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METHOD FOR PRODUCING PRINTING IMAGES ON PRINTING PLATES

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The difficulty in producing printing images by the photo-mechanical method, the so-called copying method, is due to the peculiarity of the printing image carriers. At the present time printing is mostly effected by means of zinc or aluminium plates. For copying purposes there are used in this connection almost exclusively colloid solutions (albumen, fish glue, Le Page and so forth), rendered sensitive to light by bi-chromate, the treatment of such colloid solutions being well known and it is therefore not necessary to describe it separately. When developing it is always found that the colloids are retained by the metal with considerable force everywhere and even at the unexposed points. Probably the metal has a tanning action on the colloids and holds these firmly in the thinnest possible layer which is insoluble or only soluble with difficulty. It will be quite clear that this causes difficulties.

When using the albumen copying method printing is effected from the exposed albumen particles. When there has been sufficient exposure the albumen adheres very firmly. Some of it, however, also adheres to the unexposed points and during the printing partly collects ink whereby the printed images become fuller. Attempts to remedy this defect by energetic etchings or weaker exposure do not help in any way. In the latter case the printed images at the most acquire a slighter hold. Further, the albumen bi-chromate solutions which are still liquid are very sensitive and have become considerably worse after two to three days.

Prepared and dried albumen layers vary considerably under the action of heat and storing after copying. If, for example, a negative of a plate is copied a number of times in succession, this, as is well known, appears in a very disturbing manner. Above all a comparatively large amount of albumen remains in the first copies and is baked between the screen point and causes a disturbing appearance, in the manner described, later on when printed.

Whereas it is apparently not possible in the so-called albumen copying method to eliminate the defects referred to, it will be shown hereinafter how the copying method with reversal, which at the present time is still unsatisfactory and in which the unexposed parts are used for the production of the printed image, can be carried out. These methods differ from the albumen copying methods less by the selection of the colloids than by the fact that by means of the copy a negative in colloid is first produced on the printing plate. The actual printing image is quite sharp and apparently blank without a coating of colloid after development.

Actually some colloid is still present on the apparently blank points as already mentioned in the form of a very thin, discontinuous layer, that is to say, in the form of a veil or gauze. For removing this colloid film a large number of methods are already available. The film is disturbed, for example, by a mechanical action with pumice stone flour or by chemical treatment with acids. In the latter case there is used about 2% acid in alcohol or glycerine so that the actual copy will not be disturbed at the same time.

Recently it has been found that dilute nitric acid only slightly attacks the actual copy layer so that the seemingly blank exposed parts have the film removed therefrom by deep etching. By this method a considerable variation in the tone values is, however, always produced. Disregarding the fact that all these means either do not sufficiently remove the film or remove it uniformly and more or less damage the actual colloid image when the action is long or energetic, or vary the tone values, this method finally has further difficulties.

The printing plate, according to the known method, is provided directly with printing ink or firstly with an intermediate layer. Thereupon the colloid copy, together with the parts of the layer which cover it, is mostly washed with dilute hydrochloric acid so that the printing image remains. Dilute acid, however, cannot in any way completely remove the colloid as by reason of exposure and the adhesive power of the metal it is combined extremely firmly with the metal. It may also be assumed that with granular printing plates the lowermost colloid plates

have a greater adhesion. When printing toning points are nearly always exhibited as in the course of time the colloid residues take up ink. Even very energetic etchings cannot remove these colloid residues.

All these difficulties and objections can be removed in the following manner. According to the present invention the disturbing colloid film is removed by treatment with certain salt solutions, having the common property of effecting a direct solution of a thin layer of glue or gelatin from the surface. This is accomplished by first washing off with water the prepared glue layer, after exposure, so that the unexposed portions of the layer are dissolved and removed. The colloid veil of course remains notwithstanding this dissolving operation. Thereupon the copy is thoroughly dried with the aid of cold air, so that any trace of colloid and the colloid veil may be removed in the manner described without endangering the copy, that is the exposed layer, on the entire exposed plate.

Probably the action of such salt solutions consists, according to their nature, in that the salts partly effect a dissolving of the colloids under conditions without mechanical, chemical or thermal assistance, as for example, potassium bromide or ammonium nitrate. It is, however, also possible to use salts which without any such assistance do not dissolve colloids, for example salts of fatty acids, iron sulphate or sodium sulphate. Consequently the treatment by rubbing with a wadding pad or the like is apparently also effected by reason of the fact that by the friction and slight softening of the uppermost layer of the colloid image the film is loosened and removed mechanically. Finally all salt solutions have a so-called de-acidifying action on the metal of the printing plate so that at these points, after removal of the film, the printing ink and the like will adhere efficiently.

