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Patented Apr. 9, 1901.

O. FULTON & M. GILLARD.

PHOTOGRAPHIC PRINTING SURFACE AND METHOD OF MAKING SAME.

(Application filed July 23, 1900.)

(No Model.)

Fig. 1.

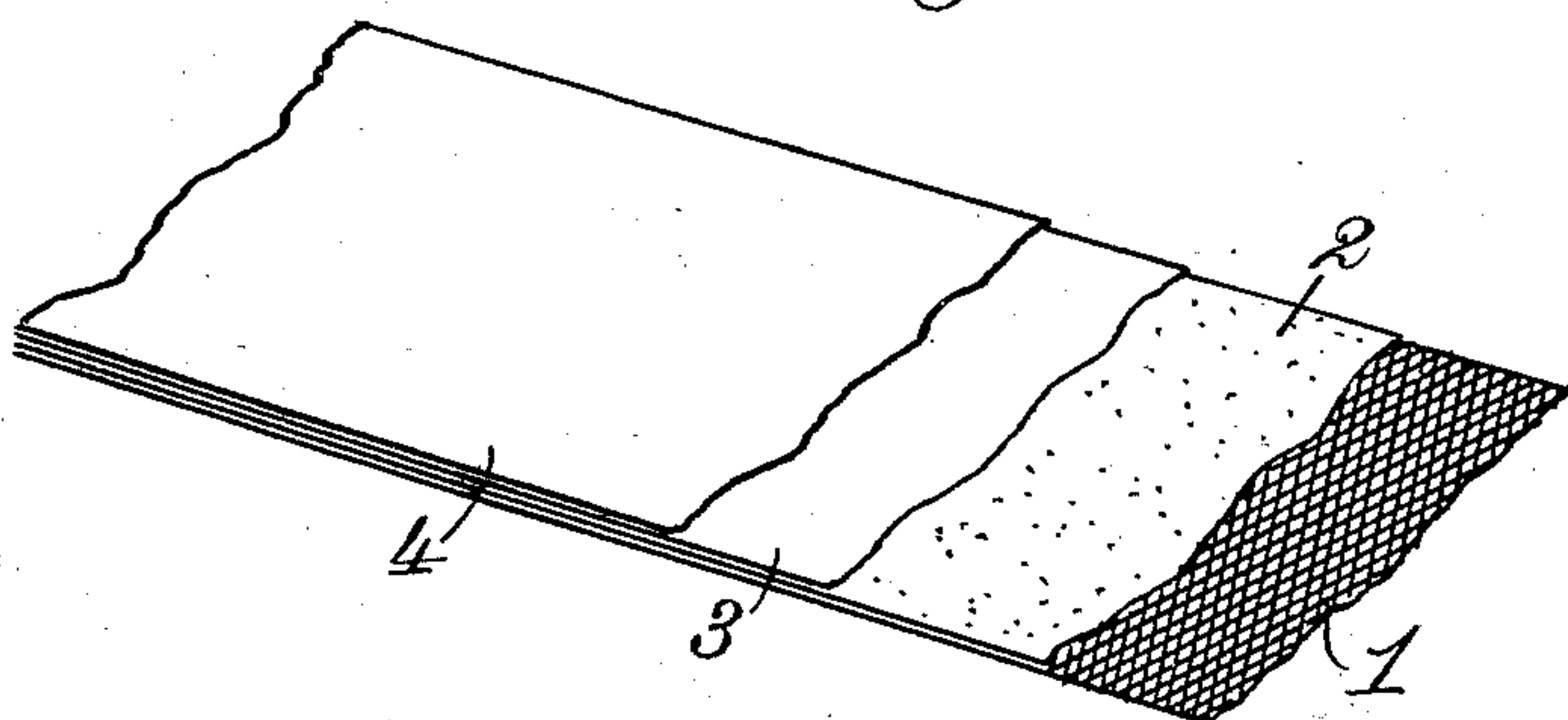
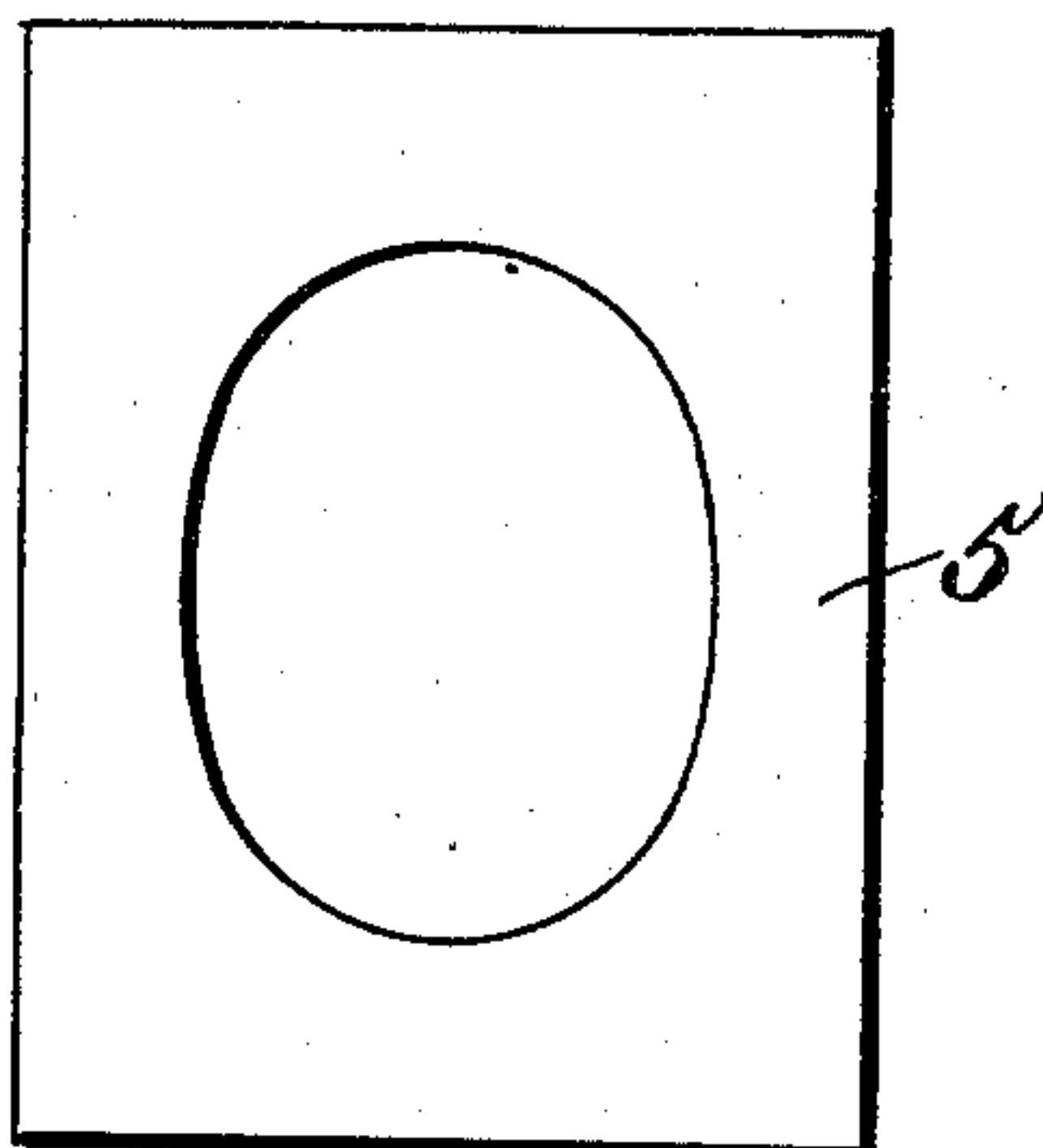


