Dec. 19, 1967 R. W. MORRILL ETAL 3,358,570

COPY COUNTING SYSTEM

Filed Nov. 17, 1965 3 Sheets-Sheet 1

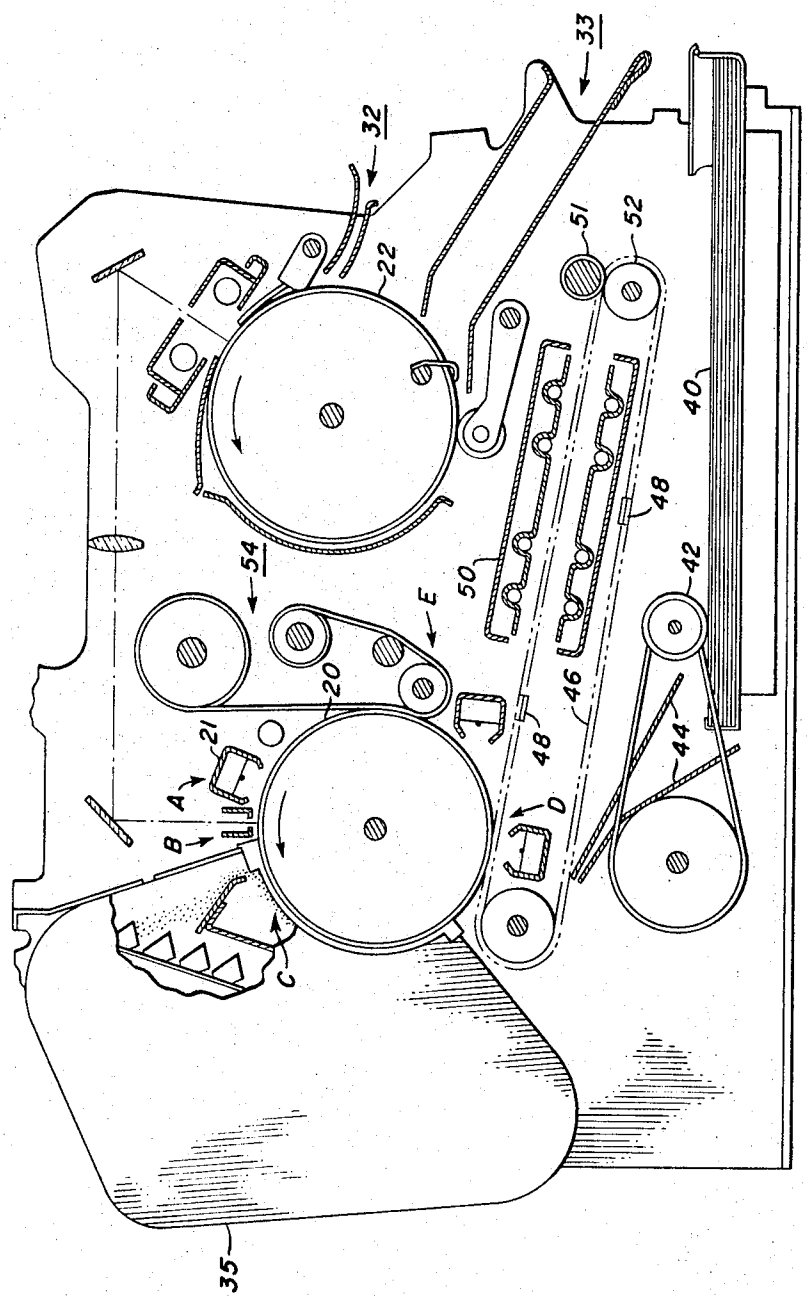

FIG. 1

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COPY COUNTING SYSTEM

Filed Nov. 17, 1965 3 Sheets-Sheet 2

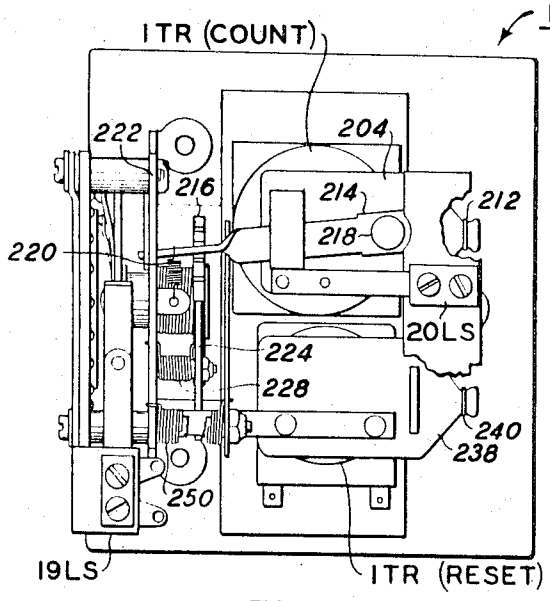

FIG. 2

