

May 5, 1931.

C. S. JENNINGS ET AL

1,803,391

DEFLECTOR CONTROL MECHANISM

Filed April 5, 1929

3 Sheets-Sheet 1

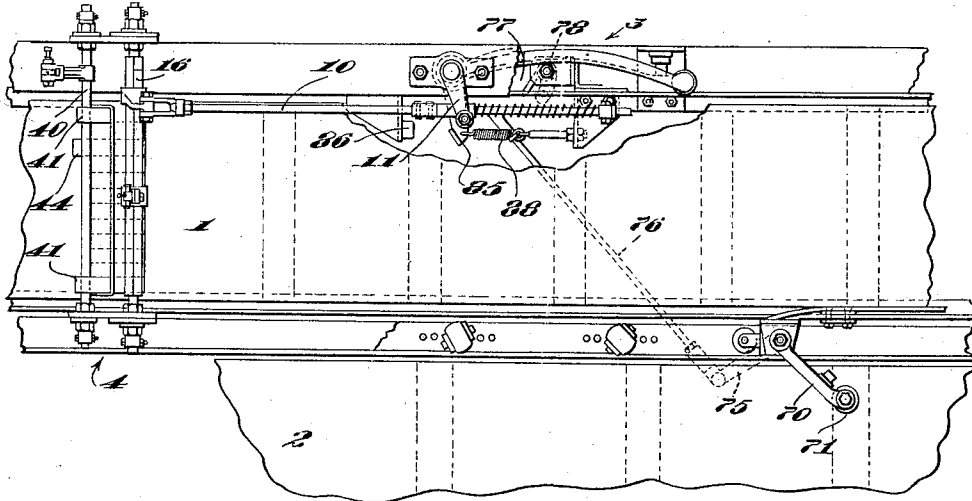


Fig. 1

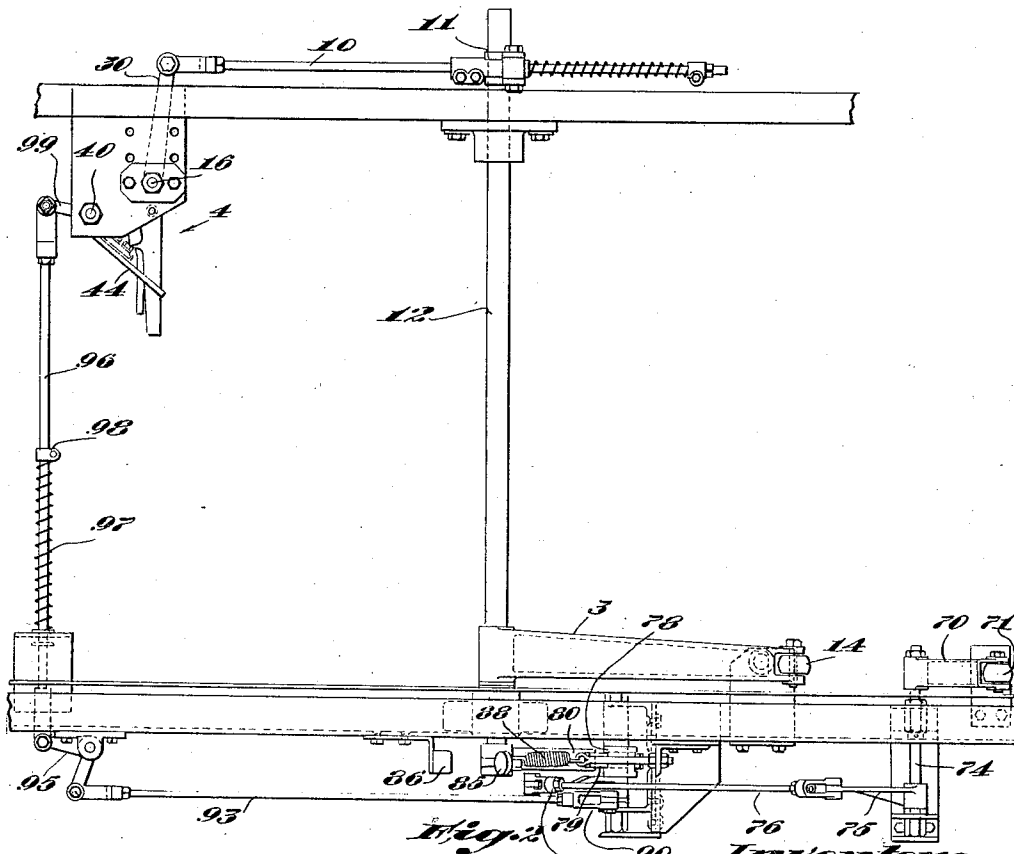