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

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PHOTOGRAPHIC-PRINTING SURFACE AND METHOD OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 671,882, dated April 9, 1901.

Application filed July 23, 1900. Serial No. 24,591. (No specimens.)

To all whom it may concern:

Be it known that we, OTTO FULTON and MOUNTSTEVEN GILLARD, photographers, subjects of the Queen of Great Britain, residing at Main street, Port Elizabeth, Cape Colony, have invented certain new and useful Improvements in Photographic-Printing Surfaces and Methods of Producing the Same, of which the following is a specification.

10 This invention relates to the production of photographic-printing surfaces in a simple, economical, and expeditious manner without requiring any special ability on the part of the person making and using the same. Furthermore, the printing-surfaces are so formed that a great number of prints or impressions can be obtained therefrom without the aid of any expensive apparatus or machinery upon any desired material and in various colors or tints. Moreover, the said printing-surfaces do not materially deteriorate by remaining out of use for a considerable length of time.

According to our invention we obtain what is known as a "collotype" printing-surface upon a sheet of celluloid or similar non-flaccid but semirigid waterproof material which is elastic and flexible, so that it can be freely handled like a card and printed from without either being cemented to a mounting-block or stretched at the two ends, as is usually necessary with films that are flaccid. One of the surfaces of the aforesaid sheet must be rough or matte, and to this surface we apply a gelatinous solution, and we dry the coated sheet in such a manner that perfect adhesion of the dried gelatinous film or coating to the said sheet will be insured, as hereinafter explained. It is important that the gelatinous solution from which the said film is formed should contain formalin, citric acid, (together or separately,) or some other substance that will tend to harden the film. The said celluloid sheet provided with its gelatinous film is then ready to be sensitized by means of a solution of a bi-chromate or a chromate in the way well known to collotype printers, after which it is placed in an ordinary printing-frame, together with a negative, and exposed to light in the manner which is well understood. After exposing the same for a sufficient length of time the negative is removed from the frame and the back

of the sheet is exposed to the light for a short time in order to completely indurate that portion of the gelatinous film which is in immediate contact with the said sheet. After this operation the sheet is soaked in water and dried. The surface upon which the photographic picture has been obtained is then treated with a mixture of glycerin, ammonia, and water. After this treatment and when all superfluous moisture has been removed the sheet is ready to receive the printing-ink, which may be applied in any ordinary and well-known manner.

