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PHOTO-MECHANICAL PRINTING PROCESS AND PRINTING MATERIAL FOR CARRYING OUT THE SAME

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The present invention relates to a photo-mechanical printing process and to printing materials used therein.

One object of the present invention is a new and accomplished photo-mechanical printing process, another object of the present invention is a new printing material used for carrying out the said process. Further objects of the invention will be apparent from the following description.

In the ordinary photographic printing processes, light-sensitive printing materials are used and the print is produced by exposing such light-sensitive printing materials through a master-image and thereafter developing and fixing the print in the usual manner.

Furthermore, it is known that prints can be obtained from a photographic picture formed in a silver halide layer by exposing and developing, by pressing the image containing layer impregnated with the developer on to a printing material which is free from light-sensitive substance. Thereby the not developed silver halide which is present in the layer containing the master image and which is fixed out in the usual photographic process, diffuses in an image-like manner into the printing material. If the layer containing the master-image is thereafter removed from the printing material, a reversed image is obtained in the printing material.

If the diffusion of the silver halide is effected in the manner described above the transfer of the image is incomplete and takes an unusual long time.

It has now been found that the process may be improved and accelerated in a considerable manner by the presence of certain substances. These substances may belong to the class of the products capable to act as reduction nuclei or crystallization nuclei for silver halides, such as for instance colloidal silver, silver sulphide, colloidal sulphur, phosphor, or to the class of the substances that are not such nuclei by themselves but may form these nuclei by interaction with the diffusing silver halides, either by reduction such as for instance stannous chloride, or by formation of difficultly soluble compounds with the silver halides, such as for instance sulphides or organic substances which easily split off sulphur, as for instance thiosinamin.

The presence of silver halide solvents is required for the application of the process. Eventually the silver halide solvents contained in a usual photographic developer, as for instance sodium sulphite, suffice, but also special additions may be made. Among these additions a special action is performed by sodium thiosulphate which, as a silver halide solvent, introduces diffusion and at the same time supplies the necessary reduction nuclei for the transfer by conversion with the diffusing silver halide.

In carrying out the process the nuclei for the developing of silver halide or the compounds forming such nuclei with or without the required silver halide solvents are preferably incorporated in the reception material during the manufacture of the latter or by bathing them into the finished layer.

The expression "reception material" used throughout the present specification is to be understood as the material on which the image is left after accomplished diffusion and removal of the original printing layer.

Furthermore, it has proved to be useful to fix the active substances in the reception material by means of precipitants (for instance sodium thiosulphate may be precipitated by barium chloride).

As final carriers may be used most differing substances as for instance coated or uncoated papers, multilayered or stripping supports, textures, wood, celluloid and other plastics, metal, glass, porcelain and any other materials which very often are not suited for the normal photographic process but can be used here since no consideration must be given to the photographic neutrality of the support while no sensitive layer is present.

The process according to the present invention is among others especially indicated for the transfer on to both sides of a leaf formed carrier, which is of great importance in the reproduction of documents and books; here it has namely the advantage of discarding the risk inherent to a material light-sensitively coated on both sides, in which the opacity of the support does not always prevent the light from affecting the opposite sensitive layer.

The photographic transferred images obtained by this transfer process consists of very finely divided silver and silver compounds. They are accessible to any of the subsequent treatments employed in photography, such as intensification, reduction, toning, colouring by dye mordanting processes or colour development and may also be used in contact-tanning reactions like ordinary photographic images. They may be used for building up colour images by the silver bleaching process.

EXAMPLE 1.—A textile design is reproduced on a silver chloro-bromide paper and is developed in

a metol-hydroquinone developer as usually sold (f. i. Gevaert Formula 251), to which has been added 1 g of sodium thiosulphate and 0,05 g sodium sulphide per liter. Without any subsequent treatment the developed image is pressed on to a textile carrier and kept into contact with it for 10 minutes. After stripping the photographic paper, a positive image remains on the textile carrier.

For the purpose of obtaining the same design in colour, it is bleached in a bath consisting of 5 g potassium ferricyanide and 5 g potassium bromide per liter, then washed and hereupon developed in a known colour developer, containing as a colour coupler trichloro-alpha-naphthol. The thus obtained image is blue.

EXAMPLE 2.—*Reception material.*—To a mixture of 100 ccm gelatine 1%, 10 ccm silver nitrate 10% and 1 ccm hydroquinone 1% are added. Of the so obtained colloidal silversol 20 ccm are mixed with a solution containing per liter 60 g gelatine and 1 g sodim thiosulphate. This mixture is cast on to a paper support and dried.

Treatment.—From a smalfilm diapositive an enlargement is made on silver bromide paper and developed in a metol-hydroquinone developer as usually sold (f. i. Gevaert Formula 251) and to which 1 g sodium thiosulphate is added per litre. After development the image, without having been washed, is squeezed on to the carrier, which during the time of development, for the purpose of promoting the proceeding, has been already treated with the developer simultaneously with the silver bromide paper. After 10 minutes contact both layers are separated. An enlarged positive image remains on the reception material and it may be treated subsequently in a selenium toning bath so as to enhance the toning.

EXAMPLE 3.—*Reception material.*—To 1 liter of gelatine 10%, 100 ccm sodium sulphide 1 o/oo and 200 ccm silver nitrate 1 o/oo are added gradually. The mixture is heated during one hour at 40–45°, then solidified, shredded, washed and after melting, cast on to a paper support and dried.

Treatment as described in Example 2.

EXAMPLE 4.—*Reception material.* Two mixtures are prepared previously: A contains 1 liter water, 100 g gelatine and 150 g barium chloride, B contains 1 liter water, 100 g gelatine and 150 g sodium thiosulphate. B is swiftly added to A at 50°, then the mixture is solidified, shredded and washed. After another melting an equal quantity of sodium sulphide 1 o/oo is mixed in this solution, then the mixture is cast on to a paper support and dried. The same mixture is equally cast upon the reverse side of the same paper support and dried.

Treatment.—On two sheets of reflectographic paper (silver chloride emulsion) a print is made reflectographically of each side of a double-sided printed document. The two sheets are developed for one minute in a usual metol-hydroquinone developer (f. i. Gevaert Formula 251), the reception material being treated simultaneously in the same bath so as to promote the proceeding. The exposed and developed reflectographic paper sheets are pressed on to each side of the reception material and, after 10 minutes contact, the three sheets are separated from each other. On the reception material there now remains a double-sided positive copy and after washing no further treatment is required.

EXAMPLE 5.—*Reception material.*—The following solution is cast on to a multilayered paper support, consisting of a paper support of medium thickness, a stripping layer and a thin paper layer: 1 liter gelatine 6%, 30 ccm thiosinamine 2 o/oo and 20 ccm sodium thiosulphate 10%.

Treatment.—One sheet of reflectographic paper is exposed reflectographically and developed for one minute in a usual metol-hydroquinone developer, whereby also the reception carrier is treated in the same bath simultaneously with said development. After development both layers are pressed upon one another and after ten minutes separated again. The so obtained text-positive may be stripped after washing and drying and represents a method of copying especially appropriate for the purpose of correspondence by air mail.

EXAMPLE 6.—On a paper support, provided with a stripping gelatine layer, a mixture consisting of 50 g gelatine, 3 g sodium thiosulphate and 0.3 g stannous chloride are cast and dried.

Treatment.—The treatment is the same as cited in Example 5. After washing and drying, the thick gelatine layer may be stripped. There remains a diapositive of the text which may be used further on according to known photomechanical processes.

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