United States Patent [19]

Radin et al.

[11] **3,717,408**

[45] **Feb. 20, 1973**

[54] FLASH FLAT-BED WET COPIER

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[22] Filed: **Aug. 19, 1970**

[21] Appl. No.: **65,181**

[52] **U.S. Cl.** **355/3,** 355/13, 355/14

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

[58] **Field of Search**.....355/3, 13, 14, 17, 28, 29

[56] **References Cited**

UNITED STATES PATENTS

2,771,002	11/1956	Mayo et al.	355/3
3,002,434	10/1961	Reuter, Jr.	355/3 X
3,418,047	12/1968	Lee et al.	355/13 X
3,482,912	12/1969	Zerfahs	355/14
3,467,469	9/1969	Hastings et al.	355/28 X
3,503,677	3/1970	Uchiyama	355/13
3,536,401	10/1970	Mason et al.	355/10 X

FOREIGN PATENTS OR APPLICATIONS

636,452	2/1962	Canada	355/13

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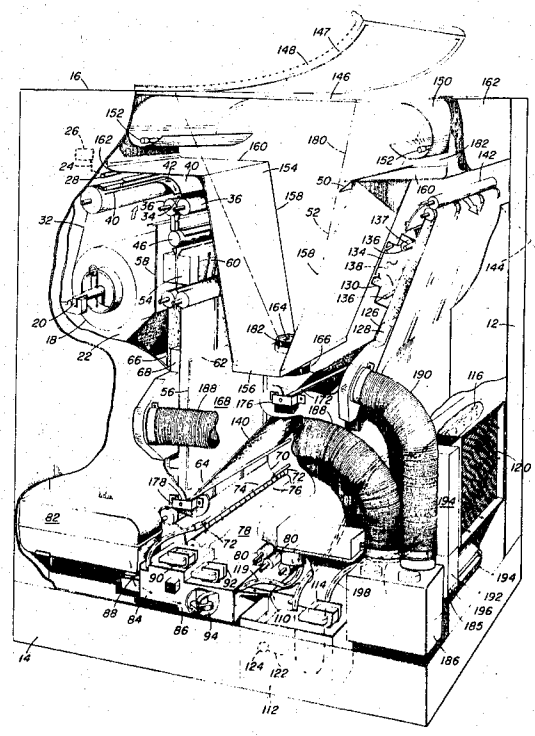
[57] **ABSTRACT**

An electrostatic flat-bed wet copier in which copy moves in the exposure station while a 1:1 image of the stationary original is flashed thereon through a shutterless optical system upon the automatic energization of Xenon flash-tubes that flash-illuminates the underside of such original. The copy paper web is automatically fed from a supply roll, charged, cut into sheets of selected length corresponding to that of the original, one-shot flash exposed without interruption, wet-processed, and dried at a rate of up to 40 copies per minute. The copies moving through the machine are electronically monitored at each station by the electrical system so that any trouble is automatically indicated, to show the station involved, and further operation stopped until the trouble is corrected. The pre-wet developing device not only supplies and recirculates the liquid toning solution for flow with the copy, but maintains the pre-wet solution at a selected level in the liquid solution reservoir by gravity feed, and adds concentrated toner to an inlet to the liquid recirculating pump. The system is such that only concentrate need be added to the dip-developer system because a greater amount of pre-wet solution (same solution as liquid carrier for toner) is added on per copy basis than is squeegeed off after image development (in effect toner is manufactured with this system; never have to add to dip tray).

A sump receives any overflow from the toner reservoir, and feeds the liquid therein when the latter raises to a certain level, to a forced air evaporator. Any residual liquid is returned to the sump. The base of the copier cabinet consists of a liquid-proof tray for receiving any other spilled or overflow liquid. The copy fixing or drying station contains a box-like hood containing radiant-heating rods over which air is drawn from openings in the hood by an inclined vacuum-belt as well as by forced air means which carried the squeegeed copies thereon. The electrical system automatically handles any selected one of a plurality of copy lengths, corresponding to those of any original within the length range of the original platen, by virtue of individual sets of exposure platen switches corresponding to such lengths.

