Feb. 5, 1935. A. J. SCHENK ET AL 1,990,050

CONVEYING MECHANISM

Filed Dec. 15, 1931 6 Sheets-Sheet 1

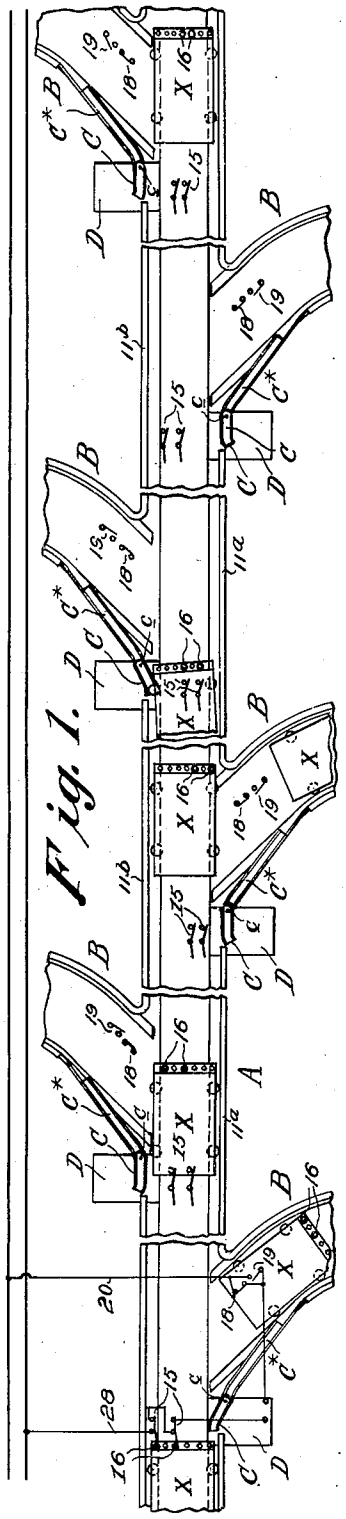


Fig. 1.

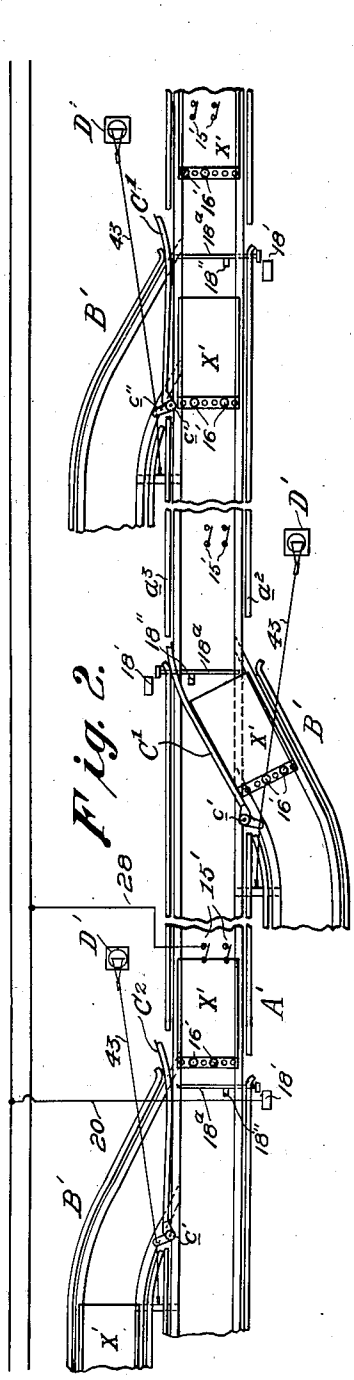


Fig. 2.

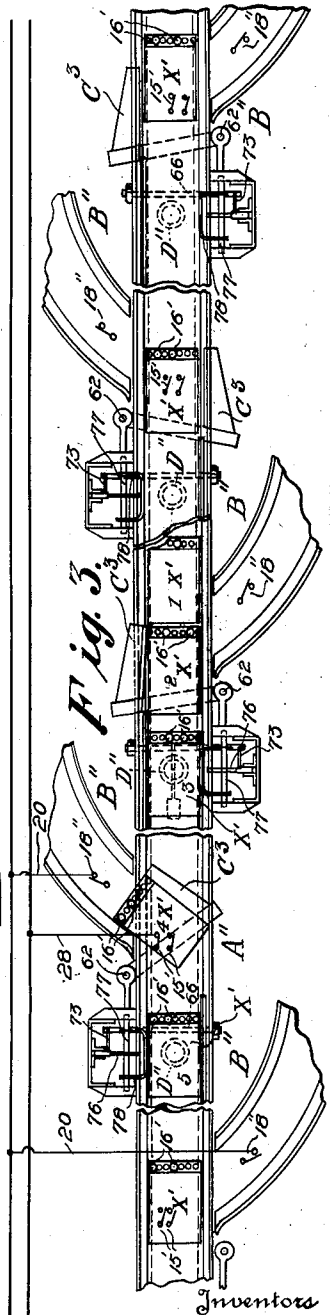


Fig. 3.

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CONVEYING MECHANISM

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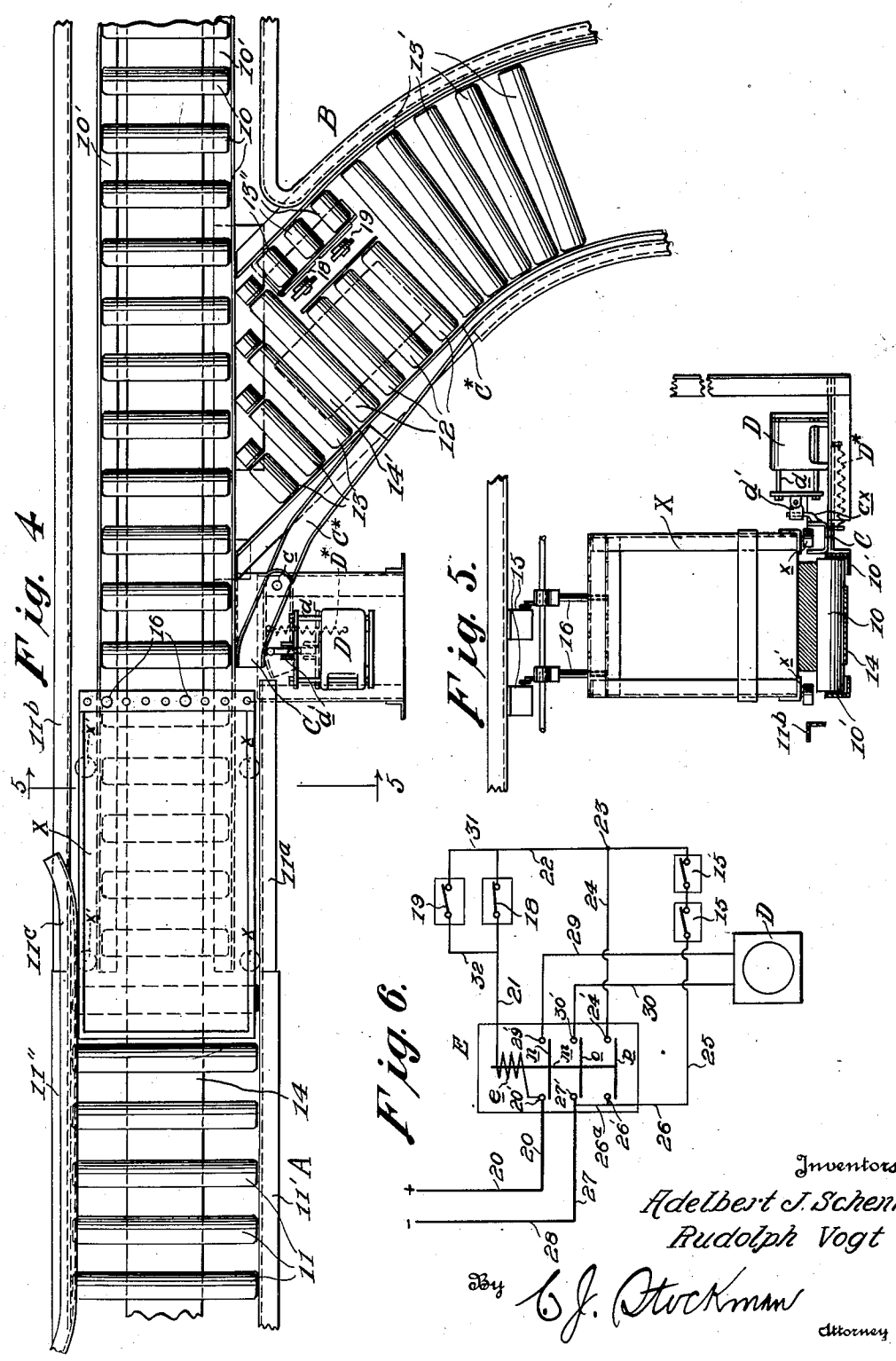


Fig. 4

Fig. 5.

Fig. 6.

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CONVEYING MECHANISM

Filed Dec. 15, 1931 6 Sheets-Sheet 3

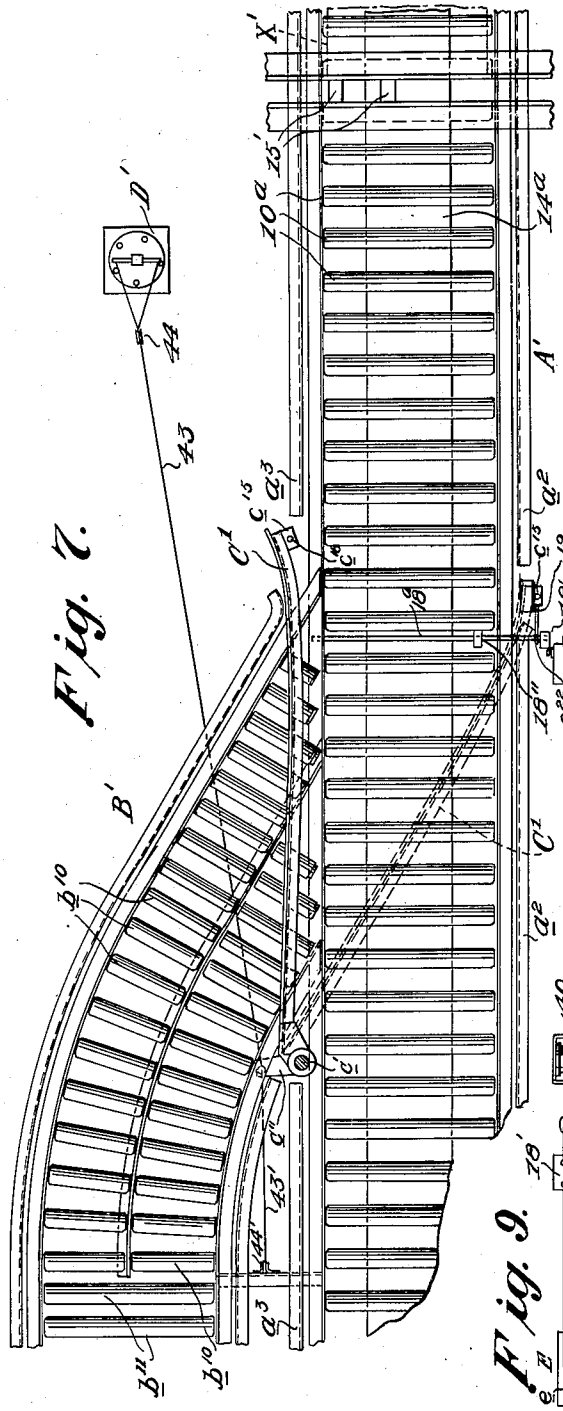


Fig. 7.

