Sept. 4, 1951 R. F. HOLM 2,566,417

CONVEYER SWITCH

Filed Dec. 6, 1948 2 Sheets-Sheet 1

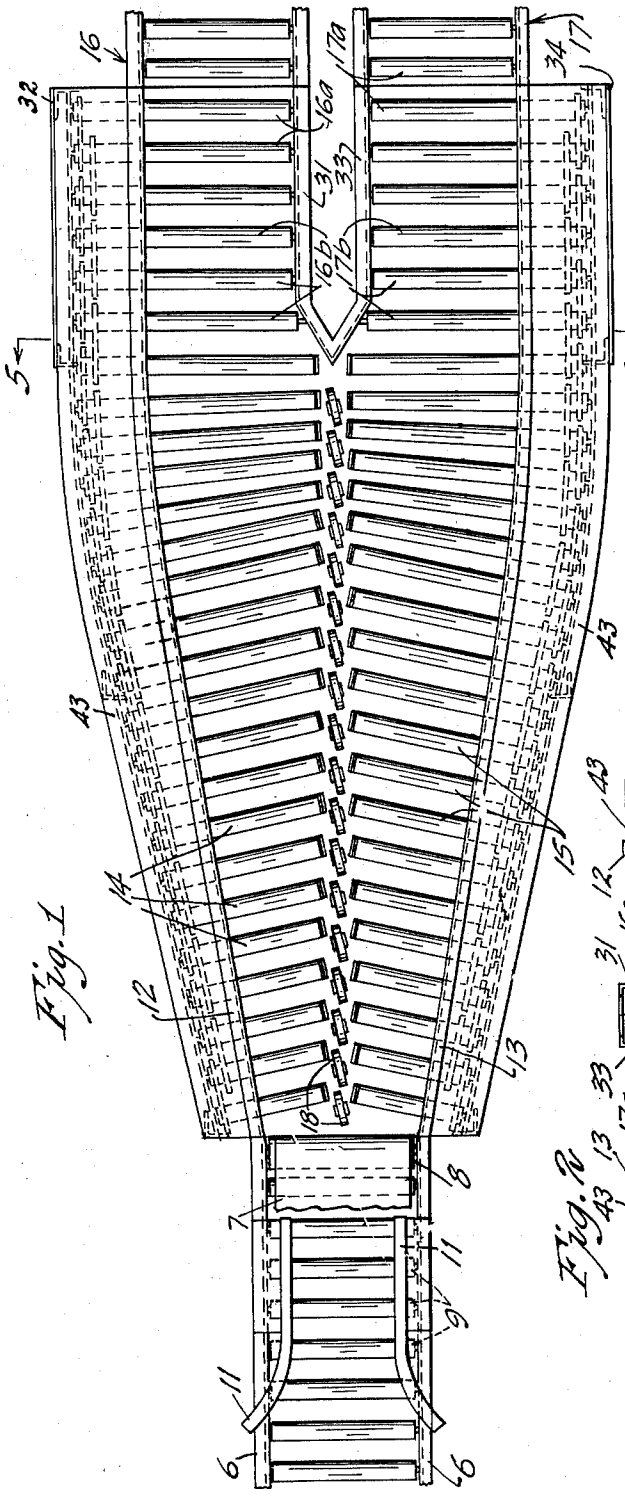


Fig. 1

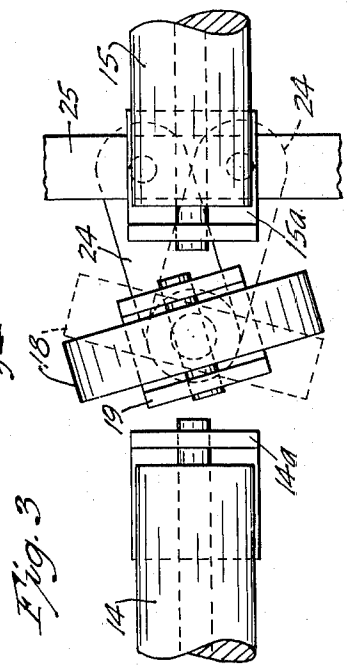


Fig. 3

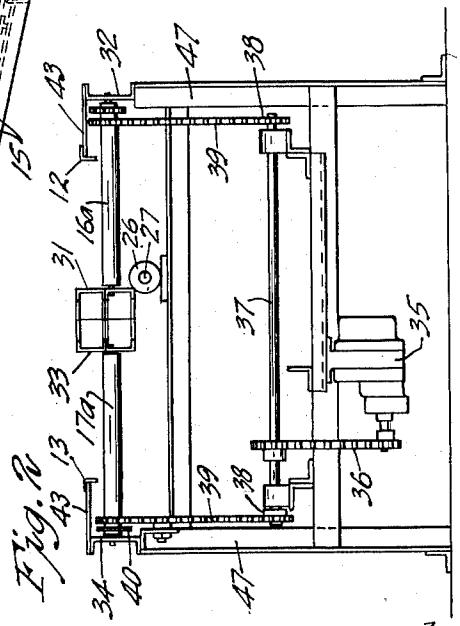


Fig. 2

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Sept. 4, 1951 R. F. HOLM 2,566,417

