11***a*, **11***b* are a first pair of cooperating paper roll holders **22** and a second pair of cooperating paper roll holders **24** thereabove as shown in FIGS. **1** and **3**. The paper roll holders are adapted to receive and rotatably support the hubs of first and second rolls **25** and **26** of electrophotographically sensitive paper. Pivotally mounted on swing arm **11***a* are a pair of spring loaded feeler arms **27** and **28** carrying rollers **27***a* and **28***a* positioned to bear upon the outer surfaces of paper rolls **25** and **26** and to operate associated microswitches whenever the outer diameter of their respective paper rolls diminishes to the point that paper on that roll has been depleted. For example, when the supply of paper on roll **26** has been depleted, feeler arm **28** actuates microswitch **29** mounted on arm **11**a by depressing the switch tab **29***a* which extends through an opening in the arm **11***a*. This disengages first drive clutch **20** and simultaneously engages second drive clutch **19** whereby paper web is fed from second supply roll **25** through the cutting and processing mechanism as will hereinafter be described in detail. A corresponding switch **29'** is provided for similar cooperation with the sensing arm **27**.

The sequential operational steps involved in loading the paper supply system will now be described with spe-

cific reference to FIG. 1 of the drawings. The operator first moves a momentary spring loaded manual switch **30** to its upward position which sumultaneously energizes a solenoid **30***a* to release a latch **31** (FIG. 3) and energize a swing arm drive motor **32** to operate in a forward direction. Motor **32,** through a right angle worm gear drive and clutch **34** drives a chain **35** to rotate a sprocket wheel **36** which is mounted by a bushing **37** and bolts **38** to arm **11***a*, whereby arms **11***a*, **11***b* are caused to swing upwardly (in a clockwise direction as seen in FIG. **1**) about the axis of shaft **12.** The motor **32** continues to operate only so long as the operator maintains finger pressure on spring loaded switch **30,** so that when the swing arms **11***a*, **11***b* are elevated to their horizontal position as shown by broken lines in FIG. **1** the switch **30** is released and motor **32** stops. The operator then proceeds to remove and discard spent paper roll spindles and to replace fresh rolls, such as **25** and **26,** in holder pairs **22** and **24.** The leading edge **39** of paper from roll **25** is passed between rollers **15** and **16** (as seen more clearly in FIG. **3**) by the operator turning a knob **40** mounted on the end of roller **17** (FIG. **2**). In the same manner, the leading edge of paper from roll **26** is passed over guide roller **41** through paper guide chute **42** and between rollers **17** and **18** by a slight turn of knob **44** which is mounted on the end of roller **17.** A brake **45** is mounted on the shaft of upper driven roll **17** adjacent to manual knob **44** to prevent wasting over-ride of this drive roller when its electromagnetic clutch **20** is de-energized. A similar brake **46** is mounted on the shaft of lower driven roller **15,** adjacent to manual knob **40,** to accomplish the same purpose when clutch **19** is disengaged. Thus the clutch **20** in combination with brake **45** cooperate to produce positive limited driving action of paper drive roll **17,** and in the same manner clutch **19** cooperates in combination with brake **46** to provide positive limited driving action of lower drive roll **15.** The manual knobs **40** and **44** over-ride the respective clutches **19–20** and the brakes **45–46** when the operator initially loads the machine with paper rolls **25** and **26** to start the leading edges of paper from the two rolls into the bite between the two driving rolls **15** and **17** and their respective pressure engaging idler rolls **16** and **18.** With the proper supply thus loaded, the operator then merely depresses momentary switch **30** which energizes swing arm drive motor **32** to operate in reverse thereby lowering swing arms **11***a*, **11***b* (in a counterclockwise direction about shaft **12**) until they are retracted into the base of the machine as shown by solid lines in FIG. **1.** When the latch **31** (FIG. **3**) engages, the paper supply assembly mounted on arms **11***a*, **11***b* is locked into operative position and the machine is ready to produce electrostatic master copies as will now be described.