Fig. 2

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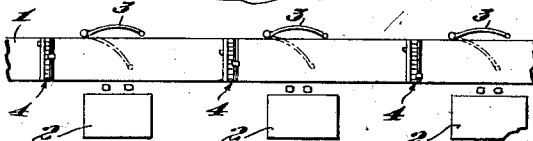
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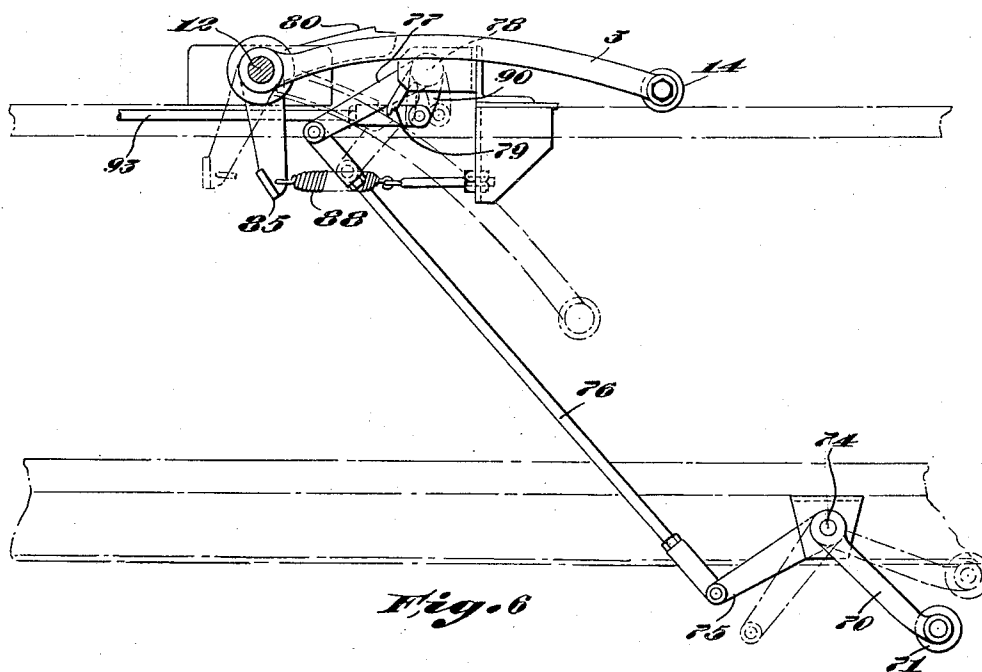


