Feb. 9, 1971

A. FROHLICH

3,562,003

ELECTROSTENCIL

Filed July 7, 1967

Fig. 1

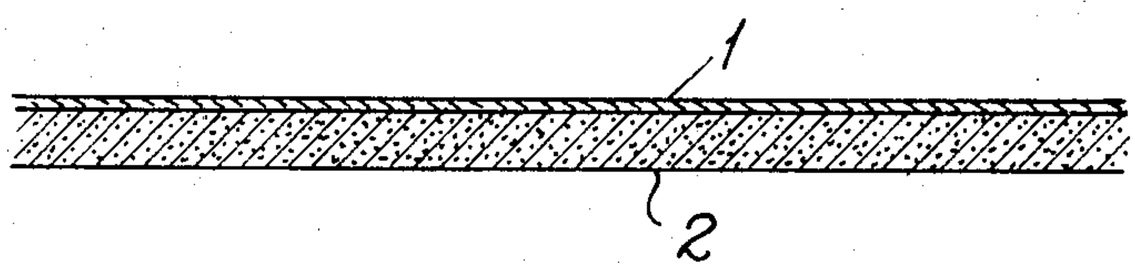
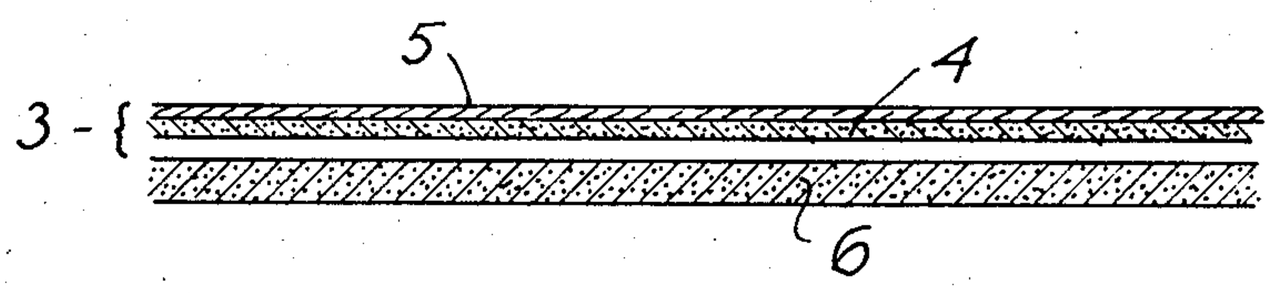


Fig. 2



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United States Patent Office

3,562,003
Patented Feb. 9, 1971

3,562,003

ELECTROSTENCIL

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Filed July 7, 1967, Ser. No. 651,778
Claims priority, application Denmark, July 11, 1966, 3,572/66
Int. Cl. H01l *1/06*
U.S. Cl. 117—201 10 Claims

ABSTRACT OF THE DISCLOSURE

A stencil blank includes a stencil sheet which is capable of being perforated by electric sparks, the stencil sheet being juxtaposed with and supported on a backing sheet made of an electrically conductive material. The backing sheet may comprise electrically conductive black glazed paper. The stencil sheet may be formed entirely of an inherently electrically conductive syntheti cresin. In a modified form of the invention, the stencil sheet comprises a thin sheet of paper containing finely dispersed carbon particles and coated with a layer of inherently electrically conductive synthetic resin.

This invention relates to stencil blanks adapted to be electrically perforated, and more specifically to stencil blanks of the type comprising a stencil sheet having an electric conductivity sufficient for perforation of the sheet by means of electric sparks, and a backing sheet.

Stencils of this type are known in various forms. The simplest in principle, however the most difficult to make, only consist of a backing sheet of paper of the type generally used for such purposes, and a film of synthetic resin fastened thereto in a readily strippable manner, in which carbon particles, such as carbon black, are dispersed in such a manner that the carbon concentration and, accordingly, the electric conductivity of the film increases from the front side of the film remote from the backing sheet towards the back side of the film.

Since the manufacture of thin sheets of synthetic resin having a carbon particle concentration varying in a predetermined manner across the thickess of the film is exceedingly difficult, it has also been proposed to compose the stencil sheet of a plurality of layers having different carbon particle concentrations. To this effect, the backing sheet may be coated first with a film of synthetic resin having a relatively high concentration of carbon particles, and subsequently with an additioanl film having a lower carbon particle concentration. These films may be applied in the form of solutions in different solvents. Alternatively, a thin paper sheet loaded with carbon particles is coated on both sides with synthetic resin equally containing carbon particles. The sheet prepared in this manner is fastened to the backing sheet in the manner usual in stencil blanks.

