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KINEMATOGRAPHIC FILM.

APPLICATION FILED JULY 30, 1912.

1,068,747. Patented July 29, 1913.

Fig. 1

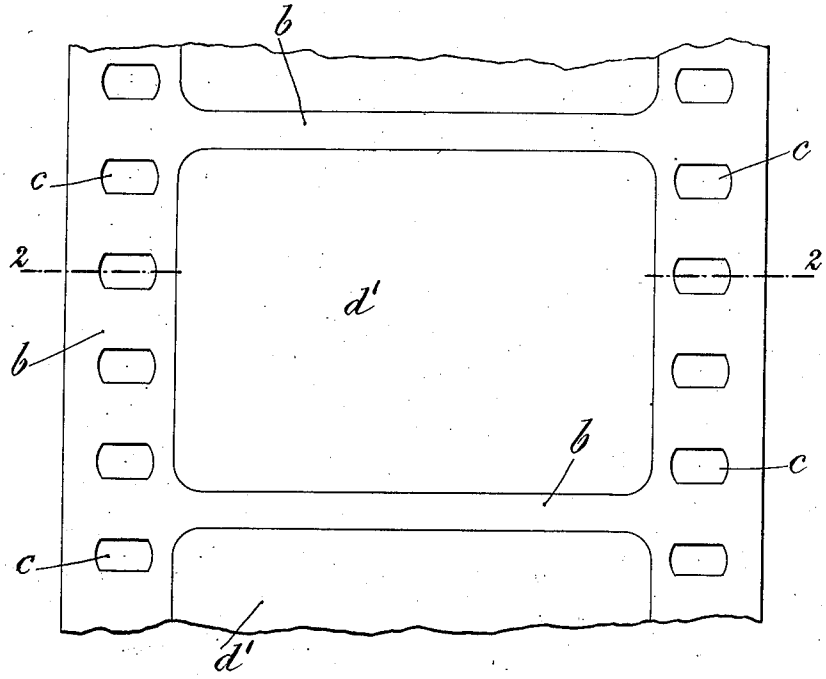


Fig. 2

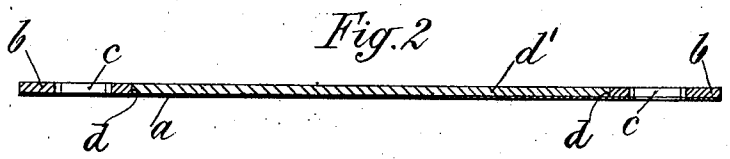


Fig. 3

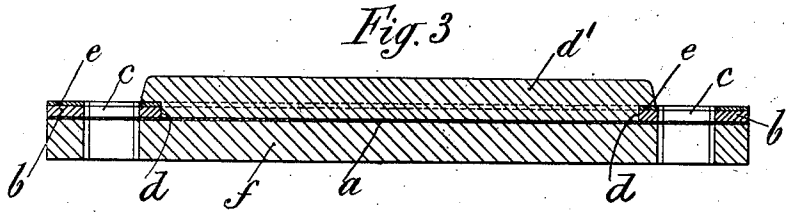
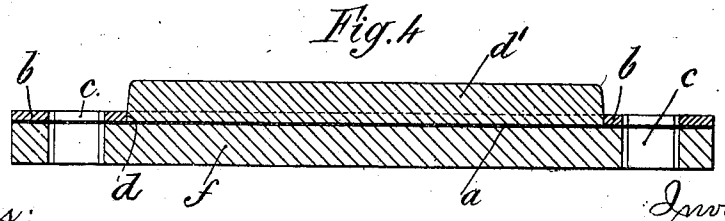


Fig. 4



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UNITED STATES PATENT OFFICE.

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KINEMATOGRAPHIC FILM.

1,068,747. Specification of Letters Patent. Patented July 29, 1913.

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To all whom it may concern:

Be it known that I, CHARLES DUPUIS, citizen of the Republic of France, and residing at 22 Rue de la Cerisaie, Charenton, Seine, in the said Republic, engineer, have invented certain new and useful Improvements in Kinematographic Films; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to kinematographic films which consist in a strong paper band provided with lateral feeding perforations and with axial openings, and in transparent positive images, obtained for instance by photography on gelatin, which fill these openings in such a manner that the thickness of the film is uniform at all points. This combination of opaque paper and transparent gelatin provides a band for animated projections which is economical and practically fireproof and which combines the advantages of paper as regards strength, flexibility, and preservation of the dimensions with those of the gelatin as photographical substratum and for transparency.

