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M. DE' SPERATI

PHOTOCOLLOGRAPHIC PRINTING PLATE AND METHOD FOR PRODUCING THE SAME

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Fig. 1

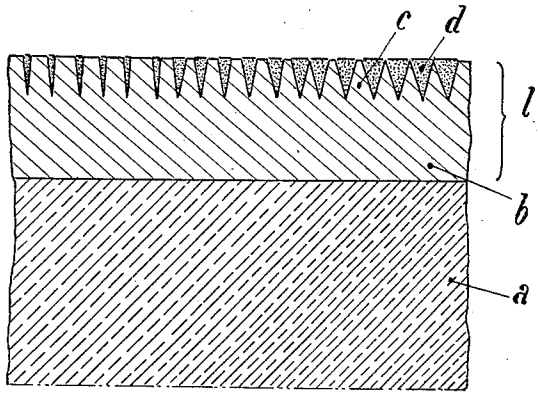
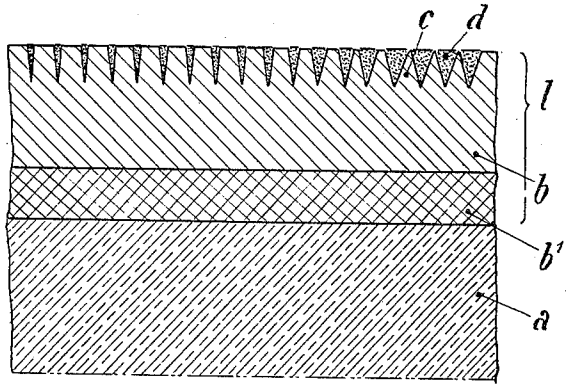


Fig. 2



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UNITED STATES PATENT OFFICE.

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PHOTOCOLLOGRAPHIC PRINTING PLATE AND METHOD FOR PRODUCING THE SAME.

Application filed May 12, 1926, Serial No. 108,616, and in Italy May 3, 1925.

The present invention relates to printing plates obtained by the action of light on a colloidal layer located on a support.

This invention has for its object an improved printing plate of the above stated character and a method of making the same.

According to the present invention the improved printing plate comprises a layer of colloidal material which, in its portion adjacent to its support, is evenly impervious to moisture, whereas its surface portion or skin is differentiated to provide dots, lines or spots which are hard and impervious to moisture, and therefore in condition to take up ink, and also to provide dots, lines or spots which are slightly pervious to moisture and therefore are in condition to absorb an amount of moisture during the printing operation according to known lithographic processes, thus producing the white portions of the image.

In the annexed drawing, Figures 1 and 2 represent by way of illustration enlarged fragmental transverse sections of different plates constructed according to this invention.

In Figure 1, —*a*— is a support which may be of celluloid, or of any other material, while —*l*— is a layer of colloidal material applied on said support.

When the plate is ready for printing, as shown on the drawing, after the treatment hereinafter described, the layer —*l*— comprises a portion or sheet —*b*— adjacent to support —*a*—, which portion, throughout its entire extent is impervious to moisture; and to this portion or sheet —*b*— are connected projecting portions —*c*— which are made hard and impervious like the underlying sheet —*b*— and are encircled by portions —*d*— where the colloidal matter is in its original condition that is, it is soft and pervious to moisture.

In portions —*c*— the colloidal light sensitive material has been acted on by light at the time of exposure under a negative, and their outer surface is in condition to take up ink; whereas in portions —*d*— the colloidal material has not been acted on by light and therefore these portions *d* are able to absorb moisture and repel ink.

The word "sheet," as used herein and in the appended claims, is intended to denote a portion of the layer extending over the entire surface of the plate and having a different character from adjacent similar portions or sheets, without necessarily implying that each sheet is physically separated or distinct from the adjacent ones.

In the left-hand portion of Figure 1 the skin sheet of the layer has dots of small size giving a white portion in the image when printed; the intermediate portion thereof has an intermediate tone, and the right-hand portion has large hard spots giving a dark portion in the final image.

As shown in Figure 1, the portions —*d*— of colloidal material which are left pervious, extend through a small fraction only of the layer —*l*— which has a comparatively great thickness.

This feature has the advantage of removing difficulties found in producing exceedingly thin layers, which are inherently liable to be worn out in printing machinery.

Further it provides a satisfactory adhesion of the colloidal layer —*l*— on the support —*a*— and prevents said layer from becoming detached from its support during the printing operations on account of moisture absorbed by portions —*d*—, because the moisture absorbed by said portions —*d*— is small owing to their reduced thickness and because it cannot reach the region where the layer sheet —*b*— contacts with support —*a*—.

Finally, owing to contraction of the colloidal material under the action of the alkaline bichromate treatment, the surface is made somewhat depressed at the portions *c* with respect to portions —*d*— and thus these depressed portions —*c*— are enabled to retain large quantities of ink, this feature improving the sharpness and uniformity of prints.

To produce a printing plate of the described character, a plate or a film is used, having a comparatively thick layer of emulsion which may be obtained by usual mechanical means as known in connection with the manufacture of photographic films.

In Figure 2 the bottom sheet —*l*— consists of a plurality of sheets *b*—*b'* having different degrees of hardness and imperviousness to moisture.

Hereinafter is described by way of example a preferred method for the preparation of a plate according to this invention.

