United States Patent [19]

Yamaguchi et al.

[11] **3,752,571**

[45] **Aug. 14, 1973**

[54] **ELECTROPHOTOGRAPHIC COPYING APPARATUS**

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[22] Filed: **Aug. 28, 1972**

[21] Appl. No.: **284,276**

[30] Foreign Application Priority Data

Sept. 1, 1971 Japan 46/67699

[52] **U.S. Cl.** **355/3,** 355/8, 355/12, 355/16

[51] **Int. Cl.** **G03g 15/00,** G03g 15/18

[58] **Field of Search** 355/3, 8, 10, 78, 355/12, 16, 84, 14

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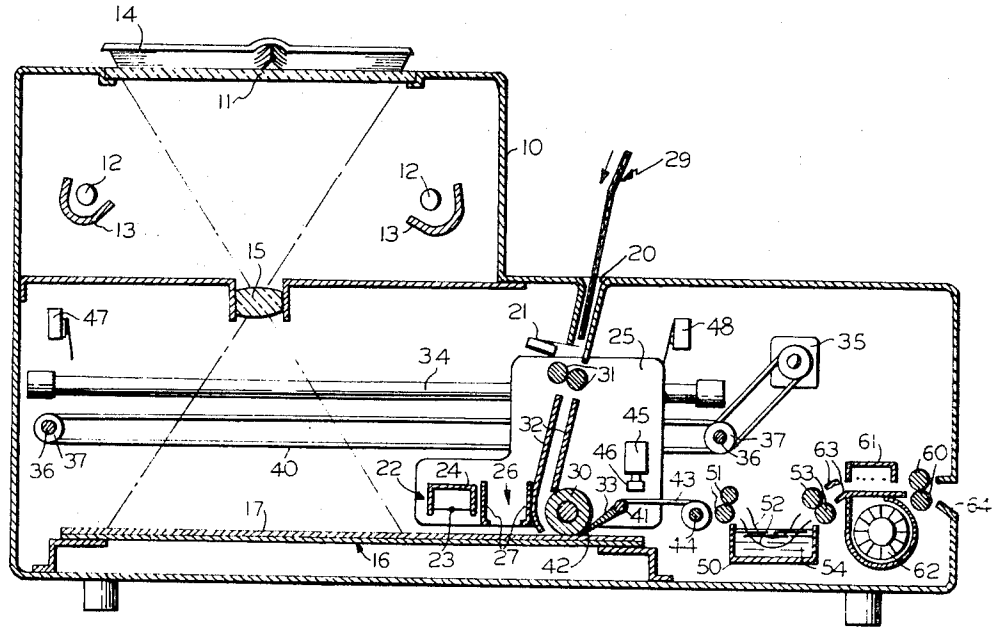
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Primary Examiner—Robert P. Greiner
Attorney—E. F. Wenderoth et al.

[57] **ABSTRACT**

A copying apparatus for producing a visible image of an original on a copy sheet which has a conductive base and a dielectric surface. During the movement of a carriage across a photoconductive base plate, charging means imposes a uniform electrostatic charge on the photoconductive surface of the base plate, projecting means successively projects a partial light image onto the uniformly charged photoconductive surface of said base plate through framing means to form an electrostatic latent image of an original on the base plate, and charge transfer means transfers the electrostatic latent image from the photoconductive surface of the base plate to the dielectric surface of the copy sheet. The electrostatic latent image transferred onto the dielectric surfaces of said copy sheet is converted into a visible image by developing means.

