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LOADING DEVICE FOR CONVEYING SYSTEMS

Filed Sept. 18, 1926

2 Sheets-Sheet 1

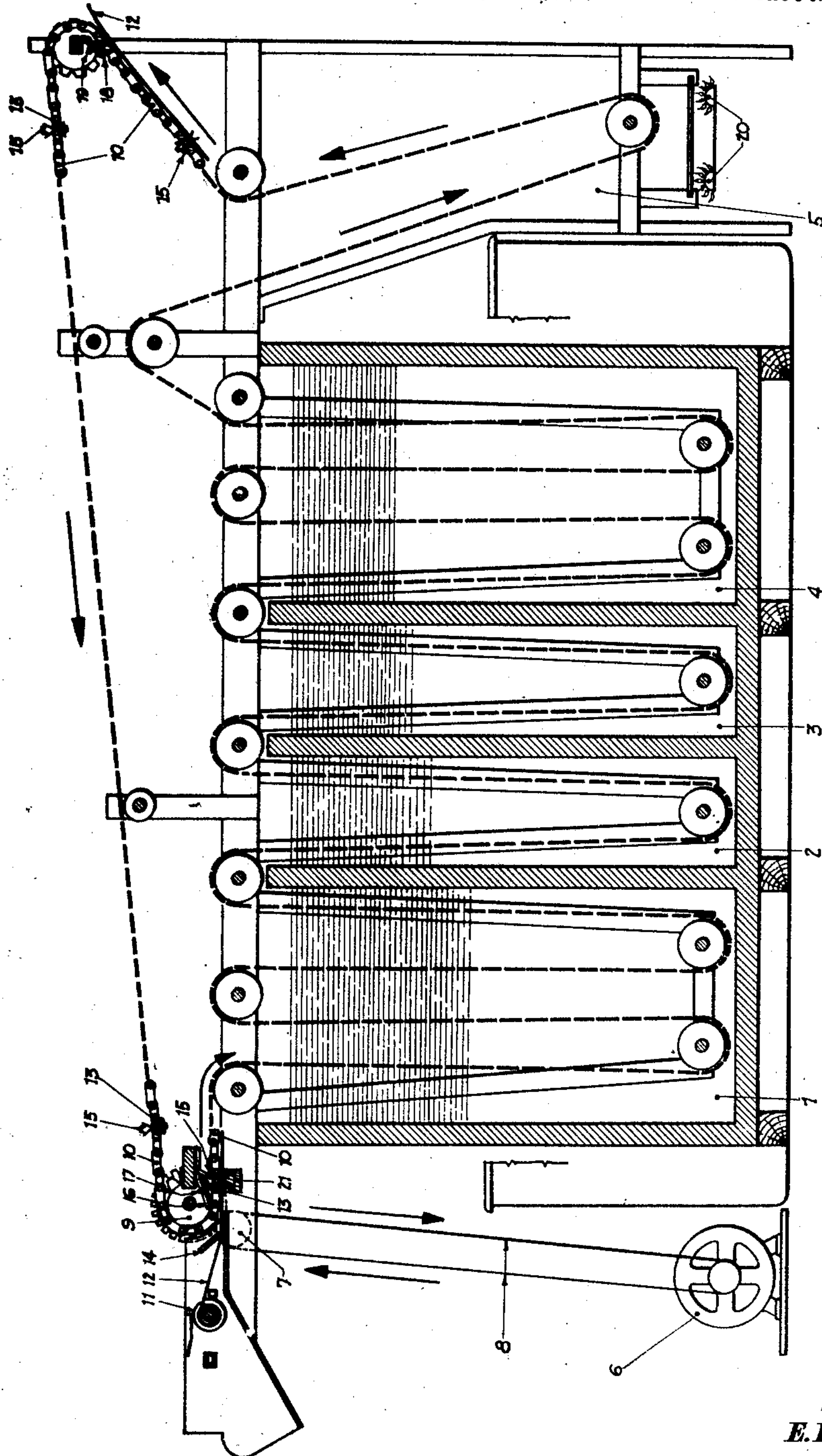


Fig. 1

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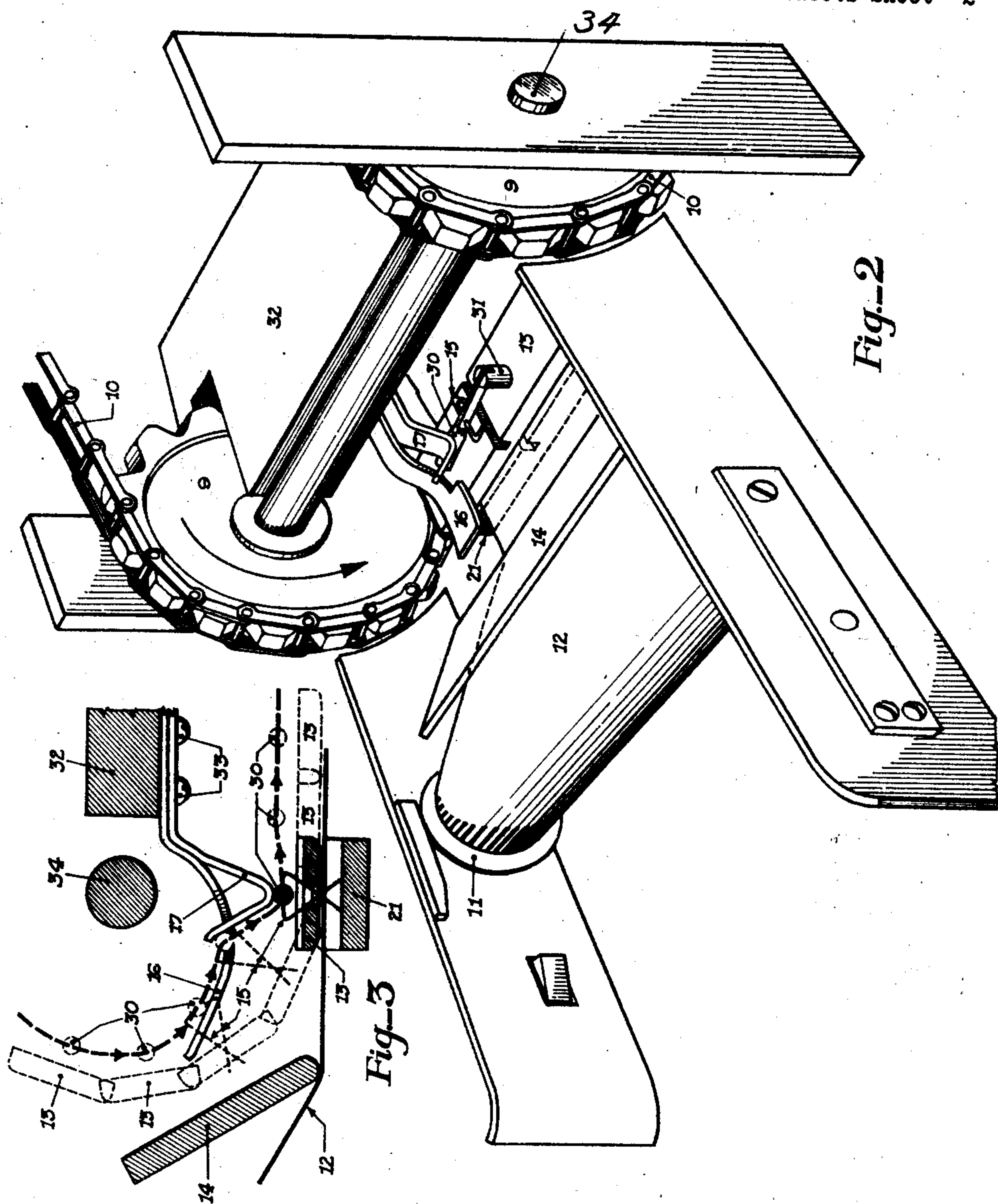
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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LOADING DEVICE FOR CONVEYING SYSTEMS.

Application filed September 18, 1926. Serial No. 136,265.

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 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 the 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 passing through 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 acted upon chemically by these solutions, the system being arranged so 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 relate a long strip of paper to a plurality of cross-bars which are equally spaced from each other, and which are permanently fixed to a movable belt or chain so that holes, or other perforations, may be successively pierced in the paper at predetermined inter-

vals in order to permit gripping means to be successively passed therethrough to grip the paper to the cross-bars, the paper being thereby conveyed from one point to another.

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 chemical solutions; Fig. 2 represents a perspective of a loading or feeding device for such a system for feeding flexible material, such as paper, to a plurality of cross-bars which are permanently fixed to a movable chain or belt; and Fig. 3 represents a diagrammatic analysis of the movements of the various elements comprising the feeding or loading device. 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, for example, be 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 within 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, for example, be of leather, canvas, rubber, etc. The pulley 7 is geared to a sprocket wheel 9 and therefore rotates the sprocket wheel, and, consequently, a movable sprocket chain 10 which meshes therewith is moved thereby. A reel of paper or of any other flexible material is designated by the reference character 11. This

reel of paper, suitably supported at the feeding or loading terminal of the system, un-reels 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 somewhat disproportionately 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 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, and other triggers are similarly associated 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. Thereafter 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, is conveyed through the baths of 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 comprises another 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 the 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 direct the sprocket chain, with the paper or other flexible material gripped thereto, through the various 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 understood that these controlling elements may be varied in practice, as conditions necessitate, so as to keep the paper, or other flexible mate-

rial, 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 suitable drying temperature by means of burners 20.

