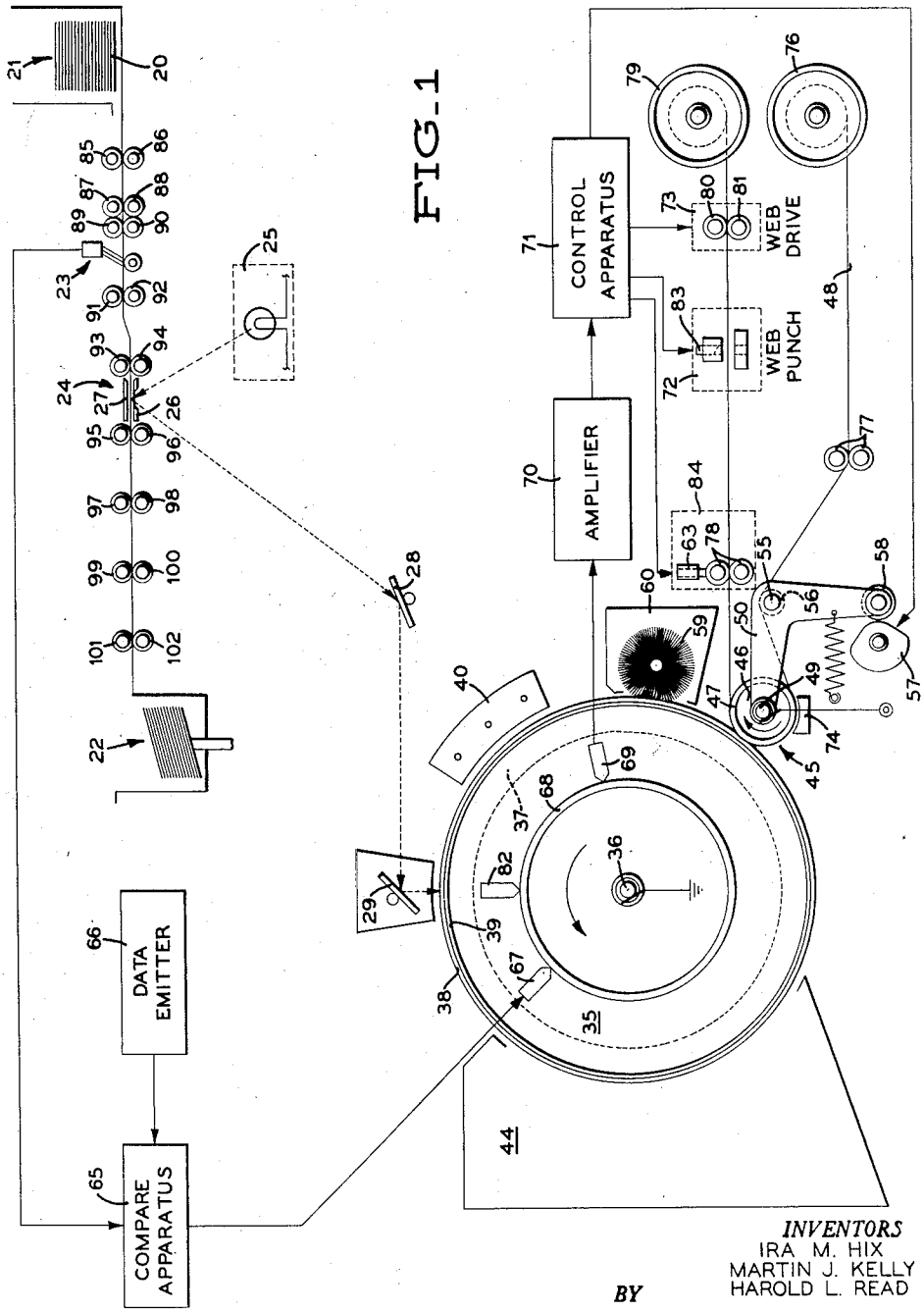
Nov. 11, 1958 I. M. HIX ET AL 2,859,673

ELECTROPHOTOGRAPHIC PRINTER

Filed March 29, 1954 4 Sheets-Sheet 1

FIG. 1



INVENTORS
IRA M. HIX
MARTIN J. KELLY
HAROLD L. READ

BY

J. Tonein Jr.
ATTORNEY

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ELECTROPHOTOGRAPHIC PRINTER

Filed March 29, 1954 4 Sheets-Sheet 2

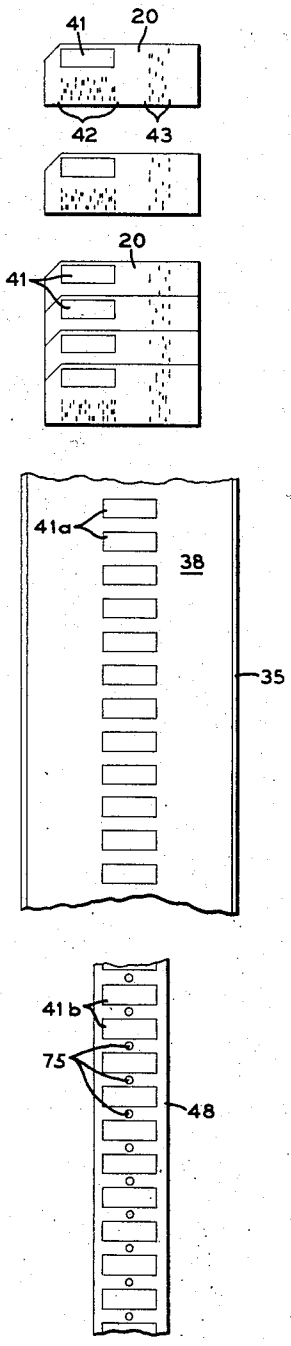

FIG. 2

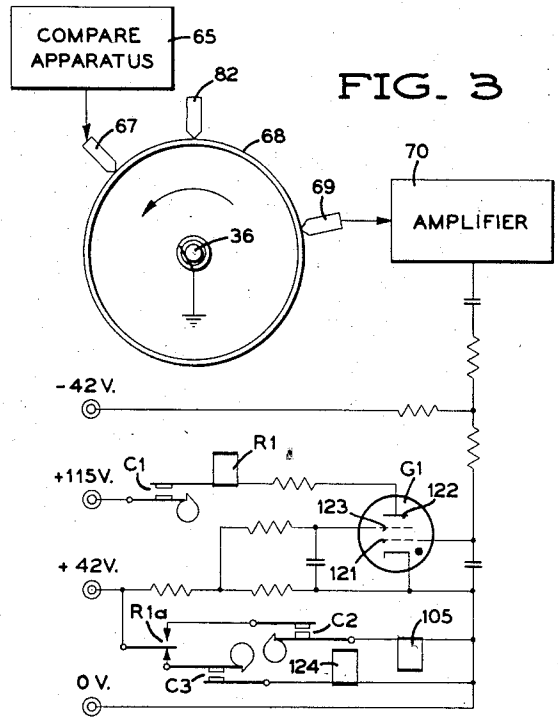

FIG. 3

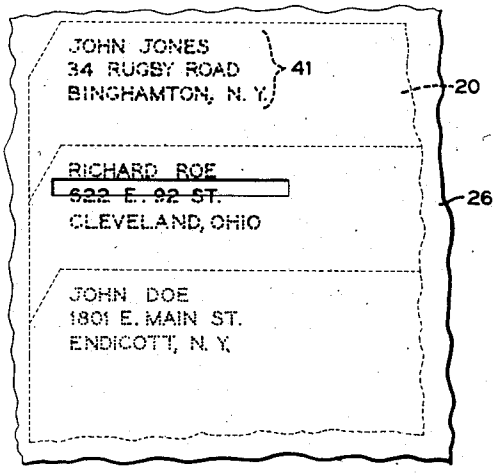

FIG. 4

INVENTORS
IRA M. HIX
MARTIN J. KELLY
HAROLD L. READ

BY

J. Tarcai Jr.
ATTORNEY

Nov. 11, 1958 I. M. HIX ET AL 2,859,673

ELECTROPHOTOGRAPHIC PRINTER

Filed March 29, 1954 4 Sheets-Sheet 3

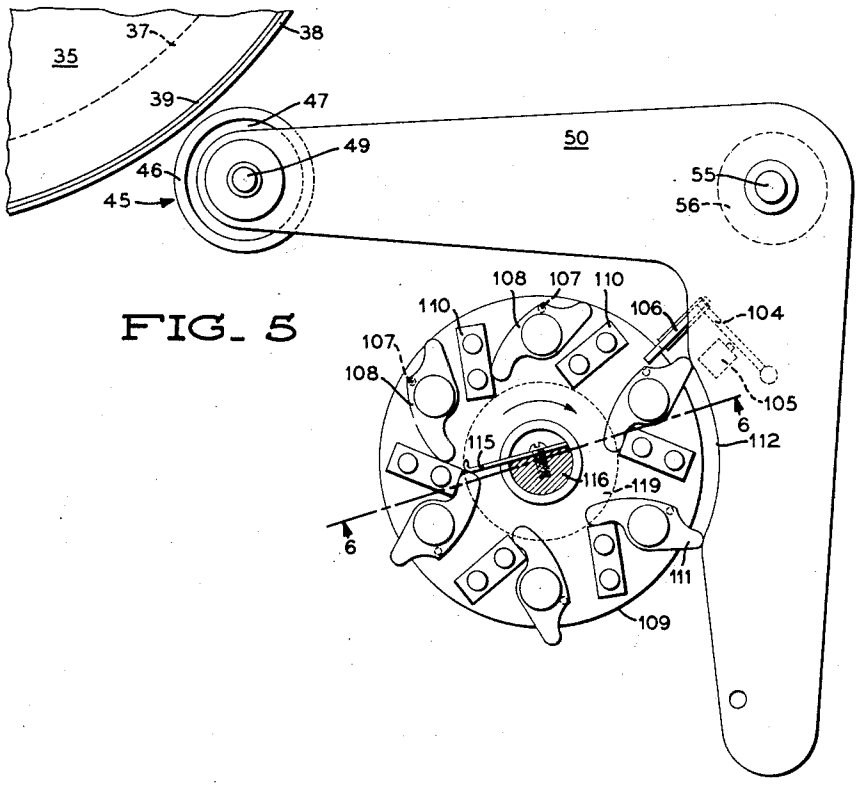

FIG_5

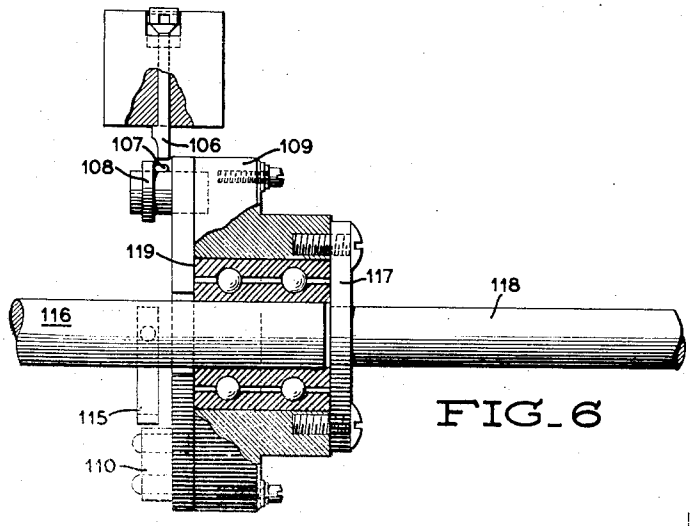

FIG_6

INVENTORS
IRA M. HIX
MARTIN J. KELLY
HAROLD L. READ

BY

J. Jansen Jr.
ATTORNEY

ELECTROPHOTOGRAPHIC PRINTER

Filed March 29, 1954 4 Sheets-Sheet 4

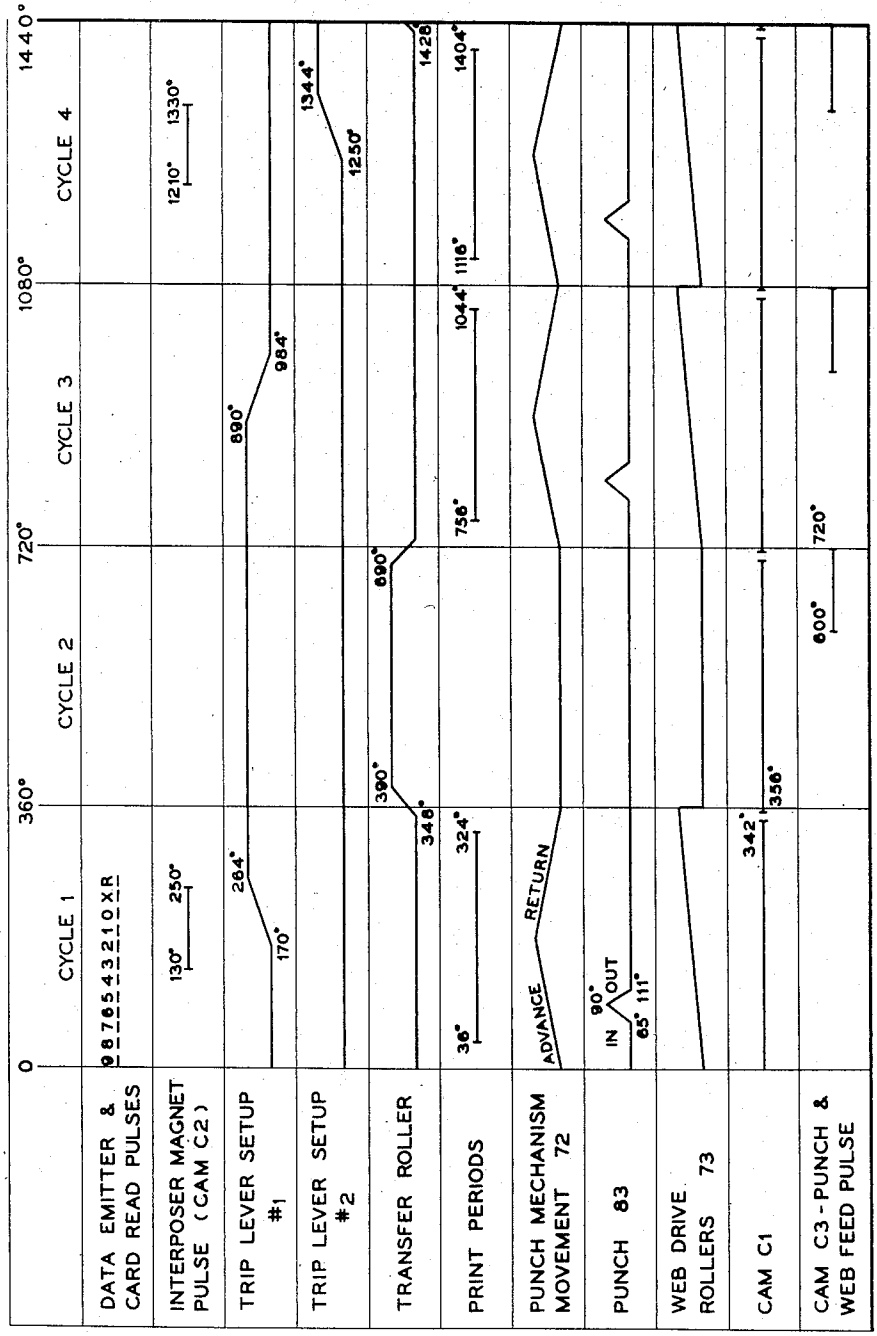

FIG. 7

INVENTORS
IRA M. HIX
MARTIN J. KELLY
HAROLD L. READ

BY

J. Tancini Jr.
ATTORNEY

United States Patent Office 2,859,673 Patented Nov. 11, 1958

2,859,673

ELECTROPHOTOGRAPHIC PRINTER

Ira M. Hix, Vestal, Martin J. Kelly, Endicott, and Harold L. Read, Vestal, N. Y., assignors to International Business Machines Corporation, New York, N. Y., a corporation of New York

Application March 29, 1954, Serial No. 419,392

12 Claims. (Cl. 95—1.7)

