Jan. 29, 1963 A. J. CERASANI ET AL 3,075,493

XEROGRAPHIC APPARATUS WITH WEB CUTTING MEANS

Filed Sept. 14, 1959 5 Sheets-Sheet 1

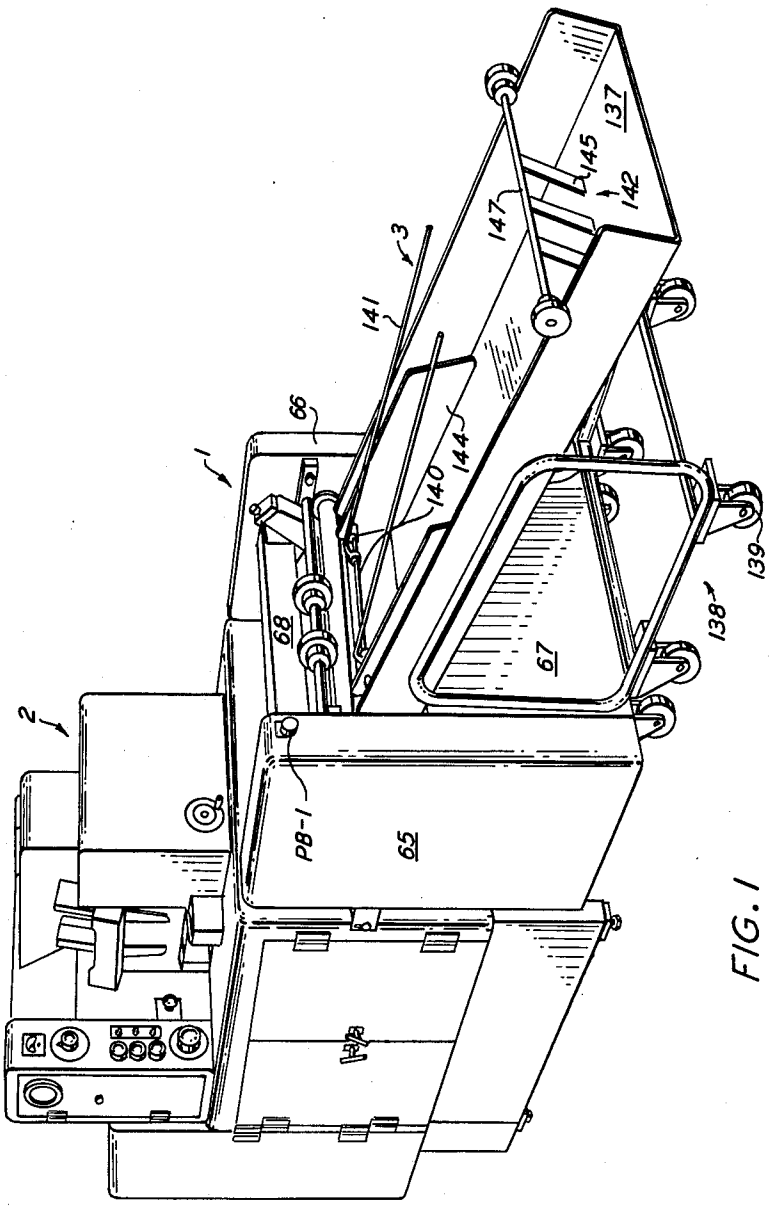

FIG. 1

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XEROGRAPHIC APPARATUS WITH WEB CUTTING MEANS

Filed Sept. 14, 1959 5 Sheets-Sheet 2

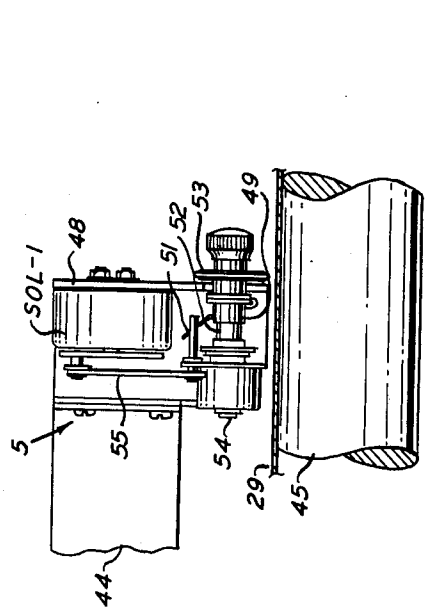

FIG. 6

FIG. 2

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XEROGRAPHIC APPARATUS WITH WEB CUTTING MEANS

Filed Sept. 14, 1959 5 Sheets-Sheet 3

