No. 647,901. Patented Apr. 17, 1900.

A. W. McCURDY.

PHOTOGRAPHIC ROLL FILM.

(Application filed Nov. 28, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

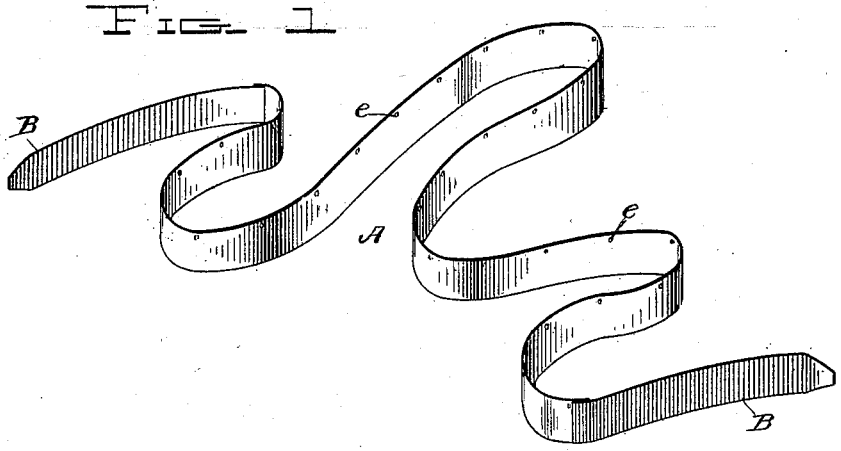

Fig. 2

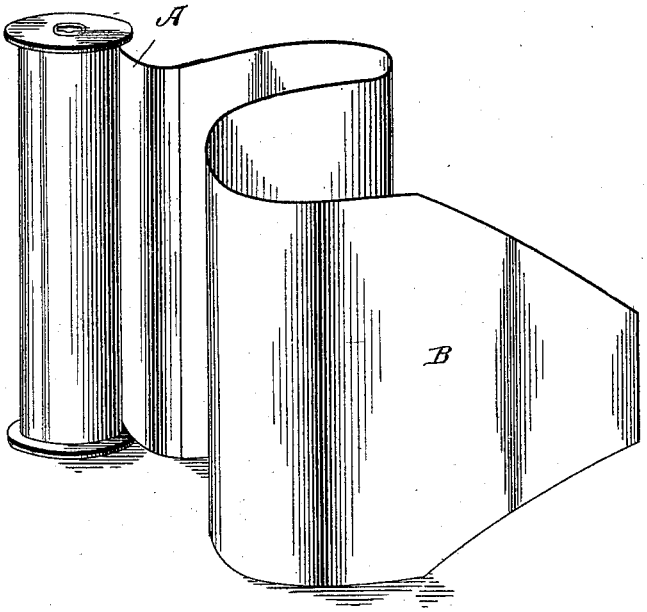

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FIG. 3

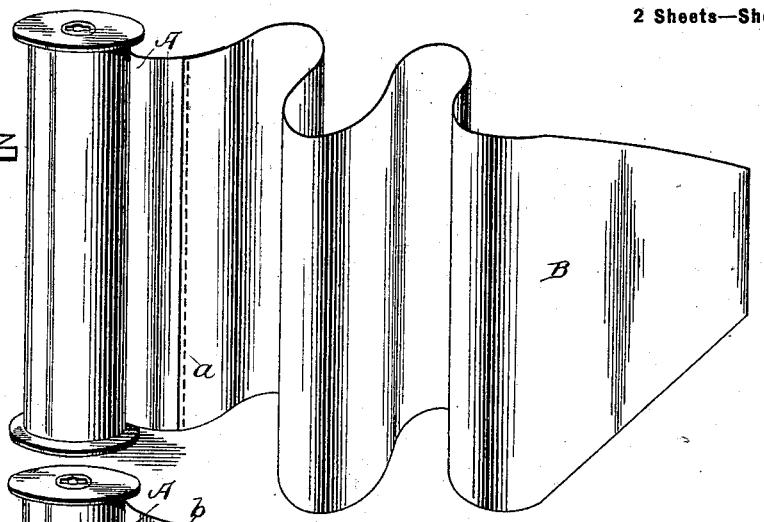


FIG. 4

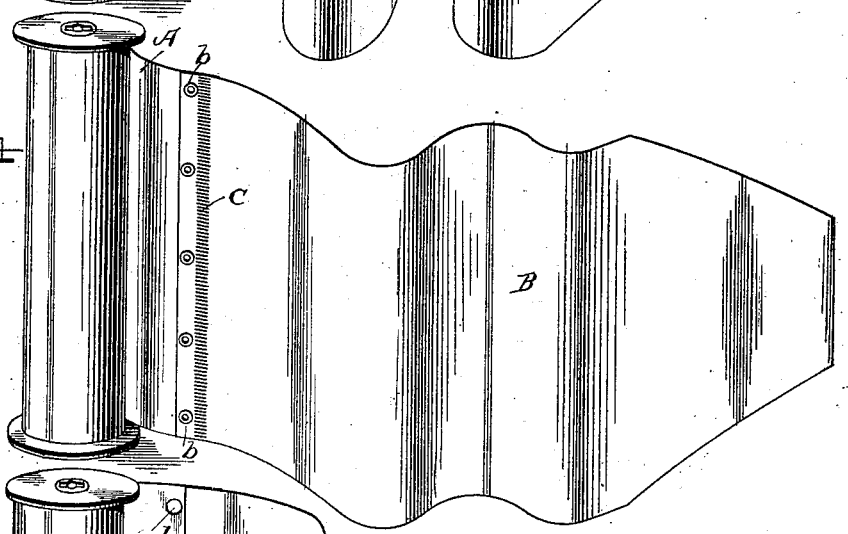
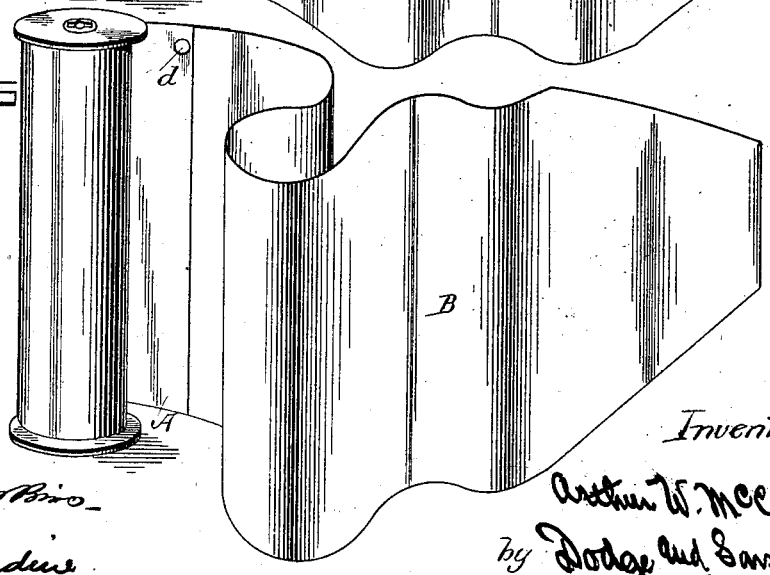


FIG. 5



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UNITED STATES PATENT OFFICE.

ARTHUR W. McCURDY, OF WASHINGTON, DISTRICT OF COLUMBIA.

PHOTOGRAPHIC ROLL-FILM.

SPECIFICATION forming part of Letters Patent No. 647,901, dated April 17, 1900.

Application filed November 28, 1899. Serial No. 738,583. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR W. McCURDY, a subject of the Queen of Great Britain, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Photographic Films, of which the following is a specification.

My invention pertains to what is now generally known to the trade as a "daylight film-cartridge," by which is meant a sensitized film coiled upon a spool or about itself and protected by a wrapping or envelop capable of excluding the actinic rays of light from the image-receiving portion of the film. As hitherto constructed such films have consisted of a long flexible band or strip, commonly of transparent celluloid, coated with an emulsion of suitable character and duly sensitized, provided at its ends with black-paper extensions, one or the other of which latter, being closely wound about the previously-coiled image-receiving portion, has served to exclude the actinic rays. Many films or cartridges of this character have been provided with a continuous backing strip or sheet of the black paper attached to one end and extending some distance beyond each end of the film; but in all prior daylight-cartridge films of which I have knowledge the black paper has been present and has been deemed essential. In the class last noted it is made to bear numbers or markings indicating the different sections or "exposures" of the film and to protect the film against light entering the camera at the window or opening through which the markings are read or noted.

