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PRODUCTION OF PATTERNS ON CLOTH OR SIMILAR SUBSTANCES

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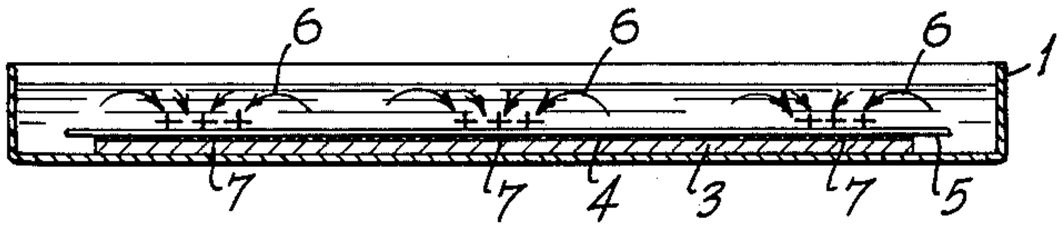

FIG. 1

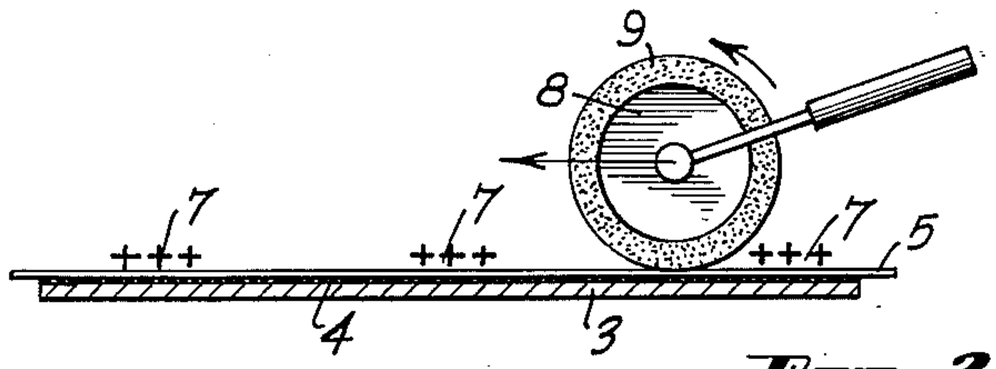

FIG. 2

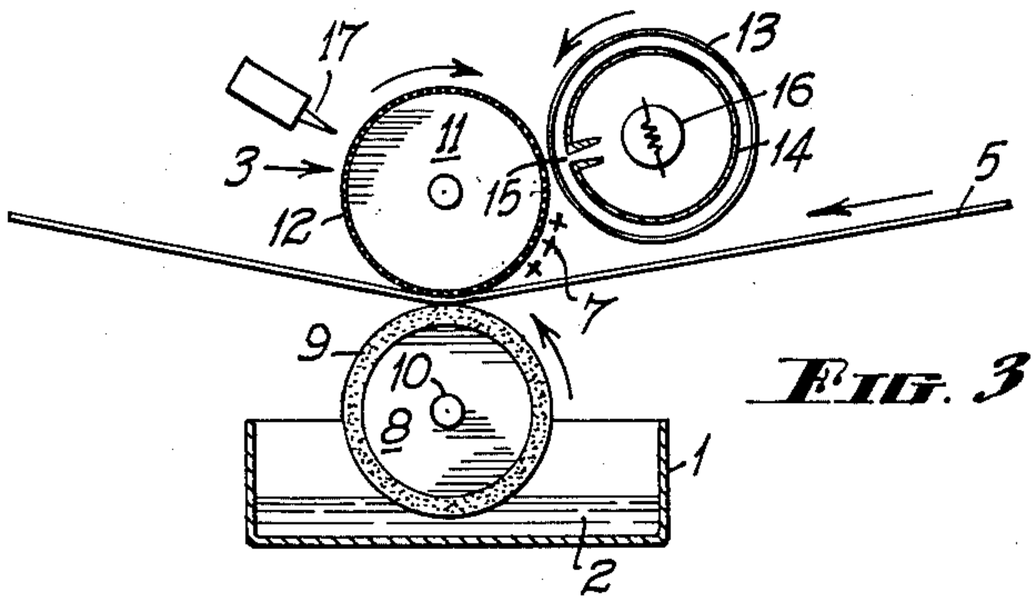

FIG. 3

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PRODUCTION OF PATTERNS ON CLOTH OR SIMILAR SUBSTANCES

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This invention relates to the production of patterns on cloth or similar substances such as canvas or the like.

Printing of patterns on cloth is usually effected by either running the cloth beneath printing rollers inked in any normal manner or by weaving in threads which have been pre-printed and which will then give the required pattern when woven.

The present invention relates to the production of patterns on cloth or the like which has already been proposed, but instead of printing by means of dyes in the normal manner, the pattern is, according to our invention, produced on the cloth by electrostatic printing.

The method of producing the printed patterns according to this invention comprises applying an electrostatic pattern by means of a photoconductor surface to a cloth or similar substance and applying liquid developer to the cloth or similar substances as it is in contact with the electrostatic pattern, whereby the developer which forms the coloring medium will be deposited on the cloth in accordance with the electrostatic pattern on the control member.

The device for producing the printed patterns on the cloth or similar substances comprises a control member having a photo-conductor surface on it and means to press the cloth into contact with the said photoconductor surface, and means to apply developer at the area of contact.

To enable the invention to be fully understood embodiments thereof will now be described with reference to the accompanying drawings in which:

FIG. 1 shows schematically how the pattern can be applied by using a control member which has the electrostatic pattern thereon, the control member with the cloth thereon being submerged beneath the developer,

FIG. 2 shows how the developer may be applied to the cloth by a roller carrying the developer, and

