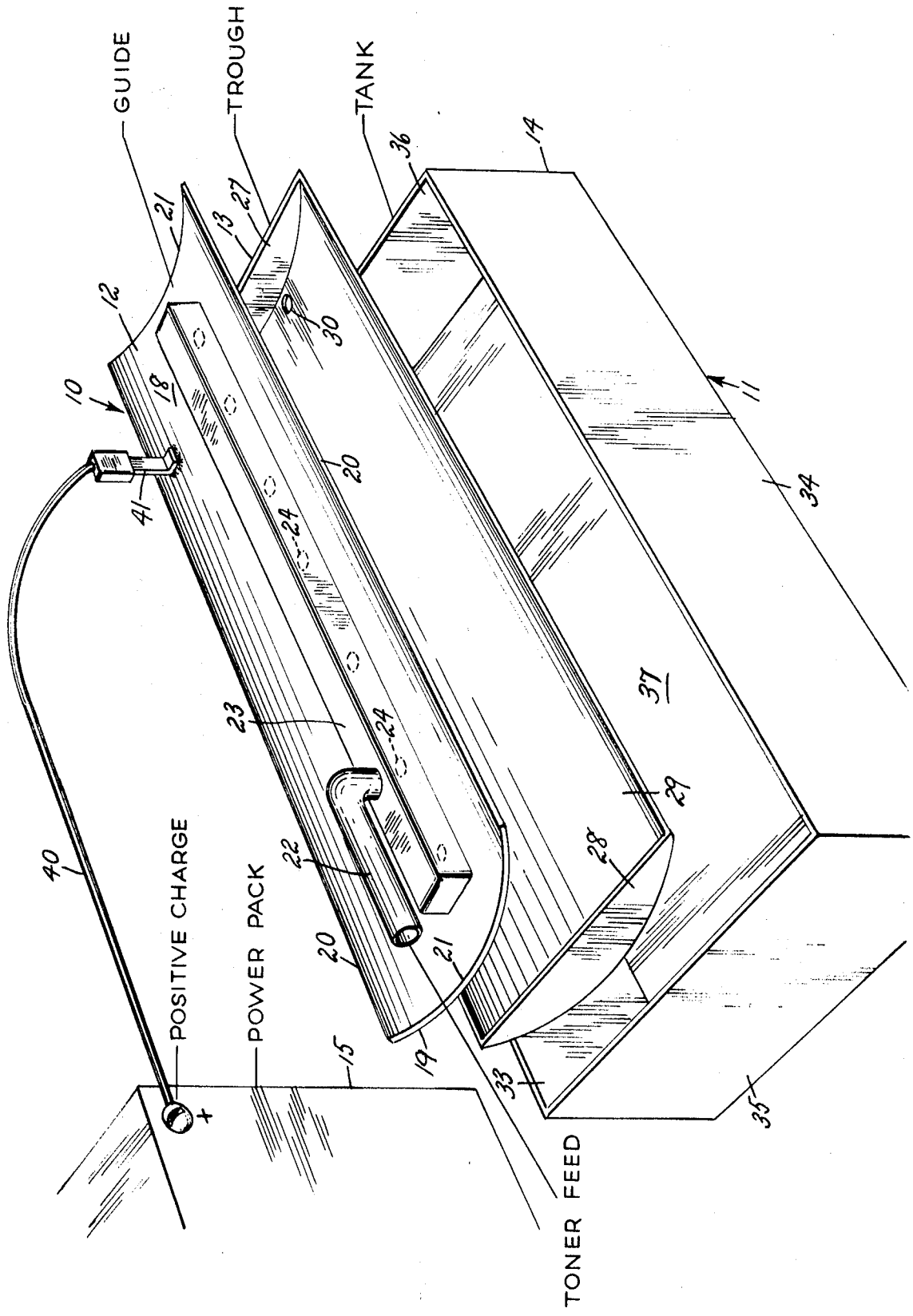
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MEANS FOR CHARGING ELECTROSTATIC LIQUID TONER

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MEANS FOR CHARGING ELECTROSTATIC LIQUID TONER

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ABSTRACT OF THE DISCLOSURE

Means for imparting a positive charge to liquid toner as the same is sprayed upon exposed sensitized paper, the toner having a charge opposite that of the unexposed areas on the paper to which the toner is to be attracted.

This invention relates generally to the field of electrostatic copy machines of the so-called "Electrofax" type in which a zinc oxide coated sheet of paper is imaged by exposure to light, and subsequently subjected to the action of a toner, normally a liquid containing suspended carbon black particles wherein the particles are attracted to the sheet in the unexposed areas to recreate the image. During the course of exposure, the sheet is first charged by a corona to a positive potential. Subsequent exposure to light destroys the charge in the clear areas of the image, so that the toner will subsequently be attracted only to those areas which are to be darkened to create the image. While this process has been satisfactory, the quality of copy has been inferior to that created by a more expensive process in which the image is first placed upon a charged selenium drum which subsequently attracts a toner in powdered form, and transfers the toner to a sheet of conventional paper which becomes the copy. The superiority of the latter type, commercially sold under the trademark "Xerox" is due principally to the fact that the selenium coated drum may be charged to a much greater potential, and the toner does not have to be separated from a liquid medium.