4 Claims, 7 Drawing Figures



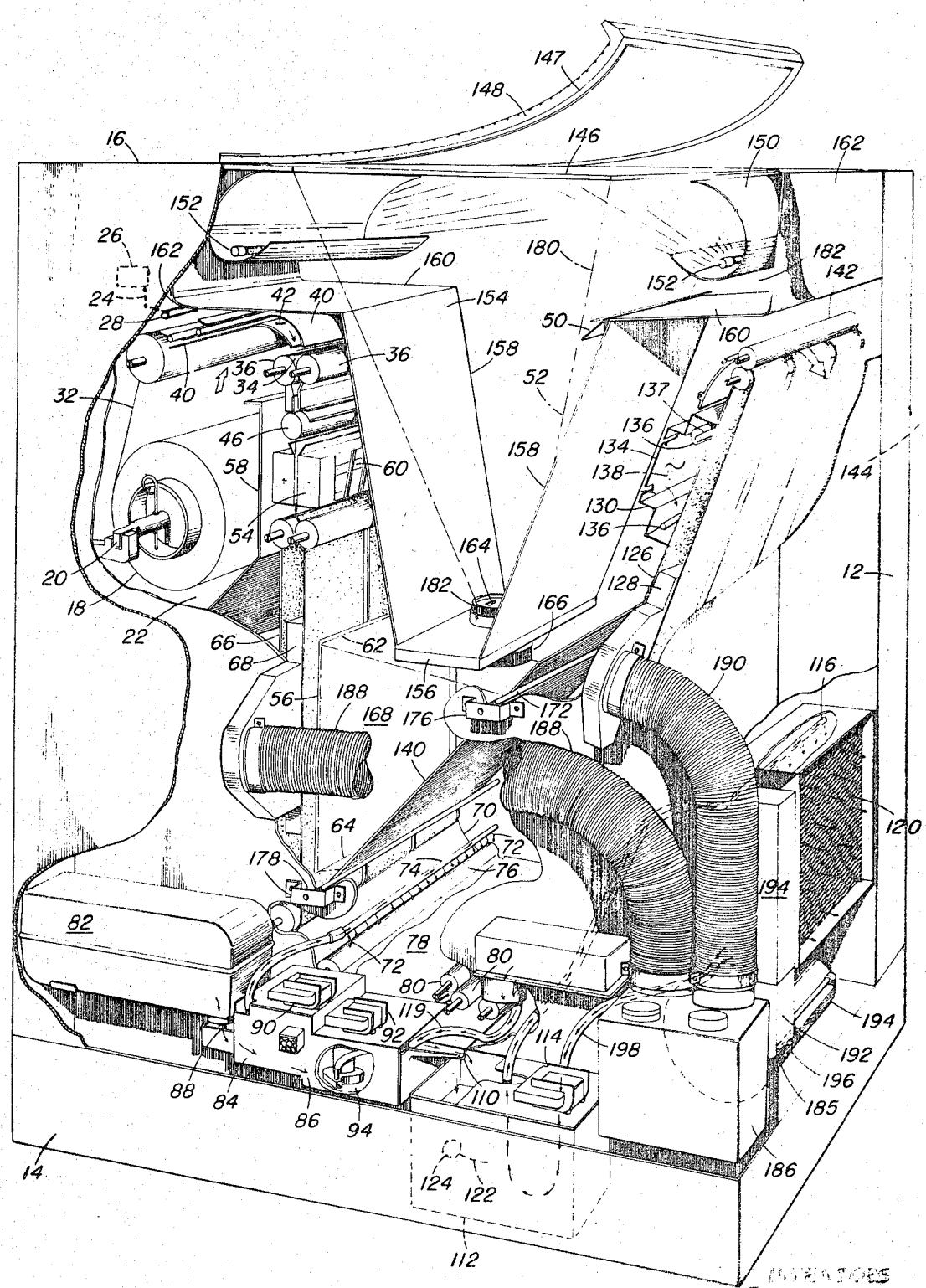


Fig. 1.

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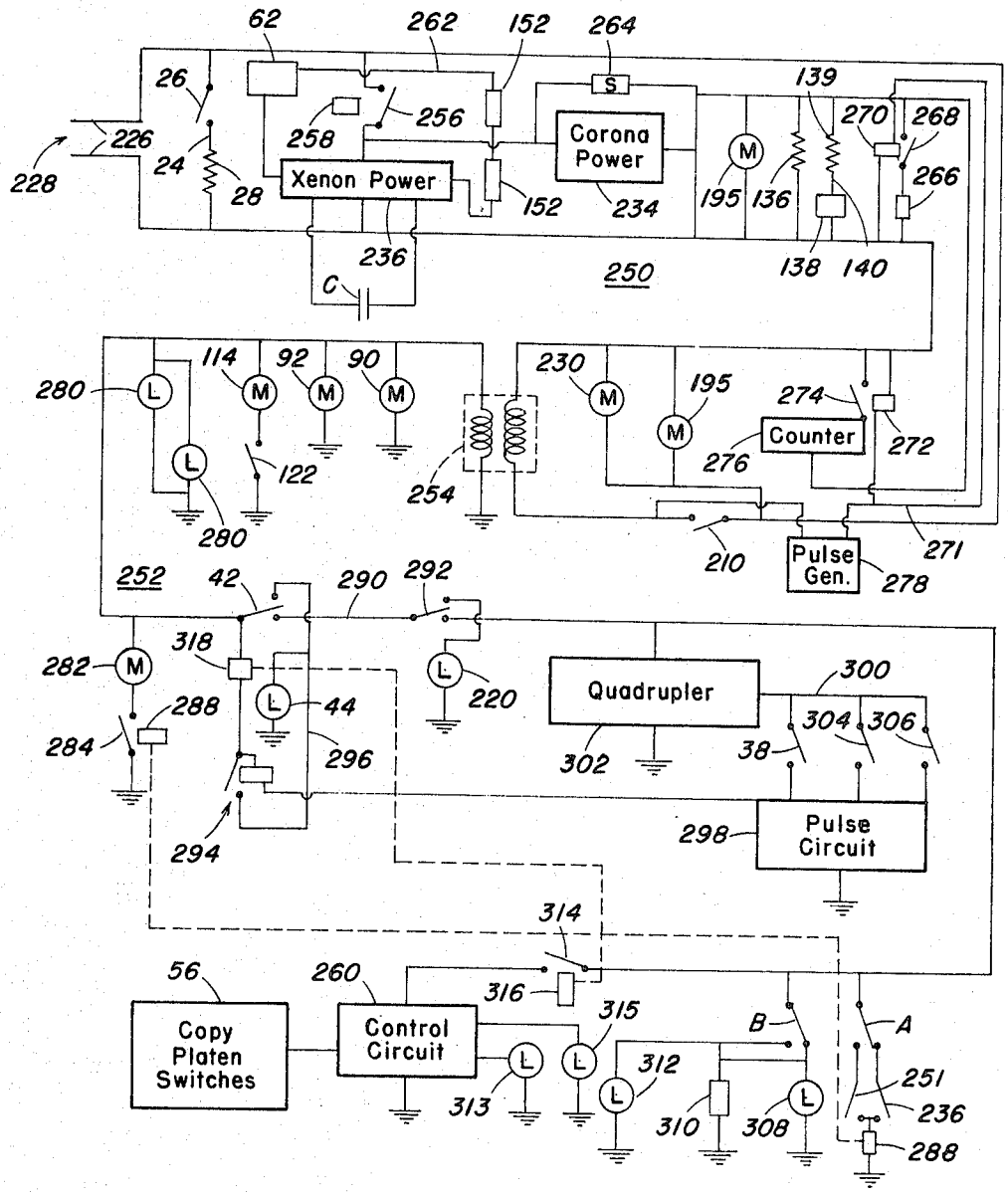

Fig. 2.

