

(No Model.)

E. KUNKLER & J. BRUNNER.

METHOD OF PREPARING SURFACES FOR PRINTING BY PHOTOGRAPHY.

No. 333,470.

Patented Dec. 29, 1885.

FIG. 1.

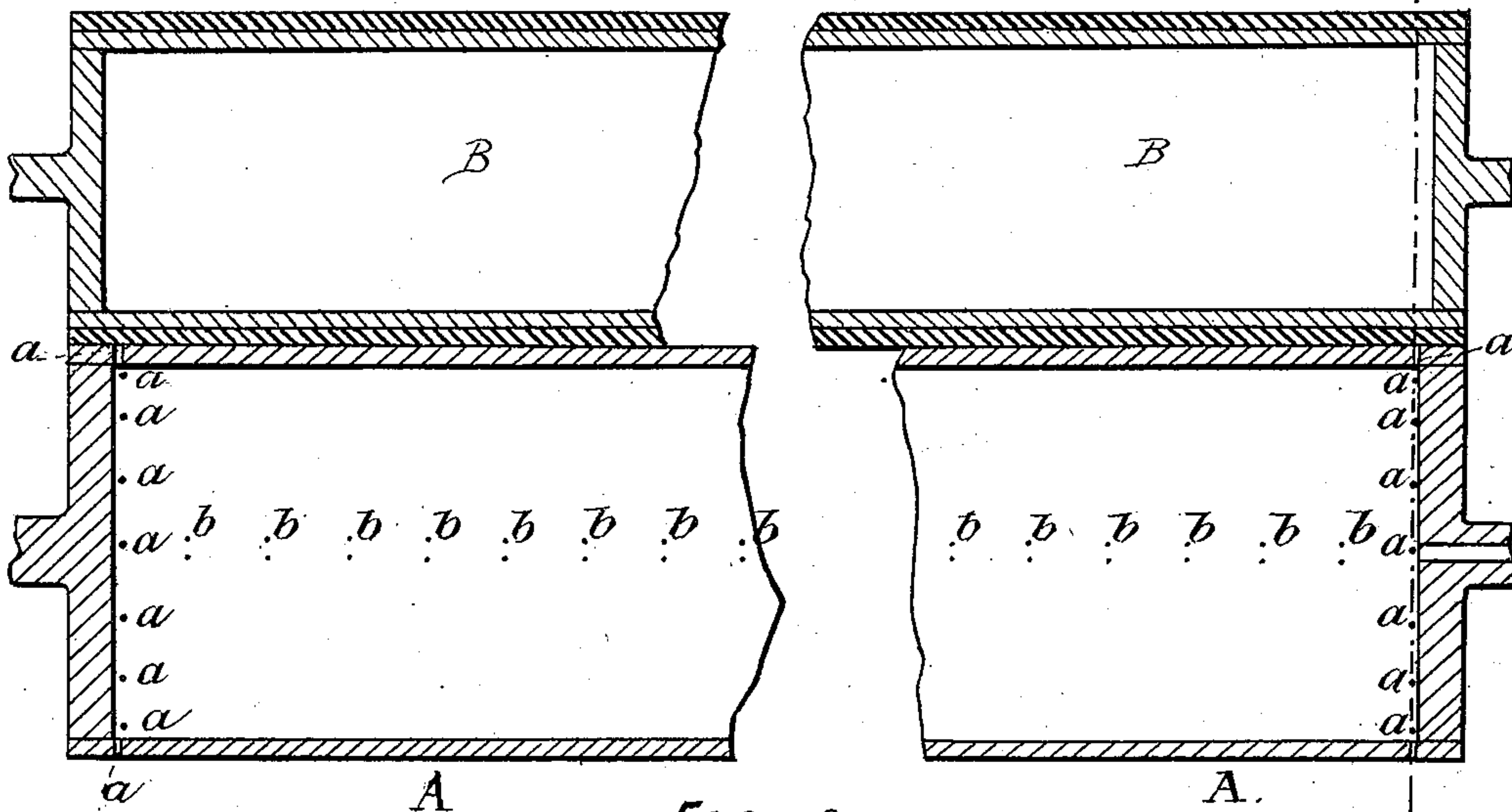
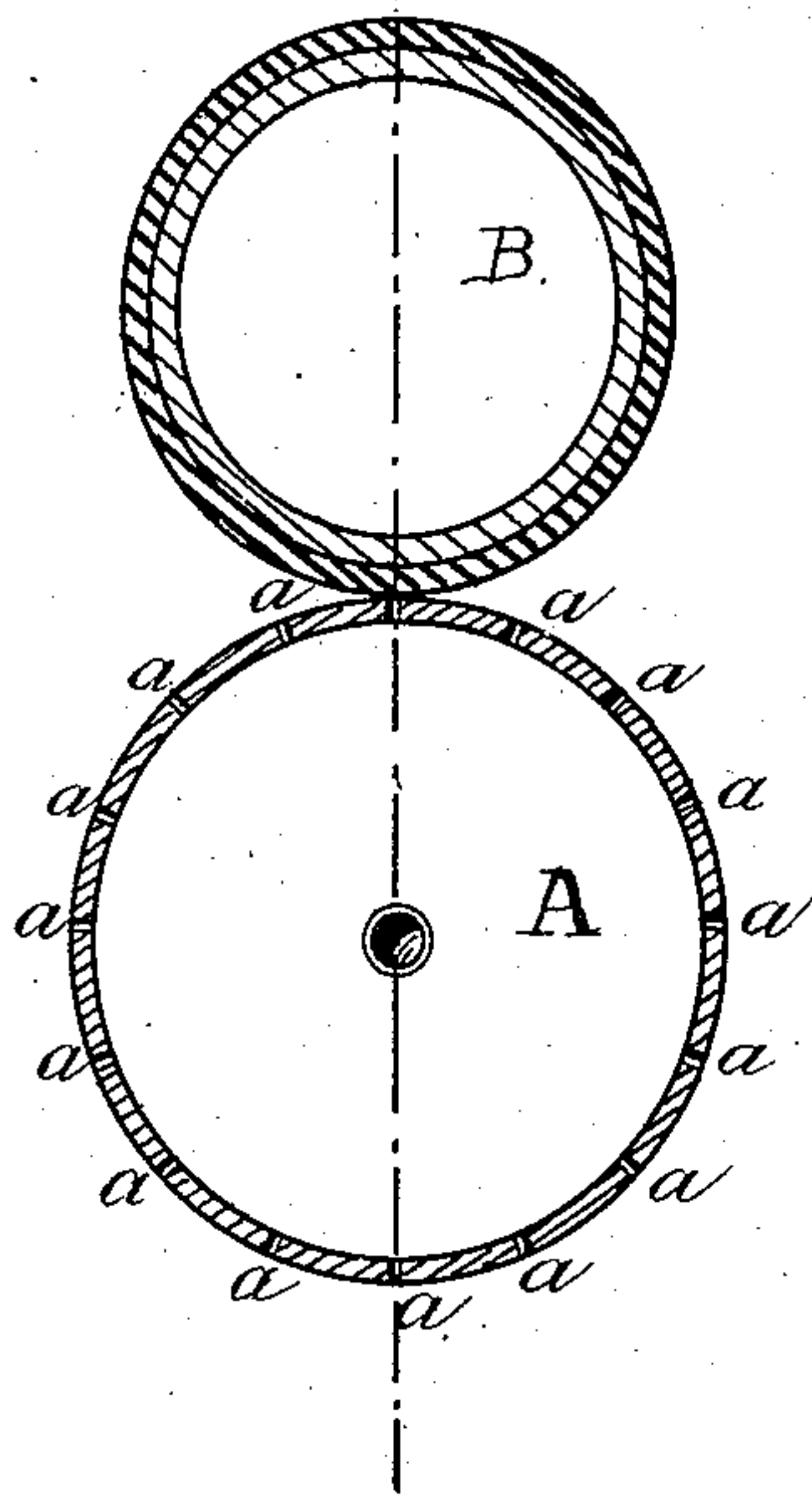