Referring to the accompanying drawings, Figure 1 is an enlarged top view of a band constructed in accordance with this invention; Fig. 2 is a transverse sectional view on the plane 2—2, Fig. 1. Figs. 3 and 4 are sectional views showing the band at different stages of its preparation.

In these drawings, *a* is the layer of images. *b* designates the strong paper band, *c* the feeding perforations and *d* the openings filled with gelatin for strengthening the layer *a*.

e designates a thin paper band which is temporarily cemented upon the strong paper band, as will be hereafter explained.

f is the temporary backing.

The construction of a kinematographic band according to this invention, if for instance the band is of usual size, requires a number of separate operations as follows:

1. Production of the images.—As the images must be obtained on a temporary backing, a long band *f* of celluloid, paper or polished silver 35 millimeters wide is first prepared, said band being perforated like an ordinary film; this band is by preference powdered over with talc or coated with a thin layer of wax in order to facilitate the subsequent withdrawal of the layer *a* of images. A gelatino-bromid of silver emulsion is next applied upon the backing and the usual photographic operations, *i. e.* the printing of the images and their development, fixing and washing, are then accomplished according to the methods generally used in kinematography with an ordinary film.

2. Preparation of the paper band.—Strong paper *b* having a thickness of about twelve hundredths of a millimeter (this being the average thickness of the celluloid used for preparing kinematographic films) is varnished with celluloid varnish for instance, in order to render it waterproof, thus making it more capable of resisting hygrometrical actions, and is then coated on one side with a weak solution of india rubber in benzin; on the other hand, comparatively thin paper *e* is also coated with india rubber on one face and the two pieces of paper thus prepared are superposed, the two surfaces coated with india rubber being in contact, and then are rolled with the result that they become cemented together but capable of being easily separated later on. The external surface of the strong paper *b* is then gummed and the whole is finally cut in bands or strips 35 millimeters wide. The side perforations *c* and the central openings *d* are afterwards cut out in these paper bands (composed in fact of a thick paper band *b* and of a thin band *e* united together by india rubber) in such a manner that they correspond with the images of the band *a* of gelatin they are designed to position, taking into account if necessary the variations in the length of the paper at the time of cementing.

3. Application of the united paper bands b and e upon the layer a of images.—In order to apply the paper band upon the band of images, which has not left its temporary backing *f*, said layer *a* of images is first suitably moistened if it has been allowed to dry, the gummed face of the piece of strong paper *b* is then applied upon the gelatin *a*, care being taken that the openings *d* are opposite the images and that the perforations *c* come in register with perforations in the backing *f*; in fact the precision of this registering is insured by the use of hooks or of

toothed drums which bring and maintain the two bands exactly in the proper position until the end of the drying operation.

4. Reinforcement of the layer of images.— The band *f* of celluloid, metal or paper called the temporary backing, which serves as a support for the layer *a* of images and for the two bands *b* and *c* of paper provided with openings *c* and *d*, is then unrolled in an apparatus of a well known type which pours upon said band a solution of gelatin *d'* designed to reinforce the layer of images. The part of the apparatus which delivers the gelatin solution *d'* onto the band *e* and layer *a* is so sized that the width of the sheet of gelatin does not much exceed the width of the openings *d*, as shown in Fig. 3, in order to prevent the gelatin from reaching the internal edge of the feeding perforations *c*. A solution of gelatin to which has been added alcohol in order to facilitate the drying, as well as a small quantity of glycerin to give more suppleness, will be used by preference; this solution is applied at the lowest degree of heat possible so as to prevent the melting of the gelatin of which the layer of images is composed. The process is facilitated by the fact that the gelatin composing the layer *a* of images has been slightly tanned by the action of the developing baths.

As soon as the gelatin solution *d'* has set sufficiently, the thin paper *e* on the top is taken off the band *b*, bringing with it the gelatin parts which it carries and leaving gelatin upon the images only, that is in the openings at *d* as shown in Fig. 4; obviously the moment for the taking off of the thin paper must be the very instant when the degree of hardening of the gelatin is the most favorable for the success of the operation, but constant results are obtained by operating in constant conditions. The gelatin solution has been poured taking its concentration into account, in such a quantity that when dry the gelatin layer has the same thickness as the strong paper band *b* as shown in Fig. 2 (that is about 12 hundredths of a millimeter). This gelatin layer reinforcing the layer of images adheres perfectly to it and moreover adheres also to the edges of the openings; when completely dry, the kinematographic band produced as aforesaid has only to be detached from its temporary support or backing.

