A. P. H. TRIVELLI.

MOTION PICTURE FILM.

APPLICATION FILED SEPT. 29, 1919.

1,411,677.

Patented Apr. 4, 1922.

FIG. 1.

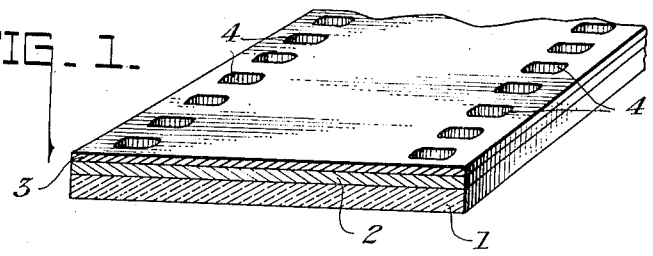
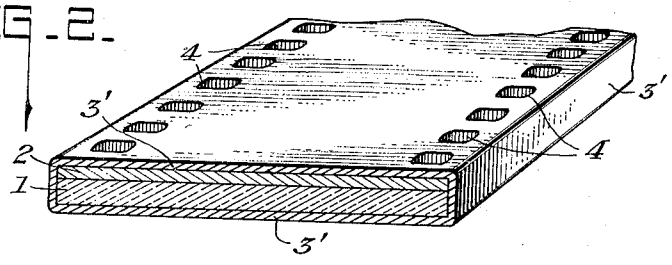


FIG. 2.



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MOTION-PICTURE FILM.

1,411,677. Specification of Letters Patent. Patented Apr. 4, 1922.

Application filed September 29, 1919. Serial No. 327,152.

To all whom it may concern:

Be it known that I, ADRIAAN P. H. TRIVELLI, a subject of the Queen of the Netherlands, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Motion-Picture Films, of which the following is a full, clear, and exact specification.

This invention relates to an improvement in photographic film, and more particularly in films such as are customarily used in taking and projecting motion pictures.

The objects of my invention are to make such films more durable, and less liable to become scratched and marred; to renovate them, when so injured; to protect them from the effects of usage; and to render them less inflammable.

Other objects will appear in the course of this specification.

I attain these objects by the use of a varnish or coating having certain desirable properties, which is transparent, flexible, and durable; soluble in certain substances which are not solvents for the photographic emulsion or the support which carries it, and uninflammable in the sense that is far less combustible than pyroxylin which is customarily used for the support for such films.

I find all these desirable properties to be present in certain cellulose ethers, more particularly the ethyl ethers of cellulose such as are described in the patent to Lilienfeld, No. 1,188,376, June 20, 1916. If a water impervious layer is desired, those ethyl ethers which are insoluble in water would be used.

It is well known that the picture-containing layer of motion picture film, being customarily of gelatine, is easily scratched and marred and that it deteriorates very rapidly under the hard usage to which it is put; so that in a very short time it becomes practically valueless. By my invention such deterioration can be prevented, or if found to exist can be cured. If the film has already become scratched, it may be passed through a bath of varnish and thus be coated, and as the material thus filling the scratches has substantially the same refractive index as the film it will render the imperfections invisible. If the coating is applied to the developed film before the film is used, it protects the emulsion from the effects of wear and tear and as its surface is much tougher than that of the emulsion the life of the film is very greatly prolonged. Should it become scratched a further coating can be given, or the original protective coating may be removed, by the use of solvents that do not affect the pyroxylin base, and another coating applied.

Toned images have been found to be particularly susceptible to the effects of usage and I consider such a protective coating to be particularly advantageous with motion picture film where the silver image has been transformed or toned into images of silver salts such as silver sulphide by any known toning method. The varnish may be applied either to positive film which is subjected to hard usage in being repeatedly passed through a projecting machine or to negative film from which very large numbers of positives are printed, and which undergoes severe usage in being repeatedly passed through a printing machine.

In the accompanying drawings are shown fragmentary pieces of my improved film, partially in section, Fig. 1 being coated on one side only and Fig. 2 carrying a coating entirely around it.

