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2 Sheets-Sheet 1

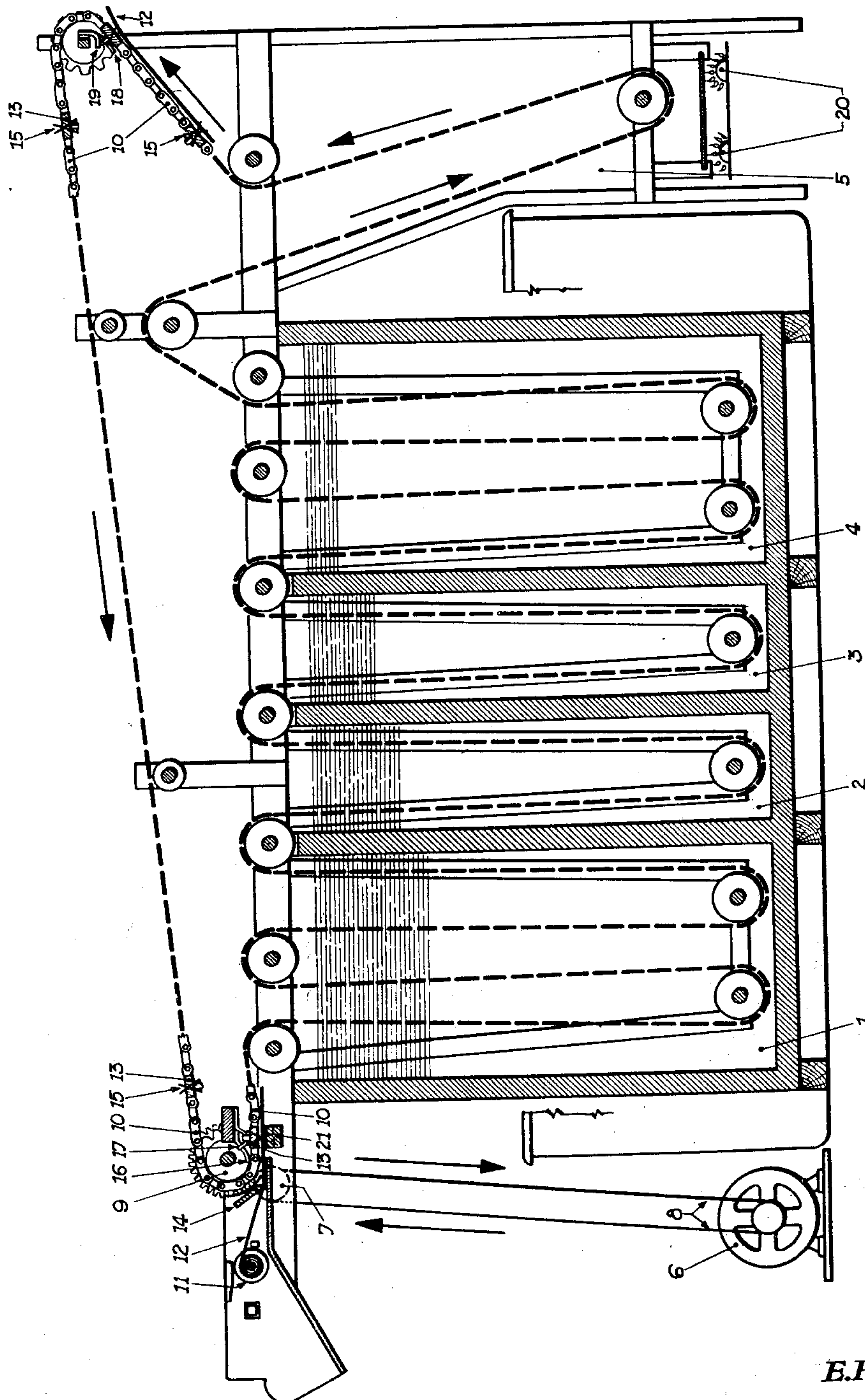


Fig. 1

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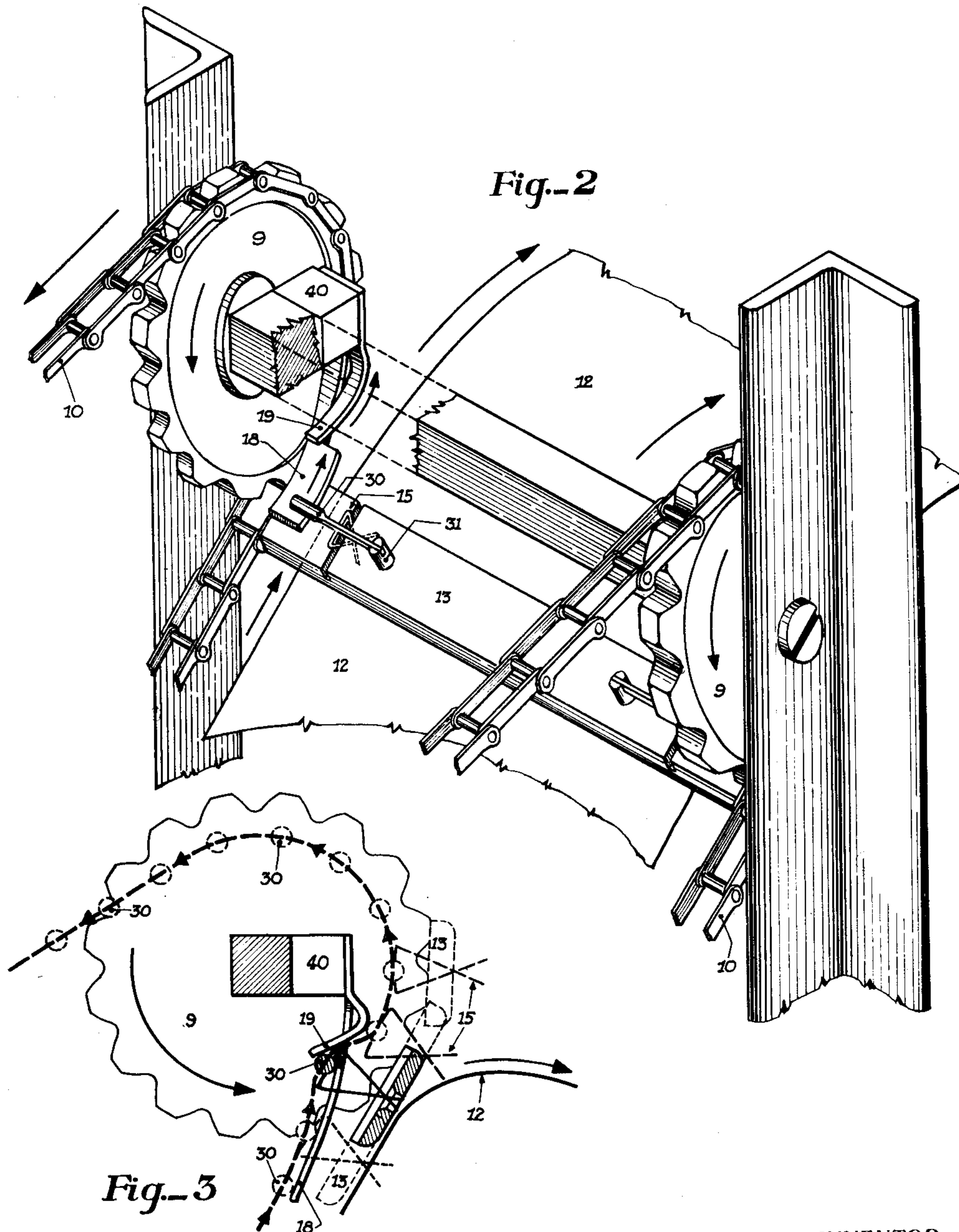
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2 Sheets-Sheet 2



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UNLOADING DEVICE FOR CONVEYING SYSTEMS.

Application filed September 18, 1926. Serial No. 136,266.

