Feb. 6, 1945. C. N. BERGMANN 2,368,738

AUTOMATIC START AND STOP MECHANISM

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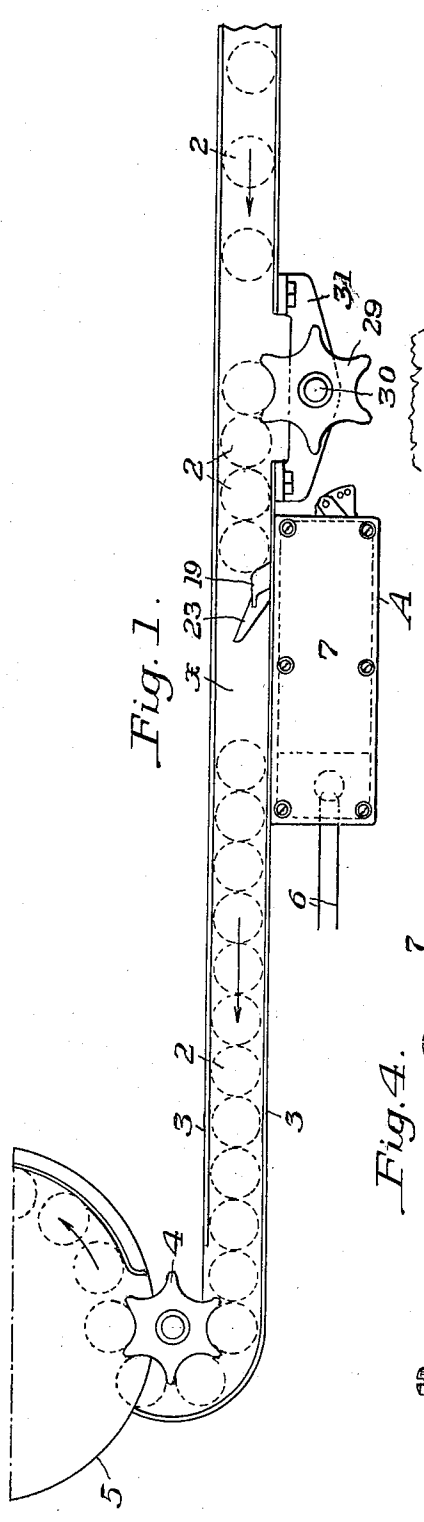


Fig. 1.

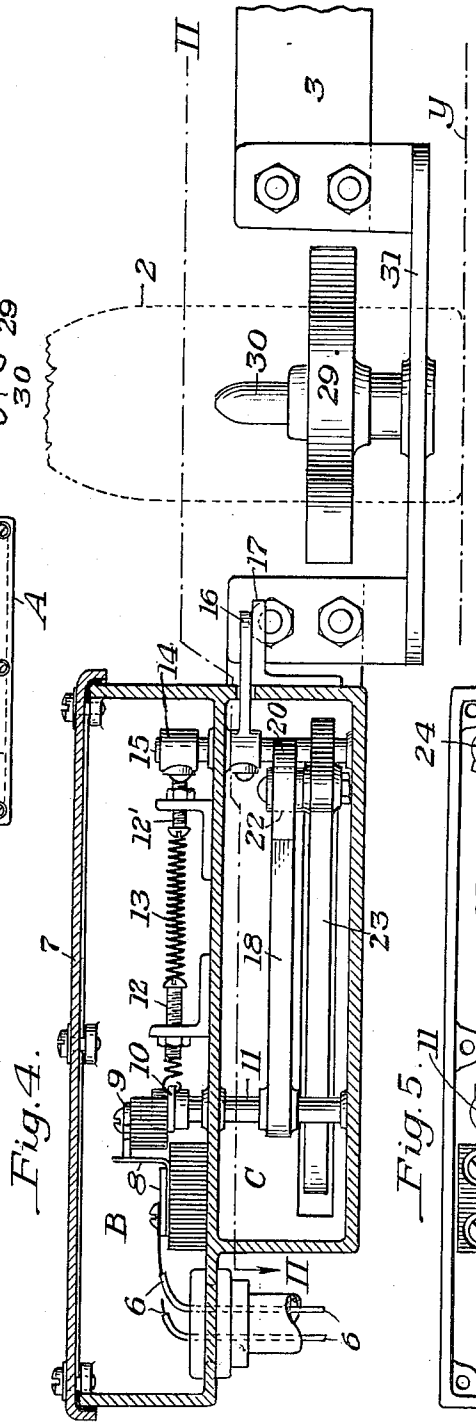


Fig. 4.

