

Aug. 4, 1953

J. P. EBERT  
ELECTROGRAPHY

2,647,464

Filed Oct. 26, 1949

3 Sheets-Sheet 1

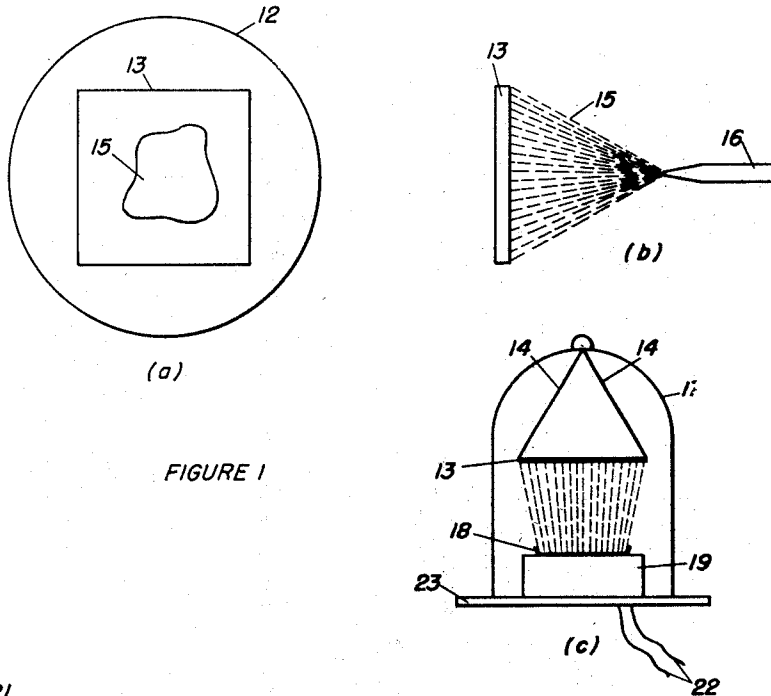


FIGURE 1

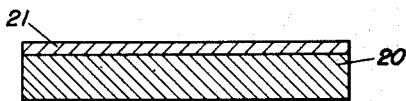


FIGURE 2

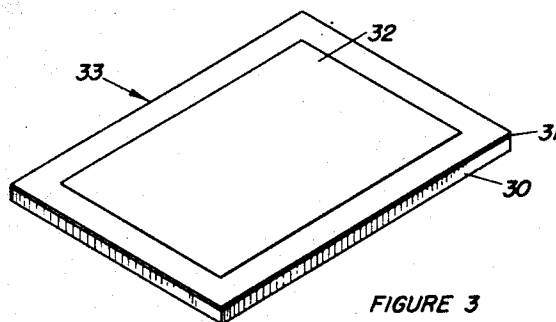


FIGURE 3

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3 Sheets-Sheet 2

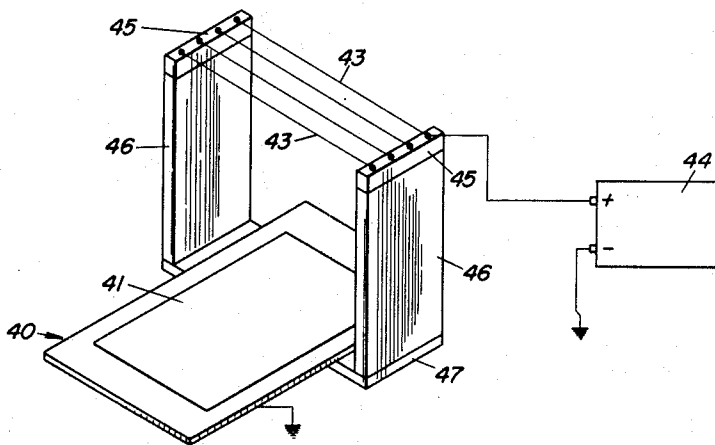


FIGURE 4

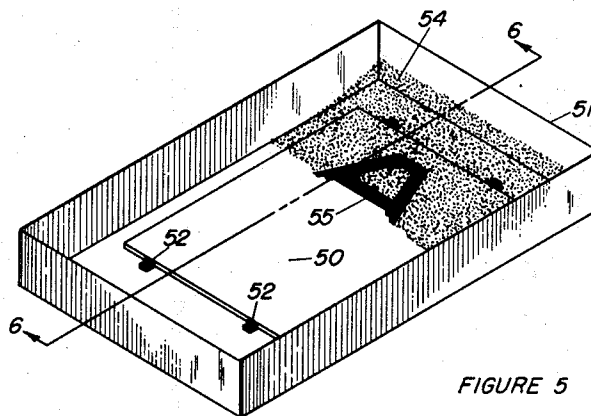


FIGURE 5

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3 Sheets-Sheet 3

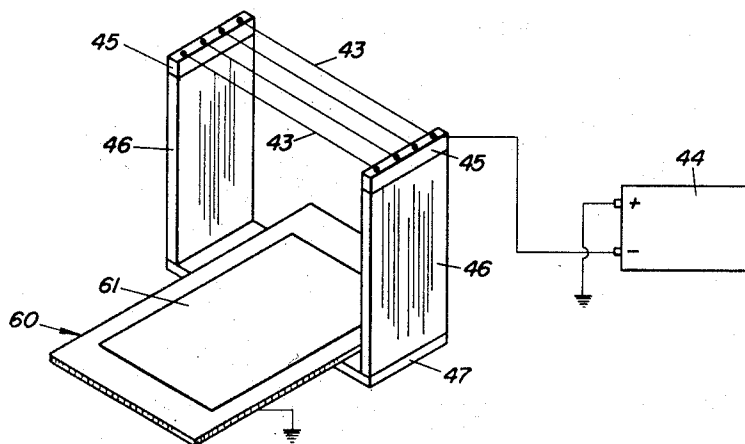


FIGURE 7

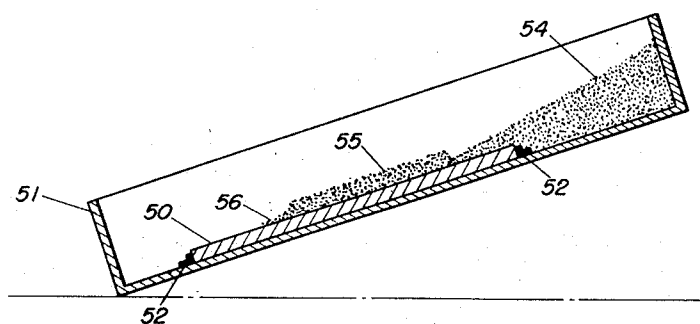


FIGURE 6

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## UNITED STATES PATENT OFFICE

2,647,464

## ELECTROGRAPHY

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Application October 26, 1949, Serial No. 123,651

21 Claims. (Cl. 101—426)

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This invention relates to an electrical method for reproducing printed images and other images and to apparatus for effecting such electrical reproduction.

Various methods for reproducing images printed on paper or otherwise superimposed on various materials have recently been proposed and developed. For example, U. S. Patent No. 2,297,691 to Chester F. Carlson describes an electrophotographic method for obtaining images on conductive plates having a photosensitive or photoconductive layer of material applied thereto.

It is an important object of this invention to provide means and methods for reproducing images without requiring the use of photosensitive layers of materials, whereby the step of light exposure may be eliminated in image reproduction.

It is another object of this invention to provide means and methods for reproducing either side of material having images on both sides by a simple contact procedure.

Yet another object of this invention is to provide a new and readily applicable method for preparing master plates for duplication and printing processes.

Other objects and advantages of this invention will be apparent in view of the following description thereof, considered in the light of the attached drawings wherein,

Figure 1 shows several methods of preparing a plate for use in the process of the invention,

Figure 2 is a cross-section through a plate suitable for use in the present method,

Figure 3 is a view showing an assembly of the various elements in position for the preliminary steps of the process, and

Figure 4 illustrates one method of producing a latent electrostatic image of the material to be reproduced on an electrographic plate,

Figure 5 illustrates a way of developing, or making visible, such latent electrostatic image,

Figure 6 illustrates the accumulation of powder particles on the image areas, and

Figure 7 illustrates one of the transfer methods for transferring the developed powder image to paper or other transfer material.

