

UNITED STATES PATENT OFFICE.

MARIO RUSSO, OF ROME, ITALY, ASSIGNOR OF ONE-HALF TO GIOVANNI B. ZANARDO, OF SAME PLACE.

ART OF REPRODUCING OBJECTS IN RELIEF OR INTAGLIO BY THE AID OF PHOTOGRAPHY.

SPECIFICATION forming part of Letters Patent No. 520,707, dated May 29, 1894.

Application filed March 12, 1894. Serial No. 503,329. (No specimens.) Patented in Italy May 1, 1894, No. 36,024.

To all whom it may concern:

Be it known that I, MARIO RUSSO, of No. 97 Via Pedacchia, Rome, Kingdom of Italy, have invented certain new and useful Improvements in the Art of Reproducing Objects in Relief or Intaglio with the Aid of Photography, (for which I have obtained a patent in Italy, dated May 1, 1894, No. 36,024,) of which the following is a specification.

This invention has reference to a process wherein the action of suitable light such as solar light or electric light on chemical preparations is employed in the production in relief or in intaglio of objects of various kinds capable of being photographed; and whereby reliefs and intaglios can be produced whereof the various parts will be more or less prominent according to the relative prominence or representation of prominence of the corresponding parts in the originals and quite irrespective of the color or colors of the various parts of the originals.

In carrying out this process I first obtain a negative of the object to be reproduced in relief and from this negative I make a transparent positive of approximately the same density. It is necessary that the negative be very clear and exact in all its details and in it the more prominent parts be the better illuminated. The negative should also be strongly developed but without having its transparency impaired.

Having obtained a suitable negative and positive I proceed to the preparation of a sensitive plate which is made in the following manner: I first prepare sheets or plates of non-sensitized gelatin as follows: I take of white gelatin one hundred grams which I soften in four hundred grams of water and afterward dissolve in a water bath heated to a temperature not exceeding 45° centigrade. I add pure glycerin thirty-five grams and add fifteen grams of ammonia and stir gently, preferably with a glass rod. When this solution is nearly cool but still capable of flowing, I pour it gently so as to form a thickness of about five millimeters of the composition, over well polished glasses which are covered with talc and surrounded by a border of frame and I allow the sheets thus formed to dry as rapidly as possible. When the sheets

thus prepared are well dried I detach them from the glasses in the form of sheets or plates of gelatin and preserve them between sheets of paper. These plates thus prepared will keep indefinitely and I may conveniently make up a stock of the same and keep them on hand.

When it is desired to prepare a relief I make a sensitized plate in the following manner: I first prepare bichromated gelatin by heating and mixing in a water bath very pure gelatin four grams; distilled water, one hundred grams; bichromate of ammonia, one gram, and filter the resulting mixture. I then spread the bichromated gelatin, in an even layer, over the surface of a finely ground plate of glass on the ground side. I then place upon this layer, very carefully, one of the sheets of dry gelatin, prepared as above mentioned, taking care that no air bubbles remain between the glass and the sheet of gelatin. This being done I spread over the dry gelatin a coating of the bichromated gelatin, allowing it to flow over the sheets in such a manner as to form a perfectly level and smooth surface. I then allow it to dry in a place protected from light and dust. This operation should always be performed in a place from which natural light is excluded or is only admitted through red or orange glass, or if artificial light is used a lamp or candle is protected by red or orange glass, as is usual in a photographic dark room. The sensitive plate, which must be carefully kept shielded from light and dust, is now ready to receive the impression which is effected in the following manner, I superimpose upon the sensitive plate thus prepared a negative and positive produced as before mentioned in such a way that the details shall almost, but not exactly, register. I then clamp the negative, positive and sensitized plate together and expose to the light. The following table indicates the approximate duration of exposure: sun, three to four hours; diffused light, six to eight hours; electric light, five to six hours.

