Feb. 28, 1933. D. E. KEECH 1,899,338

CONVEYER CONTROL

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Fig. 1.

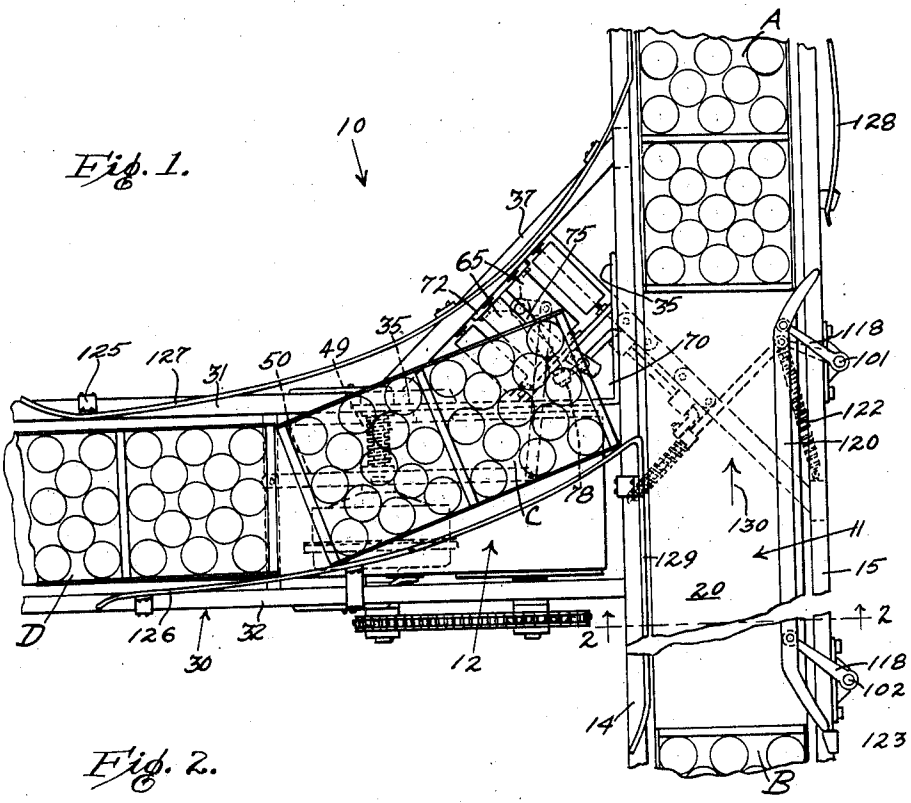
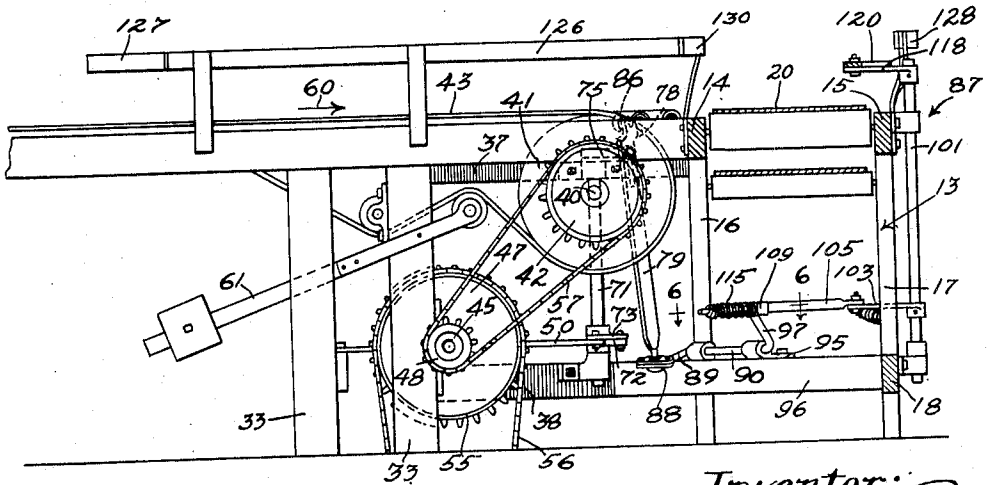


Fig. 2.



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Fig. 3.

