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(Under International Convention.)

Date claimed for Patent under Patents and
Designs Act, 1907, being date of first Foreign } 4th June, 1907
Application (in France),

Date of Application (in the United Kingdom), 29th May, 1908

At the expiration of twelve months from the date of the first Foreign Application,
the provision of Section 91 (3) (a) of the Patents and Designs Act, 1907,
as to inspection of Specification, became operative

Accepted, 18th Feb., 1909

COMPLETE SPECIFICATION.

**"Improvements in or relating to the Manufacture of Screens or
Coloured Surfaces for Colour Photography."**

I, LOUIS DUFAY, of Villa Jean Simonne, rue Andre, Chantilly, France,
Engineer, do hereby declare the nature of this invention and in what manner
the same is to be performed to be particularly described and ascertained in and
by the following statement:—

5 Numerous attempts have been made to produce a perfect or even satisfactory
colour screen for colour photography, but either the processes proposed have
been impracticable or the results unsatisfactory. The ideal form of screen
would appear to be one in which—in the three colour process now usually
10 adopted—the screen is constituted by extremely minute dots evenly distributed
and in regular order. Parallel line screens in three colours are not so satisfac-
tory as the continuous lines of each colour are not adapted to give a good
impression of white or other colour by transmitted or reflected light, the con-
tinuous lines of each colour being objectionable. Attempts have therefore been
made to produce "dot" screens, but hitherto these have been constituted either
15 by coloured grains or the like, which are objectionable owing to their being
more or less opaque or to their acting to some extent as lenses, thus producing
distortion, or to their colour being unevenly distributed apart from the diffi-
culty of making such screens. In other cases when the dots are successively
20 printed in the different colours, such extreme accuracy in registration or shift-
ing of the plate in successive printing is necessary to prevent overlapping, that
in view of the minute character of the dots registered such accuracy of registra-
tion is not possible in practice.

In other forms the colour applied by printing and dyeing have to some extent
overlapped which is objectionable, or lines have been ruled or printed in colours
25 and cross lines cut therethrough to enable the surface so exposed (gelatine,
collodion or the like) to be subsequently dyed.

The present invention relates to an improved method of producing a "dot"
screen—in contradistinction to a line screen—the actual shape of the dots being
of minor importance as they may be square, round or of other shape, and the
30 object is to form a screen in which the dots shall be evenly arranged, each
dot being of even intensity of colour and the surface of the whole screen being

[Price 8d.]



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a perfect plane whereby no distortion is caused, the dots being side by side and arranged without any superposition or blank spaces in the desired relative position and order so that the different colours of the screen balance each other and form a perfectly neutral surface giving consequently the sensation of white.

To succeed in producing the said sensation on a screen with an absolute transparency which is a necessary factor for obtaining the shortest photographic exposure possible, it is necessary to constitute the polychromatic elements, arranged side by side, not by means of foreign substances such as grains, varnishes or coloured printer's ink, for instance inserted between the glass of the photographic plate and the sensitive layer; thus constituting a heterogeneous medium and necessarily absorbing a considerable quantity of light but, on the contrary, by the use of dyed elements or portions, arranged side by side without superposition or missing portions, on one continuous surface, of great transparency, such as for instance a layer of gelatine. In this manner each of the polychromatic elements effects on the whole of its surface a correct selection work for the purpose of a perfect rendering of colours, and the luminous rays coming from the object glass and passing through the screen, arrive at the sensitive layer in the regular travel, without undergoing injurious refraction or reflection and, therefore, are recorded in a manner absolutely regular and optically correct, the colours thus being given their full and correct intensity.

To obtain this result, the following principle is utilised.

If on any support or background impermeable to greasy materials are printed lines, points or figures, in such greasy material, which must be sufficiently liquid to enable it to be applied to the said support by any suitable printing process, and if on the whole surface of the support on which the said greasy substance has been so distributed, is applied a varnish which does not dissolve or mix with the greasy material, such for instance as a solution of gum lac, in, for instance, alcohol, the solution or varnish will coat well the whole surface of the support but naturally will not adhere to it, except at the places where there is no greasy material. Everywhere in fact, where it meets the soft greasy material, it will cover it without however becoming connected to it or incorporated into it.

Consequently, if after the varnish has dried, the support thus treated is submitted to the action of a solvent of the greasy material, such for instance as benzine, or turpentine essence, the previously applied greasy printing or impression will be dissolved with the greatest ease by slight rubbing or sponging and the solvent will carry away and remove from the support, together with the greasy substance, also those portions of the alcohol varnish which, covered the greasy substance, but were unable to adhere to it, or consequently to the support so that only the adhering portions of the varnish will be left on the support.

This principle applied to photo-printing as already stated, enables polychromatic screens for colour photography to be manufactured in an optically correct manner.

A convenient method of carrying out the process is as follows:—

A bichromated gelatine or like film on a flexible or rigid support is exposed in the ordinary manner to light behind a screen and in contact with the same, the said screen being constituted either by alternately transparent and opaque lines parallel to each other, or by square or other shaped points, according as it is desired to obtain a ruled coloured screen or a screen with regular or irregular coloured points. This plate is subjected to the ordinary washing and preparing operations, then it is amply impregnated with a coloured aqueous solution of one of the three colours which are to form the final screen, for instance orange red, which amply colours the gelatine in the portions which have remained soluble and were not exposed to the action of light during the printing of the plate. Then the latter is inked by ordinary method with a greasy substance of suitable fluidity, used for this kind of impressions, which greasy material will be preferably of black colour, so as to enable the work to

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be more easily followed. The greasy substance will adhere only to the portions which had been exposed which will be exactly those which have not absorbed the red orange colour. Pulls are then printed by means of a quick printing machine with mechanical inking, in the well known manner. This printing is effected on gelatine coated glass if the original plate is on a flexible support, and on gelatine film if, on the contrary, the printing plate is rigid, but in any case the two gelatine surfaces will be left for the desired time in contact, so as to obtain sufficient intensity of the transferred orange red lines.