9 Claims, 4 Drawing Figures



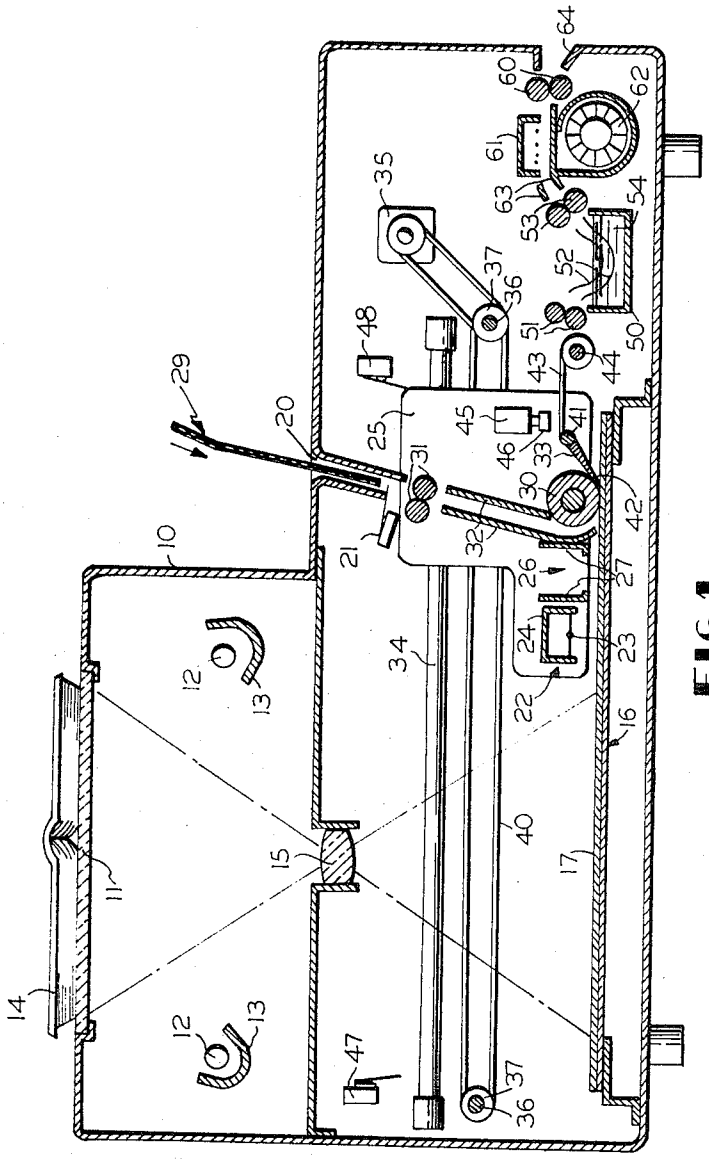

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FIG. 1

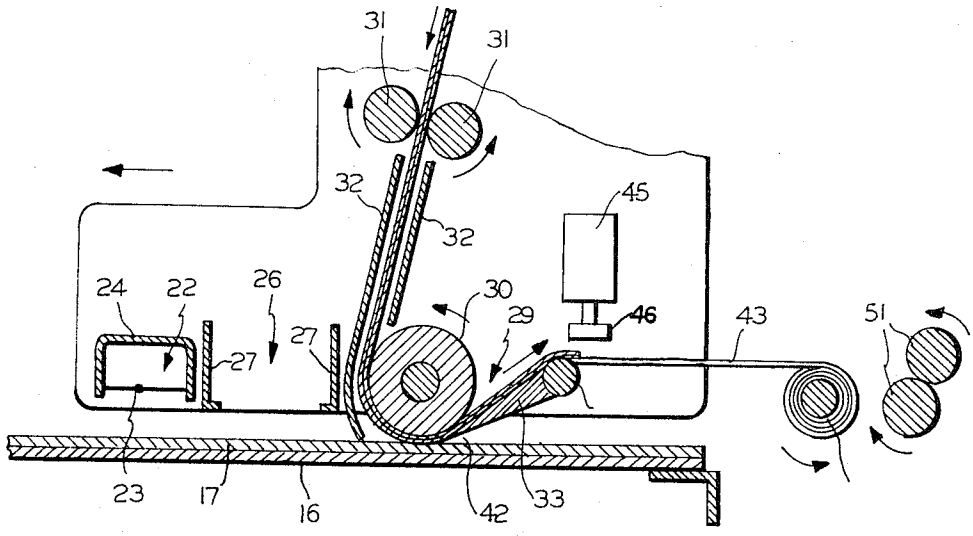

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FIG. 2

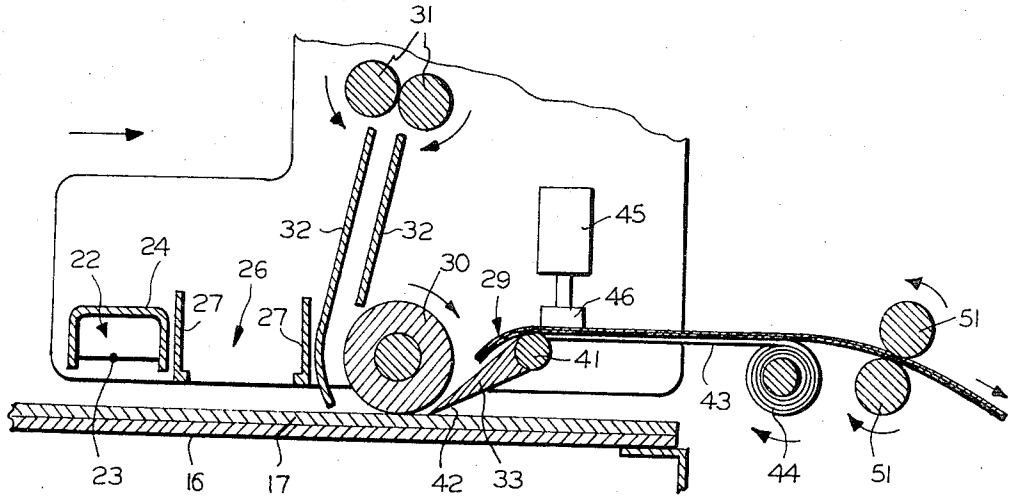

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FIG. 3

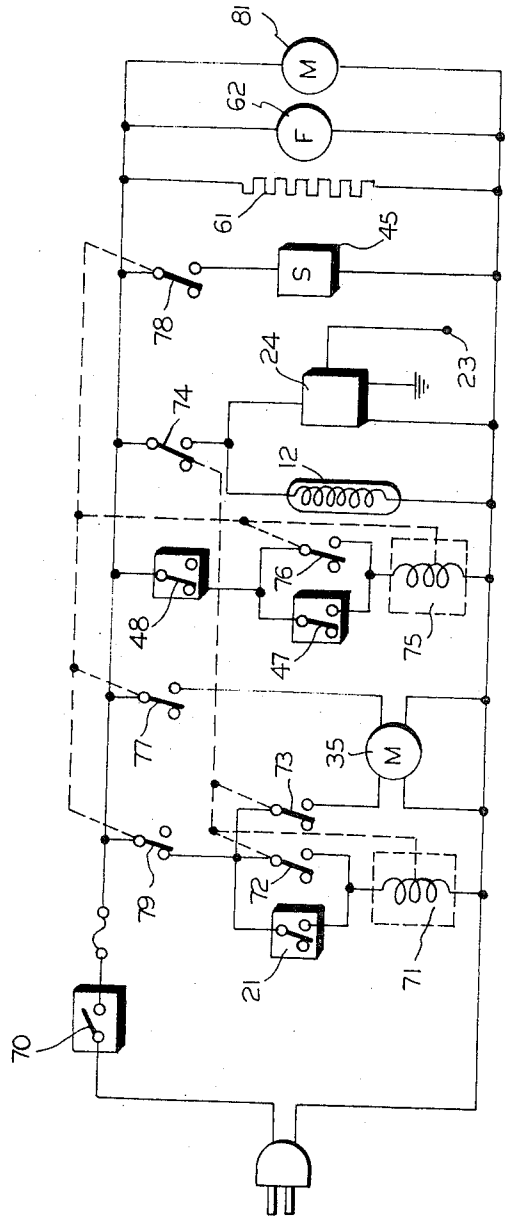


FIG. 4

ELECTROPHOTOGRAPHIC COPYING APPARATUS

FIELD OF THE INVENTION

This invention relates to a copying apparatus, and more particularly to electrophotographic copying apparatus for producing a visible image of an original upon a copy sheet which has a conductive base and a dielectric surface by using a process of transferring a latent electrostatic image from a photoconductive base plate to the dielectric surface of the copy sheet.

BACKGROUND OF THE INVENTION

In a conventional electrophotographic copying apparatus, a visible image is directly formed on the surface of a photoconductive plate. The surface of the photoconductive plate is electrostatically charged and an image of an original is optically projected onto the charged surface so that a charge pattern of the original is produced on said surface. The charge pattern is then converted into a visible image by applying developing material onto the surface of the photoconductive plate. A copy sheet is superposed on the surface of the photoconductive plate, and is separated from the surface so that the formed visible image is transferred from the surface of the photoconductive plate to the copy sheet. After the visible image is transferred to the copy sheet, developing material which remains must be scraped off the photoconductive surface. Accordingly, such apparatus is apt to be complex in structure and expensive to manufacture.

