Feb. 28, 1933. D. E. KEECH 1,899,336

CONVEYER CONTROL

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Fig. 1.

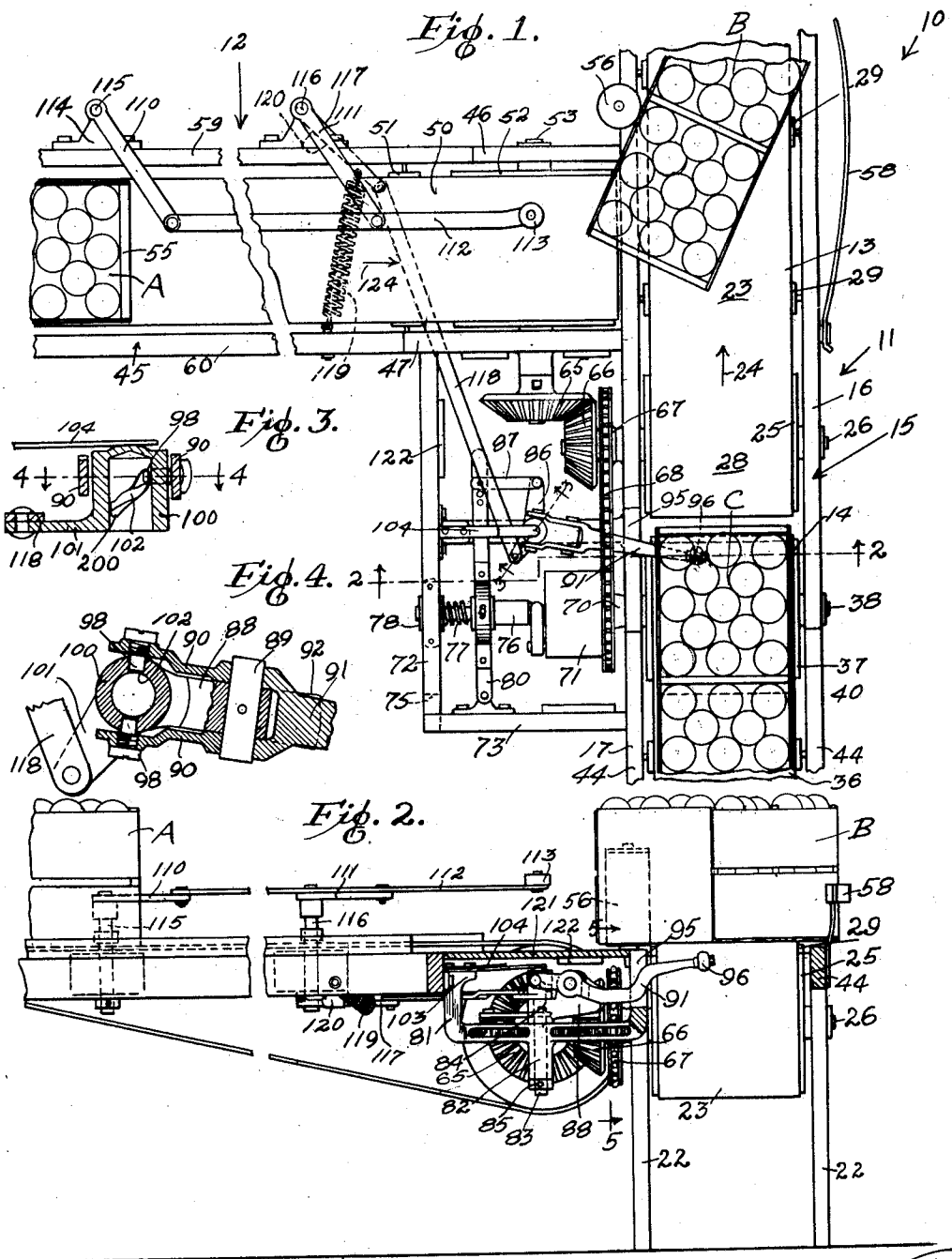


Fig. 3.

Fig. 4.

Fig. 2.

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Fig. 5.