FIG. 3 shows a continuous process in which a control member having a photo-conductor surface controls the pattern on the cloth as the cloth passes over a developer roller.

Referring first to FIG. 1, a developer dish **1** has in it the developer solution **2** which consists of a pigment or dye which is to form the coloring medium for the cloth or the like suspended in a liquid of high electrical resistivity. Into this dish is placed a control member **3** which may comprise a plate or the like having a photo-conductor surface **4** on it such as a zinc oxide set in a suitable bonding resin. The photo-conductor surface **4** has a pattern on it which can be produced in any conventional manner such as by charging the photo-conductor material and then bleeding away the charge by projecting a light pattern onto the surface, the cloth **5** being placed on the photo-conductor surface **4** of the control member **3** prior to submerging of the control member into the developer solution. Alternatively, the developer **2** can be poured into the dish **1** after the control member **3** and the cloth **5** have been located in the dish.

It is normally desirable to contact the cloth with the developer only when it is in contact with the control member as this insures that the dye or pigment of the developer **2** is deposited only in predetermined areas, the charge on the control member being so selected

that there is the necessary gradient which will insure that the pigment particles or the dye will flow as indicated, for example, by the arrows **6** in FIG. 1. Those areas where no deposition is to take place will be denuded of the pigment or dye by the flow which takes place to the charge areas **7** which attract the dye or pigment to such areas.

Instead of using a negative developer a positive developer could be used, in which case the movement of the particles or dye will be in a direction opposite to that shown in FIG. 1.

It will be obvious that a negative charge could be used on the control member, such as by using zinc oxide, although a positive is shown in the illustration.

The developer will of course have such a proportion of carrier liquid to pigment that discoloration of the cloth will not take place undersirably.