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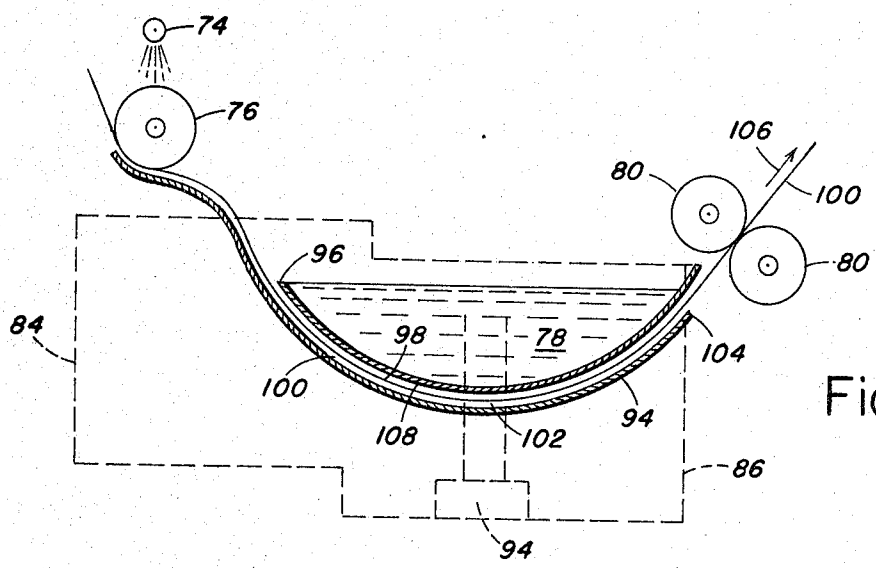

Fig. 3.

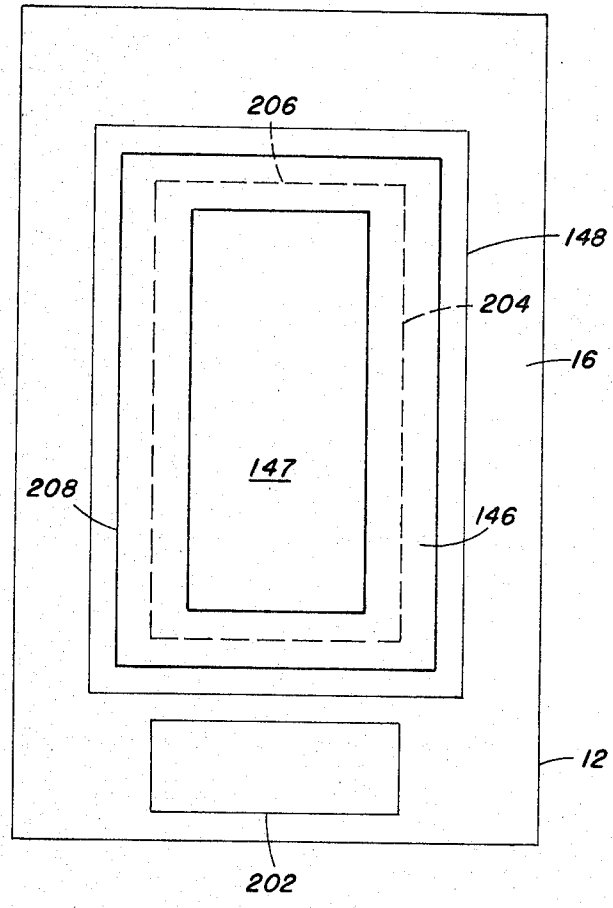

Fig. 4.

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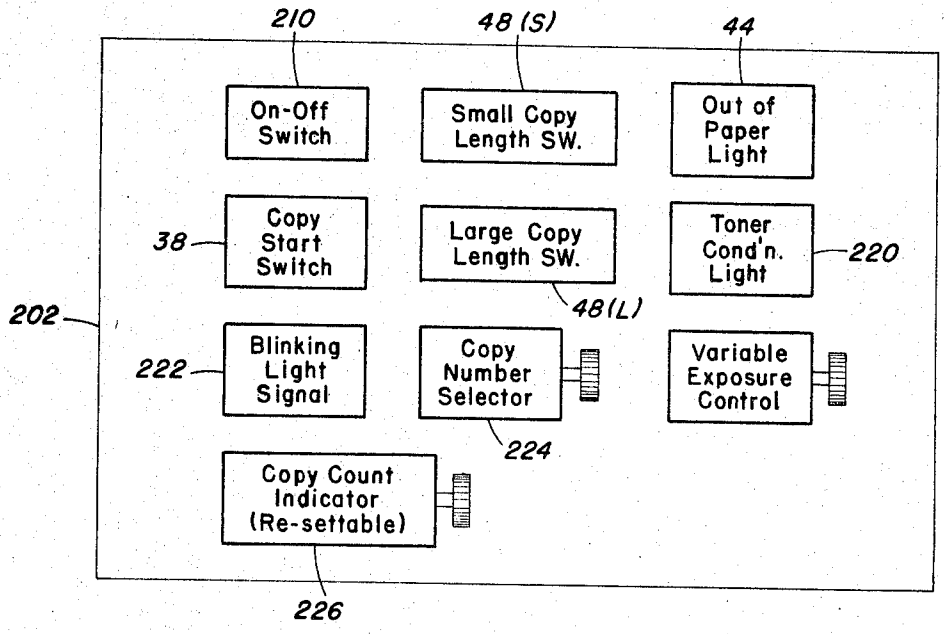
Fig. 5.