CONVEYER SWITCH

Filed Dec. 6, 1948 2 Sheets-Sheet 2

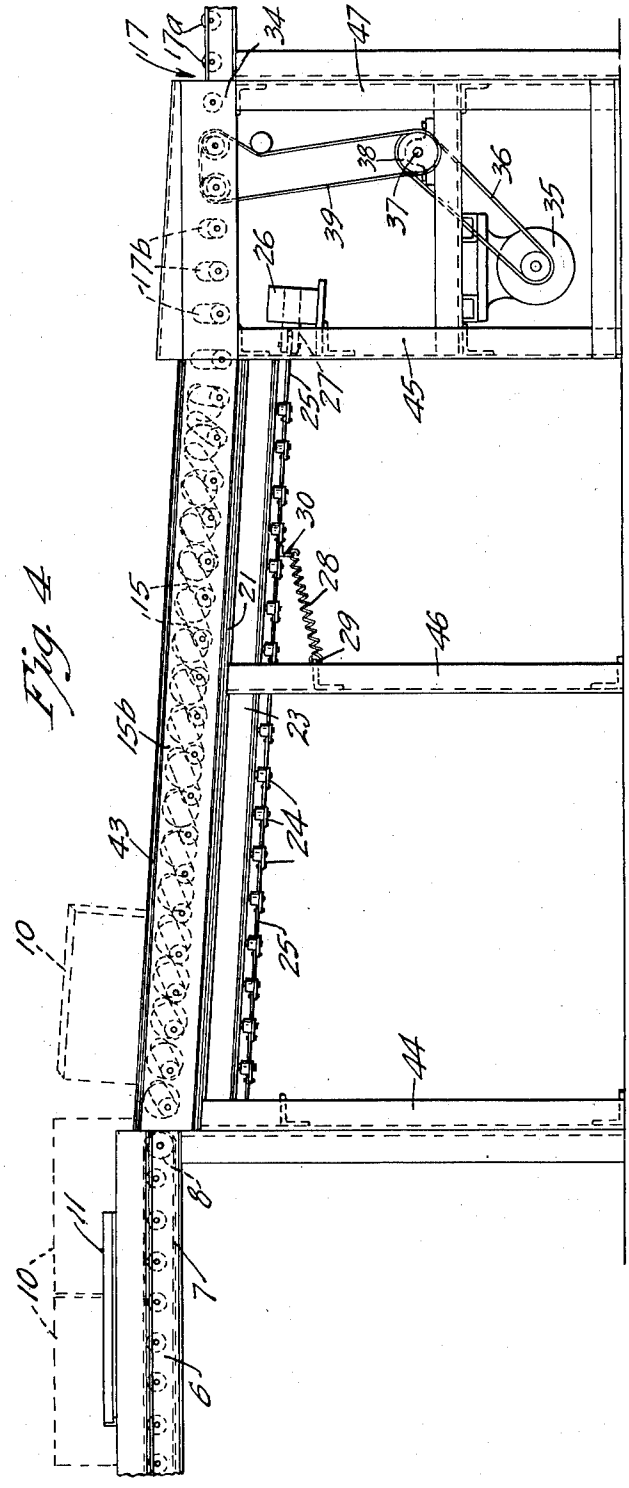


Fig. 4

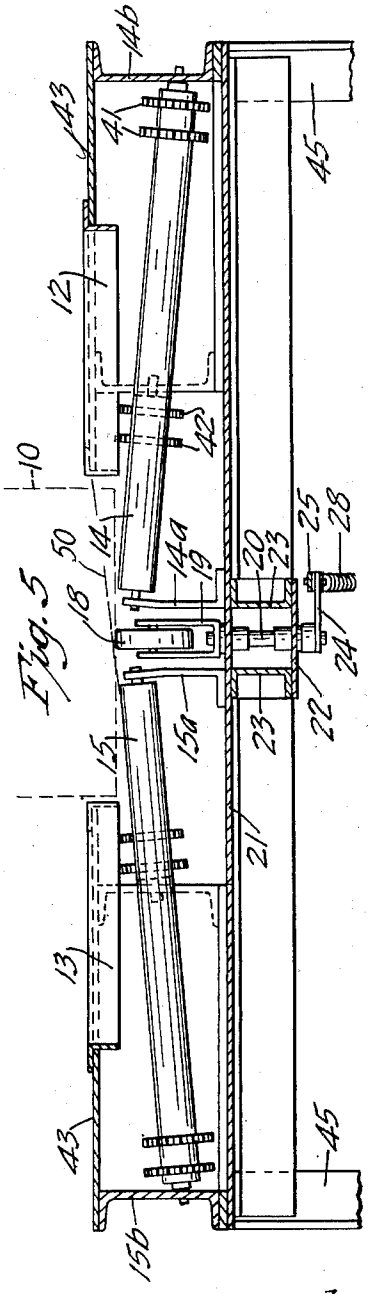


Fig. 5

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CONVEYER SWITCH

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9 Claims. (Cl. 198—31)