In the drawings accompanying this specification, Figure 1 is an elevation, broken away, of our improved photographic-printing surface; and Fig. 2 is a plan of a mask used in connection therewith.

Referring to the drawings by reference-numerals, 1 indicates a rough or matte sheet of celluloid; 2, the gelatinous film; 3, the sensitized film, and 4 the preservative coating.

The reference-numeral 5 indicates a mask used in the preparation of the printing-surface. This mask may be of any desired form.

The components of the gelatinous film, the sensitized coating, and the preservative will be hereinafter explicitly set forth.

In carrying our invention into practice we take a sheet of celluloid which is rough or matte on one side and thick enough to be rigid in the sense in which a sheet of ordinary thin card is rigid. The thickness of the sheet we prefer to use is about one-hundredth of an inch. Extremely thin celluloid like that used in photographic-roll holders is not satisfactory, neither are sheets the thickness of which reaches one-thirteenth of an inch. It is necessary that the natural translucency of the sheet of celluloid employed shall not be entirely destroyed by the addition or incorporation of pigments. In order to coat the celluloid sheet evenly with the gelatinous film, we proceed as follows, viz: A perfectly flat support preferably consisting of plate-glass is coated with an adhesive solution composed of water, eight (8) ounces; glue, (French,) one-half ($\frac{1}{2}$) ounce; glycerin, three (3) ounces; formalin, sixty (60) minims. Such solution is prepared in the following manner: The glue in small pieces is placed in a vessel con-

taining the water and allowed to remain there-
 in for some hours, and when the glue is thor-
 oughly softened the vessel is gently warmed
 until the glue is dissolved. The formalin and
 5 glycerin mixed together are then added
 slowly, the whole being well stirred. The so-
 lution is then filtered through a piece of mus-
 lin. During the filtering it is desirable to
 warm the muslin and the vessel intended to
 10 contain the adhesive solution. A quantity
 of this adhesive solution is then poured upon
 the plate-glass and evenly spread over the
 entire surface by the aid of a warmed glass
 rod to form a thin coating. The support thus
 15 coated is then placed upon a perfectly-level
 slab and allowed to remain for a few minutes
 until the adhesive surface has set and cooled.
 The celluloid sheet is next applied to the ad-
 hesive surface of the support and with the
 20 rough side upward is slightly pressed down
 onto the adhesive surface by the hand with
 the aid of a cloth, great care being taken that
 no air-bubbles are left between the celluloid
 sheet and the adhesive surface. When the
 25 celluloid sheet has been thus mounted upon
 the adhesive surface, we coat the said sheet
 with a gelatinous mixture which is prepared
 as follows: Gelatin, one hundred and eighty
 (180) grains; formalin, fifteen (15) minims; cit-
 30 ric acid, five (5) grains; water, five (5) ounces.
 The gelatin is cut into small pieces, placed in
 four ounces of the water, and allowed to soak.
 It is then warmed to a temperature of about
 120° Fahrenheit and stirred until dissolved.
 35 The vessel containing the mixture should be
 heated in a water-bath and not directly by
 a flame. When the gelatin has been com-
 pletely melted, the formalin and citric acid are
 mixed with the remaining ounce of water and
 40 this liquid is added slowly to the gelatinous
 mixture and at the same time is well stirred.
 The solution is afterward filtered with simi-
 lar precautions to those already mentioned.
 We now coat the sheet of celluloid while it is
 45 still mounted on the aforesaid support by
 pouring upon it a sufficient quantity of the
 solution to cover the sheet with a thin layer,
 the solution being spread thereon by the aid
 of a warmed glass rod. A surface eight and
 50 one-half inches by eight and one-half inches
 will ordinarily require about one ounce of the
 gelatinous solution. The solution is now al-
 lowed to set while the celluloid is still on the
 level adhesive support, and the coating is af-
 55 terward dried at a temperature of about 85°
 Fahrenheit. Provided that the coating has
 thoroughly set, there is no objection to placing
 the support vertically when drying. When
 perfectly dry, the coated celluloid sheet, with
 60 its gelatinous film, is removed from the ad-
 hesive support by drawing it off by one of its
 corners. It will be found advantageous to
 place a fresh sheet of celluloid upon the ad-
 hesive support immediately after the removal
 65 of the first-mentioned one, so as to protect
 the adhesive surface from air and dust. It
 can then be used a great number of times or