On a celluloid sheet, which has been previously treated in known manner to improve

the adhesion of the colloidal layer to be applied thereon, there is spread an emulsion of first-class gelatin having the desired thickness, which may be about 20 or 30 thousandths of a millimetre, either by spreading a layer in a single operation, or by spreading a number of layers one upon another, as described in connection with Figure 2.

The completed layer must have its maximum degree of imperviousness to moisture near the support and its minimum most reduced degree of imperviousness on its outer surface or skin, this being obtained, in the multi-layer construction, by first applying on the support a sheet or layer of chemically hardened gelatin and then superimposing on the same more and more pervious sheets or layers.

In case the layer is made in a single operation (that is, by spreading a single layer), the same requirement may be complied with by sensitizing the emulsion when dry by means of a solution of alkaline bichromate, and by exposing the film to light from its back for a time sufficient to make the emulsion impervious to moisture to a gradually decreasing extent from the back portion of the layer contacting with the support towards its outer skin.

By means of the described treatment, which must be completed by a washing operation to remove the yellow colour and the soluble chromium salts left in said layer, a layer of emulsion is obtained having its maximum hardness in its portion contacting with the support while its hardness progressively decreases toward its outer surface or skin.

For preparing a printing plate for printing operation, a film having a layer of colloidal material obtained in the described manner is firstly treated in a hardening bath, say a 5% formalin bath, and then is washed about 10 minutes; then it is sensitized by means of an alakaline bichromate solution, preferably of ammonium, say a 3% solution, and it is finally dried while protected against light and dust.

The film thus obtained may then be exposed under a negative plate which may be a dotted or reticulated or grained one, or which may also be a half tone negative; the exposure may be very short, as it is only required to act on the skin or surface of the sensitized gelatin layer.

When the plate is intended for direct printing on paper, no further operation is required before washing; on the contrary when the plate is intended to be used in an indirect-printing or offset machine, it is advisable to subject the plate to further exposure to light from the back, for a time about one third that of the exposure under the negative plate, so as to increase the thickness of the sheet —*b*— which is evenly hardened and made impervious, and thus reduce the thickness of portions —*d*— which are left somewhat pervious to water.

The film is finally thoroughly washed, for about two hours, to remove the soluble chromium salts, and is ready for printing.

The plate obtained in the described manner is printed in the usual way followed in lithographic processes, that is, it is moistened after each inking and printing operation; then it provides, with usual lithographic inks, very sharp and strong images by a single printing operation.

After printing has been started, the moistening operation at each printing operation may be replaced by or alternated with an exposure to moist air.

What I claim as my invention and desire to secure by United States Letters Patent is:—

1. A printing plate comprising a support, a layer of colloidal material on said support, said layer comprising a moisture impervious sheet immediately adjacent to said support and a moisture pervious sheet on its skin or surface remote from said support, said moisture pervious sheet having definite, relatively small hard and impervious spots for inking and printing purposes.

2. A printing plate comprising a support, a layer of colloidal material on said support, said layer comprising a moisture impervious sheet immediately adjacent to said support and a moisture pervious sheet on its skin, said moisture pervious sheet comprising definite, relatively-small hard and impervious spots obtained by light action and integrally connected with said impervious sheet.

3. A printing plate comprising a translucent support, and a layer of light-sensitive material on said support; said layer having its skin surface rendered hard and moisture impervious to different extents at different definite spots, and having its inner surface evenly hard and moisture impervious, said evenly hard and moisture impervious inner surface being integrally connected with said hard and moisture impervious skin spots.

4. A method of making printing plates, comprising the steps of forming upon one face of a translucent support a layer of light-sensitive material having its maximum and minimum degrees of imperviousness to moisture located, respectively, adjacent said support and at its outer surface or skin; sensitizing said layer; and exposing said layer to light under a negative plate to form on the said outer surface or skin of the layer definite, relatively-small hard and impervious spots for inking and printing purposes.

5. A method of making printing plates, comprising the steps of forming upon one face of a translucent support a layer of light-sensitive material having its maximum and minimum degrees of imperviousness to mois-

ture located, respectively, adjacent said support and at its outer surface or skin; sensitizing said layer; exposing the outer surface or skin of the layer to light under a negative to form thereon definite, relatively-small hard and impervious spots for inking and printing purposes; and exposing said layer to light through said support to render its inner surface evenly hard and moisture-impervious.

6. A method of making printing plates, comprising the steps of coating a support with a layer of colloidal material; treating said layer photochemically to render its back, for the greatest part thereof, hard and impervious to moisture, while leaving at its outer surface an extremely thin skin which remains pervious; sensitizing said skin; and exposing said layer behind a negative, with the sensitized skin in contact therewith.

7. A method of making printing plates, comprising the steps of coating a translucent support with a layer of sensitized colloidal material; exposing the coated support to light from the back so as to harden said layer with the exception of an extremely thin skin at its outer surface which remains pervious to moisture; washing said layer and then sensitizing it again; exposing said skin to light behind a negative to differentiate it in hardened portions and portions pervious to ink; and then printing.

8. A printing plate comprising a support; and a layer of colloidal material on the support which is hardened and impervious to moisture with the exception of an extremely thin superficial skin that is differentiated in hardened portions and pervious portions to form the printing surface.

In testimony whereof I affix my signature.

MARIANO DE' SPERATI.