Essentially the present invention relates to a process of image reproduction wherein an electrostatic image of the image to be reproduced is prepared on a plate coated with a dielectric material.

A basic element in the present process is a plate upon which the image to be reproduced is first

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reproduced in the form of an electrostatic image and later caused to take on a physically visible form by developing with a suitable powder. Such a plate comprises a backing platen of metal or other suitable electrically conductive material and a layer of a dielectric material over the surface of such backing platen. Such plates are hereinafter designated as electrographic plates. Many methods for applying the layer of dielectric material to the metal plate have been devised and there is nothing critical in the method of application. The dielectric layer is preferably between 0.00025 and 0.0005-inch thick although thicknesses as great as 0.002-inch are operative. Examples of methods which have been successfully employed in the application of the dielectric materials include:

(1) A "whirling" technique whereby the dielectric material is dissolved in a suitable solvent and the solution is flowed over the surface of an electrically conducting plate. The covered plate is then placed on the platform of a commercially available plate whirler and whirled until dry.

(2) The dielectric material may be dissolved in a suitable solvent and sprayed onto an electrically conducting plate.

(3) The dielectric material may be deposited upon an electrically conductive plate by vacuum evaporation.

(4) One side of a commercially prepared plastic film may be coated by vacuum evaporation with a metallic substance which is a good electrical conductor.

(5) Other miscellaneous methods such as dipping the plate in a solution of the dielectric material or flowing the solution over the plate and removing the excess by scraping with a metal or wooden blade, etc., may also be used in the preparation of electrographic plates.

Once the electrographic plate has been prepared as above described it is ready for repeated use in the process as hereinafter set forth. Briefly the steps of this process may be stated as follows:

1. The original to be copied is placed so that the image to be reproduced is in contact with the dielectric layer of the electrographic plate. (See Figure 3.)

2. An electrostatic charge is applied to the dielectric surface through the original being copied. This may be accomplished by corona discharge from wires or needles, or by induction for example.

3. The original which is being copied is stripped from the plate.

4. The electrographic plate is contacted by an electrically charged powder. This results in the production of a visible powder image of the latent electrostatic image formed in step 2. In this step the powder should have the same polarity of charge as the charge applied to the dielectric surface in step 2.

5. The developed powder image is transferred to a second surface by suitable electrical, mechanical, or chemical process.

6. The transferred image is permanently fixed to the second surface. This may conveniently be accomplished by heating, or by chemical fixing, or other similar processes.

7. The electrographic plate is cleaned of any remaining powder particles and is discharged of any electrostatic charges remaining thereon. This is readily accomplished by scrubbing the plate surface with a damp rag and permitting the plate to dry, for example.

The steps described above are illustrated in the drawings, wherein,

Figure 1 illustrates several ways in which the dielectric layers may be applied to a backing plate. In (a) is shown a top view of a rotating device 12 to which is fastened a plate 13 to be coated. The plate 13 is fastened to the whirling or rotating device 12 by any suitable fastening means (not shown). A dielectric material which has been dissolved in a solvent is represented at 15. It will be seen that upon rotating 12, the dielectric material 15 will be caused to flow and cover the entire area of plate 13, evenly and uniformly. In (b) it is illustrated how a plate 13 can be given a coating of dielectric material by spraying the dissolved dielectric 15 from a spray device 16, shown schematically. In (c) a vacuum evaporation technique is illustrated. Plate 13 is suspended by wires 14-14 within a vacuum chamber 17 wherein a dielectric material held in a container is vaporized by the application of heat supplied, for example, by a resistance heater coil device 19 energized through leads 22-22. The entire assembly is supported by a suitable bench or table 23, as indicated.

In Figure 2 a cross-section through an electrographic plate is shown to illustrate that such plates consist of two layers; first, a dielectric layer 21, and, second, a backing layer 20 of metal or other conductive material.

Figure 3 illustrates the initial step in the process, wherein the original copy 32 to be reproduced is placed with the material to be copied in contact with the dielectric layer 31 of an electrographic plate 33 consisting of dielectric 31 and metal backing 30.