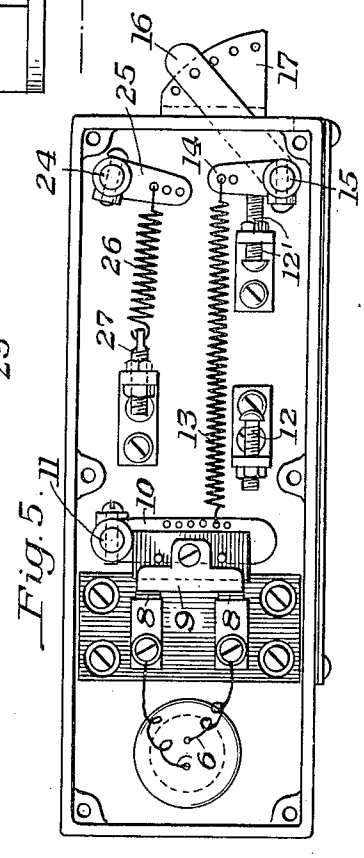


Fig. 5.

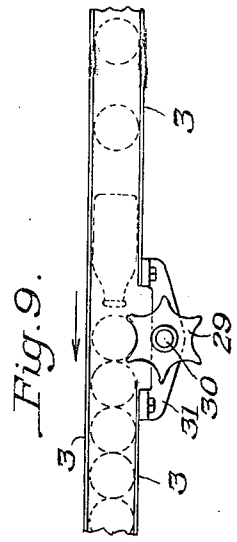


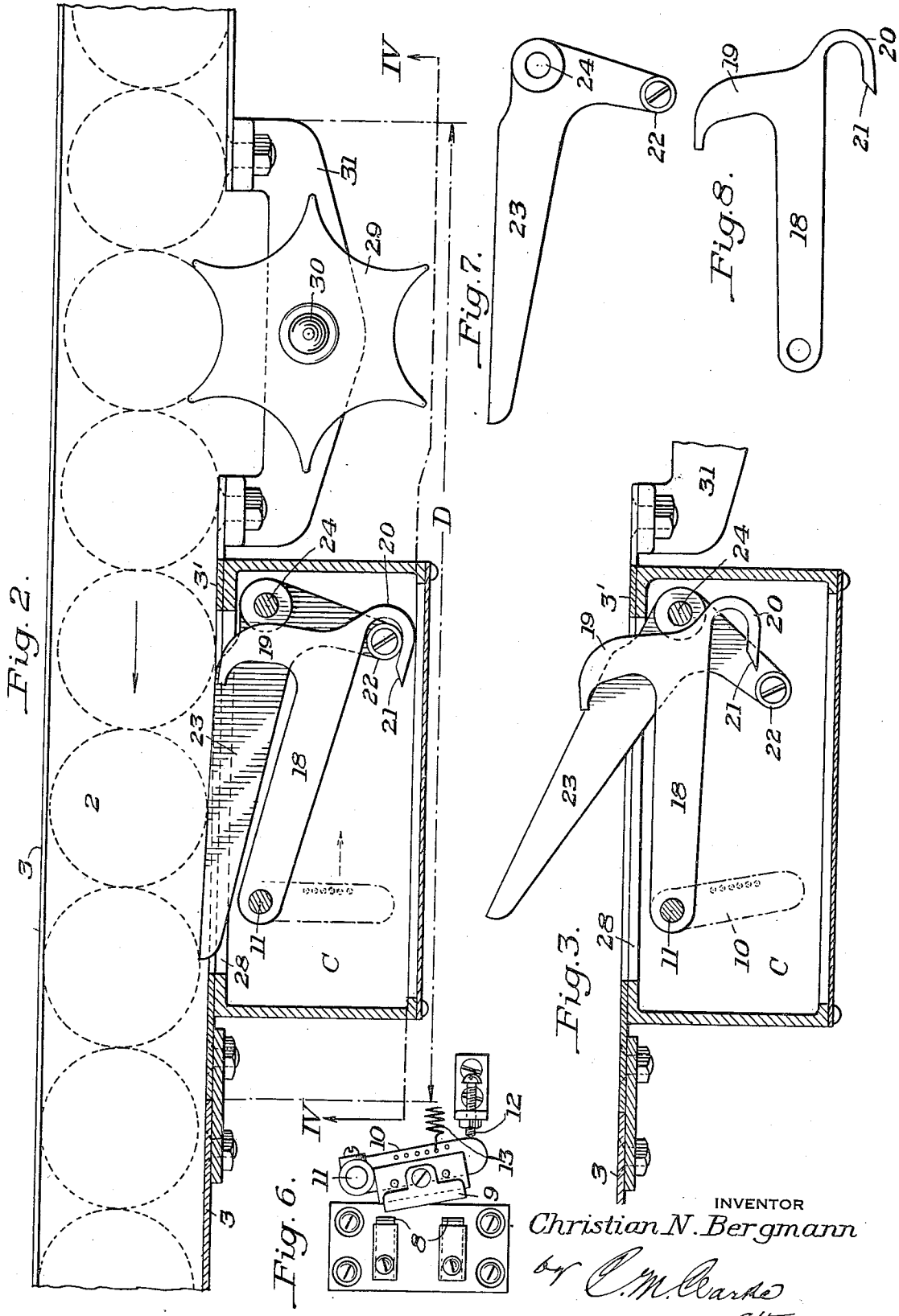
Fig. 9.