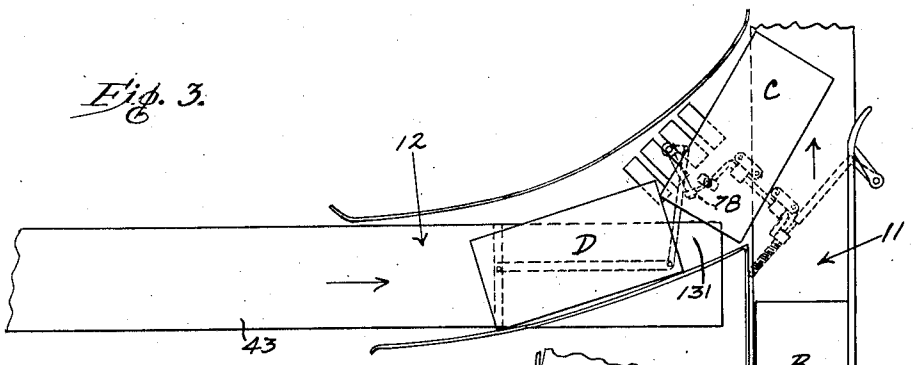


Fig. 4.

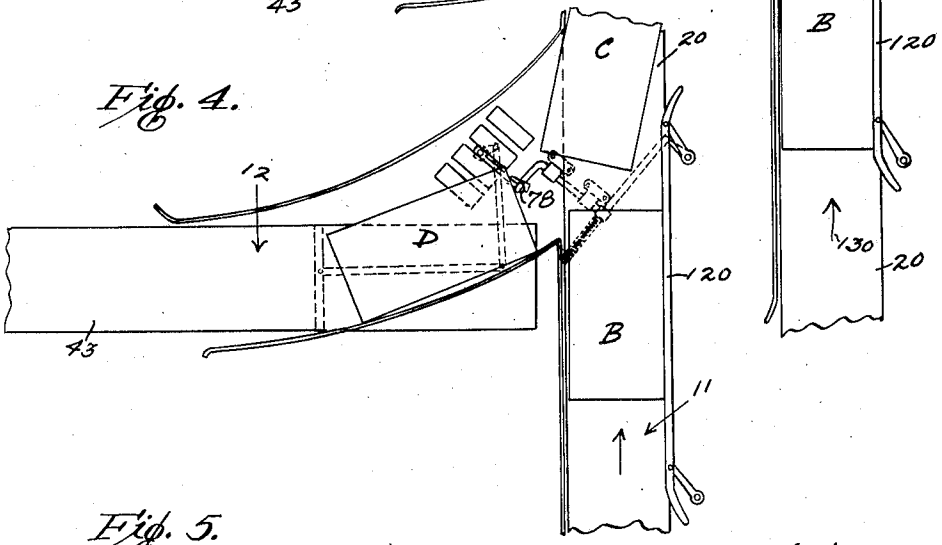


Fig. 5.

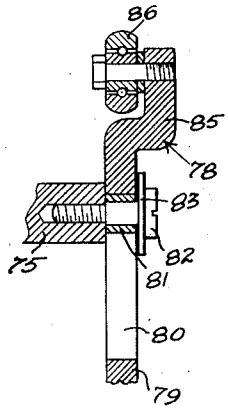
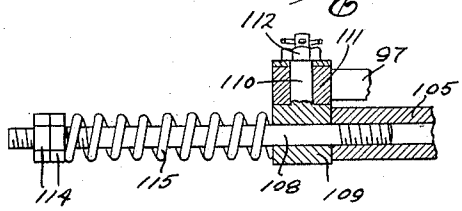


Fig. 6.



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UNITED STATES PATENT OFFICE

DANA E. KEECH, OF GLENDALE, CALIFORNIA

CONVEYER CONTROL

Application filed January 28, 1930. Serial No. 424,086.

My invention relates to conveyer controls and particularly to such controls as are automatically operated by articles carried on the conveyer.

While my invention is adaptable to many different situations involving conveyers, the embodiment of it disclosed herein comprises an automatic conveyer intersection switch.

The general purpose of such switches is to prevent articles on a feeder conveyer from fouling those carried on a main conveyer onto which the feeder discharges. Switches are in general use for this purpose but they all fall short of satisfactorily accomplishing it. The principal difficulty seems to have been that under certain circumstances a box which it is desired to restrain from passing into the intersection will come to rest supported partly upon a dead conveyer and partly on a live one. Thus supported, the box may be dragged slowly onto the live conveyer just in time to be carried into the intersection and foul another box having the right of way.

It is accordingly an object of my invention to provide an automatic control for a conveyer which will not halt operation of said conveyer with an article resting partly on said conveyer and partly off of it.

It is also an object to provide, by the use of this means, a conveyer intersection switch which will not jam.

