M. ULLMANN.

TRANSFER NEGATIVE.

APPLICATION FILED JULY 8, 1922.

1,436,629.

Patented Nov. 21, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

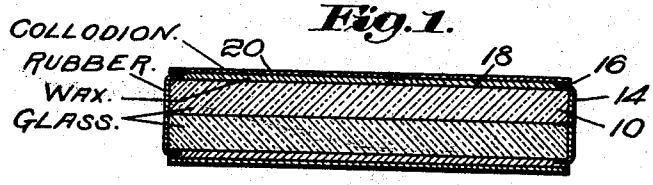


Fig. 2.

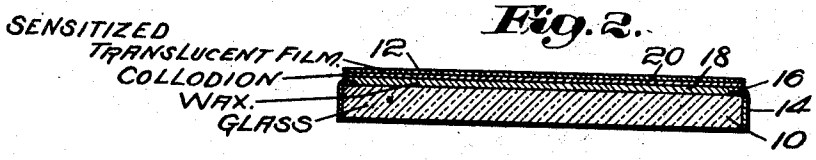


Fig. 3.

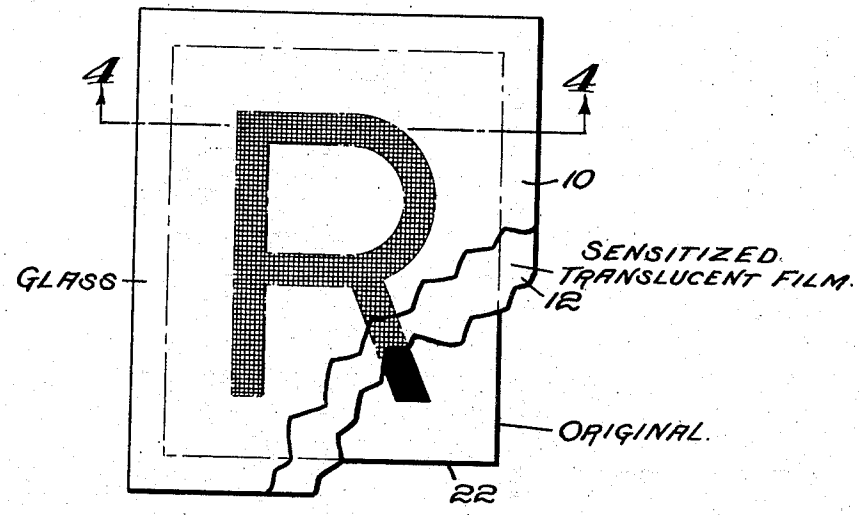
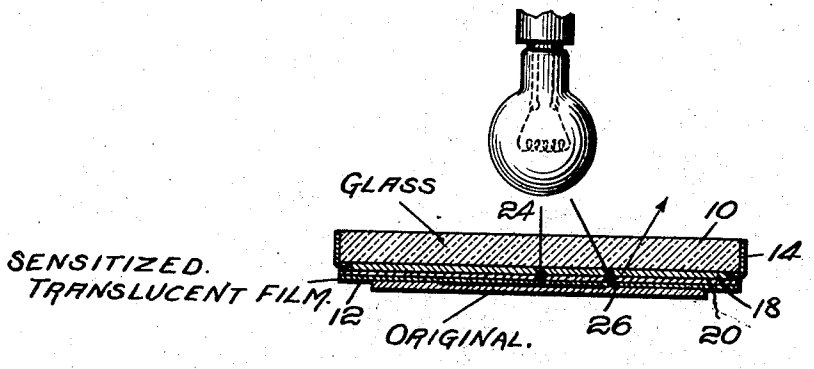