Fig. 2 represents in somewhat greater detail a perspective of the loading device which is located at the loading terminal. The reel 11, having paper thereon, is revolved so that the paper, which is of substantially uniform width throughout, is guided to the cross-bar 13 by means of the guide plate 14. The cross-bar 13 is permanently fastened to two movable sprocket chains 10, so that as these sprocket chains 10 are moved longitudinally by the sprocket wheels 9, the cross-bar 13 will be similarly moved. A trigger 30 is associated with the cross-bar 13 which is supported at one end by a pivot 31. It will be understood that while only one trigger has been shown in this figure associated with the cross-bar 13, of the drawing, merely for the purpose of illustration, any number of these triggers may be similarly associated with each cross-bar, which triggers may have considerably different shapes from the one shown, 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 is controlled by two cams 16 and 17. As the trigger 30, which is supported at one of its terminals by means of pivot 31 at the cross-bar 13, comes in contact with the cam 16, 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 trigger 30, moves upwardly with respect to the cross-bar 13. The pin 15 is brought to its most extreme upward position, and the paper unrolled from the reel 11 then becomes substantially flush with the lower surface of the cross-bar 13. Shortly thereafter, the free terminal of the trigger 30 comes in contact with the lower surface of the cam 17. Consequently the trigger is moved downwardly with respect to the cross-bar 13 at a suitable speed so as to pierce the paper adjacent to the lower surface of the cross-bar 13; the downward movement of the bar being prevented by a bar 21. The pin 15 then grips the paper to the cross-bar 13 so that the paper may be conveyed from the loading or feeding terminal of the system to the unloading terminal. A support 32 is located at the feeding or loading device and maintains the cams 16 and 17 permanently fixed in position thereat. Consequently as each cross-bar passes the loading device, each trigger and its associated pin are successively moved upwardly with respect to the cross-bar so as to permit the paper to become substantially flush with the under surface of the cross-bar, and are then

successively moved downwardly by the cam 17 so as to pierce the paper and grip it to that cross-bar.

Fig. 3 shows an analysis of the movements of the various elements at the feeding or loading 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 which is associated therewith. The paper 12 is guided by the guide plate 14 to the loading device. Except at the loading and at unloading devices the cross-bar 13 is at all times equally spaced from the free terminal of the trigger 30. At the loading device, however, the trigger moves over the upper surface of the cam 16 and consequently carries the pin with it upwardly with respect to the cross-bar 13. The cam 16 moves the trigger 30, and consequently the pin 15, to such a position that the paper 12 may become fairly flush with the lower surface of the cross-bar 13. Thereupon the cam 17 becomes effective to move the trigger 30, and consequently the pin 15, downwardly in order to pierce a hole in the paper. The cam 17 moves the pin still further downwardly with respect to the cross-bar, whereupon the pin grips the paper to the cross-bar and conveys it to the unloading terminal of the system. Thereafter the trigger 30, and the pin 15 associated with it, assume their normal positions with respect to the cross-bar. The cams 16 and 17 are shown in this figure permanently fixed to the support 32 by means of screws 33. The reference character 34 designates the shaft about which the sprocket wheels 10 revolve.

The unloading device, which is located at the unloading terminal of the system, is not shown herein in any separate view, but it is somewhat similar in construction to the loading device involving primarily means for raising the pin upwardly and away from the cross-bar so as to permit the paper to be deflected and separated therefrom, and means for thereafter releasing the pin so that it may assume its normal position with respect to the cross-bar.

While this invention has been described with particular reference to a system for conveying 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.

