July 10, 1934. J. FLORIAN 1,966,404

ROLL OF DIRECT POSITIVE PAPER

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Fig. 1.

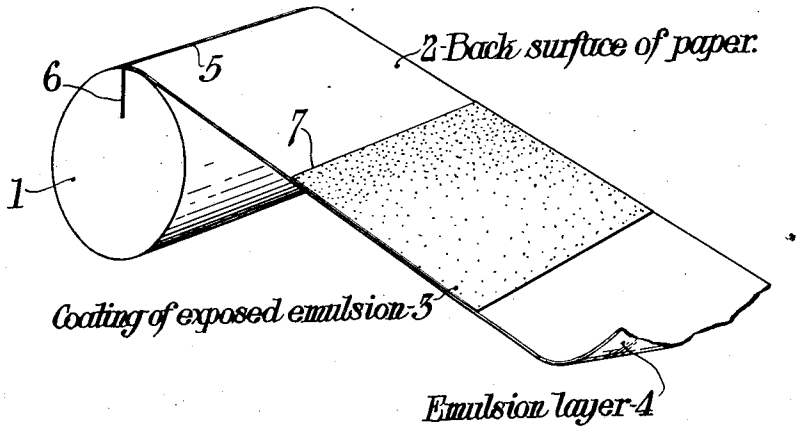
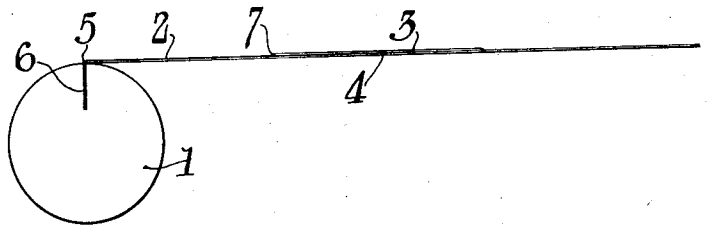


Fig. 2.



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ROLL OF DIRECT POSITIVE PAPER

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5 Claims. (Cl. 95—8)

This invention relates to direct positive paper and particularly to a roll of such paper which is provided with a visual indication of the approach of the end of the roll.

In the following specification reference is made to the accompanying drawing, in which Figure 1 is a perspective view and Figure 2 a side view of a core, and the tail end portion only of a band of paper adapted to be wound on the core.

Direct positive paper is used in cameras for the direct production of positives by a reversal process, thereby obviating the necessity of preparing a transparent negative, and yielding a positive on a paper support. Such paper is usually supplied in long rolls for use in a camera, some form of cutting mechanism being provided to cut off individual pictures or series of pictures. As it comes from the camera, the paper is subjected to a series of processing steps which usually includes (1) first development (2) bleaching (3) clearing (4) re-exposure (5) redevelopment, and in some cases (6) fixing. If the print is not redeveloped to a black but a sepia is desired, the re-exposure and re-development (steps 4 and 5) are replaced by immersion in a sulphide redeveloper.

My invention relates to an improved means for warning the operator of the approach of the end of the roll of paper. I have found a simple, effective, and inexpensive method of doing this to be the use of a photographic layer which may be visible prior to or during the first development but which becomes invisible during the later processes. I coat on the rear surface of the paper, near the end of the band that is attached to the core, an area of a very thin photographic emulsion layer which has been previously fully exposed to light. As the paper comes from the camera, it approaches the end of the roll near which my coating is placed. The prints when first developed show an indicating black marking on the back which warns the operator, as he is developing the pictures, that the roll is nearly used up. This black marking is subsequently bleached and disappears in the bleaching solution (step (2)) and is not re-developed in the later steps because there are left no unexposed developable salts.

The emulsion which I use is preferably one containing a minimum amount of collodion and a maximum amount of very volatile solvents with ether predominating. This is for the purpose of facilitating the drying of this special strip, which, as stated, is applied to the back of the paper, that is, on the surface opposite the emulsion coating used for the pictures. The following is a suitable emulsion for the purpose:

Solution A

Silver nitrate (powdered)	3.40	grams
Collodion	100.	c. c.

To this, water is added drop by drop with shaking until the silver nitrate is dissolved.

Solution B

Calcium chloride (anhydrous)	2.24	grams
Collodion	100.	c. c.

The emulsion is prepared by slowly mixing one part of Solution A with one part of Solution B while shaking or stirring vigorously. The emulsion is exposed to strong light until appreciably printed out or darkened and diluted with collodion as required, say four times or more, to give a very thin and rapidly drying coating when applied. The collodion referred to in the above two formulas is a one per cent solution of cellulose nitrate in equal parts of ethyl alcohol and ethyl ether.