FIG. 2.



WITNESSES:

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their atty.



# UNITED STATES PATENT OFFICE.

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## METHOD OF PREPARING SURFACES FOR PRINTING BY PHOTOGRAPHY.

SPECIFICATION forming part of Letters Patent No. 333,470, dated December 29, 1885.

Application filed July 10, 1884. Serial No. 137,376. (No model.) Patented in France January 29, 1884, No. 159,994, and in Belgium January 29, 1884, No. 63,992.

*To all whom it may concern:*

Be it known that we, EDWARD KUNKLER, of St. Gall, in the Republic of Switzerland, civil engineer, and JACQUES BRUNNER, photographer and art printer, of Küssnacht, in the canton of Zurich, in the aforesaid Republic, have invented certain new and useful Improvements in the Method of Preparing Surfaces for Printing or Etching by the aid of Photography; and we 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.

In the drawings, Figure 1 represents a longitudinal section, and Fig. 2 a cross-section, of an apparatus which we preferably use, as hereinafter stated, in practicing our invention.

The invention relates to an improved process for the manufacture of photographic negative and positive plates, hatched or grained, of glass, paper, card-board, or any other suitably transparent or translucent material adapted to the production of types, clichés, or negatives, which can at once in a direct manner be used for the production of highly and deeply etched devices on metals, lithographic stone, or other suitable materials.

The methods or processes hitherto known and in use for the producing of clichés, types, or negatives adapted for the etching on metals, stone, &c., generally require for the true rendering of the photographic images taken after nature with their middle tones, one or more intermediate manipulations between the photographic negative and the ultimate surface in design to be transferred. These methods or processes are therefore wanting in perfect nicety, clearness, or sharpness of contours, shades, and other details of the finished picture.

In operating according to this invention, by which the grain or hatching required for the production of high and deep etchings is in most intimate contact with the surface in design or negative or the picture itself, and is, so to speak, most intimately amalgamated or combined with it; and this process also offers the further advantage that the photographic

plates made for the above-mentioned purposes may be treated in the same manner as heretofore, which manner is well known to every photographer and amateur, and used for the production of the ordinary photographic negatives, so that only after the development of the photographic image does the operation become a different one from that hitherto generally known or practiced, and the designs or pictures obtained are adapted for direct transmission onto the above-mentioned materials, such as metals, stone, &c.

For the making of typographic or other like photographic plates, (negatives and positives,) a transparent grained or hatched plate is employed, and for its production we preferably use bichromatized gelatine.

When proceeding according to one modification or sequence of the process, we cover a polished glass plate on one side with "chrome-gelatine," to which is added more or less of chrome-kalium (bichromate of potash,) according as a coarser or finer grain is wanted. After the drying of this prepared plate at a temperature of, say, 30° to 40° centigrade, or 86° to 104° Fahrenheit, lower or higher, according to the grain required, the plate is freely exposed to light during some, say, five to ten minutes, more or less, according to circumstances, and it is then well washed and dried according to the manner usually practiced in this art. After this the grained surface produced is inked with printer's ink or suitable composition, and then varnished with negative varnish.

In producing hatched typographic positive or negative plates, we employ similar photographic matrices, types, or clichés, having thereon the desired hatchings or grainings.

For the production of typographic or such like dry plates by this invention variously designated "gelatine," "collodion," "emulsion," and "pellicule" dry plates, we expose them behind one or the other of the above-mentioned or other transparent mother plates, types, or matrices in a copying-frame before a ground or semi-translucent roughened glass plate to either natural or artificial light, and then develop, fix, and wash the plate in any suitable known way. Then the actinized



film or layer on the plate, after undergoing suitable drying, is well tanned or hardened, say, by means of a concentrated solution of alum, and then subjected to an alcohol bath. The gelatinized plates are then covered over with an isolating layer or film of collodion or "leather collodion," or collodion prepared with castor-oil, and then treated with an india-rubber, albumen, or other suitable isolating solution. The plate is then dried naturally or artificially, and is afterward covered again with a layer of, or has applied to it, a sensitized solution, gelatine, emulsion, or collodion, and dried or allowed to dry. The plate is then ready for employment in the photographic art. After the required exposure and subsequent "developing" and "fixing" the picture appears on a beautiful "underground," presenting the predetermined quality of "grain-ing" or "hatching" adapted for the required end or purpose, and it is thereby rendered thoroughly adapted for direct high or deep etching. The emulsion layer, proof, or film on the glass may be removed therefrom, if so desired, in manners similar to that now employed sometimes for a like purpose with the ordinary dry-plates.

Trade-marks, firm styles or names, and other desired words, ciphers, numbers, or other indication, either by means of a stamp or in any other suitable manner, may be applied to the margins or other parts of the plates so produced between the first and second emulsion, film, or layers, which marks, words, numbers, ciphers, &c., then appear after the exposure, development, and fixing of the cliché, type, or negative. When proceeding according to a somewhat modified sequence of the operation adapted to the circumstances of an already-existing photographic plate or film with the image already upon it, we apply the sensitive film or layer to the surface of that plate or film and produce thereupon the desired graining or hatching, as already described.