On the other hand a copying apparatus according to this invention employs a process of transferring an electrostatic latent image from a photoconductive surface of a base plate to the dielectric surface of a copy sheet instead of a visible image. The transferred electrostatic latent image on the copy sheet is developed by a developing device so as to be made visible. In the first step of the charge transfer process, the photoconductive surface of the base plate is electrostatically charged, and then an image of an original is optically projected onto the charged surface so that an electrostatic latent image of the original is formed on said photoconductive surface. A copy sheet is superposed on the base plate, with its dielectric surface facing the photoconductive surface of the base plate, and is pressed against said base plate. Then, the copy sheet is separated from the base plate so that the electrostatic latent image is transferred from the photoconductive surface of the base plate to the dielectric surface of the copy sheet by electric discharge which is produced through an air gap at the moment when the copy sheet is separated from the base plate.

For getting an excellent copy, the point of separation of said copy sheet from said base plate should be as close as possible to the point at which the copy sheet is pressed against the base plate. If the point of separation is far from said point of application of pressure, the resistivity between the conductive base of the copy sheet to the conductive backing plate of the base plate is quite large so that it is difficult to obtain enough electric discharge between the photoconductive surface of the base plate and the dielectric surface of the copy sheet. Therefore, effective charge transfer can not be obtained, and charge potential transferred to said copy sheet is low.