after remaining disused for a considerable
 length of time. The coated celluloid sheet
 thus obtained is then placed in a sensitizing 70
 solution or bath, with the gelatinous film up-
 permost, this solution being an ordinary bi-
 chromate or chromate sensitizing-bath—such
 as potassium bichromate, one (1) ounce; am-
 monium hydrate, ten (10) drops; water, forty 75
 (40) ounces. In hot weather it may be nec-
 essary to cool the sensitizing solution. The
 sheet is allowed to remain in the sensitizing
 solution for about two and one-half minutes.
 It is then removed and placed between folds 80
 of damp blotting-paper for the purpose of re-
 moving superfluous moisture, and the sheet
 is then dried in the dark. When perfectly
 dry, the sheet is placed, with the photo-
 graphic negative, in an ordinary printing- 85
 frame, with the yellow or sensitized side of
 the celluloid sheet against the negative. Be-
 fore printing, however, we prefer to place be-
 tween the glazed opening of the printing-
 frame and the negative a mask, so as to leave 90
 a margin around the celluloid sheet of about
 half an inch, this mask being similar to the
 "safe edge" used by carbon-printers. The
 margin may be broader, but should not be
 narrower. We then expose the negative and 95
 the celluloid sheet in a soft light or in the
 shade until the said celluloid sheet exhibits
 the picture in all details and graduations.
 We then remove the negative, still keeping
 the mask in the frame. We then reverse the 100
 celluloid sheet, so that its unsensitized side
 is toward the glass of the frame. The sheet
 is then exposed to the light for about three
 minutes (or generally about one-fifth of the 105
 time of the chief exposure) to harden the
 gelatinous material which is in immediate
 contact with the celluloid sheet. We now
 remove the celluloid sheet from the print-
 ing-frame and place it with the yellow side
 uppermost in a bath of water, changing the 110
 water about every five or ten minutes till
 all the free bichromate is washed out and no
 trace of yellow left. The sheet is then re-
 moved from the water, and after the super-
 fluous moisture has been removed by a cloth 115
 the sheet is allowed to dry. Upon the dried
 sheet we pour a solution consisting of gly-
 cerin, ten (10) ounces; ammonium hydrate,
 one quarter ($\frac{1}{4}$) ounce; water, five (5) ounces.
 The quantity of this solution used is suffi- 120
 cient to just cover the picture and a small
 margin around the same. It is allowed to
 stand for forty or fifty minutes, according to
 the softness or hardness of the negative em-
 ployed. After sponging it and removing all 125
 superfluous moisture the sheet is then ready
 to receive the printing-ink, which may be the
 ordinary lithographic or typographic kind
 mixed with varnish. The ink may be applied
 to the printing-surface of the celluloid sheet 130
 in any ordinary manner. The impressions
 from the printing-surface can be made on any
 kind of material and in almost any color and
 with only a slight pressure obtained by a

hand-roller or a letter-press or in any other convenient manner.

From time to time the printing-block should be sponged with a mixture of glycerin and 5 water in about equal proportions.

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

1. The herein-described method of obtaining a photographic-printing surface, consisting in first coating a sheet of suitable material with a hardened gelatinous film having a safe edge, sensitizing the said coating and exposing and then reversing the sheet to allow the light to harden the whole film excepting 15 the safe edge.

2. The herein-described method of obtaining a photographic-printing surface, consisting in coating a sheet of suitable material with a gelatinous film, sensitizing the said 20 film, masking a portion of said film while printing to form a safe edge and finally hardening the gelatinous film.

3. A photographic-printing surface, consisting of a sheet of celluloid having a hardened gelatinous film with a safe edge. 25

4. The herein-described method of obtaining a photographic-printing surface, consisting of placing a sheet of suitable material

upon a support having an adhesive surface, coating the outer face of said sheet with a 30 gelatinous film, sensitizing the said film, masking a portion of said film while printing from a negative to form a safe edge, and finally hardening said gelatinous film.

5. The herein-described method of obtaining a photographic-printing surface, consisting of placing a sheet of celluloid upon an adhesive surface, coating the outer face of said sheet with a solution consisting of gelatin, formalin, citric acid and water to form a 40 gelatinous film, sensitizing the said film, masking a portion of said film while printing to form a safe edge, and finally hardening said gelatinous film.

6. A photographic-printing surface, consisting of a sheet of celluloid having a hardened sensitized film of gelatin, formalin and citric acid with a safe edge. 45

In testimony whereof we have hereunto set our hands, in presence of two subscribing 50 witnesses, this 18th day of December, 1899.

OTTO FULTON.

MOUNTSTEVEN GILLARD.

Witnesses:

J. COLLINS,

FRED C. HARRIS.