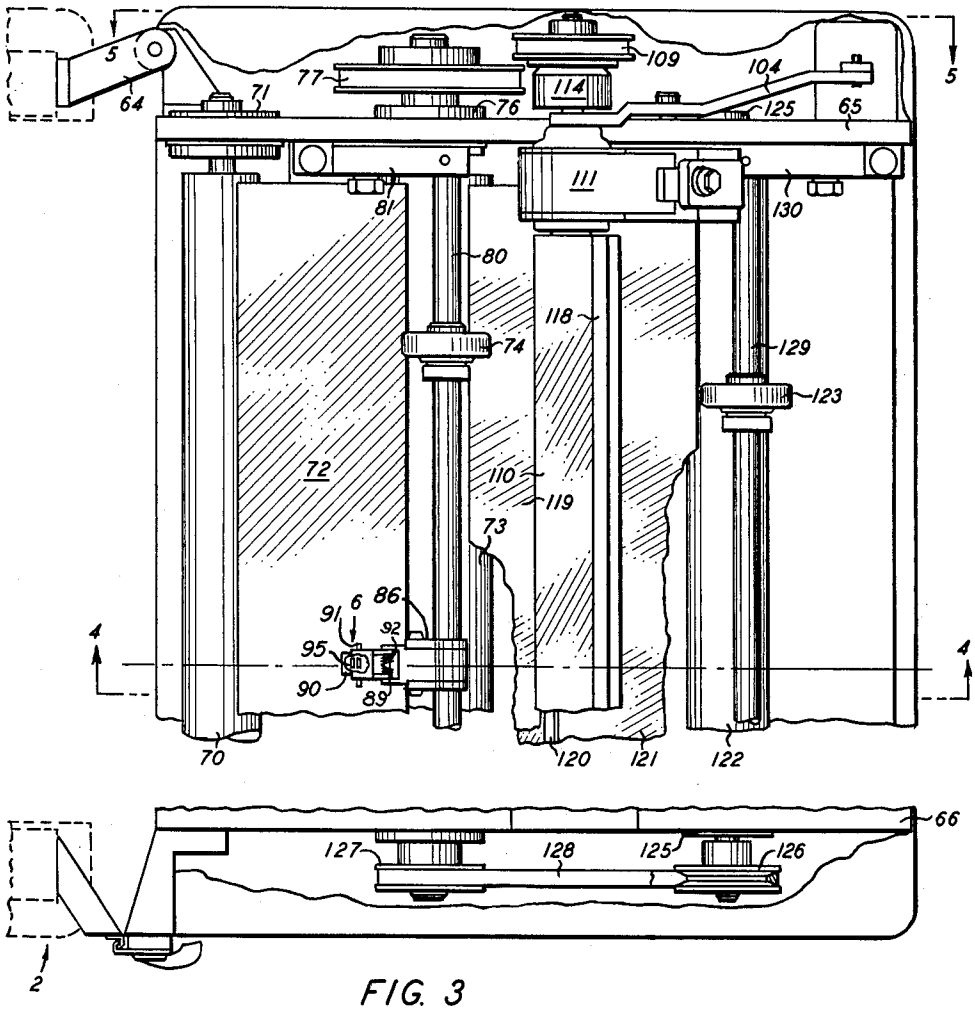

FIG. 3

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XEROGRAPHIC APPARATUS WITH WEB CUTTING MEANS

Filed Sept. 14, 1959 5 Sheets-Sheet 4

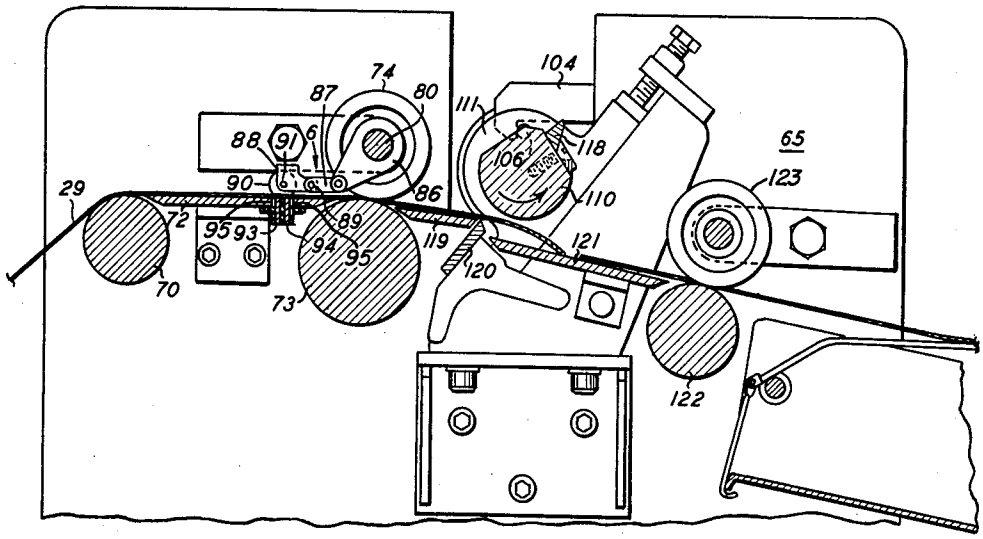

FIG. 4

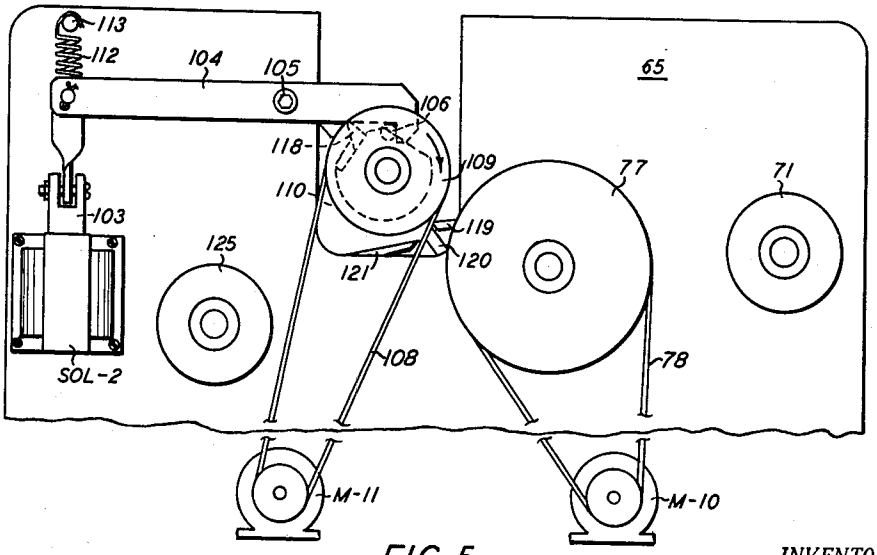

FIG. 5

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XEROGRAPHIC APPARATUS WITH WEB CUTTING MEANS

Filed Sept. 14, 1959

5 Sheets-Sheet 5

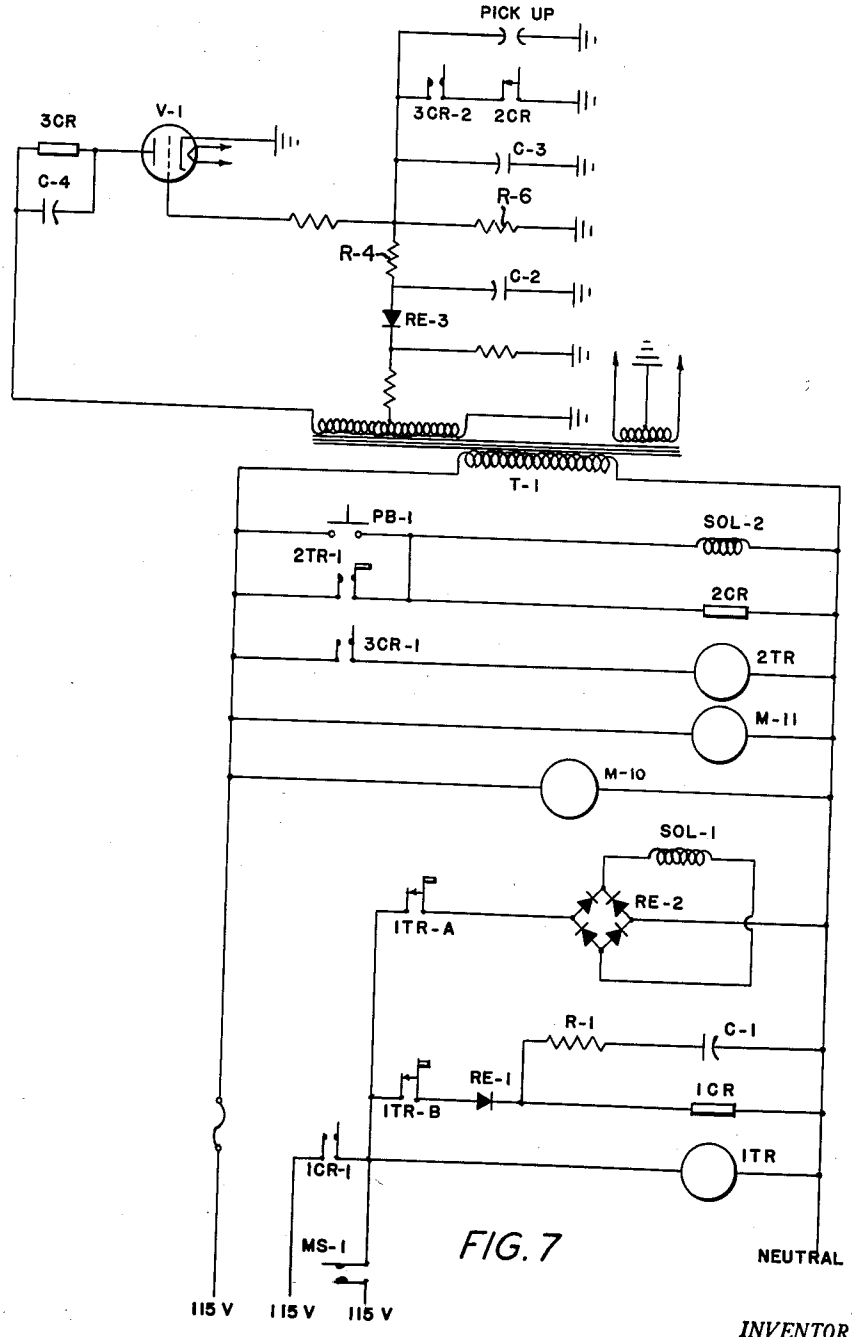

FIG. 7

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United States Patent Office 3,075,493 Patented Jan. 29, 1963

3,075,493
XEROGRAPHIC APPARATUS WITH WEB CUTTING MEANS

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Filed Sept. 14, 1959, Ser. No. 839,839
9 Claims. (Cl. 118—11)

This invention relates to improved paper cutting apparatus for use with automatic xerographic reproduction machines. More particularly, this invention relates to improved paper cutting apparatus for cutting a moving web support surface on which xerographic reproductions have been formed of copy to be reproduced.

