MR. HARDWICH'S NEGATIVE PRINTING PROCESS UPON NITRATE OF SILVER.

Take

Pure Citric Acid	50 gr.
Chloride of Ammonium . .	50 gr.
Gelatine	10 gr.
Water	10 oz.

Neutralise the citric acid with carbonate of soda as in the positive process. Papier Saxe or Papier Rive may be employed, floated on the above bath from one minute to a minute and a half. Render sensitive with aceto-nitrate of silver, 30 grains of nitrate to the ounce of water, with half a drachm of glacial acetic acid; taking the usual precautions against the entrance of white light. The exposure to light, which is very short (three or four minutes in dull weather), is regulated by the colour of the margin of the print on removing the paper; the full outline of the image should be seen, but faint and indistinct. Immersion in bath of gallic acid (3 grains to the ounce of water, diluted to one-half in hot weather), rapidly developes the picture, and in two or three minutes it is fully brought out.

It is of importance to hit the right time of exposure to light, for which take the following directions:—

The under-exposed print developes slowly, becomes *jet black* by continuing the action of the gallic acid, but shows no half tones; the over-exposed, on the other hand, developes with unusual rapidity, and it is necessary to remove it speedily from the bath in order to preserve the clearness of the whites, when washed it appears very red and pale without any depth of shadow. Observe, however, that a certain length of exposure is necessary in this process, and that very few details can be developed which are altogether invisible before the gallic acid is applied. The action of the developer must be stopped at a point when the proof appears somewhat lighter than it is intended to remain; since the use of the gold bath adds a little to the intensity, and the print becomes darker on drying.

Tone with the sel d'or bath as in the positive process. The white parts of the impression will remain pure if the gallic acid be properly washed out, and the toning bath shielded from the action of light. No time, however, must be lost in passing the print from the toning to the fixing bath, or there will be some danger of a decomposition and a yellowness in the lights. From what little experience I have had in negative printing, this appears to me to be the best process in existence. With

a small amount of care any one may obtain very decent prints in a very weak light; but, as a rule, the best developed print is far inferior to a good positive taken in the usual way.

MR. SUTTON'S NEGATIVE PROCESS.

The details of this process are taken from Mr. Sutton's "New Method of Printing Positive Photographs." The only advantage I can see in it is, that it enables the operator to print in a light insufficient for carrying on any of the other processes, except that immediately preceding.

Mr. Sutton's process involves the following six operations, viz.:—

1. To prepare the paper with serum of milk.
2. To render it sensitive.
3. To expose it in the pressure-frame.
4. To develope the picture.
5. To colour with sel d'or.
6. To fix it and remove by washing the redundant chemicals.

To Prepare the Paper.—This is very simple. Immerse each paper separately in a bath containing serum of milk. The serum is prepared thus:—Curdle some fresh milk by means of a piece of rennet; filter it through muslin to separate the curd; then boil it in an earthen pipkin. Filter again through muslin, and afterwards through blotting-paper. The piece of rennet, if

salted, must be washed in order to remove the salt. The best paper for this process is Canson's, thick or thin; papier Rive, or Marion's; or the German positive.

To render the Paper Sensitive.—Immerse the papers entirely in a bath of aceto-nitrate of silver, using a bent glass rod to remove air-bubbles. The strength of the bath will vary with the paper employed and the negative to be printed. When the negative is somewhat feeble, employ a weak solution,—15 grains of nitrate of silver and ½ drachm of acetic acid to each ounce of distilled water. But with a strong negative, use 30 grains of nitrate of silver and ½ drachm of acetic acid to the ounce of distilled water. Let the paper remain for two or three minutes in the bath, then hang it up to dry in a yellow light. White light must be carefully excluded. The sensitive papers must be used as soon as possible after they are excited. Before using the nitrate bath it should be carefully filtered. The strength of the bath is not diminished by use, and it can be employed to the last drop.

To Expose to Light.—Place the paper in the pressure-frame in the dark room, cover the front with a dark cloth, and convey it to the light. Place it in full sunshine, if possible, but ordinary daylight will do; it is merely a question of time. When all is ready, remove the dark cloth, and watch the outside border of the paper; experience alone will determine the tint which the border ought to assume before the exposure should be stopped. This will vary with different negatives, so

that to fix any definite time would only be to mislead. The time of exposure will vary from twenty seconds to as many minutes; but in twenty minutes a print might be obtained when it would be impossible to print at all by the ordinary method. The picture ought to be faintly visible on removal from the frame. An over-exposed print will present, when finished, the same appearance as a sun-print under similar circumstances,—that is, it will be too black. On the other hand, an under-exposed picture will be too faint. The pressure-frame need not be hinged at the back.

To Develope the Picture.—Remove the pressure-frame into the dark room; take out the print and place it in a saturated solution of gallic acid, previously filtered; remove all air-bubbles from the surface of the print by means of a bent glass rod: two or three prints may be put into the same bath. The development will generally occupy about five minutes. It is scarcely necessary to remind the reader that white light, unless carefully excluded, will leave traces of its presence, or that the same precautions must be observed as in taking a negative by the collodion process. With clever manipulation the white parts of the picture need never become dirty; this can only happen through carelessness. When the picture is sufficiently developed, remove it from the gallic acid and wash it well in common water, afterwards with a pinch of salt in the water, then again in water copiously. The colour of the dark parts of the picture will now be of a dark reddish brown. The

developed print loses nothing by the subsequent action of the colouring and fixing bath.

To Colour the Picture.—This is a very simple process, and may be conducted in a half-light, near a door ajar, or at a north window with the blind down: there being little or no chloride in the print, it is now nearly fixed. To make the colouring bath, take—

Chloride of Gold . .	8 gr.	*Dissolve.*
Distilled Water . . .	16 oz.	
Hyposulphite of Soda .	24 gr.	*Dissolve.*
Distilled Water . .	16 oz.	

Pour the gold solution into the hyposulphite (this is very important), and mix them well together. Then pour as much of the solution into a gutta-percha dish as you require for one print. Immerse the print completely and keep it moving about; watch the changes of colour which it undergoes: in the course of five or ten minutes it will pass through every shade of brown to black. Stop the process at whatever tint you like best, by removing the print, and placing it in a bath of clean water. But, above all things, observe carefully the change which takes place in the light parts of the print, and do not let the action go too far, or these will become yellow. Do not omit to wash the print well before placing it in the colouring bath, or there will be a considerable precipitation of the gold. The bath may be used over and over again, until it gets too weak to colour well, then throw it away.

To Fix and Wash the Picture.—Make a fresh bath of

Hyposulphite of Soda . . .	1 oz.
Filtered Water	10 oz.

and let the print lie in it for not less than ten minutes. Every trace of hyposulphite should then be removed, by washing for twenty-four, or even thirty-six hours, in an abundance of water, which must be changed at least a dozen times.