The manner of accomplishing the foregoing objects, as well as further objects and advantages will be made manifest in the following description and in the accompanying drawings in which:

Fig. 1 is a plan view of a preferred embodiment of the automatic conveyer intersection switch of my invention.

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1.

Figs. 3 and 4 are diagrammatic plan views illustrating the operation of the invention.

Fig. 5 is a transverse vertical sectional view of the control member of my invention.

Fig. 6 is a fragmentary sectional view taken on the line 6—6 of Fig. 2 illustrating a detail of the control member positioning mechanism.

Referring specifically to the drawings, the illustrated embodiment of the invention is indicated generally by the numeral 10 and includes a primary conveyer 11 and a secondary conveyer 12. The primary conveyer 11 has a frame 13 which includes upper longitudinal members 14 and 15 and legs 16 and 17. Connecting two of the legs 17 is a lower longitudinal member 18. Supported in the usual manner by the longitudinal members 14 and 15 is a conveyer belt 20. The belt 20 is continuously driven by any suitable power means (not shown).

The secondary conveyer 12 includes a frame 30 having upper longitudinal members 31 and 32 which are supported upon legs 33. The member 32 connects directly to the frame member 14 while the member 31 is provided with a bracket 35 which connects to the primary conveyer frame member 14. One of the legs 33 is provided at the juncture of the bracket 35 with the horizontal frame member 31 and this leg 33 is braced by upper and lower diagonal braces 37 and 38 to the primary conveyer frame 13.

Journalled in suitable bearings attached to the horizontal members 31 and 32 is a shaft 40 carrying a pulley drum 41 and a sprocket 42. Disposed about the drum 41 and driven thereby is a secondary conveyer belt 43 which is disposed as shown and supported in the usual manner upon the frame members 31 and 32. Supported on a shaft 45 which journals in suitable bearings provided on a pair of the legs 33 is a clutch 47 and a pinion sprocket 48. Disposed about the shaft 45 to keep the clutch 47 normally closed is a spring 49 which is adapted to be compressed by a clutch lever 50, which is fulcrumed at one end on the frame 30. The clutch 47 is adapted to be rotated by a ring sprocket 55 provided on the periphery thereof and engaged by a chain 56. When the clutch 47 is engaged the sprocket 48 is driven thereby which in turn drives the sprocket 42 through the chain 57 so as to rotate the drum 41 and draw the conveyer belt 43 in the direction of the arrow 60. In order to keep the belt 43 at the proper tension a belt tightener 61 is provided on the frame 30.

Mounted between the member 37 and the

bracket 35 are four rollers 65, the uppermost elements of which are on substantially the same level as the upper flight of the belts 20 and 43.

Transmission control member and positioning mechanism

The bracket 35 is so formed as to provide an open space 70 therethrough which is located closely adjacent to the discharge end of the secondary conveyer belt of the conveyer 12. Mounted on a lower portion of a shaft 71 which is journalled in suitable bearings provided on inner faces of the diagonal braces 37 and 38 is a short arm 72 which is connected by a link 73 to the free end of the clutch lever 50. Mounted upon the upper end of the shaft 71 is a clutch arm 75 the end of which is disposed opposite the space 70 in the bracket 35.

Mounted on the outer end of the clutch control arm 75 is a control member 78. The member 78 includes an upright bar 79 having a slot 80 formed therein in which a roller 81 is disposed. The roller 81 is rotatably secured upon the outer end of the clutch control arm 75 by a screw 82 so that when the screw is in place the bar 79 is trapped between the end of the arm 75 and a washer 83 which is placed around the screw 82, but the bar 79 is slidable vertically on the roller 81 the full length of the free space in the slot 80. An upper end portion 85 of the bar 79 is offset as shown in Fig. 5 so that an antifriction roller 86 mounted upon this portion is substantially in alignment with the main body of the bar 79. When the bar 79 is in its lowermost position as shown in Figs. 2 and 5 the roller 86 is disposed out of contact with objects passing thereover on the belt 43 and the rollers 65, but when it is in its uppermost position with the roller 81 disposed in the lower end of the slot 80 the antifriction roller 86 extends above the surface of the belt 43 a sufficient distance to be engaged by an article carried thereon for a purpose which will be made manifest further on in this description.

The control member 78 is adapted to be positioned for actuation by a positioning mechanism 87. This includes a ball and socket joint 88 which connects the lower end of the bar 79 to an arm 89 of a bell crank 90. The bell crank 90 is journalled in a pair of bearings 95 provided upon a horizontal frame member 96 extending from the diagonal brace 38 to one of the posts 17. The opposite end of the bell crank 90 from the arm 89 has an arm 97.