Figure 4 shows a method of producing an electrostatic charge pattern on the electrographic plate wherein plate 40, with copy 41 to be reproduced, properly placed thereon as shown in Figure 3, is passed under corona discharge wires 43-43 energized by high voltage source 44. The corona wires 43-43 are strung between metal bars 45-45 supported by posts 46-46 of wood, plastic or other non-conductive material, which in turn may rest upon or be fastened to and supported by plate 47. Plate 47 may be either a conductive or non-conductive material. If conductive it should be grounded electrically, if non-conductive, it will be necessary to provide a ground connection for plate 40, as illustrated.

Figure 5 illustrates one way of carrying out the step of developing the latent electrostatic image produced on an electrographic plate by the operation shown in Figure 4. An electrographic

plate 50 which has a latent electrostatic image on its dielectric face is placed in a tray 51, provided with stops 52-52 to position plate 50. A developer material 54 is caused to flow back and forth across the dielectric face of plate 50 (by tilting tray 51 first one way and then the other) whereupon the electrostatic image is made visible by reason of the adherence of the developer material 54 thereto. In the drawing the developer material 54 has been permitted to flow part way across the face of plate 50 making visible those portions of the image area 55 contacted by the developer 54.

Figure 6 illustrates the manner in which the developer particles 54 accumulate on the image areas 55 of the plate 50 during the developing process. This figure shows a section through the apparatus of Figure 5 along the line 6-6. As indicated in Figure 5, the particles 54 have not yet been cascaded entirely across the plate 50, and most of these particles are still in the upper corner of tray 51. However, it is already apparent that the particles 54 are building up in the image area 55, while in the neighboring non-image areas, as 56, there is no accumulation of particles.

A transfer method for transferring a developed image from an electrographic plate to a transfer material is illustrated in Figure 7. It will be noted that the same equipment shown in Figure 4 may be used for the transfer step. In transferring, plate 60 bearing the powder image and a transfer material, such as paper sheet 61, are passed under corona discharge wires 43-43 as in the charging step. Note, however, that the polarity of the corona wires 43-43 is required to be opposite in the transfer step from what it was in the charging step. Thus, as illustrated, where the corona discharge wires 43-43 are positive during the sensitizing process, they must be negative during the transfer. Similarly, if the corona wires 43-43 are negative in the charging or sensitizing step, they must be positive to effect transfer.

It will be understood that for certain applications of the present process the developed image may be fused to the electrographic plate instead of being transferred to a second surface as described in step 5. Such applications are concerned with processes wherein a number of duplications or copies of the original are desired. The electrographic plate with the image fused thereto may be used in the manner of a master plate in such processes.

The method above described has been employed in making copies of many kinds of original subjects including lithographic copy, India ink drawings, pencil drawings, typewritten copy, mimeograph copy, and many types of printed copy. These originals may be thought of as stencils, or better "electric stencils" in the present process. As a matter of fact, a stencil made by cutting a pattern to be printed into an electrically insulating or electrically conducting material will serve as an original for the process.

There are many satisfactory dielectric coating materials, and a list of these would include the following: chlorinated rubber, Amberol F-71, Staybelite Ester #10, polystyrene, polyethylene, Vinyl VU 1900, Pliofilm, ethyl cellulose, various combinations of Parlon and Rezyl, certain resin blends made up of various combinations of the above-named resins, anthracene, and various other materials which possess dielectric properties.

While the exact mechanism by which the present invention operates is not known or established, the following explanation is now generally accepted and is believed to possess considerable merit. The theory supposes that to insure optimum operation of the invention both the original to be copied and the electrographic plate to be used should meet certain requirements and specifications. Broadly it appears that the original to be copied must comprise an image-supporting material which is neither a good electrical insulator nor a good electrical conductor, and an image which has either a somewhat higher or a somewhat lower electrical resistance than the image-supporting material. In other words, it appears that the image-supporting material and the actual image material must have at least slight differences in electrical resistance properties, if optimum performance of the method is to be obtained. Other factors probably contribute to the effect; for example, it appears that a thin layer of dielectric material of high resistivity on an electrically conductive backing produces superior results.