This invention relates to record controlled printing machines in general, and to record card controlled electrophotographic Dick Strip printers in particular.

The embodiment of this invention pertains to a selective printing xerographic machine capable of making a duplicate of information appearing on selected source records, such as record cards for example, onto a print receiving material, such as a Dick Strip for instance, whereon the selected imprints are successively arranged. As is well known to persons familiar with the electrophotographic printing art, xerography is a term applied to a printing process in which electrostatic latent images are rendered visible by an electrically charged toner powder, the resulting powder image thereafter being transferred and fixed to a print receiving material.

A broad object of this invention is to provide a practicable electric printer which affords efficient and rapid printing operations that may be selectively controlled.

Other general objects of this invention are to provide a record controlled electrophotographic printer, a selective printing xerographic printer, and a record card controlled xerographic Dick Strip printer.

A still another object of this invention is to provide an improved apparatus for effecting a transfer of selected ones of a plurality of images onto a print receiving material.

As will be described in detail hereinafter, the source records having the information thereon to be transferred, are fed past an optical scanning station in an overlapping arrangement so that the entire surface of each of the source records is not scanned, but instead only the general areas of information on the records are scanned optically. The overlapping arrangement referred to is one wherein a next following card overlaps the preceding card so that the card area defined by the offset edges of the cards, is substantially the area of information to be scanned. Accordingly, another object of this invention is to provide appartus in an electrophotographic printer for projecting an image of select information appearing at a certain place, or places, on successively advanced records.

In line with the foregoing, another object of this invention is to provide a record card feeding mechanism for advancing record cards past an optical scanning apparatus in an overlapping arrangement such that a next following card is positioned with respect to the preceding card in a manner to define the area to be scanned.

Other objects of this invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a somewhat diagrammatic view of a record card controlled electrophotographic Dick Strip printer.

Fig. 2 is a flow diagram depicting generally the operations required in order to place the image of source record information upon a print receiving material.

Fig. 3 is a wiring diagram of the control apparatus for governing the processing of the Dick Strip.

Fig. 4 shows record cards in an overlapping arrangement with respect to the member at the optical scanning station having a scanning slit therein.