The above example is solely by way of example and any photographic emulsion may be used which may or may not be distinctly visible before development. This emulsion, after it is made, is exposed to a bright light source, such, for example, as an arc or strong tungsten lamp. It is essential that this emulsion should be thoroughly fogged or exposed. After exposure, it is coated in a stripe across the roll on the back surface of the paper near what is to be the inner end of the roll. This stripe may be of any convenient width, such as anywhere from 1 inch to several feet in width. The coating should extend back from the end of the roll a sufficient amount to enable the operator to get several more pictures before changing the roll but be near enough so that the roll may be replaced soon. A distance of 5 or 6 feet will normally be sufficient. The coating may be done in any of the recognized ways, as, for example, either by a coating machine or by merely brushing across the roll.

The figures of the drawing will serve to show the finished product more clearly. A core 1 which may be supplied with a slot 6, has the paper 2 attached to it by its inner end 5, the paper 2 being coated on its inner face 4 with sensitive emulsion. On the rear or outer face, as shown, there is coated an area 3 of the previously exposed collodion emulsion. The coating 3, as already stated, must be very thin. The length of

the area 3 may be of the order of 1 to 24 inches and the distance from the end of the roll 5 to the beginning of the coated area 7 should preferably be of the order of 5 or 6 feet, although the coated area may extend nearly or quite to the end. If, as is preferable, the coated area is narrow, it gives a definite signal on a single picture area at a definite distance from the end.

The paper is exposed in the camera and is then removed and cut off for processing. It is normally put through the steps already indicated. As the end of the roll is approached, the prints appearing will have at least a portion of the coated exposed collodion emulsion on their rear surface. The operator, while developing these prints, occasionally turns them over to look for the warning indication. When a print appears which develops a black area on the rear surface, he knows that the end of the roll is near and may act accordingly. The black marking on the back of the print is dissolved and dissipated in the bleaching solution. This bleaching solution may have, for example, the following composition:

Water	1 gallon
Potassium bichromate	1¼ ounces
Sulphuric acid, C. P. conc	1½ ounces

The action of such bleaching solutions in dissolving silver, is of course, well known.

It is particularly important that the collodion emulsion to be used as described must be completely exposed to light so that it develops to a maximum density in the short time that it is in the first developer. Otherwise, any portion which is not developed the first time will be developed in the second developer if subjected to any second exposure and leave a gray or black deposit on the back of the paper. However, if the emulsion is fully exposed to a very bright light source, as indicated, the black marking on the back will completely disappear in the bleaching solution.

As also already indicated, the application of the collodion emulsion to the back of the paper must be thin enough so that there is no appreciable cockling or warping and so that the drying may be accomplished in a short time. With the coating I have given, applied in a thin layer, drying is accomplished in a few seconds, especially if the coating is passed through warm air.

I consider as included within my invention all modifications and equivalents within the terms of the following claims.

What I claim is:

1. A rolled band having a photographically sensitive layer over one surface and having on its other surface, near the inner end of the band only, a limited area coated with a previously fully exposed emulsion that edge of the limited area which is farthest from the inner end being a definitely predetermined distance therefrom such that the area may be used as an indication of the nearness of such end.

2. A rolled paper band having a photographic emulsion on one surface and having on the other surface, near the inner end of the band only, an area coated with a very thin layer comprising a previously fully exposed emulsion that edge of the limited area which is farthest from the inner end being a definitely predetermined distance therefrom such that the area may be used as an indication of the nearness of such end.

3. A rolled paper band having a photographic emulsion on one surface and having on the surface opposite the emulsion coating, near the inner end of the band only, a limited area coated with a previously exposed but undeveloped emulsion that edge of the limited area which is farthest from the inner end being a definitely predetermined distance therefrom such that the area may be used as an indication of the nearness of such end.

4. A rolled paper band having a photographic emulsion on one surface and having on the surface opposite the emulsion coating, near the inner end of the band, an area coated with a previously exposed but undeveloped collodion emulsion that edge of the limited area which is farthest from the inner end being a definitely predetermined distance therefrom such that the area may be used as an indication of the nearness of such end.

5. A rolled band having a photographically sensitive layer over one surface and on the other surface, near the inner end of the band only, a limited area coated with a gelatine emulsion layer containing a visible silver deposit susceptible of being removed in a photographic bleaching bath that edge of the limited area which is farthest from the inner end being a definitely predetermined distance therefrom such that the area may be used as an indication of the nearness of such end.

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