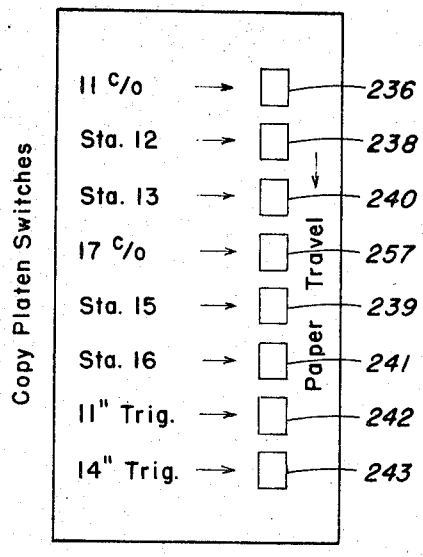


Fig. 6.

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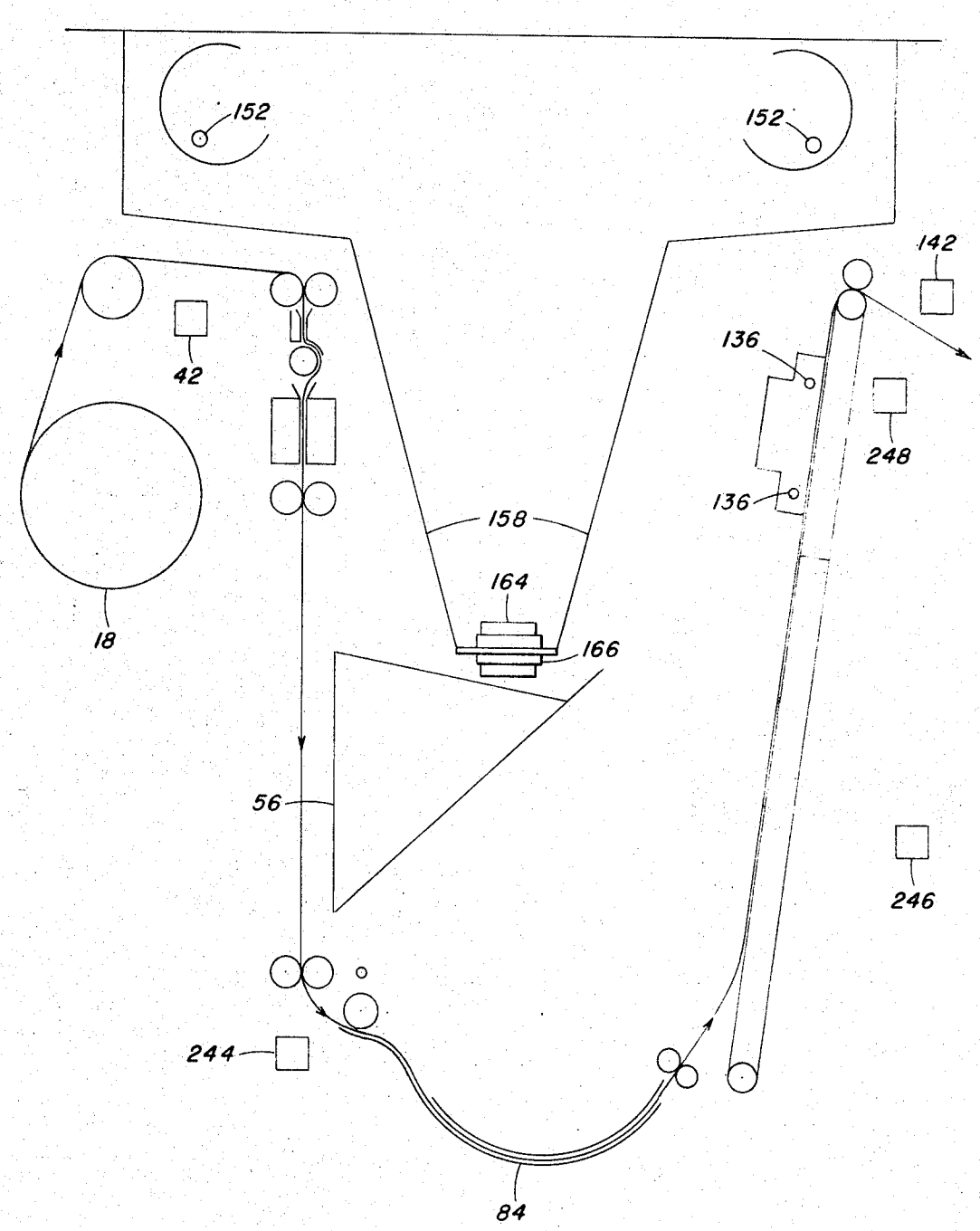

Fig. 7.

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FLASH FLAT-BED WET COPIER

This invention relates to electrostatic flat-bed copiers, and more particularly to an automatic machine for making 1:1 copies of a fixed original at high speed.

It has been proposed by Mihojevich et al in U.S. Pat. No. 3,416,860, dated Dec. 17, 1968, to stop electrically charged copy sheets at the imaging station prior to their being developed in a liquid toning station.

Also, Stanton proposed in U.S. Pat. No. 3,282,177 dated Nov. 1, 1966, to make electrophotographic copies of a stationary original by stopping each of the charged copies at an exposure station prior to wet processing them.

Such proposals not only slow the making of multiple copies, but use shutters in the optical system along with complicated timing mechanism necessary for operating the shutter when the copies are each stopped for exposure.