Fig. 5 is a view of the transfer roller camming mechanism.

Fig. 6 is a sectional view taken along plane 6—6 of Fig. 5.

Fig. 7 is a timing chart.

General description

Referring to Fig. 1, record cards **20** to be operated on are stacked in hopper **21**, and are fed, one by one, each card cycle out of hopper **21** towards stacker **22**. Successive pairs of feed rolls **85** through **102** cause a record card to be advanced during successive card cycles past reading brush station **23** and optical scanning station **24**. As will be explained hereinafter, the aforesaid feed rolls are driven at speeds so that the cards are fed in seriatim past brush station **23** separately and successively, and past optical station **24** in an overlapping arrangement (see also Fig. 4).

Associated with the optical scanning station is a single light ray projector **25** for directing a band of light rays upon the constricted center of the aperture in member **26**, to thereby effect a conventional light scanning operation whereby the image of the printed information, identified by reference numeral **41** in Fig. 2, on a record card **20** is transferred by mirrors **28** (Fig. 1) and **29** to the surface of xerographic drum **35**.

The xerographic drum is mounted on a shaft **36** and is driven by an electric motor (not shown) in a counterclockwise direction. This drum includes an electrically conducting cylinder **37** and a light sensitive photoconductive insulating printing plate **38**. The plate is carried by a sheet of any flexible metal or other conductive material **39** that enables its being flexed around and attached to the cylinder **37**.

With the feeding of record cards from hopper **21** to stacker **22**, the xerographic drum is caused to rotate by shaft **36** at a speed correlated to the feeding speed of the record cards. As successive incremental areas of the light sensitive photoconductive insulating plate **38** are moved past ion-producing charging unit **40**, the aforesaid plate is charged electrically. Carlson Patent No. 2,588,699 issued on March 11, 1952, may be referred to for a complete showing and description of the afore-mentioned ion-producing charging unit **40**.

Consequent upon the exposure of the surface of plate **38** to the optical image of an area of a record card **20**, an electrostatic latent image is caused to remain thereon for the reason that those electrically charged incremental areas of plate **38** onto which light rays are directed, are discharged, and those areas not illuminated by light rays remain charged. This, of course, is for the reason that plate **38** is a photoconductive insulating material which is in electrical contact with conductive backing sheet **39**, said sheet **39** being electrically connected to electrically grounded shaft **36**. Hence, after photoconductive plate **38** is exposed to an aforementioned optical image, an electrostatic latent image corresponding to the optical image will remain on plate **38**, this electrostatic latent image being one wherein the "dark" characters within printed information image areas identified by reference numeral **41***a* (Fig. 2) retain an electrical charge, and the "light" image areas corresponding to the record card surface having no printed information thereon are no longer charged.

Continued rotation of the xerographic drum **35** in a counterclockwise direction causes the electrostatic latent image portions **41***a* of plate **38** to be moved into a

developing chamber 44 (Fig. 1) similar to one utilized in the apparatus of Schaffert Patent No. 2,576,047 which issued on November 20, 1951, and wherein the electrically charged toner powder is permitted to flow onto plate 38 and over the electrostatic latent image. As a result thereof, a charged powder image which visibly defines the electrostatic latent image is formed on the surface of the plate 38. The surplus toner powder which does not adhere to the electrostatic latent image formed, falls into a receiving receptacle within chamber 44. The toner may be of the type described in Copley Patent No. 2,659,670 which issued on November 17, 1953; i. e., an electroscopic powdered dye, pigment, carbon or other colored substance. A further rotation of the xerographic drum causes the powder image on plate 38 to move out of chamber 44 and into the transfer, or printing, station having transfer roller 45 thereat. Inasmuch as the shifting powder image transfer apparatus is shown and described in a copending U. S. patent application, Serial No. 419,314, filed on March 29, 1954, now Patent No. 2,807,233, reference may be had to the application for more detailed information.

Briefly, however, the transfer roller comprises an inner-metallic conductive portion 46 and an outer portion 47 of very resilient or yielding material having a high electrical resistance of at least 10^6 ohms per cubic centimeter, as for example, a layer of soft conducting rubber. Transfer roller 45 is spring-biased in the direction of xerographic drum 35 so that web 48 is normally sandwiched between plate 38 and the surface of transfer roller portion 47. The transfer roller is supported by shaft 49 thereof which, in turn, is journaled at each end in a pair of supporting arms 50 in a manner so that shaft 49 and roller 45 are electrically insulated from arms 50. Inverted L-shaped arms 50 are pivotally mounted on shaft 55 which has an idler web feed roller 56 rotatably mounted thereon, and which is fixed in conventional printing machine support frames (not shown).

As long as charged powder images are to be transferred from plate 38 onto web 48, the generally L-shaped arms 50 will be positioned by the spring-biasing force so that transfer roller 45 supports web 48 in contact with plate 38. The potential applied to transfer roller 45 will cause the charged powder particles to migrate from the xerographic drum to the web. To disable printing, however; i. e., to preclude the transfer of charged powder images, camming mechanism 57 is operated so as to engage follower 58, and to thereby move transfer roller 45 a sufficient distance away from xerographic drum 35.

In order to remove any toner powder which remains on the surface of plate 38 prior to the incremental areas thereof becoming charged again by ion-source charging unit 40, a rotating plush roller 59 is provided. This roller is positioned within a housing 60 for retaining the powder removed by the counterclockwise rotating action of the roller, from the xerographic drum plate 38. A vacuum cleaner unit (not shown) is also associated with housing 60 in order to remove the powder therefrom.