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

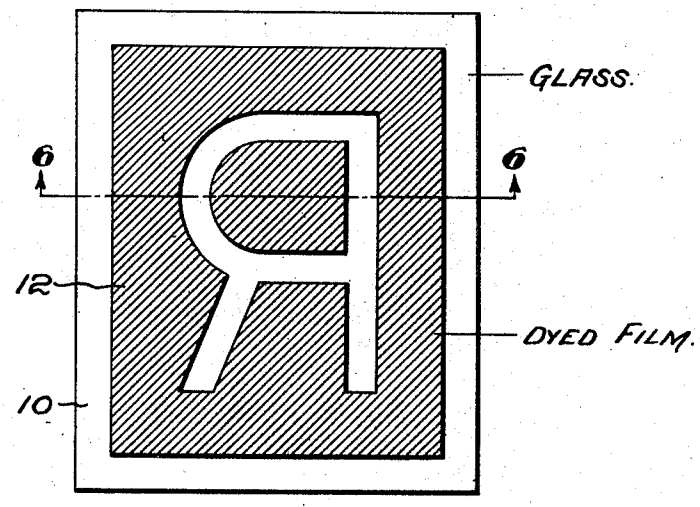


Fig. 6.

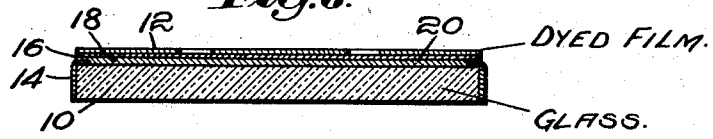


Fig. 7.

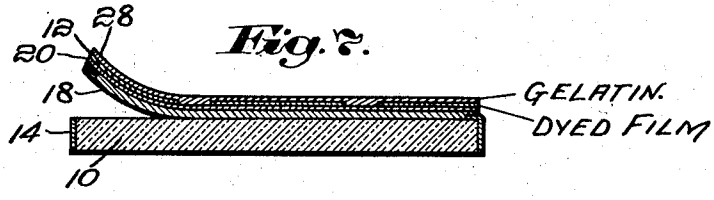
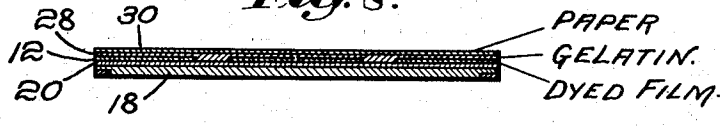


Fig. 8.



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Patented Nov. 21, 1922. 1,436,629

UNITED STATES PATENT OFFICE.

MAX ULLMANN, OF ZWICKAU, GERMANY, ASSIGNOR TO KARL WERTH, OF THE HAGUE, NETHERLANDS.

TRANSFER NEGATIVE.

Continuation of applications Serial No. 810,092, filed January 2, 1914, Serial No. 461,454, filed April 14, 1921, and Serial No. 461,155, filed April 14, 1921. This application filed July 8, 1922. Serial No. 573,660.

To all whom it may concern:

Be it known that I, MAX ULLMANN, residing at 16 Talstrasse, Zwickau, Saxony, Germany, have invented an Improvement in Transfer Negatives (for which I have filed applications in Germany, No. 287,214, Apr. 16, 1914, filed Aug. 18, 1913; No. 349,230, Dec. 21, 1921, filed Jan. 7, 1920; No. 349,231, Dec. 21, 1921, filed Jan. 7, 1920; Belgium, No. 261,402, Nov. 14, 1914, filed Oct. 25, 1913; No. 253,982, filed Dec. 12, 1920; No. 253,983, filed Dec. 2, 1920; Denmark, No. 1,915/15, filed Oct. 24, 1913, and 459/21, filed Feb. 21, 1921; No. 29,873, June 23, 1922, filed Oct. 28, 1920; No. 3,383, filed Oct. 27, 1921; England, No. 24,607, Apr. 16, 1913; filed Oct. 29, 1913; No. 725/21, filed Jan. 7, 1921; 726/21, filed Jan. 7, 1921; France, No. 464,-713, Jan. 20, 1914, filed Nov. 10, 1913; No. 526,835, July 8, 1921, filed Nov. 3, 1920; No. 626,836, July 8, 1921, filed Nov. 3, 1920; Sweden, No. 40,165, Jan. 27, 1916, filed Oct. 24, 1913; No. 5,432/20, filed Nov. 16, 1920; No. 5,433/20, filed Nov. 16, 1920; Norway, No. 25,815, March 8, 1915, filed Oct. 25, 1913; No. 33,301, Aug. 22, 1921, filed Nov. 2, 1920; No. 33,302, Aug. 22, 1921, filed Nov. 6, 1920; Italy, No. 433/42, Jan. 22, 1914, filed Nov. 6, 1913; No. 542/185, Jan. 31, 1922, filed Oct. 20, 1920; No. 542/186, Jan. 31, 1922, filed Oct. 20, 1920; Switzerland, No. 66,334, June 30, 1914; filed Oct. 24, 1913; No. 91,898, Sept. 15, 1921, filed Oct. 22, 1920; No. 92,159, Sept. 30, 1921, filed Oct. 22, 1920; Austria, No. 67,756, Sept. 29, 1914, filed Oct. 23, 1913; Austria, No. 5,873-20, filed Oct. 21, 1920; No. 5,874-20, filed Oct. 21, 1920; Hungary, No. 66, 072, Oct. 8, 1914, filed Oct. 24, 1913; No. 14,667, Feb. 14, 1921, filed Oct. 29, 1920; No. 14,668, Feb. 14, 1921, filed Oct. 29, 1920; Russia, No. 60,247, filed Oct. 19, 1913; Luxemburg, No. 10,412, Oct. 25, 1913, filed Oct. 25, 1913; No. 11,985, Oct. 23, 1920, filed Oct. 23, 1920; No. 11,986, Oct. 23, 1920; filed Oct. 23, 1920; Czecho-Slovakia, No. 7,051/2, Sept. 7, 1921, filed Nov. 11, 1919; No. 8,921/20, filed Nov. 20, 1920; No. 8,922/21, Nov. 20, 1920; Argentine, No. 11,513, Aug. 28, 1914, filed Dec. 18, 1913; No. 22,781, Apr. 11, 1921, filed Apr. 11, 1921; No. 22,394, Jan. 14, 1921, filed Jan. 14, 1921; Rumania, No. 3,486, Dec, 21, 1913, filed Nov, 12, 1913; No. 6,854, filed March 17, 1921; No. 8,649, filed Jan. 25, 1921; Spain, No. 56,872, Jan. 5, 1914, filed Nov. 20, 1913; No. 76,313, Nov. 23, 1920, filed Nov. 22, 1920; No. 76,338, Nov. 24, 1920, filed Nov. 23, 1920; Jugo-Slavia, No. 510, May 13, 1922, filed March 31, 1921; No. 451, filed March 18, 1921; No. 452, filed March 18, 1921; Japan, No. 9,537, filed Dec. 6, 1913; No. 67,124, filed March 30, 1921; No. 66,112, filed March 5, 1921; Poland, No. 19,463, filed April 21, 1920; No. 14,994, Oct. 28, 1920; No. 15,090, filed Oct. 30, 1920; Canada, No. 155,917, May 26, 1914, filed Dec. 26, 1913; No. 255,117, filed June 10, 1921; No. 255,148, filed June 10, 1921; Brazil, No. 11,840, filed Jan. 13, 1914; No. 12,395, Nov. 28, 1921, filed Jan. 25, 1921; No. 12,446, Dec. 17, 1921, filed March 26, 1921; Australia, No. 11,848, March 6, 1914, filed Jan. 13, 1914; No. 1,071/21, filed March 23, 1921; No. 69/21, filed Jan. 8, 1921; Mexico, No. 14,971, Dec. 9, 1916, filed March 7, 1914; No. 20,023, Feb. 18, 1921, filed Feb. 14, 1921; No. 20,289, May 18, 1921, filed May 17, 1921; Holland, No. 3,645, Nov. 19, 1913, and No. 1,805, Feb. 15, 1921; filed Nov. 27, 1920; filed Nov. 29, 1920; Finland, No. 8,693, Sept. 2, 1921, filed Nov. 2, 1920; No. 8,694, Sept. 2, 1921, filed Nov. 2, 1920; Portugal, No. 12,104, Dec. 19, 1921, filed Feb. 26, 1921; No. 11,994, March 11, 1921, filed Dec. 15, 1920; Turkey, No. 3,178, March 12, 1921, filed March 12, 1921; No. 3,152, Dec. 15, 1920, filed Dec. 13, 1920), of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to a transfer negative which may be produced by a quick and cheap process and will provide a well defined reproduction of such originals as are adapted to reflect light from at least a portion of their surfaces, for example, printed matter, photographs, drawings, charts and other designs, and which is adapted for direct transfer to printing plates for use in offset or direct printing. As described herein the invention provides further improvements facilitating the production of transfer negatives adapted for safe and convenient handling, shipment and storage.