In the process of xerography, for example, as disclosed in Carlson Patent 2,297,691, issued October 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 that reaches them, and thereby creates an electrostatic latent image on or in the photoconductive layer. Development of the latent image is effected with an electrostatically charged, finely divided material such as an electroscopic powder that is brought into surface contact with the photoconductive layer and is held thereon electrostatically in a pattern corresponding to the electrostatic latent image. Thereafter, the developed xerographic powder image is usually transferred to a support surface to which it may be fixed by any suitable means.

Most commercially available apparatus for reproducing copy on a continuous web support surface have some means provided for cutting the reproductions from the web. Many reproduction units resort to a manual and separate cutting operation, but, generally, apparatus for large volume reproduction usually employ some automatic cutting means for expediency and economy, as, for example, in the amateur photographic business wherein photographic prints are produced on a continuous web and in the newspaper media wherein a paper cutter severs the pages of newspaper from a continuous web.

Many types of automatic cutting devices are marketed for the cutting of reproductions from a continous web, all of which employ some means to effect cutting in precise spaced relation to the reproduction. One of the more common types utilizes a form of visible indicia placed on the web in spaced relation to the reproduction after which in the course of web movement the indicia is detected or sensed to effect cutter operation. Typical of this type unit is an automatic roll paper cutter, Model 30E, manufactured by the Eastman Kodak Company, of Rochester, New York, for cutting of a continuous web of photographic prints. Operation of this cutter is dependent upon an electrically conductive graphite mark previously placed on the web by a marking device referred to as "Kodak Print Marker Model 5." In the reproduction apparatus with which this is employed a photosensitive web is stopped to expose a negative thereto for printing, after which the web is indexed or advanced for a subsequent exposure. A graphite mark is placed on the web support surface by means of the print marker in spaced relation to the indexing of the photographic exposure or printing cycle. The cutting operation is performed in a separate apparatus in which the conductive mark energizes an electric circuit which momentarily stops the moving web before executing the cut.

In automatic xerographic machines marketed widely by Xerox Corporation, of Rochester, New York, it is the

usual practice for the web support surface on which reproductions are to appear to move continuously at a constant rate. To expose copy to be reproduced to a moving sensitized xerographic plate the copy is moved past a projection system at constant rate in timed relation to the rate of movement of the plate and the web support surface. Since the web moves continuously, whereas copy may be reproduced in irregular intervals, to cut the moving web in spaced relation to a reproduction thereon is dependent upon cutter operation effected from detection or sensing of a reference indicia formed or placed on the web in spaced relation to the reproduction.

A form of cutting apparatus for use with automatic xerographic apparatus is disclosed in copending application Serial No. 803,800, filed April 2, 1959, in the name of Cerasani et al., in which cutter operation is dependent upon detection of a visible reference indicia formed from the original copy xerographically on the support surface in spaced relation to and on the same surface as the reproduction. The present invention constitutes an improved web cutting apparatus operative from detection of visible reference indicia which can be placed on the moving support surface in spaced relation to the reproductions on either side of the web by apparatus external of the xerographic process, as distinguished from a xerographic formation effected by the original copy itself in the course of its movement as disclosed in the above-cited Cerasani application.

The principal object of the invention is to improve cutting apparatus for cutting a moving web support surface. A further object of the invention is to improve cutting apparatus for cutting a moving web support surface in spaced relation to reproductions formed thereon. A still further object of the invention is to improve apparatus for placing visible reference indicia in spaced relation to reproductions on a moving web support surface. A still further object of the invention is to improve apparatus for placing reference indicia in spaced relation to reproductions on a continously moving support surface effected from the movement of copy to be reproduced in timed relation to the support surface.

These and other objects of the invention are attained by means of the apparatus of the invention which includes a web marking apparatus, a mark sensing apparatus and a paper cutter.

A preferred form of the invention is shown in the accompanying drawings, in which:

FIG. 1 is a perspective view of an automatic xerographic reproduction machine combined with the cutter apparatus of the invention;

FIG. 2 schematically illustrates the apparatus of the invention in operative relation with an automatic xerographic reproduction machine;

FIG. 3 is a partial plan view of the paper cutting and mark sensing apparatus of the invention;

FIG. 4 is a sectional view taken substantially on line 4—4 of FIG. 3;

FIG. 5 is a sectional view taken substantially on line 5—5 of FIG. 3;

FIG. 6 is a front elevation of the marker assembly of the invention arranged in operative relation to a paper web support surface; and

FIG. 7 is a wiring diagram.

The invention is shown in the drawings in conjunction with a type of fully automatic xerographic machine for reproducing information contained on microfilm cards and which may be of a type disclosed in copending application Serial No. 776,848, filed November 28, 1958, in the name of R. A. Hunt. This machine reproduces copy on a continuous roll of paper that may have a web width up to 24", from either positive or negative film,

whereby microfilm images of different sizes may conveniently be enlarged to the full width of the web.

Referring to FIG. 1, the paper cutter assembly of the invention is shown in operative relation to an automatic xerographic machine 2 and a stacker unit 3 for the stacking and storing of reproductions cut by the cutter.

For a general understanding of the xerographic processing system with which the invention is shown, reference is had to FIG. 2 in which the various system components are schematically illustrated. As in all xerographic systems based on the concept disclosed in the above-cited Carlson patent, a light or radiation image of copy to be reproduced is projected onto the sensitized surface of a xerographic plate to form an electrostatic latent image thereon. Thereafter, the latent image is developed with an oppositely charged developing material to form a xerographic powder image, corresponding to the latent image, on the plate surface. The powder image is then electrostatically transferred to a support surface to which it may be fused by any suitable form of fusing device, whereby the powder image is caused permanently to adhere to the support surface.