Elmer in his U. S. Pat. No. 3,428,397, dated Feb. 18, 1969, proposed a rather complicated illuminating system in combination with strob-flash operated tubular lamps in a flat-bed copier. In such copier, considerable copy paper was needed, since the whole size of the copy platen, as well as of the original platen, was involved regardless of the smallness of the size of the original being copied.

Also, prior proposals were not suited to the rapid copying of a flat-bed original because of the time required by previous apparatus for wet-toning and drying copies. That is to say, high-speed flat-bed copying requires high-speed wet processing and drying of the copies.

The main object of this invention is to solve such problems by providing a unique and novel high-speed flat-bed electrostatic flash-copier employing liquid toning that is capable of making up to 40 (1:1) copies/minute of a stationary original of any length within the length range of the copier.

According to the invention such object is accomplished mainly by the provision of Xenon flash-illumination of a stationary original in conjunction with a shutterless optical system for projecting a 1:1 flash-image of the original onto each moving copy as the latter passes through an exposure station located directly under a corona charging module and above a liquid toning station without interruption, and a unique pre-wet liquid toning system that is capable of processing the 1:1 copies as fast as they move through the exposure station.

Considering the relatively large size of the copies that are rapidly processed, the liquid toning system constitutes an important feature of the invention. Such system involves the use of pre-wetting, concentrated toning solution, an image intensifier screen constituting an integral part of the liquid toning and developing apparatus, constant recirculation of the liquid solution, drain-off of spent solution, and continuous evaporation of the latter during the operation of the copier.

Another feature of the invention involves novel apparatus for the high speed drying and image fixing of the wet-processed copies prior to their discharge from the machine.

The invention provides a high speed electrostatic flat-bed copier for reproducing 1:1 copies from a stationary original, in which the copy paper web is stored

in a supply roll in a humidity controlled compartment. The web is drawn from such roll as required and cut into a selected length corresponding to that of the original prior to passing through the corona charging module and an exposure station wherein each is exposed to a Xenon-flash-image of the original without any interruption in movement of the copy during the Xenon flash-exposure thereof in such station. Such flash-image is accomplished by a shutterless optical system, and brilliant flash-illumination of the underside of the stationary original by the simple one-shot energization of Xenon flash tubes located in parabolic reflectors positioned directly under the ends of a platen on which the original rests under a light-impervious blanket.

The so-exposed copies are then conducted through a high-speed pre-wet liquid-toner processing system for quickly developing the latent image of the original resulting from such exposure, including an image intensifier constituting an integral part of a double liquid tray arrangement in which the liquid spills over the front edge of an upper tray onto the copy as the latter enters and progresses through a curved way provided therefor under the upper tray by a lower tray from the rear edge of which the liquid spills and is then recirculated.

The under surface of the upper tray is provided with either a plastic composition containing metal or made entirely of metal providing the image intensifier for the liquid carrying copy moving in the curved way directly thereunder. At the same time a highly concentrated liquid toner is circulated by way of the liquid recirculating pump having an inlet at the bottom of a liquid toner tank. Toner concentrate is added to the liquid toner tank on a programmed basis from the concentrate supply container (X on FIG. 1). Overflow liquid from such tank falls into a sump provided with a pump controlled by a float operated switch, so that the sump liquid is thereupon pumped to an evaporator from which residual liquid flows back to the sump. Thus, spent liquid is disposed of; but in case of any overflow from the top of the sump, the bottom of the copier comprises a liquid large tray for receiving and retaining the same.

Upon leaving squeegee rollers adjacent the liquid toning system wherein the latent image on each copy is developed, the copies are conveyed in succession by an inclined vacuumized belt and blower fan means under an efficient high-speed dryer including reflected and direct heating elements over which air is blown, heated, and directed onto the moving copies, thereby effectively flash-drying and "fixing" them just before their discharge.

In the drawings;

FIG. 1 is a fragmentary view, mainly in perspective of a high-speed electrostatic flat-bed copying machine that is illustrative of the invention.

FIG. 2 is a simplified circuit diagram of the electrical system.

FIG. 3 is a fragmentary view mainly in cross section of the concentrated liquid toner developing unit.

FIG. 4 is a reduced top plan view of the machine.

FIG. 5 is an enlarged block diagram of the control panel.

FIG. 6 is a view in front elevation of the exposure platen illustrating the arrangement of the copy operated switches associated therewith.

FIG. 7 is a schematic view of the system.

Referring to FIG. 1, the illustrated flat-bed electrostatic wet copying machine comprises a rectangular cabinet 12 having a watertight base tray 14 and a flat top 16.

A roll 18 of copy paper web is stored on a holder-brake unit 20 in a compartment 22 located in the cabinet 12 on the left side of the machine 10. Inasmuch as the copy paper characteristics are affected by humidity, the compartment 22 environmental conditions are sensed and maintained by a subsystem 24 comprising a humidity control 26 and a heater 28, respectively. This subsystem 24 insures that the compartment 22 is maintained at a relative humidity that appears best suited for the electrostatic process.

Machine operators have access to the paper supply roll storage compartment 22 via a normally closed door 30. The copy paper web 32 needs only to be inserted into the nip 34 of feed-in rollers 36 which are parted until the print switch 38, FIG. 2, is depressed. The feed-in guide sheets 40 house an end-of-paper switch 42 that provides the operator with a visible panel signal 44, FIG. 2, as well as causing the machine 10 to become nonfunctional until additional paper 32 is threaded.

A copy paper cut-off knife 46 is located immediately downstream of the feed-in rollers 36. The operator first selects the copy length desired by depressing one (S or L) of the copy length selector switches 48, FIG. 5. A pivoted light baffle 50 is located in the lamp-reflector area 52 to provide means for preventing copy pre-exposure during multiple copy operation for shorter length copy.

