Nov. 18, 1941. E. L. BAXTER 2,262,987

ROLL FILM CARTRIDGE

Filed Nov. 19, 1940

FIG. 1.

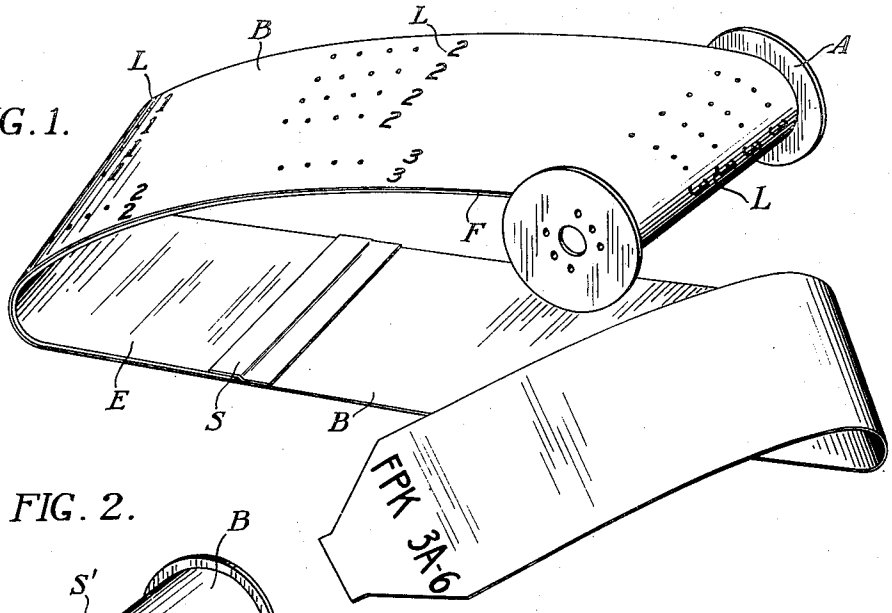


FIG. 2.

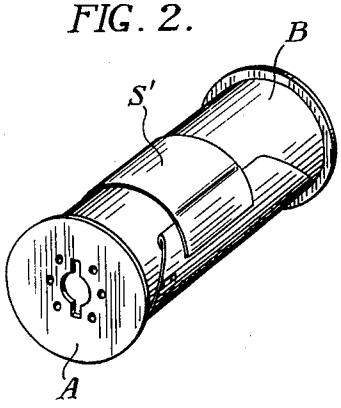


FIG. 3.

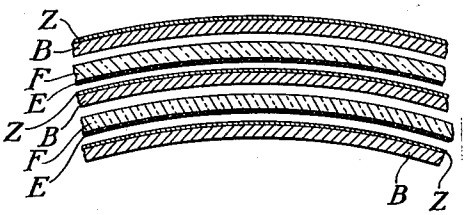
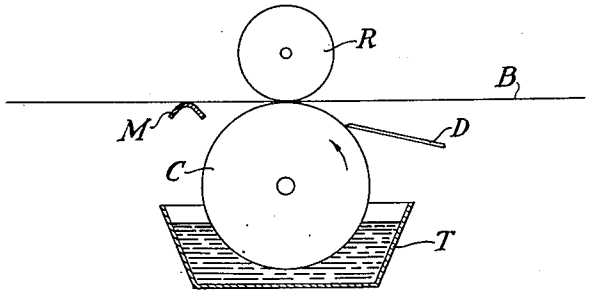


FIG. 4.



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ROLL FILM CARTRIDGE

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Application November 19, 1940, Serial No. 366,277

8 Claims. (Cl. 95—9)

This invention relates to improvements in backing paper for roll film. A photographic roll film cartridge usually comprises a flanged spool upon which is wound a long strip of opaque paper to which is attached a strip of sensitive film, the ends of the paper extending beyond the ends of the film and constituting light protective leader and trailer strips for the film which is interwound with the paper. The backing paper carries various printed symbols, such as the numbers of the exposure areas, warning marks and advertising matter, over which is coated a protective layer intended to protect the sensitive emulsion from the paper and the ink used in printing when the film and paper are interwound in close contact. Examples of such protective coatings are found in numerous prior patents.