The selective printing operation is governed by a data compare apparatus identified in Fig. 1 by reference numeral 65. The comparing operation is such that as each card 20 is fed past reading station 23, the coded indicia, for example perforations in accordance with the well-known IBM code, in a selected control field 43 (see also Fig. 2) of the card, is compared by apparatus 65 with a designated standard data directed thereto by data emitter 66. An unmatched, or unequal, data condition during any card cycle will cause an electrical impulse to be directed to magnetic drum recording head 67, to thereby record a magnetic spot upon the magnetizable surface of a magnetic storage drum 68. This drum is also attached to shaft 36 so that drums 35 and 68 rotate in step with one another. When a magnetic spot on the surface of drum 68 is detected by magnetic drum reading head 69, a signal is transmitted to amplifier circuit 70 which, in turn, directs a corresponding signal to control apparatus 71. As a result thereof, the web punch mechanism 72 and the web drive mechanism 73 and 84 are disabled, and the camming mechanism 57 is operated so as to cause transfer roller 45 to be shifted away from xerographic drum 35. The shifting movement applied to transfer roller 45 and the mechanism associated therewith is sufficient to effect a braking operation upon web 48 by squeezing the web between transfer roller 45 and braking member 74. The resulting air gap which is defined by the surface of plate 38 and the periphery of transfer roller 45, is great enough so as to preclude a transfer of the charged powder from xerographic drum 35 onto web 48.

It must be pointed out at this time that the selective printing operation does not necessarily need to be one wherein printing is suppressed consequent upon the detection of an unmatched data condition. As is well known to persons familiar with the record card controlled machine art, such operations may be effected as a result of the detection of any one of a plurality of predetermined relationships between separate groups of data.

The web punch mechanism identified by reference numeral 72 is used to perforate a Dick Strip hole 75 (see also Fig. 2) in web 48 while the web is in motion. That is, punch mechanism 72 causes a punch-in-flight operation so that as web 48 is being advanced by the web drive mechanism from reel 76 past guide rollers 77, around idler roller 56 and transfer roller 45, and past pressure fixing rollers 78 and feed rollers 80 and 81, to reel 79, a perforation 75 is placed in the web during the forward movement thereof. A punching mechanism of this type is shown and described in Patent No. 2,136,210 issued on November 8, 1938, to E. H. Hall. Referring to Fig. 7, the punch mechanism movement is shown to be an oscillating or reciprocating one whereby the punch mechanism 72 (see also Fig. 1) is advanced with the web during the first half of a machine cycle, and returned to a home, or starting, position during the last half of the machine cycle. It is also shown in Fig. 7 that punch 83 starts to perforate web 48 at 65° and is returned to the starting point at 111°.

Web drive feed roller 81 (Fig. 1) which engages companion roller 80 so as to advance the web and punch mechanism 72, are connected to the main drive mechanism (not shown) through a conventional ratchet type clutch. The clutch magnet 124 thereof is shown in Fig. 3 to be included within control apparatus 71 so that whenever magnetic drum reading head 69 detects a magnetic spot on the surface of the drum, drive roller 81 and punch mechanism 72 are disconnected from the afore-mentioned main drive mechanism. Pressure fixing rollers 78 are utilized to fix those powder images transferred onto web 48. A sufficient line contact pressure of 500 pounds per lineal inch of contact, for example, will cause toner powder to flow into the fibers of the web material. In order that the web is not torn or mutilated by being pulled through the transfer rollers 78 under high pressure, the said rollers are also connected to the main drive mechanism by means of the afore-mentioned ratchet type clutch. As a result, rollers 78 are driven in step with drive roller 81. An oil pad 63 is provided to remove any excess powder which will cling to the upper fixing roller.

As is normal in magnetic drum operations, erase head 82 is provided so as to remove all magnetic spots applied to the surface of drum 68 by recording head 67, after these spots have been detected by reading head 69.

Card feed mechanism

As stated hereinbefore, the record cards 20 (Fig. 1) to be operated on are stacked in hopper 21, and are fed, one by one, each card cycle out of hopper 21 towards stacker 22 by means of successive pairs of feed rolls 85 through 102. The card feed mechanism is basically a conventional one such as is used in record card sorters.

However, in order to cause the cards feeding in seriatim past brush reading station **23** separately and successively to be arranged in an overlapping condition when moving past optical station **24**, improvements have been made to the card feed mechanism which will now be taken up.

For illustrative purposes only, it is assumed that record cards **20** are the well-known IBM tabulating cards, each of which is three and one-quarter inches in length. The bottommost card **20** is fed by a conventional picker such as is shown in J. J. Robbins et al. Patent No. 2,448,830 which issued on September 7, 1948, into the bite of a first set of feed rolls **85** and **86** having a peripheral speed of two thousand inches per minute. Successive feed rolls **87** through **92** also rotate at a peripheral speed of two thousand inches per minute. Thus, inasmuch as the afore-mentioned card picker is operated so that there is a distance of four inches between the leading edges of succeeding cards, feed rollers **85** through **92** cause five hundred cards per minute to be advanced past brush reading station **23**. As a result, the three and one-quarter inch cards are separated by a three-quarter inch spacing between the trailing edge of any one card and the leading edge of the next following card. The fifth, sixth and seventh sets of feed rolls, i. e., feed rolls **93** through **98**, respectively, are operated at a peripheral speed of six hundred and twenty-five inches per minute. As a result of this slower speed which is applied to the record cards by feed rollers **93** through **98**, and in view of the offset card line between the fourth and fifth sets of feed rolls whereby the advancing cards are directed downwardly, the record cards being advanced past optical station **24** are arranged in an overlapping arrangement such that a next following card is above and slightly behind the preceding card. At this time the trailing edge of the said preceding card is one and one-quarter inches in front of the leading edge of the said next following card (see also Fig. 4). Inasmuch as the printed information **41** (see also Fig. 2) is within an area one and one-sixteenth inches tall, and is positioned near the trailing edge of a record card **20**, it may now be seen that every record card acts as an optical shield for its next following record card. Thus, recorded code information such as that identified by reference numeral **42** (Fig. 2) will not be transferred onto the xerographic drum **35**, and the image areas **41***a* may be spaced more closely on plate **38** of continuously rotating drum **35**.

Feed rolls **99** and **100** are operated at a peripheral speed of twelve hundred fifty inches per minute whereas feed rolls **101** and **102** are operated at a peripheral speed of twenty-five hundred inches per minute, whereby the record cards in an overlapping arrangement, are separated. This of course, is for the reason that it is desirable to have the record cards **20** enter the stacker **22** one at a time in order to provide against card jams which might occur very frequently at high card feeding speeds, such as five hundred cards per minute for instance.

Image transfer apparatus

As mentioned previously, a shifting image transfer apparatus of the type shown and described in copending patent application Serial No. 419,314, now Patent No. 2,807,233, is utilized in the printer embodiment shown in Fig. 1.