Fig. 6

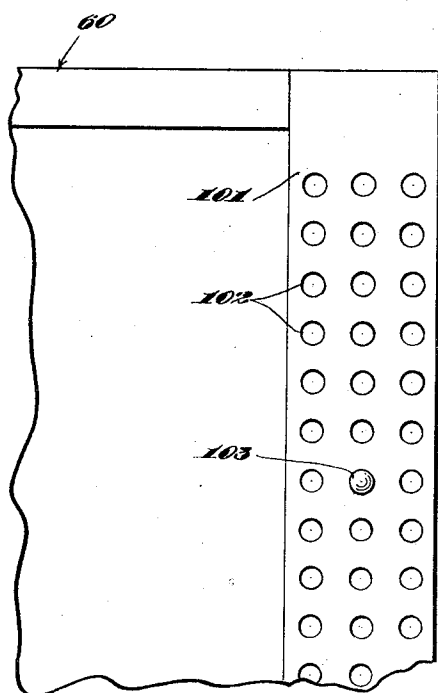


Fig. 7

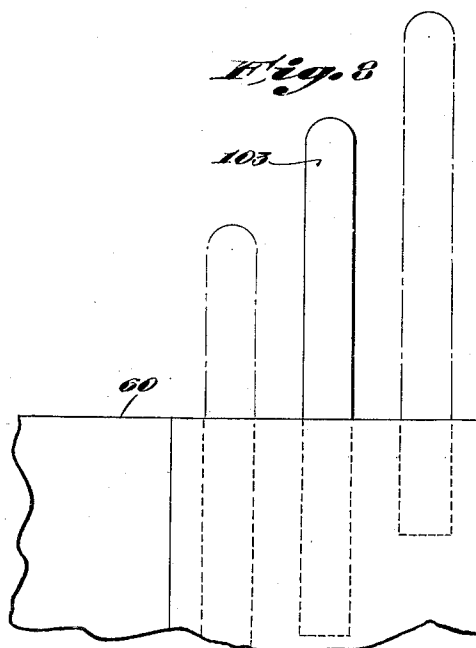


Fig. 8

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UNITED STATES PATENT OFFICE

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DEFLECTOR-CONTROL MECHANISM

Application filed April 5, 1929. Serial No. 352,671.

This invention relates to improvements in conveyor systems and particularly to means for diverting articles from a main to an auxiliary conveyor, and for preventing the continued diversion of such articles when the auxiliary conveyor is occupied or filled.

This invention is particularly applicable to use with deflectors that are adapted to engage articles carried by a belt conveyor and to divert them from the same to an auxiliary conveyor or dwell station which is arranged beside or adjoining the main belt. In order to operate deflectors of this character, contacts or tabs are arranged on boxes or articles to be deflected in such a manner that they will operate control means for a selected deflector to divert the carrier or box to a predetermined auxiliary conveyor, although they readily pass other deflector controlling mechanisms until they reach the control means for the selected deflector. Apparatus of this general character is disclosed, for example, in Patent No. 1,535,075 to T. S. Knapp.

In accordance with the present invention means is provided to release the deflector from operative position after an article has been deflected thereby, and means is associated therewith automatically to interrupt the normal functioning of the control means for the deflector so that the control means is no longer effective in causing the deflector to move to its operative position if the auxiliary conveyor is occupied. Furthermore, the deflector control means is arranged so that the deflector will be operative in response to a pin or tab of a given height and in a given lateral position and so that it will be rendered inoperative either when the tab projects at a different height or when a second auxiliary pin is properly positioned, thereupon permitting the box to pass to a subsequent deflector for diversion to a dwell station. Further features of the invention relate to the specific mechanical control means provided for controlling and operating the deflector and for rendering the normal control mechanism inoperative.

In the accompanying drawings,

Fig. 1 is a top plan view of a portion of a main conveyor belt, and of an auxiliary

conveyor belt, with a deflector control mechanism and related parts associated therewith; certain portions of the main belt being broken away to indicate more clearly the arrangement of these parts;

Fig. 2 is a side elevational view of a portion of the mechanism shown in Fig. 1;

Fig. 3 is an elevational view of an auxiliary deflector control unit;

Fig. 4 is a side elevational view of the same together with a main deflector controlling factor;

Fig. 5 is a similar view showing the latter being actuated;

Fig. 6 is a plan view of the deflector and related parts;

Fig. 7 is a top plan view of a portion of a typical carrier box;

Fig. 8 is an elevational detail of the same, the dot and dash lines showing optional positions of contacts or tabs; and

Fig. 9 is a diagrammatic plan view, to small scale, illustrating a conveyor system embodying the invention.

Referring to Fig. 9 the invention is illustrated as embodied in a conveyor system comprising a main track or pathway along which carriers, or other articles, or material are moved, for example by a conveyor belt 1 having at spaced intervals divergent auxiliary conveyor paths, dwell stations, or the like indicated at 2, and of which in accordance with the scope of the present invention there may be a great number.

For selectively determining the delivery of carriers or the like to the several dwell stations, I provide a diverter adjacent to each station or auxiliary conveyor, such diverter being here shown as a normally inoperative deflector or switch 3 movable to an oblique position across the path of articles on the main conveyor, and when thus positioned switching the articles which engage it into the corresponding station or auxiliary conveyor.

For each diverter or deflector switch 3 I provide actuating mechanism generally designated by the numeral 4 (Fig. 1). This actuator mechanism is designed to move the deflector 3 to operative position in response to

a predetermined or selected conditioning of articles upon the main conveyor 1. For example, each box or carrier which is normally conveyed by apparatus of this character may be provided with a series of holes adapted to receive one or more upstanding pins. Such pin (or pins) in accordance with its position in a selected hole in the box is adapted only to operate a selected deflector controlling mechanism whereby the corresponding deflector is swung into the path of the boxes in order to divert the same onto the corresponding auxiliary conveyor.

