April 28, 1931. J. BEKK 1,802,936

PROCESS FOR PHOTOCHEMICALLY PRODUCING PRINTING FORMS

Filed Jan. 18, 1929

Fig. 1.



Fig. 2.

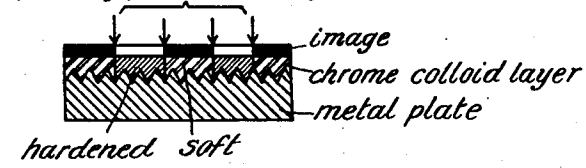


Fig. 3.

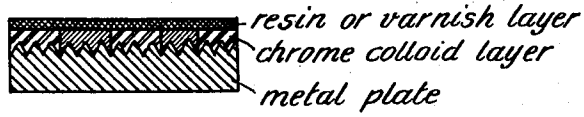


Fig. 4.

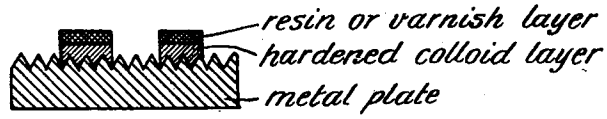


Fig. 5.

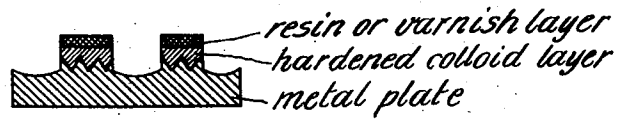


Fig. 6.

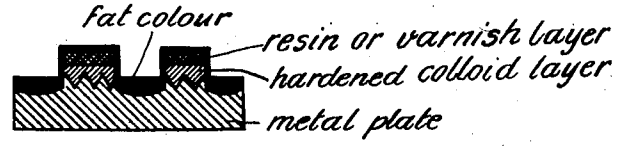


Fig. 7.

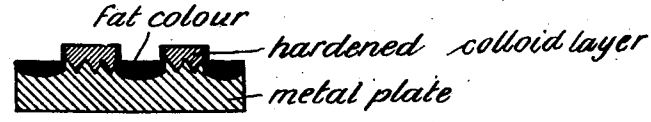


Fig. 8.



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UNITED STATES PATENT OFFICE

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PROCESS FOR PHOTOCHEMICALLY PRODUCING PRINTING FORMS

Application filed January 18, 1929, Serial No. 333,526, and in Great Britain December 3, 1928.

The process of producing photo-mechanical printing forms, especially printing plates, by means of sensitive chromate-colloid layers is generally known. The printing with these plates or the like takes place by those parts of the metal plates which are laid free after exposing and developing. These so-called positive-copying-processes enable the production of printing plates by copying an original without first preparing a negative. The hitherto known processes for preparing such printing forms, which for instance are applied in offset printing and to which the process described hereafter is attached, either work in the way that, for instance after developing of the chromate-colloid copy, the parts of the metal plate laid free by such development are freed from fat or are otherwise rendered adaptable for taking on fat-colours, whereupon the whole plate is covered with colour and subsequently the colour adhering to the chromate-colloid layer is removed by wiping or rubbing in the presence of water, diluted acids, or the like. As experience has shown these processes answer the purpose only in copying from coarse originals, line drawings and in the most favourable case with originals of coarse screen. The reason for this is that the freeing from fat has to be very thorough if the colour layer adhering to the free metal parts of the plates should be able to stand the subsequent rubbing off without getting damaged. A very thorough treatment with acids as used for removing the fat on the other hand penetrates easily the chromate-colloid layer and causes the settling of colour in these penetrated places. Thus the printing plates are soiled for printing and can no more be cleansed. Another objection is that the mechanical hurts of the fat colour-image, which are almost indispensable with the wiping or rubbing of the colour-layer make it impossible to produce finer copies.

The present invention renders possible the production of good copies from originals with finest screen. This is achieved by producing above the chromate-colloid copies a varnish- or resin-layer soluble in spirits, said varnish- or resin-layer being removed from the unexposed portions of the chromate colloid layer, the remaining portions of the varnish or resin layer perfectly resisting the treatment with acids and remaining unattacked in the covering with fatty colour. After the production of the thus obtained varnish- or resin-layer, the parts of the plate or the like laid free by the preceding development are etched whereupon the whole printing form is covered with fat colour and exposed to the action of spirit or some other dissolving agent of such a kind, which does not act upon the fat colour but on the other hand dissolves the varnish layer underneath, thus removing the connection between the respective places of the base and the fat-colour, and thereby also removing the latter from those portions of the plate which bear the hardened chromate layer.

