

Louis J. M. Daguerre, "A New Mode," June 1844

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ON A NEW MODE OF PREPARING PLATES DESTINED TO RECEIVE
PHOTOGRAPHIC IMAGES¹

BY M. DAGUERRE.—LETTER TO M. ARAGO.

YOU have been kind enough to announce to the Academy that I had arrived, by a series of experiments, at recognising in a certain manner that, in the present state of my process, the layer sensible to light being too thin, could not furnish all the gradation of tints necessary for reproducing nature with relief and firmness ; indeed, although the proofs hitherto obtained are not deficient in purity, they leave, with a few exceptions, much to be desired with relation to general effect and relief.²

It is by superposing on the plate several metals, reducing them to powder by friction, and by acidulating the empty spaces which the molecules leave, that I have been enabled to develop galvanic actions which permit the employment of a much thicker layer of iodide, without having to fear, during the operation of light in the camera obscura, the influence of the liberated iodine.

The new combination which I employ, and which is composed of several metallic iodides, has the advantage of giving a sensible layer capable of receiving impressions simultaneously by all the degrees of tone, and I thus obtain, in a very short space of time, the representation of objects vividly enlightened with demi-tints, all of which retain, as in nature, their transparency and their relative value.

By adding gold to the metals which I first used, I am enabled to avoid the great difficulty which the use of bromine, as an accelerating substance, presented. It is known that only very experienced persons could employ bromine with success, and that they were able to obtain the maximum of sensibility only by chance, since it is impossible to determine this point very precisely, and since immediately beyond it the bromine attacks the silver, and is opposed to the formation of the image.³

With my new means, the layer of iodine is always saturated with bromine, since the plate may, without inconvenience, be left exposed to the vapor of this substance for at least half the necessary time; for the application of the layer of gold is opposed to the formation of what is called the veil of bromine. This facility must not, however, be abused; for the layer of gold, being very thin, might be attacked, especially if too much polished.⁴ The process which I am about to give may, perhaps, be found rather complicated; but, notwithstanding my desire to simplify it as much as possible, I have been led, on the contrary, by the results of my experiment, to multiply the substances employed, all of which play an important part in the whole process. I regard them all as

necessary for obtaining a complete result, which must be the case, since I have only gradually arrived at discovering the properties of these different metals, one, of which aids in promptitude, the other in the vigor of the impression, &.⁵

From the concurrence of these substances arises a power which neutralises all the unknown effects which so often oppose the formation of the image.⁶

I think, besides, that Science and Art should not be interrupted by the consideration of a more or less long manipulation ; we should be contented to obtain beautiful results at this price, especially when the means of execution are easy.

For the galvanic preparation of the plate does not present any difficulty. The operation is divided into two principal parts: the first, which is the longest, may be made a long time previously, and may be regarded as the completion of the manufacture of the plate. This operation, being once made, serves indefinitely; and, without recommencing it, a great number of impressions may be made on the same plate.

DESIGNATION OF THE NEW SUBSTANCES.

Aqueous solution of bichloride of mercury:

Solution of cyanide of mercury:

White oil of petroleum, acidulated with nitric acid:

Solution of chloride of gold and platinum.

PREPARATION OF THE SUBSTANCES.

Aqueous Solution of Bichloride of Mercury.—5 decigrammes of bichloride of mercury in 700 grammes of distilled water.

Solution of Cyanide of Mercury.—A flask of distilled water is saturated with cyanide of mercury, and a certain quantity is decanted, which is diluted with an equal quantity of distilled water.

*Acidulated White Oil of Petroleum.*⁷—This oil is acidulated by mixing with it one-tenth of pure nitric acid, leaving it for at least -t8 hours, occasionally agitating the flask. The oil, which is acidulated, and which then powerfully reddens litmus paper, is decanted. It is also a little colored, but remains very limpid.

Solution of Chloride of Gold and Platinum.—In order not to multiply the solutions, I take the ordinary chloride of gold, used for fixing the impressions, and which is composed of 1 gramme of chloride of gold, and 4 grammes of hyposulphate of soda, to a quart of distilled water.

With respect to chloride of platinum, 2 1/2 decigrammes must be dissolved in 3 quarts of distilled water ; these two solutions are mixed in equal quantities.

Modus Operandi.

FIRST PREPARATION OF THE PLATE.

Note.—For the sake of brevity in the following description, I will abridge the name of each substance. Thus, I will say, to designate the aqueous solution of bichloride of mercury, *sublimate*; for the solution of cyanide of mercury, *cyanide*; for the acidulated oil of petroleum, *oil*; for the solution of chloride of gold and platinum, *gold and platinum*; and for the oxide of iron, *rouge* only.

