

PATENT SPECIFICATION

Convention Date (France): Feb. 7, 1927.

284,995

Application Date (in United Kingdom): Feb. 6, 1928. No. 3701/28.

Complete Accepted: Jan. 31, 1929.

COMPLETE SPECIFICATION.

Improvements in Machines for the Reproduction of Cinematographic Colour Record Films.



We, SOCIÉTÉ DU FILM EN COULEURS KELLER-DORIAN, a société anonyme organised under the laws of France, of 42, rue d'Enghien, Paris, France, 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:—

My invention relates to optical devices for intensifying the colour values and changing the shades thereof at will in the reproduction of Keller-Dorian embossed films made with the Keller-Dorian duplicating apparatus described in Patent Specification No. 247,168. It will be remembered that the Keller-Dorian films are those whose celluloid surface is embossed with very small lenticular elements acting either as spherical lenses or "picots" or as cylindrical lenses.

The accompanying figure on the drawing illustrates a diagram of our invention.

In the said figure the film A to be reproduced and the virgin film A¹ are placed in the two corresponding principal planes of the reproducing objective with the embossing on the side toward the objective. The reproducing objective is an objective formed of two symmetrical parts O, O¹, calculated and established in such wise that the images C of the selector filter of colours, fixed on the surface of gelatine of the films to be reproduced, are re-formed in the plane of diaphragm B of the said reproducing objective, by the picot arrangement and the first half O

of this objective. The image of said diaphragm B is engaged by the other half O¹ of the objective and by the picots or lines of the virgin film A¹ and is formed anew on the sensitive layer opposite each picot.

Now the picots and lines are not perfect lenses. Like all lenses they are affected by aberrations. Furthermore, the embossing often gives, as shown in Figure 2, rounded depressions D, a fault which is called "tables". It is these "tables" which diffuse the light and cause the colours to be smeared with white during reproduction.

In order to increase the efficiency of

[Price 1s.]

the colours, according to the principal characteristic of our invention, the film to be reproduced is illuminated by light which is strictly parallel. In fact, if it is assumed that the picots or lines constitute lenses which have an aperture, that is the ratio of diameter to focal length, greater than the objective taking the views, there remain the spaces E between the picots or lines not exposed to the light and which are blackened upon inversion (Figure 2). These are known as horns. Now these horns happen to be opposite the tables and obstruct them completely when illuminating with parallel light (Figure 3).

In the case of the reproduction of films illumination must take place by a light which is strictly parallel. For this purpose, in the focus of a lens or achromatic objective is placed a luminous point which can be a hole pierced in a sheet of foil and strongly illuminated or better still a Philips tungsten arc lamp which is a luminous source which is rigorously punctiform.

For reproducing lined films, illumination is produced either by a luminous slot or by a lamp L having a rectilinear filament placed in the focus of the collimating lens G and parallel to the lines (Figure 4).

If:

a = length of the filament;

f = focal length of the lighting collimating lens G;

F = focal length of one half of the reproducing objective O—O¹; and

D = diameter of diaphragm B then,

$$\frac{f}{F} = \frac{a}{D}$$

If, for artistic reasons or the like, it is judged necessary to change or modify the colour values of the film, this may be easily effected irrespectively of what change is desired by the means about to be described.

The image of the selector filter for colours is formed in the plane of the diaphragm (Figure 1). If obscuring screens or regulatable windows are used with the diaphragm of the reproducing objective, the part of the diaphragm corresponding

to any particular colour may be weakened or strengthened. The corresponding colour value in the film to be reproduced is relatively diminished whereas the two others are improved and become more strong. Furthermore, it is almost always necessary to close the central part of the objective (corresponding to green) because the diffraction spectra of the filament which form on the diaphragm are much weaker for the higher orders (red or blue part of the diaphragm) than for the central image of the filament. This follows from the fact that the lamp used for illuminating has its filament in the prolongation of the axis of the objective. Everything happens then as in the theoretical case of a point (represented by the filament) placed in front of a diffraction grating (represented by the gofferred film). There is thus formed in the plane of the diaphragm a central diffraction spectrum bordered by spectra of the 2nd, 3rd, etc., orders. The central image which corresponds to the green is the most prominent so that the luminosity decreases from the centre towards the periphery. Thus to avoid the dominant greens which are not required to be reproduced it is necessary to close the central part of the objective.

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

1. In a machine for reproducing an image from cinematographic films of the Keller-Dorian type, the combination of a source of light and means for projecting parallel light rays from said source of light on said film for the purpose described.

2. In a machine for reproducing an image from cinematographic picot films of the Keller-Dorian type, the combination of a collimator and a source of light comprising an illuminating point disposed in the focus of said collimator whereby the rays of light projected on the said film are all parallel for the purpose described.

3. In a machine for reproducing an image from cinematographic lined films of the Keller-Dorian type, the combination of a collimator and a source of light comprising an illuminating slot disposed in the focus of said collimator the said slot being disposed parallel to the lines of the film for the purpose described.

4. In a machine for reproducing an image from cinematographic lined films of the Keller-Dorian type, the combination of a collimator and a source of light comprising a rectilinear filament disposed in the focus of said collimator the said rectilinear filament being disposed parallel to the lines of the film for the purpose described.

5. A machine as claimed in any of the preceding claims comprising adjustable means for controlling the rays corresponding to the red, blue and green whereby the colour values may be modified at will in the production of the image.

6. A machine as claimed in Claim 5 wherein the said controlling means comprises an adjustable diaphragm.

7. Improved apparatus for the reproduction of cinematograph films substantially as described with reference to the accompanying drawings.

Dated this 6th day of February, 1928.

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[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1

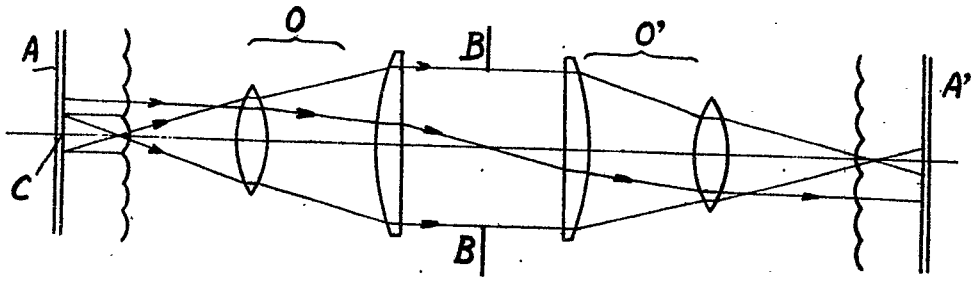


Fig. 2

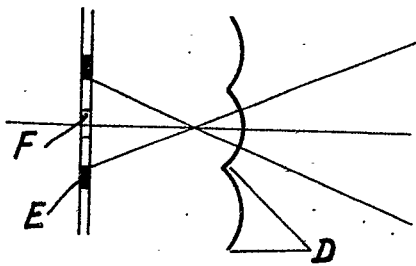


Fig. 3

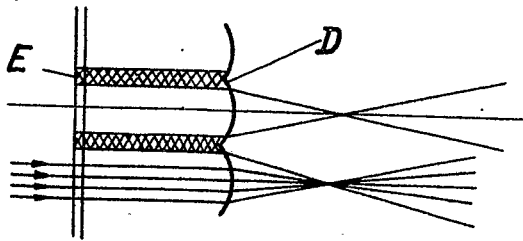


Fig. 4

