

UNITED STATES PATENT OFFICE.

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PHOTOGRAPHIC PRINTING.

SPECIFICATION forming part of Letters Patent No. 728,310, dated May 19, 1903.

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To all whom it may concern:

Be it known that we, EDWARD SANGER SHEPHERD and OWEN MORTIMER BARTLETT, subjects of the King of Great Britain, residing at 5, 6, and 7 Gray's Inn Passage, Holborn, London, England, have invented new and useful Improvements in Photographic Printing, of which the following is a specification.

Our invention relates to the production of photographic printing and chiefly to the production of multicolor prints upon a plain paper or surface.

We have found by experiment that when a gelatin relief or film with a selective absorption is stained with an anilin or other suitable dyestuff and placed in contact with a damped surface of gelatin softer than that of the relief or film the coloring-matter will be absorbed by the softer gelatin, the color forming a perfect image of the colored graduations. In a suitable method of applying this discovery to the production of color-prints upon paper from three color record-negatives we prepare a positive from each negative as follows—that is to say, we coat a sheet of thin celluloid or other suitable support with a film of gelatin sensitized with a bichromate salt after the manner well known in producing carbon-prints. The dried film is exposed to light under the negative through the support and subsequently developed with warm water. In order to keep the relief as low as possible, it is desirable to add bromid of silver to the gelatin solution, which is removed after printing by a solution of hyposulfite of sodium.

A negative is necessary for making the positive the complete printing-film, consisting of two distinct portions—the insoluble gelatin relief, which is of substantially uniform hardness, and the celluloid base. The celluloid base is incapable of absorbing the water-color printing-ink, and the selective absorption of the film is governed by the thickness of the gelatin relief constituting the photographic image. The highest lights in the printing-plate are entirely free from gelatin, and as the celluloid base is incapable of absorbing the coloring-matter the high lights in the finished print are consequently quite white. It is necessary to make the printing-

plate from a negative and not from a positive, for the reason that the portions of the printing film or plate representing the deepest colors correspond to the transparent portions of the negative. Consequently they are represented in the printing film or plate by the greatest thickness of gelatin relief, and as it is only the gelatin relief which holds the ink and subsequently transfers the same to the paper it is obvious that both the printing-film and the resulting paper-print from it must be positives.

It is to be noted that as the photographic image is printed from the back of the celluloid or support the developed image on the printing-film—that is to say, the gelatin relief—is reversed. This reversal being reversed in transferring to the paper, the final result on the paper is an unreversed print. As a consequence, it is not necessary to make reversed negatives for this method of printing.

The resulting low reliefs in insoluble gelatin are next stained up in dye-baths of greenish blue, pink, and yellow, respectively.

In order to combine the colored impressions corresponding to the reliefs upon one surface—such as a sheet of paper, opal, glass, or the like—the said surface, previously coated with a film of soft gelatin, is wetted and the reliefs are successively laid upon it in proper register, each relief being allowed to remain for sufficient time for the color to be absorbed by the soft gelatin.

It is to be understood that the reliefs may be repeatedly redyed according to the number of prints to be produced.

Instead of transferring a greenish-blue dye to the surface of a print the desired greenish-blue color may be produced by any of the ferropussiate processes and the pink and yellow prints laid down upon the support by the method above described. For example, to obtain a ferropussiate print the printing-film may be soaked in any ferric salt—as, for instance, red prussiate of potash—rinsed in water, and applied to the gelatinized paper. After absorption has taken place the image may be developed by brushing over the print with a weak solution of a ferrous salt, or a ferrous salt may be applied to the printing-

film and a ferric salt used on the print as a developer. The blue-print may also be prepared by the ordinary blue-print process of the engineer from the original negative, if
 5 desired, the pink and yellow tinted films being applied thereafter, as before described. It is to be understood that the gelatin coating on the paper is extremely thin, and if the blue-print is made upon well-sized paper very
 10 perfect prints may be made by this method.

Another modification of the ferroproussiate print is to transfer the pink and yellow tinted films to a sheet of gelatinized paper and to make the blue-print as a low clear gelatin
 15 relief on a celluloid film, the blue color being developed by first soaking the relief in a ferrous salt and afterward treating it with a ferric salt, so as to produce a deposit of insoluble Prussian blue in the substance of the gelatin relief. The resulting blue-print on celluloid is then squeegeed in registering contact with the piece of gelatinized paper bearing the pink and yellow images. The last method is particularly suitable for miniature
 20 or button pictures, as the celluloid film protects the faces of the picture.

It will be clear that our process is applicable not only to multicolor prints or reproductions, as above described, but also to monochrome reproductions.
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Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

35 1. A process for obtaining reproductions from photographic negatives which consists in preparing a positive gelatin relief of substantially uniform hardness, the selective absorption being obtained by the varying thickness of the gelatin, staining the film and placing it in contact with a surface coated with a film of gelatin, whereby the color in the gelatin relief is absorbed by the softer gelatin, substantially as described.
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45 2. A process for obtaining reproductions

from photographic negatives which consists in preparing a positive gelatin relief of substantially uniform hardness, in which the high lights are represented by an absence of the gelatin and the selective absorption of
 50 the relief is obtained by the varying thickness of the same, staining the said relief, preparing a surface with a coating of soft gelatin, dampening the said gelatin-surface, applying the stained film to the gelatinized surface, whereby the color will be absorbed by
 55 the softer gelatin, substantially as described.

3. A process for obtaining reproductions from photographic negatives which consists in coating a transparent support, with a gelatin-surface, sensitized with a bichromate salt, exposing said surface through said support in contact with a photographic negative, developing the said surface to produce a gelatin relief of substantially uniform hardness
 60 and having selective absorbent qualities conforming to the thickness of the parts of said relief, staining said relief, and applying it to a surface coated with soft gelatin previously moistened, substantially as described.
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4. A process for obtaining multicolor reproductions or prints, from a plurality of color record-negatives, which consists in preparing a positive from each negative on a gelatin relief of substantially uniform hardness, having
 75 selective absorbent qualities in accordance with the variations in thickness of said relief, staining the said reliefs with colors corresponding to their color record-negatives and then applying them successively in proper
 80 register upon a surface coated with soft gelatin and previously dampened so that the colors are absorbed by the said soft gelatin, substantially as described.

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Witnesses:

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