Paper of the character referred to requires special and peculiar preparation and is, moreover, quite costly. It contains a large percentage of pigment or dyestuff of one or another character, which is in greater or less degree soluble in water and in the developing and fixing baths in which the film is treated after exposure. The composition is such too that the paper is more or less hygroscopic and either by gathering moisture from the atmosphere and giving it to the sensitized film or by causing chemical or mechanical constituents of the paper to be given off to the film injuriously affects the latter. So, too, the printed markings or numbers on the back of the paper are found to offset upon the film or to reproduce themselves thereon to the serious detriment of the negatives subsequently produced.

I have invented or discovered a novel mode of developing and fixing photographic films and have contrived an apparatus for that purpose. In carrying out my method and in using said apparatus it is necessary or at least is very desirable that the film be totally immersed in the solution or solutions during the process of developing and fixing. It is therefore of great importance that the film and the envelop, which is considered as a part of the film in the foregoing statement and is immersed therewith, be free from any ingredient, element, or substance which either under the ordinary variations of atmospheric conditions during storage or use or under the influence of any solution to which the film will in practice be subjected might injuriously affect the film or the solutions. So, too, it is important that the enveloping or light-excluding sections or extensions be attached to the image-receiving portion of the film in such manner as shall preclude detachment therefrom during manipulation of the film in the process of development or fixing. This may be accomplished by stitching or like mechanical fastening or by the employment of cement or adhesive insoluble in water and in solutions to which the film is subjected.

The present application is confined solely to films in which the light-excluding portions or extensions are formed of pieces distinct from the image-receiving section of the film and are attached thereto in some suitable manner. While ordinarily the light-excluding extension will be used at both ends, it may in some cases be used only at the outer end. For the purpose of enabling the user to determine the junction readily both in placing or using the film in a camera and in manipulating the same in the developing apparatus it is important that some mark or indication be provided. This may be the line of stitching, the line of pasting or cementing the two parts together, a difference in color or texture, a perforation, or, in fact, any distinctive mark. In practice the film will advisably be wound upon a spool the heads or flanges of which serve, together with the en-

veloping section or covering portion of the film, to exclude the light therefrom at the edges; but I do not restrict myself to the employment of a spool.

Having thus stated in a general way the character and purpose of the invention, I will now describe the same more in detail with the aid of the accompanying drawings, in which—

Figure 1 is a perspective view of a film prepared in accordance with my invention, but unwound to show the two ends; Fig. 2, a perspective view of a spooled film or cartridge, the enveloping or light-excluding portion and a short length of the image-receiving portion being unwound to show the union of the two parts; Fig. 3, a similar view showing the enveloping or light-excluding portion joined to the image-receiving section by a line of stitches; Fig. 4, a like view showing a colored or distinctive line or mark at the junction of the two portions noted, and Fig. 5 a like view showing a perforation at or near said line or junction.

In the drawings, A indicates the film proper, composed of celluloid or other thin, flexible, and preferably transparent material, and B B the enveloping or light-excluding portions at the ends of the part A. The image-receiving section A, of whatever material formed and however coated and sensitized, will, as heretofore, be made of definite length and adapted to take a predetermined number of images or exposures of given dimensions. The end portions B B, which, as above indicated, may be of any suitable material provided they contain nothing whatever that may be mechanically or chemically released to the injury of the film or the liquid solution or solutions in which the film is placed or to which it is subjected, should be of a length sufficient to wind one or more times about the coiled image-receiving portion. The number of windings will necessarily vary according to the character of the enveloping section, it being desirable under all ordinary circumstances to have about three coils or thicknesses of the enveloping section outside of the sensitized film portion. I have discovered, however, that the black paper hitherto deemed essential is not at all requisite, but that white paper or light-colored papers, particularly on the order of orange and yellow, will exclude the actinic rays of light if carried several times about the film. Various of these lighter-colored papers are reasonably free from any soluble coloring-matter which in the bath or solution to which the film is subjected might injuriously affect the latter or act upon the film; but the best results are attained, if paper be used, when the paper is devoid of coloring-matter of any kind. A good Manila paper or a plain white paper answers well. Various other thin flexible substances—fibrous, textile, and other—answer the purpose quite well and contain nothing which can injure the film or the bath in which the film is placed.

The manner of attaching the light-excluding or enveloping sections B is variable, and I have in the drawings indicated different modes of attachment. Thus in Fig. 1 the parts are shown as lapped slightly one upon the other and cemented together. Assuming that white paper or light-colored paper be used, this of itself would sufficiently mark the line or point of junction of the sensitized film A and the enveloping portions B. In Fig. 2 the same construction is indicated. In Fig. 3 I have shown a line *a* of stitches, and in Fig. 4 a row of eyelets *b*. These or any other suitable connecting or fastening devices may be employed, provided care be taken in the case of paste or cement to select such as shall be insoluble in the baths or solutions to which the film is subjected and free from liability of becoming softened at any temperature to which the film will in practice be subjected. In the case of eyelets or like fastenings they should be of or be coated with a material free from injurious action upon or by the developing and fixing solutions, and it will be preferable in the case of stitching to use white thread.

