

## UNITED STATES PATENT OFFICE

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## PROCESS FOR RECLAIMING FILM SCRAP

No Drawing.

Application filed May 24, 1930. Serial No. 455,448.

This invention relates to a process for the recovery of photographic film scrap and more particularly to a process whereby what is known as the sub-layer is removed from cellulose acetate film scrap and the film is further processed and reused.

While film scrap seems to have been first reclaimed successively by the process of leaching disclosed in the Kocher Patent 1,525,750, it has subsequently become known in the art that certain types of cellulosic scrap film may be reclaimed by combining with this leaching process the previous bleaching of the dye contained in the film scrap. However, the Kocher leaching process has its greatest application to the reclamation of dyed film scrap, and, as known in the art prior to my invention, the bleaching step was employed only in connection with the reclamation 10 of film scrap which has been intentionally dyed, such, for instance, as disclosed in the Middleton Patent 1,743,155. However, this bleaching step has been utilized prior to my invention only in connection with intentionally dyed film scrap upon the theory that certain enhanced results might be obtained 15 by oxidizing the dye in the film prior to the leaching step.

I have found that the treatment of both 20 clear and dyed cellulose acetate film scrap with a hydrolyzing solution, from which is liberated nascent oxygen, has an effect not heretofore contemplated in the art. Practically all cellulose acetate film which appears 25 upon the market comprises a base or support of cellulose acetate, or other organic derivative of cellulose.

The surface of this base or support may 30 be given certain treatments, then coated with a layer of gelatine, and finally an emulsion containing a light sensitive silver halide composition. This gelatine sub layer tends 35 to harden when in combination with the cellulose acetate base, and becomes insoluble 40 even in hot water so that when the light sensi-

tive emulsion coating is taken off by hot water treatment, the gelatine sub layer is not removed.

It is, therefore, among the objects of my invention to provide a process for reclaiming 50 film scrap and more particularly film scrap which includes a hardened gelatin sub-layer. It is further an object to provide a process for hydrolyzing or otherwise converting hardened gelatin into a form which is more 55 readily soluble. Other objects will herein-after appear.

I have found, for instance, that clear cellulose acetate film scrap which has not been in any way dyed, if given merely the ordinary 60 hot water treatment for the removal of the emulsion coating and then placed in solution in a suitable solvent such as acetone, will give a dope or solution which is grainy and unsuitable for the greater majority of purposes for which it is intended, such as for the production of new film, the production of lacquer, fabric coatings, etc. I have found that if this sub-layer of hardened gelatin composition be hydrolyzed with, for instance, an 65 alkaline hypochlorite solution subsequent to the removal of the silver halide emulsion coating, the film scrap will be freed of the substance which creates the haze and grain 70 in subsequent solutions of the reclaimed 75 scrap.

Assuming that the photographic film scrap has passed through the usual hot water treatment by which the silver halide emulsion has been removed from the film scrap, one is 80 ready to proceed with my hydrolysis step. If then, for instance, 100 lbs. of clear cellulose acetate film scrap base be treated with a water solution of calcium hypochlorite having an available chlorine content of between 85 .1 and .5% for from 45 minutes to as much as 5 or 6 hours at temperatures ranging between approximately 60° F. and 90° F., the film scrap will be freed of this hardened gelatin sub-layer. Following this hydrolyzing 90

treatment, the cellulose acetate film scrap is, of course, washed with water until substantially all free chlorine has been removed therefrom. Some chlorides, however, still 5 remain adsorbed or occluded in the film surface and it is necessary, in order to obtain the best product, that the film scrap be treated subsequent to the hydrolyzing treatment with a mixture of approximately 80% methyl alcohol and 20% butyl alcohol or some similar chloride-removing bath. Approximately 80 gallons of this alcohol mixture is usually sufficient for chloride removal from a batch 10 of 100 lbs. of scrap film. These chloride-removal treatments may best be repeated three 15 or four times at a temperature of from approximately 60° F. to 110° F. for one hour each treatment. It may be stated that when it is intended to utilize the reclaimed film 20 scrap for the manufacture of lacquers, fabric coatings and the like, it may not be necessary to remove these chlorides from the film. However, where the reclaimed scrap 25 is to be re-employed in the manufacture of new film, it is important to remove the majority of these chlorides from the film.