The actuator mechanism 4 (Figs. 1 and 2) is adapted to move the deflector 3 into operative position by means of a link 10 which is connected to a crank 11 at the upper end of a vertically disposed shaft 12. To the lower end of the latter is fixed the deflector 3 which, as shown, comprises a curved arm having an antifriction roller 14 upon its outer end. This arm may be swung from a position at one side of the conveyor, as indicated by full lines in Fig. 6, to a position wherein it extends substantially across the same, as indicated by dotted lines in that figure.

Each actuator, as seen more particularly in Fig. 4, comprises a horizontal shaft 16 upon which the bracket 17 is adjustably mounted by means of a hand screw 18, the shaft 16 having a plurality of holes spaced longitudinally thereof for the selective reception of the element 18, such holes corresponding to selected positions of deflector operating pins upon the boxes or carriers, thus permitting different lateral positioning of the actuator at the different stations or branch conveyors. A downwardly extending tab member 19, connected by a pivot 20 to a depending portion of bracket 17, constitutes the actuator proper.

Member 19 has a latch element 23 pivotally connected thereto and adapted normally to hook over or engage a projecting portion 24 of bracket 17. An extension 27 of the latch 23 projects below the pivotal connection of the same with the tab member 19 and forms a latch operating striker 27. This latch, with its tail 27, constitutes a controller for determining the operative connection of the part 19 to the shaft 16. A crank arm 30 upon the end of shaft 16 is pivotally connected to the rod 10 so that rotation of the shaft will cause the rod 10 to be moved, thereby swinging the deflector 3 into its operative position. A pair of tension springs 36 normally tends to hold the latch 23 in engagement with the projection 24 of bracket 17 so that movement of the tab member 19 will normally cause the bracket to move in unison therewith so as to cause the rotation of shaft 16 and actuation of the deflector through link 10 and related parts. On the other hand, disengagement of the controller latch 23 from projection 24 permits the member 19 to swing freely about pivot 20

without causing movement of the shaft 16 or actuation of the deflector.

For each actuator I provide a determinator (illustrated in Fig. 3) which is adapted at times to release the controller latch and thereby permit free or inoperative movement of member 19. The determinator comprises a rock shaft 40 substantially parallel to but spaced a short distance from shaft 16 in the direction opposite to the movement of the conveyor belt. The shaft 40 carries a pair of downwardly inclined arms 41 which are connected by a flat bar 42. This bar supports a plurality of plates 44 having longitudinal slots 45 which receive fastening elements 46 that secure them in adjusted relation to the bar. A clip 49 is connected to a portion of plate 42 which corresponds to the lateral position of the main deflector controlling tab member 19. This clip carries an adjustably mounted bumper 50 adapted to engage the latch extension 27 in order to disengage the latch from projection 24. Thus rotation of the plate 42 about shaft 40 causes the member 50 to engage the latch extension and to cause the main deflector actuating tab 19 to swing freely about pivot element 20. As soon as the member 42 and the parts carried thereby have returned to their normal position, springs 36 are effective in returning the latch to engagement with member 24 so that bracket 17, shaft 16 and member 19 will turn in unison.

As indicated by Figs. 7 and 8, a typical carrier box 60 may be provided with a front portion 101 having a plurality of rows of openings 102 therein; for example, as shown three openings may be arranged directly behind each other. These openings may have different depths so that pins inserted therein project at different heights, the vertical positioning or the degree of vertical projection of the pin determining which deflector will be actuated thereby. Thus, as shown in Fig. 5, the pin 103 projects to a sufficient height to engage the latch extension 27 and to disengage the latch 23 from the bracket 17, thus permitting the tab 19 freely to swing about pivot 20 without rotating shaft 16. On the other hand, a pin 103a, such as shown in Fig. 4, will pass beneath the latch extension 27 and will directly engage the lower portion of tab 19 and swing the latter to rotate shaft 16 thereby to actuate the deflector.