1

This invention relates to conveyor systems having branches to which load units may be selectively transported and particularly to switch mechanism adapted to be actuated either automatically or by remote or local control to change the path of travel of the load units.

It is an object of my invention to provide in combination with a conveyor adapted to feed the load units to the switch mechanism, a novel conveyor switch which is operative to quickly and effectively change the path of travel of the load units irrespective of whether such units are spaced apart or disposed in contact with one another when received by the switch mechanism.

A further and particular object is to provide a novel conveyor switch adapted to carry load units from a feeding conveyor to either of two branch conveyors, the switch mechanism comprising diverging conveyors which are operative to space the load units carried thereby one from another and to cause such units to tilt and turn laterally to one side or to the other side under control of a row of switch rollers extending along a central line separating the diverging conveyors.

Other objects will appear and be more fully pointed out in the following specification and claims.

Referring to the accompanying drawings which illustrate, by way of example and not for the purpose of limitation, a preferred embodiment of my invention:

Figure 1 is a plan view of my improved switch mechanism together with portions of the connecting conveyors;

Fig. 2 is an end view showing particularly the mechanism for actuating the switch conveyors;

Fig. 3 is a fragmentary plan view showing one of the switch idler rollers and adjacent end portions of two of the power actuated rollers;

Fig. 4 is a side elevational view of the switch mechanism together with fragmentary portions of the feeding and receiving conveyors, and

Fig. 5 is a cross sectional view taken approximately on the line 5—5 of Fig. 1.

In the drawing the numeral 6 indicates a pair of side rails for a feeding conveyor which may comprise a conveyor belt 7 trained on a drum 8 and having its upper reach supported on spaced parallel rollers 9 and adapted to carry load units 10 to the switch conveyors presently to be described. Since details of the feeding conveyor form no part of the present invention, it will be understood that any suitable conveyor adapted to transport the load units to the switch conveyors may be employed. Guide rails 11 are provided

2

to center the load units 10 as they are fed to the switch conveyors. A load unit may comprise any body of suitable size and shape or a package, case, box or other container, either empty or containing the goods, material or commodity to be conveyed.

Projecting above the load carrying surface of the belt 7, the rails 6 are disposed in continuation of diverging rails 12 and 13 respectively extending along opposite sides of switch conveyors each comprising a multiplicity of power-driven rollers. The power-driven switch rollers of the left branch are indicated by the numeral 14 and those of the right branch by the numeral 15. The left branch switch conveyor is adapted to carry the load units to a receiving conveyor section indicated generally by the numeral 16 and the right branch switch conveyor is adapted to carry the units to a receiving conveyor 17.

As indicated in Fig. 1, each of the rollers 14 is disposed obliquely to the left rail 12 so that these rollers are adapted to carry the load units obliquely toward the left rail 12 and the rollers 15 are similarly disposed with reference to the rail 13 so that the load units carried by the right switch conveyor are moved obliquely toward and along this right hand rail. As best shown in Fig. 5, each of the rollers 14 and 15 is also disposed with its upper periphery and axis of rotation inclined downward and laterally outward and these rollers are severally supported at their inner ends by brackets 14*a* and 15*a* respectively and at their outer ends by side rails 14*b* and 15*b*.

Extending in a row along the vertical center plane separating the rollers 14 from the rollers 15 is a multiplicity of switch idler rollers 18 which are adapted to be oscillated about substantially vertical axes to selectively direct the load units to either of the switch conveyors. Each roller 18 is freely revoluble on a support comprising a U-shaped bracket 19 which is fixed on the upper end of a susbtantially vertical shaft 20 having bearings in a large base plate 21 and in a narrow, parallel plate 22 mounted on the bottom of longitudinally extending frame 23. The lower end of each of the shafts 20 has fixed thereon, below the plate 22, a crank arm 24. The several crank arms 24 project at one side of the row of shafts 20 and are connected together for movement in unison by an actuating bar 25 adapted to impart oscillating movement to the several rollers 18 about the axes of their pivot shafts 20.