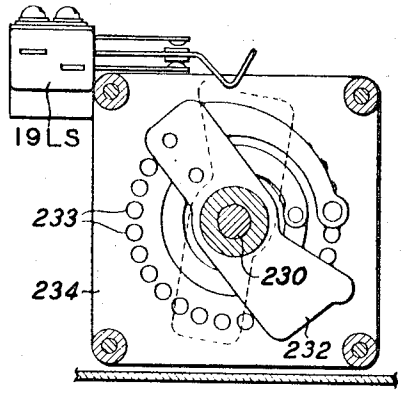

FIG. 5

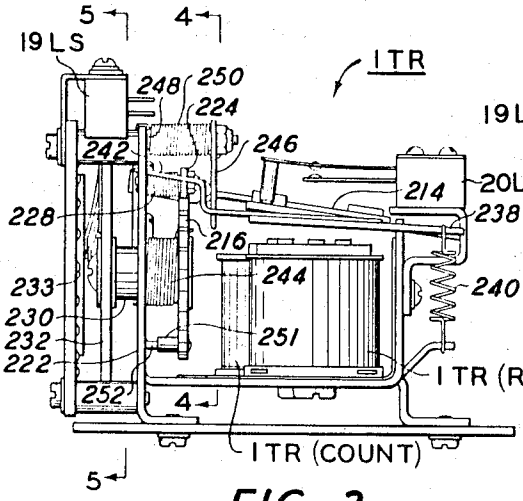

FIG. 3

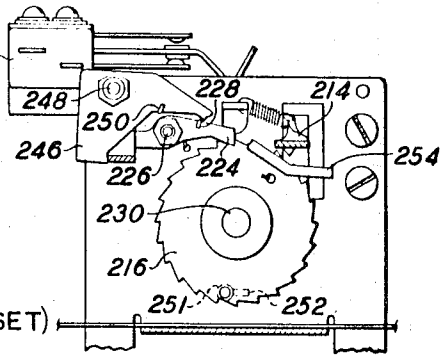

FIG. 4

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COPY COUNTING SYSTEM

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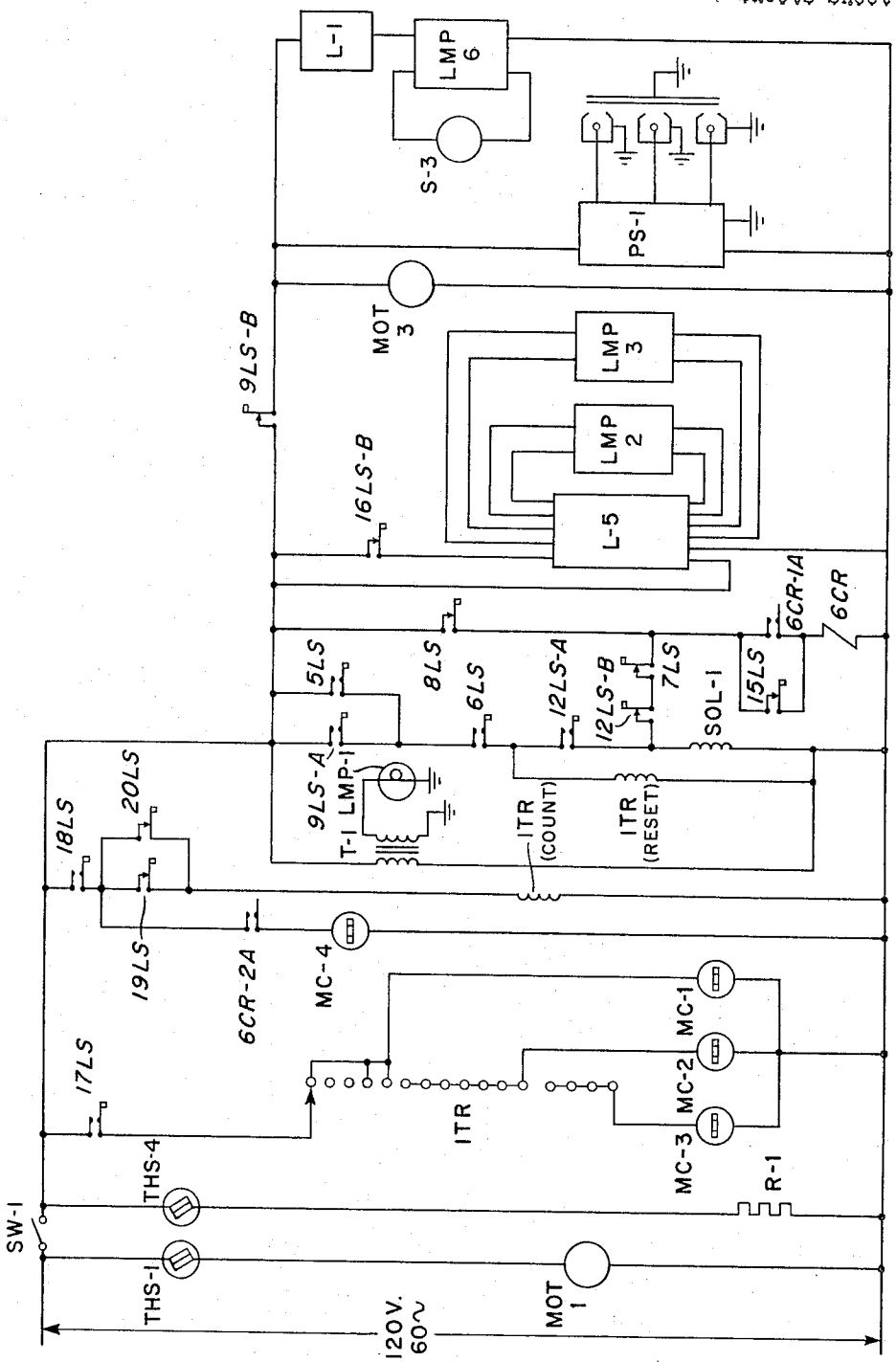