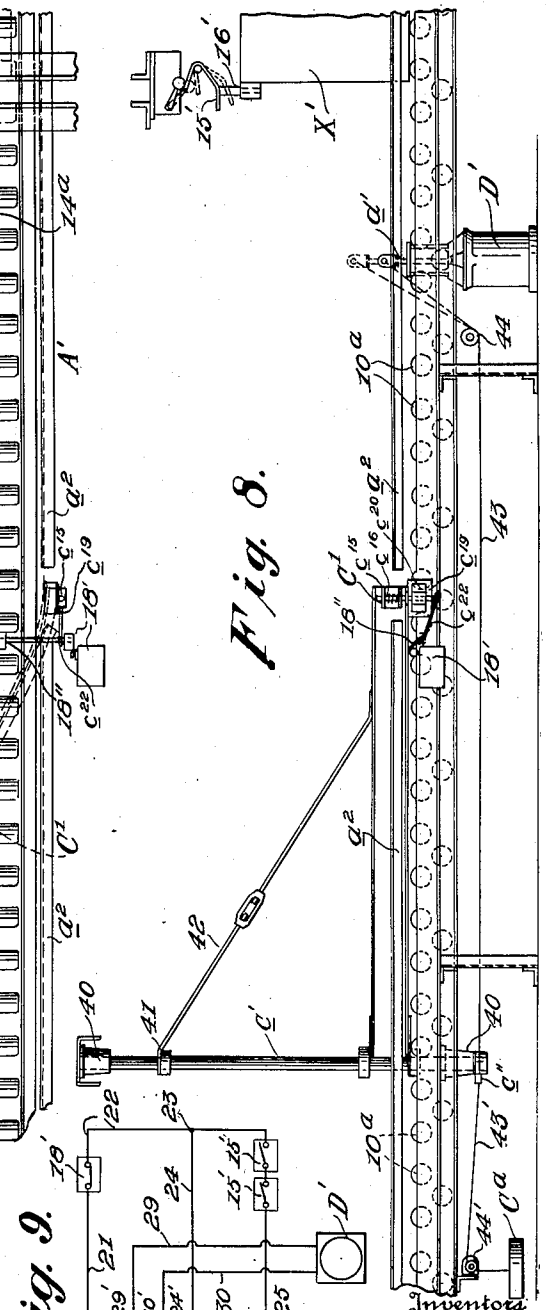


Fig. 8.

Fig. 9.

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Fig. 10.

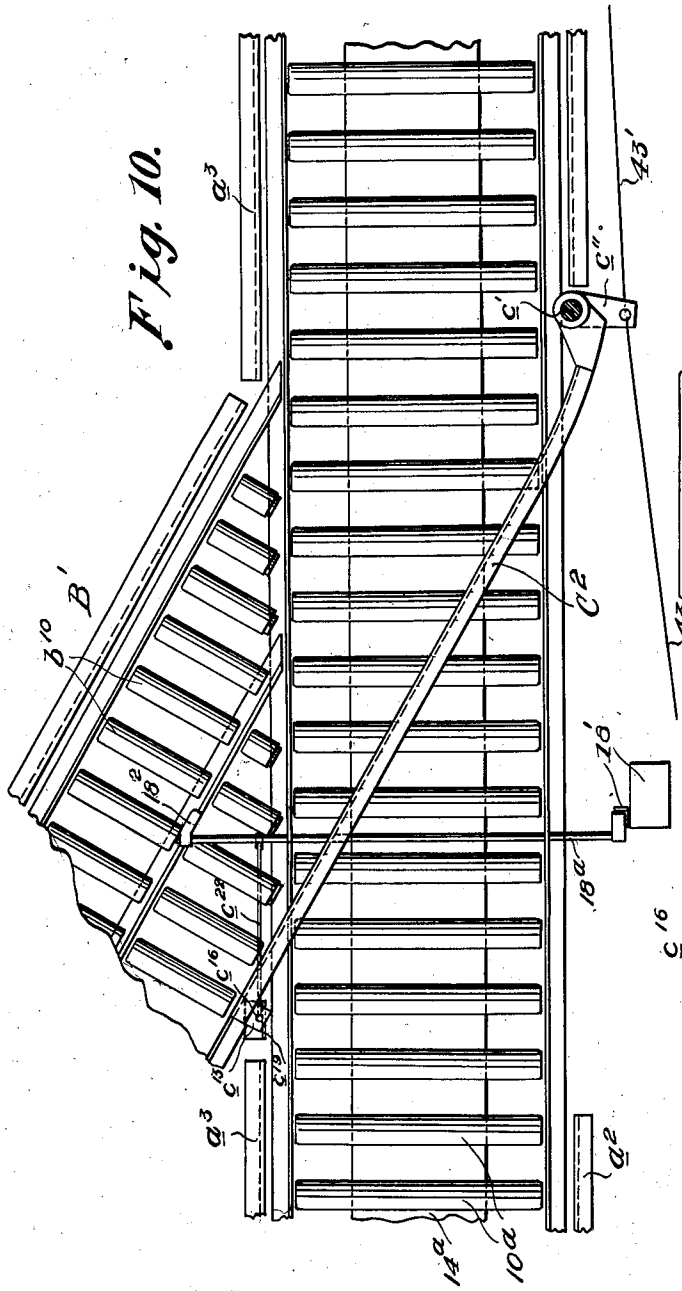


Fig. 12.

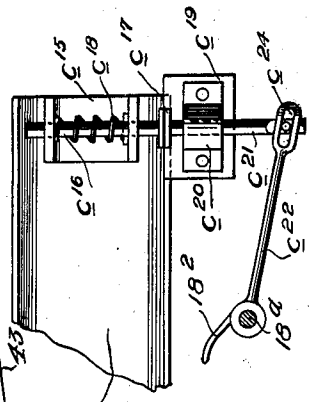
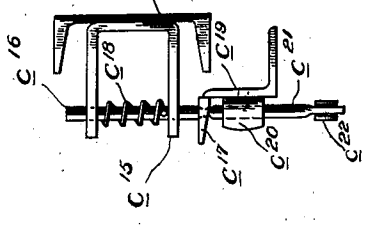


Fig. 11.



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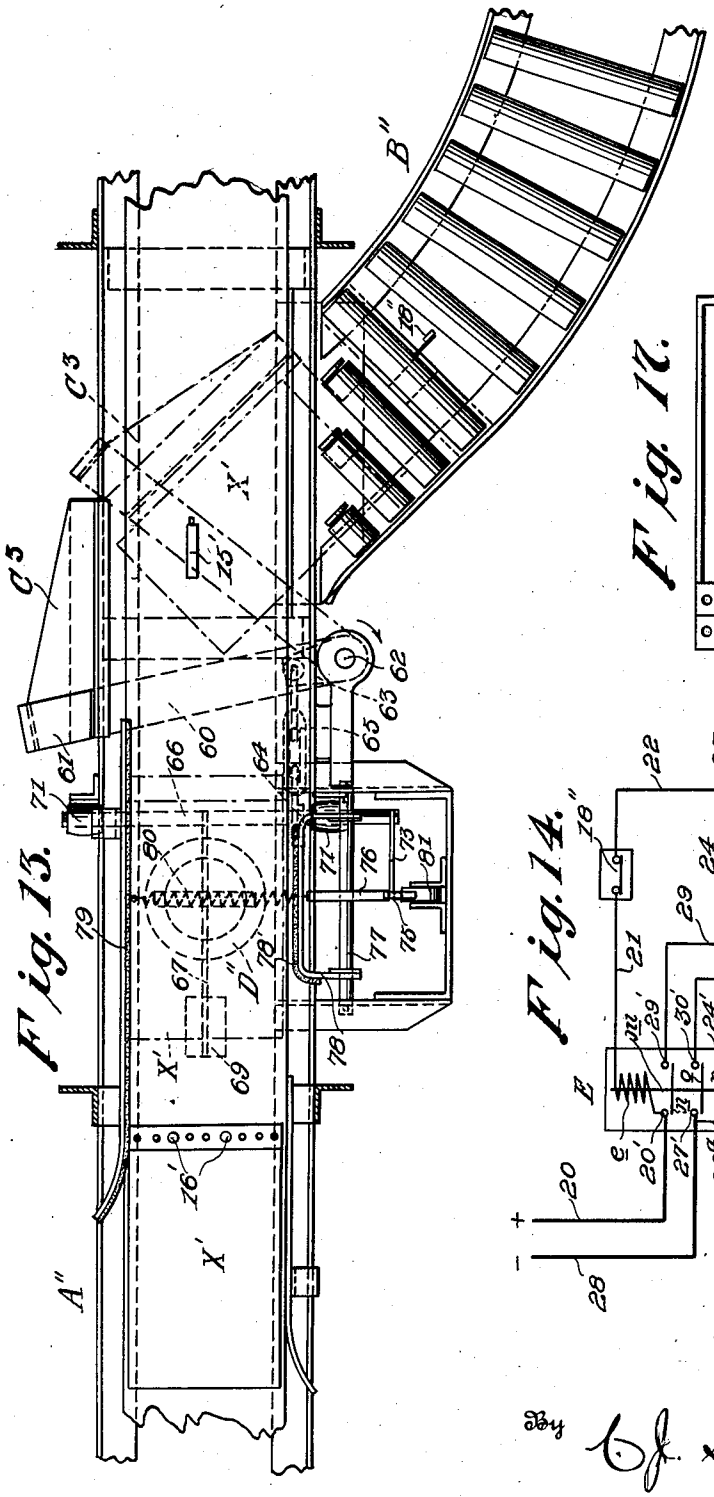


Fig. 13.

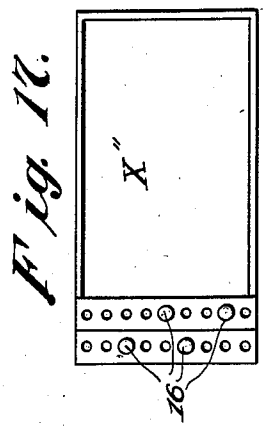


Fig. 17.

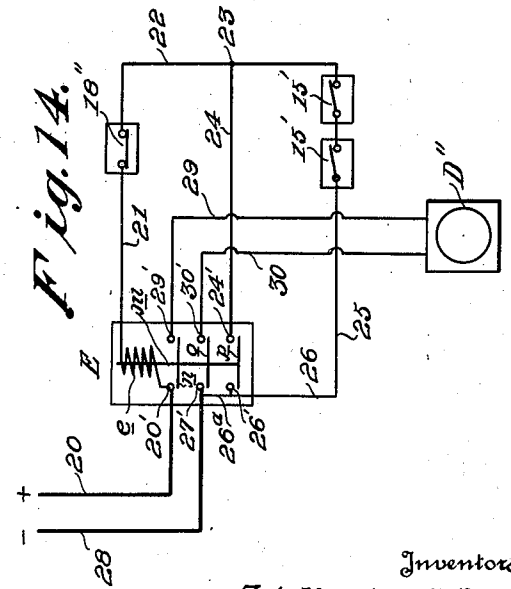


Fig. 14.

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CONVEYING MECHANISM

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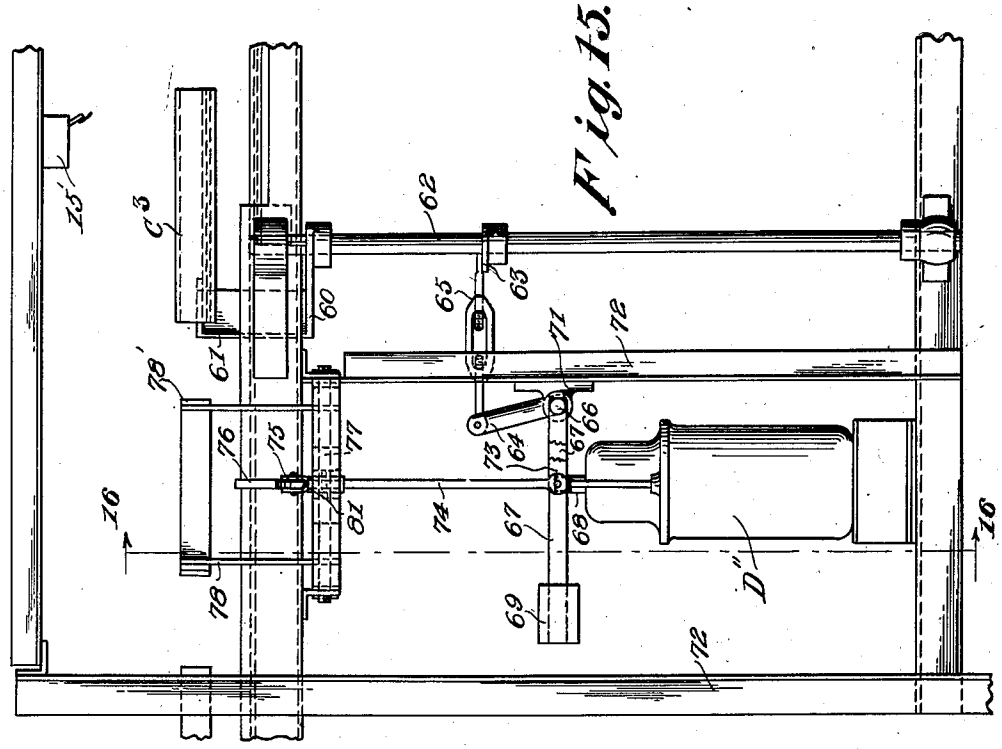


Fig. 15.