In practice a large number of diverters with their corresponding actuating and controlling mechanisms may be associated with a single conveyor. Succeeding tabs 19, which are in the same position laterally of the conveyor, may be located at different heights so that they are adapted to be actuated by pins of different heights. Thus, for example, when three sets of pins are utilized the diverter actuating and controlling mechanisms may be located at three different

heights. The deflector operating tabs at the remote end of the conveyor are located at the highest level so that a carrier box having a pin projecting to the greatest height will pass deflector tabs which are located at lower levels having engaged the latches associated therewith to render these deflector tabs inoperative and will finally engage the tab for the last deflector mechanism which is properly positioned to be operated by the pin. In order to permit an even larger number of diverters to be operated, the plates 44 of the determinator are arranged in the manner described. A pin, for example of maximum height, may be arranged at one side of the deflector operating pin so that it will engage one of the plates 44 which, through the bumper 50, releases the latch and renders the corresponding tab 19 inoperative. Thus, although one pin is properly positioned laterally of the box and has a proper height to engage a tab 19, the second pin at one side of the first-mentioned pin will engage one of the plates 44 and render the tab inoperative. A carrier box with the pins so arranged may pass to a subsequent determinator having one of its plates 44 located in a raised position to avoid the longer pin which is located at one side of the deflector operating pin. For example, the plate 44a is shown in this position in Fig. 3. With the parts thus arranged, the longer pin will not cause the deflector control mechanism to be inoperative, and accordingly the tab 19 may be engaged to operate the deflector. It is thus evident that a plurality of deflector control mechanisms may be arranged to be operated by a pin of the same height and having the same lateral position upon the carrier since a second pin may be arranged to engage the deflector releasing elements 44 of all except a selected one of the control mechanisms so arranged. Thus a very large number of control mechanisms and deflectors may be associated with a single conveyor and the arrangement of the auxiliary control plates 44 and the positioning of the pins at different heights and lateral locations permits the actuation of any single selected deflector.

Adjoining the auxiliary conveyor is an arm 70 which carries an anti-friction roller 71 and which normally lies in the path of an article that has been diverted to the auxiliary conveyor and is so positioned that it will be swung and held out of its normal position by the last article reaching the auxiliary conveyor when the latter is substantially full. Arm 70 is pivotally mounted upon a vertical shaft 74 to the lower end of which a crank arm 75 (Figs. 1 and 6) is connected, the latter arm being articulated to a link 76 which extends beneath the main conveyor and is connected to a crank 77 that is mounted upon a vertical shaft 78. Shaft 78 carries a suitable

latch 79 that is adapted to engage an outwardly projecting arm 80 carried by the lower end of shaft 12 upon which the deflector 3 is fixed. Thus, when the deflector is swung to its operative position, the latch engages arm 80 to hold the deflector in this position until the latch is released. Movement of the latch by means of the link 76, in response to the engagement of a box or article with arm 70, permits the deflector to be released and to return to its inoperative position. A stop arm 85 is also carried by the shaft 12, its end portion being adapted to engage an abutment or bumper 86 (Fig. 2) carried by the conveyor frame, thereby to limit the outward movement of the deflector 3. A tension spring 88 is connected to arm 85 and normally tends to swing the shaft 12 and arm 3 to inoperative position.

Shaft 78 carries an arm 90 which is connected by a longitudinal link 93 to a bell crank 95 that swings about a horizontal axis below the main conveyor frame. Crank 95 is also connected to the vertically disposed link 96 which is normally urged upwardly by a spring 97 engaging a collar 98 secured to the link, the upper end of the latter being pivotally connected to an arm 99 that is keyed to shaft 40; thus bumper 50 and arm 70 are yieldably held in their normal positions. Thus, movement of the arm 70 and links 76, 93, 96 in response to engagement of an article with the former will cause the shaft 40 to be turned, which results in the disengagement of the member latch 23 from the member 24 so that the positioning of an article upon the auxiliary conveyor in engagement with the arm 70 renders the corresponding deflector control mechanism inoperative.