The mechanism 87 also includes vertical shafts 101 and 102, these being mounted in suitable bearings provided upon the frame 13, the lower end of shaft 101 having an arm 103 secured thereto. To the outer end of the arm 103 is pivoted a tubular link 105 the opposite end of which is provided with a rod 108 extending therefrom as clearly shown in Fig. 6. The rod 108 extends through a swivel block 109 having a stud 110 which extends through and pivots in a head portion 111 of the bell crank arm 97. Suitable securing means 112 as shown in Fig. 6 retain the block 109 upon the head 11. Disposed about the rod 108 and held thereon by lock nuts 114, which are screwed onto the end of the rod 108, is a compression spring 115. This spring is normally under a tension so as to pressurably hold the block 109 against the adjacent end of the link 105.

Secured upon the upper ends of the shafts 101 and 102 are arms 118 which are pivotally connected by a box contacting bar 120 as shown in Fig. 1.

Also connected to the pivotal joint between the arm 103 and link 105 is a tension spring 122 which is also connected to the frame 13 so as to urge parts of the mechanism 87 into positions as shown in Fig. 1 where the bar 120 is disposed over the belt 20 and its rear end is pressing against a stop 123 as shown in Fig. 1.

Provided upon suitable metallic standards 125 which are secured to the frames 13 and 30 are metallic box guides 126, 127, 128 and 129. The form of these guides is shown in Fig. 1. The guide 126 extends diagonally across the discharge end of the secondary conveyer 12 and then bends back to form the guide 129, disposed alongside the primary conveyer 11 opposite the box contacting bar 120. The guide 127 is so curved and disposed, as shown, to shunt the rear portions of boxes onto the belt 20 when these have arrived at a position as shown by the leading box in Fig. 4. The guide 128 performs the function of preventing the leading ends of boxes passing from the secondary conveyer 12 onto the primary conveyer 11 from extending over the right hand edge of the belt 20 after they are entirely through the intersection 10.

The operation of my invention is as follows:

To begin with, the action of the spring 122 holding the parts of the mechanism 87 in the position in which they are shown in Figs. 1 and 2 causes the transmission control member 78 to rest in its downward or inactive position so that a box carried on the secondary conveyer 12 may pass over the control member and onto the primary conveyer 11 providing, of course, that there are no boxes upon the primary conveyer which will interfere with such a transfer. As before stated, it is the principal object of the intersection switch 10 to permit the transfer of boxes from the secondary conveyer 12 onto the primary conveyer 111 without any such interference being possible. The manner in which this object is accomplished will now be explained.

In Figs. 1, 3 and 4 are shown boxes car-

ried on the conveyers 11 and 12 in three successive situations, each situation developing from that preceding it in the normal operation of the intersection 10. As previously stated, the belt 20 of the primary conveyer 11 is continuously in operation so as to carry boxes disposed thereon in the direction of the arrow 130. In Fig. 1 the secondary conveyer 12 is in motion so as to carry boxes resting thereon towards the belt 20. In this figure we see box A on the primary conveyer 11 which has just passed out of contact with the box contacting bar 120 permitting the spring 122 to return this to its normal position as shown. Also resting on the primary conveyer 11 is a box B just about to contact the bar 120 so as to swing it outwardly and cause the link 105 to be drawn away from the block 109. This will place a yieldable pressure of the spring 115 against this block, tending to operatively position the control member 78. Traveling over the secondary conveyer 12 are boxes C and D, the front end of the former having just extended over the clutch control member 78 so that this member will not be able to rise into its upward or operative position when box B contacts the arm 120 with the results above noted. Thus when box B contacts the arm 120 the spring 115 will be compressed and the roller 86 will be forced under its pressure against the bottom of box C. Box D closely follows box C as shown.

In Fig. 3 box A has passed out of the picture, box B is in contact with the arm 120 approaching the juncture of the primary and secondary conveyers 11 and 12 at a safe distance from box C, which is turning the corner onto the belt 20 as shown and is entirely free from the secondary conveyer 12. Box C is still disposed over the control member 78 and is holding this in its downward position. Box D is still closely following box C but as yet rests practically entirely on the secondary conveyer 12. Owing to box C being carried away by the belt 20 a gap 131 is created between the boxes C and D in which the transmission control member 78 may rise when it has been cleared by box C.

