

PATENT SPECIFICATION



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COMPLETE SPECIFICATION.

Improved Manufacture of Films for Colour Kinematography.

I, RODOLPHE BERTHON, a French citizen, of 89, Avenue de Neuilly, Neuilly-sur-Seine (Seine), 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:—

In view of solving the problem of kinematography in natural colours, it has been proposed to use a film which has, on one face, a large number of juxtaposed refringent microscopic elements. Experience has shown that such films are perfectly suitable for this purpose and are just as serviceable for unlimited reproduction of originals.

For the said result two requirements must be fulfilled.

(1) The microscopic elements must be optically perfect, without any intermediate opaque or rough-surfaced intervals.

(2) The diameter of said microscopic elements should be an accurate function both of the relative aperture of the camera used, of the thickness of the film and of the curvature of the said microscopic elements.

Thus with lenses having an aperture of F/2.5 (generally the best in practice) with a film thickness of 12 to 13/100ths of a millimeter and with a radius of curvature of 4/100ths of a millimeter, the diameter of the elements must be very near 4/100ths of a millimeter. In practice there are from 22 to 23 elements per linear millimeter.

It is known that the enlargements generally used on kinematograph projection imply as regards images a sharpness of the order of 1/50th of a millimeter. In other words, the projected picture is sharp only if the image on the film is constituted by elements or points less than 1/50th of a millimeter in size.

The consequence is that a film having

refrigerant elements at the rate of 22 per linear millimeter, that is to say measuring 4.5/100ths of a millimeter, cannot give an impression of sharpness on ordinary screens. Such an impression would be obtained only with screens reduced to one fourth of their present area.

Therefore, a film with microscopic elements cannot be projected in the same halls in which black-and-white films are projected, unless the size of the refringent elements is less than 2/100ths of a millimeter.

According to the laws of optics such a result would be possible only with films not exceeding 6/100ths of a millimeter in thickness, which would have no strength and could not be used with the projecting apparatus at present on the market.

The object of the invention is to provide a process for the manufacture of kinematograph films in which the refringent elements of the sensitized layer may be disposed as closely as desired and consequently the size of the said refringent elements may be reduced.

According to this process, the film is constituted by two contiguous layers of materials of dissimilar refractive indices, the adjoining surfaces of which are not flat but are constituted by microscopic refringent elements.

A film of this nature may be produced for example by forming on an ordinary commercial film for example of celluloid, refringent microscopic elements, which may be embossed on or recessed into the said film. The said surface is then covered with a solution of a material having a refractive index dissimilar from that of the film, the sensitized emulsion being laid on after the said solution has been dried.

The film has the microscopic elements recessed or embossed according as to whether the material of the added layer

[Price 1/-]

has a mean refractive index greater or less than that of the film. Sensitized films suitable for use with various lenses can be prepared by this process without altering the film, by simple modifying the thickness of the layer of the added material.

The films are illustrated in Figure 1 and Figure 2 in the appended drawing. In the said figures, A and B are the film and the sensitized emulsion respectively.

In Figure 1, C denotes the material having a high refractive index while, in Figure 2, C¹ denotes the material having a low refractive index.

Among high refractive index materials suitable for the purpose are phenolic resins (for example the material known under the registered trade mark as "Bakelite") and among those having a low refractive index are gelatines.

A practical way of carrying the invention into practice is as follows:

(1) An ordinary film for example, of celluloid, is embossed by means of a cylinder or roller having adjacent hemicylindrical projecting striæ of less than 1/100th of a $\frac{m}{m}$ radius of curvature.

(2) The striated face is covered with thick "Bakelite" solution in a carrier which does not react with the support;

(3) The "Bakelite" is hardened so as to bring out its full flexibility;

(4) The emulsion is laid on. A film of this nature is suitable for all the uses of a film with surface refringent elements, but the sharpness of the images is equal to that of ordinary black-and-white films.

Having now particularly described and ascertained the nature of my said inven-

tion and in what manner the same is to be performed, I declare that what I claim is:—

1. A kinematograph film for example of celluloid having on one face juxtaposed microscopic refringent elements characterised in that the refringent elements are covered with a contiguous transparent layer the refractive index of which is different from that of the film, the layer being for example of synthetic resin when the said index is higher or of gelatine, for example, when the index is lower.

2. A process of manufacturing a kinematographic film comprising rolling an ordinary film, for example of celluloid, with a cylinder having juxtaposed embossed or recessed semi-cylindrical striæ the radius of curvature of which striæ is less than 1/100th of a millimeter; covering the face of the film thus striated with a thick solution of "Bakelite" or similar material dissolved in a solvent having no action upon the film; hardening the "Bakelite" or similar material so that it may assume its full degree of elasticity; and finally applying the sensitized emulsion.

3. The kinematograph film substantially as described with reference to the accompanying drawings.

4. The process of manufacturing kinematograph films substantially as described.

Dated this 2nd day of July, 1926.

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Fig. 1.

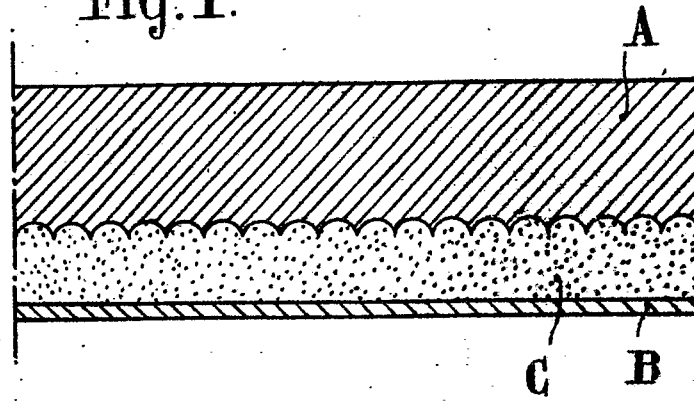
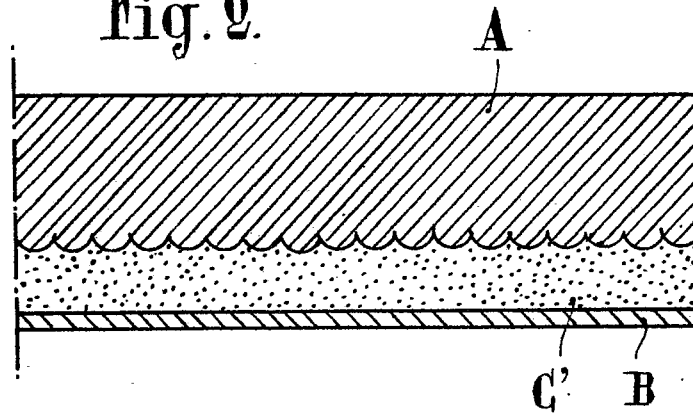


Fig. 2.



[This Drawing is a full-size reproduction of the Original.]