This invention relates to systems for conveying flexible material, and more particularly to such systems which convey flexible material through a plurality of baths of various solutions to be treated by said solutions.

In photography, after a strip of paper having a film of emulsion thereon has been exposed to an image formed by the lens of a camera, the exposed paper has to be developed before the image becomes visible. The paper may be fed on a continuous or endless belt or chain to be immersed in baths which may have various chemical solutions therein, some of which are commercially known as the developer, the "short stop," the "fixing bath," the water bath and the dryer. Briefly, the developer brings out the lights and shadows. The "short stop" prevents the image on the paper from being over-developed. The fixing bath removes any of the emulsion on the paper which has not been acted upon by exposure to the lens of the camera, and permanently fixes that which has been exposed to the lens so that no further change takes place. The water bath acts to wash out all superfluous chemicals not making up the image, and the dryer dries the paper with the image fixed thereon after being washed in the water bath. The picture is then said to be developed.

A long strip of paper, when conveyed through chemical solutions, obviously becomes wet and tends to increase in length. By virtue of the low tensile strength of the paper, it will tear when pulled through such solutions.

It is therefore an object of this invention to provide a system for conveying paper or other flexible material through a plurality of baths of various chemical solutions to be treated chemically by these solutions, the system being so arranged that the paper or other flexible material does not tear, or otherwise become distorted, while being conveyed through these solutions.

It is another object of this invention to provide in a system having a movable belt or chain to which a plurality of cross-bars are permanently fixed, which cross-bars have gripping means associated therewith for gripping paper or other material thereto, means for successively releasing said gripping means after the movable belt passes a

certain point so as to successively free and separate the paper or other flexible material from the gripping means associated with said cross-bars.

While the nature of the invention will be pointed out with particularity in the appended claims, the invention itself, both as to its further objects and features, will be better understood from the detailed description hereinafter following, when read in connection with the accompanying drawing, in which Figure 1 represents a cross-sectional view of a conveying system for conveying flexible material, such as paper, through a plurality of baths of various solutions to be treated thereby; in which Fig. 2 represents a perspective of an unloading device for such a system for freeing and separating the flexible material, such as paper, from the gripping means used to convey the flexible material; and in which Fig. 3 represents a diagrammatic analysis of the movements of the various elements comprising the unloading device of the system. Similar parts will be designated by similar reference characters wherever they appear throughout the drawing.

Referring to Fig. 1 of the drawing, a plurality of baths are shown designated by the reference characters 1 to 5, inclusive. Bath 1 may be, for example, the developer; bath 2 may be the "short stop;" bath 3 may be the "fixing bath;" bath 4 may be the water bath; and bath 5 may be the dryer. Yet it will be understood that while only five baths have been shown herein for the purpose of illustration, which have particular reference to a photographic system, any number of baths may be included in any system whatsoever, and the solutions in these baths may be of any desirable chemical compositions without in any way affecting the scope of the invention.

A motor is designated by the reference character 6, which motor drives a pulley 7 connected to the motor by means of a belt 8 which may be, for example, of leather, canvas, rubber, etc. The pulley 7 is geared to a sprocket wheel 9 and therefore rotates the sprocket wheel; and a movable sprocket chain 10 which meshes with the teeth of the sprocket wheel is therefore moved thereby. A reel of paper, or of any other flexible material, is designated by the reference char-

acter 11. This reel of paper, suitably supported at the feeding or loading terminal of the system, unreels flexible material, such as paper, designated by the reference character 12 to be picked up by a plurality of cross-bars, one of which is shown at the feeding terminal merely for illustrative purposes, and which is designated by the reference character 13, in order that the paper 12 unrolled from the reel may be conveyed through the various chemical solutions within the baths 1 to 5, inclusive, to the unloading terminal of the system. The paper 12 unrolled from the reel is guided to the cross-bar 13 at the feeding terminal by means of a guide plate 14. A trigger (or triggers) is associated with the cross-bar 13 as well as with a number of other similar cross-bars, preferably equally spaced from each other, all permanently fixed to the movable sprocket chain 10. This trigger carries a pin 15, the movement of which is controlled by two cams 16 and 17. Cam 16 moves the pin upwardly and away from the cross-bar, so that the paper that passes the guide plate 14 may come substantially in contact with the lower surface of the cross-bar. Cam 17 then acts upon the trigger so as to move the pin downwardly and toward the cross-bar in order to pierce a hole, or other perforation, in the paper, the paper being prevented from moving laterally by the bar 21. Thereafter, the cam 17 causes a further movement of the trigger, and consequently effects a further movement of the pin to grip the paper to the cross-bar. The paper, which is now fastened to the cross-bar, passes through the baths of the various chemical solutions to be treated and acted upon thereby, and later reaches the unloading terminal of the system.