A band produced in the manner above described is of a uniform thickness in all its parts (opaque and transparent parts) is strong and supple and with images kept perfectly flat and slightly stretched by the paper framing each of them. Moreover such a band is little susceptible to hygrometrical actions and does not tend to twist or roll itself up in one direction, and as it is practically fireproof it does away with the necessity of employing safety means incumbent on the use of celluloid films.

With regard to the mechanical use of a band of this kind in projecting apparatus for kinematographs it is evident that the result is the same as in the case of a band offering the same resistance at all points of its surface, because the strain produced by the toothed drums or the hooks which enter the feeding perforations acts upon the paper only without injuring the images, which are comparatively brittle; the wear is therefore properly distributed and very much reduced. Considered from an optical point of view, this band has the advantage of giving as luminous projections as possible since it prevents the usual absorption due to the existence of a support for the layer of images (celluloid, etc.); no other existing kinematographic band possesses this particular feature consisting in a layer of images supported by a material having the same coefficient of refraction, which results in a greater transparency. It may also be noted here that the celluloid used for making films as it slowly abandons its camphor and its nitric acid becomes sensibly colored after a time, while gelatin of a good quality preserves all its transparency and its other properties. It will thus be understood that a band constructed according to my invention is placed in the very best conditions of manufacture, use and preservation. Finally owing to the low cost of the materials used this band is exceptionally economical. Without departing from the essential features of the invention, the mode of operation as above described can be modified in several ways as regards the temporary backing or support, the nature of the transparent substratum, the production of the images, the perforation of the paper bands and the assembling of the whole with an adhesive agent, as well as the succession of the operations. Thus, instead of emulsifying the entire width of the temporary backing *f* it will be sufficient to emulsify the middle part, that is to say the part situated between the two rows of feeding perforations; in that case it is preferred that the paper band *b* be gummed also in the middle only, that is upon a uniform width of about 25 millimeters, in order to avoid the adherence of the edges of the paper band upon the edges of the temporary backing, which would prevent the subsequent taking off of the band. The paper band provided with the openings as above mentioned will also sometimes be stuck upon the band of images previous to the making of the side perforations in the paper band; in fact said perforations can be made subsequently by any known means. Finally, if desired any well known process is used for hardening the gelatin or for rendering it more flexible; in the same man-

ner varnish is applied to the band if desired after its preparation.

In order to obtain bands having a strictly determined pitch, it is advantageous to employ as temporary backing, in preference to paper or celluloid, a metal band, of polished silver for example, which shall be practically proof against the treatment by means of liquids followed by passages in drying apparatus; the length of other backings would be sensibly altered by such operations. It is hardly necessary to mention that the same silver band may be used for a considerable number of similar operations. In many cases where the silver band must be passed through certain baths, I prefer to gilt the same, in order to protect against their action.

It is to be noted that a band for projections according to this invention will facilitate the realization of colored and stereoscopic projections as the thinness of the membrane of images allows of superposing several such membranes and obtaining a band still flexible and thin. Said colored photographic pictures on colorless background will be preferably obtained by hydrotype.

What I claim is:—

1. A kinematographic film which presents transparent images and is provided with feeding perforations, consisting in a band of strong paper provided with openings and in photographs on gelatin filling said openings in such a manner that the film is of uniform thickness in all its parts; the feeding perforations being cut upon the edges of the paper in operative relation to the images.

2. A kinematographic film, comprising a layer containing images, a band of paper mounted on said film and having openings for the images, and gelatin filling said openings.

3. A kinematographic film, comprising a layer containing images, a band of paper fixed on said film and having openings exposing the images and a gelatin film in each of said openings forming a film of uniform thickness.

4. The process of making kinematographic films, which comprises fixing a sensitized layer on a suitable backing, fixing on the layer a strip of strong paper which is provided with openings exposing images on the layer, closing the openings with a solution of transparent substance, and removing the film thus produced from the backing.

5. The process of making kinematographic films, which comprises fixing a sensitized layer on a suitable backing, fixing on the film a strip of thick paper which is provided with openings exposing images on the layer temporarily fixing a similar strip of thin paper onto the strong paper, covering the sensitized layer and a portion of the thin paper with a solution of gelatin, removing the strip of thin paper and the solution thereon from the thick strip, drying the solution, and removing the film thus produced from the backing.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

CHARLES DUPUIS.

Witnesses:
H. C. Coxe,
Alcide Fabe.