In the practical application of the invention a series of auxiliary deflectors with suitable control mechanism of the type described is arranged along the main conveyor. A carrier box or article which is to be diverted to a selected one of the auxiliary conveyors has its deflector actuating pin properly positioned to operate the desired deflector controlling mechanism, i. e., to swing the predetermined member 19, thus rotating its shaft 16 and swinging the deflector across the path of the oncoming box so that as the latter continues to advance it will be deflected upon the desired auxiliary conveyor. As the box enters the auxiliary conveyor it will engage and swing the arm 70, thereby releasing the retaining latch 79 and permitting the deflector to return to inoperative position; at the same time the control factor 4 is allowed to return to its normal position so as to be ready for engagement with the selecting pin upon a succeeding box. When the auxiliary conveyor is substantially filled with boxes, the last to enter will remain in engagement with the end of arm 70 and will thus hold the deflector engaging latch 79 out of position to

engage the arm 80 on the shaft 12 and the spring 88 holds the deflector to inoperative position. Under these conditions the striker 50 carried by plate 42 will hold latch 23 out of engagement with bracket member 24 so that member 19 may swing freely without causing rotation of shaft 16 or movement of the deflector across the conveyor. Thus, as long as the auxiliary conveyor is full, the deflector can not be operated to cause additional boxes to be diverted to the already full auxiliary conveyor. When the parts are in this condition, a box with a pin positioned to cause operation of the deflector normally will cause the member 19 to swing freely about the pivot 20 without resulting in actuation of the deflector and the box will continue along the main conveyor.

It is thus evident that I have provided deflector means which is controlled by selectively operated mechanism automatically responsive to the conditioned articles upon the main conveyor during the normal operation of the device, and that the movement of an article from the main to the auxiliary conveyor will permit (1) the deflector to be restored to inoperative position so as to permit succeeding boxes not destined for said auxiliary conveyor to pass along the main conveyor to other deflectors, and (2) when the auxiliary deflector is full to permit all of the boxes to continue along the main conveyor.

I claim:

1. Conveyor apparatus comprising means defining a predetermined path along which carriers may move, a carrier movable in said path, said carrier having provision for supporting a plurality of contact elements, a diverter for causing carriers to leave said path, an actuator normally responsive to engagement by one contact element to make said diverter operative, and control means operable by another contact element spaced laterally of the first-named element to make the actuator inoperative.

2. Conveyor apparatus comprising means defining a predetermined path along which carriers may move, a carrier movable in said path, said carrier having provision for supporting a plurality of contact elements, a diverter for causing carriers to leave said path, an actuator normally responsive to engagement by one contact element of one height to make said diverter operative, and a controller operable by another contact element spaced laterally of the first-named element to make the actuator inoperative.

3. Conveyor apparatus comprising means defining a predetermined path along which carriers may move, a carrier movable in said path, said carrier having provision for supporting contact elements of different effective heights, a diverter for causing carriers to leave said path, an actuator normally responsive to engagement by a contact element of a

given height to make said diverter operative, and a determinator responsive to engagement by a contact element at a different position laterally of the carrier from the first-named contact element to make the actuator inoperative.

4. Conveyor apparatus comprising means defining a predetermined path along which carriers may move, a carrier movable in said path, said carrier having provision for supporting contact elements of different effective heights, a diverter for causing carriers to leave said path, an actuator normally responsive to engagement by a contact element of a given height and at a predetermined position laterally of the carrier to make said diverter operative, a controller responsive to engagement by a contact element of a greater height, but similarly positioned laterally, to make the actuator inoperative, and a determinator responsive to engagement by a contact element at a different position laterally of the carrier to make the actuator inoperative.

5. Conveyor apparatus comprising means defining a predetermined path along which carriers may move, a carrier movable in said path, said carrier having provision for supporting contact elements of different effective heights, a diverter for causing carriers to leave said path, an actuator normally responsive to engagement by a contact element of a given height to make said diverter operative, and a determinator comprising a plurality of relatively adjustable abutment members respectively disposed at different positions laterally of the carrier path, said determinator being so constructed and arranged that when any of its abutment members is engaged by a contact element upon a carrier the determinator is thereby energized to make the actuator inoperative.

6. Conveyor apparatus comprising means defining a predetermined path along which carriers may move, a carrier movable in said path, said carrier having provision for supporting contact elements of different effective heights, a diverter for causing carriers to leave said path, an actuator normally responsive to engagement by a contact element of a given height and at a predetermined position laterally of the carrier to make said diverter operative, and a determinator comprising a series of abutment members extending transversely with respect to the carrier path, said members being individually adjustable toward and from said path, the determinator acting, when any of said abutment members is engaged by a contact element, to make the actuator inoperative.