It is believed that when an original of either of the types mentioned above is placed upon an electrographic plate of the type described heretofore and subjected to an electrical discharge as previously stipulated, those areas of the electrographic plate directly below the background portions of the original become more highly charged than those areas directly below the image portions. Consequently, an electrostatic image of the original is formed on the electrographic plate in the form of an electrostatic pattern of varying charge intensity. This electrostatic image is made visible by applying an electrically charged powdered material to the plate. This powder should be electrically charged with electricity of the same polarity as the electricity applied by the electrostatic discharge operation and is, therefore, repelled from areas of high charge intensity, and is deposited upon the areas of low charge intensity, which are the image areas. Experience has shown that this is always the case no matter whether the original copy consisted of a conductive image on an insulating background or an insulating image on a conductive background. Once the powder image is developed on the electrographic plate it may be treated in any one of several ways depending upon the ultimate use to which it is to be put. For example, as previously pointed out, in one application the image is fused to the electrographic plate. Other applications require that the image be transferred to a second surface and this is conveniently done by placing the transfer material over the image and spraying said transfer material with electricity of polarity opposite to the polarity of the electricity on the powder. Other transfer methods may be used, of course. For example, various chemical transfer methods or methods involving hygroscopic action are available.

Whatever may be the exact mechanism by which the present method effects reproduction of images, it is certain that the adoption of the steps described above will result in such reproduction in a rapid and satisfactory manner. The following example shows the specific operations carried out in preparing reproductions of either (1) images more conductive than the supporting medium or (2) images less conductive than the supporting medium. Of course, it will be understood that this example has been selected

for illustrative purposes only and is not intended to be considered restrictive in any way.

#### Example

An electrographic plate was prepared by the "whirling" technique previously described. In this manner a coating of Staybelite Ester #10 (a glycerine esterified rosin manufactured by the Hercules Powder Company, Wilmington, Delaware) was applied to an aluminum sheet. The solvent used was trichlorethylene and the whirling process required 5 minutes of whirling at 40 R. P. M. The aluminum surface had previously been cleaned by swabbing with acetone and cotton followed by a rinse with acetone.

The coated plate was charged negatively by a corona discharge device operating at 7000 volts (peak) half-wave rectified A.-C. The charging wires were spaced  $\frac{1}{8}$ -inch from the plate, and the plate was passed once under the discharge device at a speed of 1 $\frac{1}{2}$  inches per second. It is understood, of course, that the image to be reproduced was in contact with the dielectric layer of the plate during the charging operation.

The electrostatic image produced by the above-described charging process was developed using a developer mixture wherein the powder component consisted of 20 parts Amberol F-71 (The Resinous Products & Chemical Company, Philadelphia, Pennsylvania) and 1 part Raven Bead Carbon Black (Benney & Smith Company, New York, N. Y.), integrally bonded together. The carrier component consisted of soybean protein.

The developed image was transferred from the electrographic plate to a transfer paper by the electrical method previously described and illustrated in Figure 7, employing positive corona discharge at 7000 volts (peak) rectified A. C. The transferred image was fixed and made permanent by heating on a hot-plate for a few seconds. The plate was cleaned and readied for re-use by wiping with a damp cloth.

The above-described procedure was followed in detail in reproducing both the conductive-image and the insulating-image type original. It is also possible to use positive electrostatic discharge in sensitizing the plate, provided an appropriate developer combination is selected.

One of the striking features of the present invention is that it permits the reproduction of copy printed or drawn on both sides of a paper by an electrical contact procedure without employing or involving any light-sensitive elements. To do this it is necessary only to follow the steps already defined and to make certain that the side bearing the image to be reproduced is placed in contact with the dielectric layer while applying the electrostatic charge. When the electrostatic image so formed is developed it will be found that the desired image has been reproduced without trace of the image on the other side of the original paper from which the copy was made.