The image charge remaining on the photoconductive surface of the base plate after the charge transfer operation can be easily and completely erased simply by applying a sufficient uniform electrostatic charge. Therefore, the photoconductive plate can be used repeatedly for making copies on succeeding copy sheets.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a new and improved electrophotographic copying apparatus employing a process of transferring an electrostatic latent image effectively from the photoconductive surface of a base plate to a copy sheet.

Another object of this invention is to provide an improved copying apparatus wherein charge transferring means is adapted to move across the photoconductive base plate to transfer an electrostatic latent image from the photoconductive base plate to a copy sheet.

Still another object of this invention is to provide an improved copying apparatus employing a photoconductive base plate having a plane flat surface.

Still another object of this invention to is provide a copying apparatus based on a charge transfer principle, having an electrically conductive roller to press a copy sheet against a photoconductive base plate which has a latent image thereon, said copy sheet being separated from the photoconductive base plate by an unique copy sheet separating member.

Still another object of this invention is to provide an improved copying apparatus which has a simple construction and which is inexpensive to manufacture and employing novel charge transfer means.

These objects are achieved by providing a copying apparatus according to the present invention for producing a visible image of an original upon a copy sheet which has a conductive base and a dielectric surface, said apparatus comprising a housing, a photoconductive base plate having a conductive backing plate and a photoconductive surface formed on said backing plate, projecting means mounted on said housing for projecting a light image of an original onto the photoconductive surface of said base plate, a carriage movably mounted on said housing to travel across said photoconductive base plate, charging means mounted on said carriage for imposing a uniform electrostatic charge on the photoconductive surface of said base plate, framing means mounted on said carriage for limiting the projected light image on the photoconductive surface of said base plate to a partial slit area, copy sheet feeding means for feeding a copy sheet onto said base plate, charge transfer means mounted on said carriage for pressing the dielectric surface of said copy sheet against the photoconductive surface of said base plate and separating said copy sheet from said base plate, driving means for moving said carriage across said base plate so that said charging means imposes the uniform electrostatic charge on the photoconductive surface of said base plate, said projecting means successively projects the partial light image onto the uniformly charged photoconductive surface of said base plate through said framing means to form an electrostatic latent image of the original, and said charge transfer means transfers said electrostatic latent image from the photoconductive surface of said base plate to the dielectric surface of said copy sheet, and developing means for developing the copy sheet to which the charge has been transferred to convert the electrostatic

latent image on the dielectric surface of said copy sheet into a visible image.

BRIEF DESCRIPTION OF THE FIGURES

The invention will now be described in greater detail with reference to the accompanying drawings, in which:

FIG. 1 is an elevational sectional view of a copying apparatus according to the present invention;

FIGS. 2 and 3 are enlarged fragmentary sectional views of the copying apparatus, illustrating the charge transfer operation; and

FIG. 4 is a schematic diagram of a circuit for controlling the operation of the copying apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. 1, the apparatus includes a housing 10. A mounting glass table indicated generally at 11 is provided at an upper portion of the housing 10. The mounting glass table 11 can receive an original 14 to be copied, such as a single sheet or a bound volume, on an upper surface thereof.

Illumination means which includes a pair of lamps 12 and a pair of reflectors 13 is positioned in the housing 10 under the mounting glass table 11 to illuminate a lower surface of the original through the mounting glass table 11. A lens unit 15 is mounted in the middle of said housing 10. The lens unit 15 is adapted to transmit the reflected light from the original 14 on said mounting glass table 11 and focuses a light image of said original 14 upon a photoconductive surface 17 of a base plate 16. The size ratio between the original 14 and the light image projected onto the photoconductive surface 17 in this embodiment is 1:1. The image projected on said photoconductive surface 17 is a mirror image of the original 14. Said mounting glass table 11, said illumination means and said lens unit constitute projecting means in this apparatus.

The base plate used in this invention is a compound photoconductive plate which comprises a conductive backing plate, such as a flat aluminum plate, an amorphus selenium layer coated on said backing plate by a vaporizing method, and an organic photoconductive layer, such as poly-N-Vinylcarbazole, coated on the amorphus selenium layer. Such a compound photoconductive layer is quite effective for use in a latent electrostatic image transfer process because a sufficient electrostatic charge can be applied to the photoconductive layer by a corona charging means.

The copy sheet 29 can be inserted into the housing through a copy sheet inlet 20 provided at the middle portion of the housing 10. Upon insertion of the copy sheet 29 into the copy sheet inlet 20, the copy sheet 29 actuates a sheet detecting switch 21 which is provided at a lower portion of the copy sheet inlet 20.

In advance of exposure of the light image, the photoconductive surface 17 of the base plate 16 is electrostatically charged by charging means 22 which will be explained in detail hereinafter.

