

UNITED STATES PATENT OFFICE

2,073,033

PHOTOGRAPHIC DUPLICATING PROCESS

Geza Szasz, Berlin, Germany

No Drawing. Application July 16, 1935, Serial
No. 31,609. In Germany February 21, 1935

5 Claims. (Cl. 41—31.5)

This invention relates to a photographic process for duplicating printed matter, maps and other documentary representations having strongly contrasting lines, the process being characterized by a faithful reproduction of the original and the facility or rapidity with which it can be carried out. The invention also includes an improved gelatin matrix for use in the process.

In carrying out the process of the invention, a washed out relief matrix is photographically produced in a silver halide gelatin emulsion layer carried by a suitable flexible transparent base. This silver halide gelatin emulsion layer should be one capable of reproducing strong contrasts. In general, the relief matrix is formed by selectively exposing the light sensitized gelatin layer in accordance with an original representation, and properly developing and treating the selectively exposed layer. This may be accomplished by exposing the gelatin layer to light passed through a photographic negative of the original representation, and then developing the gelatin layer with pyrocatechol developer free from sulphite or with a similar developer capable of tanning the gelatin layer in proportion to the exposure thereof. The unexposed and untanned gelatin is then washed out with warm water and a true image of the original, in the form of a washed out relief, is thereby obtained. The making of the negative from which the matrix is formed may be accomplished photographically, by a reflex copying process or by contact printing.

In accordance with the invention, I prefer to slightly color the silver halide gelatin layer forming the matrix with a suitable substance, as by this means I can accurately control the formation of the washed out relief to a remarkable degree. The coloring of the gelatin layer renders it visible and accordingly, the operator can readily determine when all of the unexposed gelatin has been washed away. In this manner, a matrix comprising a highly accurate and faithful image of the original is obtained.

The coloring substance so employed should be of such a nature that it does not react with the water soluble dyes which may be subsequently used in printing, and I have found that pigments may be employed for this purpose. The pigment may be incorporated in the silver halide gelatin layer by mixing it in the emulsion from which this layer is prepared.

The duplicating process may be carried out according to two different methods of procedure.

According to one embodiment of the invention, the washed out relief matrix, produced as described above, is colored with water soluble copying dye of high tinctorial power, such as methylene blue or methylene violet. Such dyes are commonly used in the known hectographic inks. This can be done by the dusting process in which the matrix is moistened, then blotted to remove moisture from the areas not covered by the gelatin layer and then dusted with the dye in powdered form, the excess dry dye being shaken off. The dye adheres to the gelatin coated portions of the matrix which have retained some moisture, but does not adhere to the dry exposed base on which the gelatin is carried. As an alternative to the dusting process of dye application, I may employ a dye layer formed of a highly concentrated water soluble dye provided with a binder and if necessary with wetting additions. This dye layer may be formed by coating on a backing of paper or the like, a mixture comprising a dye of high tinctorial power, such as methylene blue or methylene violet, a binder, such as japan wax, and a moistening agent, such as glycerin.

The dye layer is pressed on to the matrix, the relief image portions of which have been previously moistened, and the dye is thereby transferred to the relief image.

The dye image, produced either by the dusting process or the dye layer procedure described above, is then transferred to a second layer of gelatin or similar material having glycerin incorporated therein to keep it moist, this being accomplished by squeezing the matrix against the second layer. This forms on the second layer printing areas covered with dye. The second gelatin layer forms a printing matrix from which impressions can be made on paper or other material in considerable numbers.

I claim:

1. A process of duplicating printed matter and other documents having strongly contrasting lines, comprising forming a matrix carrying a washed out relief image by selectively exposing a light sensitized silver halide gelatin layer in accordance with an original representation, said layer being carried on a flexible imperforate support and being capable of reproducing strong contrasts, tanning the exposed portions of said layer with a developer and washing out the unexposed portions thereof, applying a water soluble dye of high tinctorial power to the relief image of said matrix, pressing said matrix on a second gelatin layer to transfer the dye image thereto and mak-

ing impressions from the dye image on said second gelatin layer.

2. A process of duplicating printed matter and other documents having strongly contrasting lines, comprising forming a matrix carrying a washed out relief image by selectively exposing a colored light sensitized silver halide gelatin layer in accordance with an original representation, said layer being carried on a flexible imperforate support and being capable of reproducing strong contrasts, tanning the exposed portions of said layer with a developer and washing out the unexposed portions thereof, applying a water soluble dye of high tinctorial power to the relief image of said matrix, pressing said matrix on a second gelatin layer to transfer the dye image thereto and making impressions from the dye image on said second gelatin layer.

3. A process of duplicating printed matter and other documents having strongly contrasting lines, comprising preparing a negative of the original document, exposing a silver halide gelatin photographic emulsion layer carried on a flexible imperforate support and capable of reproducing strong contrasts to light through said negative, tanning the exposed portions of said layer with a developer and washing out the unexposed portions thereof, thereby forming a matrix constituting a positive washed out gelatin relief image of said original document on said support, moistening said gelatin relief, applying a hectographic ink thereto, transferring said ink from said relief to a hectographic gelatin printing layer, and making copies from the dye image on said second gelatin layer.

4. A process of duplicating printed matter and

other documents having strongly contrasting lines, comprising forming a matrix carrying a washed out relief image by selectively exposing a light sensitized silver halide gelatin layer in accordance with an original representation, said layer being carried on a flexible imperforate support and being capable of reproducing strong contrasts, tanning the exposed portions of said layer with a developer and washing out the unexposed portions thereof, pressing a dye layer comprising a water soluble dye of high tinctorial power mixed with a binder and a moistening agent against the relief image of said matrix whereby the dye is applied to the relief image, pressing the matrix on a second gelatin layer to transfer the dye image thereto and making impressions from the dye image on said second gelatin layer.

5. A process of duplicating printed matter and other documents having strongly contrasting lines, comprising preparing a negative of the original document, exposing a silver halide gelatin photographic emulsion layer carried on a flexible imperforate support and capable of reproducing strong contrasts to light through said negative, tanning the exposed portions of said layer with a developer and washing out the unexposed portions thereof, thereby forming a matrix constituting a positive washed out gelatin relief image of said original document on said support, moistening said gelatin relief, applying a hectographic ink thereto, transferring said ink from said relief to a hectographic gelatin printing layer, and making copies from the dye image on said hectographic layer.

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