Dec. 13, 1966 T. I. ABBOTT ETAL 3,291,610

PHOTOGRAPHIC ELEMENT

Filed May 31, 1963

Fig. 1

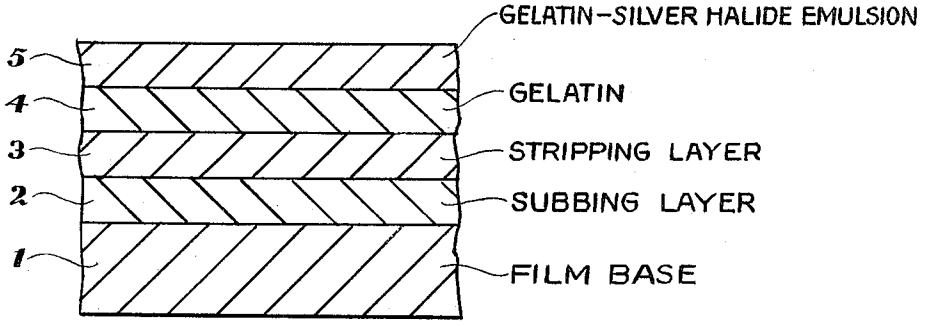
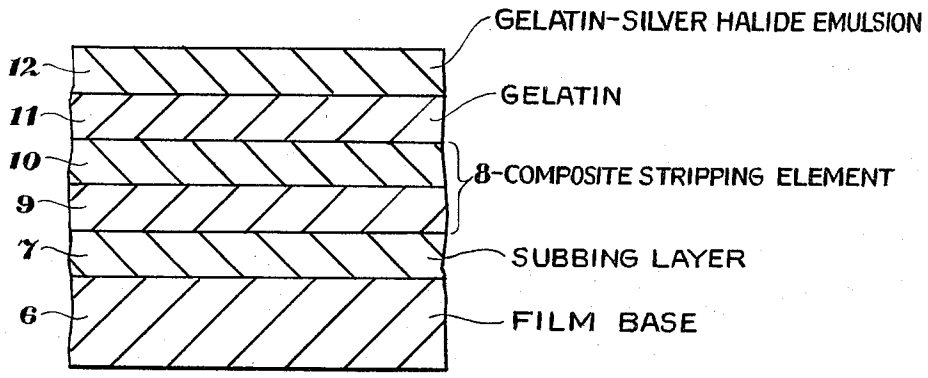


Fig. 2



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PHOTOGRAPHIC ELEMENT

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This invention relates to photographic elements, and more particularly to photographic stripping layers.

Previously, stripping layers which have been employed for gravure etch resist films have been completely hydrophobic or composed of a hydrophilic substance containing some hydrophobic material introduced to weaken the normally strong bonds which the hydrophilic material forms with film subbing layers and gelatin emulsion layers. The disadvantage of the latter type of stripping layer has been the unreliable stripping characteristics thereof. Hydrophobic stripping layers are objectionable since organic solvents are required to remove the stripping skin.

One object of our invention is to provide photographic stripping layers. Another object of our invention is to provide stripping layers having the proper degree of adhesion to adjacent layers, and which may be stripped easily from the film base. A further object of our invention is to provide stripping layers which may be readily removed with warm water. A still further object of our invention is to provide a water-removable, composite stripping layer one surface of which provides excellent adhesion between the stripping layer and gelatinous overcoatings thereon, and the other surface providing good stripping characteristics. Other objects of our invention will appear herein.

These and other objects of our invention are accomplished by providing a photographic stripping layer comprising ethyl cellulose and gelatin.

In a preferred embodiment of our invention, we provide a composite photographic stripping element having one layer comprising ethyl cellulose and gelatin in a high ratio of gelatin to ethyl cellulose. This layer has excellent adhesion to gelatinous layers applied thereon. The composite photographic stripping element contains another layer comprising ethyl cellulose and gelatin in a high ratio of ethyl cellulose to gelatin. This second layer possesses good stripping characteristics to allow easy stripping from the film base. The composite stripping layer is readily removed with warm water.

Our invention will be further illustrated by the accompanying drawings which show, in greatly enlarged cross-section, typical photographic elements having stripping layers in accordance with our invention. In FIG. 1, a film base **1** having a conventional subbing coating, such as gelatin, thereon **2** is provided with a stripping layer **3** in accordance with the invention, a gelatin coating **4** thereover and a photographic gelatino silver halide emulsion **5** thereon. The gelatin layer **4** may be omitted if desired.

FIG. 2 shows a film base **6** having coated thereover a subbing layer **7** and a composite stripping element **8** thereon comprising a first layer **9** and a second layer **10**. A gelatin layer **11** is carried over layer **10** of stripping element **8**, and a gelatino silver halide emulsion **12** is coated over gelatin layer **11**. The gelatin layer **11** may be omitted if desired.

Our invention will be further illustrated by the following examples. Example 1 demonstrates a photographic stripping element of the type described in FIG. 1.