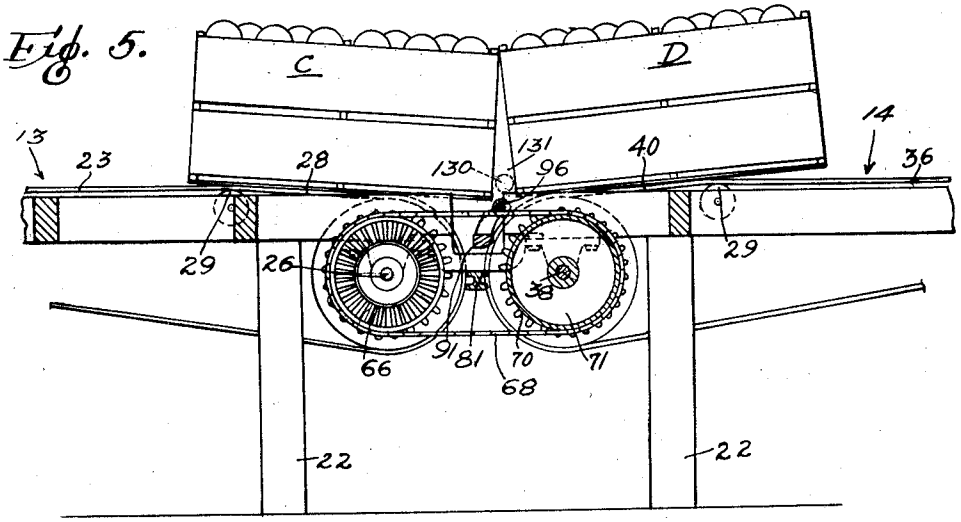


Fig. 6.

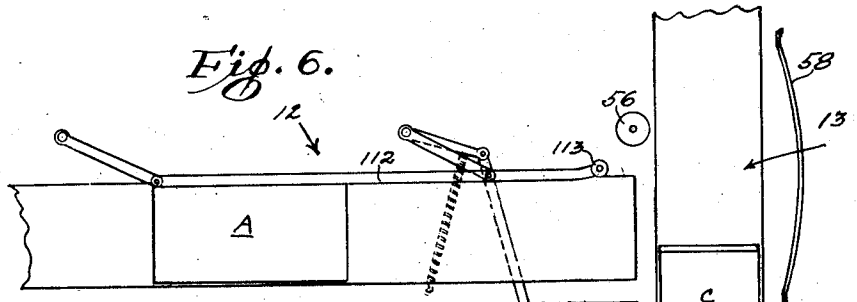
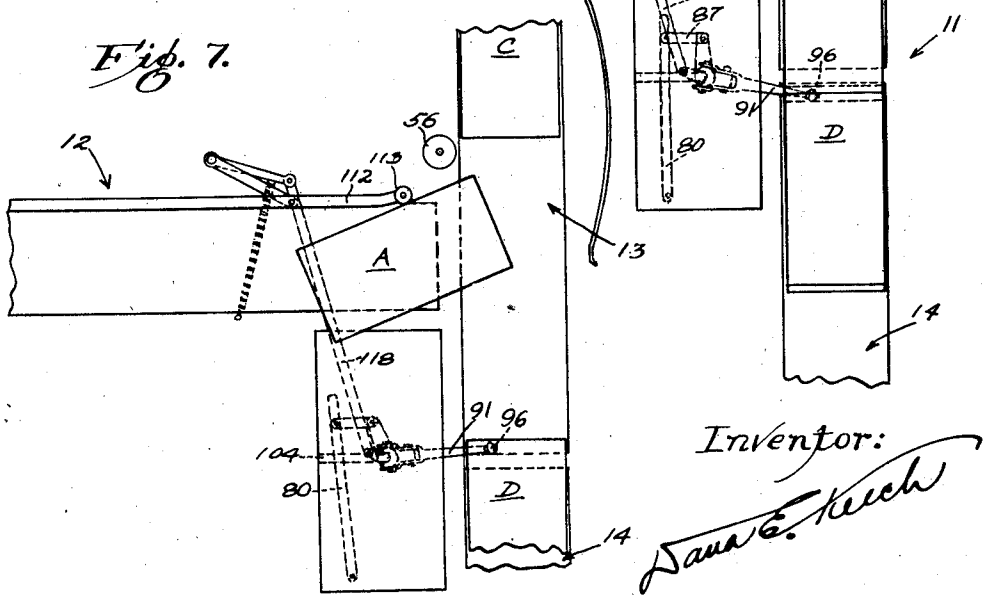


Fig. 7.