In these figures, 1 indicates the base or support, which is customarily of pyroxylin though I do not limit myself in any way to this substance as I contemplate the use of other esters of cellulose or composition containing them or any other desirable material; 2 indicates the picture layer, usually a gelatine emulsion containing a sensitive silver salt before exposure, which is transformed into a silver image by photographic methods and may be further transformed or toned into an image of silver salt or salts of other metals, a dye image or any other form of substituted image known to the photographic art, any of which may be termed photographic images. In Fig. 1, 3 indicates a coating of varnish or protective material applied to the emulsion side only of the film, by any desired coating or brushing method. In Fig. 2, 3′ indicates a layer of varnish or protective material entirely surrounding the film and applied in any desired manner as by passing the film through a bath of such material. The usual perforations are designated 4.

As examples of varnishes useful for the

purposes outlined, the following may be mentioned:

Cellulose-ethyl-ether	4	parts
Butyl alcohol	20	parts
Benzol	76	parts

Another example is:

Cellulose-ethyl-ether	3	parts
Amyl alcohol	15	parts
Toluol	82	parts

A third example is:

Cellulose-ethyl-ether	5	parts
Amyl alcohol	5	parts
Butyl alcohol	15	parts
Xylol	75	parts

The above proportions need not be exactly followed as a considerable degree of variation therefrom is permissible. I contemplate the use of many other substances having suitable properties as equivalents of the constituents specifically mentioned. It appears desirable however that the varnish should comprise a cellulose ethyl ether, a high boiling softener such as one of the higher alcohols, which will remain in the coating and evaporate but slowly thus adding plasticity to the varnish, and a volatile solvent that will render the varnish fluid during its application but which will evaporate quickly leaving a firm coating. The materials mentioned when used alone and when combined are not solvents for the cellulose esters which form the supports of motion picture films.

The cellulose ethers are, as compared to pyroxylin, and its compounds, very slow burning and, in that sense, uninflammable, and a coating thereof therefore tends to render the film to which it is applied less inflammable. There may be added to the varnish any known substance such as triphenylphosphate having the property of decreasing the inflammability.

Should it be desired that the coating be impervious to moisture those ethyl esters which are insoluble in water could be used. Such a varnish may be applied at the time of manufacture of the sensitive film and may be removed after exposure but before development by passing the film through a bath of a solvent that will remove the varnish but will not affect the support or emulsion. In this way the film both before and after exposure will be protected from the effects of humidity which, as is well known, causes the sensitiveness of the emulsion to decrease and the latent image to lose the ability to be developed.

The coating thus described is extremely hard and is not easily scratched, it is however very flexible and does not break or crack even when submitted to the bending and winding incidental to its use in motion picture machines. It is perfectly transparent, in no way affecting the taking or projecting of pictures.

It is to be understood that any photographic or other products may be treated with my protective varnish and that I contemplate as within the scope of my invention all such uses and applications.

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

1. A motion picture film having its surface coated with cellulose ether.

2. A motion picture film having its surface coated with a cellulose ether composition containing as a solvent for the ether a material in which the base of the film is insoluble.

3. A motion picture film having its surface coated with a celluose ether composition containing a higher alcohol.

4. A motion picture film comprising a support of cellulose ester, a coating of gelatine thereon containing photographic images, and a protective coating thereover comprising a cellulose ethyl ether and a solvent therefor, the support not being soluble in the solvent.

5. A motion picture film comprising a support of cellulose ester, a photographic emulsion thereon, and a protective varnish therefor, the varnish containing cellulose ethyl ether, a high boiling softener and a volatile solvent, the support being insoluble in each of the materials specified or in them when combined.

6. As an article of manufacture, a film containing a photographic image having its surface coated with cellulose ether.

7. As an article of manufacture, a support, a layer of photographic material thereon, and a protective coating containing cellulose ether.

Signed at Rochester, New York, this 24th day of September, 1919.

ADRIAAN P. H. TRIVELLI.