Fig. 4 shows box C as it is disposed practically entirely on the primary conveyer 11. Box B has further advanced but is still in contact with the bar 120. Thus the control member 78 is still urged upwardly and as it has been freed from beneath box C it has risen into its upward position and into the path of box D and has been contacted thereby so that motion of the box D on the belt 43 has carried the control member 78 with it, rotated the shaft 71 and swung the clutch lever 50 so as to disengage the clutch 47, thereby disconnecting the secondary conveyer 12 from the power transmission means driving it. Motion of the belt 43 is thus halted, allowing box B to proceed on the belt 20 past the point of juncture between primary and secondary conveyers 11 and 12. As the box B passes out of contact with the arm 120 it will be approximately in the same position as box A in Fig. 1. At this moment, parts of the mechanism 87 return to their positions in which they are shown in Fig. 1 under the power of the tension spring 122 which causes the mechanism 87 to draw the control member 78 downwardly so that it disengages the front end of box C and permits the clutch 47 to be reengaged under the action of the clutch spring 49, which causes the motion of the clutch lever 50, which moves the control member 78 rearwardly into the position in which it is shown in Fig. 1. With the engaging of the clutch 47, motion of the secondary conveyer 12 recommences and box D is fed onto the primary conveyer 11 in the same manner as previously described for box C.

It is thus seen that owing to the yieldable urging of the control member 78 into the path of boxes on the secondary conveyer 12 this conveyer can never be stopped with a box partly upon this conveyer and partly upon the belt 20, thereby causing a "hangover" which might result in jamming of the boxes. It is furthermore to be noted that this arrangement might be useful in any situation where it is desired to actuate a control means for halting a conveyer such as the secondary conveyer 12 carrying articles thereon, and where it is desirable that the functioning of that control so actuated shall be deferred until an article reaches a definite position on the conveyer and that this deference be accomplished even though at the time the control is actuated an article is already slightly beyond this position so that after said actuation that article will be fed from the conveyer without the functioning of the control to stop the conveyer. Jamming is thus positively prevented in the intersection switch 10 by virtue of the fact that the arm 120 is long enough so that any box on the primary conveyer 11 coming into contact with the arm 120 will have to travel such a distance before reaching the juncture of the two conveyers that any box on the secondary conveyer at the time the bar 120 was first contacted and which was advanced far enough towards the primary conveyer so as to extend over the control member 78 will have ample time to completely transfer to the primary conveyer before the first mentioned box arrives at said point of juncture. Moreover, the secondary conveyer 12 as previously pointed out, can never be stopped with the box resting partly thereon and extending into the path of boxes carried on the primary conveyer 11, as the only time that the conveyer 12 can be stopped is with a box in the position of box D in Fig. 4, so that all boxes preceding it complete the transfer onto the primary conveyer and

all those following it are at rest upon the secondary conveyer.

It is therefore clear that, while I have shown but a single embodiment of my invention, many other uses and adaptations of the invention might be made without departing from the spirit of the invention or the scope of the appended claims.

What I claim is:

1. In combination: a primary conveyer; a secondary conveyer disposed at an angle thereto and adapted to discharge boxes onto said primary conveyer; means for guiding said boxes over the angle between said conveyers toward the direction of travel of said primary conveyer, as said boxes are discharged onto said primary conveyer; and a control member disposed in said angle and adapted to be extended upwardly to be actuated to perform a control function when engaged by the front of one of said boxes, contact with the bottom of a box being ineffective to actuate said control member.

2. A combination as in claim 1 in which means is provided for stopping and starting said secondary conveyer, said means being controlled by said control member to stop said secondary conveyer when the front of a box thereon engages said control member; and a member responsive to a box on said primary conveyer, approaching said intersection, and connected to said control member to extend the latter upwardly into position to be actuated by a box on said secondary conveyer.

3. In combination: a primary conveyer; a secondary conveyer disposed at an angle thereto and adapted to discharge boxes onto said primary conveyer; guide means for shifting a box laterally on said secondary conveyer as it is about to be discharged therefrom onto said primary conveyer, thus forming a free space between the rear end of said box and a second box immediately following; means controlling the movement of said secondary conveyer; and an actuating member for said control means adapted to be urged into said space in the path of boxes on said secondary conveyer, said member being responsive to engagement with a front face of a box to stop said secondary conveyer but unresponsive to engagement with a longitudinal face of a box, to accomplish this result.

4. A combination as in claim 3 in which a positioning member is provided for urging said control actuating member as aforestated when said positioning member is engaged by a box on said primary conveyer approaching said intersection.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 3rd day of January, 1930.

DANA E. KEECH.