It is also possible to use a number of compounds together in one solution, such as a mixture of a solution of a soluble alkaline salt of a higher fatty acid which is inert to the material of the plate and which has the property of dissolving unexposed colloid with any one of the other salts named herein, that is, potassium bromide, ammonium nitrate, iron sulphate, sodium sulphate, sodium chloride. Further, different solutions may be used in succession, in which case it is advisable to effect an intermediate rinsing and renewed drying. The solutions may be used cold or under circumstances also hot. Finally a portion of the water in the solutions may also be replaced for example by alcohol and/or glycerine.

Solutions of about 10 to 30% strength can be used but frequently a considerably lower concentration is sufficient. As a rule those means are preferred which allow the metal of the printing plate to appear bright, influence it favourably for the further treatment, and which can be allowed to act for an indefinitely long time, as for example salts of fatty acids or common salt, as when removing the film any injury to the colloid copy and any modification of the tone values must be effectively avoided.

The fatty acid salts referred to may be, for example, the oleates, palmitates, stearates or butyrates of sodium, potassium, or ammonium. These salts are preferably those of the higher fatty acids, that is, the acids above acetic.

After the removal of the film the copy is copiously and energetically rinsed with water and completed in the usual manner.

Of particular advantage and of great importance is the combination of the removal of the film above described with the completion of the treatment by the use of strong alkalis, for example soda lye. After removing the film, rinsing and drying the plate which has been treated to this extent is provided with a uniformly thin suitable coating capable of resisting the action of alkali, for example of asphalt. After this there is preferably effected a preliminary treatment with a very weak acid for example in a vessel containing water weakly acidified with hydrocholric acid (about 0.2% HCl).

The plate is then rinsed, soda lye applied thereto and the colloid image, in so far as this is still present, removed by rubbing with a wadding pad or the like.

Contrary to the treatment with any acids or ammonia the strong alkali can actually remove the colloid without residue. The printing images consequently remain completely clean on the support which is otherwise not the case.

The process briefly summed up is as follows: The zinc plate is coated with a film of colloid made sensitive with bichromate. This is exposed to light, and is developed by being washed in water. The plate is then dried and afterwards treated with some of the salts named above to remove the portions of the colloid which although unexposed, have not been completely removed by the water. The plate is then rinsed and dried and coated with asphalt. It is then developed with a weak acid and rinsed, and the remaining colloid and any asphalt which may lie thereon is removed by rubbing with soda lye and a wadding pad.

It has been proposed hitherto, in connection with reversing copying methods, to apply iron chloride to the copy developed with water and therefore having a swollen exposed layer, for the purpose of etching the plate, or to add alum for removing the acid. Both substances, however, cannot by themselves, that is without mechanical aids, remove the colloid veil completely, so that the effect of these salts used in a well known manner will

not insure sufficiently the adherence of the ink to the metal. Iron chloride when used without rubbing will remove the veil only in an indirect way, that is to say only when owing to its acid content it will eat away the metal under the colloid veil.

Salts which attack the metal of the printing plate or affect this by the formation of unfavorable deposits should not be used, as for example in the case of zinc plates, copper bromide ($CuBr_2$) and iron chloride ($FeCl_3$).

I claim:—

1. In the process for producing printed images on printing plates by photomechanical methods, the steps of developing the exposed plate, and then removing the thin veil of colloidal material which adheres to the unexposed portion of the plate after the first development by treating the plate with a solution of a soluble alkaline salt of a higher fatty acid.

2. In a process for producing printed images on printing plates by photomechanical methods, the steps of developing the exposed plate, and then removing the thin veil of colloidal material which adheres to the unexposed portion of the plate after the first development by treating the plate with a solution of a salt of the group comprising potassium bromide, ammonium nitrate, iron sulphate, sodium sulphate, sodium chloride, and the soluble alkaline salts of the higher fatty acids.

3. In the process for producing printed images on printing plates by photomechanical methods, the steps of developing the exposed plate, and then removing the thin veil of colloidal material which adheres to the unexposed portion of the plate after the first development by treating the plate with a solution of a soluble alkaline salt of a higher fatty acid which is inert to the material of the plate and which has the property of dissolving the colloid, and an addition of a salt of the group comprising potassium bromide, ammonium nitrate, iron sulphate, sodium sulphate, sodium chloride.

4. In the process for producing printed images on printing plates by photomechanical methods, the steps of developing the exposed plate, then removing the thin veil of colloidal material which adheres to the unexposed portion of the plate after the first development by treating the plate with a solution of a soluble alkaline salt of a higher fatty acid which is inert to the material of the plate and which has the property of dissolving the colloid, hereafter coating the plate with a layer of asphalt, and finally removing the exposed colloid parts by a strong alkali.

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

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