I have found that an improved copy can be obtained, using the "Electrofax" process by imparting a positive charge to the toning medium at the time the same is applied to the paper, whereby a greater attraction will exist between the particles in the toner and the paper. This charge need only be maintained for a time sufficient to complete the toning process, at which time mechanical adherence maintains a permanent image.

It is therefore among the principal objects of the present invention to provide for producing an improved copy in coated paper type reproduction devices.

Another object of the invention lies in the provision of an improved means for imparting a charge to the particles of the toner at the time of application to the paper opposite that of the charge existing on the areas of the paper to which the toner is attracted.

Yet another object of the invention lies in the provision of improved means of the class described, which may be readily incorporated into existing prior art devices with small, if any, modification therein.

Still another object of the invention lies in the provision of improved toner charging means in which the cost of fabrication may be of a relatively low order, as contrasted with the entire cost of fabrication of a copying device, thereby permitting consequent wide sale, distribution and use to the purchasing public.

A feature of the disclosed embodiment lies in the fact that an existing power supply may be employed to create the source of charge in the toner particles.

These objects and features, as well as other incidental ends and advantages, will more clearly appear in the

progress of the following disclosure, and be pointed out in the appended claims.

In the drawing, to which reference will be made in the specification, the single figure is a schematic view in perspective showing an embodiment of the invention.

In accordance with the invention, the device **10** is adapted to be used in conjunction with known electrostatic type copying machines, as for example that disclosed in my co-pending applications, Ser. Nos. 719,291, filed Mar. 20, 1968 now Pat. No. 3,523,766; and 763,242, filed Sept. 27, 1968. In devices of this type, a sheet of zinc coated or similar paper is first subjected to the action of a corona which imparts a positive charge to the coated surface of the paper. It is subsequently moved to an exposure station where an image is projected upon the surface, and subsequently the paper is moved to an activator station where it is immersed in a toner bath consisting of carbon particles and an evaporable vehicle, following which a heating and drying station evaporates the vehicle to leave the copy in dry condition. During the exposure of the paper, the actual light destroys the imparted charge in predetermined areas, so that only those areas which are to receive toner particles retain a charge sufficient to attract the toner particles thereto. I have found by increasing the difference in potential between the unexposed areas on the paper and the particles in the toner, the attraction is correspondingly enhanced, with a resultant darker image being obtained. The device **10** which accomplishes this end, comprises broadly a tank element **11** including a guide member **12**, a trough member **13**, a tank member **14** and a source of positive potential **15**.

The guide member **12** is preferably of metal or other similar material capable of retaining a high electrostatic charge. It is preferably chromium plated, and is bounded by an upper surface **18**, a lower surface (not shown), rectilinear side edges **20** and arcuate side edges **21**. A feed pipe **22** communicates with a gallery **23** overlying orifices **24** extending between the surfaces **18** and **19** whereby fluid toner (not shown) is continuously dispensed during operation of the copier to impinge upon the upper sensitized surface of successive sheets of paper.

The trough member **13** supports the paper as toner is impinged thereupon, and includes side walls **27** and **28** and a curvate lower wall **29**, preferably having an orifice **30** for drainage of toner, whereby the same may be maintained at proper level. Recirculating means (as disclosed in the above mentioned co-pending applications) provides a continuous flow of toner to the gallery **23**.

The tank **14** serves as a reservoir for excess toner, and feeds the above mentioned recirculating means. It includes side walls **33** and **34**, end walls **35** and **36** and a bottom wall **37**.

The source of positive potential **15** may be the power pack used to operate the corona in a manner well known in the art, and a conductor **40** interconnects such source with a welded contact member **41** secured to the upper surface of the guide member **12**. As the trough member **13** is formed of non-conductive material (preferably a synthetic resin), the guide and gallery members effectively produce an increased electrostatic charge in the continuously moving toner. As the toner enters the gallery, it acquires an instantaneous charge which will normally be retained a time sufficient to permit it to impinge upon the paper and be attracted to the oppositely charged area thereon, resulting in an increased depositing of carbon particles. This produces greatly increased contrast in the finished sheet, and an image closely approaching that produced by the "Xerox" process.

I wish it to be understood that I do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifica-

tions will occur to those skilled in the art to which the invention pertains.

I claim:

1. In an electrostatic copier, fluid toner supply means comprising: an elongated, closed end trough member having a concave upper face, an elongated guide member of conductive metal and corresponding substantially in length and curvature to said trough member, means mounting said guide member above said trough member, a plurality of apertures defined by said guide member and extending along its longitudinal axis, a toner supply conduit of non-conductive material mounted above the apertures in said guide member in sealed relationship to said guide member, toner supply means connected to said conduit in fluid communication therewith, and charging means connected to said guide member to uniformly impose an electrical charge on said guide member.

2. Apparatus as set forth in claim 1, wherein at least the lower surface of said guide member is chromium plated.

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117—37; 118—629