In the step of developing the electrostatic image it has been found that various resinous powders are very satisfactory. These powders should be caused to assume an electric charge of the same polarity as the polarity of the charge on the electrographic plates. This may be done by means of devices which spray electric charges or may be effected by triboelectric action in a mixture of the developer powder and a carrier material, the particular materials chosen being determined and selected in accordance with a triboelectric series, wherein it may be ascertained that the developer

component will assume the proper polarity charge upon triboelectric reaction with the carrier material. It will be understood that a triboelectric series is a classification of materials wherein any material in the series may be caused to assume a positive electrostatic charge by contact with any material below it in the series. A primary function of the carrier material is to insure that the developer powder assumes the proper electrostatic charge polarity (by contact with the carrier). Additional data as to the properties and specifications of developer materials and carrier particles are included in copending applications. Serial No. 24,674, filed May 1, 1948, by L. E. Walkup and E. N. Wise, and Serial No. 55,645, filed October 20, 1948, by L. E. Walkup, now Patent No. 2,618,551. The particular powders and carriers used in the present method are not critical to its operation, the only requirement being that the powder be charged with the same polarity as the electrographic plate. In this connection it should be noted that the image developing powder may be, and often is, of the same material as the dielectric layer on the electrographic plate. Also in many cases the developer powder consists of two or more components integrally bonded together.

The particular apparatus or technique employed in forming the electrostatic image on electrographic plates is not critical and many variations in design and application are possible. Methods which can and have been used include producing a corona discharge from wires or needles and passing the electrographic plate through the discharge area; induction, as by covering the electrographic plate-copy assembly with a metal plate and connecting the metal plate to a voltage source; and other methods of producing an electric field in the vicinity of the plate-copy assembly.

In the electrographic reproduction of images which are made up of material which is more conductive than the image-supporting material, it has been found that "escape paths" should preferably be provided for the electrical charges which arise on these areas during the charging step. Such escape paths are sometimes inherent in the dielectric layer of the electrographic plate in the form of impurities or imperfections. When not inherent in the plate they may be provided either by treatment of the electrographic plate or by treatment of the original copy. For example, small holes may be made in the dielectric layer of the plate, or the image areas of the original copy may be connected together with an electrical conducting material.

It will be appreciated that a new and useful method for reproducing copy has been described. Throughout the specification and claims the word "copy" is used to describe material to be reproduced. It will be readily understood that the term, so used, is broad enough to include originals to be copied as well as actual copy material to be recopied. It is again pointed out for purposes of emphasis that no light-sensitive elements are required and no light sensitizing steps are performed. The operation is based entirely upon electrical principles as has already been pointed out and explained. It will be apparent that the present method provides for the production of either a positive or negative of the copy being reproduced. This is so since the operation of the novel steps is to produce charged areas corresponding to the non-image areas of the original and areas having little or no charge

which correspond to the image areas of the original. By selecting a developer carrying a charge of the required polarity either the charged areas or the non-charged areas can be developed, thus producing a positive or negative copy as desired, and without regard to whether the original was a positive or a negative.

What is claimed is:

1. An electric method of reproducing copy, comprising the steps of placing the copy to be reproduced in contact with the dielectric layer of an electrographic plate comprising a conductive backing plate with a dielectric coating layer, subjecting such assembly to an electrostatic discharge, removing the original copy from the electrographic plate, contacting the plate with an electrically charged powder, transferring the powder image so formed to a second surface, and fixing the transferred image to said second surface.
2. An electric method of reproducing copy, comprising the steps of placing the copy to be reproduced so that the image contacts the dielectric layer of an electrographic plate comprising a conductive backing plate with a dielectric coating layer, subjecting such assembly to an electrostatic discharge, removing the original copy from the electrographic plate, contacting said plate with a powder electrically charged with the same polarity as the polarity of the discharge, transferring the powder image so formed to a second surface, fixing the transferred image to said second surface, and cleaning and discharging the electrographic plate.
3. An electric method of reproducing copy, comprising the steps of preparing an electrographic plate consisting of a dielectric layer on a conductive backing plate, placing the copy to be reproduced so that the image contacts said dielectric layer, subjecting such assembly to an electrostatic discharge, removing the original copy from the electrographic plate, flowing a powder electrically charged with the same polarity as the polarity of the electrostatic discharge across said plate, transferring the powder image so formed to a second surface, and fixing the transferred image to said second surface.
4. An electric method of reproducing copy, comprising the steps of placing the copy to be reproduced so that the image contacts the dielectric layer of an electrographic plate comprising a conductive backing plate with a dielectric coating layer, subjecting such assembly to an electrostatic discharge, removing the original copy from the electrographic plate, contacting said plate with a powder electrically charged with the same polarity as the polarity of the electrostatic discharge, electrostatically transferring the powder image so formed to a second surface, and fixing the transferred image to said second surface.
5. An electric method of reproducing copy, comprising the steps of preparing an electrographic plate consisting of a dielectric layer on a conductive backing plate, placing the copy to be reproduced so that the image contacts said dielectric layer, subjecting such assembly to corona discharge, removing the original copy from the electrographic plate, contacting said plate with a powder electrically charged with the same polarity as the corona discharge, electrostatically transferring the powder image so formed to a second surface, and fixing the transferred image by heat to said second surface.
6. An electric method of reproducing copy, comprising the steps of preparing an electrographic