An example of a positively charged developer paste is as follows:

	Grams
"Pentarol 20"	15
"Rhodene L6/100"	15
Xylene	25
"Phthalocyanine blue"	150

The "Pentarol 20" is digested in xylene and when solution is complete the "Rhodene L6/100" is added. The phthalocyanine blue is then mixed with the resins and blended either in a ball mill or triple roll mill until mixing is complete and pigment particle size is reduced to the required fineness, such as 0.5 micro, average. For most purposes eight hours milling in a ball mill should be found sufficient. An example of a negatively charged developer paste is as follows:

	Grams
Boiled linseed oil	25
Lead chromate	75
Drier, lead naphthenate	0.5

The ingredients are milled together for eight hours in a ball mill.

In both cases, the paste is used as the basis for a dispersion in a liquid of high volume resistivity. An example of the method of dispersion is as follows: stir a small portion of the paste into the required liquid, such as n-pentane or carbon tetrachloride, and strain to remove portions of paste that have not completely dispersed. For fine grained developers filter before use through filter paper and use filtrate as a developer. The concentration of the dispersion may be varied at will, a typical concentration of a preferred dispersion being a suspension of 0.5 gram developer paste in 100 mil of liquid.

In the embodiment shown in FIG. 2 the cloth **5** is shown in position on the control member **3** but the developer is being applied by means of a roller **8** having an absorbent cover **9** which carries the developer, the principle of operation being the same as with reference to FIG. 1 in that as the roller carries the developer over the cloth **5**, the developer is accepted at the areas **7** but is rejected at the other areas due to the fact that the developer particles or the dye have an inherent charge which can cause deposition only at the areas on the cloth where the control member gives the opposite polarity.

FIG. 3 shows a system somewhat similar to that of FIG. 2 but of a continuous type.

In FIG. 3 the dish **1** has in it the developer **2** and mounted to dip into the developer **2** is a roller **8** having a surface **9** which is wetted by the developer, the roller **8** being free to revolve about its spindle **10**.

The cloth **5** is fed over this roller and is in contact with the surface which is wet with developer, but in this case the control member **3** consists of a roller **11** having

a photo-conductor **12** on its surface, the roller contacting the cloth at the point of its contact with the developer roller.

The control member **3** has its charge pattern regulated by a drum **13** which revolves around a shield **14** having a slit **15** in it adjacent a light source **16** so that as the drum **13** which carries the negative or other pattern-producing member is revolved, the pattern is projected by the light source **16** through the slit **15** onto the photo-conductor face of the roller **11** to modify the charge pattern on it, a corona discharge device **17** being of course used to charge the photo-conductor surface prior to the charges being modified by the light beam from the source **16**.

In this way as the cloth **5** passes around the photo-conductor surface **12** on the control member **3**, the image is developed by contact with the surface **9** of the developer roller **8**.

By this invention, direct pattern deposition on to cloth can thus take place without the cloth itself having to be provided with a photo-conductor surface.

In the claims the expression "cloth" is to be understood as including similar substances.

What is claimed is:

1. The method of producing printed patterns on cloth comprising applying an electrostatic pattern to a photo conductor surface on a control member, placing one side of the cloth on to the control member so that the electrostatic pattern extends through the cloth, applying liquid developer directly to the other side of the cloth as it is subjected to the electrostatic pattern of the control member, and subsequently removing the cloth from the control member.

2. The method of producing printed patterns on cloth comprising applying an electrostatic pattern to a photo

conductor surface on a control member, placing one side of the cloth on to the control member so that the electrostatic pattern extends through the cloth, applying liquid developer directly to the other side of the cloth by rolling it on as the cloth is subjected to the electrostatic pattern of the control member, and subsequently removing the cloth from the control member.

3. The method of producing printed patterns on cloth comprising applying an elastrostatic pattern to a photo conductor surface on a control drum, and feeding a web of cloth between the said drum and a developer roller carrying a liquid developer so that one side of the cloth is in contact with the control drum and the electrostatic pattern extends through the cloth, and whereby the liquid developer is applied directly to the other side of the cloth as it is subjected to the electrostatic pattern of the control drum.

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