A double corona copy charging module 54 is located between the cut-off knife 46 and an exposure platen 56 at a corresponding exposure station. Accessibility to the corona module 54 is achieved by removing the paper roll holder until 20 and partition plate 58. The negative side of the corona module 54 can be of standard construction or can be provided with a slot 60 through which a small quantity of air is either pulled or pushed to provide for dust removal by vacuum or blowing action and to further provide positive positioning of copy paper with respect to corona wires.

The copy paper is transported adjacent to the exposure platen 56 where the leading and trailing edges of the paper actuates switch means on or in the platen body, FIG. 6, for functional sequencing as required for the system operation. The paper is conveyed along the platen 56 via belts 66 and held in exposure position by the action of a vacuum manifold 68. The flash exposure of the copy paper is accomplished while the paper continues to be transported.

Copy paper is then directed from the exposure platen 56 to the pre-wet liquid toning system 70 where the latent electrostatic image thereon is developed. The toning system 70 provides for pre-wetting the incoming paper with a clear dispersant 72, by a spray bar 74—metering-roll 76 technique, dip toning in a shallow tray unit 78 containing a highly concentrated toning solution, and removal of excess liquid by squeegee rollers 80. The pre-wet solution supply is stored in a container 82 and fed into the pre-wet section 84 of a toner tray 86 via a chicken feeding device 88 to maintain by gravity a proper level consistent with operation of a dependable recirculating pump 90.

The pre-mixed solution is also recirculated by a pump 92. Toner solution is pumped from a lower tray reservoir 94 to an upper tray 96, FIG. 3, which then overflows at the paper incoming edge 96 at the front of such tray 96—causing impingement of the solution on the image side 98 of the copy paper 100 as it enters the curved space 102 provided under the tray 96 and above a lower tray 104. The lower tray is provided with a lower rear edge 104 over which excess liquid spills, since the liquid flows in the direction 106 of paper travel and return to the tray reservoir is achieved at the paper out-going edge 104. The upper guide 108 of the toner tray unit 78 is either metalized plastic or metal and acts as an image intensifier screen. The copy is prevented from contacting the intensifier by a monafilament wrap of TEFLON. An appropriate operating level of liquid is maintained in the toner tray unit 78 without the need for a specific make-up container because a greater amount of pre-wet solution is carried into the tray unit 78 than is removed by the squeegee roller 80.

Toner tray overflow is prevented by the bleed-off of any excess solution through a waste tube 110 which is located at an appropriate level and empties into a sump 112. The excess solution is pumped through an evaporator unit 120 utilizing the exhaust air of the system, or it can be simply stored in the waste sump 112. The excess or waste solution is generated because of the pre-wet system utilized in the machine. A greater amount of pre-wet solution is applied to the copy prior to its entrance into the toner unit 78 than is removed by the final squeegee action.

The accumulated excess solution is stored in the sump 112 from which it is discharged by a pump 114 to a spray bar 116. The solution is discharged from the spray bar 116 to the top of an evaporator filter which contains a large surface to be wetted and thereby allowing sufficient evaporation to take place due to the machine discharge air passing through the wetted filter 120. Solution not evaporated is returned to the waste sump 112 from which it is continually recycled through the filter 120 as long as the machine is in the ON mode. A float switch 122 controls the operation (ON-OFF function) of the waste pump 114 by a float 124 in the sump 112. The excess toner can also be allowed to collect in the base tray 14 of the machine 10 where it will be evaporated by natural or forced means. Toner concentrate is introduced via pipe 119 into the toner tank 86 on a programmed basis from a concentrate bottle 121 located above sump 112.

As the paper emerges from the squeegee rollers 80, it is deposited on an upwardly inclined drying conveying belt 126. The paper is held in position thereon by the action of a vacuum manifold 128 backing the transport belt 126 at the in-feed end and by fan blower means 130 at the mid-point to exit end. Copy travels in an upward direction and is subjected to heating and air flow when it arrives at a heater system 132 consisting of a reflector 134 and three infra-red lamps or heaters 136. The lower heater 136 is provided with a high-efficiency reflector 137 and burns without interruption, as does the center heater which the upper one 139 is autocy-

cled by a thermostat-switch 138 in the energizing circuit 140 thereof, FIG. 2. The copy is completely dried and "fixed" at the time it emerges from the feed-out roller 142 from which it is ejected face-up into an adjustable receiving tray 144.

The top 16 of the machine 10 is provided with an original platen 146 on which an original 147 is placed under a suitable blanket 148. Under the top 16 and adjacent the front and rear ends of the exposure platen 146 are mounted parabolic reflectors 150 containing Xenon flashtubes 152, for flash-illuminating the underside of the original 147 on the platen a146. An upper light tunnel 154 is disposed under the platen 146, comprising a rectangular base 156 connected to upwardly and outwardly flared panels 158 which, in turn, are connected to horizontally and outwardly extending panels 160 the outer ends of which merge into vertical end portions 162. The latter are attached to the cabinet 12. A lens 164 enclosed in a barrel 166 is mounted in the center of the base 156.

A lower light tunnel 168 houses the exposure platen 56 and comprises an inclined rear wall consisting of a first surface mirror 170 located under the lens 164 and behind the platen 56. The wall mirror is mounted so that it can be tiltably adjusted manually with respect to the platen 56 and lens 164 in the cabinet 12, by an upper hinge-rod member 172 about a lower hinge-rod 174. The member 172 is pivoted adjacent its ends to external side brackets 176, and the rod 174 to side brackets 178.

