

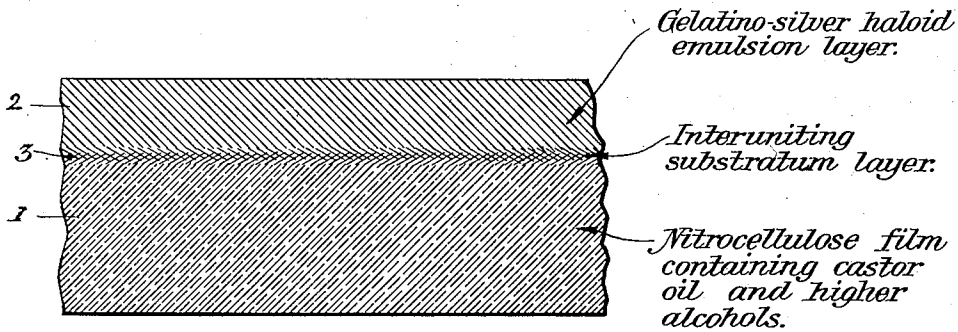
P. C. SEEL, H. COMBS AND R. KEMP.

PHOTOGRAPHIC FILM.

APPLICATION FILED MAY 10, 1920.

1,370,922.

Patented Mar. 8, 1921.



WITNESSES:

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PHOTOGRAPHIC FILM.

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Specification of Letters Patent.

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Application filed May 10, 1920. Serial No. 380,410.

To all whom it may concern:

Be it known that we, PAUL C. SEEL, HENRY COMBS, and RICHARD KEMP, citizens of the United States of America, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Photographic Films, of which the following is a full, clear, and exact specification.

10 This invention relates to photographic film in which the layers are fully inter-united in spite of the fact that the nitro-cellulose base contains greasy but otherwise desirable and inexpensive ingredients.

15 Our object is to produce high-grade photographic film in which the nitrocellulose sheet or base contains sufficient greasy softener, such as castor oil, to enhance the flexibility of such base without repelling the light-sensitive gelatino-silver haloid emul-
20 sion; or in other words without preventing the interunion of said base and emulsion through a suitable substratum layer.

Photographic films are known, the bases
25 of which contain nitrocellulose and relatively non-greasy but expensive camphor. In the nitrocellulose species of artificial leather the use has been proposed of greasy but inexpensive castor oil as a softener; but
30 its use in photographic films has been considered to be impractical. Certain experimenters, for instance, have definitely stated that greasiness in a nitrocellulose film causes the latter to repel photographic emulsions,—
35 see U. S. Patent 610,861, Goodwin, Sept. 13, 1898, page 2, lines 122 to 125. Now sufficient amounts of castor oil to impart flexibility to a nitrocellulose base also undoubtedly give it a decidedly greasy type of sur-
40 face. Consequently it might logically have been expected that a reliable union of such base with the emulsion could not be effected.

We have discovered, however, that when
45 the castor oil is incorporated with the nitro-cellulose together with certain additional ingredients, the greasiness of the surface on the resulting sheet or film base is not harmful if a gelatino-silver haloid emulsion layer
50 be united to such base by means of an intermediate substratum of the type disclosed in

U. S. Patent No. 550288, Penniman, Nov. 26, 1895. Such a substratum contains gelatin and a nitrocellulose solvent, such as acetic ether, which is a solvent for gelatin also. 55 Because of the solvent this very thin intermediate layer unites with both the nitro-cellulose and the gelatino-silver haloid emulsion by a slight intermingling at the surfaces of such layers in a way probably anal- 60 ogous to a welded or soldered joint in metals. This action we prefer to call an interunion. We have found that film made in this way does not frill during the ordinary photo-
graphic fluid treatments; and in the case of 65 positive motion picture film the image layer, derived from the gelatino-silver haloid emulsion layer, still adheres to the nitrocellulose base sufficiently to resist the bending, abrading and heating actions to which it is sub- 70 jected in the motion picture projectors.

In the accompanying drawing the single figure is a diagrammatic sectional view on an exaggerated scale of a photographic film embodying our invention. 75

In carrying out one illustration of our invention, we thoroughly incorporate in 100 parts of nitrocellulose and 30 to 100 parts of fusel oil or butyl alcohol, an amount of castor oil equal to from one per cent. to twenty 80 per cent. of the weight of the cellulose nitrate. The intermixture of these ingredients is accomplished by means of 400 to 600 parts of acetone or methyl alcohol or a mixture of these substances in any proportion. 85 When the ingredients are thoroughly mixed into a homogenous solution or flowable mass, they may be filtered if desired. The various ingredients are of the grades usually used in the nitrocellulose art. The butyl alcohol 90 may be any of the isomers included under that term or a mixture of them, the synthetic butyl alcohol of commerce being the least expensive at the present time. The methyl alcohol is of the grade which exhibits suf- 95 ficient solvent action on nitrocellulose.

The solution, being of the proper thickness and viscosity, is flowed in the well known way into sheets or film base, the volatile constituents passing off after the spread- 100 ing of the sheet but not too rapidly to impair the product. The resulting film base 1

containing cellulose nitrate and higher aliphatic alcohols of from 4 to 5 carbon atoms, such as the fusel oil and butyl alcohol mentioned above, together with castor oil is very flexible, transparent and uniform. It is waterproof and unaffected by ordinary photographic chemicals.

When the film or sheet 1 thus formed is sufficiently dry, it is coated with a very thin layer of substratum 3 containing gelatin and a solvent for nitrocellulose of the Peniman type. Then the gelatino-silver haloid emulsion 2 is coated over this in the customary manner. The final product has the necessary union of all the assembled layers, so that it withstands the customary photographic manipulations and usage and yet it has the flexibility of its base enhanced by the relatively inexpensive but inherently greasy castor oil. In the drawing the interuniting substratum layer 3 is shown without ruled outlines to diagrammatically indi-

cate the slight intermingling of this layer with the other layers at its surfaces.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

As an article of manufacture in combination, (1) a flexible photographic film comprising a flowed nitrocellulose sheet containing aliphatic alcohols of from 4 to 5 carbon atoms and sufficient castor oil to enhance the flexibility of said sheet, (2) a light-sensitive gelatino-silver haloid photographic emulsion and (3) a substratum layer intermediate said sheet and said emulsion, and firmly interuniting them, whereby separation of said emulsion from said sheet during normal photographic use is prevented.

Signed at Rochester, New York, this 24th day of April, 1920.

PAUL C. SEEL.
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