Details of the xerographic machine referred to herein are disclosed in the copending Hunt application mentioned above. In general, however, microfilm to be reproduced is mounted on a microfilm card which is placed in a card magazine 14 from which it is fed seriatim to a card carriage 18 of card carriage assembly 19 by a card handling apparatus generally designated by reference character 15, arranged to the rear of the card magazine assembly. Driving means for the card carriage are provided from motor M–9 having a roller 40 secured to its drive shaft and engaging drive rod 41 whereby the carriage slides on shaft 42 so as to move the card to the right past the optical axis of a projection lens system 16 that is illuminated by a projection lamp LMP–3 for the purpose of scanning the microfilm frame after which a solenoid (not shown) restores the carriage to "start of scan" position. The microfilm card image is projected downwardly through an adjustable objective lens assembly 17 and then reflected upwardly by an adjustable mirror element 20 to either of two transverse mirror assemblies 21 or 22. The light image is projected downwardly through a variable slit aperture assembly 23 and onto the surface of a xerographic plate in the form of a drum 24. After scanning, the apparatus may be operated to repeat the scan, or the scanned card may be ejected and a new card fed.

Xerographic drum 24 includes a cylindrical member mounted in suitable bearings in the frame of the machine and is driven in a counterclockwise direction by a motor M-2 at a constant rate that is proportional to the scan rate of the microfilm card, whereby the peripheral rate of the drum surface is identical to the rate of movement of the reflected light image. The drum surface comprises a layer of photoconductive material on a conductive backing that is sensitized prior to exposure by means of a screened corona generating device 25, which may be of the type disclosed in Walkup Patent 2,777,957, that is energized from a suitable high potential source.

The exposure of the drum to the light image discharges the photoconductive layer in the areas struck by light, whereby there remains on the drum a latent electrostatic image in image configuration corresponding to the light image projected from the microfilm card. As the drum surface continues its movement, the electrostatic latent image passes through a developing station 26 in which a two-component developing material, which may be of the type disclosed in Walkup Patent 2,638,416, is cascaded over the drum surface by means of developing unit 10.

After developing, the xerographic powder image passes a discharge station 27 at which the drum surface is illuminated by a lamp LMP–2, whereby residual charges on the non-image areas of the drum surface are completely discharged. Thereafter, the powder image passes through an image transfer station 28 at which the powder image is electrostatically transferred to a continuously moving support surface web 29 by means of a second corona generating device 30 similar to corona charging device 25, mentioned above.

The support surface to which the powder image is transferred may be of any convenient type although in preferred embodiment it is usually of paper and is obtained from a supply roll 31 and is fed over suitable guide and tensioning rolls and directed into surface contact with the drum in the immediate vicinity of transfer corona generating device 30. After transfer, the support surface is separated from the drum surface and guided through a suitable fusing apparatus 32, which may be of the type disclosed in Crumrine Patent 2,852,651, whereby the powder image is permanently affixed to the support surface. Thereafter, the support surface is fed over a further system of guide and tensioning rolls and through feed-out rolls 33 that are driven by motor M–3. It may be noted here that the rate of web movement is identical with the peripheral rate of the drum surface and proportional to the scan rate of the microfilm card.

After transfer, the xerographic drum surface passes through a cleaning station 34 at which its surface is brushed by a cleaning brush assembly 35, rotated by a motor M–4, whereby any residual developing material remaining on the drum is removed. Thereafter, the drum surface passes through a second discharge station 36 at which it is illuminated by a fluorescent lamp LMP–1, whereby the drum surface in this region is completely flooded with light to remove any electrostatic charge that may remain thereon. Suitable light traps are provided in the system to prevent any light rays from reaching the drum surface, other than the projected microfilm image, during the period of drum travel immediately prior to sensitization by corona generating device 25 until after the drum surface is completely passed through the developing station 26.

As mentioned above, the scan rate of the microfilm card is proportional to the rate of web movement. While the carriage is moving the microfilm card to the right (as viewed in FIGS. 2 and 3) for the purpose of scanning, a means, described below, at a scan position in the course of movement momentarily closes microswitch MS–1 to effect operation of marker assembly 5. Whereas closing of MS–1 could occur just as easily at any scan position, in the embodiment shown it occurs at the "end of scan" by means of drive rod 41 which closes the microswitch MS–1 when moved to the extreme right as viewed in FIG. 2.

For placing a visible reference indicia on web 29, marker assembly 5 is employed (see FIGS. 2 and 6) which is supported within the xerographic machine 2 in operative relation to the web. The composition of the mark could take several forms, the only actual requirement being that it be operative with a sensing unit capable of detecting its presence on the web. In preferred embodiment, the marker assembly employed places an electrically conductive graphite mark on the web which is sensed by a detection means connected to an electric circuit that is actuated by the conductiveness of the mark as will be described below. Other markings devices such as one employing ink and detected by a photoelectric cell could be used in the alternative.

Marker assembly 5 may be the Kodak Print Marker, mentioned above, which is shown on the drawings supported in the xerographic machine in operative relation to web 29 by bracket 44 secured to the side of the xerographic unit. Directly below the marking means of the assembly is back-up roller 45 suitably supported for rotation whereby the web travels over the roller and below the marker assembly.