FIG. 6

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3,358,570

COPY COUNTING SYSTEM

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Filed Nov. 17, 1965, Ser. No. 508,227
4 Claims. (Cl. 95—1.7)

This invention relates to xerographic reproducing apparatus and, in particular to an improved copy counting system.

More specifically, the invention relates to an automatic xerographic apparatus for use in producing xerographic reproductions from transparent, translucent or opaque copy, in the form of single sheets and wherein a first series of copies are counted on a first counter, a second series of the copies are counted on a second counter, all remaining copies are counted on a third counter wherein the apparatus allows for at least one cycle without indicating such on any counter, and if desired, the total copies produced can be counted on a fourth counter, whereby the user of rented apparatus may be billed on a stepped basis according to the use he makes of his apparatus.

In the process of xerography, for example, as disclosed in Carlson Patent 2,297,691, issued Oct. 6, 1942, a xerographic plate, comprising a layer of photoconductive insulating material on a conductive backing is given a uniform electric charge over its surface and is then exposed to the subject matter to be reproduced, usually by conventional projection techniques. This exposure discharges the plate areas in accordance with the radiation intensity which reaches them and thereby creates an electrostatic latent image on or in the plate coating.

Development of the image is effected with developing material which comprise, in general, a mixture of a suitable pigmented or dyed electroscopic powder hereinafter referred to as toner, and a granular carrier material, which later functions to carry and to generate triboelectric charges on the toner. More exactly, the function of the granular material is to provide the mechanical control to the powder, or to carry the powder to an image surface and, simultaneously, to provide almost complete homogeneity of charge polarity. In the development of the image, the toner powder is brought into surface contact with the coating and is held thereon electrostatically in a pattern corresponding to the electrostatic latent image. Thereafter, the developed xerographic image is usually transferred to a support or transfer material to which it may be fixed by any suitable means.

In conventional copying machines that are utilized on a leased basis, it is common practice to bill customers at a set rate for the number of copies made. As a rule, the set rate is based on a minimum monthly charge for a predetermined number of copies and, then, on a somewhat reduced rate for all copies in excess of the predetermined number made during the month. By this arrangement, a customer effectively pays the same rate per copy for all copies regardless of whether the customer uses the machine for the short-copy runs, medium-copy runs or long-copy runs. Inasmuch as the use of the machine for short copy runs results in increased wear of the machine over medium and long copy runs, it is preferred to adjust charges for copies on a basis proportionate to the actual wear or usage imposed upon the machine. On the other hand, it is desirable to adjust the charges for medium-copy runs which impose less wear on the machine than short-copy runs but more wear than on long-copy runs.

The principle object of the present invention is to improve copy counting systems in a manner to compensate for excess machine use resulting from short-copy runs as compared with medium or long-copy runs while maintaining a proportioned system for medium-copy runs.