A mechanical storage device such as is shown in Fig. 5, may be used in place of camming mechanism **57** (Fig. 1), and will now be described. Referring to Figs. 1, 5 and 6, when a magnetic spot is detected by reading head **69**, an electrical signal is caused to be applied to interposer magnet **105**. The resulting energization of this magnet and attraction thereto of armature **104** will cause interposer **106** to be moved so that the operating end thereof is placed in the path of a lug **107** on a trip lever **108**. Inasmuch as trip lever carrier **109** having trip levers **108** and stop blocks **110** attached thereto, rotates continuously, and in step with xerographic drum **35**, the particular trip lever whose lug **107** is engaged by the interposer **106**, is caused to pivot in a counterclockwise direction until the extended end of the trip lever engages stop block **110**. As may be seen, a trip lever in this position, i. e., in an operating position, provides a camming end **111** which extends beyond an outer circumference of carrier **109**. As carrier **109** rotates, this camming end subsequently engages the portion of arm **50**, identified by reference numeral **112**, so as to shift the transfer roller **45** away from xerographic drum **35**.

Reference to the timing chart of Fig. 7 will show that if the interposer magnet **105** is energized during a machine cycle, cycle 1 for example, a trip lever **108** will be set to a camming position at 264° of cycle 1 and will remain in this position until 170° of cycle 3, to thereby provide the necessary transfer roller camming action during cycle 2 when print suppression is desired. At 170° of the third cycle, the other end of trip lever **108** engages a stationary resetting arm **115** which is connected to a support **116** fixed in a frame member (not shown), and causes the previously operated trip lever **108** to be reset to its inactive position. As is shown, carrier **109** has six trip levers **108** pivotally mounted thereon, the arrangement being such that the carrier is rotated at a speed to complete one revolution for every six card feed cycles. Referring particularly to Fig. 6, carrier **109** is attached to support plate **117** which, in turn, is fixed to rotatable shaft **118**. Bearing **119** is positioned between stationary support **116** and rotatable carrier **109**.

Circuits

A conventional card reading station **23** such as is shown in Phelps et al. No. 2,602,544 which issued on July 8, 1952, is employed to sense the perforated code indicia **43** (Fig. 2) in record cards **20** that are fed from hopper **21** to stacker **22**. Comparing apparatus **65** is comprised of existing data comparison circuits, such as those, for example, shown in the afore-mentioned Phelps et al. patent. A plurality of comparison circuits, one for each card column representing a different order, are connected in tandem to control comparison result means so that the relation of the values in the higher orders dominates the relation of values in the lower orders. Briefly, upon the detection of unmatched orders of data in any one of the higher order comparison circuits, an electrical signal will be directed from this circuit to the result means, and will be caused to bypass the succeeding comparison circuits.

Data emitter **66** is a conventional apparatus, one such emitter being shown and described in Rabenda et al. Patent No. 2,602,394 which issued on July 8, 1952. As is shown in Fig. 8*a* thereof, any digit and/or alphabetic character representing signals in accordance with the well-known IBM code, may be had every machine cycle. Thus, by permitting only predetermined "standard data" signals to be directed from emitter **66** to compare apparatus **65**, and by comparing these selected data emitter signals with the signals resulting from the reading of selected control field **43** (Fig. 2) card columns at reading station **23** (see also Fig. 1), compare apparatus **65** may be controlled to direct an electrical pulse to magnetic drum recording head **67**. Inasmuch as the system for magnetic storage is also a conventional one, reference may be had to existing prior art, such as Patent No. 2,587,532 for example, issued to Schmidt on February 26, 1952, for suitable magnetic spot reading and recording circuits.

The control apparatus identified by reference numeral **71** in Fig. 1, is shown in detail in Fig. 3. Whenever a magnetic spot on the surface of drum **68** is detected by reading head **69**, an electrical impulse is directed to an amplifier circuit **70**. This circuit, in turn, directs a positive voltage signal of approximately 50 volts to the control grid **121** of gas tube G1 via a capactive coupling. As is shown, the anode **122** of tube G1 is connected to a +115 volt source through cam contacts C1 (see Fig. 7

for timing thereof) and relay R1, whereas the screen grid 123 is connected to a +42 volt source by a resistor network. The detection of a magnetic spot by reading head 69 and the resulting +50 volt impulse to control grid 121, causes tube G1 to fire, whereby the energization of relay R1 is effected. Contacts R1*a* transfer consequent upon the energization of relay R1 so as to complete a circuit when cam contacts C2 close to interposer magnet 105 (see also Fig. 5). As described previously, the energization of magnet 105 will cause a trip lever 108 to be set up, whereby the transfer roller 45 (see also Fig. 1) will be shifted away from xerographic drum 35 so as to suppress printing.

Referring once again to Fig. 3, the absence of a magnetic spot on drum 68 will result in tube G1 remaining non-conducting and relay R1 being maintained de-energized. Thus, when cam contacts C3 close at 240° (see also Fig. 7), a circuit will be completed to punch and web feed mechanism clutch magnet 124. The energization of clutch magnet 124 and the resulting operation of the clutch associated therewith, will cause the companion web drive rollers 80 (see also Fig. 1) and 81, and the fixing rollers 78, to rotate, and the punch mechanism identified by reference numeral 72 to operate in the manner described previously.

Operation and summary

As an example, which, however, is not to be construed in a limiting sense, a main file of record cards 20 (Fig. 1) may comprise names and addresses of magazine subscribers, for instance, and associated perforated indicia represented by reference numerals 42 and 43 in Fig. 2. In the normal course of business, all of these record cards in the main file would ordinarily be arranged alphabetically. Hence, inasmuch as in certain special operations it may be desirable to print the names and addresses of only those subscribers within a particular sub-category, such as doctors for example, provision must be made for selective printing.

It is assumed that every record card having the name and address of a doctor printed thereon in the area identified by reference numeral 41, to have an X, or 11, perforation (see also Fig. 7) in a single designated card column within the field identified by reference numeral 43. By connecting the reading brush for reading the aforesaid single designated card column to compare apparatus 65, and by connecting data emitter 66 to compare apparatus 65 so than an X timed impulse is directed from data emitter 66 every machine cycle to compare apparatus 65, those record cards within the afore-mentioned "doctor" sub-category may be detected.

