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PHOTOMECHANICAL PRINTING

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In lithographic printing with plane printing surfaces, and more particularly in so-called off-set printing in colors, where the printing elements of the plates are dots or lines due to the use of a screen, or the like, it is generally essential to be able to peripherally increase or reduce the size of the half tone dots without impairing their printing density, in order to obtain the desired tone and color values.

As regards photomechanical action, the means used for this purpose may be said to fall into two groups, one being mechanical and the other chemical. An example of the former is the use of a resist of shellac, bitumen or like layer with a glue half tone picture copied on to it, the resist being treated with a mechanical solvent, for example paraffine oil, which penetrates at the edges of the half tone dots and reduces the size thereof. An example of the chemical method is the use of copper on a glass plate, instead of the shellac or bitumen, a chemical solvent of copper being used. These methods are very uneven in their effect, particularly the former, and the prints may become distinctly rough, due to the edges of the glue half tone dots crumbling, where the former support which was afforded by the shellac or copper is taken away.

An old method for the peripheral reduction of half tone dots, is the so called cutting down of a collodion negative (wet plate), but the object in this case is not so much to reduce the size as to make the periphery sharp. This method is very even in its effect, but the reduction effect is inadequate, because if the cutting is carried too far the "cover" or printing density is so much reduced that printing cannot be effectively performed.

My improved method has some superficial resemblance to this "cutting" method. Instead of collodion, which does not reswell, I use a colloid capable of reswelling so that "cutting" can be repeated as often as desired, and in order that printing density is maintained, even if the reduction of the half tone dots is extreme, I provide that where the dots or lines occur the colloid in which they are embedded is less permeable to liquid, after development or printing, than elsewhere. At the same time I arrange in known manner that the embedding of the half tone dots is as deep as practicable, i. e., that the principal dimension of the dots is in the direction of depth, due to the very long exposure using a small shutter opening.

I may, for example, produce a screen negative or diapositive on a coating like silver emulsion gelatine, e. g., a dry plate, develop with a tanning developer, and then treat the same, for reduction of the size of the half-tone dots, with one of the usual reducers such as a mixture of potassium ferric cyanide and hypo. This does not, as is usual in other cases, act on the embedded silver salt, but is checked by the colloid in proportion as the latter is hardened, which is principally the case at the central regions of the half tone dots. The periphery of the latter may by this means be substantially reduced, without losing the density. It may also be of advantage to make the exposure through the plate, because then the bases of the cones due to the light are protected by the carrier, and only the sides are exposed to the reducer.

Another example is as follows.

A carrier coated with a gelatine layer treated with silver salt such as an emulsion containing metallic silver is made sensitive to light by means of a bichromate. The sensitiveness of the silver salt is in this case of little or no importance; for instance a dry plate may already be reduced or blackened by general exposure and resensitized by bichromate of ammonia. By exposure through a screen negative, half tone dots are produced, in the form of hardened ("tanned") and therefore less liquid permeable portions of the coating. Then the plate is treated with an agent capable of dissolving the silver salt or reduced silver. A diapositive of the negative is thus obtained, because the solvent penetrates quickly in the unhardened or less hardened portions and only slowly into the hardened portions, but continued action may ultimately effect the peripheral reduction of the dots to mere pin points. It is remarkable that though these dots are substantially uniformly hard throughout and do not consist of

hard cores and less hardened outer layers, the reduction of size proceeds in a manner analogous to that in the previous example mentioned. It appears to be immaterial whether the exposure is made through the carrier or from the other side.

Instead of a diapositive a negative may be made. This may be done by printing from the diapositive which may also be modified as described, or by using ferric-salts instead of bichromate, that is to say salts whose original hardening effect is destroyed by exposure to light.

The best reducers are those which also have a hardening effect. Of course I may also use solvents, such as perchloride of iron, which first produce a compound, e. g. silver chloride, which is then dissolved by a separate treatment.

If the reduction of size is to be local only, resists of asphaltum varnish or fat chalk may be applied locally, or the application of the solvent may be local.

Selective local enlargement, after reduction, may be effected by reconstituting partly dissolved residuals by means of silver strengtheners of the usual kind. This is especially the case where metallic silver is formed.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. The process of cutting half-tone negatives, in which the density of the half tone dots is retained consists in causing the dots to be embodied in a hardened liquid resisting deep condition within the less hardened remaining colloid and reducing the dots by solution with photographic reducers of the class including Farmer's reducer.

2. The process of cutting half-tone negatives, as claimed in claim 1, in which the colloid is emulsified with soluble light obstructing means.

3. The process of cutting half-tone negatives on dry plates previously blacked by exposure and development and resensitized by means of potassium of bichromate, which consists in causing the dots to be embodied in a hardened liquid resisting deep condition within the less hardened remaining colloid, emulsified with soluble light obstructing means, and thereafter reducing the dots by solution with photographic reducers of the class including Farmer's reducer.

4. The process of cutting half-tone negatives as claimed in claim 3, which includes the step of effecting the cutting locally at selected parts by applying the said reducer thereto.

In witness whereof I have signed this specification.

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