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AUTOMATIC START AND STOP MECHANISM

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AUTOMATIC START AND STOP MECHANISM

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20 Claims. (Cl. 192—125)

This invention is an improvement in means for controlling the motor or prime mover of a machine dependent upon normal feed thereto of a continuous succession of units to be acted upon, and for promptly discontinuing the operation of the machine, due to any temporary interruption of the normal feed.

More particularly, it is designed for use, in connection with the art of filling receptacles, as milk bottles, where, due to interruption of continuous grouping of a column, irregular spacing, improper or abnormal placement on the conveyor runway, etc., proper and correct delivery to the machine, as a bottle filler, is prevented.

Such interruptions, in the operation of modern dairy plants, frequently result in jamming and breakage of bottles, causing loss and delay. Ordinarily, the bottles are conveyed to the filler, for instance, in regular successive contact engagement with a synchronized delivery device, as in the common practice of using a star wheel.

Wherever however, due to delay or any cause, effecting irregular and open spacing of the bottles in approaching or arriving at such device out of proper timing, the normal operation is interrupted with resulting jamming and breakage. It is desirable therefore, that the motor control means of the present invention be located at a sufficient distance in the rear of or backwardly from the said star wheel, with ample intervening supply of bottles in continuous progress, to ensure proper successive engagement with the filler-distributing star wheel, when the motor of the filler is again energized.

Assuming that the invention is to be utilized in the transfer and regulation of milk bottles, it is illustrated in the accompanying drawings, in which:

Fig. 1 is a general plan view of the installation as used in distributing bottles to a filling machine;

Fig. 2 is an enlarged horizontal sectional and plan view on the line II—II of Fig. 4, as in normal movement of a column of bottles;

Fig. 3 is a similar view of the bottle-actuated motor starting means in interfering position, following interruption of continuous column movement;

Fig. 4 is a longitudinal vertical sectional view on the line IV—IV of Fig. 2;

Fig. 5 is a plan view of the circuit control switch mechanism, with the cover removed;

Fig. 6 is a detail view showing the electrical contact means in open position;

Figs. 7 and 8 are detail views of the interlocking control levers for actuating same;

Fig. 9 is a partial detail view showing an improperly placed bottle in transit.

As shown in Fig. 1, a column of bottles 2 is transferred in the usual manner by a supporting continuously running conveying chain, between the usual lateral guides 3. These guides lead to any suitable point where a controlling star wheel or other synchronized device 4 distributes them, generally in circular travel, around the localized positions of a filling machine. Such machine is diagrammatically indicated by the numeral 5, and is usually geared with the star wheel 4.

The filling machine 5 is usually rotated at a definite speed continuously, during normal feed of bottles. The motor control switch for the filler motor is connected with opening and closing switch mechanism in the casing A, by conductors 6, through a suitable water tight fitting, as controlled by the operative elements in said casing.