A common drawback in the electro stencils described hereinbefore is that the manufacture thereof is complicated and expensive, because a very homogeneous, exactly proportioned distribution of the electrically conductive particles over the area of the stencil sheet has to be insured, and that, even if the stencil blank is made in the most careful manner, the prints made therewith become relatively unsharp and grainy, because the electric conductivity is limited to the several carbon particles incorporated in the material.

In the case of electro stencils of resin-coated paper, a further inconvenience is that, when such stencils are used with duplicator inks of the emulsion type they have a very limited durability due to the fact that the resin coating, by reason of the carbon particles incorporated therein, is too porous to afford an effective protection of the paper against the water of the emulsoin type ink.

It is an object of this invention to remedy these disadvantages. To this effect, the invention provides a stencil blank of the kind referred to, in which at least a layer of the stencil sheet consists of an inherently electrically conductive synthetic resin. Such resins may, in all of the known electrostencils described hereinbefore, replace the carbon particle loaded resins used heretofore, i.e. the stencil sheet may consist entirely of inherently electrically conductive synthetic reisn, or a thin sheet of paper loaded with carbon particles may be coated with such resin.

Synthetic resins having inherent electrically conductive properties are known, but so far not in common use. Various groups thereof exists. One group comprises polyolefins the chain structure of which has been modified through electronic bombardment. Another group comprises polyamides made conductive through vacuum pyrolysis at 850° centigrade. Furthermore, various polymers are susceptible of transformation into polykations connected with negative tetracyanoquino-di-methane ions, the conductivity being controlled by the amount of tetracyanoquino-di-methane used. This list is not complete, and a constant development is taking place in this field.

The inherently electrically conductive synthetic resins afford the advantage, as compared with the carbon particle loaded resins used heretofore for electro stencils, that they are completely homogeneous and non-porous so that the electric conductivity is the same at all points. Accordingly, perforation through electric sparks may produce stencil holes having sharp contours, however small they be. Furthermore, the resins in questions are waterproof so as to be well fit for use with duplicator inks of the emulsion type.

Reference will now be had to the accompanying drawings, in which:

FIG. 1 is an enlarged section view of one form of stencil blank in accordance with this invention and

FIG. 2 is a similar view of another form.

In the form shown in FIG. 1, a thin sheet **1** of a material such as polyisobutylene which is made conductive through electronic bombardment, is fastened to a backing sheet **2** of electrically conductive paper, such as black glazed paper, in such a manner as to be easily strippable from the backing. The electric conductivities of the stencil sheet constituted by the polyisobutylene sheet and of the backing sheet, respectively, do not appear to be very critical, as long as the conductivity of the backing sheet is greater than that of the stencil sheet.

Instead of a backing sheet of electrically conductive paper, one of usual paper having a conductive coating may, of course, be used, or the stencil sheet may be composed of two bonded resin layers having different conductivities.

According to FIG. 2, the stencil sheet **3** consists of a thin paper sheet **4** having a weight of approximately 6–12 grams per square meter and containing finely dispersed carbon particles, this sheet being coated with a thin film

5 of inherently electrically conductive polyisobutylene. The backing sheet **6** may, as in FIG. 1, consist of electrically conductive paper, or may be provided with an electrically conductive coating.

With this stencil, too, perforations having very sharp contours may be obtained, irrespective of the use of carbon particle loaded paper for the stencil sheet.

The stencil blanks described may, if desired, be provided with an additional coating of the stencil sheet for color contrast, in order to make the perforations easily visible, such as is known in the art.

What I claim is:

1. A stencil blank comprising a stencil sheet capable of being perforated by electric sparks, said sheet being juxtaposed with and fastened to a backing sheet of electrically conductive material, the stencil sheet comprising one or more layers at least one layer of the stencil sheet being formed a homogeneous inherently electrically conductive synthetic resin, and the backing sheet being made of an electrically conductive material.

2. A stencil blank as claimed in claim **1**, wherein the stencil sheet consists entirely of an inherently electrically conductive, synthetic resin.

3. A stencil blank as claimed in claim **2** wherein the backing sheet comprises electrically conductive paper.

4. A stencil blank as claimed in claim **3** wherein the backing sheet comprises black glazed paper.

5. A stencil blank as claimed in claim **1**, wherein the

stencil sheet comprises a thin sheet of paper containing finely dispersed carbon particles and coated with a layer of inherently electrically conductive synthetic resin.

6. A stencil blank as claimed in claim **5** wherein the backing sheet comprises electrically conductive paper.

7. A stencil blank as claimed in claim **6** wherein the backing sheet comprises black glazed paper.

8. A stencil blank as claimed in claim **1** wherein the conductivity of the backing sheet is gretaer than that of the stencil sheet.

9. A stencil blank as claimed in claim **1**, wherein the backing sheet comprises electrically conductive paper.

10. A stencil blank as claimed in claim **9**, wherein the backing sheet comprises black glazed paper.

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U.S. Cl. X.R.

117—35.5; 252—500; 101—128.2