The marking to indicate where the enveloping or light-excluding portion terminates and the sensitized portion begins may be varied considerably or may be simply the difference in color and texture of the adjoining sections, or if these be the same, or essentially the same, then the line of pasting or a special mark, as *c*, a perforation, as *d*, at or near the point of junction, or the line of stitches *a* will adequately mark the point of connection. These and many other simple markings will serve to indicate to the person using the film, whether in placing it in the camera or in the developing apparatus, the point at which the sensitized film begins.

In the camera for which this film is more especially intended, though not confined to any particular style or make of camera, a counter is employed, one member or part of which enters a perforation in the film at each operation of the counter. The film will therefore by preference be provided with a series of perforations *e* near one edge at the points or on lines between successive exposures or exposure-sections of the film A, as indicated in Fig. 1. This, however, is optional.

It will be seen from what has been above stated that the distinguishing feature of this invention is the employment of a white or uncolored enveloping section or extension in lieu of the black paper hitherto deemed essential, or at least the employment of a light-excluding or enveloping portion which, while sufficient to exclude actinic rays, shall be free from any injurious action in or upon the solution or solutions in which it is used or upon the film itself. Such a film as here described is capable of use where a paper with the usual black or dark-colored enveloping or light-excluding portions would answer but indifferently, if at all. The capability of the

white or uncolored paper, fabric, or envelop, or of even light-colored wrappings, to exclude actinic rays is a matter of discovery which has been made after a long-continued use of the black-paper envelop, entailing great expense and requiring the erection of special factories for the manufacture of such paper.

The film under the present common practice being moved in the camera across an opening covered with colored glass, celluloid, or the like and being under my new process developed in a vessel provided with windows or openings having similar colored material, the difference in color between the sensitized and the light-excluding portions of the film may not be readily distinguished. Hence the special and distinctive mark becomes important.

Having thus set forth my invention and explained the reasons for and advantages of the construction adopted, I claim—

1. As a new article of manufacture, a photographic film comprising a sensitized portion, and light-excluding or enveloping end portions of white or uncolored material attached to the sensitized portion by material insoluble in the baths, substantially as described, whereby they are prevented from becoming detached in the solutions in which the film is placed.

2. A photographic film having at the end of the image-receiving portion an extension formed of white paper.

3. A film for photographic purposes, comprising a sensitized image-receiving section, and a light-excluding section attached to the image-receiving section by material insoluble in the baths, the light-excluding section being formed of a material devoid of any substance or ingredient which might injuriously affect the film or the solution or solutions in which the film is treated.

4. A photographic film consisting of a sensitized image-receiving section of definite length, and light-excluding sections attached thereto by material insoluble in the baths, the sensitized portion of the film being provided with a series of perforations indicating the limitations of successive exposures or image-receiving divisions.

5. A film for photographic purposes, comprising a sensitized image-receiving section, and a light-excluding section attached thereto by material adapted to withstand the detaching effect of the baths or solutions in which the film is treated.

6. A film for photographic purposes comprising a sensitized image-receiving section, and a light-excluding section attached thereto, the light-excluding section and the material by which said section is attached to the image-receiving section being adapted to withstand the action of the baths or solutions in which the film is treated, whereby injury of the film and of the baths is prevented when the film is bodily immersed therein.

7. A photographic film consisting of a sensitized image-receiving portion, and light-excluding end sections attached thereto, which end sections will remain firmly attached to the sensitized portion when the whole is placed in or subjected to the action of the developing or fixing solutions.

8. A photographic film comprising a sensitized image-receiving portion, and light-excluding or enveloping sections attached to the ends thereof by cement insoluble in the liquids to which the film is subjected.

9. A photographic film comprising a sensitized image-receiving portion, and flexible light-excluding end sections attached thereto by material insoluble in the baths, substantially as described, whereby they are prevented from becoming detached when subjected to the action of a bath or liquid, the film being provided with a perforation or distinctive mark located in position to indicate the junction of the sensitized portion and the light-excluding sections of the film.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR W. McCURDY.

Witnesses:
G. O. TOTTEN, Jr.,
HORACE A. DODGE.