The casing comprises a closed two-part rectangular box, including an upper compartment B and the lower compartment C. Upper compartment B is tightly closed and hermetically sealed as by a cover plate 7, for protection against moisture, usually incidental to liquid splashing operations as in a bottling plant.

Ordinarily, the bottles 2 in their normal progress, are regularly distributed from the longitudinal conveyor to the filler delivering terminal, in a continuous supply column.

However, due to any interruption or delay, it sometimes happens that open spaces or gaps between the bottles, or between sections thereof, may cause a termination of close continuity of the column, and interruption of regular delivery to the filler assembly 5.

For prevention of column interruption and confusion, with resulting bottle breakage or jamming against wheel 4, the invention provides means for immediately effecting a termination of filler operation after the terminal bottle of a column has passed beyond a point of conveyor progress, ahead of an open space or gap in the column.

Such spacing in the column may, for instance, occur after the end bottle has passed beyond the mechanism contained in casing A.

In the upper portion or chamber B of said casing, is contained the make-and-break contact mechanism for circuit 6.

It consists of a pair of terminals 8, 8, adapted to be closed by contact 9 mounted on the swinging arm 10 of a vertical partly rotatable spindle 11.

Arm 10 and its contact 9 are normally retracted against a regulating stop 12 by spring 13.

Said spring is subject to tension adjustment, as by attachment to differently spaced openings in lever 10 and also in a lever 14 of spindle 15. Additional adjustment may be made by an adjusting arm 16 adapted to be located at different positions, and held by a pin through a registering hole in a supporting shelf 17. A limiting adjusting screw 12' may be also provided, like stop 12, for limiting movement of said lever 14.

Secured to spindle 11 of the switch arm 10, is an arm 18, having an outwardly extending rounded lateral camming projection or abutment 19 and an inner locking loop or hook 20 terminating in a cam face 21.

In its inward position, as in Fig. 2, for closing the circuit, arm 18 is interlocked by means of said initial cam 21 and hook 20, with an inwardly moving roller 22 of a cooperating lever and fending arm 23. Said arm is pivotally secured to spindle 24, at the upper end of which is a short lever arm 25 connected by spring 26 to an adjusting stem 27.

By such construction, assuming an open space or gap x to exist, due to interruption of the column, the lever arm 23 will have been relieved of bottle pressure and will be extended by spring 26 as in Fig. 3, thrusting roller 22 away from holding loop 20.

Thereupon lever 18 being thus released, tension of spring 13 rotates spindle 11, withdrawing arm 10, breaking the contact 8—8—9 as in Fig. 6, and thrusting the lever 18 outwardly, extending cam 19 through clearance slot 28 into bottle engaging position, Fig. 3.

The circuit thus being opened to the motor control switch, the filler 5 will cease to function, arresting further feed to the filling machine, until normal operation is resumed by closing of the switch contacts.

In such operation, with the switch open, additional approaching bottles will be arrested by cam abutment 19, until they have accumulated sufficiently to depress the abutment and arm 18 backwardly as in Fig. 2, for further bottle movement, at the same time closing the circuit. At the same time the oncoming bottles will pass over the arm 23, effecting the interlock by roller 22, while permitting slight play of said arm, without unlocking arm 18 until a final bottle has again passed beyond the arm 23.

It will be understood that the usual movement of the bottles in such operation is somewhat slower than that of their supporting chains, involving slippage, and ensuring close contact as the bottles approach the abutment, and beyond in approaching the wheel 4.

Also, that ordinarily a freely rotatable star wheel 29 is mounted on stud 30 of an extended bracket 31, connected between terminals of the main guide rail 3 and 3' of the casing A, for spacing assistance, or arresting an upset bottle, as in Fig. 9.

The operation is as follows: Upon beginning a run of bottles to the filler, for instance, assuming both lever arms 18 and 23 to be extended, with the circuit open, the first bottle of an approaching column, as resisted by the opposite guide 3, will ride against the cam 19, thrusting it and lever 18 inwardly as in Fig. 2, closing the circuit, as described.

If however the bottles are not sufficient in number, or close together, they will be retarded until sufficiently numerous to effect depression, dependent upon the tension adjustment.

Onward movement of said first oncoming bottle, and of following bottles as well, will first depress arm 18 and then lever 23, causing its roller 22 to ride over cam face 21 into hook 20, thus closing the circuit. Then, after the last bottle of a column, or of any interrupted portion of it because of resulting spacing, has passed over and beyond both lever arms, lever 23 will first be erected, followed by lever 18, opening the circuit.