In the case of a negative or a positive plate or film already bearing a picture or image the surface of which has been already varnished, it is necessary to remove that varnish, say by means of caustic potash or other suitable solvent therefor, and then having treated that plate or film with an insulating film or coating we apply the sensitive layer, and then we hatch or grain this sensitive layer or film in the manner already set forth herein.

When the grained or hatched negative is desired to be produced of very large size and with one sensitive layer for use in effecting the photo-mechanical transfer of direct photographic takings onto large metal plates, cylinders, rolls, or drums, for high or deep etching, we find the following modification to be well adapted to the purpose and to give excellent results: A polished glass plate is covered with a very fine transparent or diaphanous paper having upon it the "grain" or hatching produced by printing or otherwise,

in such a manner that by cutting the said paper along the margins of the glass plate such paper may ultimately be removed. This paper, stretched or distended on the glass plate, is isolated by the application of a suitable solution—such, for instance, as raw collodion or chrome-alum gelatine or india-rubber—and after the drying of the solution the paper is treated with a sensitive solution of collodion or gelatine emulsion in the usual well-known way. After the photographic exposure, the development, the fixing, washing, and drying of the first diaphanous sensitive paper sheet or surface, a second very pure, transparent, or diaphanous paper is pressed onto the "finished" negative so that it adheres to that negative. After properly drying, the whole combined preparation, forming now one sheet or leaf, is separated from the glass plate or its equivalent supporting-surface by cutting or dividing it around the edge or margin. The "negative" or "positive" being covered on both sides by the transparent or diaphanous paper, can be copied from either side without sacrificing its distinctness or sharpness of details, while it is moreover protected from injurious atmospheric influences.

Such a negative or positive sheet or film as has just been described will be found extremely useful in and adapted to effect the repeated transfer of the photographic picture by photo-mechanical means onto the surfaces of large plates, drums, rolls, cylinders, or other forms of metal for the purpose of high or deep etching being produced thereon for printing in colors, calico-printing, or other use. If the purpose for which the sheet so prepared be that of printing in colors from designs or pictures upon the surfaces of cylinders or other forms, such sheet is, while still affixed on the glass plate, carefully and evenly covered or spread over with a thin isolating film of raw collodion, and then with a thin solution of gelatine applied by means of a sponge, a broad flat brush, or other vehicle adapted to the purpose, and is then allowed to dry freely and thoroughly.

The gelatine solution just referred to has been found well adapted to this purpose when prepared by the admixture with the gelatine of one-third part of alcohol and two per centum of alum; but these proportions may be varied.

This gelatine solution having been so applied, then that portion of the design or picture on the negative or sheet on which it is not desired that the color shall appear is covered or protected by the application of covering or blocking-out ink or material. This application of blocking-out or covering material is effected before the removal of the sheet from the glass plate or support. After the covering or blocking-out material has become properly dry, the sheet or film is removed from the glass plate or equivalent support, and is applied and secured to the surface to which its application is desired, such as to the surface of a cylinder,



After the surface, such as that of a cylinder or drum, has been prepared for the etching for the design for the first color desired the prepared sheet or leaf may be again used for the production of another similar design for the like surface of another cylinder or form by stretching that prepared sheet or film onto a glass plate or equivalent surface and securing it thereon, while the covering or blocking-out material is being removed by sponging or otherwise with benzine, turpentine, or other suitable solvent, and then drying the sheet by means of blotting-paper or other suitable absorbent. The design or picture is then again covered with covering-color or blocking-out material in such a way that only the portions of the design desired for the next color to be printed are left free or available for reproduction on the surface to be printed from or etched. The subsequent treatment will then be like that already described for the first color surface. The like manipulations may then be similarly repeated for any further color portions to be similarly represented by reserved portions of the design or picture on the surface, such as a printing cylinder or drum or other form. The covering-color or reserving or blocking-out matter should be so finely ground or reduced and by admixture with benzine or other suitable solvent brought to such a consistency that its most useful power of attenuation may be secured.

In order to render such large surfaces of sheet so prepared of greater usefulness it becomes necessary to afford means of securing them on the surface whereon the design or picture is to be reproduced wholly or in part, and for this object the following adaptation or arrangement of apparatus will be found useful; but in this application we make no claim for the apparatus, but reserve the right to make an independent application therefor. The large negative or positive sheet of transparent material produced as described is wound round or applied to the cylindrical or other contour of the surface desired to be etched in design, and such sheet having been so applied as lightly and evenly and flatly as possible by the use of the means of retention hereinafter detailed, not only enables a better result to be attained but also permits of its reuse for a large number of times.