Referring now to FIG. **3** of the drawings the paper supply assembly indicated generally at **13** includes two substantially identical paper drive and cutting systems **47** and **48** mounted on and between swing arms **11***a*, **11***b*. The first and lowermost paper drive system **47** includes an input paper guideway **49** through which the leading edge of paper from roll **25** is inserted by the operator into the bite between driving pressure rolls **15** and **16** at the time of loading as described above. Subsequently when the driven roll **15** is rotated by a chain drive **61** (FIG. **2**), when the control circuit of FIG. **10** calls for paper feed, the leading edge **39** of paper web from roll **25** is driven by rollers **15–16** past the open knife edge **50** into the bite of drive rollers **51–52,** thence through guideway **53** into the bite of drive rollers **54–55,** through guideway **56** into an electrostatic charging box **57,** and from there into the bite of drive rollers **59–60.** It is to be understood that the successive driven rollers in this path, **15, 51, 54** and **59** are all driven simultaneously and at the same rate by the common drive chain **61,** through clutch **19** as shown in FIG. **2** of the drawings.

Referring now to FIG. **4** of the drawings, as the paper web exits from between drive rollers **59–60** of paper supply assembly **13** it engages an upwardly curved guide **62** which deflects the paper web upwardly into engagement with the front surface of a vertical moving belt conveyor indicated generally at **64.** Belt **64** moves in a clockwise direction (as seen in FIG. **4**) around an upper roller **65** and a lower roller **66.** At least one of the rollers **65** or **66** is driven by a suitable drive belt, and preferably both are driven as shown by broken lines in FIG. **1.** The vertical conveyor belt **64** is actually formed of a plurality of separate parallel flexible pierced bands **67, 68** and **69** having parallel vertical spaces **70–71** therebetween, as shown in FIG. **5.** The several belts, **67, 68** and **69** which comprise the conveyor **64** pass through openings in a plenum chamber **73** so that the upwardly moving portion of the belt overlies the left surface of the chamber (as seen in FIG. **4**). This surface is pierced with openings **72** and a pair of vacuum fans **74** and **75** are mounted on chamber **73** whereby vacuum is created between the front and back of conveyor **64** to hold the paper web flat against the exposed face of the conveyor belt **64.** Mounted on the front portion of chamber **73** in the vertical space **70** between belts **67** and **68** are vertically disposed microswitches **76, 77** and **78,** each in a position to be operated by the leading edge of paper web as the same is moved vertically upward by the conveyor belt assembly **64.** The upper microswitch **76** actuates a short duration high intensity electronic flashlight to expose an optical image of copy focused on the vertical master paper held by carrier **64,** while the lower microswitches **77** and **78** respectively operate the number one knife **50′** in cutter assembly **47** or the number **2** knife **80′** in cutter assembly **48,** depending upon whether the paper web at any given time is being fed from lower roll **25** or from upper roll **26.** The vertical distance between microswitches **77** and **78** corresponds to the difference in paper path length from lower cutter assembly **47** and the longer path of paper from upper cutter assembly **48.**

Referring once again to FIG. **2** and FIG. **3** it will be seen that the paper cutting systems **47** and **48** mounted on the paper supply assembly **13** (FIG. **3**) each include a pair of horizontally extending knife blades, **50** and **50′** and **80–80′** respectively. Blades **50′** and **80′** are movable, while blades **50** and **80** are stationary. Both blades of each cutting system are normally spring biased into their open (separated) positions whereby the paper web passes fully therebetween as it is driven forward by the paper drive rollers. When paper is being fed into the machine from the lower paper supply roll **25** the microswitch **78** (FIG. **4**) is deactivated by the control circuit of FIG. **10** and the paper web is carried by the vertical conveyor belt **64** upwardly to the point where the leading edge of paper passes over microswitch **77** which causes energization of solenoid **81**

(FIG. 2) which actuates linkage **81***a* to operate movable knife blade **50'** into cutting engagement with stationary knife blade **50** whereby the prescribed length of paper for one exposure is cut. The cut length of paper continues to move upwardly, being held flat against the front surface of vertical conveyor **64** (FIG. 4) by the vacuum therebehind until the entire cut sheet of master paper is in position for exposure. At this position the upper edge of paper on carrier **64** passes over microswitch **76** causing instantaneous operation of the high intensity electronic flash which produces an exposure in less than 1/1000 second focused onto the plane of the vertically moving sensitized sheet. The exposed sheet continues its upward travel on the support of continuously moving vertical carrier **64** and the leading edge of exposed paper is funnelled into a vertical guideway **84** and into the bite of driving pressure rollers **85** and **86,** thence between driving rollers **87** and **88** and through a curved guideway **89** into a developing system (not shown). Immediately upon the completion of one exposure by the actuation of microswitch **76** as described above, the apparatus is ready to produce another master in the same manner.