Inventor:

Dana E. Keech

Patented Feb. 28, 1933 1,899,336

UNITED STATES PATENT OFFICE

DANA E. KEECH, OF GLENDALE, CALIFORNIA

CONVEYER CONTROL

Application filed December 17, 1929. Serial No. 414,667.

My invention relates to conveyer controls, and an important object of the invention is to provide an automatic conveyer intersection switch which will perform its functions under practical conditions without jamming.

In an article handling apparatus it is often desirable to accomplish a controlling function of some kind which is related to the presence or absence of articles on a conveyer at a certain point thereon. It is another object of my invention to provide an improved means for accomplishing such a control.

It is a further object of my invention to provide such a control which normally does not affect the travel of articles on a conveyer passing a given point but that when actuated accomplishes the control function when an article reaches a predetermined position.

It is a still further object of my invention to provide such a control means which is responsive to the presence of articles on a conveyer and is adapted to be actuated by contact with an article but which is not actuated by contact with an article which has proceeded past the exact position in which an article must be on the conveyer in order to operate the control means to accomplish its controlling function.

It is yet another object of my invention to provide a power control means to accomplish a controlling function of some kind which is related to the presence or absence of a given actuating member at a definite point in a given path along which this member moves.

The manner of accomplishing the foregoing object 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.

Fig. 3 is a fragmentary vertical sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a horizontal fragmentary sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is a vertical sectional view taken on the line 5—5 of Fig. 2.

Figs. 6 and 7 are diagrammatic plan views illustrating the operation of the invention.

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 includes a leading conveyer section 13 and a following conveyer section 14, both of which are mounted upon a frame 15 having longitudinal frame members 16 and 17 which are supported by suitable legs 22. The leading conveyer section 13 includes an endless belt 23 which travels in the direction of the arrow 24 and is driven from the opposite end from that shown in the drawings. This belt extends around a drum 25 mounted on a shaft 26 journalled in suitable bearings secured to lower faces of frame members 16 and 17. The drum 25 is so positioned that a portion 28 of the belt 23, which is disposed between the drum 25 and the nearest of a series of rollers 29 which support the upper flight of the belt 23, is slightly inclined as shown in Fig. 5.

The following conveyer section 14 includes an endless belt 36 which is driven by a drum 37 around which the belt extends as shown and which is mounted upon a shaft 38 which turns in suitable bearings secured to lower faces of frame members 16 and 17. The belt 36 also has an inclined portion 40 similar to the inclined portion 28 of the belt 23. Secured to upper faces of the frame members 16 and 17 so as to be disposed opposite the following conveyer belt 36 are guide members 44.

The secondary conveyer 12 has a frame 45 which includes longitudinal members 46 and 47 which connect with the longitudinal frame

member 17 of the primary conveyor 11. The conveyer 12 has an endless belt 50, the upper flight of which is supported by rollers 51, and which is driven by a drum 52 supported on a shaft 53 which is journalled in suitable bearings secured on the lower faces of the frame members 46 and 47. The conveyer 12 is so disposed that articles such as boxes 55 packed full of fruit may be carried theron and discharged onto the leading conveyer section 13 of the primary conveyer 11, there being a roller 56 provided in upright position at the angle between these two conveyers about which a box may turn as shown in Fig. 1. When these boxes are turned they may be guided by a guide bar 58 which is mounted on suitable standards secured to the frame members 16. Secured upon upper faces of the frame members 46 and 47 are article guides 59 and 60 which are adapted to retain the boxes 55 in place upon the belt 50.

A mechanism 61 will now be described which has to do with driving of the secondary conveyer 12 and the following conveyer section 14 as well as the controlling of the latter to prevent boxes carried on the primary conveyer 11 from interfering with the transfer of boxes from the scondary conveyer 12 onto the leading primary conveyer section 13.

The shaft 53 is driven by the shaft 26 by a pair of bevel gears 65 and 66 mounted upon these shafts respectively. Thus the conveyer 12 and the leading conveyer section 13 are continually in operation. Also mounted on the shaft 26 is a sprocket 67 connected by a chain 68 to a sprocket 70 formed integral with the exterior shell of a clutch 71 which is mounted upon the shaft 38 as shown. The major portion of the drive and control mechanism 61 is surrounded by horizontal frame members 72 and 73 one end of each of which connects respectively to the frame members 47 and 17, their outer or free ends being supported by a post 75. The shaft 38 extends beyond the clutch 71 and receives a clutch cone 76, a clutch spring 77 and is supported by a bearing 78 mounted upon a lower face of the frame member 72. Pivotally mounted upon an inner face of the frame member 73 and provided with a yoke which extends around and connects with the clutch cone 76 is a clutch throwout lever 80.