Momentary closing of microswitch MS-1, as mentioned above, initiates operation of the marker assembly (see also

FIG. 7) by energizing of relay 1CR through rectifier RE–1 and the normally closed contacts 1TRB of timer 1TR. Closing of contact 1CR–1 provides a holding circuit for relay 1CR and potential to timer 1TR which delays operation of the marker to effect mark placement on the web which coincides with the space between reproductions which subsequently are transferred thereto. As may be understood by the arrangement shown in FIG. 2, the mark is to be placed on the web at a time when the corresponding space between reproductions is still on the xerographic drum rotating approximately below aperture assembly 23 and in the embodiment shown the web arrives in marking relation approximately 2 seconds after the "end of scan." At the completion of the timing cycle, timer contact 1TRA closes to energize marker solenoid SOL–1 through rectifier RE–2.

The location of the marker assembly relative to the drum is not considered critical except that the mark should ultimately appear on the web in a predetermined spaced relation to a reproduction. Where initiation of the marker would otherwise effect web marking in advance of the spaced relationship intended, a time delay may be required to delay marking and thereby compensate for the variance in mark location. However, it is apparent that by calculated placing of the assembly, the need for a time delay can be eliminated and the circuit described herein be modified accordingly.

The marker assembly includes a main support bracket 48 by which the operative components are supported. Pivot bracket 49 is secured to a pin (not shown) rotatably journaled between the sides of bracket 48 whereby bracket 49 is maintained erect in relation to web 29 by means of a spring 51. Journaled in the sides of bracket 49 is a shaft 52 to which at one end is secured a graphite marking disk 53 arranged with the disk axis parallel to the moving web and its peripheral marking surface spaced approximately ⅛" therefrom. Upon energizing of solenoid SOL–1 its armature is rotated to move link arm 55 in a manner to pivot bracket 49 and urge the disk towards the paper until making contact therewith. By means of a clutch assembly in housing 54, which is secured to the other end of the shaft 52, the disk is indexed while advancing toward the paper. Brake means (not shown) prevent disk rotation other than by the clutch. With the disk in contact against the moving web, which is backed up by roller 45, a reasonably dense graphite mark is placed thereon which for convenience is placed substantially in the web center. Simultaneous with the closing of contact 1TRA, contact 1TRB is opened and after a delay provided by resistance R–1 and capacitance C–1, relay 1CR is released restoring the components to their pre-operative positions.

In preferred embodiment, as may be seen by the arrangement in FIG. 2, the graphite mark is placed for convenience on the backside of the web, the side opposite to which reproductions are subsequently transferred. It may be noted that for center marking of the paper a backside indicia has been found to be more convenient; however, with other combinations of marking and sensing apparatus or with other arrangements of the apparatus of the preferred embodiment, reference indicia could just as easily be placed on either side of the paper at any spaced relation to the reproductions thereon, the only limitation being that the sensing apparatus be capable of distinctly detecting the reference indicia so placed.

After the reproductions are permanently affixed to the web by fuser 32, the web travels over guide and tensioning rolls and through feed-out rolls 33 (see FIGS. 1 and 2) whereafter the web emerges from the xerographic machine through opening 58 and is threaded into paper cutter assembly 1. The cutter assembly (see FIGS. 3, 4 and 5) includes a base section generally designated as 62 from which the cutter elements are supported and casters 63 by which the cutter assembly may conveniently be positioned to the xerographic unit. The cutter is secured to the xerographic unit by means of hinge 64 (see FIG. 3) and can be locked in position by means of a clamping device 67. For convenience of threading the paper web from the xerographic unit to the cutter assembly, the clamping device may be unlocked and the cutter swung on the casters about the hinge.

Base section 62 includes two side frames 65 and 66, front plate 67, top plate 68 and rear plate (not shown). As web 29 is threaded into the paper cutter assembly it first passes over lead-in guide roller 70 having an eccentric height adjustment mounting from which it is rotatably supported between side frames 65 and 66 in suitable bearing means 71 and wherefrom the web passes onto support plate 72 secured between the side frames. Thereafter the web passes between continuously rotating feed rolls 73 and 74. Roller 73 is rotatably supported between the side frames in suitable bearing means 76 with the end of its shaft extending through frame 65 and to which is secured pulley 77 being driven by belt 78 from pulley 79 secured on the drive shaft of continuously operative motor M–10. There are at least two rolls 74 mounted for rotation on stationary shaft 80 which is supported between side brackets 81 secured to side frames 65 and 66, whereby suitable means (not shown) are provided to prevent lateral movement of rolls 74 on shaft 80. The surfaces of rolls 74 frictionally engage the surface of roll 73.

For detecting a reference indicia placed on the web by marker assembly 5, sensing unit 6 is employed which may be a modified form of Eastman Kodak pickup #818603 and by which an electrically conductive graphite mark on the moving web initiates the cutting cycle. Referring to FIGS. 3 and 4, sensing unit 6 includes a bracket 86 secured to shaft 80 and which supports brace 87 from which roller holder 88 is pivotally secured by means of pin 89. Roller 90 is freely rotatable on pin 91 supported between the sides of holder 88, and spring 92 coiled about pin 89 and secured to the holder has sufficient force to urge the roller into continuous engagement with the edges of closely spaced electrically conductive pickup electrodes 93 and 94 which are insulated from each other and which have about .020" separation and are supported from the underside of plate 72. The electrodes protrude through opening 95 and can be adjustably positioned so that their top edges are substantially flush with the travel line of the paper and are located in the center between the side frames to coincide in position with a graphite mark on the web passing between the roller and the plate whereby roller 90 presses the moving web against the electrodes of the pickup.