The plate is first polished with sublimate and tripoli, and afterwards with rouge,⁸ until a beautiful black is arrived at. Then, the plate is layed on the horizontal plate, and the

solution of cyanide is poured on it and heated over a lamp, as in fixing an impression with chloride of gold. The mercury is deposited, and forms a whitish layer. The plate is allowed to cool a little, and, after having poured off the liquid, it is dried by rubbing with cotton and sprinkling with rouge.

It is now necessary to polish the whitish layer deposited by the mercury. With a piece of cotton steeped in oil and rouge, this layer is rubbed until it becomes of a fine black. In the last place, it may be rubbed very strongly, but with cotton alone, in order to render the acidulated layer as thin as possible.

The plate is afterwards placed on the horizontal plane, and the solution of gold and platinum is poured on. It is heated in the ordinary manner; it is then allowed to cool, the liquid is poured off, and it is dried by gentle friction with cotton and rouge.

This operation must be performed with care, especially when the impression is not immediately continued; for, otherwise, some lines of liquid would be left on the plate, which it is difficult to get rid of. After this last friction the plates should be only dried, and not polished.

This concludes the first preparation of the plate, which may be made a long time previously.

SECOND PREPARATION.

Note,—I do not think it fit to allow a longer interval than 12 hours to intervene between this operation and iodising the plate.

We left the plate with a deposit of gold and platinum. In order to polish this metallic layer, the plate is rubbed with a piece of cotton, and oil and rouge, until it again becomes black; and then with alcohol and cotton only, in order to remove this layer of rouge as much as possible.

The plate is then rubbed very strongly, and passing several times over the same places, with cotton impregnated with cyanide. As this layer dries very promptly, it might leave on the plate traces of inequality; in order to avoid this, the cyanide must be again passed over it, and, while the plate is still moist, we quickly rub over the whole surface of the plate with cotton imbibed with a little oil, thus mixing these two substances; then, with a piece of dry cotton, we rub in order to unite, and, at the same time, to dry the plate, taking care to remove from the cotton the parts which are moistened with cyanide and oil. Finally, as the cotton still leaves traces, the plate is likewise sprinkled with a little rouge, which is removed by gently rubbing.

Afterwards, the plate is again rubbed with cotton impregnated with oil, only in such a manner as to make the burnish of the metal return; it is then sprinkled with rouge, and then very gently rubbed round, in such a manner as to remove all the rouge, which carries with it the superabundance of the acidulated layer.⁹

Finally, it is strongly rubbed with a rather firm pledget of cotton, in order to give the last polish.¹⁰

It is not necessary often to renew the pledgets of cotton imbibed with oil and rouge; they must only be kept free from dust. I have said above that the first preparation of the plate may serve indefinitely; but it will be comprehended that the second must be modified, according to whether we operate on a plate which has received a fixed or an unfixed impression.

ON THE FIXED IMPRESSION.

The stains left by the washing water must be removed with rouge and water slightly acidulated with nitric acid (at 36°F. at this season [April?], and less in summer).

Afterwards, the plate must be polished with oil and rouge, in order to remove all traces of the image.

The operation is then continued as I have just described for the second preparation of the new plate, and beginning with the employment of alcohol.

ON THE UNFIXED IMPRESSION (BUT WHOSE SENSIBLE LAYER HAS BEEN REMOVED IN THE ORDINARY MANNER).

First, the plate must be rubbed with alcohol and rouge, in order to remove the traces of oil which serve for receiving the foregoing impression.

We afterwards proceed as indicated above for the new plate, beginning with the employment of alcohol.

SUMMARY OF THE OPERATIONS.

First Preparation.

1. Corrosive sublimate, with tripoli first, and rouge afterwards, in order to polish the plate:
2. Cyanide of mercury, heated and dried with cotton and rouge:
3. Acidulated oil, with rouge for polishing the layer of mercury:
4. Gold and platinum, heated and dried with cotton and rouge.

Second Preparation.

5. Acidulated oil with rouge, for polishing the layer of gold and platinum:
6. Absolute alcohol, for removing, as much as possible, the oil and rouge:
7. Cyanide of mercury, employed cold, and rubbed only with cotton:
8. Oil rubbed very strongly, and equalised in the last place with rouge sprinkled on it.

On the fixed Proof.

1. Nitric acid at 36°F. with rouge for removing the stains :
2. Oil with rouge for removing the traces of the image and for polishing.
Continue then as above, setting out from No. 6, alcohol, etc.

On the unfixed Proof.

Alcohol with rouge for removing the traces of oil, and continuing as above, beginning from No. 6, alcohol, &c.