I have found that zein is as efficacious as or superior to the materials previously suggested for this purpose and combines advantages not found in any one of them. Gelatine is probably the most effective material hitherto known for protecting the sensitive emulsion from fog or mottle produced by the paper or offset marks caused by ink. It does not, however, protect the film from moisture vapor or its effects. Cellulose esters give excellent protection against moisture but are not good protection against fog, mottle or offset marks from the paper and ink.

Excellent protection is given by a gelatine coating overcoated with cellulose ester or resin, the gelatine protecting against the action of the paper and ink and the overcoat against moisture. However, adherence between these two coats is poor, making necessary an intermediate bonding layer between the two and an additional manufacturing operation for best adhesion. These cannot be applied nearly as rapidly as coatings of gelatine or zein.

Resins and cellulose have a strong tendency to give static discharges. They have the additional disadvantage that the stickers used to seal the cartridge do not adhere to them, and either the ends of the backing paper must be left uncoated or must be additionally treated to provide an area to which the stickers will adhere.

I have discovered that prolamines and particularly zein, a prolamine of corn, do not have the disadvantages mentioned above. Other prolamines, such as gliadin, hordin, may be used.

Zein has the following specific advantages for the purposes described. It gives as much protection from fog, mottle, and offset as gelatin; and as good protection from moisture as cellulose esters and resins. It is free from static effects and can be applied either directly to the paper or to a gelatine underlayer, with which it forms a perfect bond. It also forms a perfect bond with the glue used on the sealing stickers. It can be coated as rapidly as a gelatine solution and more rapidly than cellulose esters or resin compositions and solutions, and it dries much more rapidly than any of these because of the great ease with which it gives up its solvent. The other materials require considerable time to dry, set or cure.

A considerable number of formulae used in coating will now be given. In these, the term "denatured alcohol" means

	Per cent
Ethyl alcohol	90
Methyl alcohol	5
Water	5

The zein used is that sold commercially in the form of a white powder containing 5 to 8% water. The isopropyl and butyl alcohols used are those sold commercially and the isopropyl alcohol contains approximately 9% water by volume. The butyl alcohol is practically anhydrous. The various specific formulae which I have found particularly useful with the coating method disclosed herein fall within the following general formula:

Zein (exclusive of water) 10 to 30% by weight of total solution

Alcohols (exclusive of water) 85 to 95% by volume of solvent mixture

Water 5 to 15% by volume of solvent mixture

Specific examples falling within the above general formula are:

Example 1

Denatured alcohol	cc.	385
Water	cc.	16
Zein	gm.	80

Example 2

Denatured alcohol	cc.	362
Water	cc.	15
Zein	gm.	100

Example 3

Denatured alcohol	cc.	366
Water	cc.	32
Zein	gm.	80

Example 4

Isopropyl alcohol	cc.	407
Zein	gm.	80

Example 5

Isopropyl alcohol	cc	382
Zein	gm	100

Example 6

Denatured alcohol	parts by weight	4
Butyl alcohol	do	4
Water	do	2
Zein	do	1

Example 7

Denatured alcohol	parts by weight	4 to 5
Zein	do	1

Other known solvents for zein, such as N-propyl alcohol, tertiary butyl alcohol, lactic acid, acetic acid, ethyl lactate, monomethyl ether of ethylene glycol or propylene glycol, may be used alone or in combination and with or without water. Numerous formulae are known which would be operative, but the above have been found particularly advantageous.

Reference will now be made to the accompanying drawing in the several figures of which the same characters designate the same parts and in which—

Fig. 1 shows in perspective a partially unrolled film cartridge.

Fig. 2 shows in perspective a spool cartridge resealed after use.

Fig. 3 is a section of several strips of film and backing paper shown slightly separated.

Fig. 4 is a diagrammatic showing of a coating apparatus used in applying coating to backing paper.

Fig. 1 shows a well-known type of spool A upon which is interwound a strip of sensitive film F and of backing paper B, the latter being longer than the film, and its ends extending to form protective leaders and trailers, the lead end being shown in this figure. The end of the film is attached to the backing strip by a sticker S. The backing strip carries suitable legends L, on its rear surface, against which the sensitive emulsion layer E of the film is pressed in the cartridge.