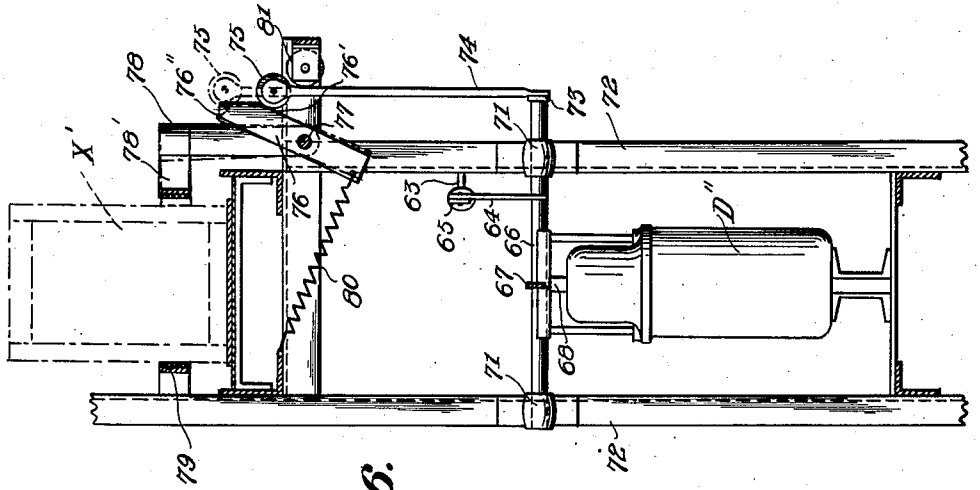


Fig. 16.

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Patented Feb. 5, 1935 1,990,050

UNITED STATES PATENT OFFICE

1,990,050

CONVEYING MECHANISM

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Application December 15, 1931, Serial No. 581,204

60 Claims. (Cl. 198—38)

This invention relates to improvements in conveying mechanisms of which the following is a specification, reference being had to the accompanying drawings, in which:—

Figs. 1, 2 and 3 are diagrammatic representations of parts of typical systems respectively showing different embodiments of switching mechanisms included in said systems and each constructed in accordance with this invention;

Figs. 4, 5 and 6 conjointly illustrate, on a larger scale than Fig. 1, the means at the junction of two intersecting lines of the conveying mechanism, for deflecting the articles from one line to the other, Fig. 4 being a plan view showing the switch in deflecting position, Fig. 5 a cross section on the line 5—5 of Fig. 4, looking in the direction of the arrow, and showing also the circuit closing switches, which are omitted from Fig. 4, and Fig. 6 a wiring diagram related to this particular embodiment;

Figs. 7, 8 and 9 are, respectively, a plan view, a side elevation and a wiring diagram of the embodiment of the invention at the junction of two intersecting lines of the particular conveying mechanism diagrammatically illustrated in Fig. 2;

Fig. 10 is a view, similar to Fig. 7, of an embodiment of the invention like the latter but in which the deflector swings from the opposite side of the main conveyor;

Figs. 11 and 12 are detail views of a means applied to the deflectors of Figs. 7 and 10, for releasably locking the same in deflecting position;

Figs. 13, 14, 15 and 16 conjointly illustrate the construction at the junction of two intersecting lines of that embodiment of the invention which is illustrated in Fig. 3; Fig. 13 being a plan view, Fig. 14 a wiring diagram, Fig. 15 a partial side view, and Fig. 16 a vertical section on the line 16—16 of Fig. 15;

Fig. 17 is a view of a box or the like to be conveyed and containing provision for the utilization of a plurality of switch operating members variously arranged in different positions longitudinally as well as transversely of the box.

This invention relates to a conveying mechanism in which the articles conveyed are selectively delivered to various destinations which have been predetermined by the setting of appropriate devices movable with said articles.

An appropriate layout of a conveying mechanism of this kind includes a line of conveyors, (as A, A' or A'', Figs. 1, 2 and 3, respectively), which serves as a feeder for delivering the articles to be transferred to any one of a series of other conveyors or conveying sections, (as B, B' or B'') which lead off from either or both sides of the feeder line to different places to which the respective articles are to be delivered.

To distinguish the lines of conveyors A, A' and A'' from the conveyors B, B' and B'', each of the former will hereinafter be referred to as "main conveyor" and the conveyors B, B' and B'' will be referred to as "branch conveyors". Each main conveyor and each branch conveyor may be of any suitable type and construction, and of any appropriate length and shape, as best suited to the particular requirements of any given installation. For example, any main conveyor and any branch conveyor may have its load supporting bed composed wholly or partly of endless traveling belts, endless traveling aprons, live rollers having any appropriate means for driving the same, or idler rollers, and if composed in part of idler rollers and in part of live rollers the latter may be interspersed in groups or singly, as preferred, among or between the idler rollers. In some instances the idlers may be so arranged as to utilize the force of gravity in effecting movement of the loads along the whole or any selected part or parts of either the main or any branch line. In short, it is not our purpose herein to restrict ourselves to any particular type or construction of the main or branch conveyors, since we are aware that there are many kinds thereof which are suitable for our use and from which the one or ones considered to be best adapted to a particular installation will be selected for use in such installation. However, there are features of certain embodiments of the invention which call for special construction of frames and beds of main or branch conveyors in order that the best results may be secured, and in such instances said special constructions may be regarded as being parts of this invention and accordingly have been included in certain of the appended claims. Such a construction is exemplified in Figs. 1 and 4–6, inclusive, hereinafter described in detail.

Since endless traveling belts arranged below and in frictional contact with the under surfaces of load supporting rollers provide a desirable means to rotate said rollers and cause them to impart advancing movement to the load supported thereon, such means has been illustrated herein, the belt forming the means for rotating the rollers 10 and 11 of the main conveyor, shown in Fig. 4, being marked 14 and the belt for rotating the rollers 12 of the branch conveyor shown in said figure being marked 14'.

The "articles" being, or to be, conveyed, (marked X, in Figs. 1, 4 and 5, X' in Figs. 2, 3, 13

and 16, and X'' in Fig. 17) may be of any appropriate style, as boxes, racks, crates, or the like, suitable to contain or to carry merchandise or other loads to be transferred from one place to another by the conveying system.

In order that these articles X, X', or X'' may be deflected or switched from the main line to the particular branch lines which lead to their respective predetermined destinations, a series of selectively operated tensioned deflecting members (marked C^1, in Figs. 1, 4 and 5, C' in Figs. 2, 7 and 8, C^2 in Fig. 10 and C^3 in Figs. 3, 13 and 15) are provided at the junctions of each main conveyor and its associated branch conveyors.

The mechanism which constitutes the present invention is characterized, in part, in that it includes electrically controlled power elements, indicated at D, Figs. 1, 4 and 5, and at D', Figs. 2, 7, 8 and 9 and at D'' in Figs. 3, 13, 15 and 16.

Each of the circuits which includes a power element D, D' or D'' is hereinafter called "deflector-operating circuit". Each of these circuits includes one or more normally open switches, (marked 15 in Figs. 1, 5 and 6 and 15' in Figs. 2, 3, 7, 8, 10, 11 and 12) to be closed by a means, as a finger or fingers (marked 16 in all the figures of drawings) extending from the article to be transferred, for example, to thereby energize the corresponding power element. It will be understood that there is a separate deflector-operating circuit at each branch line and that the circuit closing switches 15 or 15' thereof are variously positioned, and also that the fingers, 16, or other suitable switch closing means employed in lieu thereof, are settable upon the respective articles in selected positions whereby they will operate the switches 15 or 15' associated with the branch lines for which said articles have thus been predetermined, and will pass by, without operating, the similar switches associated with branch lines other than those for which the corresponding articles are intended.

In some instances a multiplicity of branch lines may be required adequately to serve the needs of the user of a given system, and this multiplicity of branch lines may render it expedient to provide each article to be transferred with a plurality of switch closing fingers, or like devices, 16, variously positioned relatively to each other upon the respective articles from which they project and operating conjointly upon a similar plurality of circuit closing switches to close the corresponding deflector-operating circuits, their relative positions determining the particular switches 15 or 15' to be closed thereby. In the accompanying drawings we have illustrated, for exemplary purposes, two such devices, 16, for initiating the closure of each deflector-operating circuit. The openings may be arranged in a single line, in each article, as shown in Figs. 1, 2, 3, 4 and 10, or in a plurality of lines, as exemplified by Fig. 17 and may be placed at any appropriate place or places on the article. Moreover, there may be more than two complementary switch-closing devices and circuit-closing switches to operate conjointly in relation to a given circuit.

Each of these deflector-operating circuits also includes one or more normally closed switches (marked 18 in Figs. 1, 4 and 6; 18' in Figs. 2, 7 and 9 and 18'' in Figs. 3 and 11) arranged to be opened under control of the article which has been, or is being, deflected and, when thus opened, to cause the continuity of the circuit to be broken and, accordingly, the corresponding power element to be deenergized: and each of said circuits also includes an electro-magnetic switch E of a suitable construction having higher resistance than the corresponding power element and provided with an electrical interlock, by which the circuit which has been completed through the power element by the closing of the switch or switches 15, or 15' is maintained in closed condition after the corresponding switch closing device or devices 16 have passed out of contact with said switch or switches and until the circuit is opened under control of the article being deflected. The parts are so arranged that this opening of the respective circuits occurs at that time in relation to the deflection of said article which enables the corresponding deflecting member to be returned to its normal, nondeflecting, position in time to be again moved into deflecting position, if so predetermined, by an article which closely follows the one which has been deflected and which is intended for the same branch line.

There are other novel features of the invention which will become apparent as the description of the illustrated embodiments thereof proceeds.

The three embodiments illustrated in the accompanying drawings are typical of constructions which while generically alike yet are specifically different from each other in respects which meet a particular condition or answer a particular requirement with relation to which they possess certain advantages, respectively.

For example:

(1) Figs. 1, 4 and 5 exemplify a construction of very desirable nature in which the articles, X, conveyed are boxes, racks, or the like, which are not removed from the system and the particular construction illustrated and hereinafter described in detail enables articles of said nature which closely follow one another on a completely loaded line to be deflected onto the same branch line or to continue on the main line, as predetermined by the setting of control devices movable with the articles;

(2) Figs. 2, 7 and 8 exemplify a construction in which each deflecting member, C^1, after it has been moved into deflecting position, which in this instance is diagonally across the path of the article to be deflected, and has been engaged by the forward end of said article, tends to return to its nondeflecting position under the influence of the tensioning means connected to the deflecting member, but is held back from completely so returning by the article engaged therewith until said article has completely entered the branch line, the said member returning to its former position immediately in the wake of the article;

(3) Figs. 3, 13, 14, 15 and 16 exemplify a construction in which each deflecting member, marked C^3, is so constructed and so mounted and tensioned that in its operation the initial part of its movement to its deflecting position diagonally across the main line is relatively to the article to be deflected from the main line onto the acompanying branch line and causes the free end of said member to engage the foremost corner of said article, and thereafter, that is, during the remainder of its movement through its arc of travel, the speed and direction of the deflecting member and the article will be substantially the same, whereby the article will be guided off the main line and on the branch line gradually and with no appreciable friction. These figures also exemplify a construction in which a braking means comes into operation upon the article on the main line next succeeding the one which is to be deflected onto the corresponding

branch line at substantially the same time that the latter article is engaged by the deflecting member C'', the engagement of the braking means and said article continuing until the preceding article has been deflected.

The several illustrated embodiments of the invention will now be described in more specific detail without, however, intending thereby to imply that the invention is restricted in all respects to these details.

Referring first to the embodiment shown in Figs. 1, 4, 5 and 6:

The bed of the main conveyor A is of the live roller type and comprises successively arranged groups of transversely extending load-supporting rollers 10 and 11. The groups of rollers 10 are arranged at the respective switching stations, one of which is shown in Fig. 4, and extends across the receiving ends of the branch conveyors B at said stations. The rollers 11 are longer than the rollers 10 and are arranged between the switching stations, in groups which alternate with the groups of rollers 10. The bed of the branch conveyor shown in Fig. 4 is formed in part of live rollers and in part of idler rollers, in a particular arrangement which affords space in said bed for switches 18 and 19 to be operated, under control of the article X which has been diverted to said bed, to effect the return of the deflecting member C to its former position. It will be noticed that there is a group of live rollers 12, each extending only partway across the bed, arranged in the receiving end of the bed and between two groups of idler rollers, 13 and 13', and that a third group of idler rollers 13'' is arranged in an endwise relation with the live rollers 12, with a space between the confronting ends of the third group and said live rollers to accommodate the switches 18 and 19.