7. Conveyor apparatus comprising means defining a predetermined path in which carriers may move, a carrier movable in said path, said carrier having a plurality of transversely extending rows of sockets for the re-

ception of contact pins, a plurality of diverters spaced in the carrier path, each diverter being adapted to cause carriers to leave said paths, an actuator for each diverter, the respective actuators being disposed at different positions transversely of the carrier path, each actuator being normally responsive to engagement by a contact pin of a given height disposed in a socket of one row at a corresponding position transversely of the width of the carrier, and determinator means associated with each actuator, said determinator means comprising an abutment member disposed laterally with respect to the actuator and engageable by a pin on a carrier disposed in a socket laterally offset from the socket for the corresponding actuator operating pin, said determinator, when activated by a contact pin, making the actuator inoperative.

8. Apparatus of the class described comprising a conveyor, a deflector actuable to divert articles from the conveyor, and an actuator engageable by a contact upon a conveyed article to actuate the deflector, said actuator being operable in response to a contact projecting at a given height from an article upon the conveyor and being rendered inoperable by a contact upon the article spaced laterally of the first-named contact.

9. Apparatus of the class described comprising two juxtaposed conveyors, a deflector arranged to swing over one conveyor to divert articles thereon to the other conveyor, an actuator engageable by a contact upon a conveyed article, said actuator including a swinging member in the path of a contact in a selected position upon an article carried by the conveyor, means normally connecting the swinging member with the deflector to cause the latter to swing outwardly into operable position in response to the movement to said member, a controller responsive to a contact in a different position to disconnect the swinging member from the connecting means so that movement of the former does not actuate the deflector, a member movable in response to a given positioning of articles upon the article receiving conveyor, and means responsive to the movement of that member to operate the controller.

10. Apparatus of the class described comprising two juxtaposed conveyors, a deflector arranged to swing over one conveyor to divert articles thereon to the other conveyor, an actuator engageable by a contact upon a conveyed article, said actuator including a swinging member in the path of a contact in a selected position upon an article carried by the conveyor, means normally connecting the swinging member with the deflector to cause the latter to swing outwardly into operable position in response to the movement to said member, a controller responsive to a contact in a different position to release the

swinging member from the connecting means so that movement of the former does not actuate the deflector, a member movable in response to a given positioning of articles upon the article receiving conveyor, and means responsive to the movement of that member to operate the controller, said last-named means also causing the movement of the deflector from its operative position.

11. Apparatus of the class described comprising two juxtaposed conveyors, a deflector arranged to swing over one conveyor to divert articles thereon to the other conveyor, an actuator for moving the deflector to operative position, yieldable means normally holding the deflector in inoperative position, said actuator including a swinging member in the path of a contact in a selected position upon an article carried by the conveyor, linkage normally connecting the swinging member with the deflector to cause the latter to swing outwardly into operable position in response to the movement to said member, means responsive to a contact in a different position to disconnect the swinging member from the linkage, and permitting the yieldable means to return the deflector to its inoperative position so that movement of the former does not actuate the deflector, a member movable in response to a given positioning of articles upon the article receiving conveyor, and means responsive to the movement of that member to operate the disconnecting means.

12. Apparatus of the class described comprising a conveyor, a deflector arranged to move to an operative position to divert articles from the conveyor into an article receiving region adjoining the latter, an actuator including a part engageable by a contact upon a conveyed article to actuate the deflector, and release means rendering the actuator inoperative, said release means being actuated by an article diverted into said region to prevent actuation of the deflector by a succeeding article.

13. Apparatus of the class described comprising two juxtaposed conveyors, a deflector arranged to swing over one conveyor to divert articles thereon to the other conveyor, an actuator engageable by a contact upon a conveyed article to actuate the deflector, said actuator comprising a member adapted to be moved by engagement with a selectively positioned tab on a conveyed article, and means normally connecting said member with the deflector to cause the latter to swing out into operative position, a controller associated with said last-named means to permit the actuator to move without actuating the deflector, and a member adjoining the article receiving conveyor for operating the controller in response to a given positioning of an article upon that conveyor.