Charging means 22 includes a corona discharge wire 23. Said wire 23 is stretched across the photoconductive base plate 16 and is supplied with a negative potential of several thousand volts, for example 7000 volts, from a D.C. high voltage source 24 connected to said wire 23. The wire 23 is supported at both ends on a pair of spaced insulating blocks (not shown) which are mounted on a carriage 25. A grounded conductive shield 24 is mounted behind the wire 23 in order to improve the characteristic of the corona charge.

Said carriage 25 is provided with framing means for limiting the light image projected on the photoconductive surface of said base plate to a partial slit area 26. Said slit area 26 is constituted by a pair of slit plates 27. Said slit plates 27 are arranged parallel to said corona discharge wire 23. The photoconductive surface 17 of the base plate 16 is partially and successively illuminated according to the movement of the carriage 25 to the left.

In the copying apparatus according to this invention, paper coated with a dielectric material is used as a copy sheet, Said copy sheet comprises a conductive base and a dielectric material coated on said base. A single copy sheet 29 must be inserted into the inlet 20, with its dielectric material coated side facing to the left. The inserted copy sheet 29 is successively fed by copy sheet feeding means. Said copy sheet feeding means comprises a pair of feed rollers 31 and a pair of guide plates 32. Said rollers 31 are located below said copy sheet inlet 20 when the carriage is at a starting first position. The rollers 31 are driven during the movement of said carriage 25 to the left so as to introduce the copy sheet between the guide plates 32.

The fed copy sheet has a latent electrostatic image transferred to it from the base plate 16 by charge transfer means. The charge transfer means employed in the present invention includes a conductive rubber roller 30 and a copy sheet separating member 33. Said roller 30 is rotatably mounted on the carriage 25 and is pressed against the photoconductive surface 17 of the base plate 16 by its own weight. Said conductive rubber roller 30 can be prepared by dispersing finely divided conductive particles such as graphite, metal oxide or metal powder in rubber. It is necessary that the electrical resistivity and hardness of the conductive rubber roller 30 must be controlled for a good result. A preferred electrical resistivity is less than 10^7 ohms-cm and a preferred hardness is 30° to 60° on the Hs scale (JIS C type). By employing said electrically conductive rubber roller a uniform visible image can be reproduced throughout the whole area of the copy sheet.

A copy sheet separating member 33 is positioned between conductive rubber roller 30 and the base plate 16 to separate the leading edge of the copy sheet from the photoconductive surface 17 of the base plate 16. Said copy sheet feeding means and said charge transfer means are mounted on said carriage 25. Said carriage 25 is movably supported by straight guide bars 34 for travel in the right and the left direction, and is driven by driving means. Said driving means comprises a reversible electric motor 35, and a chain 40 disposed between the spaced sprockets 37 on shafts 36. A part of the chain 40 is fixed to one side of the carriage 25 so that the travel of the chain 40 moves the carriage 25 in the right or left direction along the straight guide bars 34 according to the direction of rotation of the motor 35. The reversible motor 35 is controlled by control means, such as the control circuit shown in FIG. 4.

Said conductive roller 30 is connected to ground so that the potential of said conductive backing plate of said photoconductive base plate 16 is ground potential.

The copy sheet separating member 33 forms in the shape of a wedge, and is made of material having nonstick or nonadhesive properties, such as polytetra-

fluoroethylene resin. Said member **33** can slide freely along the photoconductive surface **17** of the base plate **16** with low frictional resistance. One end of said member **33** is rotatably supported on a shaft **41**, and the other free sharp end **42** is in contact with the photoconductive surface **17** of the base plate **16** just under the conductive roller **30**. Therefore, said member **33** lifts the leading edge of the copy sheet away from the photoconductive surface **17** of the base plate **16** as soon as the leading edge passes through the nip point between said conductive rubber roller **30** and said base plate **16**, as shown in FIG. **2**.

Charge transfer of the electrostatic latent image is achieved in such a way that the electric charge on the photoconductive surface **17** of the base plate **16** is transferred to the dielectric surface of the copy sheet **29** by electric discharge produced between said photoconductive surface **17** of the base plate **16** and the dielectric surface of the copy sheet **29** when the copy sheet **29** is separated from the base plate **16**. The discharge effect depends largely upon the electrical resistivity of the elements connecting the conductive backing plate of the base plate **16** with the conductive base of the copy sheet **29**. If said electrical resistivity is large, sufficient electric discharge can not be produced and the charge potential of the electrostatic latent image transferred to the copy sheet **29** may remain at a low level. Accordingly, an excellent copy can not be obtained even if the copy sheet is well developed. On the other hand the electrical resistivity is low, electric discharge can be effectively produced when the copy sheet **39** is separated from the base plate **16**, and a high charge potential and an excellent electrostatic latent image can be obtained on the copy sheet **29**. Actually, this electrical resistivity is the sum of the electrical resistivity of the partial section of the conductive base of the copy sheet **29** from the point at which the copy sheet **29** is separated from the base plate **16** to the point at which the copy sheet **29** is pressed against the base plate **16** by the conductive rubber roller **30**, the electrical resistivity of the conductive rubber roller **30**, and the electrical resistivity of elements connecting the conductive rubber roller **30** with the conductive backing plate of the base plate **16** through the housing **10**.