The purpose of placing the negative and positive slightly out of register is this: If a negative and a positive of substantially the same density be exactly superimposed, one

over the other, the result is that the transparent parts of the negative will be blocked by the opaque parts of the positive so as to present a practically even opaque appearance, but if the position of one of the plates be shifted slightly it will be noticed that there is at once produced a relief effect and it is this fact that I take advantage of. By using a negative and a positive of substantially the same density the difference of colors is practically eliminated because the color effect of the negative almost counteracts the color effect of the positive.

After the plate has been exposed as before stated, I proceed to the development, first allowing the sensitive gelatin plate to cool, if it has been exposed to the sun. The developing is effected by immersing the plate in water and moving it frequently until it presents the desired relief. If the plate be immersed for a comparatively short time, the relief will be slight; if it be immersed for a longer time the relief produced will be greater, and I may take advantage of this fact to regulate the amount of relief according to the subject or the effect desired to be produced. When the desired relief has been effected, I remove the plate from water and immerse it for several hours in a five per cent. solution of sulphate of iron or other hardening agent; I then remove it from this bath and thoroughly wash it, when it is ready for use to produce the mold from which reliefs may be produced by electrotyping, or by any other process, in the usual manner.

In cases when the larger part of the figure to be reproduced is of a uniform light color, that is to say when there are only one or more transparent spots in the negative which are to be rendered opaque, I have found it advantageous to only apply to the negative the parts of the positive corresponding to such portions of the negative as are to be rendered opaque.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The process herein described of reproducing objects in relief or in intaglio, whereby there is obtained the proper relative relief of the various parts of any subject irrespective of its color or colors, the same consisting in first superposing upon an ordinary negative a positive, or part of a positive, as described, so as to be slightly out of register, and in contact with a suitably prepared sensitive plate, then exposing the plate thus arranged to light, then subjecting said sensitive plate to a bath of water, substantially as described.

2. The process herein described of reproducing objects in relief or in intaglio, whereby there is obtained the proper relative relief to the various parts of any subject irrespective of its color or colors, the same con-

sisting in the first superposing upon an ordinary negative a positive, or part of a positive, as described, so as to be slightly out of register, and in contact with a suitably prepared sensitive plate, then exposing the plate thus arranged to light, and then subjecting said sensitive plate to a bath of water and then to a hardening bath, substantially as set forth.

3. The process herein described of reproducing objects in relief or in intaglio, whereby there is obtained the proper relative relief to the various parts of any subject irrespective of its color or colors, the same consisting in first superposing upon an ordinary negative a positive, or part of a positive, as described, so as to be slightly out of register, and in contact with a suitably prepared sensitive plate, then exposing the plate thus arranged to light then subjecting said sensitive plate to a bath of water, then to a hardening bath, and then making from the said plate a mold of plastic material, substantially as set forth.

4. The process herein described of reproducing objects in relief or in intaglio, whereby there is obtained the proper relative relief of the various parts of any subject irrespective of its color or colors, the same consisting in first superposing upon an ordinary negative a positive, or part of a positive, as described, so as to be slightly out of register, and in contact with a suitably prepared sensitive plate, then exposing the plate thus arranged to light, then subjecting said sensitive plate to a bath of water, then to a hardening bath, then making from the said plate a mold of plastic material, and finally making a relief from said mold, substantially as set forth.

5. The process herein described of preparing sensitive plates for use in the production of objects in relief or in intaglio, the same consisting in first applying to the ground surface of a glass plate a coating of bichromated gelatin prepared as explained, then applying to the surface thus coated a layer or sheet of dry gelatin prepared as explained, and finally spreading over the surface of the dry gelatin layer a coating of the bichromated gelatin, substantially as set forth.

6. In a process of reproducing objects in relief or intaglio, the sub-process which consists in super-imposing a negative upon a positive in such a manner that the details are slightly out of register, and then submitting a sensitive plate to the action of light through the so arranged positive and negative, substantially as described.

In witness whereof I have signed this specification in presence of two witnesses.

MARIO RUSSO.

Witnesses:

G. B. ZANARDO,
FRANCESCO FRUGUELE.