The frame of the main conveyor includes longitudinal members 11' and 11'' at opposite sides thereof. These members carry the rollers 11, other longitudinal members 10', 10' being provided to support the rollers 10 and said members 10', 10' being arranged within the vertical planes of the side members 11', 11''. The frame of the main conveyor also includes at each article switching station, guard rails 11^a and 11^b at opposite sides of said frame and a guide rail 11^c at one side of the frame. Each guard rail 11^a extends from a point adjacent the end of the corresponding member 11'' to a place immediately adjacent the end of the corresponding deflecting member C and each guard rail 11^b extends from the end of one frame member 11'' to the frame member 11'' next in line therewith. Each guide member 11^c extends from one article switching station to another, along the side of the conveyor provided with the member 11''.

Thus it will be seen that at each switching station one side of the frame of the main conveyor A is interrupted and a branch conveyor B extends therefrom in such relation thereto that an article being conveyed may be deflected from the main conveyor and onto the branch conveyor and in its movement from one to the other will pass through the opening formed by said interruption. In this deflecting of the article it engages the deflecting member C which has been moved into deflecting position under control of the article. Each deflecting member C is U-shaped in cross section to thereby provide an upwardly open channel and is pivoted at c to one end of a similarly channeled member C* whose opposite end merges into the side of the frame of the branch conveyor B. It will be seen, therefore, that the parts of the branch conveyor B adjacent the main conveyor A are so shaped that the receiving end of the branch conveyor will be curved upon an arch which conduces to an easy transfer of the article gradually from the main conveyor onto the branch conveyor.

The article X is provided with rollers x at one side thereof and rollers x' at the opposite side thereof. These rollers are for guidance purposes and may be underneath the bottom of the article, as shown, or elsewhere in its height, as best suited to a given installation.

The rollers x' are positioned to engage the guide rail 11^c in the travel of the article X and co-operate with said guide rail in holding the article in a straight position longitudinally of the main conveyor between the switching stations and in assuring that the rollers x at the opposite side of the article will enter the deflecting member C. As clearly shown in Fig. 4 the guide rail 11^c has its end curved outward and terminating in such position with respect to said deflecting member C that it will not interfere with the angular position relatively to the length of the main conveyor which the article assumes while being deflected. The guards 11^a and 11^b co-operate with the guide rail 11^c in maintaining the article in proper position on the main conveyor for deflection by a deflecting member which has been adjusted to deflecting position and are so positioned with respect to the rollers x' and x that they permit such deflection. Their position is such that they will act also to hold the article in proper position to pass by any branch conveyors whose deflecting members have not been adjusted to deflecting position. In short, the correlation of the parts is such that when any one of the deflecting members C has been moved to its deflecting position, (shown in full lines in relation to the first and fourth branch lines reading from the left hand end in Fig. 1, and also in Figs. 4 and 5,) the rollers at the corresponding side of the article X which is to be diverted enter the said deflecting member and the latter, in conjunction with the member C*, operates to guide the box from the main conveyor and onto the branch conveyor: and when any one of the said deflecting members is in non-deflecting position, (shown in full lines in relation to the second, third, fifth and sixth branch lines reading from the left hand in Fig. 1 and in dotted outline in Fig. 4,) all of the articles X will pass by the corresponding branch lines without entering the same. It will be noticed that the live rollers 12 in the bed of the branch conveyor B are so positioned that they will co-operate with the live rollers 10 in the bed of the conveyor A and with the deflecting members C, C* and with the rollers x and appurtenant parts in assuring positive and unfailing movements of the articles X from the main conveyor onto the predetermined branch conveyors, notwithstanding that no part of the deflecting member extends across the bed of the main conveyor A.

In this particular illustrated embodiment of the invention the power elements D for moving the respective deflecting members C into and out of article deflecting position, are in the form of solenoids, although any other suitable form of electrically operative means for the purpose may be employed. Each of these power elements is included in a deflector-operating circuit, as previously stated herein. One of the solenoids and its operating circuit, and also its connection to

the corresponding article-deflecting member, is shown in Figs. 4, 5 and 6 and since they are all substantially alike, the description of this one will be understood as applying to each of the others.

The solenoid D is provided with a member *d* which is moved outward when the solenoid is energized, the corresponding deflecting member C is provided with a projecting *cx*, and a connecting element *d'*, which is pivoted at one end to the member *d*, connects the latter with said projection *cx* and operates to swing said deflecting member into deflecting position when the member *d* is moved outward. The circuit which includes this solenoid comprises normally open circuit-closing switches 15, 15, a normally closed switch 18, a normally open switch 19 and an electro-magnetic switch E. The switches 15, 15 are arranged to be engaged by correspondingly positioned switch closing devices 16, carried by the article to be deflected at this station. The normally closed switch 18 is arranged in the bed of the branch conveyor adjacent the receiving extremity of the latter and the normally open switch 19 is arranged in the same bed and immediately after the switch 18, and is wired in parallel with the latter. The electro-magnetic switch E includes a coil *e* and is provided with a member *m* having members *n*, *o* and *p*, respectively adapted to span the space between and to make contact with terminals 20' and 29', 27' and 30', and 26' and 24'. The wiring diagram shown in Fig. 6 also includes wires 20 leading from a suitable source of electrical energy to the contact 20'; a wire 21 extending from the coil *e* to the switch 18; a wire 22 extending from the switch 18 to the switches 15; wires 25, 26, 26ª, 27 and 28 which conjointly extend from said switches back to the source of electrical energy and include the terminals 26' and 27'; a wire 24 which taps the wire 22 at the point 23 and extending to the terminal 24'; a wire 29 extends from the terminal 29' to the solenoid; and a wire 30 which extends from the solenoid to the terminal 30'. The switch 19 is connected in parallel with the switch 18 by the wires 31 and 32.

In the use of this mechanism, a box or rack X, whose switch closing devices 16 are in a position corresponding with the position of the switches 15, 15 associated with a particular branch line onto which said box or rack is to be deflected, upon its approach to said branch line, closes said switches 15, 15, thereby completing a circuit through the coil *e* of the corresponding electro-magnetic switch E. This circuit includes the wires 20, terminal 20', coil *e*, wire 21, switch 18, wire 22, switches 15, 15, and wires 25, 26, terminal 27' and wires 27 and 28. The coil *e* is thus energized and draws the member *m* into position in which its contact members *n*, *o* and *p* respectively make contact with the terminals 20' and 29', 27' and 30', and 26' and 24'. The solenoid D is in a circuit which includes members *o* and *n*, wires 29 and 30 and the corresponding terminals. The coil *e* is of higher resistance than the latter circuit and since the current will flow through a circuit of lesser resistance in preference to one of higher resistance, it follows that the solenoid will be energized when, as the result of the energization of the coil *e*, the circuit which includes the wires 29 and 30 is completed and said circuit will remain closed until the circuit through the coil *e* is broken. The solenoid being thus energized operates to force the member C into article deflecting position, Engagement of the switch closing devices 16 with the switches 15, which initiated the energization of the coil *e*, is of momentary duration only, but the coil *e* will continue to be energized as long as a closed circuit exists through wire 20, coil *e*, wire 21, switch 18, wires 22 and 24, switch member *p*, and wires 26ª, 27 and 28: and this particular circuit comes into existence as soon as the switches 15, 15 are closed. Since this particular circuit does not include said switches 15, it follows that the circuits through the electro-magnet at *n*, *o* and *p* remain closed after the switches 15 have been opened.

The deflecting member C having thus been forced into article-deflecting position, is engaged by the wheels *x* at the corresponding side of the box or rack X, said wheels running in the track formed in part by said member C and in part by the member C*, whereby the box or rack is guided in its travel from the main conveyor onto the branch conveyor, where it comes into contact with and opens the switch 18. This results in the denergization of the solenoid D and permits the deflecting member C to be returned to its former, non-deflecting, position under the influence of its tensioning means, here shown as a spring D*.

It may frequently happen that a box or rack X following the one which is thus being deflected is intended for the same branch line and it will be apparent that if the same reaches the circuit closing switches 15 while the preceding box or rack is still engaged with the switch 18, it would be ineffective to cause reenergization of the solenoid D and the throwing of the deflecting member C into deflecting position, since the circuit to the solenoid remains broken at the switch 18 as long as the said preceding box or rack X is in engagement with said switch. It is to meet this situation that the second switch, 19, arranged in the bed of the branch conveyor and wired in parallel with the switch 18, is provided. It will be noticed that this switch 19 is mounted in such relationship to the switch 18 and to the line of movement of the box or rack X on the branch conveyor that it is closed by the latter shortly after the switch 18 is opened and remains closed as long as said box or rack is passing thereover. Thus, it will be seen that immediately after the circuit has been interrupted at the switch 18, and the solenoid D and also the coil *e* have thereby been de-energized and the deflecting member C restored to its non-deflecting position, and while the circuit is still interrupted at said switch 18, the switch 19 is closed, whereupon the coil *e* and the solenoid D may again be energized consequent upon the reclosing of the switches 15, notwithstanding switch 18 remains open. The only difference is that when switch 18 is closed and switch 19 is open the circuit passes through switch 18 over the wires 21 and 22, but when switch 18 is open and switch 19 closed the current passes through switch 19 over the wires 21, 31 and 32.

In the embodiment of the invention shown in Figs. 2, 7, 8 and 9, the main conveyor, marked A' has its bed composed of transversely extending rollers, 10ª driven by a belt 14ª engaging the undersurface of said rollers and positioned about midway of the length of the latter, as in the previously described construction, but it will be understood that any other suitable type of construction of load-supoprting bed may be employed. Each branch conveyor B' in this particular construction has its bed composed of idlers, but this also is not material in the instant invention. The frame of the main conveyor is provided with

longitudinally extending guard rails a^2 and a^3 at opposite sides thereof. The guard rail a^3 is interrupted at each switching station and the receiving end of the corresponding branch conveyor B' extends through the interrupted portion of said guard rail and ends in such relation to the bed of the latter that the rollers forming the bed of the branch conveyor will be so correlated with the rollers forming the bed of the main conveyor that articles may be freely diverted from the latter bed and onto the branch bed without shock or jar. It will be noticed that the branch conveyor has its receiving end extending around in a curve and that the rollers, b^{10}, at the end of the branch conveyor are arranged in two groups of which the rollers forming either group have an endwise relationship with the rollers forming the other group. This construction conduces to the easy transfer of the articles from the main conveyor onto the branch conveyor. The remaining rollers, b^{11}, of each branch conveyor are shown as extending entirely across the bed of the conveyor. All of the rollers of each branch conveyor may be arranged to convey the articles by the force of gravity, or otherwise as preferred in any given installation. In other words, while a particular type and construction of load supporting bed of the branch conveyors as well as a particular type and construction of load supporting bed of the main conveyor, have been illustrated in the drawings, any other suitable type or construction of either of the same may be employed, if preferred in any given installation.

Figs. 7 and 8 illustrate the construction of this particular embodiment of the conveying mechanism at any one of the switching stations, and upon reference thereto it will be seen that each deflecting member, C^1, is in the form of an arm having one of its ends attached to a vertical shaft c' whose opposite ends are mounted in appropriate bearings 40, 40 and whose intermediate portion has a bearing in a collar 41 held in position by guy line 42. The shaft c' is so positioned with respect to the main and branch conveyors that the arm C^1 which projects therefrom will when in non-deflecting position, shown in full lines in Fig. 7, span the space formed by the interruption in the frame member a^3 of the main conveyor and extend across the receiving end of the branch conveyor: and when in its deflecting position, shown in dotted outline in said figure, will extend diagonally across the main conveyor and substantially form a continuation of the frame at the corresponding side of the branch conveyor, and be in position to be engaged by an article on the main conveyor and destined for said branch conveyor.

In this particular embodiment of the invention the movements of the arm C^1 to and from its deflecting position are effected through power applied to a crank arm, c'', which extends from the shaft c' and is disposed at an angle with the arm C^1. As here shown the power which turns the arm C^1 from its nondeflecting position to its deflecting position is derived from an electrically operated power element—here shown as a "thrustor", marked D', whose plunger d' is connected with the crank arm c'' by a cable 43, or other appropriate element of flexible nature. This cable passes over one or more appropriately arranged idlers 44 and the end portion 43' thereof, which is arranged after the crank c'', also passes over one or more idlers 44' and is provided with a counterweight C^a which maintains tension on the crank arm c'', cable 43, shaft c' and arm C^1 tending automatically to return the latter to its non-deflecting position.