Thereafter the operation may be renewed by further approaching bottles as often as necessary, depending on the continuation or interruption of bottle movement.

It will be understood that the star wheel distribution to the filler is sufficiently remote from the installation of the controlling lever 18 and switch box A, to ensure supply continuity of contacting bottles towards the star wheel 4, prior to starting of the motor. Also, that ample supply will be always moving in close column formation to ensure distribution to the filler, subject to any spacing gap being closed by renewal of supply to the conveyor.

Should a bottle be in upset position, as in Fig. 9, it cannot of course pass beyond the star wheel 29, unless standing erect on the surface y of the supporting chain as indicated in Fig. 4, and further movement of the oncoming bottles will be temporarily arrested until such unit is properly replaced.

It should be noted also that the entire attachment is comparatively narrow and short, within the dimension line D of Fig. 2.

While the invention is particularly designed for and adapted to the transfer control of milk bottles or similar containers, the means herein disclosed are adapted to other relevant uses or applications. It may be changed in detail construction, as by modification of the specific interlock between the levers, or otherwise, by the skilled mechanic, within the scope of the following claims.

What I claim is:

1. In combination with an independently driven continuously operating unit conveyor having lateral guides leading to a terminal receiving device, and a motor for said receiving device, means for energizing said motor comprising a switch and a pair of successively acting interlocking switch operating arms both dependent on continuous stream movement of the units on said continuously operating conveyor.

2. In combination with an independently driven continuously operating unit conveyor having lateral guides leading to a terminal receiving device, and a motor for said receiving device, means for de-energizing said motor comprising a switch and a pair of successively acting interlocking switch operating arms both dependent on interruption of continuous stream movement of the units on said continuously operating conveyor.

3. In combination with an independently driven continuously operating unit conveyor having lateral guides leading to a terminal receiving device, and a motor for said receiving device, means for energizing said motor comprising a switch and a pair of successively acting interlocking switch operating arms both dependent on continuous stream movement of the units and for de-energizing the motor upon interruption of such movement on said continuously operating conveyor.

4. Control means for a receiving and shifting

device as described adapted to engage the terminal unit of a continuously moving approaching column, and a motor therefor, consisting of an energizing circuit for the motor, a switch in said circuit, an arm extending into the unit pathway for operating the switch, and a secondary arm also extending into the unit pathway having locking and unlocking relation to said switch operating arm.

5. Control means for a receiving and shifting device as described adapted to engage the terminal unit of a continuously moving approaching column, and a motor therefor, consisting of an energizing circuit for the motor, a switch in said circuit, an arm for operating the switch having a cam portion extending into the unit pathway, and a cooperating unit-contacting arm also extending into the unit pathway adapted to interlock with said arm and also release same.

6. Control means for a receiving and shifting device as described adapted to engage the terminal unit of a continuously moving approaching column, and a motor therefor, consisting of an energizing circuit for the motor, a switch in said circuit, an arm for operating the switch having a cam portion extending into the unit pathway and a locking portion, and an arm extending into the unit pathway having a cooperating locking portion.

7. Control means for a receiving and shifting device as described adapted to engage the terminal unit of a continuously moving approaching column, and a motor therefor, consisting of an energizing circuit for the motor, a switch in said circuit, an arm for operating the switch having a cam portion extending into the unit pathway and a locking loop, and an arm extending into the unit pathway having a lever extension provided with a roller engageable with the locking loop of the first named arm.

8. Switch controlling means for an energizing circuit, consisting of a casing enclosing the switch and adapted to be located at one side of a unit conveyor, a laterally movable arm connected with the switch having an outwardly extending unit-engaging abutment and an inner locking portion, means urging the arm outwardly and the switch away from contact, and a secondary outwardly urged unit-engaging arm having a portion engageable with the locking portion of the first named arm.

9. Switch controlling means for an energizing circuit consisting of a casing enclosing the switch and adapted to be located at one side of a unit conveyor, a laterally movable arm connected with the switch having an outwardly extending unit-engaging cam and an inner locking portion, a spring for retracting the switch and extending the arm, a secondary laterally movable unit-engaging arm having a portion engageable with the locking portion of the first named arm, and a spring for extending the secondary arm.