A further object of the invention is to improve copy counting means to enable the application of several stepped billing rates as a function of the quantities of copies produced.

Another object of this invention is to prevent registration of at least one cycle to allow the apparatus to time out.

These and other objects of the invention are attained by the utilization of a copy counter system wherein the first series of copies of any copy producing cycle are totalized by a first counter and the second series of copies are totalized by a second counter. A switch is arranged to prevent actuation of the first counter during the reproduction of the first series of copies for at least one cycle. A fourth counter is provided to operate in conjunction with each of the foregoing counters whereby the total copies of any given run may be indicated individually.

For a better understanding of the invention as well as other objects and further features thereof, reference is had to the following detailed description of the invention to be read in connection with the accompanying drawings, wherein:

FIG. 1 illustrates schematically a preferred embodiment of the xerographic apparatus of the invention adapted for continuous and automatic operation;

FIG. 2 is a top view of the stepping switch used in the counting system;

FIG. 3 is a front view of the stepping switch;

FIG. 4 is a view along line 4—4 of FIG. 3;

FIG. 5 is a view along line 5—5 of FIG. 3 and

FIG. 6 is schematic electrical wiring diagram of the xerographic apparatus.

As shown in FIGURE 1, the xerographic apparatus comprises a xerographic plate including a photoconductive layer or light receiving surface on a conductive backing and formed in the shape of a drum which is journaled in a frame to rotate in the direction indicated by the arrow to cause the drum surface sequentially to pass a plurality of xerographic processing stations.

For the purpose of the present disclosure, the several xerographic processing stations in the path of movement of the drum surface may be described functionally as follows:

A charging station at which a uniform electrostatic charge is deposited on the photoconductive layer of the xerographic drum is shown at A. An exposure station at which a light to be reproduced is projected onto the drum surface to dissipate the drum charge on the exposed areas thereof, and thereby form a latent electrostatic image on the copy to be reproduced is shown at B. A developing station, where a xerographic drum is developed is shown at C. A transfer station at which the xerographic powder image is electrostatically transferred from the drum surface to the material is shown at D. A drum cleaning station is shown at E.

The charging apparatus or corona charging device 21 includes a corona discharge array of one or more discharge electrodes that extend transversely across the drum surface and are energized from a high potential source and are substantially enclosed within a shielding member.

The optical scanning or projection assembly consists of a copyboard in the shape of a drum, hereinafter referred to as copy drum 22, which is adapted to support copy to be reproduced and arranged to rotate in light-projection relation to the moving light-receiving surface of the xerographic plate.

Copy fed through paper guides 32 to the copy drum is removably secured thereon by a suitable gripper mechanism for movement therewith in timed relation to the movement of the xerographic drum whereby a flowing image of the copy is projected onto the xerographic drum. After the copy is scanned it can be released from

the copy drum to be transported out of the machine through copy guide 33.

Adjacent to the exposure station is a developing station C in which there is positioned a developer apparatus 35. Mounted within the developer housing is a motor driven bucket-type conveyor used to carry the developer material previously supplied to the developer housing to the upper portion of the developer housing from where the developer material is cascaded over a hopper chute onto the drum.

As the developer material cascades over the drum, toner particles of the developer material adhere electrostatically to the previously formed electrostatic latent image areas on the drum to form a visible xerographic powder image; the remaining developer material falling off the peripheral surface of the drum into the bottom of the developer housing. Toner particles consumed during the developing operation to form the xerographic powder image are replenished by a toner dispenser mounted within the developer housing.

Positioned next adjacent to the developing station is the image transfer station D which includes a suitable sheet transporting mechanism including a sheet feeding mechanism and a sheet conveyor mechanism adapted to feed and convey sheets of paper successively to the xerographic drum in coordination with the presentation of the developed image on the drum at the transfer station. The sheet feeding mechanism includes a sheet source, such as paper tray 40, for a plurality of sheets of a suitable support material, that is, sheets of paper or the like, separator rollers 42 adapted to feed the top sheet of the stack of support material through a guide 44 to a sheet conveyor mechanism 46 having paper grippers 48 thereon which carry the sheet support material into contact with the rotating xerographic drum in coordination with the appearance of a developed image at the transfer station.

As the paper gripper mechanism continues to move forward in its closed circuit, it will strip the support material from the xerographic drum and carry it to a fixing device, such as, for example, heat fuser 50, whereat the developed and transferred xerographic powder image on the support material is permanently fixed thereto.