As a graphite mark passes over the electrodes a circuit is closed to initiate the cutting cycle which may provide a time delay to allow for the web to travel from the point of mark detection to the position at which the cutting is to be executed. Analogously, as described above in regard to the marking assembly, by proper spacing of the cutter to the pickup unit, the need for a time delay can be eliminated. Before the mark is sensed triode V–1 is cut off by a negative bias furnished from the negative side of rectifier RE–3 and maintained by the resistance divider of resistors R–4 and R–6. In closing the circuit, the graphite mark is paralleled with R–6 to reduce the negative grid bias to ground potential and triode V–1 conducts to energize relay 3CR thereby closing contact 3CR–2 which in series with normally closed contact 2CR maintains the triode grid at ground potential and provides a holding circuit for 3CR. Closure of contacts 3CR–1 energizes timer 2TR which on completion of the timing cycle closes contact 2TR–1 energizing cutter solenoid SOL–2 and also energizing relay 2CR opening its contacts to effect breaking of the holding circuit and restoring the grid of V–1 to a negative bias below cutoff to de-energize the solenoid. Capacitor C–4 prevents chattering of relay 3CR. Manual opera-

tion of the cutter may be initiated by depressing push button PB–1 (FIG. 1).

Energizing of solenoid SOL–2 effects withdrawing of its armature 103 and causing bar 104 to pivot about pin 105 and trip pin 106 of clutch 114 to engage the clutch, which is preferably a type of single revolution clutch manufactured by the Hilliard Corp., of Elmira, New York. The continuous drive transmitted from motor M–11 through pulley 107 to belt 108 and thence to pulley 109 secured to the continuously rotative clutch section is thereby transmitted through the clutch to effect a single revolution of cutter shaft 110 which is rotatably supported at each end in suitable bearing means enclosed in housings 111. After the solenoid is de-energized, spring 112 secured in tension between pin 113 and the end of bar 104, restores the bar to its initial position. Cutting knife 118 is secured to shaft 110 so as to be rotative therewith. Web 29, moving between feed rolls 73 and 74 onto support plate 119, passes its line to be cut over the edge of bed knife 120 at the instant that the cutting edge of knife 118 reaches that part of its revolution to execute the cut. Suitable means are provided for positioning the cutting edges of bed knife 120 and knife 118.

After being cut, the severed sheet section of web slides onto support plate 121 so as to slide into and between pinch rolls 122 and 123 wherefrom the sheet is ejected at an accelerated rate into stacker unit 3 described below. Roll 122 is rotatably supported in suitable bearing means 125 of side frames 65 and 66 whereby its end extends through frame 66. Secured to the end of roll 122 is pulley 126 which has a smaller pitch diameter than pulley 127 secured to an end of roll 73 wherefrom rotative motion is transmitted by belt 128 to rotate roll 122 at a rate faster than the rotative rate of 73. The surfaces of rolls 123 frictionally engage the surface of roll 122 and are rotatably secured to stationary shaft 129 supported between brackets 130 whereby suitable means (not shown) are provided to prevent lateral movement of rolls 123 on shaft 129.

From the accelerated impetus furnished by the pinch rolls, the severed web sheet is imparted into stacker unit 3 (see FIG. 1) which includes a receiving bin 137 supported on a dolly generally designated as 138 which may be moved about on casters 139. Supported between the side walls of bin 137 at the ingress end is shaft 140 to which is secured a pair of parallel longitudinally extended guide rods 141 over which the imparted sheet glides until descending therebetween into the bin against stopper generally designated as 142. Rods 141 as well as paper guides 144 may slidably be positioned laterally and secured on shaft 140 by suitable means in accordance with the width of web being cut. Stopper 142 may conveniently be positioned within the receiving bin and the position secured by means of suitable clamps 146 which can be made to bind on the sides of the bin. For stopping the paper, metal flaps 145 extend downwardly from lateral support bar 147.

In operation, the xerographic apparatus is completely and continuously operative for effecting reproductions of copy to be reproduced which in the described embodiment is for the reproduction from card-mounted microfilm fed seriatim to the apparatus. As each microfilm is to be reproduced, it is optically scanned for the information contained thereon by moving the card by means of carriage 18 in timed relation to the peripheral rate of xerographic drum 24 and consequently in timed relation to the rate of moving web 29 on which reproductions of the originals are to appear. At the end of scan, drive rod 41 momentarily closes microswitch MS–1 to initiate operation of marker assembly 5, which places a graphite mark on the moving web passing thereunder. The mark is carried on the web in spaced relation to reproductions subsequently transferred thereon and the web emerges from the xerographic machine through opening 58 and thence into paper cutter assembly 1. Feed rolls 73 and 74, being continuously driven from motor M–10 draws the web over plate 72 whereat sensing unit 6 detects the presence of the graphite mark. On detection, electrically conductive electrodes 94 and 93 of the sensing unit are energized so as to initiate the cutting cycle. Solenoid SOL–2 is energized which, through clutch 114, effects a single revolution of cutter shaft 110. Cutting knife 118 is thereby rotated and executes a cut of the web as the knife rotates past bed knife 120. The cut sheet slides into and between pinch rolls 122 and 123 which imparts the sheet at accelerated speed and wherefrom it glides over guide rods 141 of stacker unit 3 until descending into bin 137, against stopper 142.