The electrical resistivity of the conductive rubber roller **30**, which can be less than 10^7 ohms-cm as described above, is negligible as regards the discharge effect in the present invention. In addition, either said conductive rubber roller **30** or the conductive backing plate of said base plate **16** are connected to ground so that the electrical resistivity therebetween is assumed to be negligible. Accordingly, the electrical resistivity controlling the discharge effect mostly depends upon the electrical resistivity of the partial section of the conductive base of the copy sheet **29** from the point of separation to the point of pressing. The smaller the electrical resistivity of the partial section of the conductive base of the copy sheet **29**, the more easily the electrical discharge is produced between the photoconductive surface **17** of the base plate **16** and the dielectric surface of the copy sheet **29**. For this reason, the distance between the separating point and the pressing point should be as small as possible. Therefore, in the apparatus according to this invention the copy sheet **29** is separated from the base plate **16** by the copy sheet separating member **33** just under the conductive rubber roller **30** so that the point of separation is close to the point of pressing. This causes effective electric discharge between the photoconductive surface **17** of the base plate **16** and the dielectric base of the copy sheet **29**, and excellent charge transfer of the electrostatic latent image can be achieved. An end of a belt **43** is secured to said shaft **41**, and the other end of said belt **43** is wound around a rotatable shaft **44**. A torsion spring (not shown) acts to rotate said shaft **44** so as to wind said belt **43** up around said shaft **44**. Said belt **43** is made of insulating material. During the movement of said carriage **25** to the left, i.e. from the first position in an advancing direction said belt **43** is extended over the photoconductive surface **17** of the base plate **16**. A solenoid **45** secured to said carriage **25**, is adapted to actuate a plunger **46** to move downward to press the leading end of the copy sheet against said belt **43** upon engization by the control circuit shown in FIG. **4**. Two switches **47** and **48** are fixed to the housing **10** to be actuated at the limit of the travel of the carriage **25**.

Developing means includes a developing vessel **50**, a pair of rollers **51**, guide members **52** which are located in the developing vessel **50**, and a pair of squeeze rollers **53**. Liquid developer **54** is placed in said vessel **50**. Said liquid developer **54** has electroscopic positive charged powder dispersed in a solvent. The rollers **51** and **53** are driven by a motor **81** (shown in FIG. **4**). The copy sheet is fed through the rollers **51** into the entrance of the passageway defined between the guide members **52**, and then is fed beneath the surface of the liquid developer **54** through the passageway defined between the guide members **52** to be developed by said liquid developer **54**, and is fed into the nip between the squeeze rollers **53**. Then, the developed copy sheet is sent to drying means.

The drying means includes a pair of rollers **60**, a heater **61**, a fan **62**, and guide members **63**. The rollers **60** are driven by the motor **81**. While the copy sheet is passing through the passageway defined by the guide members **63**, the copy sheet is dried and the image on the copy sheet is fixed by the warm air drawn by the fan **63** through the heater **61**.

A control circuit in FIG. **4** coordinates and controls the operation of the various components of the copying apparatus as will be described hereinafter. Before operation of this apparatus begins, an original **14** such as a page of the book to be copied is placed upon the mounting glass table **11**. A main switch **70** is closed and electric power is supplied therethrough to the control circuit. The motor **81** is energized to rotate the rollers **51**, **53** and **60**. Electric power is also supplied to the fan **62** and the heater **61**, so that a flow of warm air is produced.

The operator inserts a copy sheet through the inlet **20**, and the leading edge of said copy sheet closes the start switch **21** to initiate the operation of the apparatus. Said switch **21** energizes a winding of a relay **71** and contacts **72**, **73** and **74** of said relay **71** are maintained in the closed condition. The closure of the contacts **74** supplies electric power to the D.C. high voltage source **24** so that the corona discharge wire **23** is supplied with a high negative D.C. potential. Thus the charging means **24** is now placed in a condition to apply a uniform electrostatic charge to the photoconductive surface **17** of the base plate **16**. Further, the closure of the contacts **74** energizes the lamps **12** so that the original **14** above the mounting glass table **11** is illuminated. The reflected light from the original **14**

is transmitted by the lens unit **15** onto the photoconductive base plate **16.**