If a ruled screen has been used for the original plate the printing will result in a series of transparent lines coloured red orange, separated from each other by greasy lines of opaque black colour. Before complete drying of the greasy lines, colourless alcohol varnish is poured on the printed surface, and then as soon as the varnish is dry, the plate is submitted to the action of a solvent, such as turpentine essence, which will eliminate the black greasy lines and those portions of the alcohol varnish which, owing to the greasy substance, have been unable to adhere. The plate thus treated will then have only a series of red orange lines covered with alcohol varnish and separated from each other by colourless lines not covered with varnish.

On the screen thus formed, is printed, making use this time of a second collographic plate saturated in its non-exposed portions with, for instance, a blue-violet aqueous solution, a second temporary greasy network intended ultimately to be removed like the first, care being taken that the lines of the second impression intersect those of the first at a right or other angle. The same will happen for this second impression as happened for the first, that is to say, there will be obtained a series of continuous greasy lines separated from each other by violet blue lines, but the latter will not be continuous, as at the points where the printing plate was in contact with the colourless varnish covering the orange red lines on the screen, the colourless varnish will prevent the contact of the two gelatinous surfaces, and consequently will prevent the colouring in blue-violet colour of the gelatine at the points covered by the varnish.

Before the complete drying of this second impression, a layer of colourless alcohol gum-lac varnish is applied to the screen, the varnish adhering only to the points not covered with greasy substance, that is to say only to the points coloured blue-violet.

A washing with turpentine will eliminate the greasy material and leave on the plate a series of continuous red lines, and a series of broken blue-violet lines crossing the red lines, the said two series of lines being covered with colourless varnish. There will be left between the two series of lines colourless intervals intended to receive the third green-colour which can be applied with the greatest ease, for instance by bringing the plate into contact with a thick layer of gelatine or any other pad saturated with green solution.

The screen having been thus prepared, that is to say, carrying its three colours, of which two are covered with colourless varnish, it will merely remain to remove this varnish which is now superfluous, and which can be effected with the greatest facility by subjecting the screen to the dissolving action of absolute alcohol, or by any other suitable method of elimination. There will thus be left on the screen only the original layer of gelatine entirely coloured over the whole of its surface, without superposition or black portions, with an infinite number of coloured lines or dots arranged in due position, calculated for the purpose of an optically correct photographic selection and having an absolute transparence, since the layer of gelatine has no foreign substance, alcohol varnish or greasy substance, which could affect its transparency.

The colours can of course be arranged on the plate in any order, proportion or number.

The screens obtained could be directly sensitised for the purpose of obtaining prints in colours adhering to the screen network, or used as independent

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screens and brought into contact with the sensitive panchromatic layer of an ordinary photographic plate.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. A process of manufacturing polychromatic transparent screens for colour photography, said screens being constituted either by coloured lines, nets or dots of any shape arranged or formed side by side in the desired order, without any superposition of colour and without any colourless spaces, and being produced by the successive application by imbibition on the surface of the screen of suitably chosen dyes, characterised by the fact that the screen is protected in part by greasy substance only for the first colour, in part by greasy substance and a special varnish for the intermediate colours, and in part by this special varnish, without greasy substance for the last colour, so as to prevent the following colour, applied on another portion of the surface from becoming superposed on the previously applied colours, the said varnish and greasy substance being eliminated in turn from the screen after having enclosed provisionally and successively each colour entering into the composition of said screen, the constituent parts of the varnish being such that the solvent of the latter does not dissolve the greasy substance, while the varnish is insoluble in a solvent of the said substance and is not susceptible of becoming incorporated or combined with it.

2. A method of carrying into effect the process claimed in Claim 1, consisting in obtaining the first colour by producing a greasy impression on gelatine glass then dyeing by imbibition of the layer on the parts not covered by greasy substance and varnishing the surface with a special varnish, then obtaining each intermediate colour by repeating the two operations just described, and finally obtaining the last colour by simply dyeing by imbibition, the screens thus obtained being either sensitised directly so as to obtain proofs in colours adhering to the crossed lines, or used as independent screens placed in contact with the sensitised layer of an ordinary panchromatic plate, the varnish being eliminated by a solvent.

3. Polychromatic screens for colour photography, having an absolute and perfect transparency with selective divisions, having any geometrical form, regular or irregular, geometrical or otherwise and constituted by dyed coloured portions side by side without superposition or blank spaces in a homogeneous layer of gelatine, without black colourless spaces, without addition of coloured foreign elements (greasy ink, coloured varnish, fecula or other grains), without superposition of colours or differences in the depth of the same, and without alteration of the chemical composition of said layer of gelatine.

4. A polychromatic screen for colour photography produced substantially as in the manner hereinbefore described.

5. The method of manufacturing polychromatic transparent screens, substantially as described.

Dated this 29th day of May 1908.

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