plate consisting of a dielectric layer on a conductive backing plate, placing the copy to be reproduced so that the image contacts said dielectric layer, subjecting such assembly to an electrostatic discharge, removing the original copy from the electrographic plate, flowing a powder electrically charged with the same polarity as the polarity of the electrostatic discharge across said plate, transferring the powder image so formed to a second surface, fixing the transferred image to said second surface, and cleaning and discharging the electrographic plate with a damp cloth.

7. An electric method of reproducing copy, comprising the steps of placing a copy comprising an image-supporting material and an image material of different electrical conductivity properties in contact with the dielectric layer of an electrographic plate consisting of a dielectric coating layer on a conductive backing plate, subjecting such assembly to an electrostatic discharge, removing the copy from the electrographic plate, contacting said plate with a powder electrically charged with the same polarity as the polarity of the electrostatic discharge, transferring the powder image so formed to a second surface, and fixing the transferred image to said second surface.

8. An electric method of reproducing copy, comprising the steps of preparing an electrographic plate consisting of a dielectric layer on a conductive backing plate, placing the copy to be reproduced so that the image contacts said dielectric layer, subjecting such assembly to an electrostatic discharge, removing the original copy from the electrographic plate, contacting said plate with a powder electrically charged with the same polarity as the polarity of the electrostatic discharge, and fixing the image so formed to the electrographic plate.

9. An electric method of reproducing engineering drawings, comprising the steps of placing the drawing to be reproduced so that the drawn image contacts the dielectric layer of an electrographic plate consisting of a dielectric coating layer on a conductive backing plate, subjecting such assembly to an electrostatic discharge, removing the drawing from the electrographic plate, flowing a powder electrically charged with the same polarity as the polarity of the electrostatic discharge across said plate, transferring the powder image thus formed to a second surface, and fixing the transferred image to said second surface.

10. An electric method of reproducing either side of copy printed on both sides, comprising the steps of placing the side of the copy desired to be reproduced in contact with the dielectric layer of an electrographic plate consisting of a dielectric coating layer on a conductive backing plate, subjecting such assembly to an electrostatic discharge, removing the copy from the electrographic plate, contacting said plate with a powder electrically charged with the same polarity as the polarity of the electrostatic discharge, transferring the powder image thus formed to a second surface, and fixing said transferred image to said second surface.

11. An electric method of reproducing copy, comprising the steps of preparing an electrographic plate consisting of a dielectric layer 0.00025 to 0.0005-inch thick on a conductive backing plate, placing the copy to be reproduced so that the image contacts said dielectric layer, subjecting such assembly to an electrostatic dis-

charge, removing the original copy from the electrographic plate, flowing a powder electrically charged with the same polarity as the polarity of the electrostatic discharge across said plate, transferring the powder image so formed to a second surface, and fixing the transferred image to said second surface.

12. An electric method of reproducing copy, comprising the steps of preparing an electrographic plate consisting of a dielectric layer less than 0.002-inch thick on a conductive backing plate, placing the copy to be reproduced so that the image contacts said dielectric layer, subjecting such assembly to an electrostatic discharge, removing the original copy from the electrographic plate, flowing a powder electrically charged with the same polarity as the polarity of the electrostatic discharge across said plate, transferring the powder image so formed to a second surface, and fixing the transferred image to said second surface.

13. An electrical method of reproducing an image formed upon a material having a different electrical resistance from said image, comprising the steps of bringing the image bearing material into contiguous relation with the dielectric layer of an electrographic plate comprising a dielectric coating layer on a conductive backing plate, and subjecting said contacting image bearing material and dielectric layer to an electrical discharge, thereby to form an electrostatic image of said design on said dielectric layer.