This application is a continuation of my earlier application for method of manufacturing printing plates, filed Jan. 2, 1914,

Serial No. 810,092, and my later applications filed April 14, 1921, Serial Nos. 461,454 and 461,455, in which three applications I have claimed more particularly novel methods which may be utilized in the production of transfer negatives embodying my invention.

My invention will best be understood by reference to the following description of a particular embodiment thereof taken in connection with the accompanying diagrammatic drawings, wherein:

Figs. 1 and 2 are diagrammatic sections illustrating steps in the production of the negative;

Fig. 3 is a plan view with parts successively broken away illustrating the process of copying;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a plan of the negative;

Fig. 6 is a section on the line 6—6 of Fig. 5;

Fig. 7 is a diagrammatic section illustrating a further step in preparing one form of negative; and

Fig. 8 is a section illustrating a still further form of the negative.

It will be understood that in the drawings the thickness of the various layers is enormously exaggerated.

My invention may be conveniently understood from a description of the following method of preparing the transfer negative. For an illustrative example I will describe the production of a transfer negative which in its completed form need embody no such carrier as a glass plate and which is reversible to permit it to be utilized in preparing plates, on one hand for an offset press or on the other hand for an ordinary lithographic press or zinc rotary machine. To produce this negative I may utilize a translucid carrier 10 such as a glass plate which carries a translucent film 12 of chromated colloid such as bichromated gelatin.

Referring to Fig. 1, two suitable glass plates 10 may be placed together as shown and held pressed together by clamps or other suitable means. The edges of the plates are then dipped into a solution of rubber so that the side edges of the glass plates are covered as illustrated at 14 and also the margins of the faces thereof at 16 to form a rubber coated margin perhaps .25 cm. in width. The double plate thus produced may then be immersed in a solution of beeswax which has been dissolved in carbon tetrachloride, for example. The faces of the plate will each thus receive a smooth, perfectly transparent layer 18 of wax. When this coating is dried, the plate is dipped into a vessel containing 3% collodion and a few drops of castor oil to provide the coatings 20. It is then set upright and allowed to dry. When the coatings shown in Fig. 1 are dry, the two plates, each being coated on one side and uncovered on the other, are separated and each is then treated as a unit. The coated side is coated, as shown in Fig. 2, with a solution of chromated colloid such, for instance, as bichromated gelatin, to provide a sensitized layer 12 which should be very thin, preferably much less than .01 of a millimeter thick. The completed plate may then be utilized for copying an original.

The plate is laid on the original 22 which is to be copied with the film 12 in face to face contact therewith, as illustrated in Figs. 3 and 4, and light rays 24 from a suitable source are passed from the rear of the plate 10 through the various transparent layers on the face thereof including the sensitized layer 12 and are reflected at 26 from the white portions of the original but are absorbed by the black portions such as ordinary print. The portions of the sensitized film 12 opposite the white portions of the original are rendered actinized and insoluble by the reflected light. The negative is then washed in water or dilute acid to remove the portions which have not been rendered insoluble. There is thus produced on the plate 10 a negative defined by the insoluble portions of the chromated colloid layer and exhibiting the design corresponding to the black or colored design of the original in intaglio where the soluble colloid has been washed away. After the washing the plate is dipped in one or more suitable coloring or dyeing baths until the parts of the colloid layer remaining on the plate are sufficiently colored and made relatively opaque so that they will intercept all objectionably actinic light, the plate 10 being resistant to the dye. Baths of suitable soluble aniline dyes are adaptable for this purpose such, for instance when printing plates having sensitive coatings of the kinds commonly used are to be produced as methyl violet or a dilute solution of pentamethyl - p - rosaniline. A negative exposed and dyed in this manner, whether or not utilizing the layers 18 and 20, which I have here described in order to facilitate the understanding of the subsequent description of further possible and desirable manipulations of the negative, may be used in the production of printing plates and forms; for example, it may be copied upon a sensitized printing plate and the printing carried on by the offset process in the usual way.