The cabinet 12 houses the Xenon flashtubes or lamps 152 and parabolic reflectors 150 near the original platen 146. In the near-platen reflector system the light tunnel 154 is fabricated from black, non-reflecting materials, and the flashtubes 152 are located outside the specular ray bundle 180. Side reflectors 182 are also utilized with this system to optimize the light distribution at the original platen 146.

The optical assembly comprising a lens 164 is capable of 1:1 image reproduction. The lens has a scribe mark 182 on the lens barrel 166 indicating the optimum 1:1 and focus position from some fixed point, such as the image plane. This technique will allow for minimum assembly operations when setting up the optical portion of the machine. Fine focus is accomplished by moving the first surface mirror 140 toward or away from the exposure platen 56.

A vacuum blower 184 driven by a motor 185, FIG. 2, is located adjacent the evaporator 120 for creating a vacuum in a chamber 186 which is in communication with manifolds 68 and 128 by flexible hoses 188 and 190, respectively. The air outlet 192 of the blower 184 is connected to a pressure chamber 194 of the evaporator 120. Liquid collected in pan 196 under the evaporator 120 is returned to the sump 112 by gravity means through a pipe 198. The pump 114 pumps such liquid through a pipe 200 to the spray bar 116 located above such evaporator 120.

Referring to FIG. 4, a control panel 202 is provided in the top 16 of cabinet 12 of the machine 10 in front and to the side of blanket 148. The original platen 146 is provided with guide lines 204, 206 located on the original platen bezel for the size-to-size copy to be made, as well as with an original guide plate 208 having markings. Thus, in order to produce a copy, an original such as a document 147 is placed on the original platen 146 in a particular relationship provided by the guide lines 204, 206 for the size-to-size copy to be made. The adjustable original platen guide plate 208 is positioned partly on the original platen 146 and the edge of the original will be placed against it. Originals ranging in widths of 5 inches to 9, inches as well as 11 inches and 14 inches long can be copied size for size for example. The width dimension are determined by the size of the copy paper roll 18, whereas one of two lengths will be selected by the operator from the push button control panel 202. Prior to putting the machine into operation, the operator must place the original blanket 148 over the original 147 to be copied. The original blanket 147 completely covers the original glass platen 146, is electrically interlocked, so that the intense illumination from the Xenon flashtubes 152 cannot strike the operator's eyes. The system is non-functional unless the blanket is covering the original platen 146. Documents as long as 11 inches and 14 inches can be reproduced by the illustrated apparatus.

The operator control panel 202, FIG. 5, comprises an arry of push-button switches including a switch 210 for machine power ON-OFF, the two copy length selector switches 48 (S) and 48 (L), a copy start switch 38, and two panel lights 44 and 220 indicating out-of-paper and toner conditions, respectively. A blinking paper light signal of lamp 44 indicates a paper feed or transport problem. A thumb wheel dial control 224 allows the operator to select any number of copies desired from 1 to 100, or continuous operation. A second thumb wheel control provides the operator with a variable exposure control 226 which adjusts the flashtube voltage. The final item to be located on the control panel 202 is a re-settable copy counter. An internal counter or measuring device may be located inside the machine cabinet 12 if desired.

Once the document 147 to be copied is in position and the length and the number of copies selection made, the operator need only to depress the start switch 38 to begin automatic copy production. Copies are produced preferably at a rate of 40 per minute.

The logic of the machine system is such that the humidity sensor 26 and related heater 28 are made functional and remain so as long as the power cord 226 is plugged into the external source 228. When the machine POWER-ON main switch 210 is actuated; drive motor 230, FIG. 2, pre-wet, toner and waste pump motors 90, 92 and 114 and the blower motor 195 are made functional as soon as the blower flag switch becomes actuated due to action of blower output. The copy paper feed-in clutch, solenoid 232 corona power supply 234, and Xenon flashtube power supply 236 are actuated when the start switch 38 is depressed. At this time copy paper 32, FIG. 1, begins to feed past the cut-off knife 46 through the corona unit 54 for charging, and on to the copy exposure platen 56.

Referring to FIG. 6, the copy exposure platen 56 is provided with eight logic sequencing switches including, for example, in the case of short copies of 11 inches long, and long copies of 14 inches long, two sets (11 inches and 14 inches)—one for each length. The short (11 inches) copy set comprises a copy cut-off switch 236, a knife release switch 238, a copy paper feed switch 240 and a flash trigger switch 242, for ex-

ample. Similarly, the long (14 inches) copy set of copy platen switches includes corresponding switches **237**, **239**, **241** and **243**. The two adjustable switches **242** and **243** controlling flashtube **152** actuation are located near the lower end of the plate **56** to provide proper registration for 11 inches and 14 inches long copies. Cut-off switches **236** and **257** are also adjustable to provide required cut-off lengths. For the single copy case, the Xenon power supply **236** does not recharge after it is triggered; whereas, in the multiple copy mode, the supply is recharged immediately after triggering so that the capacitors (not shown) are charged to a sufficiently high level by the time a subsequent copy is in exposing position.

The system logic is such, that a copy must be at a particular station in a given time interval to keep the system functions operable. Three positions must be traversed by the copy to prevent machine shut-down. The first station **42**, FIG. **7**, senses a malfunction in the feed-in to the exposure platen **56** section; the second station senses a malfunction in the toner tray **84** area, and the third one senses a lack of copy paper at the copy paper compartment, Another safety means is provided for the vacuum platen functions in the form of an air flow sensor **246** at the blower exhaust. Another safety means comprises a motion sensor **248** for the drying transport. If any of the sensors indicate a malfunction, additional copies are not fed and the drying heaters **136** are turned off.