10. Switch controlling means for an energizing circuit consisting of a casing enclosing the switch and adapted to be located at one side of a unit conveyor, a pivoting spindle secured to a switch arm, a laterally movable arm connected with the spindle having an outwardly extending unit-engaging abutment and an inner locking loop, a spring urging the arm outwardly, a secondary outwardly movable unit-engaging arm having a roller engageable with the loop, and a spring for extending the secondary arm.

11. In combination with a continuously moving conveyor having flanking guides for moving series of grouped units, means for arresting movement of a group located rearwardly of a terminal unit of a preceding group consisting of a pair of pivotally mounted interlocking spring-actuated arms normally in non-interfering retracted position by unit contact, one of said arms having operative connection with a unit-movement-control device, the other arm being operable to effect opening of the interlock by outward movement across the conveyor pathway upon release of contact with the terminal unit.

12. In combination with a continuously moving conveyor having flanking guides for moving series of grouped units, means for initiating movement of a conveyor-propelled group consisting of a laterally movable arm having operative connection with a unit-removal control device and provided with a locking element and an outwardly extending unit-engaging abutment, and a laterally movable companion arm having a cooperating locking element for the other arm and a unit engaging extension, said abutment and extension being successively subject to inward movement by contact with advancing units.

13. In combination with a continuously moving conveyor having flanking guides for moving series of grouped units, means for initiating movement of a conveyor-propelled group consisting of a laterally movable arm having operative connection with a unit-removal control device and provided with a locking element and an outwardly extending unit-engaging abutment, and a laterally movable companion arm having a cooperating locking element for the other arm and a unit-engaging extension, said abutment and extension being successively subject to inward movement by contact with advancing units and both being subject to reacting spring resistance.

14. A unit movement control assembly consisting of a casing having an inner wall forming a flush connecting section of one of the guide walls of a unit conveyor, a contact switch and a laterally movable arm connected therewith having a projecting unit-contact abutment and a locking portion, a laterally movable unit contact companion arm having a coacting locking portion, said casing having inner slotted clearance for said abutment and companion arm.

15. A unit movement control assembly in combination with a conveyor and lateral guide rails therefor consisting of a casing having an inner wall forming a flush connecting section of one of the guide walls of said unit conveyor, a contact switch in the casing, a laterally movable arm connected therewith having a projecting unit-contact abutment and a locking portion, a laterally movable unit-contact companion arm having a coacting locking portion, said casing having inner slotted clearance for said abutment and companion arm, and an extension bracket beyond the casing extending across an opening in the guide rail provided with a regulating star wheel extending into the path of the conveyor.

16. A unit movement control assembly consisting of a casing having an inner wall forming a flush connecting section of one of the guide walls of a unit conveyor, a contact switch, a laterally movable arm connected therewith having a projecting unit-contact abutment and a locking portion, a laterally movable unit-contact companion arm having a coacting locking portion, said casing having inner slotted clearance for said abutment and companion arm, and retracting springs for each of said arms tending to extend them out-

wardly of the casing upon termination of unit contact.

17. A lever assembly operable alongside a unit conveyor trackway for opening and closing an actuating circuit comprising a spring-retracted arm connected with a switch device and having a depressible abutment and an interlocking portion, and a cooperating spring-retracted arm having a depressible portion and an interlocking portion whereby to effect holding engagement between said interlocking portions when both arms are depressed, each of said arms having a portion extensible across the conveyor trackway.

18. A lever assembly operable alongside a unit conveyor trackway for opening and closing an actuating circuit comprising a spring-retracted arm connected with a switch device and having a depressible abutment and an interlocking portion, and a cooperating spring-retracted arm having a depressible portion and an interlocking portion, one of said interlocking portions having a shoulder and the other having a cam faced holding terminal engageable therewith, each of said arms having a portion extensible across the conveyor trackway.

19. A lever assembly operable alongside a unit conveyor trackway for opening and closing an actuating circuit comprising a spring-retracted arm connected with a switch device and having a depressible abutment and an interlocking portion, and a cooperating spring-retracted arm having a depressible portion and an interlocking portion, one of said interlocking portions having a roller and the other having a cam faced holding terminal engageable therewith, each of said arms having a portion extensible across the conveyor trackway.

20. Construction as in claim 17 characterized by the inclusion of means for varying tension of the spring or springs.

CHRISTIAN N. BERGMANN.