In this embodiment, as in the one previously described, the power element D' is energized when the switches, marked 15', are closed by the engagement with said switches of correspondingly positioned actuating elements, marked 16, projecting from the article, marked X', being conveyed. This article may be in the form of a box, a rack, a crate, or otherwise, adapted to carry merchandise, and does not require the wheels or rollers x, x' which form parts of the embodiment previously described, since each deflecting arm C^1 when in deflecting position is arranged above the bed of the main conveyor and in the path of travel of the body of the article X' predetermined to be deflected thereby.

In many important respects each electrical circuit by which the corresponding power element D' is energized, is identical with that already set forth with relation to the previously described embodiment, as will be seen upon comparison of the diagrammatic view thereof shown in Fig. 9 with the diagrammatic view shown in Fig. 6. The supplemental switch 19 and wires 31 and 32, shown in Fig. 6 as parts of the previously described embodiment, are not required in the embodiment now being particularly described. Moreover, in the latter embodiment, the switch, marked 18', which is normally closed and is opened under control of the article X' and which in this particular embodiment corresponds to the switch 18 of the previously described embodiment, is not arranged in the bed of the branch conveyor and, in fact, is arranged to be operated to deenergize the power element D' before the article whose direction of travel has been changed by its engagement with the deflecting arm C^1 has been diverted onto the corresponding branch conveyor. To this end the means which includes said switch 18' comprises a shaft 18^a which extends transversely of the bed of the main conveyor and is provided with a tab or other projection 18'' so positioned that it will be engaged by the forward edge of the bottom of the article X' at about the moment the forward corner of said article engages the deflecting arm C^1, which deflecting arm, as will be understood, was previously moved into its deflecting position by the closing of the circuit at the switches 15'. The projection 18'' is pressed downward by its engagement with said article X' thereby causing the shaft 18^a to turn and to open the switch 18; thus interrupting the circuit which includes the power element D'. The tendency is for the arm C^1 now to be returned to its non-deflecting position by the counterweight C^a, through the connections between said counterweight and the arm, but this tendency is resisted by the engagement of the article X' which is being deflected with said arm, the counterweight, however, acting to hold the arm against the article and causing said arm to return to its non-deflecting position in the wake of the article, so that when the article has become settled upon the branch conveyor, the arm C^1 will be fully in its nondeflecting position and all the parts will be in position for reoperation by a succeeding article X' predetermined to be deflected onto said branch conveyor.

The same reference characters have been applied in Figs. 6 and 9 to those elements of the circuit connections, including the electro-mag-

netic switch E, which are identical in both embodiments and have not yet been particularly described in relation to the particular embodiment shown in Figs. 2, 7 and 8. It will be understood, therefore, that when an article X' provided with switch actuating devices 16 positioned to actuate the switch 15' associated with the branch line B' shown in Fig. 7, reaches the place on the main line at which said switches are located the latter are closed, thereby completing a circuit which includes the coil *e* of the electro-magnetic switch E, said circuit being as follows: wire 20, terminal 20', coil *e*, wire 21, normally closed switch 18', wire 22, switches 15', 15', wire 25, terminals 26', 27', and wire 28. The coil *e* being thus energized draws into it the member *m* whose switch elements *n*, *o* and *p* are thus caused to bridge the spaces between terminals 20'—29', 27'—30' and 26'—24', respectively, whereupon the circuit through the power element D' is completed and remains so, even after the switches 15', whose closing initiated the energization of the coil *e*, have been opened. In short, the circuit which includes the power element D', is complete from the moment the coil *e* is energized by the closing of the switches 15', 15' and until said coil is deenergized by the opening of the switch 18', regardless of the intermediate opening of the switches 15', since the coil *e* is of higher resistance than the circuit which passes through the power element and hence the curernt will flow over the wire 24, instead of through the switches 15' and wires 25 and 26, when said switches 15' have been opened and until the switch 18' also has been opened.

Fig. 10 illustrates a construction in which the deflector, marked C^2 in this figure, and also the connections between said deflector and the power element and the connections which control the power element are all identical with the construction of these parts in the embodiment illustrated in Figs. 7, 8 and 9. In the embodiment shown in Fig. 10, however, the parts are so arranged that the deflector swings from the side of the main conveyor opposite that from which it swings in the embodiment shown in Figs. 7 and 8—in other words, swings away from the path of deflection of the article being deflected in its movement from deflecting to non-deflecting position. For this reason said deflector should not be freed for movement to its non-deflecting position until the article being deflected has reached that position with relation to the branch line which enables it to be firmly seated upon said branch line without further assistance from the deflector. Accordingly, the projection or tab, marked 18^2 in Fig. 10, connected to the shaft 18^a, and which operates the normally closed switch, marked 18' in both of these embodiments of the invention, is arranged in the bed of the branch line adjacent the inlet end of the latter and hence said switch 18' will not be opened to thereby deenergize the corresponding power element until the article has entered the branch line.

Each of the embodiments shown in Figs. 7, 8 and 10 is provided with a means under control of the deflector, C^1 or C^2, for automatically latching said deflector in its deflecting position against any tendency to rebound into a position in which it will not properly engage the article to be deflected. This latching means is arranged to be released from the deflector under control of the article being deflected and is of the same nature whether applied to the embodiment shown in Figs. 7 and 8 or to the embodiment shown in Fig. 10, or, indeed, to any other of the embodiments to which it may usefully be applied. It is shown generally in Figs. 7 and 10 and on a larger scale and in detail in Figs. 11 and 12.

It will be noticed that the deflector, C^1 or C^2, is of channel construction and carries near its free end a bracket c^{15} having spaced arms through which a latching member c^{16} has logitudinal slidable movement. Said latching member is provided at one of its ends with a wedged shaped head c^{17} and is under tension of a spring c^{18} which tends to hold it in latching position.

At an appropriate place in the path of travel of said head c^{17} with the free end of said deflector a cooperating keeper c^{19} of any suitable nature is mounted, the correlation of these parts being such that when the deflector has reached its deflecting position the spring, c^{18}, which was placed under tension in the movement of the head c^{17} over the keeper c^{19}, will force said head into latching position behind the keeper, thus holding the deflector in its deflecting position.

The keeper c^{19} is provided with a sleeve or other suitable guiding device c^{20} through which a latch releasing member c^{21} is mounted to have longitudinal slidable movement. This latch releasing member has its free end engaged with the contiguous surface of the head c^{17} when said head is in its latching position, and appropriate elements under control of the article which is being or is to be deflected, are provided to force the latching member c^{16} upwardly against the tension of the spring c^{18}, to thereby free the deflector, C^1 or C^2 as the case may be, and permit the latter to be returned to its non-deflecting position under control of its hereinbefore referred to tensioning means.

As here shown the elements under control of the article for freeing the deflector and permitting it to return to its non-deflecting position include the shaft 18^a. Said shaft as previously herein stated controls the normally closed switch 18' and is connected with the latch releasing member c^{21} by an arm, c^{22}, whose end opposite the shaft has a lost motion connection, shown at c^{24}, with the corresponding end of said member c^{21}. Thus it will be seen that the pressure of the article upon the tab (Fig. 7) or other projection 18'' or 18^2 (Fig. 10) causes the shaft 18^a to turn and thereby open the corresponding normally closed switch 18' and at the same time causes the arm c^{22} to force the latching member c^{16} upward until the head c^{17} has been freed from the keeper.

The means by which the free end of the deflector is automatically latched in its deflecting position and automatically released so that it may be returned by the tensioning means to its non-deflecting position, is the same, as previously stated, whether applied to the arm C^1 (Fig. 7) or to the arm C^2, (Fig. 10). In Figs. 11 and 12 the parts are shown in the relative positions they occupy when applied to the construction shown in Fig. 7, and it will be apparent that certain of these parts will necessarily extend from the deflector in a direction opposite that shown in these figures when the latching and latch releasing means are embodied in the construction shown in Fig. 10.

Referring now to the construction shown in Figs. 3, 13, 14, 15 and 16, in which the main conveyor is marked A'', the branch conveyors are marked B'', the article deflecting arms are

marked C^3 and the boxes, crates, racks or other suitable articles for carrying merchandise or the like to be transported are marked X'.

In this particular exemplification, the power element, marked D'', is of the thrustor type but any other suitable type or construction of electrically operated power element may be employed, if preferred. The article X' may be of the simple type of that employed in relation to the embodiment shown in Figs. 2, 7 and 8, or of any other suitable construction. The beds of the main and branch conveyors also may be of any suitable kind, driven or otherwise, as preferred.

The circuit arrangement at each branch station, as shown by the wiring diagram (Fig. 14), appears to be the same as that shown in Fig. 9. The only material difference is that the switch, marked 18'', which corresponds in function to the switch 18 (Fig. 6) and switch 18' (Fig. 9) is in the bed of the branch conveyor in position to be engaged by the bottom of the article X' which has been deflected to said branch conveyor, being in this respect similar to the switch 18 of the first described embodiment. All other parts of the circuit connections, being identical with what has been set forth in relation to the wiring diagram shown in Fig. 9, are given the same reference characters as the latter.

In this particular embodiment the article deflecting arms C^3 are carried by members 60 which extend across the main conveyor A'' beneath the bed thereof. Each of these members is provided at its end opposite the corresponding branch conveyor with an upward projection 61 to which the corresponding arm C^3 is attached at one end, the projection 61 enabling the arm to occupy a level above the bed of said main conveyor. The end of the member 60 opposite the projection 61 is secured to a vertically arranged rotative shaft 62 from which a crank 63 projects. This crank is connected with one end of a second crank 64 by a link 65 which preferably is of a form, as shown, permitting its length to be varied to thereby regulate the throw of the deflecting arm C^3 to that found to give the best results in a particular installation. The end of the crank 64 opposite the link 65 is fixedly secured to a shaft 66 which derives movement on a horizontal axis from the power element D'' through the medium of a lever 67 one of whose ends is fixedly secured to said shaft. This lever is connected between its ends to the movable member 68 of the power element and is provided with a counterweight 69 by which tension is put on said member 68 and also on the shaft 66, crank 64, link 65, crank 63, shaft 62, member 60 and article deflecting arm C^3, whereby said parts, after the deflecting member C^3 has been moved to its deflecting position by energization of the power element D'', are returned automatically to their former positions, with said deflecting member in its nondeflecting position, upon deenergization of said power element. This tension may be varied by adjusting the counterweight longitudinally of the arm.

The shaft 66 is mounted in bearings 71 carried by supporting standards 72. One end of said shaft projects through the corresponding bearing 71 and is provided with a crank 73 to which is pivoted one end of an arm 74 whose opposite end is arranged to slidably engage the surfaces 76', 76'' of a cam 76, being preferably provided with a friction reducing roller 75 for such engagement. This cam is fixedly secured about midway of its length to a shaft 77 from which a brake member 78 projects, the said brake member having its lower end fixedly secured to the shaft and its upper end 78' projecting inwardly over one side of the bed of the main conveyor in a position such that when it is moved inwardly it will engage the corresponding side of an article X' which is in a closely following relation with a preceding article being deflected at the corresponding switching station. A fixed brake member 79 is mounted in a position to engage the side of said article opposite the end 78' of the brake member 78. A spring 80 is arranged to tension the cam 76, shaft 77 and brake member 78 and, in cooperation with a roller 81, which engages the arm 74, to hold the cammed surfaces 76' and 76'' and the roller 75 in operative engagement with each other.

In the operation of this particular embodiment of the invention, an article X', upon its approach to the particular branch line for which it is destined, will, by the engagement of its switch-actuating device or devices with the switch or switches 15', close the circuit through the corresponding power element D'' and said circuit will remain closed until opened by engagement of said article with the switch 18'', after the article has been deflected onto the corresponding branch line B''. The circuits being the same as previously described with particular reference to the embodiment shown in Figs. 2, 7, 8 and 9 need not be described in detail at this point, since such description would substantially be a repetition of what has already been set forth. When the power element D'' is thus energized its movable element 68 is moved upward, thereby rotating the shaft 66 upon its horizontal axis and this in return causes the shaft 62 to turn upon its vertical axis. This movement of the shaft 62 causes the arm 61 to swing from the position shown in full lines in Fig. 13 to the position shown in dotted outline in said figure and accordingly swings the article deflecting arm C^3 through an arc of a circle with the shaft 62 as the axis of its movement, from its nondeflecting to its deflecting position. The rotative movement of the shaft 66 also causes the rod 74 to move upward from the position shown in full lines in Fig. 13 to the position shown in dotted outline in said figure. In this movement of said rod its end or roller 75 travels slidably from the surface 76' and along the surface 76'', of the cam 76, thereby pressing the upper end of said cam inwardly and imparting rotative movement to the shaft 77 and, accordingly, to the brake member 78, whose upper end 78' is thereby moved into a position where it will engage the corresponding side of an article X' if the latter article is in a closely following relationship with the preceding article, which is being deflected. Thus it will be noticed that energization of the power element at any one of the switching stations results (1) in the movement of the deflecting arm into a position to deflect the article intended to be deflected at said station and (2) in the movement of a brake member into braking relationship with an article closely following the former.