In Fig. 3 portions of the capital R representing the image on the original are section lined for black merely to indicate that they are beneath the plate 10 and the films 12, 18 and 20. As the latter are transparent obviously the image would show with practically complete intensity. In Fig. 5, representing the negative, the dyed colloid film

is lined to represent purple, this being merely for purposes of illustration and not by way of limitation to a particular color.

The film 12 of bi-chromated colloid is an example of a translucent material adapted, without substantial change in its light transmitting properties, to be rendered differentially soluble by the action of light so that a portion thereof may thereafter be selectively dissolved by a suitable reagent and washed away. Because it does not print out it may be subjected to the actinic action of light for an adequate time. This is of a particular advantage when the original to be copied is printed on both sides, as, for example, in reproducing a book. It has been found that no difficulty is encountered with shadows from the printed matter on the reverse side of the original not in contact with the colloid film, and I believe this to be the case because the passage of the light is not immediately obstructed as soon as the material is exposed to light, but a continued action of the reflected light is permitted which, metaphorically speaking, burns out any shadows which might be due to a slight absorption of the light by printed matter on the reverse side of the original.

The materials utilized in the process are very cheap and may be handled without the aid of a camera by girls and relatively unskilled labor and with ordinary care may be manipulated in daylight.

While a negative prepared as just described may be utilized without further treatment it is possible that the image may fade or "bleed" if the negative is left in water and give an indistinct picture requiring re-coloring. Furthermore, if the negative after drying is to be coated, for instance, as hereinafter described with an aqueous preparation such as a gelatin solution, there is danger that the coating will absorb the dyestuff. I therefore prefer to convert the dyestuffs, whether basic or acid, into compounds insoluble in water by treatment with certain salts and acid or basic bodies according to the character of the particular dyestuff originally used, usually an acid agent being adapted for use with a basic dyestuff and vice versa. Thus, if as suggested the original dyestuff is pentamethyl-p-rosaniline, the negatives colored thereby may be washed in a dilute aqueous solution of diamidostilbene-disulphoaciddiphenol. The reaction of these bodies produces a percipitate which is insoluble in water and which is formed in the layer of chromated colloid so that no fading takes place while the negative is immersed in water and if a warm solution of gelatin is poured on the negative no coloring of this solution takes place.

It will be understood that such a negative as is illustrated in completed form in Figs. 5 and 6 is a negative both as regards coloration and as regards form, that is, the characters are reversed as compared with the original. Such a negative, therefore, unless a counter-transfer is made, can be used for printing only on offset machines. The negative would in such case be copied on a zinc or aluminum plate in well known manner. The image on the metal plate would then be a positive, the characters appearing right side to and thus suitable for printing on an offset press. If it is desired to print on an ordinary lithographic press or on a zinc rotary press, a counter-transfer could be made so as to reverse the image. Since by the process of transfer and counter-transfer sharpness and distinctness are lost, I prefer to provide means for producing negatives in such a manner that they may be reversible and can be utilized without transfer for producing plates either for a lithographic machine or for an offset one. For this purpose I preferably prepare the negative in the manner already described and after it has been brought to the stage illustrated by Fig. 6 the negative is completed by the addition of an outer coating and removal from the glass plate. For example, an aqueous gelatin solution to which a few drops of glycerin have been added may be applied, thereby providing the coating 28. The plate is then placed on a cold support and quickly chilled to set the gelatin. The drying is done with warm air. As indicated at the left of Fig. 7 the rubber margins of the compound film comprising the layers 18, 20, 12 and 28, inclusive, are then severed and this compound film stripped off the glass plate 10.