It is possible to use with advantage in this connection also an alkaline means, for instance on alkaline lye, by which the resin- or varnish-layer as well as the colloid layer is removed from the exposed places without the laid free metal being attacked or corroded. Most suitable for this purpose is a mixture of alkaline lye and alkaline carbonate, which besides contains alkaline chromate and gelatine solution. In this case also with quick work and in the application of a fairly concentrated lye a deteriorating influence of parts of the etching agent, which may have penetrated before in the colloid layer, on the metal lying underneath this layer is prevented.

In order that the present invention may be better understood reference is made to the accompanying drawing wherein

Figure 1 is a diagrammatic elevation in section on an enlarged scale of a metal plate covered with a sensitive layer;

Fig. 2 is a corresponding view showing the same sensitive plate under the action of luminous rays;

Fig. 3 shows the plate exposed before, covered with a resin or varnish layer;

Fig. 4 shows the plate according to Fig. 3 after the removal of the soft, unhardened

portions of the sensitive layer with the resin or varnish layer upon those portions;

Fig. 5 shows the plate according to Fig. 4 after being etched;

Fig. 6 shows the plate according to Fig. 5 wholly covered with fat color which will be in a thicker layer on the free, etched portions of the plate than on the others;

Fig. 7 shows the plate according to Fig. 6 after the removal of the varnish or resin together with the fat color which was situated above said varnish or resin;

Fig. 8 shows the plate according to Fig. 7 after the removal of the hardened sensitive layer.

The preparing of the varnish- or resin-picture or layer soluble in spirit may take place in the following manner.

The sensitive chromate-colloid layer is put on the clean grained metal plate or the like, the chromate-colloid picture or image then being produced by exposure in the usual way. Before, however, developing this picture with water, it is rubbed with a resin solution, e. g. with sandarac dissolved in amyl acetate, the plate finally being watered under the sprinkler. By this treatment those parts of the resin layer which are lying on the unexposed portions of the chromate-colloid layer are washed away with the latter.

The varnish- or resin-picture thus produced now is treated with a corrosive or etching means for the laid open portions of the metal, the varnish or resin layer preventing with security the penetrating of the etching means to the exposed portions of the metal plate and an even slight corrosion of these portions of the plate. By the etching process the grain is removed from those parts of the metal plate which have been laid free before and the said parts of the plate are somewhat deepened out.

For the etching purpose different means can be used as for instance acids or salt solutions or mixtures thereof, as in particular mixtures of different metal chlorides. Lactic acid or a mixture of aluminium chloride and iron chloride may for instance be employed. Very good results, however, are to be attained with a mixture of iron chloride and nitric acid. The iron chloride herein preferably is used in a highly concentrated form of solution by either dissolving same in a small quantity of water or mixing it in the solid state with the nitric acid. In the application of such a viscous or paste like etching means those portions of the plate which are covered by the chromate-colloid layer and by the varnish- or resin-picture remain unattacked whereas the etching on laid free parts of the metal is performed quite uniformly and can be adjusted in depth at will.

There can also be added some solution of iodine in potassium iodide to the etching agent in order to clean the metal and increase its taking capacity for fat colour.

For instance there can be used for the etching of the plate a mixture which is prepared in the following manner:

75 parts of solid chloride of iron are dissolved in 25 parts of water, to which solution 10 parts of nitric acid of the specific gravity of 1, 4 are added. Hereafter about 1 part of a solution of iodine in potassium iodide is added to this solution. The thus obtained etching means can be applied according to requirements upwards to several minutes on the printing form provided with the varnish- or resin-picture.

After the etching the whole printing form or plate is covered with fat colour and can hereafter be treated with a spirit bath which does not attack the fat colour whereas the varnish- or resin-layer underlying it at the place of the hardened colloid layer is dissolved, the connection between the respective portions of this colloid layer and the fat colour thereby being removed, the spirit penetrating the fat color layer which consists of solid color, and dissolving the resin or varnish lying under the color particles. It is to be noted in this connection that a fat color when rubbed on the plate will remain only in a thin layer on those portions which are covered by varnish or resin, but in a thick layer on the laid free and etched deepened portions of the plate. By then putting the plate under the water sprinkler the particles of fat colour loosened from their base are removed, generally without requiring further mechanical action. Only in case where the fat colour has been put on very thick a wiping off with a sponge or such like will be advisable for accomplishing the developing process. The explanation for this is that in the deep laying places of the screen picture the colour particles loosened from their basis are clutched sideways and hold by those particles which are settled on the etched free parts of the metal plate.