Each switch, or group of complementary switches, 15' is so positioned with relation to the article-deflecting arm C^3 associated therewith that the closing of said switch or switches under control of the article to be deflected by said arm will be so timed that when the arm has completed about one-fourth of its arc of travel its forward end will engage the forward corner of the article to be deflected and will escape the preceding article, even though the latter be but a

very short distance ahead of the one which is to be deflected. In the further movement of said arm through its arc of travel it guides the article off the main conveyor and onto the branch conveyor. It will be noticed that the path of travel of the arm at the beginning of its movement to deflecting position is in about the same direction as that of the approaching article to be deflected and about the same speed, so that when the arm makes contact with said article they are both traveling at about the same speed and in about the same direction and hence the force of the impact is very slight: and that from the time its forward edge has engaged said article until it has reached its final position it gently guides the article from the main line and onto the branch line: the deflecting of the article being thus brought about gradually and while the arm and the article are travelling together. This feature of both the deflector and the article travelling in the same arc and this arc having a component in the direction of travel of the main conveyor is an important advantage since it reduces the friction resulting from deflection to a minimum.

Moreover, the end member 75 of the brake rod 74 is so positioned relatively to the surfaces 76′ and 76″ of the cam 76 that the brake member 78′ reaches its braking position at substantially the same moment the corresponding article deflecting arm C^3 has made contact with the preceding article X′. In short, the deflecting and braking mechanisms at each switching station are so correlated with each other and the corresponding switch or switches 15′ are so arranged that energization of the corresponding power element D″ consequent upon the closing of said switch or switches results in movement of the arm C^3 into position to make contact with the article to be deflected and of the brake member 78′ into position to engage the article next succeeding the one to be deflected at about the same moment. The movable brake member 78′ in cooperation with the stationary brake member 79 operates to hold the article X′ which happens to be closely following the one which is to be deflected against movement until the deflecting of the preceding article has been completed, in the way already described. In other words, the parts are so arranged that the brake member 78 is thrown into its braking position during substantially the first one-fourth of the vertical stroke of the movable member 68 of the power element D″ and that during the remaining three-fourths of the stroke the said brake member simply remains in its braking position. By this means friction between two closely following articles X′ during deflection of the one immediately in advance of the other is eliminated.

The foregoing phases of movement are illustrated in Fig. 3 in which certain of the articles X′ have supplemental designations, to wit, 1, 2, 3, 4 and 5, respectively. It will be noticed that the article bearing the supplemental designation 2 is in a closely following relation to the article designated 1 and has been contacted by the corner of the arm C^3 at the adjacent switching station, and that at about the same moment the rear corner of the article 1 has passed the position at which it would be engaged by said arm. The article bearing the supplemental designation 3 and which closely follows the one designated 2 is shown as being held by the brake which at about this same moment has been moved into position to engage the side of said article. The article having the supplemental designation 4 is shown in the position it occupies after the corresponding arm C^3 has been fully adjusted to deflecting position and the article having the supplemental designation 5, which is in a closely following relationship with the one being deflected, is shown as being held by the brake mechanism. It will be noticed that in the foregoing description the middle one of a group of three articles X′ is set forth as being the one deflected, but it should be understood that it is practicable, according to this invention, to deflect any one of a group of consecutive adjacent articles X′ placed end to end and with no appreciable spacing between them.

When the deflected article has reached the normally closed switch 18″ and has opened the same, thereby deenergizing the corresponding power element D″, the arm C^3 and the rod 74 are returned to their former positions under the influnece of the tensioning means, here shown as counterweight 69. During the return of the parts to non-deflecting and non-braking positions, respectively, the member 78′ of the braking mechanism remains in engagement with the article X′ until the deflecting arm has reached that position in which it will be out of the way of the forward travel of said article—that is to say until said arm has travelled throughout about three-fourths of its movement to its non-deflecting position.

It should be understood that the terms "one-fourth" and "three-fourths" as used herein are intended to be merely exemplary, the important point being that the movement of the arm C^3 into position to make contact with the article to be deflected and the movement of the corresponding brake member 78′ into position to hold the next succeeding article will be completed at substantially the same time and that the said arm by its continued movement affects the deflection of the article to be deflected and during the latter time the said brake member is held in braking relationship with the succeeding article: and, moveover, that the said brake member will be maintained in its holding relationship with said article and will detain the latter until the same arm in its return movement has reached the position relatively to the bed of the main conveyor at which it will not obstruct the forward movement of the article which was held.

The main conveyor of the particular embodiment of the invention may be of the live roller type, belt type, roller flight type or in fact any type of conveyor in which the friction between the article and the conveyor bed is not so great as to damage said article when held by the brake or while it is being deflected.

Reference has heretofore been made to the fact that the switch closing devices carried by the respective articles may be arranged to operate singly or may be so arranged that a plurality thereof will operate complementarily in closing the circuits through corresponding power elements, and it has also been suggested that these devices may be disposed in a single line or in a plurality of lines, as preferred in any given installation. Fig. 17 exemplifies an arrangement of the latter type. It shows two groups of switch closing devices 16, with one group arranged after the other. It will be understood that in any given installation some of the circuits may be controlled by individual pins and others by a plurality of complementary pins, and that the pins whether they operate individually

or complementarily may be positioned in a single line or in a plurality of lines, the only requisite being that the normally open switches 15 or 15' to be selectively operated thereby will be correspondingly positioned.

Having thus described the invention as illustrated with relation to several exemplary embodiments thereof, what we believe to be new and desire to secure by Letters Patent, is:—

1. A conveying system comprising a load carrying article, means for causing said article to traverse a defined course and an electro-mechanical switching mechanism operable to vary the course of travel of the load carrying article, said mechanism including a deflector movable into and out of deflecting position with respect to said article, an electrically-operable power element connected to the deflector and operable to move the latter to one of its positions, a control circuit for said power element, having a normally open switch arranged to be closed under control of the load-carrying article which is to be deflected and a normally closed switch arranged to be opened under control of said article after the latter has entered upon its changed course of travel, said circuit also having a means through which it is closed to the power element upon closure of the normally open switch and remains closed until the normally closed switch is opened; and tensioning means for moving the deflector to its other position when the circuit to the power element has been opened.

2. A conveying system comprising a load-carrying article, a main line, a branch line leading off from the main line, power means for imparting travelling movement to the load carrying article and an electro-mechanical switching mechanism operable to deflect said article from the main line to the branch line; said mechanism including a deflector normally arranged alongside the course of travel of the article on the main line and movable therefrom into a position diagonal to said main line and relatively to the branch line to deflect the article onto the latter, an electrically-operable power element connected to the deflector and operable to move the latter to its deflecting position, a control circuit for said power element, having a normally open switch arranged to be closed under control of the load-carrying article which is on the main line and is to be deflected to the branch line and a normally closed switch arranged to be opened under control of said article after the latter has entered the branch line, said circuit also having a means through which it is closed to the power element upon closure of the normally open switch and remains closed until the normally closed switch is opened; and tensioning means for moving the deflector to its non-deflecting position when the circuit to the power element has been opened.

3. A conveying system comprising a frame, a load supporting bed carried by the frame, load carrying articles mounted on said bed, means for applying power to the bed to move said articles relatively to the frame and electro-mechanical switching mechanisms arranged at various points along the length of the bed; each of said switching mechanisms comprising a deflector movable into and out of deflecting position, a tensioned power element connected to the corresponding deflector, and electrical connections for controlling the power element, including a normally open switch, a normally closed switch and a switch separate from said normally open and normally closed switches and correlated therewith and with the power element to cause the power element to be energized when the normally open switch is closed and to remain in energized condition when said switch has been opened and until the normally closed switch is opened, and means under control of the load carrying articles for closing the normally open switches selectively and for opening the normally closed switches.

4. A conveying system comprising a frame, a load supporting bed supported by the frame, load carrying articles mounted on said bed, means for applying power to the bed to move said articles relatively to the frame and electro-mechanical switching mechanisms arranged at various points along the length of the bed; each of said switching mechanisms comprising a deflector pivoted to have movement into and out of deflecting position, a tensioned power element connected to the deflector, and electrical connections for controlling the power element, including a normally open switch, an electro-magnetic switch, and a normally closed switch correlated to cause the power element to be energized when the normally open switch is closed and to be maintained in energized condition after said switch has been opened and until the normally closed switch has been opened; the normally open switches of the several switching mechanisms being variously positioned relatively to the said bed and the said load carrying articles having switch closing means settable into positions to close said normally open switches selectively, and said normally closed switches being positioned to be opened by the load carrying articles and to cause the corresponding power element to be deenergized for the return of the respective deflectors to their non-deflecting positions in time to be reoperated by the next succeeding load carrier, if so predetermined by the setting of the switch closing means of the latter.

5. A conveying system having switching stations at different places in its length, each of said switching stations including a deflector movable into and out of deflecting position and mechanism under control of the article to be deflected at said station for operating said deflector; said mechanism at each of the switching stations including an electrically operable tensioned power element connected to the corresponding deflector, a switch provided with a coil having a higher resistance than the power element and with an armature having spaced circuit closing members, electrical connections, including a normally open switch arranged to be closed under control of the article to be deflected and when closed to energize said coil, a plurality of pairs of terminals respectively arranged to be bridged by said circuit closing members when the coil is energized and circuit connections, including said pairs of terminals by which the energization of the power element is controlled by the coil, the latter circuit connections having a normally closed switch through which said coil is maintained in energized condition after the normally open switch has been opened, said normally closed switch being arranged to be opened under control of the article and thereby deenergize the coil and power element in time for the deflector to return to its nondeflecting position to be again moved to its deflecting position under control of the next succeeding article if the latter is intended to be deflected at the same station.

6. A conveying system comprising load carry-

ing articles, conveyors relatively arranged to form a main line and a series of branch lines leading off from different points in the length of the main line, each of said conveyors having a bed for supporting the load carrying articles and a frame for supporting its said bed, means for applying power to either of said beds to thereby cause said articles to be moved relatively to the frame, and mechanisms for switching the load carrying articles selectively from the main line and onto the branch lines under control of said articles, respectively, each of said mechanisms comprising a deflector movable into and out of deflecting position, an electrically operated tensioned power element connected to the deflector and electrical connections, including a normally open switch, an electro-magnetic switch and a normally closed switch, correlated to cause the power element to be energized when the normally open switch is closed and to be maintained in energized condition after said switch has been opened and until the normally closed switch has been opened, and each of said load carrying articles having a circuit closing device arranged to predeterminedly close a particular one of the normally open switches.

7. In a conveying system, a main line, a series of branch lines tapping the main line at different points in the length thereof and leading off therefrom, a series of load carrying articles adapted to said main and branch lines, deflectors at the junctions of the main line and the respective branch lines, and mechanisms selectively controllable by said articles for throwing the respective deflectors into and out of article deflecting position, said mechanisms including electrically controlled tensioned power elements connected to the deflectors, respectively, electrical circuits, including electro-magnetic switches and the power elements, said circuits having normally open switches variously positioned with relation to the main line and the articles being conveyed having circuit closing devices settable into positions to engage said normally open switches, selectively, to thereby initiate the energization of the selected electro-magnetic switches and corresponding power devices as predetermined by the setting of said devices, said electro-magnetic switches having higher resistance than the corresponding power elements and said circuits including normally closed switches and connections through which the respective electro-magnetic switches and corresponding power devices are maintained in energized condition when the corresponding circuit closing device has passed out of contact with the normally open switch and the latter has resumed its normally open condition, said normally closed switches being arranged to be opened under control of the articles and each when opened breaking the circuit to the corresponding electro-magnetic switch and thereby deenergizing the corresponding power element for the return of the corresponding deflector to its former position in time for its re-operation by the article next succeeding the one deflected, if intended for the same branch line.