At the unloading terminal there is an unloading device which will be described in greater detail in connection with Figs. 2 and 3. This unloading terminal is shown herein to comprise a pair of cams 18 and 19 which, first, cause the pin to be moved upwardly and away from the cross-bar in order to permit the paper to be deflected and separated from that cross-bar, and which, second, bring the pin back to its normal position with respect to the cross-bar.

The teeth of a plurality of sprocket wheels (shown circularly merely for convenience) mesh with the movable sprocket chain 10 and connect the sprocket chain with the paper or other flexible material thereon as it is conveyed through the various chemical solutions within the baths. The length of time that the paper or other flexible material will remain in any particular bath will depend upon the number of sprocket wheels associated with that bath, the distance between these sprocket wheels, the speed of the movable sprocket chain, etc. It will be un-

derstood that these various elements may be varied in practice as conditions necessitate so as to keep the paper or other flexible material in any one bath for any predetermined length of time. The dryer 5, which has been referred to hereinabove as a bath, is brought to a suitably drying temperature by means of burners 20.

Fig. 2 represents, in somewhat greater detail, a perspective of the unloading device which is located at the unloading terminal. A plurality of cross-bars, which are preferably equally spaced from each other and having paper gripped thereto by means of pins, successively reach the unloading terminal of the system at which there is the loading device above referred to. The cross-pin 13, as well as a plurality of other similar cross-bars, are permanently fastened to the movable sprocket chains 10 and are moved longitudinally by sprocket wheels 9. A trigger 30 is associated with the cross-bar 13 and is supported at one of its ends by a pivot 31. It will be understood that while only two triggers have been shown in the figure associated with the cross-bar 13, merely for the purpose of illustration, any number of triggers may be similarly associated with each cross-bar, which triggers may have considerably varied shapes, within the scope of this invention. A pin 15 is carried by each trigger, and this pin may move laterally, i. e., upwardly or downwardly, with respect to the cross-bar 13. The movement of this pin at the unloading device is controlled by two cams 18 and 19. As the trigger 30, which is supported at one of its terminals by means of a pivot 31, comes in contact with the cam 18, the other or free terminal of the trigger passes over the upper surface of this cam so that the pin 15, which is carried by the trigger 30, moves upwardly with respect to the cross-bar 13. The pin 15 is then brought to its most extreme upward position so that the paper 12 may be freed and separated from the cross-bar 13 to which it was previously gripped by the pin 15. Shortly thereafter, the free terminal of the trigger 30 comes in contact with the lower surface of the cam 19. Consequently, the trigger is moved downwardly with respect to the cross-bar 13 in order that the trigger and the pin carried by it may both assume their normal positions with respect to the cross-bar 13. The cams 18 and 19 are permanently fixed to a support 40 so that as each trigger and its associated pin are successively brought to these cams, the paper is first released from the gripping means, and then each trigger and its associated pin are successively brought to their normal positions with respect to the cross-bar.