The record cards 20 (Fig. 1) are fed past reading station 23 separately so that a comparison is effected every machine cycle with the pulses directed from data emitter 66, and past optical station 24 in an overlapping arrangement whereat the printed information image from every card is directed onto plate 38 of xerographic drum 35. As explained previously, whenever the record card-emitter data compared in compare apparatus 65 are unmatched, a signal is applied to magnetic drum recording head 67 in order to cause a magnetic spot to be placed on the surface of magnetic drum 68. Inasmuch as xerographic drum 35 and magnetic drum 68 are both fixed to shaft 36 for rotation therewith, the aforesaid drums move in step with one another. Thus, there is a definite physical relationship maintained between the electrostatic latent image of a printed information 41*a* (see Fig. 2) carried on the card as information 41 and a magnetic spot caused to be applied to the surface of drum 68 as a result of the perforated indicia on the record card having the corresponding printed information thereon.

So long as magnetic drum reading head 69 does not detect a magnetic spot on the drum surface, web 48 is advanced by the cooperative operation of drive rollers 80 and 81, and pressure fixing rollers 78, from reel 76, around transfer roller 45 to reel 79, and punch mechanism 72 is caused to operate. At this time transfer roller 45 is in a position whereby web 48 is sandwiched between plate 38 and transfer roller 45 so as to effect a printing, or transfer, operation. However, when reading head 69 detects a magnetic spot on the surface of magnetic drum 68, the resulting signal which is applied to control apparatus 71 renders the web punch mechanism 72 and web drive mechanism 73 and 84 disabled, and the transfer roller camming mechanism identified generally by the reference numeral 57, operated. The resulting action causes transfer roller 45 to be shifted away from xerographic drum 35, whereby the powder image transfer process is stopped. The transfer roller will remain in the latter designated non-print position in the event another magnetic spot is detected by 69, said another magnetic spot corresponding to a succeeding powder image 41*a* on plate 38. And during the period that transfer roller 45 is in a non-print position, web 48 is braked by the cooperation between transfer roller 45 and braking member 74.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the devices illustrated in their operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A record card controlled electrophotographic printer comprising record card indicia sensing means, record card printed information scanning means, means for feeding record cards past said sensing means and said scanning means, an electrostatically charged photoconductive member, an optical system for operatively connecting said scanning means and said member so as to impress electrostatic latent images of record card printed information on said member, means for developing the electrostatic latent images by applying a transferable powder thereto, means including a rotatable conductive cylinder for applying an electric force at a printing zone, means for moving said member relative to said cylinder in a timed relation to the feeding of record cards past said sensing means, means for feeding a print receiving material between said member and said cylinder in a timed relation to the movement of said member, whereby said cylinder is caused to rotate, and means controlled by said sensing means for shifting said cylinder relative to said member so that the strength of the electric force at the printing zone is varied from one limit whereat powder images are caused to transfer from said member to said print receiving material, to another limit whereat the powder images are caused to remain on said member.

2. A record card controlled electrophotographic printer including record card indicia sensing means, and record card feeding means for moving record cards, one by one, past said sensing means; in combination with a rotatable member adapted to support charged powder images thereon; a normally operative apparatus having a shiftable conductive cylinder to apply an electric force at a printing zone for transferring at said printing zone select ones of said charged powder images to a print receiving strip; means for rotating said image supporting member so that the surface thereof is moved relative to said conductive cylinder in a timed relation to the feeding of record cards past said sensing means; normally operative means for feeding said print receiving strip through said printing zone defined by the opposing surfaces of said image supporting member and said conductive cylinder and in a timed relation to the rotational movement of said member; and means controlled by said sensing means for shifting said conductive cylinder away from the surface of said image supporting member

to suppress charged powder image transfer onto said print receiving strip, and for concurrently therewith rendering inoperative said print receiving strip feeding means.

3. A printer according to claim 1 additionally comprising means for permanently affixing to said print receiving material the powder images transferred thereto.

4. A printer according to claim 1 wherein said record feeding means includes successive sets of record feed rolls for advancing records past said indicia sensing means one by one and past said information scanning means in an overlapping arrangement such that one record is positioned to partially overlap an adjacent record so that the record information to be scanned on said one record is defined by said adjacent record.

5. In an electrophotographic machine of the class described, the combination of a selectively operable transfer apparatus, record indicia sensing means, record information scanning means for producing optical images of said information, means for feeding records past said indicia sensing means and said information scanning means, electrostatically charged photosensitive means for storing electrostatic charge patterns of optical images projected thereon, means for operatively connecting said optical information scanning means and said electrostatically charged photosensitive means so that an electrostatic charge pattern corresponding to an optical image of record information is caused to be stored in said photosensitive means, means for developing the stored electrostatic charge pattern images of record information by applying a pigmented electroscopic material thereto, means for moving said photosensitive means so that the developed images of record information are moved past said transfer apparatus at a speed correlated with the speed of feeding records past said indicia sensing means, means for moving a copy sheet intermediate said photosensitive means and said transfer apparatus at a speed correlated with the speed of moving said photosensitive means, and means controlled by said indicia sensing means for governing the operation of said selectively operable transfer apparatus so that only certain select ones of the developed images of record information are transferred to the copy sheet.

6. In an electrophotographic machine of the class described, the combination of a selectively operable transfer apparatus, record indicia sensing means, record information scanning means for producing optical images of said information, means for feeding records past said indicia sensing means and said information scanning means, an endless electrostatically charged photosensitive means for storing electrostatic charge patterns of optical images projected thereon, means for operatively connecting said optical information scanning means and said electrostatically charged photosensitive means so that an electrostatic charge pattern corresponding to an optical image of record information is caused to be stored in said photosensitive means, means for developing the stored electrostatic charge pattern images of record information by applying a pigmented electroscopic material thereto, means for moving said photosensitive means so that the developed images of record information are moved past said transfer apparatus at a speed correlated with the speed of feeding records past said indicia sensing means, means for moving a copy sheet intermediate said photosensitive means and said transfer apparatus at a speed correlated with the speed of moving said photosensitive means, means controlled by said indicia sensing means for governing the operation of said selectively operable transfer apparatus so that only select ones of the developed images of record information are transferred to a copy sheet, and means for removing from the surface of said photosensitive means the residual electroscopic material remaining on said photosensitive means after the operation of said transfer apparatus.