The method of securing the sheets as aforesaid on the surface to which their retention (for the time being) is desired is as follows: The cylinder or other curved surface is formed hollow, as is represented in the accompanying drawings, in which A represents parts of a printing-drum in section, which hollow cylindrical form has pierced through it a number of radial holes, *a a a*, of small size, reaching from the periphery to the interior of the cylinder, and supplemented, if desired, by two other rows of small holes disposed in parallel lines or other suitable disposition, or the number of rows and their disposition may be varied and reaching across the cylinder's surface from side

to side—that is to say, in a direction parallel to its axial line—or otherwise suitably disposed. One or both of the axially supporting parts of the rolls or drums A may be formed hollow or so as to admit of an exhaust being placed in communication with the interior of said cylinder or drum—such as a pipe from an air pump—so as to create a partial vacuum or reduction of pressure therein. One end of the transparent or prepared sheet or plate is then applied to the cylindrical surface or drum, and the partial vacuum or reduction of internal pressure being maintained by the exhaust, and the drum or cylinder being caused to revolve at a suitable speed, the prepared sheet or combined film is rolled or spread around the drum's surface and retained thereon.

In order further to aid in the better application of the prepared surface or combined film bearing the picture or design destined for reproduction on the surface of the cylinder, a pressure-cylinder is employed, driven by suitable gearing or by frictional contact properly timed and arranged to operate with the gearing to the cylinder A, and, like that cylinder, carried in suitable supports or framing and bearings, &c., but which parts are omitted for simplicity and clearness, they forming no essential part of the invention, and being well understood by any competent machinist. This cylinder B is most conveniently covered with india-rubber or other suitable elastic material adapted to afford an elastic pressure to the sheet or combined film to be evenly spread by its agency around surface A.

The operation of the exhaust within the cylinder A is as follows: The sheet of material described, and carrying the picture, being pressed or spread over the holes pierced through the drum A, the exhaust within reduces the internal pressure and the external air pressing on the external surface of the sheet such sheet becomes fixed or retained to the surface of the drum so long as the partial vacuum be adequately maintained. This period will in most cases be only so long as may be desirable for the application of the sheet and during the "exposure" of the picture or image on the prepared sheet necessary for its application to the drum or cylinder's surface, and so soon as the detaching or removal of the prepared sheet be desired that may readily be effected by the suspension of the exhaust, when the internal pressure being restored the sheet will be separable without its having suffered injury or deterioration, thus permitting of repeated reuse.

In referring to hatching or graining, it is to be understood that by such term being used no restriction is intended as to the character of pattern or effect which is referred to, as these will vary greatly with the nature of the design or picture, and such effects are variously denominated as "hatching," "cross-hatching," "stippling," "graining," "mezzotinting," "lining," "sanding," and other effects of a like nature.



It is desired to be understood that no claim, separately considered, is made to the well-known process of making photographic dry-plates or negative plates; but

5 What we do claim as our invention, and desire to secure by Letters Patent, is—

1. The method of preparing surfaces for printing by photography, which consists in combining into one plate or sheet two layers  
10 of transparent or diaphanous paper, the first or under one of which has the grain or hatching made or printed thereon and is then covered with a sensitive material, and after exposure and development applying the other  
15 sheet of diaphanous paper pressed onto the finished negative, the combined sheet being adapted to be copied from either side of the same.

2. The described method of preparing the  
20 first or under layer of the subsequently combined sheet with the desired hatching, marking, or graining, which consists in providing

it with the isolating solution or composition, and next the sensitive layer or film thereon, next the exposure, developments, fixing, and  
25 other manipulations of the images on the lower sheet being completed, and then applying the second transparent preserving-sheet, so as to form one combined sheet or plate, as and for the purposes set forth. 30

3. The described method of applying firm styles, trade-marks, or names or other indications to the combined plates herein described, consisting in applying them to the margins or other parts of the plates between the first  
35 and second emulsion film or layers prior to the exposure and development, as set forth.

In testimony whereof we have hereto set our hands this 23d day of May, 1884.

EDWARD KUNKLER.  
JACQUES BRUNNER.

Witnesses:

EMMA KUNKLER,  
MINA KUNKLER.