Referring again to FIG. **2**, the electrical system illustrated is a simplified circuit diagram of the preferred arrangement of automatic and manually operated components, some of which have been omitted, or shown in black boxes. The electrical system, in general, comprises a conventional voltage (115 volts) section **250**, and a low, voltage (32 volts) section **252** connected by a voltage step-down transformer **254**. The Xenon power **236**, having a capacitor C, is connected across the conventional voltage section **250** by a relay at switch **256** when solenoid **258** is energized by control circuit **260**. This sets up the circuit **262** for the one-shot flushing of Xenon by discharge of capacitor **236** and lamps **152** when trigger switch circuit **62** is operated by the leading edge of copy as the latter moves in exposure station.

The corona power **234** is similarly set-up and energized, together with pressure solenoid **264** which, when energized, closes the copy feed rolls. Closure of relay switch **256** also energizes dryer-blower motor **195**, and heaters **136** and **139**; as well as knife-solenoid **266** when relay switch **268** is closed by the energization of solenoid **270**. The latter is in turn energized by relay pulse circuit **271** upon closure of the main switch **210**. Also operated by the relay circuit **271** is a relay solenoid **272** of a switch **274** of a copy counter circuit **276**. The circuit **271** contains a current rectified pulse generator **278**.

Closure of main switch **210** also energizes the transformer **254**, applying voltage to the low voltage circuit section **252**, lighting off on lamps **280**, as well as energizing isopar and toner pumps **90** and **92**, and setting up the circuits of sump pump and concentrate motors **114** and **282** for energization when float switch **122** and relay switch **284** are closed. The latter is closed when solenoid **286** is energized by control circuit **260**. When the "end of roll" switch **42** opens, signal light **44** is energized, and the rest **290** of the low voltage circuit section **252** is deenergized. The same is true when isopar float switch **292** opens, at the same time connecting toner lamp **220** to the circuit subsection **290**. A pulsing relay **294** in the circuit **296** of lamp **44** is energized by pulse circuit **298** that is, in turn, connected to the outlet circuit **300** of a frequency quadrupler **302** by "print" switch **38**, dryer switch **304**, and motion sensing switch **306**.

The 14 inch copy length selector switch A is normally connected in series with normally open 11 inch copy length cut-off switch **236**, so that when the latter closes, relay solenoid **288** closes switch **284**, resulting in the operation of toner concentrate motor **282**. The latter is similarly operated when 14 inch copy selector switch A and the corresponding cut-off switch **237** are connected in series with relay solenoid **288**. The 14 inch copy selector switch B normally completes a circuit including 11 inch copy signal lamp **308**, and shutter solenoid **310**. This advances light baffle **50** in light tunnel **154**, FIG. **1**, for short length copy operation. Transfer of switch B results in the energization of the 14 inch copy length indicator lamp **312**.

Paper jam and print lamps **313** and **315** are lighted when relay switch **314** is closed by energization solenoid **316** which also controls a relay latch switch **318** in the pulse circuit **296** of the "end of roll" signal lamp **44**. The relay solenoid **316** is, in turn, controlled by control circuit **260**. Finally, control circuit is electrically associated with the copy platen switches and other components of the electrical system, as now will be understood by those skilled in the art, to cause safe fully automatic operation of the machine.

The present copier is not only compact, but is entirely automatic in making copies from one to any selected, or unlimited number, rapidly, smoothly and safely, by virtue of the electrical system including the unique copy exposure platen switch sets, for controlling the operation so as to take care of any selected original/copy length one-shot brilliant Xenon flash illumination of the original to be copied, the advanced pre-wet developer and image concentrator, and the novel image fixing station wherein the copies are quickly dried by radiant heat and hot air drawn thereover by the vacuum-belt carrying the squeegeed copies away from the developer.

What is claimed is:

1. An improved electrostatic flat-bed copier in combination, comprising: a copy sheet exposed while moving to a one-shot flash image of a stationary original, parabolic reflectors located directly under the ends of the original platen disposed outside of the specular ray area; flash lamp means cooperating with said reflectors directed toward the underside of said platen for illuminating the original and being adapted to provide a uniformly projected image on said copy sheet; a series of cooperating switch means adapted to function in the presence of a selected paper length responsive to the leading edge of a copy sheet advancing through an exposure station for enabling such copy sheet to be produced of a preselected length provided with; trigger switch means disposed further down-stream in paper travel energized by the leading edge of such sheet to initiate said flash lamp means; a plurality of copy cut

switch means for controlling the advance and severance of a sheet of selected length from a copy supply roll and associateddone-shot Xenon light switches means corresponding to a preselected number of original lengths for enabling Xenon flash-illumination to occur at a point when such preselected copy lengths are in proper exposure registration respectively with an original; and restart switch means including a re-start switch disposed downstream with respect to said cut switch means for restarting additional copy movement through said exposure station for additional copying.

2. The invention as defined by claim 1 including at least one copy monitoring switch means at a copy exposure station, a stationary original illuminating station, and a developing station, in combination with a common control circuit means adapted to indicate any malfunction with such copy at or in the respective stations.

3. The invention as defined by claim 1, including power supply means for said one-shot Xenon flash-tubes comprising capacitor recharging means adapted to urge energization of the Xenon tubes each time a moving copy sheet reaches the correct exposure position when the machine is programmed for multiple copy reproduction.

4. An improved electrostatic flat-bed copier in combination, comprising a copy exposure station; an exposure platen at said station, a plurality of sets of platen trigger switches arranged to be operated by the leading edge of copy in said station, there being a set for each of a plurality of different copy lengths provided by the copier; each of said platen trigger switch sets consisting of "cut" switches for controlling the advance and severance of a sheet of selected length from a copy supply roll, as well as the one-shot flash exposure thereof as such sheet subsequently moves through the correct exposure position in the station therefor depending upon the selected copy length which corresponds to that of a stationary original being copied as a result of such one-shot flash exposure.

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