Disposed between and connected to the horizontal frame members 17 and 72 at a point directly opposite the space between the leading and following conveyers 13 and 14 respectively is a clutch control arm base 81 having a bearing 82 formed intermediate the ends thereof. Rotatable in the bearing 82 is a shaft 83 having rigidly mounted thereon above the bearing 82 a clutch control arm hub 84 and, below this bearing, a collar 85. Formed integral with the hub 84 is a short arm 86 which is connected by a link 87 to one of several holes provided in the free end of the clutch control lever 80 as shown in Fig. 1. The hub 84 also has a lateral extension 88 which is adapted to receive a pin 89 upon the extending ends of which are pivoted the legs 90 of a bifurcated clutch control arm 91. The extension 88 also has a shoulder 92 upon which the arm 91 may rest when in its downward position. The member 17 has an opening 95 formed thereon through which the arm 91 extends as shown in Figs. 1, 2 and 5. The arm 91 extends under the chain 68 and is shaped as shown to permit it to swing about the pin 89, for a purpose to be described later, without interfering with the proper operation of the chain 68 and the sprockets around which this extends.

Provided on the end of the arm 91 is an antifriction roller 96. Provided in the legs 90 to extend inwardly opposite the axis of the shaft 83 are pins 98.

Disposed about an upper projecting portion of the shaft 83 is a cap 100 having an arm 101, by which it may be rotated, and a pair of similar oppositely disposed helical cam slots 102 into the upper ends of which the pins 98 normally extend. Secured to a shoulder 103 of the base 81 is a leaf spring 104 the end of which rests upon the top of the cap 100.

Pivotally suspended on ends of free swinging arms 110 and 111 which extend over the conveyer 12 is a connecting rod 112 having a roller 113 at its forward end.

The swinging arms 110 and 111 are fixed on the upper ends of short shafts 115 and 116 which journal in suitable bearings 114 provided upon the longitudinal frame member 46. Secured upon the lower end of the shaft 116 is an arm 117 the end of which is pivotally connected to a link 118, the upper end of this link being pivotally connected to the arm 101 of the cap 100. Connected at one end to the frame member 47 is a tension spring 119 which constantly urges the arm 117 and the parts connected thereto into the position in which they are shown in Fig. 1, this position being determined by a stop 120 which extends downwardly from the bearing 114 of the shaft 116.

The drive and control mechanism of the conveyer switch 10 is covered by a lid 121 which rests downwardly upon supports 122 provided upon inner faces of frame members 17, 47, 72 and 73. This lid is removed in Fig. 1, but is shown in place in Fig. 2.

The operation of my invention is as follows:

The leading section 13 of the primary conveyer 11 and the secondary conveyer are continually moving in the direction of the arrow 24 and the arrow 124 respectively. The following conveyer section 14 is normally moving in the direction of the arrow 24, but is adapted to be stopped and started again by the control mechanism 61. This stop-

ping and starting, which is for the purpose of preventing boxes being delivered from the following conveyer 14 onto the leading conveyer 13 so as to interfere with the transfer of boxes from the secondary conveyer 12 onto the leading conveyer section 13, is accomplished in the following manner.

As the embodiment illustrated herein is designed particularly for use in the citrus industry, the articles 55 illustrated comprise packed boxes of oranges. Three successive dispositions of the same boxes are illustrated in Figs. 1, 6 and 7 respectively. In Fig. 1 a box A is shown on the conveyer 12 just about to contact with the arm 110. A box B has just passed out of contact with the connecting rod 112 and is turning the corner from the secondary conveyer 12 onto the leading conveyer section 13 of the primary conveyer 10. A box C is traveling on the following conveyer section 14 so that the forward end of the box has just been extended over the roller 96 of the clutch control arm 91. Although not shown in Fig. 1, a box D is closely following box C on the following conveyer section 14, adjacent ends of boxes C and D being in contact with each other.

