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COLLOTYPE PROCESS

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This invention relates to an improved process whereby very beautiful photographic impressions can be obtained in a certain and convenient manner with thick inks. The process can be used on a small scale with a hand operated transfer-press in which case the individual impression carrying the imprint of the operating artist is obtained or it can be used for rapid industrial production by means of power actuated machines such as phototype, flat or offset lithographic machines. The process in accordance with the present invention modernizes and simplifies the old phototype process and yields results unobtainable in any of the photocollographic processes, for instance inkable plates can be obtained in a few minutes by working in a dark room with a vertical enlargement and reduction apparatus for example. The process is, therefore, akin both to the Bromoil and the phototype processes, but it perfects them and particularly eliminates their most important defects, that is to say those defects which have always prevented their general rapid reliable application.

According to the invention a printing plate is produced by forming the image in a layer of light sensitive emulsion containing silver salts and having a network of capillary ducts formed therein, the layer being integral with another layer of material preferably of a colloidal nature, non-sensitive but capable of absorbing and retaining moisture.

The network of capillary ducts is formed in the layer of light sensitive emulsion by projecting the negative of the image to be printed on to the layer through a screen prepared in a special manner, so that the surface of the screen presents a network of depressions capable of refractive action. The density of the ducts depends on the degree of opacity the corresponding regions of the image thus formed present to the penetration of the light rays. It will be understood that the inkable plate thus formed is built on a film, glass plate or other support which may be prepared to ensure maximum adherence.

In carrying out the invention the colloidal non-sensitive layer is preferably in the form of a gelatinous emulsion of 8 per cent strength to which 1 per cent of dextrine has been added. This gelatine should be slightly hardened by suitable manipulations in such a manner that it cannot liquefy below about 48° to 50° C. About 4 cm. of the said emulsion is required to cover a square decimetre of the support. This gelatine layer is then granulated. In order that a high degree of uniformity of granulation may be ob-

tained, according to the type of work required of this material, different methods may be employed, for example contraction of the gelatine layer by treating it with acid solution or chromic salt; after this treatment the gelatine layer is further treated by projecting on it pulverized hard material in order to obtain a high polish such as obtained on glass or metals.

On the whole (the support and the gelatine layer) there is then applied a second layer composed of a fine grained sensitive silver chloride or bromine chloride emulsion. This operation is carried out in a suitable room, the temperature of the sensitive emulsion being kept below the melting point of the gelatine layer in order that the latter may not be damaged. The sensitive emulsion is then spread in a proportion of about 4 cubic centimetres per square decimetre of the surface to be covered. This aggregate constitutes the material which is to be used for obtaining the inkable plate.

For the impression a refraction screen is used which is produced in the following manner:—

On a film or other transparent or translucent support there is spread a suitably prepared emulsion, care being taken that the said support remains quite flat. This emulsion may be composed of gelatine and potassium bichromate in the following proportions:—

Water	-----cubic centimetres	100	30
Gelatine	-----grams	8	
Potassium bichromate	-----grams	2	

This emulsion is spread in a proportion of 6 cubic centimetres per square decimetre of the surface to be covered. It is stove-dried at a temperature of 50° to 60° C.

After having been dried, the aggregate thus obtained is exposed to diffused daylight in an ordinary press and under frosted glass. The duration of exposure varies from 10 to 15 minutes according to the intensity of the light. As soon as the exposure is completed, the whole is plunged into tepid water at about 30° C. for 10 minutes and the washing is continued in water, preferably running water, for about one hour. The screen thus obtained has a very fine and very uniform photocollographic grain and it can be inserted in an enlarging or reducing apparatus between the negative and the sensitive impression plate which has been described above and which is intended to receive the projection. Unlike the ordinary regularly or irregularly dotted or lined screens which are transparent and opaque alternatively, the screens obtained in the manner

hereinbefore indicated are formed by little, very regular funnels or ducts produced in the mass of the gelatine. At the moment of projection the light which traverses these funnels or ducts is refracted through their inclined walls, so that the resultant dotting which is more or less luminous or more or less dull is in any case of such dimensions that it is practically imperceptible even to the strongest sights.

It should be added that this refraction screen does not reduce the value or the strength of the image and keeps the high lights quite pure.