After fusing, the finished copy is preferably discharged from the apparatus at a suitable point for collection externally of the apparatus. To accomplish this, there is provided a pair of delivery rolls 51 and 52, by means of which the copy is delivered from the machine after it is released by the gripper mechanism.

The next and final station in the device is a drum cleaning station E whereat any powder remaining on the xerographic drum after the transfer step is removed and whereat the xerographic drum is flooded with light to cause dissipation of any residual electrical charge remaining on the xerographic drum.

Removal of residual powder from the xerographic drum is effected by means of a web cleaner device 54 adapted to continuously feed a clean fibrous web material into wiping contact with the xerographic drum.

Suitable drive means drive the xerographic drum, copy drum and sheet conveyor mechanism at predetermined speeds relative to each other. Suitable drive means are also provided for effecting operation of the developer conveyor mechanism.

It is believed that the foregoing description is sufficient for the purposes of this application to show the general operation of the xerographic reproducing apparatus. For further details concerning the specific construction of the xerographic apparatus shown, reference is made to Patent No. 3,099,944 issued Aug. 6, 1963 to Roger H. Eichorn et al.

In conventional copying machines that are utilized on a leased basis, it is common practice to bill customers at a set rate for the number of copies made. In order to provide an advantageous arrangement for machine users who employ the machine primarily for making multiple copy runs, i.e., on the order of 5 to 15 copies per run, the invention includes a counting system whereby the first series copies of each run are totalized on a first counter, the second series of copies are totalized on a second counter and the remaining copies of each run are totalized on a third counter. In this manner, it is possible to arrange for billing at a given rate for the first series of copies of each run, at an intermediate rate for the second series of copies of each run, and at the lowest rate for all succeeding copies of each run. In the particular embodiment disclosed, the first three copies of each run are arranged to be totalized at the highest rate, the next seven at an intermediate rate and all remaining copies at the lowest rate. However, the circuitry is arranged in a manner such that the number of copies to be totalized in this manner may be arranged at will in accordance with the requirements of a particular application.

In addition to providing separate counters to totalize different parts of each multiple copy run, the machine may include a fourth counter arranged in convenient viewing location for the operator whereby the number of copies made on each run are indicated for visual inspection.

Conveniently, the counting system counters MC–1, MC–2 and MC–3 are arranged whereby the totals registered by the counters may be observed periodically by opening one of the covers that enclose the machine. The fourth or "run total" counter MC–4 is arranged in convenient viewing position for the operator. Preferably, counter MC–4 is of the resettable type so that the operator may readily set it for indicating the copies of any run as desired.

In order to operate each of the counting system counters MC–1, MC–2, MC–3 and MC–4, means are provided operable under control of the programmer to effect proper operation of the respective counters in timed relation to the other functions of the machine such as copy-scanning, paper feeding, and sheet removal from the drum. To this end, the invention includes a stepping switch 1–TR (see FIGS. 2 to 5) described below, that is actuated under control of switch 18LS.

When 18LS is tripped if the contacts 6CR–2A are closed as indicated schematically in FIG. 6, MC–4 is pulsed and coil 1–TR (count) is energized to operate the actuator 204. The actuator 204 is held in the inoperative position shown in FIG. 3 by a spring 212. When the actuator 204 is operated by the coil 1–TR (count), an actuator arm 214 engages the ratchet 216 thereby stepping the stepping switch 1–TR actuating the sliding contact arm 232. The actuator arm 214 is pivoted on the actuator 204 above pivot point 218 and is held in the position shown in FIG. 2 by means of a spring 220 which is mounted by the bracket 222. As the actuator arm 214 is operated, the arm moves downward engaging the ratchet 216 and moves along with the ratchet until the actuator engages the coil and the pawl 224 engages the ratchet. When the coil 1–TR (count) is released, the actuator arm is moved back into the position shown in FIGS. 2 and 3 by means of the springs 220 and 212 ready to again step the stepping switch.

The pawl 224 is pivotally mounted on the bracket 222 by means of a shaft 226 which was a coil spring 228 mounted thereon for the purpose of engaging the pawl 224 with the notches of the ratchet 216.

The ratchet wheel 216 is connected by means of a shaft 230 which engages sliding contact or wiper arm 232 and contacts or terminals 233 mounted on insulated plate 234. Thus, the stepper may be actuated a specific number of times according to how many times the document drum rotates thus actuating the coil 1–TR (count) and actuates counters MC–1, or MC–2 or MC–3 and MC–4 accordingly. The operation of 19LS and 20LS which are mounted on plate 234 and actuator 204 is described below.