When the supply of paper on supply roll **25** has been exhausted, the follower arm **27** (FIG. 3) depresses the tab **29***a'* of microswitch **29'** (FIG. 1) which extends through an opening in swing arm **11***a*. This operates to energize a relay in the control circuit of FIG. **10** whereby power is removed from driving rollers **15** and **51** of cutting system **47** and driving power is applied to driving rollers **17** and **23** of upper cutting system **48.** Because of interlocking relay connections in the control circuit of FIG. **10** this condition can only occur following a cutting operation by knife blades **50—50'** (the last full sheet cut from roll **25**) so that no paper remains in the path from cutter system **47.** Since the leading edge of paper web from fresh supply roll **26** was initially fed into the bite between driven roller **17** and pressure roller **18** when the operator loaded the paper supply assembly **13** as described above, this web of paper is now driven through the space between open knife blades **80—80'** and into the bite of rollers **23–33** and thence into the upper guideway **91,** through rollers **54–55,** through electrostatic charging box **57** and rollers **59–60,** and onto the bottom guide **62** of the vertical conveyor system **64** (FIG. 4). This moving web of paper, now coming from the upper reserve supply roll **26,** is carried upwardly in FIG. 4 by the vacuum carrier belt **64** and when the leading edge of paper web passes over microswitch **78** the second solenoid **82** is energized to operate knife blade **80'** which cuts the web to a length as predetermined for one master sheet to be exposed. As mentioned above, the path length from knife blade **80** to microswitch **78** is the same as the path length from knife blade **50** to microswitch **77,** so that sheets of equal length are cut regardless of which supply roll is feeding paper. Because of the interlocking circuitry of the electrical control system shown in FIG. **10,** the circuit of microswitch **77** which controls the first cutter **50'** is deactivated when paper is being fed from the reserve roll **26.** The sheet of sensitized paper which has now been cut by knife blade **80** continues its vertical travel along vacuum conveyor **64** until the leading edge intercepts microswitch **76** and an exposure is made, and then the exposed sheet is passed on to the developer as described hereinabove.

The means by which the various electromechanical elements such as clutches, brakes, driven rollers, solenoids and cutters, etc. are controlled to operate in the sequential order as described hereinabove will now be explained in greater detail with particular reference to the schematic diagram of FIG. **10.** The condition shown in FIG. **10** is for operation of paper feed from the upper roll **26** as illustrated in FIG. **3** of the drawings. Two control relays K-**1** and K-**2** are employed to operate the entire switching system. Relay K-**1** is a bistable latching relay having two separate operating coils **94** and **95,** each with five sets of form C single pole double throw contacts. Relay K-**2** is a double pole double throw relay having a single operating coil **96.** A third relay K-**3** may be a light reed relay which merely supplies a trigger pulse for the command to print. For ease of understanding the several relay contacts are shown physically disassociated from their respective operating coils in the schematic of FIG. **10.** AC operating power for the entire system of FIG. **10** is supplied over lines **91–92.** For operation of paper feed from the lower roll **25** (FIG. **3**) the positions of the contacts of relay K-**1** are merely reversed from the condition shown in FIG. **10.**

Still referring to FIG. **10,** the coil designated L**8** is the energizing coil for the upper brake **45** in FIG. **2,** L**9** is the energizing coil for lower brake **46,** L**10** is the energizing coil for the upper clutch **20,** and L**11** is the energizing coil for the lower clutch **19.** The brake coils L**8** and L**9,** and the clutch coils L**10** and L**11** are all DC operated and accordingly direct current power is supplied for each of L**8** through L**11** by full wave rectifiers CR**1** through CR**4** as shown in FIG. **10.** The brake operating circuits each have an R-C network, C**1**–R**1** for L**8** and C**2**–R**2** for L**9,** to enable instantaneous application of maximum operating voltage for positive instant braking operation. Thus, employing brakes designed for 24 volt operation, a maximum initial surge of approximately 90 volts is applied from full wave rectifier CR**1** until capacitor C**1** is fully charged, at which time resistor R**1** drops the brake holding voltage to the prescribed value of **24** volts. Network C**2**–R**2** operates in the same manner when lower brake coil L**9** is energized. Brake coil L**8** operates to stop and lock the upper brake **45** (FIG. **2**) which is mounted on the upper driven roller **17** (FIG. **3**), and coil L**9** operates in the same manner on brake **46** of lower driven roller **15.** The brake coils L**8** and L**9** are normally energized. Brake coils L**8** and L**9** are only de-energized during paper feeding. Operation of the drive clutch coils L**10** and L**11** is initiated by a command to print when the operator closes a print switch connected to reed relay K-**3.** A start pulse generated by closure of K-**3** turns on triac gate Q**3** through a resistor R**11.** Operation of Q**3** energizes coil **96** of relay K-**2.** Relay K-**2** is then locked in through the upper roll cut switch **78,** normally closed contact of relay K-**1,** and a normally open contact of K**2** as shown in FIG. **10.**