The process is carried out by the use of the hereinbefore described plates and screens as follows:—

From an ordinary negative there is obtained by means of an enlarging or reducing apparatus, a positive capable of being used as an impression plate. With this object in view the projection is carried out through the refraction screen described above; the granulated surface of this screen being placed, as usual, at about two tenths of a millimetre from the surface of the sensitive layer, thereby producing points (or dots) on the surface of the positive more or less adjacent to or more or less remote from one another according to the value of the relative light and dark value of the subject. The printed positive is then developed in an ordinary developing bath, then fixed, washed and dried while being protected from dust. The developing solution may be composed of:—

	Grams
Water	1000
Metol	4
Hydroquinone	3
Anhydrous sodium sulphite	15
Borax	20

In order to transform the positive into a plate known solutions may be used having a basis of potassium bromide, copper sulphate, potassium bichromate or chromic acid. These solutions transform the silver of the image into bromide of silver and at the same time the potassium bichromate or the chromic acid is reduced in such a manner as to render the gelatine more or less insoluble according to the original intensity of the photographic image. As the property of insolubility depends on the intensity of the parts of the photographic image a plate is thus obtained the inking of which (depending on the degree of insolubility) will consequently correspond to the intensity of the corresponding parts of the image.

It will be remarked that the non-sensitive layer of the plate, on which the sensitive layer is applied has preserved its properties of elasticity and absorption. Consequently when, by the application of the process, the first layer has become capable of retaining the moisture in consequence of the capillary channels formed in its mass and as a result of the interposition of the refraction screen, this moisture can reach the under-layer of gelatine which itself is capable of absorbing this moisture. The facility with which the ink is transferred from the plate to the paper by application of the process of this invention is attributable to this essential characteristic.

After the transferring operation just described, the plate is fixed and washed again to eliminate the residue of silver salts, then it is washed again and suspended until it is dry.

The plate intended for the impression is pre-

pared in the same manner as an ordinary collotype plate. The inking, either hand or machine, is carried out with the usual leather, gelatine or rubber rollers.

It may be added that the chromatized layer carries the image, adhering firmly to the granulated layer, and the result of this is that the blacks will be very rough; this roughness will be less in the half-tints and the whites will be almost smooth. Hence it follows that the facility and the intensity of the inking is increased. Finally it will be remarked that in the process in question, there are two kinds of grain at one's disposal for obtaining the image. Indeed the material possesses a grain produced by the refraction screen and fixed in the outer layer itself of the plate, in order to ensure that the values of the relative light and dark value of the image are obtained. The other grain is that which belongs to the layer which covers the support of the plate. As has been indicated, the object of this grain is to cause the roughness of the parts of the printing plate to vary to some extent and consequently to carry the ink in proportion to the values of the image. The function of the non-sensitive gelatine layer is to store the moisture it receives through the capillary ducts in the layer of light-sensitive emulsion and to give up this moisture to the upper layer of emulsion under the action of pressure during the printing thus ensuring the maintenance of moisture essential for good printing.

We claim:—

1. A process for producing a printing plate for use in a collotype process which comprises applying a layer of colloidal substances capable of absorbing and retaining moisture to a suitable plate, then granulating the layer, then applying over the granulated layer a layer of light-sensitive gelatine emulsion, then exposing the plate to the action of light passing through the desired negative and an interposed refraction screen, the exposed plate then being developed, washed and dried and treated with known solutions to form a printing plate as in a collotype process.

2. A process for producing a printing plate which comprises applying a layer of non-sensitive material, preferably of a colloidal nature, to a glass or other support, treating it to render it capable of absorbing and retaining moisture, then applying thereto a layer of light sensitive silver halide emulsion, and then projecting the negative of the image to be printed onto the light sensitive emulsion through a screen having a surface presenting a network of depressions capable of refractive action, to form a network of capillary ducts in the layer of emulsion so that moisture may be given up to the upper layer of emulsion under the action of pressure during printing to maintain the moisture content of the upper layer.

3. A process of producing a printing plate according to claim 2 wherein the density of the ducts formed in the layer of emulsion depends on the degree of opacity the corresponding region of the image thus formed presents to the penetration of the light rays.

4. A process of producing a printing plate according to claim 2 wherein the under layer of absorbing and moisture retaining colloidal material is granulated.

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