While certain particular embodiments of the invention have been shown and described herein merely for illustrative purposes, it is to be distinctly understood that the general principles of this invention may be set forth 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. In a conveying system, a plurality of sprocket wheels, a plurality of endless chains meshing with and being moved by said sprocket wheels at substantially the same speed, means for feeding flexible material unrolled from a reel to said endless chains so that it may be conveyed thereby, means for piercing and gripping the flexible material to the endless chains at definite intervals, and means for thereafter releasing the flexible material from the endless chains.
2. In a conveying system for conveying a flexible material pierced at equal intervals throughout its length, a plurality of sprocket wheels, a plurality of sprocket chains to be engaged and to be moved by said sprocket wheels, gripping and releasing means associated with said sprocket chains and carried thereby, means for rendering the gripping action operative to grip the flexible material to said sprocket chains at the pierced points, and means for rendering the releasing action operative to release the flexible material from said sprocket chains.
3. In a conveying system, a plurality of cross-bars which may be moved over a fixed path, and means associated with each of said cross-bars to grip and to release a strip of flexible and penetrable material to and from each of said cross-bars, respectively, said gripping means consisting of devices which may penetrate and then grip said flexible material, said releasing means withdrawing said devices to release said flexible material therefrom.
4. The method of conveying flexible material, such as paper, from one point to another with apparatus including a plurality of movable pins, which pins may be successively and uniformly moved between said points, which consists in penetrating the flexible material by said pins, gripping the paper thereto, and thereafter releasing the paper therefrom.
5. The method of conveying flexible and penetrable material, such as paper, from a first point to a second point, which consists in successively piercing the flexible material at the first point at predetermined intervals, and successively gripping the flexible material at the first point at said predetermined intervals, said flexible material being thus conveyed from said first point to said second point.
6. The method of conveying flexible and

penetrable material, such as paper, from a first point to a second point, which consists in successively piercing the flexible material at the first point at predetermined intervals, successively gripping the flexible material at the first point at said predetermined intervals, and successively releasing the flexible material at the second point at said predetermined intervals.

7. A system for conveying flexible and penetrable material, such as paper, from a loading point to an unloading point comprising means for successively piercing the flexible material at predetermined intervals at the loading point, and means for successively gripping the flexible material at said predetermined intervals also at said loading point, said flexible material being thereby conveyed from said loading point to said unloading point.

8. A system for conveying flexible and penetrable material, such as paper, from a loading device to an unloading device, comprising means for successively piercing the flexible material at predetermined intervals at the loading device, means for successively gripping the flexible material at said predetermined intervals also at the loading device, and means for successively releasing the flexible material at the unloading device at said predetermined intervals.

9. In a conveying system the combination of a plurality of sprocket wheels, two endless chains which mesh with said sprocket wheels, a plurality of cross-bars permanently fixed to said endless chains and moving therewith, said cross-bars being a predetermined distance from one another, a plurality of triggers carried by each of said cross-bars, a plurality of pins which may be moved upwardly or downwardly with respect to said cross-bars under the guidance of said triggers, and means for controlling the movement of said triggers.

10. In a conveying system, the combination of a plurality of sprocket wheels over which an endless chain passes, a plurality of cross-bars permanently fixed to said endless chain and moving longitudinally therewith, said cross-bars being at a predetermined distance from one another, a plurality of triggers each of which has one end permanently fastened to a cross-bar so that the other end may move transversely with respect thereto, a plurality of pins which may be moved transversely with respect to the

said cross-bars under the guidance of said triggers, and means for controlling the movement of said triggers.

11. A system for conveying paper from a loading device to an unloading device, which comprises an endless belt moving between said loading and said unloading devices for conveying a strip of paper therebetween, a plurality of cross-bars permanently fixed to said endless belt, means associated with each cross-bar for piercing holes in said paper at predetermined intervals, means associated with each cross-bar for penetrating a gripping member through each hole in said paper to grip the paper thereto, and means associated with each cross-bar for releasing the paper from the gripping member.

12. The method of loading flexible material upon a conveyor, which consists in feeding the flexible material to the conveyor, successively perforating the flexible material at some definite point, and successively penetrating the flexible material at substantially the same point in order to grip the flexible material to the conveyor to be conveyed thereby and to prevent its release in transit.

13. The method of loading flexible material upon a conveyor, which consists in feeding the flexible material to the conveyor, successively perforating the flexible material at some definite point, successively penetrating the flexible material at substantially the same point, and successively gripping said flexible material to said conveyor at substantially the same point, so as to prevent the release of the flexible material in transit, whereupon the flexible material may be conveyed by the conveyor.

14. The method of loading flexible material upon a conveyor to convey the flexible material from the loading terminal to an unloading terminal, which consists in successively perforating the flexible material at definite intervals as the flexible material reaches the loading terminal, preventing the flexible material from moving laterally to avoid perforation, and successively penetrating the perforated portions of the flexible material in order to suitably grip the flexible material to the conveyor to prevent the release of the flexible material in transit.

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

EDWARD F. DE POTTER.