Operation of relay K-**2** simultaneously de-energizes upper brake coil L**8** and energizes upper clutch coil L**10.** Closure of relay K-**2** applied DC charging current to a capacitor C**3** from a voltage divider formed by R**6** and R**7** through a diode rectifier D**3** until a charge of approximately 15–20 volts is built up on capacitor C**3.** When the knife switch **78** (FIG. **4**) is operated by the leading edge of paper passing thereover, relay K-**2** drops out and the charge previously built up on capaci-

tor C3 triggers triac gate Q1 which energizes the upper knife solenoid **82** as shown in FIG. **10.** Knife solenoid **82** remains energized until capacitor C3 has fully discharged through R4 and R5 and Q1 is released.

An optical coupler OC1 which is energized when bistable latching relay K-1 is in the state shown in FIG. **10** supplies a signal to a display board to indicate to an operator when either or both rolls of paper have been exhausted. The single pole double throw switch S15 in FIG. **10** is the microswitch **29** operated by follower arm **28** which rides on the surface of the upper paper supply roll **26** as described hereinbefore with reference to FIG. **1** and FIG. **3** of the drawings. While the upper roll is supplying paper switch S15 remains in the position shown in FIG. **10.** However, when this supply roll is almost exhausted and the feeler arm has moved in substantially to the paper roll core, S15 transfers to the number 2 contact thereby conditioning coil **94** of relay K-1 to transfer to its second bistable state. Relay K-1, however, can only operate during a cut cycle when switch **78** is open because otherwise the K2 contact between C3 and relay coil **94** is open. So upon receipt of the next command to print, this K2 contact closes, connecting C3 to coil **94,** relay K-1 transfers to its second state and thereafter paper supply is fed from the lower roll. At this time one signal lamp is lighted on the display board, through energization of optical coupler OC1, to signal the operator that one fresh roll of paper may now be added to replace the exhausted upper roll. Resistor R5 is a dummy load simulating the impedance of coil **94** of relay K-1 whereby a constant discharge rate is assured for capacitor C3 regardless of the position of switch S15. R9 is a similar dummy load for coil **95.**

The lower roll operation of braking, clutching and cutting is carried out by the lower brake L9, the lower clutch L11, the lower knife solenoid **81** and the lower roll cut switch **77,** through K-1 in its second state, in exactly the same manner as described above in reference to the mode of upper roll operation. If the lower supply roll of paper should now be used up before the exhausted paper roll has been replaced, follower switch S16 which is the microswitch **29'** operated by follower arm **27** as described hereinbefore with reference to FIGS. **1** and **3** will then transfer to the opposite condition shown in FIG. **10** and a second signal light will by illuminated on the display board through operation of optical coupler OC2. In this condition further printing is inhibited and, if desired, an alarm may be sounded to call the operator to replenish the paper roll supplies. The lowermost pair of relay contacts on relay K-1 as shown in FIG. **10** operate signal lamps **97** or **98** which indicate the mode in which the apparatus is operating at any given time, and to indicate to an operator whether the upper or lower supply roll should next be loaded.