The compound film thus stripped from the plate 10 comprises the layer 12 embodying the dyed image of actinized chromated colloid and the transparent layers on either side thereof, the layer 28 filling the depressions of the relief image formed on the layer 12 and providing a perfectly smooth surface. The gelatin layer 28 also serves as a reinforcement of the film when removed from the supporting plate of glass or other transparent material 10. The compound film is reversible and, while a negative as regards color, as compared with the original is either a negative or a positive as regards form according to which side it is viewed from. By utilizing one or another of the smooth faces thereof as desired, a printing plate may be prepared adapted for use either in an offset press or the ordinary flat plate printing machine. The operation is the customary one in doing transfer work, the proper face of the compound film being opposed to the plate in accordance with the result desired. I deem it unnecessary to describe in detail the method of operation. It will be seen that the negative prepared in this manner, without the usual car-

rier in the form of the glass plate 10 or its equivalent, may be used as a medium for copying the image either right side to or in reverse position for use either with offset printing presses or direct printing presses, and that in either instance the process is direct and time saving without the necessity of transfers, and that the sharpness and definition of images are preserved.

To reinforce such a negative as I have referred to for transportation and handling, it may be mounted as shown in Fig. 8 upon a sheet 30 of translucid tissue paper or other suitable tough material preferably of a fibrous nature but substantially without palpable grain which would cause dispersion of light and resultant lack of definition when utilizing the negative for transfer purposes. Various papers suitable for this purpose are now known although the specific steps by which they are manufactured are regarded as trade secrets.

I have described in detail the production of such a transfer negative as is illustrated in Fig. 8 but it will be understood that not all the features embodied therein are essential and that the negatives as referred to in the course of the description may be utilized. The transfer negatives in any instance are accurate and sharply defined reproductions of the original and are much cheaper than zinc plates, lithographic stones, half-tones and electrotypes and may be readily stored and shipped. The facility and low cost of their production makes it possible to dispense with the storage of expensive plates since from a single example of a work once printed from plate or types set of plates for further printing may be readily produced without sacrifice in quality of the work.

Having described in detail a particular embodiment of my invention by way of example, without limiting myself thereto, I claim as new and desire to secure by Letters Patent the following:

1. A transfer negative suitable for the production of printing plates embodying an image of actinized bichromated colloid dyed to intercept all objectionably actinic light.

2. A transfer medium comprising a translucid field and a negative image consisting of an actinized chromated colloid dyed to intercept actinic light and constituting a means which may be applied without light reversal to the direct production of a printing plate.

3. A transfer medium comprising a translucid carrier having thereon a body of actinized bichromated colloid defining a design dyed to intercept actinic light and constituting a negative image suitable for the direct production of printing plates.

4. A transfer medium comprising a translucid carrier having thereon a negative image consisting of actinized bichromated colloid formed in relief and dyed with a soluble dye having light intercepting properties as exemplified by methyl violet defining an intaglio design.

5. A reversible transfer negative suitable for the production of printing plates to provide at will either of relatively reversed images comprising an image of actinized bichromated colloid treated to intercept light and imbedded between transparent coatings presenting smooth exterior faces.

6. A reversible transfer negative suitable to produce at will either of relatively reversed images comprising an intaglio image of actinized bichromated colloid treated to intercept light and imbedded between transparent coatings filling its interstices to form a laminated film of uniform thickness.

7. A transfer negative comprising an image of actinized bichromated colloid treated to intercept light and imbedded between transparent coatings to provide a film of substantially uniform thickness, said film having one face adherent to a reinforcing sheet of translucid tough fibrous material substantially without palpable grain.

8. A flexible transfer negative consisting of a film comprising a layer of transparent colloid with which is associated a dyed image of actinized bichromated colloid, said film being reinforced with a thin sheet of translucid paper, whereby it may be printed by light from either side.

9. A flexible transfer negative consisting of a film of a plurality of layers of transparent colloid with which is associated a dyed image of actinized bichromated colloid, said film being reinforced with a thin sheet of translucid paper, whereby it may be printed by light from either side.

10. A transfer negative comprising a translucid carrier having thereon a dyed body of actinized chromated colloid defining a design and mounted on a translucid fibrous sheet.

11. A transfer negative comprising a chromate colloid photographic image treated to render it impervious to light imbedded between transparent films and mounted on a translucid fibrous sheet.

12. A flexible transfer medium comprising a negative image of actinized chromated colloid dyed to intercept actinic light mounted on a sheet of translucid tough fibrous material substantially without palpable grain.

In testimony whereof, I have signed my name to this specification.

MAX ULLMANN.