Fig. 6 shows box A after having traveled some distance in contact with the connecting rod 112 with this rod moved so as to stretch the spring 119 and rotate the collar 100 so that this collar rides upwardly upon the pins 98 and transmits the downward pressure of the spring 104 onto the legs 90 of the clutch control arm 91, thus urging the roller 96 upwardly. Boxes C and D have traveled to the positions in which they are shown in Figs. 5 and 6, in which the box C rests upon the inclined portion 40 of the belt 36. This causes the upper portions of the adjacent ends of these boxes to contact and the lower portions of these ends to separate to cause a gap or clear space 130 therebetween. Owing to the fact that the roller 96 is being urged upwardly by the spring 104, this roller immediately enters the space 130 when this comes opposite it so that the roller 96 comes into its dotted line position 131 as shown in Fig. 5. In this position the roller 96 is immediately contacted by the box D so as to swing the arm 91 into the position in which it is shown in Fig. 7, this throwing the clutch lever 80 as shown in Fig. 7, which withdraws the clutch cone 76 from the clutch 71 and stops movement of the following primary conveyer section 14.

Fig. 7 shows box C in the position which it will have upon the leading primary conveyer section 13 when box A commences to turn thereinto from the secondary conveyer 12. It is noted that box C is in advance of and entirely clear of the box A, which box is still in contact with the roller 113 of the connecting rod 112. As soon as the turning of the box A has progressed a little further it will be in the position of box B in Fig. 1 so that the roller 113 will be released to permit the connecting rod 112 and associated parts to be returned by the spring 119 into the positions in which they are shown in Fig. 1. This return movement of the cap 100 from the position in which it is shown in Fig. 7 to the position in which it is shown in Figs. 1 and 4, positively forces the arm 91 to rotate upon the pin 89 so as to depress the roller 96 from the position in which it is shown in Fig. 7 to the position immediately therebelow, thereby disengaging the front end of the box D so that, propelled by the spring 77, it returns to the full line position in which it is shown in Fig. 5, thereby permitting the spring 77 to throw in the clutch 71 and start the belt 36 in motion. The positive action of the cap 100 on the arm 91 results from the fact that when the arm 101 is in the position in which it is shown in Fig. 7 and the roller 96 is free to rise under the action of the spring 104, the collar 100 is caused to seat down upon the upper end of the hub 84. Thus when the collar 100 is rotated back to the position in which it is shown in Figs. 1 and 2, the cam slots 102 positively lift the pins 98 which forces the opposite end of the clutch control arm 91 downwardly.

By the depression of the clutch control arm 91 in this manner the roller 96 on the end thereof is moved downwardly out of contact with box D so that under the urging of the clutch spring 77 the clutch arm 91 is swung back to the original position in which it is shown in Fig. 1 which causes the clutch cone 76 to re-engage the clutch 71 and start the following conveyer section 14. At the time that the conveyer section 14 is started box A is in the position of box B in Fig. 1.

I have chosen the positions for the boxes in the illustrations which would give the maximum tendency for conflict or jamming of the boxes at the intersection if this were possible. Owing to the fact that the control arm 91 is disposed at the meeting point of the two conveyer sections 13 and 14 and that it is only actuated by contact with the front end of a box it is impossible for any box to be resting partly upon the conveyer section 13 when the conveyer section 14 is stopped. In all conveyer intersections formerly employed this is a possibility and frequently results in a box thus stalled to be slowly dragged onto the belt 13 just in time to pick up speed and be delivered to the intersection so as to jam with a box being delivered onto the primary belt 11 from the secondary belt 12.

Attention is called to the fact that the lower portions 200 of each of the slots 102 are disposed horizontally so that rotation of the arm 91 and consequent movement of the pins 98 in these slots does not affect the vertical position of the roller 96 of the arm

91 owing to the fact that the pins 98 during such rotation are disposed in the horizontal portions 200 of these slots.

The invention, a preferred embodiment of which has just been described, was invented at about the same time as several other conveyer controls. These other controls are covered in my copending applications for U. S. Letters Patent, Ser. No. 424,085 and Ser. No. 424,086, both filed on January 28, 1930. Owing to the fact that the present application was the first filed of this group, it is desired that the novel features common to this group of inventions be covered in the claims in this case. For this reason the scope of claims in this case should not be limited by attributing to the terminology of these claims the specific meaning with which this terminology is used in describing the preferred embodiment of my invention disclosed herein, excepting of course in claims which are obviously specific to this particular embodiment.