Reference is now had to FIG. **11** of the drawings which shows schematically the electrical control circuit for raising and lowering the paper supply system as described generally hereinabove with reference to FIG. **1** of the drawings. In FIG. **11** a single pole double throw switch **30** is manually operable in its upward position to cause the swing arm drive motor **32** to elevate the paper roll carrier from within the copier machine (as shown by broken lines in FIG. **1**), and in its downward position switch **30** reverses motor **32** to lower the paper supply carrier into operating position within the copier machine. Switch **30** is spring biased to normally remain in its neutral center position as shown in FIG. **11.** One side of the AC power line, designated AC Hi, is connected to the single pole armature of switch **30** and the other side of the power line, designated AC Lo, is connected to the motor **32** as shown. A control relay K6 having two normally open contacts and one normally closed contact is connected between the lower terminal of switch **30** and the AC Lo line. For simplicity of exposition the three contacts of relay K6 are shown physically disassociated from the K6 operating coil in FIG. **11.** A latch switch S-39 which is associated with the drawn carriage latch **31** in FIG. **3** is operated, as is the latch **31,** by a solenoid **30***a* connected between the upper contact of switch **30** and the AC Lo line. When the operator raises switch **30** a circuit is closed thereby to energize solenoid **30***a* which immediately releases latch **31** (FIG. **3**) and then closes switch S-39 to apply power through the normally closed contact of relay K6 to the upper side of motor **32,** causing the motor to elevate the paper supply carriage as shown in FIG. **1.** An upper limit switch S-36 is mechanically intercepted by the rising paper carriage when the swing arms reach their uppermost position as shown by broken lines in FIG. **1,** to disconnect power from motor **32.** Thus switch S-36 prevents any inadvertent over-riding of motor **32** and possible damage to the machine in the event that the operator may hold the switch **30** in its raised position longer than necessary to fully elevate the carriage.

After the paper supply roll or rolls are replaced by the operator, switch **30** is then manually depressed momentarily to close its lower contact and thereby cause motor **32** to operate in the opposite direction whereby the swing arm carriage is lowered back into its normal operating position within the copier machine as shown by solid lines in FIG. **1** and FIG. **3** of the drawings. Closure of the lower contact of switch **30** energizes the coil of relay K6 which now opens its normally closed contact and closes both of its normally open contacts. AC power is now applied through closed relay K6 to the lower side of motor **32** causing it to operate in the reverse direction to lower the paper supply carriage. When the carriage has been lowered to an angle of 45 degrees, a mechanical switch S-37 is closed by engagement with the frame of the copier and relay K6 now locks in through one of now closed but normally open contacts so that the relay K6 remains operated even when the operator releases switch **30.** Motor **32** continues to lower the carriage until it is seated into its lowermost operating position, as shown by solid lines in FIG. **1,** latch **31** (FIG. **3**) locks and lower limit switch S-38 opens, de-energizing relay K6 and motor **32.**

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention which, as a matter of language, might be said to fall therebetween.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A multi-roll paper supply system for an electrostatic photocopier comprising in combination:

A. a first paper feeding and cutting means including:

1. means rotatably mounting a first paper supply roll;
2. a first pair of rotatably driven pressure rolls on axes parallel to said first paper supply roll and in proximity thereto;
3. a first normally de-energized electromagnetic clutch drive mounted on at least one pressure roll of said first pair;
4. a first electromagnetic brake on said clutch driven roll;
5. a normally de-energized solenoid operated first knife blade adjacent said driven rolls;

B. a second paper feeding and cutting means including

1. means rotatably mounting a second paper supply roll;
2. a second pair of rotatably driven pressure rolls on axes parallel to said second paper supply roll and in proximity thereto;
3. a second normally de-energized electromagnetic clutch drive mounted on at least one pressure roll of said second pair;
4. a second electromagnetic brake on said clutch drive roll;
5. a normally de-energized solenoid operated second knife blade adjacent said driven rolls;

C. motor means for continuously driving said first and second clutches;

D. means normally energizing said first and second brakes into holding condition whereby said first and second rolls are prevented from rotation;

E. first control means operable upon command to selectively de-energize said first brake and simultaneously therewith to energize the corresponding first clutch mounted on the same one of said first driven rolls, whereby paper from the first paper supply roll is fed by said first pair of driven rolls into a focal plane position of said photocopier;

F. first and second switches located in said focal plane position operable by said paper passing thereover; said first and second switches being located equal predetermined distances from said first and second knife blades respectively;

G. second control means operable by said first switch to de-energize said first clutch, energize said previously de-energized first brake and energize said adjacent solenoid operated first knife blade all substantially simultaneously, whereby paper fed by said driven rolls is cut to a preselected length as determined by the paper path length between said first switch and said first knife blade;

H. third switch means in said focal plane operable by paper passing thereover to initiate an electronic flash for image exposure;

I. paper supply sensors on each of said first and second supply rolls; and

J. further control means responsive to said first sensor means sensing a substantially empty first supply roll to permit said second control means to be operable by said second switch to de-energize said second clutch, energize said previously de-energized second brake and selectively energize said adjacent solenoid operated second knife blade all substantially simultaneously, whereby paper is now fed to said focal plane position by said second driven roll and is cut to a preselected length as determined by the paper path length between said second switch means and said second knife blade.

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