

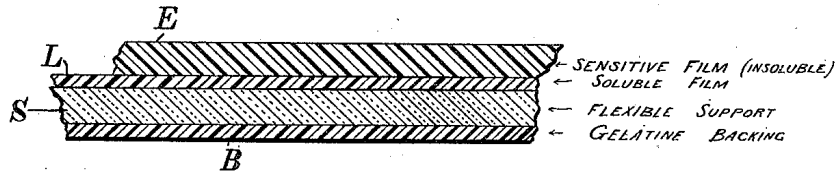
(No Model.)

G. EASTMAN & W. H. WALKER.

PHOTOGRAPHIC FILM.

No. 306,470.

Patented Oct. 14, 1884.



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# UNITED STATES PATENT OFFICE.

GEORGE EASTMAN AND WILLIAM H. WALKER, OF ROCHESTER, NEW YORK,  
ASSIGNORS TO THE EASTMAN DRY-PLATE COMPANY, OF SAME PLACE.

## PHOTOGRAPHIC FILM.

SPECIFICATION forming part of Letters Patent No. 306,470, dated October 14, 1884.

Application filed May 10, 1884. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE EASTMAN and WILLIAM H. WALKER, citizens of the United States, residing at Rochester, in the county of Monroe and State of New York, have jointly invented certain Improvements in Photographic Films, of which the following is a specification, reference being had to the accompanying drawing.

Our invention relates to an improvement on the invention described in the application of George Eastman, one of the present joint inventors, filed in the United States Patent Office March 7, 1884, Serial number 123,332; and it consists in coating the reverse side of the paper or other flexible support for the gelatine film with a layer or coating of gelatine, the object of this layer being to prevent the curling or twisting of the paper or other support during the various operations of developing and fixing the films. We have observed in working by the process described in the said application that when the support is coated on one side only the coating swells from absorption of water during the various operations of development, and the films consequently manifest a tendency to curl backward, and we have ascertained by practical experience that this tendency, which is an annoyance in transferring, may be entirely overcome by giving the support a coating or layer of gelatine on its back or reverse side; and our invention consists in the process of preparing sensitized photographic films consisting of a flexible paper or other support having a layer of gelatine on one side, and on the other a coating or layer of sensitized gelatino-argentic emulsion attached to the said support by an interposed layer of relatively more soluble gelatine; and it also consists in the said films themselves as a new article of manufacture.

In the accompanying drawing the figure we have represented is one of our improved photographic films in section on an enlarged scale, in which—

S represents the flexible support, E the sensitive gelatino-argentic coating, L the interposed layer of relatively more soluble gelatine, and B the gelatine backing or layer on the reverse side of the support.

In the practical operation of preparing our improved films, we prefer to use a thin, hard, sized and well calendered paper, (such as the well-known "Rives," which is now so extensively used for the manufacture of albumenized silver paper,) and we coat it by hand with a solution of gelatine, or we pass it through a suitable machine, by which a uniform coating of gelatine is applied to one side. We prefer to apply the gelatine to the reverse side of the paper support first, and to use a gelatine which is rendered partially or wholly insoluble by the addition of chrome-alum or other suitable chemical, and which is also rendered flexible by the addition of glycerine.

The following is a formula which we find to be well adapted to the purposes in hand: hard gelatine, (Simeon's or Heinrich's,) seven thousand grains; water, one hundred and ninety ounces; pure glycerine, eighteen ounces; chrome-alum, sixty grains. The chrome-alum should be added last, dissolved in a part of the water. After the application of this coating the paper is dried, and it is then coated on the opposite or face side with a solution of soft gelatine, (Nelson's No. 1,) seven thousand grains; water, one hundred and forty ounces, and glycerine, five ounces. The addition of the glycerine to either gelatine coating is not essential, but we prefer to use it, as the films are thereby rendered much more pliable and capable of being easily worked. The degree of flexibility may be varied by altering the proportion of the glycerine in the above formula, and the backing may be rendered more or less insoluble by increasing or reducing the proportion of the chrome-alum or other chemical added to the gelatine solution. After the coating of the face side of the support has been dried, the flexible support is passed through suitable calendering-rolls, by which it is compressed and hardened, and the surface prepared for the reception of the sensitive film. A coating of sensitive gelatino-argentic emulsion is then applied to the gelatine layer on the face side of the support, this operation being performed in a suitable non-actinic light.