Attention is particularly called to the use of the terms "primary conveyer" and "secondary conveyer" in the foregoing description. While the primary conveyer 11 is there described as including two tandem sections 13 and 14 and the secondary conveyer is described as the conveyer 12 feeding boxes onto the leading section 13, these terms as used in the claims are not necessarily restricted to the meaning with which they are used in the above description. In the claims they are used primarily to distinguish between one conveyer and another, and in many of the claims have no other significance. Certain of the claims, for instance, use the term "primary conveyer" as referring to the combined conveyers 12 and 13 which run continuously, and use the term "secondary conveyer" as applying to a conveyer such as the conveyer 14, which is controlled by certain control means rendered operative by boxes on the primary conveyer.

In each of the control devices above referred to and of which the present invention is one, the control means is box responsive to accomplish a certain control function, but this responsiveness is limited to a condition where the control means has a certain longitudinal relation with a particular transverse section of the box. In the preferred embodiment illustrated herein this section comprises the leading head of the box and the longitudinal relation which must exist between the control member and this section for the control member to accomplish its control function is for this control member to be in advance of this transverse section of the box so that this transverse section comes in contact with the control member and thus actuates it. One of the important features of the invention is thus seen to be the exclusive responsiveness of the control means to a certain transverse section of the box, which section is shorter than the box itself. In fact, the shorter this section is the more accurate the control of the box will be.

What I claim is:

1. In an automatic conveyer intersection switch, the combination of: a primary conveyer including leading and following sections; a secondary conveyer disposed to feed articles onto said leading section; movement controlling means; means actuated by an article on said secondary conveyer to cause said movement controlling means to cause the movement of a foremost article on said following section, when said article reaches a certain position, to be temporarily discontinued; and means rendering said controlling means inoperative as to said foremost article when said article overlaps said position, but permitting said controlling means to act upon the next article on said following conveyer section when it reaches said position.

2. In an automatic conveyer intersection switch, the combination of: a primary conveyer including leading and following conveyer sections; a secondary conveyer disposed to feed articles onto said leading conveyer section; means for driving said following conveyer section; drive control means actuated by an article on said secondary conveyer to halt operation of said driving means when a foremost article thereon reaches a definite position; and means rendering said drive control means inoperative when said foremost article overlaps said definite position but permitting said drive control means to halt operation of said driving means when the next article thereon reaches said definite point.

3. In an automatic conveyer intersection switch the combination of: a primary conveyer including leading and following conveyer sections; a secondary conveyer disposed to feed articles onto said leading conveyer section; means for driving said following conveyer section; drive control means which is disposed normally out of the path of articles traveling on said following conveyer section; means for yieldably urging said drive control means into a position in which it will be engaged by an article on said following section and moved with said article to halt operation of said driving means, said urging means being inoperative to effect said positioning when an article is being transferred from said following section onto said leading section; and means operated by an article on said secondary conveyer to work said urging means.

4. In an automatic conveyer intersection switch the combination of: a primary conveyer including leading and following conveyer sections; a secondary conveyer disposed to feed articles onto said leading conveyer section; means for driving said following conveyer section; drive control means which

is disposed normally out of the path of articles traveling on said following conveyer section; means for yieldably urging said drive control means into a position in which it will be engaged by a front portion of an article on said following section and moved with said article to halt operation of said driving means, said urging means being inoperative to effect said positioning when said urging takes place while an article is opposite said drive control means; and means operated by an article on said secondary conveyer to work said urging means.

5. In an automatic conveyer intersection switch, the combination of: a primary conveyer including leading and following conveyer sections; a secondary conveyer disposed to feed articles onto said leading conveyer section; means for driving said following conveyer section; drive control means which is disposed normally out of the path of articles traveling on said following conveyer section; means for yieldably urging said drive control means into a position in which it will be engaged by a front portion of an article on said following conveyer section and moved with said article to halt operation of said driving means, said urging means being inoperative to effect said positioning when said urging takes place while an article is opposite said actuating means but with said front portion thereof in advance of said actuating means; means for separating adjacent articles so as to permit said positioning to take place in front of the next article on said following conveyer section to approach said drive control means after said yieldable urging has taken place; and means operated by an article on said secondary conveyer to work said urging means.

6. In combination: article receiving means; a conveyer adapted to discharge articles onto said article receiving means; means for driving said conveyer; drive control means for engaging an article propelled by said conveyer to utilize movement of said article to disconnect said drive means; means for urging said drive control means into said engagement so that it will function only when engaged by a front portion of one of said articles; and means for providing a free space in advance of a front portion of an article closely following another article to permit said drive control means to engage said front portion of said following article.