OBSERVATIONS.

On Iodising.—The color of the impression depends on the tint given to the metallic iodide; it may, therefore, be varied at will. However, I have found the violet rose color most suitable.

For transmitting the iodine to the plate, the sheet of cardboard may be replaced by an earthenware plate deprived of enamel. The iodine transmitted by this means is not decomposed ; it is useless, I may even say injurious, to heat the plate before exposing it to the vapor of iodine.

Washing with Hyposulphite of Soda.—In order to remove the sensible layer, the solution of hyposulphite of soda must not be too strong, because it destroys the sharpness of the impression. 60 grammes of hyposulphite are sufficient for 1 quart of distilled water.

1. *Comptes Rendus*, No. 17, April 22, 1844.
2. On the plate cleaned by means of the layer of water, as I have pointed out, very fine impressions are very rapidly obtained, but which are also wanting in relief, on account of the thinness of the sensible layer.
3. Every one knows that the dry vapor of bromine is more favorable than that which is obtained by means of a solution of bromine in water, for the latter has the inconvenience of carrying with it moisture which condenses on the surface of the plate. The employment of the oil, which I indicate further on, neutralises this effect, and gives to the vapor of bromine diluted with water the same property as that of dry bromine.
4. This is so true, that if an impression be made on a plate which has been fixed several times, it may be exposed to the vapor of bromine as many times more than the necessary time as it has received layers of gold.
5. I will only observe, that the employment of all the metals of which I indicate further on, is indispensable; but the mode of applying them may be varied.
6. For, by multiplying these elements as in a pile, this power is augmented, and we are thus enabled to make the most indolent radiations act in the same time, such as those of green and red.
7. The most suitable oil of petroleum is of a greenish yellow tint, and takes, at different angles, azure reflections.

I have given the preference to this oil over the fixed oils, because it always remains limpid, although strongly acidulated. My object in employing an acidulated oil is to reduce the metals to powder, and to retain this powder on the surface of the plate, at the same time giving greater thickness to the layer by its unctuous properties; for the naphtha which results from the distillation of this oil does not produce the same effect, because, being too fluid, it carries away the powder of the metals. It is for the same reason that I have lately recommended the employment of essence of lavender rather than that of essence of turpentine.

8. If I prefer, for polishing, rouge to other substances, it is not because I recognise in it a photogenic property, but because it burnishes better, and because it assists in fixing the layer of gold, rendering it less susceptible of being removed in scales when heated too much. The galvanic plates, when they are neither marbles nor black stains (which some times happened originally), receive better than others the application of metals, and, consequently, the chloride of gold adhering to it more firmly, is not removed in scales.
9. This must be done as gently as possible; for, otherwise, the rouge would adhere to the plate, and would form a general film.
10. In operating on a plate along time after it has received the first preparation, it is necessary, before employing the acidulating oil and red oxide, to operate as I indicate further on for the plate which has received a fixed impression. This precaution is necessary or destroying the stains which time may have developed.

[End of text. For clarity in this presentation, original footnote symbols are replaced with numbers. In the section, “On the fixed impression,” the bracket word “[April?” is per original presentation.]

EDITOR’S NOTES:

This text also was published as Louis Daguerre, *Nouveau Moyen de Préparer la Couche Sensible des Plaques Destinées à recevoir les Images Photographs*, par M. Daguerre.

Lettre à M. Arago (Paris: Bachelier, Imprimeur-Libraire, 1844). Available on the website of the Bibliothèque Nationale de France, *BnF/Gallica*. (<http://www.gallica2.bnf.fr>) Text version also available in *Project Gutenberg*. (<http://www.gutenberg.org/etext/16260>)

The text was also published in Daguerre, "Improvement in the Daguerreotype Process," *Medical Times: a Journal of English and Foreign Medicine, and Miscellany of Medical Affairs* "Pharmaceutical Number" (London) No.2 (July 1844): 39–40. In the presentation, the text is preceded by the information "Communicated to the French Academy, April 22, 1844 by M. Arago".

This "new mode" is the subject of a 19 February 1841 letter from Daguerre to Robert Hunt (now in the collection of the Pierpont Morgan Library & Museum.)²

A severely abbreviated summary of these instructions is in "The Daguerreotype Process," *National Intelligencer* (Washington [DC]) (23 May 1844): first page of issue.¹

1. http://www.daguerreotypearchive.org/texts/N8440002_DAG-PROCESS_NTL-INTEL_1844-05-23.pdf

2. http://www.daguerreotypearchive.org/texts/S8410002_DAGUERRE_HUNT_LETTER_1841-02-19.pdf

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