8. In a conveying system, an article to be conveyed, provided with a plurality of switch closing elements, means for moving said article along a defined course, said means including a switching station, a deflector movable into and out of deflecting position with respect to said article at said station, and an electro-mechanical mechanism for controlling the operation of said deflector, said mechanism comprising an electrically operable tensioned power element connected to the deflector and an electrical circuit for energizing and deenergizing said power element, said circuit including a plurality of normally open electrical switches arranged in the path of said switch closing elements and operating conjointly when closed by the latter to energize the power element, and also including a normally closed switch arranged to be opened under control of the article and a separate switch which is closed under control of the normally open switch and is opened under control of the normally closed switch and maintains the power element in energized condition after the normally open switches have been opened and until the normally closed switch has been opened.

9. In a conveying system an article to be conveyed, provided with a plurality of switch closing elements, a frame having a bed by which the article is supported while being conveyed, means for applying power to said bed to move the article relatively to the frame, said system also including a switching station, a deflector at said switching station and an electro-mechanical mechanism for moving the deflector into and out of deflecting position under control of said article, said mechanism comprising an electrically operable tensioned power element connected to the deflector and an electrical circuit for energizing and deenergizing said power element, said circuit including a plurality of normally open electrical switches arranged in the path of said switch closing element and operating conjointly when closed by the latter to energize the power element, and also including a normally closed switch arranged in the path of the article to be opened thereby and a separate switch which is closed under control of the normally open switches and open under control of the normally closed switch and is arranged to maintain the power element in energized condition after the normally open switches have been opened and until the normally closed switch has been opened.

10. A conveying system having load carrying articles and switching stations for said articles, arranged at different places along the length of the system, each of said switching stations including a deflector movable into and out of deflecting position and an electro-mechanical mechanism for operating said deflector under control of the article to be deflected at said station each of said articles having a plurality of switch closing elements, the mechanism at each station comprising an electrically operable tensioned power element connected to the corresponding deflector, a plurality of conjointly operative normally open electrical switches, an electro-magnetic switch, a normally closed switch and electrical connections, all relatively arranged to cause the power element to be energized when the normally open switches are simultaneously closed and to be maintained in energized condition after said switches have been opened and until the normally closed switch has been opened; said normally open switches of the several switching mechanisms being arranged in varying positions and the switch closing elements of the several load carrying articles being correspondingly variously positioned, to effect a selective energization of said power elements, and said normally closed switches being arranged to be opened by the articles being deflected, respectively, when so opened to cause the corresponding power elements to be deenergized, in time for the return of the corresponding deflectors to

their non-deflecting positions for reoperation under control of the next succeeding load carrying article, if so predetermined by the relative positions of the switch closing elements of the latter.

11. A conveying system having load carrying articles and switching stations for said articles arranged at different places along the length of the system, each of said switching stations including a deflector movable into and out of deflecting position and an electro-mechanical mechanism for operating said deflector under control of the article to be deflected at said station, each of said articles having a plurality of switch closing elements; the mechanism at said station comprising an electrically operable tensioned power element connected to the corresponding deflector, a switch provided with a coil having higher resistance than the power element and with an armature having spaced circuit closing members, electrical connections, including a plurality of normally open switches which when closed conjointly energize said coil, a plurality of pairs of terminals respectively arranged to be bridged by said circuit closing members when the coil is energized and circuit connections, including said pairs of terminals, by which energization of the power element is controlled by the coil, the latter circuit connections having a normally closed switch through which said coil is maintained in energized condition after the normally open switch has been opened; said plurality of normally open switches of the several switching mechanisms being arranged in varying positions and the switch closing elements of the several load carrying articles being correspondingly variously positioned, to effect a selective energization of said power element, and said normally closed switches being arranged to be opened by the articles being switched, respectively, and when so opened to cause the corresponding power element to be deenergized, in time for the return of the corresponding deflector to its non-deflecting position for reoperation under control of the next succeeding load carrying article, if so predetermined, by the relative positions of the switch closing elements of the latter.

12. A conveying system according to claim 3, in which each deflector has pivotal movement at one side of the bed of the conveyor and is movable into position relatively to the bed to be engaged by the article to be deflected thereby.

13. A conveying system according to claim 3, in which each deflector has pivotal movement at one side of the bed of the conveyor and is of upwardly open channeled form in cross section and in which each load carrying article is provided with a projection to enter the channel in said deflector and be thereby guided while being switched.

14. A conveying system according to claim 3, in which each deflector moves pivotally into and out of its deflecting position and its said movements are over the bed.

15. A conveying system according to claim 3, in which each deflector has movement in an arcuate path over the bed and simultaneously with the load carrying article engaged therewith and being deflected thereby.

16. A conveying system according to claim 3, in which each deflector has movement in an arcuate path over the bed and simultaneously with the load carrying article engaged therewith and being deflected thereby, and in its said movement with the article is freed from the corresponding power element and restrained from moving into its non-deflecting position by its engagement with the article.

17. A conveying system according to claim 3, in which each deflector has movement in an arcuate path above and relatively to the bed and with the load carrying article engaged therewith and being deflected thereby, and in its said movement with the article is under control of the corresponding power element.

18. A conveying system comprising a conveying means for moving load carrying articles along a defined course of travel and electro-mechanical switching mechanisms respectively operable to deflect the load carrying articles selectively from said conveying means at predetermined places in the length of the latter: each of said switching mechanisms including a deflector, a power element connected to said deflector and controlling the movements of the latter into and out of deflecting position and electrical connections for controlling the power element, said connections comprising a first switch, arranged to be closed under control of the article to be deflected, a second switch, arranged to be closed under control of the first switch and when closed to cause the power element to be energized, a third switch operative through the second switch to maintain the power element in energized condition after the first switch has been opened, said third switch being normally closed and arranged to be opened under control of said article, and a fourth switch wired in parallel with the third switch and arranged rearward of the latter and operative under control of said article to cause the power element to be reenergized, and thereby to move the deflector into deflecting position, in time to deflect a second article closely following the one which caused its previous energization.

19. A conveying system according to claim 18 in which the conveying means includes a main conveyor and branch conveyors and the third and fourth switches are arranged in the bed of each branch conveyor.

20. A conveying system comprising a conveying means for moving load-carrying articles along a defined course of travel and electro-mechanical switching mechanisms respectively operable to deflect the load-carrying articles selectively from said conveying means at predetermined places in the length of the latter; each of said switching mechanisms including a deflector, a power element connected to said deflector and electrical connections for controlling the power element, the electrical connections for each power element comprising a normally open switch arranged to be closed under control of the load-carrying article which is to be deflected, a normally closed switch arranged to be opened by the underneath surface of the deflected load-carrying article and a switch through which the power element is energized, the last named switch being arranged to be closed upon the closing of the normally open switch and to be opened by contact of the underneath surface of the load-carrying article with the normally closed switch.

21. A conveying system according to claim 6 in which each normally closed switch is arranged adjacent the junction of the corresponding main and branch lines and in position to be opened under control of the underside of the article within said junction and to be deflected thereat.

22. A system according to claim 6 in which the respective normally closed switches are arranged within the beds of the corresponding branch lines

in positions to be engaged by the underneath surfaces of the articles being deflected.

23. A conveying system according to claim 6 in which each normally closed switch is arranged in the bed of the corresponding branch line.

24. A conveying system according to claim 6 in which each deflector has pivotal movement at one side of the bed of the conveyor and is of upwardly open channeled form in cross section and each load carrying article is provided with a projection to enter the channel in said deflector and each normally closed switch is arranged in the bed of the corresponding branch line.

25. A conveying system having a conveyor provided with a switching station, and a deflecting mechanism at said station, comprising a deflector movable into and out of deflecting position, an electrical power element, an electrical circuit which includes said power element and is provided with a series of switches, one of which is normally open and is arranged to be closed under control of the article and to thereby energize the power element, another of which is operative to maintain the power element in energized condition after the first mentioned switch has been opened and still another of which is normally closed and is opened under control of said article and thereby causes the power element to be deenergized, means connecting the deflector with the power element, for moving the former to one of its positions when the power element is energized, and a tensioning means for causing movement of said deflector to its other position when the power element is deenergized.

26. A conveying system according to claim 25 in which the means connecting the deflector with the power element comprises a shaft having movement about a vertical axis, means connecting one end of the deflector to said shaft to impart movement to the deflector about an axis struck from the axis of said shaft, a member projecting from the shaft and an operative connection between the latter member and the power element, and in which the tensioning means comprises a counterweight operatively related to said shaft and power element.

27. A conveying system according to claim 25 in which the means connecting the deflector with the power element comprises a shaft having movement about a vertical axis, means connecting one end of the deflector to said shaft to impart movement to the deflector about an axis struck from the axis of said shaft, a crank attached to the shaft and an operative connection between the crank and the power element, and in which the tensioning means comprises a counterweight and means connecting said counterweight with said crank.

28. A conveying system according to claim 25 in which the means connecting the deflector with the power element comprises a shaft having movement about a vertical axis, means connecting one end of the deflector to said shaft to impart movement to the deflector about an axis struck from the axis of said shaft, a crank attached to the shaft, a second crank, a link connecting said cranks with each other, a shaft mounted to have movement about a horizontal axis and in which the second crank is connected for movement therewith and a lever having one of its ends connected to the latter shaft and also having connection between its ends with the power element, and in which the tensioning means includes a counterweight operatively connected to the end of said lever opposite the last mentioned shaft.

29. In a conveying system having a switching station, a deflector operatively related to said station and adapted to be moved pivotally into deflecting position diagonally across the bed of the conveyor, an electrically operable power element, means under control of the article to be deflected for operating said power element, said means including a normally open switch, a second switch through which the power element is energized, a normally closed switch operatively related to the second switch to maintain the power element in energized condition when said normally open switch has been opened and until the normally closed switch is opened, said normally closed switch being arranged to be opened to thereby deenergize the power element at about the moment the article to be deflected engages the deflector, and means for applying tension to the deflector and cause it to follow in the wake of the article being deflected when said normally closed switch has been opened.

30. A conveying system, comprising a substantially horizontal conveyor having a switching station, a deflector movable in a substantially horizontal plane into and out of position to engage the forward end of the article to be deflected, and means under control of the article to be deflected for moving the deflector into and out of its said deflecting position, said means comprising electrical circuits which include an electrically operated power element having connection with the deflector and switches arranged to energize the power element and cause the latter to move the deflector into position to be engaged by the article being conveyed and to deenergize said power element when the article to be deflected has engaged the deflector, said mean also including a tensioning means which becomes operative upon the deflector to restore it to its non-deflecting position when the power element is deenergized.

31. In a conveying system, an article to be conveyed, means for imparting movement in a forward direction to said article, a deflector and means under control of said article for imparting swinging movement in a forward direction to said deflector at about the same speed as that imparted to the article and so timed that the first part of the movement of the deflector will cause its forward end to engage the article forward of the rear end of the latter and the remainder of its movement will force the article gradually and gently in an arcuate path from the means which imparts forward movement to said article.

32. In a conveying system, a conveyor for supporting and advancing the articles to be conveyed and mechanism for deflecting one of said articles from the conveyor at a predetermined place in the length of the latter and for restraining advancing movement of an article closely following the one being deflected; said mechanism including a deflector movable into and out of the path of the article to be deflected, a brake movable into and out of restraining relationship with the succeeding article and means under control of the article to be deflected and controlling the movements of said deflector and brake.

33. In a conveying system, a conveyor for supporting and advancing the articles to be conveyed and mechanism for deflecting one of said articles from the conveyor at a predetermined place in the length of the latter and for restraining advancing movement of an article closely follow-

ing the one being deflected; said mechanism including a deflector movable into and out of the path of the article to be deflected, a brake movable into and out of restraining relationship with the succeeding article and an electrically operable power element under control of the article to be deflected and having connection with said deflector and brake.

34. In a conveying system, a conveyor having a switching station and mechanism at said station for deflecting one of the articles being conveyed and for restraining movement of an article immediately following the one being deflected; said mechanism comprising a deflector, a brake, a power element under control of the article to be deflected, a shaft having movement about a horizontal axis and driven by said power element, and operating connections between said shaft and deflector and between said shaft and brake.

35. In a conveying system the combination of a conveyor having a switching station and mechanism at said station for deflecting one of the articles being conveyed and for restraining movement of an article immediately following the one being deflected, said mechanism comprising a deflector, a brake, a power element having a reciprocatory member, a shaft connected with said member to be rotated thereby on a horizontal axis, a tensioned arm having one of its ends connected to said shaft and its intermediate portion connected to said reciprocatory member, and operating connections between said shaft and deflector and between said shaft and brake.