After the machine has completed a given run, it will then return to the standby condition. When the machine starts operation by the inserting of a document, 6LS is

closed thus actuating a coil 1-TR (reset) which serves to reset the stepper in a manner to be described below. The resetting actuator arm 238 is held in the inoperative position as shown in FIG. 3 by a spring 240 which is similar to spring 212 which holds the actuator 204 in the inoperative position.

As the resetting actuator 238 is operated, the outer portion 242 thereof contacts the pawl 224 and pivots it about shaft 226 thereby releasing the ratchet 216. The ratchet 216 is returned to its starting position by means of return coil spring 244 which will serve to rotate the ratchet in the counterclockwise direction as shown in FIG. 5. As the outer portion 242 of the resetting actuator contacts the pawl 224, a dog 246 pivoted about a shaft 248 is moved in a counterclockwise direction as shown in FIG. 5 by means of a spring 250. The log 246 serves to maintain the pawl 224 out of contact with ratchet 216 before the ratchet can return completely and come to rest when protruding portion 251 on ratchet 216 contacts stopping means 252. When the actuator 204 is again operated, the actuator arm 214 will contact the outer portion 254 of dog 246 thereby releasing the pawl 224 and the resetting actuator arm 238 to the positions shown in FIG. 3.

At the start of a normal day the switch SW-1 is normally moved to the "on" position. It is noted that the thermostat THS-1 is always energized and actuates as necessary the motor MOT1 which is used to drive suitable blowers to dissipate heat from the machine generated by the fuser and projection lamps. At this time the ready lamp LMP1 is energized through a transformer T-1.

The fuser is energized through thermostat THS4 when SW1 is closed. The fuser is indicated as R1 in the schematic wiring diagram. The ballast L5 is also energized putting the lamps LMP2 and LMP3 in a standby condition.

In the average office, it is generally necessary to make at random intervals through a day, a single reproduction of an original, multiple reproductions of an original, or single reproductions from successive originals.

To make a single reproduction a copy is inserted into the machine through document guide 32 into contact with the document drum 22. The copy is advanced through the document guide 32 until its forward progress is stopped by document stops, not shown.

As the document is inserted in the document guide, its leading edge will actuate limit switch 6LS positioned beneath the document guide with its actuator extending through a suitable aperture in the document guide to thereby close its contact to complete a circuit to initiate operation of the machine. As 6LS is closed the cam release solenoid SOL-1 is energized since 9LS-A normally open contacts are held closed by the time-out cam. The cam release solenoid releases the time-out cam such that the normally opened contacts of 9LS-A and 12LS-A which were held closed thereby are released and the normally closed contacts 8LS, 9LS, 12LS-B, and 16LS that were also held open by the cam are closed.

The time-out cam is driven by a suitable drive means connected to the drive shaft which has cam surfaces formed consecutive with each other, these cam surfaces being used to actuate 8LS, 9LS-A, 9LS-B, 12LS-A, 12LS-B and 16LS.

As 9LS-B is closed the main drive motor MOT3 is energized to rotate the xerographic drum 20, the copy drum 22 and the sheet transporting mechanism 46. The conveyor for the developing apparatus 35 are suitably driven by a motor not shown but energized at the same time as MOT3.

When 16LS is closed, the exposure lamps are fully energized, that is, fluorescent lamps LMP2 and LMP3 are energized through their circuits, consisting of ballast L5. In addition, as 9LS-B is closed the discharge lamp, a fluorescent lamp, LMP6 as shown in the circuit diagram is energized through its circuit including a ballast L1 and starter switch S3. Power is also supplied to the high voltage power supply PS1 to effect operation of the corona charging device, the corona transfer device and the corona precleaning device. As the xerographic drum which has been electrostatically charged rotates through the exposure station a light or radiation pattern of the copy carried on the rotating copy drum 30 is projected by means of the mirror and lens assembly onto the surface of the drum to dissipate the charge on the drum in accordance with the light or radiation pattern of the copy, thereby forming a latent electrostatic image of the copy on said xerographic drum.

The exposed portion of the drum then rotates to the developing station C, where a xerographic developing material including toner particles having an electrostatic charge are cascaded over the drum surface whereby the toner particles adhere to the electrostatic latent image to form a xerographic powder image in the configuration of the copy. The exposed and developed portion of the xerographic drum then advances to the image transfer station D where it receives a sheet of support material advanced by the separator rollers 42 and transported into contact with the drum by the sheet conveyor 46. As the drum surface and sheet of support material pass the transfer station, the developed powder image is transferred electrostatically from the xerographic drum surface to the sheet of support material. The xerographic drum then continues to rotate along its normal path.