7. In combination: article receiving means; a conveyer adapted to discharge articles onto said article receiving means; means for driving said conveyer; drive control means located at the discharge end of said conveyer for engaging an article carried on said conveyer to utilize movement of said article to disconnect said driving means; means for urging said drive control means into said engagement so that it will function only when engaged by a front portion of one of said articles; and means for providing a free space in advance of a portion of an article closely following another article to permit said drive control means to engage said front portion of said article.

8. In a power control means adapted to be actuated by one of a series of moving articles having fairly definite side and front faces, the combination of: a control member adapted to accomplish a controlling function when actuated; means for moving said member towards the path of said articles; and anti-friction means provided on said member and adapted to contact a side face of an article opposite said member to prevent actuation of said member by such article, said member being actuated by an article upon contacting a front face thereof.

9. In combination: a power operated conveyer; means for stopping and starting said conveyer; means for actuating said aforementioned means by the power of said conveyer communicated through an article carried thereon; means for moving said actuating means into the path of a portion of such an article, said portion having a definite location longitudinally on said article so that when said portion engages said actuating means it stops said conveyer with said article in a definite position longitudinally thereon; and means embodied in said actuating means for preventing its operating said stopping and starting means to stop said conveyer when said actuating means is moved into engagement with another portion of said article than the aforesaid portion.

10. In combination: primary and secondary power conveyers delivering articles into a common space; means for halting said primary conveyer; means actuated by an article on said primary conveyer for operating said halting means to stop said primary conveyer; means controlled by an article on said secondary conveyer for positioning said operating means for such actuation; and means preventing actuation of said operating means except by a box arriving at the location thereof after said positioning means has been operatively engaged by an article on said secondary conveyer.

11. In combination: primary and secondary power conveyers delivering articles into a common space; means for halting said primary conveyer; means actuated by an article on said primary conveyer for operating said halting means to stop said primary conveyer; means controlled by an article on said secondary conveyer for positioning said operating means for such actuation; and means preventing actuation of said operating means except by a box arriving at the location thereof after said positioning means has been operatively engaged by an article on said secondary conveyer, each article actuating said

operating means being in a definite position on said primary conveyer when the latter is halted.

12. In combination: article conveying means; power control means adapted to be actuated by movement over a given path by contact with an article moved by said conveying means; means for moving said control means over a different path to place it in operative position relative to an article being advanced by said conveying means; and antifriction means on said power control means to prevent its actuation when said control means engages a side of one of said articles.

13. In combination: a conveyer; a control member adapted to accomplish a controlling function when actuated; means for moving said member into the path of an article on said conveyer to cause the front end of said article to engage said member and move it longitudinally relative to said conveyer a predetermined distance so as to actuate said member; means for withdrawing said member from the path of said article after its being thus actuated; and automatic means for returning said member, when thus withdrawn and while still opposite said article, in the opposite direction from that in which it was moved by said article and a substantially equal distance.

14. In combination: a conveyer; a control member adapted to accomplish a controlling function when actuated; means for moving said member into the path of an article on said conveyer to cause the front end of said article to engage said member and move it longitudinally relative to said conveyer a predetermined distance so as to actuate said member and accomplish said control function; means for withdrawing said member from the path of said article after its being thus actuated; and automatic means for accomplishing the negativing of said control function when said member is thus withdrawn and while it is still opposite said article.

15. In combination: a conveyer; means for starting and stopping said conveyer, said means having a control member; means for moving said member into the path of an article on said conveyer to cause the front end of said article to engage said member and move it longitudinally relative to said conveyer a predetermined distance, this movement accomplishing the stopping of said conveyer; means for withdrawing said member from the path of said article after its being thus actuated, said stop and start means automatically starting said conveyer when said member is thus withdrawn from in front of said article.

16. In a device for controlling movement of a box handling power conveyer, the combination of: power transmission means for operating said conveyer; means causing a free space between a box being discharged from said conveyer and a box immediately following; a control member adapted to disengage said transmission means; and means to extend said member into said space to accomplish said disengagement, said member being inoperative to accomplish said disengagement while withheld from entering the path of said boxes by contact with a longitudinal face of a box.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 11th day of December, 1929.

DANA E. KEECH.