36. A conveying system comprising a conveyor having a switching station and mechanism at said station for deflecting one of the articles being conveyed and for restraining movement of an article immediately following the one being deflected, said mechanism comprising a deflector, a brake, a deflector supporting arm which extends beneath the conveyor from one side thereof to the other and has at one end an upward projection to which the rear end of the deflector is secured and from which said deflector extends in a forward direction along one side of the conveyor and in a horizontal plane higher than that of the bed of the conveyor, a power element under control of the article to be deflected at said station and provided with a reciprocatory member, a tensioned arm connected intermediate its length to said reciprocatory member, a shaft mounted to have movement on a horizontal axis and to which one end of the tensioned arm is connected, operating connections between said shaft and the end of the deflector supporting arm opposite the deflector and other operating connections between said shaft and the brake.

37. In a conveying system, a conveyor having a switching station and mechanism at said station for deflecting one of the articles being conveyed and for restraining movement of an article immediately following the one being deflected; said mechanism including a brake, a deflector arranged in advance of the brake, a power element under control of the article to be deflected and connections between said power element and the deflector and between said power element and the brake, the connections between the power element and deflector including an arm which extends underneath the bed from one side thereof to the other and has at one end an upward projection to which the rear end of the deflector is secured and from which said deflector extends in a forward direction alongside of the bed and above the horizontal plane of the same, a shaft to which the other end of said arm is secured and means through which the power element imparts oscillatory movements to said shaft.

38. In a conveying system, a conveyor having a switching station and mechanism at said station for deflecting one of the articles being conveyed and for restraining movement of an article immediately following the one being deflected; said mechanism including a brake, a deflector arranged in advance of the brake, a power element under control of the article to be deflected and connections between said power element and the deflector and between said power element and the brake, the connections between the power element and brake including a reciprocatory member operated by the power element, a pivoted member having a cam surface slidably engaged by said reciprocatory member and tensioned connections between the pivoted member and the brake.

39. In a conveying system the combination of a conveyor having a switching station and mechanism at said station for deflecting one of the articles being conveyed and for restraining movement of an article immediately following the one being deflected; said mechanism comprising a deflector, a brake, a pivot attached to said brake, a tensioning means connected to the pivot, a cam also attached to said pivot, a longitudinally movable member one of whose ends is slidably engaged with said cam, a power element under control of the article to be deflected, and means operated by said power element and connected with the deflector and with said longitudinal movable arm for operating the deflector and brake.

40. In a conveying system, a conveyor having a switching station and mechanism at said station for deflecting one of the articles being conveyed and for restraining movement of an article immediately following the one being deflected; said mechanism comprising a deflector, a brake, a power element under control of the article to be deflected, a shaft having movement upon a horizontal axis and driven by said power element, an arm which derives longitudinal movement from the rotative movements of said shaft, a pivoted member having a cam surface, means connecting the latter member with the brake, the longitudinally movable arm having a head slidably engaged with said pivoted member, a shaft having movement upon a vertical axis, an arm fixed at one end to the latter shaft and to the other end of which the deflector is secured and a driving connection between said shafts.

41. In a conveying system, a conveyor having a switching station and mechanism at said station for deflecting one of the articles being conveyed and for restraining movement of an article following the one being deflected; said mechanism including a brake, a deflector, a power element under control of the article to be deflected, tensioning means connected to said power element, a shaft having rotative movement about a horizontal axis derived from said power element, a second shaft having movement about a vertical axis derived from the first mentioned shaft, an arm which extends transversely of the conveyor and is secured at one end to the second shaft and has its other end attached to the deflector, a reciprocatory member operated by said first mentioned shaft, a pivoted member having a cam surface slidably engaged by said reciprocatory member and means for tensioning the said reciprocatory and pivoted members.

42. In a conveying system the combination of a conveyor having a switching station, and a deflecting mechanism at said station, including a power element under control of the article to be deflected, an arm extending across the conveyor, underneath the same, a deflector carried by one end of said arm and extending thence forwardly alongside the conveyor in a horizontal plane higher than that of the bed of the conveyor, and means operated by said power element for applying power to the end of the arm opposite the deflector to thereby swing said deflector into deflecting posititon about an arc struck from the end of the arm to which the power is applied.

43. A conveying system comprising a conveyor having a switching station and a deflecting mechanism at said station, said deflecting mechanism including a deflector, a deflector supporting arm which extends underneath the conveyor from one side thereof to the other and has at one end an upward projection to which the rear end of the deflector is secured and from which said deflector extends in a forward direction along one side of the conveyor and in a horizontal plane higher than that of the bed of the conveyor, a power element under control of the article to be deflected at said station and provided with a reciprocatory member, a tensioned arm connected intermediate its length to said reciprocatory member, a shaft mounted to have movement on a horizontal axis and to which one end of the tensioned arm is connected, and operating connections between said shaft and the end of the deflector supporting arm opposite the deflector.

44. In a conveying system the combination of a conveyor having a switching station, a deflecting mechanism at said station and means under control of the article being deflected for restraining movement of the article next succeeding the one being deflected, said means including a brake, a power element, a pivoted cam, means connecting the cam with the brake, a member having slidable engagement with said cam and operating thereon to cause the brake to be moved into braking position, and means for transmitting slidable movement to said member by power derived from the power element.

45. In a conveying system, means for supporting and transmitting movement in a forward direction to the articles to be conveyed and mechanism for deflecting one of said articles from said means at a predetermined place in the travel of the article and for restraining movement of an article closely following the one being deflected, said mechanism including a deflector and a brake, and means under control of the article to be deflected for imparting swinging movement in a forward direction to said deflector at about the same speed as that imparted to the article and for moving the brake into its operative position, the operation of said means with relation to the deflector and brake being so timed that the first part of the movement of the deflector will cause its forward end to engage the article to be deflected adjacent the forward corner of the latter and the remaining portion of the swinging movement of said deflector will gradually move the article in an arcuate path relatively to the means which imparts forward movement to said article.

46. In a conveying system, a conveyor having a switching station and mechanism at said station for deflecting one of the articles being conveyed and for restraining movement of an article closely following the one being deflected; said mechanism including a deflector, a brake, a power element under control of the article to be deflected, connections between said power element and the deflector for imparting swinging movement in a forward direction to said deflector at about the same speed as that imparted to the article and so timed that the first part of the movement of the deflector will cause its forward end to engage the article to be deflected adjacent the forward corner of the latter and the remaining portion of the swinging movement of said deflector will gradually move the article in an arcuate path relative to the means which imparts forward movement to said article, and connections between said power element and the brake operative to move said brake to its operating position during the first part of the movement of the deflector and to maintain said brake in its operating position until the preceding article has been completely deflected.

47. A conveying system comprising an article to be conveyed, a main conveyor having means for imparting advancing movement to said article, a branch conveyor whose receiving end is arranged in operative relationship with one side of the main conveyor, a deflector arranged at the junction of the main and branch conveyors and means, including a power element having connection with the deflector and electrical connections under control of the article to be deflected from the main conveyor onto the branch conveyor, for operating said deflector; the article being conveyed having a circuit closing element and said electrical connections including a normally open switch arranged to be closed by said circuit closing element and also including a plurality of normally closed switches arranged in the bed of the branch conveyor in position to be successively opened by the article which has been diverted onto said bed, an electro-magnetic switch and elements arranged to cause the electro-magnetic switch to be energized and the power element to be operated to move the deflector into deflecting positon when the normally open switch has been closed and to remain in said energized condition after said switch has been opened and until both normally closed switches have been opened.

48. A conveying system according to claim 47 in which the deflector is of upwardly open channeled form, the article to be conveyed has wheels adapted to run in said channels and the bed of the branch conveyor is provided with transversely extending rollers relatively positioned to provide spaces within which the normally closed switches are arranged and above which they protrude in the path of said article.

49. A conveying system comprising an article to be conveyed, a main conveyor having its bed provided with rollers operated to impart advancing movement to said article, a branch conveyor whose receiving end is arranged in operative relationship with one side of the main conveyor, a deflector arranged at the junction of the main and branch conveyors and means, including a power element having connection with the deflector and electrical connections under control of the article to be deflected from the main conveyor onto the branch conveyor, for operating said deflector, the article being conveyed having a circuit closing element and said electrical connections including a normally open switch arranged to be closed by said circuit closing element and also including a normally closed switch provided with an element for opening it arranged in the bed of the main conveyor in position to be engaged by said article, said connections further

including an electro-magnetic switch and elements arranged to cause the electro-magnetic switch to be energized and the power element to be operated to move the deflector into deflecting position when the normally open switch has been closed and to remain in said energized condition after said switch has been opened.

50. A conveying system according to claim 49 in which the normally closed switch is connected with a shaft whose operation is controlled by the element in the bed of the main conveyor for opening said switch, and in which the latter element is so positioned that it will be operated to open the normally closed switch at substantially the moment the article is engaged by the deflector.

51. A conveyor provided with a deflector, electro-mechanical means under control of the load for moving said deflector into and out of deflecting position, automatically operable latching means for holding the deflector releasably in its deflecting position, said electro-mechanical means including a tensioned power element and a normally closed electrical switch in the circuit to said power element and arranged to be opened under control of the load and a shaft which has connection with said switch and also with the latching means, said switch when opened causing said shaft to become operative to release the latching means from the deflector and the deflector to be returned to its non-deflecting position.

52. In a conveyor provided with a deflector and with means under control of the load for moving said deflector into and out of deflecting position: an automatically operable latching means, including a longitudinally movable tensioned member provided with a wedged shaped head at one of its ends, for holding the deflector releasably in its deflecting position and means including a longitudinally movable member engaging said head and operative under control of the load to force said tensioned member into position to release the deflector and thereby permit the latter to be returned to its non-deflecting position.

53. In a conveyor provided with a deflector and with means under control of the load for moving said deflector into and out of deflecting position: an automatically operable latching means, including a longitudinally movable tensioned member provided with a wedged shaped head at one of its ends, for holding the deflector releasably in its deflecting position and means for forcing said member into latch releasing position, including a transversely arranged shaft provided with a projection in the path of the load, a longitudinally movable member engaging said head and a link connecting said shaft and the latter member with each other.

54. A conveyor provided with a deflector, a shaft mounted to have movement on a vertical axis arranged at the side of the conveyor and to which one end of the deflector is attached, a crank arm extending from said shaft, an electrical power element, a flexible member attached to the power element at one end and having its opposite end provided with a weight, said member being attached also to the crank arm, and means under control of the load for energizing and deenergizing said power element.

55. A conveying system comprising a deflector movable into and out of deflecting position, a power element for moving the deflector to one of its positions, an automatically operable latching means for holding the deflector releasably in its deflecting position, and means under control of the load to deenergize the power element and to release the latching means from the deflector, including a transversely arranged shaft having a projection in the path of the load and a normally closed electrical switch connected to said shaft.

56. A conveyor according to claim 54 in which a latching means is provided for releasably holding the deflector in its deflecting position and the means under control of the load for deenergizing the power element includes a transversely arranged shaft having a projection in the path of the load and a normally closed switch connected to said shaft, and in which, also, means connected to said shaft are provided to operate upon the latching means and thereby release the deflector when said power element has been deenergized.

57. A conveyor provided with a deflector, a tensioned power element, electrical means for operating said power element, means under control of the load for energizing the power element, connections controlled by said power element and operative to move the deflector into and out of deflecting position, an automatically operative latching means for holding the deflector in its deflecting position, and means under control of the load for deenergizing said power element and operating the latching means to release the deflector, simultaneously.

58. A conveyor according to claim 57 in which the power element is deenergized and the latching means released at about the moment the load makes contact with the deflector and the deflector in its movement to its non-deflecting position moves with the load.

59. In a conveying system, a conveyor having a switching station, a deflector operatively related to the conveyor at said station, means under control of the article to be deflected to throw the deflector into deflecting position upon approach of the article to the switching station, coacting deflector-holding elements automatically engageable with each other upon completion of movement of the deflector to deflecting position to prevent rebounding movement of the deflector, means under control of the article to be deflected for releasing said elements from each other when the deflector has been engaged by the article, to thereby permit the deflector to be returned to its non-deflecting position before the article has been fully deflected, and means, including a tensioning device, under control of said article and arranged to be operative as soon as the deflector has been released to throw the deflector from deflecting to non-deflecting position while the article is being deflected thereby.

60. A conveyor provided with a deflector, electro-mechanical means under control of the load for moving said deflector into and out of deflecting position and latching elements automatically engageable with each other and disengageable from each other and operating to hold the deflector releasably against rebounding movement from its deflecting position: said electro-mechanical means including a tensioned power element, a normally closed switch in the circuit to said power element, a switch-control element under control of the load, connections between said control element and the switch and separate connections between the control element and the latching elements.

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