Any suitable gelatino-argentic emulsion may be employed in the manufacture of our improved films, and the production of such emulsions is now well known to the photo-

graphic public. The sensitive coating is rendered insoluble by the addition of chrome-alum to the finished emulsion in the proportion of about one or two per cent., by weight, of the quantity of gelatine employed, the proportion varying somewhat with the quality of the gelatine; but with hard gelatines—such as Simeon's or Heinrich's—the above proportion will answer the purpose. The solutions of gelatine employed should be kept at a suitable temperature during the coating operations. When the coating of emulsion is dry, the films are ready for use.

The object of rendering the backing on the reverse side of the support more or less insoluble is to prevent its becoming dissolved when heat is applied for the purpose of removing the sensitive layer containing the image from the support, as described in the said previous application. A backing of soluble gelatine will prevent the film from curling; but we prefer to render it insoluble for the reason above stated.

The various coatings which are herein described as applied to the flexible support S may be spread over the surface in any of the ways which are now practiced for accomplishing similar results; but the operation is very much facilitated by the use of any suitable machinery. The drying also may be effected in any suitable way.

The operations of exposing, developing, and fixing our improved sensitive films do not differ materially from those now employed in the working of gelatine dry plates, and will be readily understood by the practical photographer.

The emulsion layer containing the image may be stripped from the flexible support by the application of warm water, which dissolves the interposed gelatine layer L, and the detached film may then be used alone or affixed to any suitable support for printing purposes.

We prefer to attach the film to a glass support before removing the paper, as described in the application of George Eastman, above referred to.

A photographic film consisting of a support of paper or equivalent backing, a sensitized insoluble gelatine film, and an interposed layer of soluble gelatine, being the invention of George Eastman, as described and claimed in his application No. 123,332, is herein disclaimed.

We claim—

1. As a new article of manufacture, the herein-described sensitive photographic film, consisting of a suitable flexible support coated on one side with a layer of gelatine, and on the other side with a layer of sensitive gelatino-argentic emulsion attached to the support by an interposed layer of relatively more soluble gelatine, substantially as described.

2. As an improvement in the art of photography, the herein-described process of making sensitive flexible photographic films, consisting in coating a suitable flexible support on the reverse side with a solution of gelatine, in drying the said coating, in applying to the face side a coating of soluble gelatine, in drying the said coating, and in subsequently applying thereto a coating of gelatino-argentic emulsion of relative insolubility, and in drying the same, substantially as described.

3. As an improvement in the art of photography, the herein-described process of making sensitive flexible photographic films, consisting in coating a suitable flexible support on the reverse side with a solution of gelatine, in drying the said coating, in applying to the face side a coating of soluble gelatine, in drying the said coating, in calendering the coated support, and in subsequently applying to the face side of the coated and calendered support a coating of gelatino-argentic emulsion of relative insolubility, substantially as described.

4. The combination, with the flexible support S, of the gelatine backing B, and the layer of relatively-insoluble gelatino-argentic emulsion E, attached to the support by the layer of more soluble calendered gelatine L, substantially as described.

5. The flexible support S, provided on one side with the insoluble gelatine backing B, and on the other with the soluble gelatine layer L, substantially as described.

6. The flexible support provided with a layer of soluble calendered gelatine, and having a coating of relatively-insoluble gelatino-argentic emulsion applied thereto, substantially as described.

7. The combination, with a flexible support, S, for a layer of sensitive gelatino-argentic emulsion, of the backing B, consisting of gelatine treated with chrome-alum or other chemical, and glycerine, substantially as and for the purposes set forth.

8. As a support for the film of sensitive gelatino-argentic emulsion, a flexible sheet coated with a layer of soluble translucent gelatine and calendered on the coated surface, substantially as described.

9. As an improvement in the art of preparing sensitive photographic films, the process consisting in applying to a sheet of paper or like support a layer of soluble gelatine and drying the same, then calendering the sheet to harden and polish its surface, and finally applying to the soluble layer of the calendered sheet a coating of relatively-insoluble gelatino-argentic emulsion.

GEORGE EASTMAN.

WM. H. WALKER.

Witnesses:

GEO. B. SELDEN,

H. G. PHILLIPS.