The protective coating Z is applied over the legends and separates the paper and the legends from the sensitive emulsion when the film and paper are interwound. When the film has been exposed and wound on the take-up spool, it is sealed by a second sticker band S' which overlaps the tail end of the protective paper band and the next convolution. Because the zein coating Z of the paper band forms a firm bond with the glue of the sticker S', no special preparation of the portions of the paper band to which it is to be attached is necessary.

Although the zein-coated surface of the paper is faced away from the film when the film and paper are unrolled, its utility occurs when the two are interwound and the zein coating is in close contact with the emulsion layer. A typical set-up is shown schematically in Fig. 4 wherein the paper band B passes over a coating roller C, against which it is pressed by a hard rubber roll R. The coating roller turns in a coating trough T containing a solution of zein, the excess being removed by the doctor blade D. The freshly coated surface of the paper preferably is drawn over a smoothing bar M which spreads the coating uniformly. This is particularly desirable when the surface of the paper has not been coated with gelatine, because in this instance absorption by the paper is so rapid that the zein solution does not always spread to a uniform layer. The application roll C is similar to those in gravure or intaglio printing, except that the surface is etched to uniform screen dots and not to legible characters. The outer surface of the roller C is prepared in the usual way by applying a sensitized gravure tissue which is exposed to a gravure screen, say a 75-line gravure screen, developed and etched. This method of coating requires solution of low surface tension and low viscosity, for which Examples 1, 2 and 3 are admirably adapted. This coating method is described in the copending application of Gale F. Nadeau and Eugene R. Clearman, Serial No. 361,946, filed October 19, 1940. It is, of course, to be understood that other coating means and methods may be employed.

The paper band B may previously have been coated with a gelatine solution, and this is advantageous for the following reasons: It permits the use of certain inks which, when directly overcoated with solutions containing organic solvents, tend to smear. They can, however, be overcoated with gelatine, which seals them in and prevents injury to the characters and the surface of the paper. Furthermore, the penetration of the zein solution with organic solvents into uncoated paper is much greater than it is into a gelatin layer and a more efficient coating is obtained. Moreover, in certain cases a maximum protection to the film is provided by a paper sealed with a combination of a water-soluble material, such as gelatine, and a material insoluble in water but soluble in a mixture of water and organic solvents, such as zein.

The paper coated with zein is also useful as interleaving material to be placed between flat films or plates, the sensitive surfaces of which contact the zein coating, and in other forms of light excluding wrapping than the one here shown and described.

It is to be understood that I consider as included within my invention the many modifications and equivalents that fairly fall within the scope of the appended claims.

What I claim is:

1. In combination, a photographic element in sheet form having a light-sensitive layer and adjacent thereto a sheet of paper with a layer of prolamine contacting the light-sensitive layer, the layer of prolamine protecting the light-sensitive layer from the paper.

2. In combination, a photographic element in sheet form having a light-sensitive layer and adjacent thereto a sheet of paper with a layer of zein contacting the light-sensitive layer, the layer of zein protecting the light-sensitive layer from the paper.

3. A photographic roll film cartridge comprising interwound bands of film with a light-sensitive layer and of paper with legends on one surface and a layer of prolamine thereover, the sensitive layer and the prolamine layer being in contact when the bands are interwound, and the prolamine protecting the sensitive layer from the paper and the legends thereon.

4. A photographic roll film cartridge comprising interwound bands of film with a light-sensitive layer and of paper with legends on one surface and a layer of zein thereover, the sensitive layer and the zein layer being in contact when the bands are interwound, and the zein protecting the sensitive layer from the paper and the legends thereon.

5. A photographic roll film cartridge comprising interwound bands of film with a light-sensitive layer and of paper with legends on one sur-

face, the paper carrying over the legends a layer of gelatine and an outer layer of zein, the sensitive layer and the zein layer being in contact when the bands are interwound.

6. A photographic element with a light-sensitive surface and a light-excluding paper wrapper therefor, that surface of the wrapper contacting the light-sensitive surface carrying a layer of prolamine.

7. A photographic element with a light-sensitive surface and a light-excluding paper wrapper therefor, that surface of the wrapper contacting the light-sensitive surface carrying a layer of zein.

8. A photographic element with a light-sensitive layer and a light-excluding paper wrapper therefor, the paper having a gelatine layer on one surface and a zein layer thereover, the zein layer being in contact with the sensitive layer.

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