Fig. 3 shows an analysis of the movements of the various elements at the unloading device. The trigger 30 moves in the direction

of the arrow passing through its center, having the pin 15 connected thereto. If the trigger moves upwardly or downwardly, there will be a corresponding movement of the pin 15 associated therewith. Except at the loading and at the unloading devices, the cross-bar 13 is at all times equally spaced from the free terminal of the trigger 30. At the unloading device, however, the trigger moves over the upper surface of the cam 18, and consequently carries the pin with it upwardly with respect to the cross-bar 13. The cam 18 moves the trigger 30, and moreover, the pin 15, to such a position that the paper 12 is deflected and freed from the gripping action of the pin, whereupon the paper is separated from the cross-bar. Thereafter the cam 19 becomes effective to move the trigger, and consequently the pin 15, downwardly in order to bring both the trigger and the pin to their normal positions with respect to the cross-bar 13.

The loading device, which is located at the loading terminal of the system, is not shown herein in any separate view; but it is somewhat similar in construction to the unloading device, involving primarily means for successively raising the pins of each cross-bar in order to permit the paper or other flexible material to become substantially flush with one surface of that cross-bar, and means for thereafter successively gripping the paper or other flexible material to each cross-bar in order to convey the paper from the loading device at the loading terminal of the system to the unloading device at the unloading terminal.

While this invention has been described with particular reference to a system for conveying a flexible material, such as paper, from a loading device to an unloading device, it is to be understood that the invention may be applied to numerous other systems, and to such other systems as may be required to convey any other material or substance, without deviating from the principles disclosed herein. The chemical solutions and the baths are given merely for the purpose of illustration, and, in practice, other solutions may be employed without departing from the spirit of the invention.

It will be understood that while one type of unloading device has been shown and described herein, the principles of this invention may be embodied in other and widely varied organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. The method of separating a flexible strip of material from a corresponding chain conveyor having a plurality of devices penetrating and gripping said strip, which consists in successively and transiently releasing the penetrating and gripping devices as

the conveyor passes a certain place, and moving this strip of material divergently at that place.

2. A device for separating a flexible strip of material from the corresponding chain conveyor, comprising a plurality of gripping devices penetrating and gripping said strip, means for successively and transiently releasing the gripping devices as the conveyor passes a definite point, and means for moving the strip divergently from the conveyor at that point.

3. In a device for unloading flexible material such as paper, the combination with a chain of means whereby the flexible material may be penetrated and gripped thereto at definite intervals, and means for successively releasing the penetrating and gripping means as the conveyor passes a certain point, thereby allowing the flexible material conveyed by the conveyor to be separated therefrom.

4. The method of separating a strip of flexible material from a corresponding chain conveyor to which the flexible strip of material is gripped at definite intervals by suitable penetrating and gripping means, which consists in successively and transiently releasing the penetrating and gripping means as the conveyor passes a certain point, and moving the strip of material divergently from the conveyor at that point.

5. In combination, a movable chain having a plurality of cross-bars equi-distant from each other and permanently fixed to said movable chain, a plurality of gripping devices carried by said cross-bars to grip a strip of flexible material thereto, means for successively releasing the gripping devices carried by said cross-bars as the movable chain passes a certain point, means for deflecting the flexible material from the cross-bars to which it was previously gripped, and means for thereafter bringing the gripping devices of said cross-bars into their normal positions.

6. In combination, a movable chain carrying a plurality of cross-bars, a plurality of triggers carried by said cross-bars, each of said triggers having a gripping device associated therewith to which flexible material, such as paper, is gripped, means for successively releasing the gripping devices associated with the triggers as the movable chain passes a certain point, means for deflecting the flexible material from the movable chain at that point, and means for thereafter returning the gripping devices associated with said triggers to their normal positions.

7. In a device for unloading paper conveyed by a plurality of chains having paper penetrated and gripped thereto at definite intervals, means for successively releasing the paper from the said chains as said chains pass a certain point, and means whereby the

paper may be deflected and unloaded from said chains.

8. The method of separating a flexible strip of material from a corresponding chain conveyor having a plurality of gripping devices penetrating said strip of material to grip it to the conveyor, which consists in successively and transiently releasing the

penetrating gripping devices as the conveyor passes a certain place, and thereafter successively and transiently deflecting the strip of material. 10

In testimony whereof, I have signed my name to this specification this 16th day of September, 1926.

EDWARD F. DE POTTER.