14. Apparatus of the class described com-

prising two juxtaposed conveyors, a deflector arranged to swing over one conveyor to divert articles thereon to the other conveyor, an actuator engageable by a contact upon a conveyed article to actuate the deflector, said actuator comprising a member adapted to be moved by engagement with a selectively positioned tab on a conveyed article, and means normally connecting said member with the deflector to cause the latter to swing out into operative position, a controller associated with said last-named means to permit the actuator to move without actuating the deflector, means yieldably urging the deflector toward its retracted, inoperative position, a snap latch engageable therewith to hold it in operative position, and a member adjoining the article receiving conveyor for operating the controller in response to a given positioning of an article upon that conveyor, said member concomitantly releasing the latch to permit the deflector to be retracted to inoperative position.

15. Apparatus of the class described comprising two juxtaposed conveyors, a deflector arranged to swing over one conveyor to divert articles thereon to the other conveyor, an actuator engageable by a contact upon a conveyed article to actuate the deflector, said actuator comprising a member adapted to be moved by engagement with a selectively positioned tab on a conveyed article, and means normally connecting said member with the deflector to cause the latter to swing out into operative position, a controller associated with said last-named means to permit the actuator to move without actuating the deflector, means yieldably urging the deflector toward its retracted, inoperative position, a snap latch engageable therewith to hold it in operative position, and a swinging arm yieldably held in the path of articles upon the article receiving conveyor and operating the controller in response to a given positioning of an article upon that conveyor, said arm operating concomitantly to release the latch to permit the deflector to be retracted to inoperative position.

16. Apparatus of the class described comprising a conveyor, a deflector movable over the conveyor to divert carriers therefrom, an actuator normally connected to said deflector to actuate the same in response to a given positioning of a contact upon a carrier upon the conveyor which is approaching the deflector, and a controller to disconnect said actuator from the deflector, said controller operating to disconnect the actuator and deflector and actuable by another contact upon the carrier laterally spaced relative to the first-named contact.

17. Apparatus of the class described comprising a conveyor, a deflector movable over the conveyor to divert carriers therefrom, an actuator normally connected to said deflector

to actuate the same in response to a given positioning of a contact upon a carrier upon the conveyor which is approaching the deflector, and means including a determinator for disconnecting the actuator from the deflector, said determinator having a plurality of tabs movable into and out of contact engaging position, the tabs in the latter position being arranged to engage a contact at a given position upon a carrier to render the actuator and the deflector inoperative.

18. Apparatus of the class described comprising a conveyor, a deflector movable over the conveyor to divert carriers therefrom, an actuator normally connected to said deflector to actuate the same in response to a given positioning of a contact upon a carrier upon the conveyor which is approaching the deflector, and means including a determinator for disconnecting said control mechanism from the deflector, said means operating to disconnect the actuator and deflector in response to another contact upon the carrier, said disconnecting means also being actuable to render the actuator inoperative in response to a given positioning of a carrier diverted from the conveyor by the deflector.

19. Apparatus of the class described comprising a conveyor, a deflector movable over the conveyor to divert carriers therefrom, an actuator to move said deflector to operative position, linkage normally connecting the actuator and deflector, a controller latch associated with said actuator and linkage, said latch being releasable to permit the actuator to be moved without affecting the deflector, said actuator being normally operable to move the deflector in response to a contact at a given position upon a carrier approaching the deflector, and a determinator for releasing the controller latch to prevent normal operation of said actuator, said determinator being actuable in response to a contact upon the carrier, spaced laterally from the first-named contact.

20. Apparatus of the class described comprising a conveyor, a deflector movable over the conveyor to divert carriers therefrom, an actuator to move said deflector to operative position, linkage normally connecting the actuator and deflector, a controller latch associated with the actuator and linkage, said latch being releasable to permit the actuator to be moved without affecting the deflector, said actuator being normally operable to move the deflector in response to a contact at a given position upon a carrier approaching the deflector, and a determinator for releasing the latch to prevent normal operation of the actuator, said determinator comprising a plurality of elements movable out of and into contact engaging position, said elements in such last-mentioned position being engageable by a properly positioned contact upon the car-

rier to render the deflector and actuator in-
operative despite the engagement of the first
contact therewith.

Signed by us at Syracuse, New York, this
thirtieth day of March, 1929.

CHESTER S. JENNINGS.
LAVONT C. ALLEN.

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