14. An electrical method of reproducing an image formed upon one side of sheet material having a different electrical resistance from said image, comprising the steps of bringing the image bearing side of said material into face to face contact with the dielectric layer of an electrographic plate comprising a dielectric coating layer on a conductive backing plate, and imposing an electric charge upon said dielectric face through said sheet material, thereby to form an electrostatic image upon the dielectric layer of the image to be reproduced.

15. An electrical method of reproducing an image formed upon a first surface of sheet material having a different electrical resistance from said image and having a second image formed upon a second parallel surface of said material on the opposite side of said material from said first surface, comprising the steps of bringing the first surface of said image bearing material into contiguous relation with the dielectric layer of electrographic plate comprising a dielectric coating layer on a conductive backing plate, and subjecting said contacting image bearing material and dielectric layer to an electrical discharge to form an electrostatic image of the image on the first surface on said dielectric material.

16. An electrical method of reproducing an image formed upon a material having a different electrical resistance from said image, comprising the steps of bringing the image bearing material into contiguous relation with a dielectric layer adhered to an electrically conductive plate, subjecting said contacting dielectric layer and image bearing material to an electrical discharge to form an electrostatic image of said image on said dielectric layer, removing the image bearing material from said dielectric layer, and bringing said dielectric layer into contact with a finely divided electrostatically attractable material thereby to make visible said electrostatic image.

17. An electrical method of copying an image formed upon a surface having a different electri-

cal resistance from said image upon a dielectric layer adhering to an electrically conductive plate, comprising the steps of bringing the image bearing surface into contact with said dielectric material, subjecting said contacting image bearing surface and dielectric layer to an electrical discharge to form an electrostatic image of said image on said dielectric layer, removing the image bearing surface from said dielectric layer, bringing said dielectric layer into contact with a finely divided electrostatically attractable material thereby to form a transferable image, and subjecting said transferable image and said second surface to an electrical discharge thereby to transfer said image from said dielectric layer to said second surface.

18. An electrical method of copying an image formed upon a surface having a different electrical resistance from said image comprising the steps of bringing the image bearing surface into contact with the dielectric layer of an electrographic plate comprising a dielectric coating layer on a conductive backing plate, subjecting said contacting image bearing surface and dielectric layer to an electrical discharge to form an electrostatic image of said image on said dielectric layer, removing the image bearing surface from said dielectric layer, bringing said dielectric layer into contact with a finely divided electrostatically attractable material thereby to form a transferable image on said layer corresponding to the image to be copied, and transferring said image on to a second surface.

19. An electrical method of copying an image formed upon a surface having different electrical resistance from said image, comprising the steps of bringing the image bearing surface into contact with the dielectric layer of an electrographic plate comprising a dielectric coating layer on a conductive backing plate, subjecting said contacting image bearing surface and dielectric layer to an electrical discharge to form an electrostatic image of said image on said dielectric layer, removing the image bearing surface from said dielectric layer, bringing the said dielectric layer into contact with a finely divided

electrostatically attractable material thereby to form a transferable image on said layer corresponding to the image to be copied, transferring said image to a second surface and fixing said transferred image to said second surface.

20. An electrical method of copying an image formed upon a surface having a different electrical resistance from said image comprising the steps of bringing the image bearing surface into contact with the dielectric layer of an electrographic plate comprising a dielectric coating layer on a conductive backing plate, subjecting said contacting image bearing surface and dielectric layer to an electrical discharge to form an electrostatic image of said image on said dielectric layer, removing the image bearing surface from said dielectric layer, bringing said dielectric layer into contact with a finely divided electrostatically attractable material thereby to form a transferable image on said layer corresponding to the image to be copied, bringing a second surface into contact with said transferable image, subjecting said transferable image and said second surface to an electrical discharge thereby to transfer said image from said dielectric layer to said second surface, and fixing said transferred image to said second surface.

21. In an electric method of reproducing copy wherein an electrostatic image of the copy is produced on an electrographic plate consisting of an insulating coating on a conductive backing, the steps comprising exposing the plate to an electrostatic discharge through the copy while the copy is in contact with the plate, and removing said copy from said plate.

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