EXAMPLE 1

The following solutions were prepared:

Solution A

6% ethyl cellulose (about 48% ethoxy) in toluene	g.	175.0
5% dioctyl sodium sufosuccinate in toluene	cc.	2.5
5% sorbitan monolaurate in toluene	cc.	2.5

Solution B

14% aqueous gelatin	g.	25.0

Solution B was gradually added to Solution A in a blender with stirring at high speed. Stirring was continued for 2 minutes after complete addition of Solution B. 285 grams of toluene were then added to the mixture and this preparation was coated over a cellulose acetate support at 3.5 cc./sq. ft. to give a dry coating containing 75 mg./sq. ft. ethyl cellulose and 25 mg./sq. ft. gelatin.

The stripping layer was then overcoated with gelatin at the rate of 95 mg./sq. ft. and a gelatino silver chloride photographic emulsion containing a dihydroxy benzene tanning developing agent was coated thereover at the rate of 270 mg./sq. ft. silver and 1160 mg./sq. ft. gelatin

The photographic element thus prepared was exposed and processed as follows:

(1) Activated 30 seconds in—

	Percent
K_2CO_3	7.8
NaBr	.17
KOH	.6
Ethylenediamine tetraacetic acid disodium salt	.4

(2) Prestopped 30 seconds in 5% Na_2SO_3.

(3) Stopped 30 seconds in 3% Na_2SO_4+3% acetic acid.

(4) Washed 5 minutes in tap water below 68° F.

(5) Dried.

(6) Applied to copper surface wetted with water.

(7) Film base removed by stripping.

(8) Stripping layer and gelatin removed by running water at 100° F.

The film base stripped from the stripping layer easily and the stripping layer was removed readily with the warm water.

Example 2 illustrates a preferred embodiment of our invention.

EXAMPLE 2

Solutions A and B of Example 1 were prepared and blended, and 145 g. of toluene were added to the mixture which was then coated on a subbed cellulose acetate film base to give 150 mg./sq. ft. ethyl cellulose and 50 mg./sq. ft. gelatin. The following solutions were then prepared:

Solution C

6% ethyl cellulose (about 48% ethoxy) in toluene	g.	58.5
5% dioctyl sodium sulfosuccinate in toluene	cc.	2.5
5% sorbitan monolaurate in toluene	cc.	2.5

Solution D

14% aqueous gelatin	g.	50.0

Solutions C and D were blended and 276.6 g. of toluene were added thereto. The mixture was coated over the first layer of gelatin and ethyl cellulose at the rate of 31 mg./sq. ft. ethyl cellulose and 62 mg./sq. ft. gelatin. Gelatin and gelatino-silver chloride emulsions were coated thereover as in Example 1. The photographic element thus obtained was exposed and processed as discussed in Example 1. The stripping characteristics of the photographic element thus prepared were excellent and the adherence of the emulsion and gelatin layers during processing was excellent.

The stripping layers of our invention may comprise from 0.25 to 3.0 parts of gelatin per part of ethyl cellulose. As indicated heretofore, in the preferred embodiment of our invention, we employ a composite photographic stripping element comprising a first layer having a ratio of from 0.30 to 0.50 part gelatin per part of ethyl cellulose, and a second layer comprising a ratio of from 1.5 to 2.5 parts of gelatin per part of ethyl cellulose. Although in the preferred embodiment of our invention we employ two separate layers, it is apparent that other layers may be incorporated between these two layers if desired. The important consideration is that a composite stripping layer be provided having one surface with a high ratio of gelatin to ethyl cellulose, and the other surface having a high ratio of ethyl cellulose to gelatin. Such stripping layers provide excellent adherence to the photographic silver halide emulsion during processing, and may be easily removed with warm water. These composite stripping elements have excellent stripping characteristics.

The stripping layers of our invention may be used in a variety of photographic applications, but are particularly suitable for use in gravure photographic stripping film.

The ethyl cellulose which we employ in the stripping layers of our invention advantageously contains at least 46% ethoxyl, and preferably has ethoxy content in the range of 47–50%.

The invention has been described in detail with particular reference to preferred embodiments thereof but

it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinabove and as defined in the appended claims.

We claim:

1. A photographic stripping layer consisting essentially of one part by weight ethyl cellulose and 0.25–3.0 parts by weight gelatin.

2. A composite photographic stripping element having a first layer comprising one part by weight ethyl cellulose and 0.25–0.50 part by weight gelatin, and a second layer comprising one part by weight ethyl cellulose and 1.5 to 2.5 parts by weight gelatin.

3. A photographic element comprising a film base having a subbing coating thereon and a stripping layer thereover consisting essentially of 0.25 to 3 parts by weight gelatin and 1 part by weight ethyl cellulose, and a gelatino silver halide emulsion layer coated over said stripping layer.

4. A photographic element comprising a film base having a subbing coating thereon and a composite stripping element on said subbing coat, said composite stripping element having a first layer adjacent said subbing coating, said first layer comprising 0.30–0.50 part by weight gelatin and 1 part by weight ethyl cellulose, and a second layer over said first layer comprising 1.5–2.5 parts by weight gelatin and 1 part by weight ethyl cellulose; and, a gelatino silver halide emulsion coated over said second layer of said composite stripping element.

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