In place of or besides the spirit bath there can also be used a treatment with alkaline lye, for instance caustic soda lye, by which the varnish- or resin-layer as well as the hardened colloid layer lying underneath said resin layer is removed without the laid free metal being attacked. With special advantage there can be used for instance a caustic soda lye with an addition of carbonate of sodium and of alkaline bichromate and gelatine. For preparing this means for instance 200 gr. caustic soda, 100 gr. crystallized sodium carbonate and 5 gr. bichromate of ammonia are dissolved in one liter of water to which is added 50 gr. of a 20% gelatine solution. By applying such a means the colloid as well as the varnish- or resin-layer is removed from the exposed places of the

printing form or plate without the laid free metal being attacked.

Having now particularly described and ascertained the nature of my said invention, I declare that what I claim is:

1. A process for the photochemical production of metal printing forms by means of a colloid layer sensible to light, which comprises covering a base of metal with a light sensitive colloid layer, copying the original on said layer by means of a screen, covering the exposed sensitive layer with a protecting varnish-like layer, developing the exposed sensitive layer by means of water, thereby washing away at the same time those parts of the protecting layer lying over the not-lighted portions of the sensitive colloid layer, etching the laid free portions of the metal by chemical etching means, covering the whole printing form with fat colour, and finally treating said printing form with a solvent for the varnish-like layer, said fat colour covering thereby being removed with said varnish-like layer from those parts of the printing form which had not been etched before.

2. A process for the photochemical production of metal printing forms by means of a colloid layer sensible to light, which comprises covering a base of metal with a light sensitive colloid layer, copying the original on said layer by means of a screen covering the exposed sensitive layer with a varnish-like layer not to be attacked by the printing colour, developing the exposed sensitive colloid layer by means of water, thereby also removing the varnish-like layer from those parts of the metal form which were not exposed to light before, etching the laid free portions of the metal by a mixture of iron chloride and nitric acid, covering the whole printing form with fat colour, and finally treating said printing form with a solvent for the varnish-like layer, said fat colour covering thereby being removed with said varnish-like layer from those parts of the printing form which had not been etched before.

3. A process for the photochemical production of metal printing forms by means of a colloid layer sensible to light, which comprises covering a base of metal with a light sensitive colloid layer, copying the original on said layer by means of a screen covering the exposed sensitive layer with a varnish-like layer not to be attacked by the printing colour, developing the exposed sensitive colloid layer by means of water, thereby also removing the varnish like layer from those parts of the metal form which were not exposed to light before, etching the laid free portions of the metal by a mixture of iron chloride, nitric acid, and a solution of iodine in dissolved potassium iodide, covering the whole printing form with fat colour, and finally treating said printing form with a solvent for the varnish-like layer, said fat colour covering thereby being removed with said varnish-like layer from those parts of the printing form which had not been etched before.

4. A process for the photochemical production of metal printing forms by means of a colloid layer sensible to light, which comprises covering a base of metal with a light sensitive colloid layer, copying the original on said layer by means of a screen, covering the exposed sensitive layer with a protecting varnish-like layer, developing the exposed sensitive layer by means of water, thereby washing away at the same time those parts of the protecting layer lying over the not-lighted portions of the sensitive colloid layer, etching the laid free portions of the metal by a mixture of a highly concentrated solution of iron chloride and nitric acid, covering the whole printing form with fat colour, and finally treating said printing form with a solvent for the varnish-like layer, said fat colour covering thereby being removed with said varnish-like layer from those parts of the printing form which had not been etched before.

5. A process for the photochemical production of metal printing forms by means of a colloid layer sensible to light, which comprises covering a base of metal with a light sensitive colloid layer, copying the original on said layer by means of a screen, covering the exposed sensitive layer with a protecting varnish-like layer, developing the exposed sensitive layer by means of water, thereby washing away at the same time those parts of the protecting layer lying over the not-lighted portions of the sensitive colloid layer, etching the laid free portions of the metal by a mixture of iron chloride and nitric acid, covering the whole printing form with fat colour, and finally treating said printing form with alkaline lye for removing the covering layers from the exposed portions of the printing form without attacking the metal of the form.

6. A process according to claim 4 characterized by the use of a mixture of alkaline lye and alkali carbonate for removing the covering layers from the etched and colored-in plate.

7. A process according to claim 4 characterized by the use of a mixture of alkaline lye, alkali carbonate, alkali bichromate and gelatine solution for removing the covering layers from the etched and colored-in plate.

In testimony whereof I have hereunto set my hand.

DR. JULIUS BEKK.