At that time, the carriage **25** is in its first position as shown in FIG. **1.** When the reversible motor **35** rotates in a counterclockwise direction upon closing the contacts **73,** said carriage **25** starts to move to the left in FIG. **1,** i.e. in the advancing direction from its first position. During the movement of the carriage **25,** an electrostatic latent image corresponding to the original **14** is successively formed on the charged photoconductive surface **17** of the base plate **16** by the light projected through the slit area **26.** The copy sheet is fed by the rollers **31** and is nipped between the photoconductive surface **17** of the base plate **16** and the conductive rubber roller **30.** The copy sheet is fed during the progress of the carriage **25** in the advancing direction. The copy sheet separating member **33** lifts the leading edge of the copy sheet **29** away from the photoconductive surface **17** of the base plate **16** as soon as the leading edge passes the point of pressure between said conductive rubber roller **30** and the photoconductive surface **17** of the base plate as shown in FIG. **2.** Therefore, the latent electrostatic image which was formed on the photoconductive surface of the base plate **16** is transferred to the dielectric surface of said copy sheet. The electrostatic latent image formed on the photoconductive surface **17** of the base plate **16** is a mirror image of said original **14,** and the electrostatic latent image transferred to said dielectric surface of said copy sheet is the same image as said original. Successive portions of the sheet are lifted away from the photoconductive surface **17** and held on the belt **43** stretched over said photoconductive surface **17** during the progress of the carriage **25** in the advancing direction.

When the carriage **25** arrives at a second position, the end of its travel in the advancing direction, said carriage **25** actuates the switch **47.** Upon closure of said switch **47,** the winding of the relay **75** is energized, and the contacts **76, 77** and **78** of the relay **75** are maintained in a closed condition, and a contact **79** of the relay **75** is opened.

Opening of contact **79** deenergizes the winding of the relay **71** and the contacts **72, 73** and **74** are opened. The closure of the contact **77** energizes the reversible motor **35** to rotate it in a clockwise direction so that the motor **35** moves the carriage **25** to the right in FIG. **1.** i.e. in a return direction. The closure of the contact **78** energizes the solenoid **45** to extend the plunger **46** downwards, and the trailing edge of said copy sheet which has a latent electrostatic image of said original **14** on its dielectric surface is gripped between said plunger **46** and the belt **43** as shown in FIG. **3.** Since the motor **35** rotates in a clockwise direction, the carriage **25** makes the return motion in the right direction in FIG. **1** and the belt **43** is again wound around the shaft **44.** Therefore, the leading edge of said copy sheet **29** is projected from the belt **43** and is nipped between the rollers **51** as shown in FIG. **3.** During the return movement of said carriage **25,** the copy sheet **29** is continuously fed past the rollers **51** into the entrance opening of the developing passageway **52.**

When the carriage **25** arrives at its first position, at the end of the return movement, the limit switch **48** is actuated by said carriage **25** and is opened. The winding of the relay **75** is deenergized so that the contacts **76, 77** and **78** of the relay **75** are opened. The opening of the contact **77** causes the reversible motor **35** to stop so that the carriage **25** is no longer driven and terminates its movement and occupies the original position as shown in FIG. **1.** The opening of the contact **78** deenergizes the solenoid **45** to retract the plunger **46** upwards, and the copy sheet the leading edge of which is already fed beneath the surface of the liquid developer is successively fed into the developing vessel **54** so that the electroscopic powder from the liquid developer **50** is selectively deposited on the surface of the copy sheet to convert the latent electrostatic image into a visible image. The copy sheet is further fed into the passage way defined by the guide members **63** to be dried by the warm air. After the drying of the copy sheet by the drying means, the dried copy sheet is dischanged from an outlet opening **64** of the housing **10.**

It is thought that the invention and its advantages will be understood from the foregoing description and it is apparent that the various changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the inventions, the form hereinbefore described and illustrated in the drawings being merely a preferred embodiment thereof.

What is claimed is:

1. A copying apparatus for producing a visible image of an original upon a copy sheet which has a conductive base and a dielectric surface, said apparatus comprising:

a housing;

a photoconductive base plate in said housing having a conductive backing plate and a photoconductive surface formed on said backing plate;

projecting means mounted on said housing for projecting a light image of an original toward the photoconductive surface of said base plate;

a carriage movably mounted in said housing between said projecting means and said base plate to travel across said photoconductive base plate;

charging means mounted on said carriage for imposing a uniform electrostatic charge on the photoconductive surface of said base plate;

framing means mounted on said carriage for limiting the light image projected on the photoconductive surface of said base plate to a partial slit area;

copy sheet feeding means in said housing for feeding a copy sheet onto said base plate with the dielectric surface of said copy sheet facing the photoconductive surface of said base plate;

charge transfer means mounted on said carriage for pressing the dielectric surface of said copy sheet against the photoconductive surface of said base plate and separating said copy sheet from said base plate; and

driving means coupled to said carriage for moving said carriage across said base plate, whereby said charging means imposes the uniform electrostatic charge on the photoconductive surface of said base plate, said projecting means successively projects the partial light image onto the uniformly charged photoconductive surface of said base plate through said framing means to form an electrostatic latent image of the original, and said charge transfer means transfers said electrostatic latent image from the photoconductive surface of said base plate to the dielectric surface of said copy sheet; and

developing means in said housing for receiving and developing the copy sheet to which the charge has been transfered to convert the electrostatic latent

image on the dielectric surface of said copy sheet into a visible image.