7. A record card controlled electrophotographic printer having record card sensing means, and record card feeding means for advancing the record cards past said sensing means, in combination with a movable member having a series of spaced charged powder images on the surface thereof, each of said images being associated with one of the record cards fed past said sensing means, a selectively operable powder image transfer means, means for moving said member relative to said transfer means so that the powder images are moved past said transfer means at a speed correlated with the speed of feeding record cards past said sensing means, means for moving a powder receiving material intermediate said member and said transfer means at a speed correlated with the speed of moving said member, and means governed by said sensing means for controlling said selectively operable transfer means so that only certain select powder images are transferred onto a power receiving material.

8. A record card controlled electrophotographic printer including record card indicia sensing means, and record card feeding means for moving record cards past said sensing means; in combination with a member adapted to support charged powder images thereon; a print receiving material; a normally operated apparatus effective to apply an electric force at a printing zone for transferring at said printing zone certain select ones of said charged powder images to the print receiving material; means for moving said charged powder image supporting member so that the images thereof are moved relative to said normally operated apparatus in a timed relation to the feeding of record cards past said sensing means; normally operated means for feeding said print receiving material through said printing zone in a timed relation to the movement of said charged power image supporting member; and means controlled by said sensing means for rendering said normally operated apparatus disabled to suppress powder image transfer onto said print receiving material.

9. In a cyclically operable machine of the class described, the combination of a selectively operable transfer apparatus, record card indicia sensing means, record card information scanning means for producing optical images of said information, means for feeding a record card past said indicia sensing means and said information scanning means every machine cycle, means for emitting predetermined control data every machine cycle, electrostatically charged photosensitive means for storing electrostatic charge patterns of optical images projected thereon, means for operatively connecting said optical information scanning means and said electrostically charged photosensitive means so that an electrostatic charge pattern corresponding to an optical image of record information is caused to be stored in said photosensitive means, means for developing the stored charge pattern images of record information by applying a pigmented electroscopic material thereto, means for moving said photosensitive means so that the developed images of record card information are moved past said transfer apparatus every machine cycle at a speed correlated with the speed of feeding record cards past said sensing means, means for moving a copy sheet intermediate said photosensitive means and said transfer apparatus at a speed correlated with the speed of moving said photosensitive means, means controlled by said sensing means and said data emitting means for comparing record card indicia with said predetermined control data, and means controlled by said comparing means for governing the operation of said selectively operable transfer apparatus so that only certain select ones of the developed images of record information are transferred to a copy sheet.

10. In a cyclically operable record card controlled machine of the class described having record card indicia sensing means, record card information scanning means, and record card feeding means for advancing a record card past said sensing means and said scanning means

every machine cycle; the combination of data manifesting means for emitting predetermined control data every machine cycle; electrostatically charged photosensitive means for storing electrostatic charge patterns of optical images projected thereon; means for operatively connecting said optical information scanning means and said electrostatically charged photosensitive means so that an electrostatic charge pattern corresponding to an optical image of record card information is caused to be stored in said photosensitive means every machine cycle; means for developing the stored electrostatic charge pattern images of record information by applying a pigmented electroscopic material thereto; a normally operated electroscopic toner material transfer apparatus; means for moving one of said developed images past said normally operated transfer apparatus every machine cycle at a speed correlated with the speed of feeding record cards past said sensing means; means controlled by said sensing means and said data manifesting means for comparing the record card indicia with said predetermined control data every machine cycle; normally operated means for feeding a print receiving material past said transfer apparatus at a speed correlated with the speed of moving one of said developed images of record card information past said transfer apparatus; and means operated in response to a comparison signal from said comparing means for rendering disabled (a) said transfer apparatus so that only said developed images corresponding to select ones of said record cards are transferred to said print receiving material, and concurrently therewith (b) said print receiving material moving means, whereby the developed images transferred to said print receiving material are evenly spaced.

11. In a machine of the class described having record card indicia sensing means, record card information scanning means for producing optical images of said information, and means for feeding the record cards past said sensing means and said scanning means; the combination of electrostatically charged photosensitive means for storing electrostatic charge patterns of optical images projected thereon; means for operatively connecting said optical image scanning means and said electrostatically charged photosensitive means so that an electrostatic charge pattern corresponding to an optical image of record card information is caused to be stored in said photosensitive means; means for developing the stored electrostatic charge pattern images of record information by applying a pigmented electroscopic material thereto; a selectively operable electroscopic toner transfer apparatus; means for continuously moving said photosensitive means so that the developed images of record card information are advanced past said transfer apparatus at a speed correlated with the speed of feeding record cards past said sensing means; control data manifesting means; means controlled by said sensing means and said data manifesting means for comparing the record card indicia with said control data; storage means including a magnetic drum operatively connected to said photosensitive means for movement therewith, a magnetic data read head, and a magnetic data write head; a first electric circuit connecting said comparing means and said write head whereby said data comparison results may be recorded on said magnetic drum for storage; selectively operable means for feeding a print receiving strip between said photosensitive means and said transfer apparatus at a speed correlated with the speed of moving said photosensitive means; electrical means for governing the operation of said selectively operable transfer apparatus and said print receiving strip feeding means; and a second electric circuit connecting said read head and said electrical means, whereby said transfer apparatus and said print receiving strip feeding means are controlled for operation concurrently in accordance with the data comparison results stored on said magnetic drum.

12. In a machine according to claim 11 wherein said transfer apparatus includes a shiftable conductive cylinder which is caused to rotate by the feeding movement of said print receiving strip in contact therewith; means for applying an electrical potential to said cylinder to transfer said transferable material from said charged powder image storing means onto said print receiving strip; and a camming means controlled by said electrical governing means for shifting said cylinder toward said charged powder image storing means so as to effect printing, and away from said charged powder image storing means in order to suppress printing.

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