

UNITED STATES PATENT OFFICE.

HAROLD WHITING, OF CAMBRIDGE, MASSACHUSETTS.

PROCESS OF TONING BLUE PRINTS.

SPECIFICATION forming part of Letters Patent No. 397,480, dated February 5, 1889.

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To all whom it may concern:

Be it known that I, HAROLD WHITING, a citizen of the United States, residing at Cambridge, in the county of Middlesex and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Toning Blue Prints; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

The object of my invention is to change the color of a blue print so as to resemble that of an ordinary photograph; and I accomplish this object by immersing the blue print in a solution of a certain salt of copper, whereby a portion of the iron contained in the blue print is replaced or associated with an insoluble salt of copper, the presence of copper rendering it possible to produce finer tones than can be had with iron alone. Thus if a blue print thoroughly washed is soaked in an ammoniacal solution of copper hydrate, copper will be found to enter into the portion of the print which has been exposed to light, the amount of copper depending on the strength of the solution and the excess of ammonia, changing the tone of the print, as hereinafter stated.

In practice I proceed as follows: Take one part of nitrate of copper, (crystals,) dissolve in four parts of water, precipitate hydrate of copper, and nearly redissolve it in about one part of thirty per cent. aqua-ammonia, (specific gravity ninety one-hundredths,) ($\frac{90}{100}$.) To tone, for instance, three or four blue prints five by eight inches, fixed in the ordinary manner, add to four ounces of water two drams of the aforesaid ammoniacal solution of copper and from one-half to one dram of aqua-ammonia of the above strength, and then soak the blue prints in this until the desired tone is attained, (the tint changing more or less gradually from purple to brown.) Then immediately wash them in water and dry in the ordinary manner.

To produce a brownish tone more quickly, use several drops more ammonia and less copper. To secure a violet tone, use a little less ammonia and more copper. To produce

deep tones, the prints should be made, preferably, on card-board freshly and thoroughly coated with one part citrate of iron and ammonia, one part red prussiate of potash, and ten parts water. The prints should also be exposed to light two or three times as long as for an ordinary blue print.

To produce a print insoluble in acid, tone to a browner shade than is desired for the final print by the addition of a few drops more ammonia to the bath, and then wash with water and treat with a dilute solution of muriatic or nitric acid. If a great excess of ammonia is used, the final print will be reddish, owing to ferro-prussiate of copper; but if no excess is used the final print will be blue, owing to ferro-prussiates of iron not being decomposed.

I am aware that blue prints have been toned by various processes, with results, however, so far from satisfactory that none of these processes are in common use. When, for instance, the ferro-prussic acid is replaced by tannic, gallic, or pyrogallic acid, or by sulphur, a disagreeable brownish or greenish tone usually results. The tones produced with ammonia, soda, and other volatile or soluble compounds are not permanent. The same objection applies to various processes depending upon the introduction of mercury into the print, which are also comparatively difficult.

My process differs from all others, as far as I am aware, in the combination of two highly-colored salts, both insoluble and both permanent—namely, the ferro-prussiates of iron and of copper, or of modifications thereof, due to the presence of ammonia; and I claim that by my process permanent prints, either of a neutral tint or of a greater variety of rich and pleasing tones, can be produced with less trouble and with less expense than by any other process now in use.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The process of toning blue prints by treating them with a solution containing two parts of the concentrated ammoniacal solution of nitrate of copper, thirty-two parts of water, and one part of ammonia, in or about

the proportions specified, essentially as described.

2. The process of toning blue prints by decomposing the ferro-prussiate of iron contained therein by means of a solution of copper containing free alkali, as hereinbefore set forth.

3. The process of toning blue prints by

neutralizing the bluish color due to the ferro-prussiates of iron by substituting for a portion of the same a red pigment consisting, essentially, of ferro-prussiate of copper.

HAROLD WHITING.

Witnesses:

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