By the apparatus thus described there is disclosed in a xerographic machine for the reproduction of copy in which copy to be reproduced is moved in timed relation to a web support surface on which reproductions are to appear, means for placing a visible reference indicia on the support surface in timed relation to the movement of copy with means for detecting the presence of indicia on the web and from which operation of a paper cutter is effected for cutting the web.

Since many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In an apparatus for reproducing copy wherein copy to be reproduced is moved in timed relation to a moving web-type support surface to which reproductions of the copy are to be transferred, the combination of marking means in operative relation to the support surface for placing detectable indicia thereon, control means operated by the copy moving means to actuate the marking means in timed relation to the movement of copy, sensing means for detecting the presence of indicia formed on the support surface by the marking means, and support surface cutting means actuated by the sensing means.

2. In a xerographic apparatus for reproducing copy wherein copy to be reproduced is moved in timed relation to a moving web-type support surface to which reproductions of the copy are to be transferred, the combination of marking means in operative relation to the support surface for placing detectable indicia thereon, control means operated by the copy moving means to actuate the marking means in timed relation to the movement of copy, sensing means for detecting the presence of indicia formed on the support surface by the marking means, and support surface cutting means actuated by the sensing means.

3. In a xerographic apparatus for reproducing copy from microfilm cards wherein the microfilm cards are moved in timed relation to a moving web-type support surface to which reproductions of the microfilm images are to be transferred, the combination of marking means in operative relation to the support surface for placing detectable indicia thereon, control means operated by the card moving means to actuate the marking means in timed relation to the movement of cards, sensing means for detecting the presence of indicia formed on the support surface by the marking means, and support surface cutting means actuated by the sensing means.

4. In a xerographic apparatus for reproducing copy wherein copy to be reproduced is moved in timed relation to a moving web-type support surface to which reproductions of the copy are to be transferred, the combination of graphite marking means in operative relation to the support surface for placing a graphite mark thereon, control means operated by the copy moving means to actuate the marking means in timed relation to the movement of copy, sensing means for detecting the presence of a graphite mark formed on the support surface by the marking

means, and support surface cutting means actuated by the sensing means.

5. In a xerographic apparatus for reproducing copy wherein copy to be reproduced is moved in timed relation to a moving web-type support surface to which reproductions of the copy are to be transferred, the combination of marking means in operative relation to the support surface for placing visible indicia thereon, electric circuit means energized by the copy moving means to actuate the marking means in timed relation to the movement of copy, sensing means for detecting the presence of indicia formed on the support surface by the marking means, and support surface cutting means actuated by the sensing means.

6. In a xerographic apparatus for reproducing copy wherein copy to be reproduced is moved in timed relation to a moving web-type support surface to which reproductions of the copy are to be transferred, the combination of marking means in operative relation to the support surface for placing an electrically conductive indicia thereon, a first electric circuit means energized by the copy moving means to actuate the marking means in timed relation to the movement of copy, second electric circuit means energized by the indicia formed on the support surface by the marking means, and support surface cutting means actuated by said second electric circuit means.

7. In a xerographic apparatus for reproducing copy from cards which includes a card scanning system for scanning information contained on the cards, wherein cards to be reproduced are moved by the card scanning system in timed relation to a moving web-type support surface to which reproductions of the cards are to be transferred, the combination of marking means in operative relation to the support surface for placing visible indicia thereon, control means operated by the card scanning system to actuate the marking means in timed relation to the movement of the cards, sensing means for detecting the presence of indicia formed on the support surface by the marking means, and support surface cutting means actuated by the sensing means for cutting the support surface between reproductions thereon.

8. In a xerographic apparatus for reproducing copy from microfilm cards fed seriatim to the apparatus which includes a card scanning system for scanning information contained on microfilm cards wherein microfilm to be reproduced is moved by the card scanning system in timed relation to a moving web-type support surface to which reproductions of the microfilm are to be transferred, the combination of graphite marking means in operative relation to the support surface for placing indicia thereon, first electric circuit means energized by the card scanning system to actuate the marking means in timed relation to the movement of microfilm cards, sensing means for detecting the presence of indicia formed on the support surface by the marking means, said sensing means including second electric circuit means energized on detection of indicia on the support surface, and support surface cutting means actuated by said second electric circuit means for cutting the support surface between reproductions thereon.

9. In a copying camera for reproducing images from microfilm the combination of

a continuously moving web-type support surface on which microfilm images are to be reproduced,

an optical scanning system for projecting light images of the microfilm,

a carriage for moving the microfilm in relation to the optical scanning system,

a marker operatively positioned to place an electrically conductive mark on the web-type support surface,

switch means positioned to be actuated by movement of the carriage and connected to electrical circuit means to activate the marker in timed relation to the movement of the microfilm through the optical scanning system;

electrical sensing means operatively positioned relative to the web-type support surface to sense electrically conductive marks on the support surface,

and a support surface cutter positioned to cut the web-type support surface in response to said electrical sensing means, whereby the sensing of electrically conductive marks initiates operation of the cutter to sever the support surface.

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