In the meantime, the copy drum has rotated at a corresponding rate of speed whereby the copy is to be retained on the copy drum, and the copy is ejected if a single copy is to be made or if multiple copies are to be made ready to be advanced through the exposure station again. Assuming that only a single reproduction of a single copy is being made, the copy will have been ejected from the machine and the xerographic powder image will be transferred to the sheet of support material during the one cycle of rotation of the xerographic drum and copy drum. However, at this point in the operation of the apparatus the sheet of support material, with the powder image transferred thereto, has not been ejected from the machine.

The operating cycle of the apparatus disclosed is such that it requires three cycles of rotation of the xerographic drum and the copy drum to effect one and one-half cycles of rotation of the sheet conveyor mechanism. In the embodiment of the apparatus shown, the pitch length of the chain of the sheet conveyor is twice the circumference of the xerographic drum, so for three revolutions of the xerographic drum the chain makes one and one-half revolutions.

Thus, after the transfer step, even though a second reproduction is not to be made, the xerographic drum and the copy drum must rotate through a second and third revolution to permit the sheet conveyor mechanism to eject a sheet of support material from the machine. However, during the second and third revolution of the xerographic drum and the copy drum, still assuming that only a single reproduction is being made, the optical system will in effect scan a blank copy drum and project a radiation image from the copy drum onto the xerographic drum, to expose the xerographic drum to this image of the copy drum. The xerographic drum will then again pass through the developing station and through the transfer station as previously described; however, a latch mechanism, not shown, will prevent advancement of a sheet of transfer material from the paper tray to the xerographic drum.

The continued operation of the sheet conveyor, copy drum and xerographic drum is effected and controlled by means of the time-out cam.

In addition when 6LS is closed, tripping reset coil 1TR (reset) immediately releases sliding contact arm 232 of 1TR and draws it back to the zero position by return spring 244 thereon.

As 6CR is energized contacts 6CR-2A are closed for

the purpose to be described below and contacts 6CR–1A are closed to provide its own holding circuit for 6CR. 6CR is actuated by 15LS that is normally held open and is released by a cam driven by the drive system on each revolution of the copy and xerographic drums.

During the first cycle or revolution of the copy and xerographic drum, if a single copy is to be made, or during the cycle wherein the last copy is being made, i.e., 6th cycle if six copies are being made the time-out cam will commence operation. During this cycle, the cam will open 12LSB and close 12LSA. A second cam on the document drum actuates 5LS, 17LS and 18LS on each revolution thereof. If single copies of successive originals are to be made they can be placed in the document guide thereby holding the contacts of 6LS closed. Thus as the cam on the document drum actuates 5LS, the tripping reset coil 1TR (reset) will be actuated immediately releasing sliding contact arm 232 of 1TR and drawing it back to the zero position by return spring 244 thereon. This will insure that single copies of successive documents are counted on the highest rate counter MC–1. This cam on the document will also actuate in succession 17LS and 18LS. The closing of 17LS will pulse the counter MC–1 thereby counting the first copy of a series of copies made on that counter. The closing of 18LS will pulse the multiple counter MC–4 which appears at the front of the machine since the contacts 6CR–2A are closed. This counter is a resettable counter that merely indicates the numbers of copies already made to the operator during any particular run or series of runs. 7LS is opened when the machine is set to make one copy. During this cycle the switch 7LS is opened to condition the machine for the next use of the machine.

During the next to the last cycle the time-out cam opens 8LS, thereby de-energizing the relay 6CR and opening the contacts 6CR–1A and 6CR–2A. This switch 7LS is never closed when the machine is set to make a single copy. During this revolution the cam on the document drum will also actuate 5LS which will not effect the circuits if another original is not inserted in the document guide since 6LS is open. 17LS is closed but none of the counters are pulsed since the second contact on the stepper is blank.

At the end of the last cycle 9LS–A which is normally open is closed and 9LS–B which is normally closed is opened thereby de-energizing that part of the circuit including the main drive motor MOT–3. During the third or last cycle the cam on the document drum closes 5LS but nothing will occur since 6LS is open. 17LS is closed but again nothing occurs since the second contact on 1TR is a blank and 18LS is closed thereby pulsing 1TR (count) which steps the stepper one contact.