2. The copying apparatus as claimed in claim 1, wherein said photoconductive base plate is a compound photoconductive plate which comprises a conductive backing plate, an amorphus selenium layer coated on said backing plate, and a poly-N-Vinylcarbazole layer coated on said amorphus selenium layer.

3. The copying apparatus as claimed in claim 1, wherein said photoconductive base plate is a plane flat plate and said housing has straight guide bars therein on which said carriage is movably mounted for reciprocating movement.

4. The copying apparatus as claimed in claim 1, wherein said projecting means comprises a mounting glass table in said housing for receiving an original on the upper surface thereof, illumination means beneath said glass table for illuminating the lower surface of the original through said glass table, and a lens unit below said glass table for transmitting the reflected light from the original and focusing a light image of said original upon said photoconductive base plate.

5. The copying apparatus as claimed in claim 1, wherein said carriage is reciprocatingly movable between a first position and a second position, and said developing means includes means for feeding the copy sheet to said developing means and said apparatus includes control means for controlling said driving means, projecting means, feeding means and developing means whereby during movement from the first position toward the second position, said charging means imposes the uniform electrostatic charge on the photoconductive surface of said base plate, said projecting means successively projects the partial light image onto the uniformly charged photoconductive surface of said base plate through said framing means to form an electrostatic latent image of the original, and charge transfer means transfers said electrostatic latent image from the photoconductive surface of said base plate to the dielectric surface of said copy sheet, and during return movement toward the first position, the copy sheet separated from said base plate is fed to said developing means.

6. The copying apparatus as claimed in claim 5, wherein said means for feeding the copy sheet to said developing means comprises a flexible belt, and a spring loaded shaft around which said belt is wound, the free end of said belt being attached to said carriage for holding the separated copy sheet thereupon during the movement of said carriage toward the second position as said belt is drawn off said shaft and feeding said copy sheet thereon to said developing means during the return movement of said carriage toward the first position as said belt is rewound on said shaft.

7. The copying apparatus as claimed in claim 1, wherein said charge transfer means includes an electrically conductive rubber roller on said carriage for pressing said copy sheet against said base plate and a copy sheet separating member in the shape of wedge on said carriage, the sharp end of said member being in contact with the photoconductive surface of said base plate just under said conductive rubber roller so as to lift the leading edge of said copy sheet away from said base plate and separate successively said copy sheet from said base plate to transfer the electrostatic latent image from the photoconductive surface of said base plate to the dielectric surface of said copy sheet.

8. The copying apparatus as claimed in claim 7, wherein said copy sheet separating member is made of poly-tetrafluoroethylene resin.

9. A copying apparatus for producing a visible image of an original upon a copy sheet which has a conductive base and a dielectric surface, said apparatus comprising:

a housing;

a photoconductive base plate in said housing having a conductive backing plate and a photoconductive surface formed on said backing plate;

charging means in said housing for imposing a uniform electrostatic charge on the photoconductive surface of said base plate;

projecting means mounted on said housing for projecting a light image of an original onto the uniformly charged photoconductive base plate to form an electrostatic latent image of the original upon the photoconductive surface of said base plate;

copy sheet feeding means in said housing for feeding a copy sheet onto said base plate with the dielectric surface of said copy sheet facing the photoconductive surface of said base plate;

charge transfer means in said housing relatively movable with respect to said base plate, said charge transfer means including an electrically conductive rubber roller for pressing said copy sheet against said base plate and a copy sheet separating member in the shape of a wedge, the sharp end of said member being in contact with the photoconductive surface of said base plate just under said conductive rubber roller, said rubber roller being electrically connected to the conductive backing plate of said base plate so that the potential of the conductive base of said copy sheet is the same is the potential of the conductive backing plate of said base plate;

driving means for relatively moving said charge transfer means with respect to said photoconductive base plate so that said conductive rubber roller successively presses said copy sheet against said base plate and said copy sheet separating member lifts the leading edge of said copy sheet away from said base plate and separates successively said copy sheet from said base plate to transfer the electrostatic latent image from the photoconductive surface of said base plate to the dielectric surface of said copy sheet; and

developing means in said housing for receiving and developing the copy sheet to which the charge has been transferred to convert the electrostatic latent image on the dielectric surface of said copy sheet into a visible image.

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