Although I have specified above that calcium hypochlorite may be employed, it will be understood that any other alkaline hypochlorite such as sodium hypochlorite, or some 30 similar substance which has the same hydrolyzing action may be employed. Also, different alcohols than those mentioned may be employed in the chloride-removal step and some water may also be added to the alcohol 35 mixture if desired.

While I have described my process principally in connection with the reclamation of clear cellulose acetate film scrap, it will be 40 understood that the process is equally applicable to the reclamation of dyed cellulose acetate film scrap and to any other kind of film scrap which has thereon a sub-layer of hardened gelatin which is not removed by 45 the hot water emulsion-removal treatment, it being clearly understood that the principle upon which this invention operates is the hydrolysis of the hardened gelatin sub-layer, thereby converting it into an easily removable 50 composition. Obviously, my hydrolyzing step may at the same time have some bleaching action upon the dye in dyed film scrap which may be treated, but such bleaching 55 action is merely incidental to my process and if sufficient so much the better; if insufficient, it will of course be supplemented as necessary and well known to obtain an entirely colorless product. Also, while I have 60 referred to my process as the hydrolysis of the hardened gelatin sub-layer it will be understood that this is rather broad inclusive language indicating the entire desirable action which takes place rather than any specifically limiting step; in an event the process 65

specified has the desired result which is of greater interest than mere nomenclature.

Obviously the details of this invention above set forth are only exemplary and it will be apparent to those skilled in the art 70 that numerous variations in the process may be employed without departing from the spirit thereof or the scope of the claims appended hereto. For example, it is well known that the higher the temperature of 75 treatment, within certain limitations, the shorter will be the time of treatment. The process may be employed as a batch process or it may be utilized as a continuous process, all as is well known in the art. Also 80 the process may be varied by the addition of mild acidifying agents, such, for instance, as the use of carbon dioxide as set forth in my copending application, Serial No. 455-449 filed May 24, 1930. Also, while I have 85 described the use of a hydrolyzing solution prepared from the addition of calcium hypochlorite to the solution, it will be apparent to those skilled in the art that this solution may be prepared by passing chlorine gas 90 into solutions of lime or sodium hydroxide, giving in the first instance a hydrolyzing solution of calcium hypochlorite, and in the second instance, a solution of sodium hypochlorite. 95

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

1. The process of reclaiming cellulose acetate from photographic film scrap comprising cellulose acetate, a hardened gelatin sub-layer and a superimposed coating of a silver halide emulsion which comprises removing the emulsion coating and then hydrolyzing the hardened gelatin sub-layer. 100

2. The process of reclaiming cellulose acetate from photographic film scrap comprising cellulose acetate, a hardened gelatin sub-layer and a superimposed coating of silver halide emulsion which comprises removing the emulsion coating and then hydrolyzing the hardened gelatin coating by treatment of the film scrap with a solution of an alkaline hypochlorite. 110

3. The process of reclaiming cellulose acetate from photographic film scrap comprising cellulose acetate, a hardened gelatin sub-layer and a superimposed coating of silver halide emulsion which comprises removing the emulsion coating and then hydrolyzing the hardened gelatin coating by treatment of the film scrap with a solution of calcium hypochlorite. 115

4. The process of reclaiming cellulose acetate from photographic film scrap comprising cellulose acetate, a hardened gelatin sub-layer and a superimposed coating of silver halide emulsion which comprises removing the emulsion coating and then hydrolyzing the hardened gelatin coating by treatment 120

of the film scrap with an aqueous solution of an alkaline hypochlorite.

5. The process of reclaiming cellulose acetate from photographic film scrap comprising cellulose acetate, a hardened gelatin sub-layer and a superimposed coating of silver halide emulsion which comprises removing the emulsion coating and then hydrolyzing the hardened gelatin coating by treatment 10 of the film scrap with an aqueous solution of calcium hypochlorite.

Signed at Rochester, New York this 20th day of May 1930.

CHARLES E. ALLEN.

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