If the stepping switch 1TR is wired, as shown in FIG. 6, the first three copies are thus counted on MC–1, the second seven copies on MC–2 and the remainder of the copies made are counted on MC–3. The switch 1TR may be provided with one or more dead contacts. In the embodiment shown, the second and third contacts on the switch 1TR are "dead" contacts. These contacts allow the machine to properly register the copies made on the proper counter while allowing the machine to "time" or "phase-out" without registering such time out cycles on any counter. Thus, if one copy is made it will be registered on MC–1 while the two time-out cycles required in the machine as shown will not be registered on any counter due to the dead contacts on the switch. If 13 copies are made, the first five cycles register 3 copies on MC–1 while preventing two cycles from registering due to the dead contacts. The sixth through twelfth copies register on MC–2. The last copy registers on MC–3 as do the two time-out cycles. Thus the second and third copies that did not register on any counter are registered during the time-out cycles. With this arrangement, no matter how many copies are made the copies are registered on the proper counter while not allowing for any registration for any time-out cycles. When the stepping switch has been actuated 16 times, which is the number of contacts on the switch in this case, and 14 copies are counted allowing for the two dead contact sliding contact arm 232 opens switch 19LS mechanically as shown in dotted lines in FIG. 4 which allows the counter to continue to count copies being made as described below. When the switch 19LS is opened by the sliding contact arm 232 as 1TR (count) is actuated, switch 20LS is closed to assure the complete actuation of the coil 1TR (count) by holding 1TR count closed. Switch 20LS will hold 1TR (count) closed until the power is cut off by 18LS. This is done in order to assure that the 1TR switch is completely stepped into the sixteenth or last position. Thus, the machine can continue to operate if the dial is reset during operation with the stepper in the last or sixteenth position and all counts going on to MC–3. A switch over point between MC–1, MC–2, and MC–3 can be selected by a proper setting of the contacts on the stepper. The contacts may be set by means of a connector which is prewired to give the desired switch over between the counters MC–1, MC–2 and MC–3.

While the invention has been described with reference to the structures disclosed herein, it is not confined to the details set forth, and this application is intended to cover such modifications or changes as may come within the purposes of the improvements or the scope of the following claims.

What is claimed is:

1. A xerographic reproducing machine having a xerographic drum journaled for rotation,
drive means connected to said xerographic drum to rotate said xerographic drum at a constant speed,
a control circuit connected to said drive means for effecting a reproducing cycle during at least one revolution thereof,
said control circuit having a copy counting means for registering the number of copies produced by the machine during successive reproducing runs,
said copy counting means including a first counter for registering cumulatively upon each actuation thereof, each copy of a first predetermined series of copies during a reproducing run,
a second counter for registering cumulatively upon each actuation thereof each copy of a second predetermined series of copies in said reproducing run,
and switching means in said control circuit for producing actuation of said first counter upon the production of each of the first predetermined series of copies and for producing actuation of said second counter upon production of each copy of the second predetermined series of copies,
said switching means being arranged to prevent actuation of said first counter during the reproduction of said first series of copies for at least one cycle in order to allow the machine to complete at least one time-out cycle.

2. A machine according to claim 1 wherein said machine includes
a third counter for registering cumulatively the total of copies in excess of the first and second predetermined series of copies in said reproducing run,
and said switching means includes means for producing actuation of said counter upon production of all copies in excess of said first and second predetermined series of copy.

3. A xerographic reproducing machine having a xerographic drum journaled for rotation,
drive means connected to said xerographic drum to rotate said xerographic drum at a constant speed,
a control circuit connected to said drive means for effecting a reproducing cycle during at least one revolution thereof,
said control circuit having a copy counting means for registering the number of copies produced by the machine during successive reproducing runs,

said copy counting means including a first counter for registering cumulatively upon each actuation thereof, each copy of a first series of copies during a reproducing run,

a second counter for registering cumulatively upon each actuation thereof each copy of a second series of copies in said reproducing run,

and switching means in said control circuit including a series of terminals and a contact arm to contact each terminal,

said switching means including a stepping means associated with said control circuit for advancing said contact arm one terminal for each cycle,

said first counter connected to a first predetermined number of said series of terminals,

said second counter connected to a second predetermined number of said series of terminals,

and at least one terminal being unconnected to any counter to prevent actuation of the first counter during the reproduction of said first series of copies for at least one cycle in order to allow the machine to complete at least one time-out cycle.

4. A machine according to claim 3 wherein said machine includes

a third counter for registering cumulatively the total of copies in excess of the first and second predetermined series of copies in said reproducing run,

and said third counter is connected to the remaining terminals for producing actuation of said third counter upon production of all copies in excess of said first and second predetermined series of copy.

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JOHN M. HORAN, *Primary Examiner.*

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