An electric solenoid 26 has its plunger 27 operatively connected to an end of the bar 25. As

shown in Fig. 4, a helical tension spring 28 is anchored at one end to a frame member 29 and its other end is connected to a bracket 30 which is fixed on the bar 25 so that the spring 28 biases the bar 25 longitudinally in one direction. When the coil of solenoid 26 is energized the plunger 27 actuates the bar 25 to extend the spring 28 and oscillate the several switch rollers 18 from an oblique position such as that indicated in full lines in Fig. 3 to the reverse oblique position indicated in broken lines in Fig. 3.

As best shown in Fig. 2, the receiving section 16 has load supporting rollers 16*a* disposed substantially horizontally and supported at their ends on an inner rail 31 and an outer rail 32. Similarly, the receiving conveyor section 17 has horizontally extending load supporting rollers 17*a* supported at their inner ends on rails 33 and at their outer ends on rails 34. The rails 31 and 33 have rear end portions which converge and are joined together to form a V-shaped point at the junction of the switch conveyors with the receiving conveyors. Load supporting rollers 16*b* and 17*b* near the receiving ends respectively of the conveyor sections 16 and 17 are preferably inclined at suitable angles to the horizontal in order to raise the load units gradually from their laterally inclined positions on the rollers 14 and 15 to substantially horizontal positions as they are carried to the horizontally disposed rollers 16*a* and 17*a* of the receiving sections.

Mechanism for rotating the several rollers 14, 15, 16*a*, 16*b*, 17*a* and 17*b* about their axes at approximately the same peripheral speed is provided. As shown, this mechanism comprises an electric motor 35 (Figs. 2 and 4) supported on the conveyor frame in suitable manner and operatively connected through suitable speed reducing gearing and a sprocket wheel to a chain 36 arranged to drive a sprocket wheel fixed on a shaft 37. This shaft which extends across the frame has a sprocket wheel 38 fixed on each end. A chain 39 is trained on each of the sprocket wheels 38 and is arranged to drive a pair of the load supporting rollers of one of the receiving sections. The driven rollers 16*a*, 17*a* have fixed thereon additional sprocket wheels 40 for severally driving short chains extending to and disposed to actuate sprocket wheels carried by the adjacent load supporting rollers. A succession of pairs of sprocket wheels and short chains are provided for transmitting power to all of the rollers 14, 15, 16*a*, 17*a*, 16*b* and 17*b*. As shown in Fig. 5, a pair of sprocket wheels carried by one of the longer rollers 14 are indicated by the numeral 41 and the sprocket wheels on one of the shorter rollers 14 are indicated at 42. This driving mechanism for the several load supporting rollers is guarded and enclosed by side rails 14*b* and 15*b* and cover plates 43 mounted on the upper edges of these rails and affording supports for the guide rails 12 and 13. Pairs of relatively long legs 44 support the receiving end of the switch conveyors and relatively short legs 45 support the delivery ends thereof so that these conveyors are downwardly inclined in the direction of travel of the load units. There are also intermediate supporting legs 46 and additional supporting legs 47 for the receiving conveyor sections 16 and 17.

Suitable mechanism including an electric motor (not shown) is provided for actuating the belt 7 so that the load units carried thereby are fed at a predetermined speed to the switch conveyors. The latter are preferably actuated at a higher lineal speed in order to cause each load unit as it reaches and is engaged by one or more of the rollers 14 or 15 to be separated from the load units remaining on the feeding conveyor. This prevents frictional engagement between the several load units on the switch conveyors and allows the units to turn and tilt freely to the left or right under the influence of the switch rollers 18.

As shown in Fig. 5, each of the switch rollers 18 is disposed with its upper periphery projecting slightly above the elevation of the adjacent ends of rollers 14 and 15 so that any load unit in engagement with one or more of the rollers 18 is directed to the left or right in accordance with the direction in which the rollers 18 are turned about the axes of their pivot shafts 20. It will be noted, however, that the upper peripheries of the rollers 18 do not engage the bottom surface of any load unit which has tilted to the right or left so that it is resting on the rollers 14 or 15.

Operation

With the feeding belt 7 and several rollers 14, 15, 16*a*, 16*b*, 17*a* and 17*b* in continuous operation, as described, the load units 10 are fed by the belt 7 successively between the guide rails 11 and then to the receiving end of the switch conveyors having the load supporting rollers 14 and 15. Each load unit is thereby fed to the switch conveyors with the longitudinal vertical center plane through the load unit coincident with the central dividing plane between the respective switch conveyors. As each unit is fed with its bottom surface in substantially horizontal position and with its center of gravity above the switch rollers 18, it will be supported initially on these rollers and will be directed to the left or right, depending on the angular position of the rollers 18. Thus each load unit is moved so that its center of gravity is carried to the left or right and will tilt accordingly. Thereafter it is supported on either the rollers 14 or 15 and with its bottom surface out of engagement with the rollers 18. The speed of each unit is increased as it is engaged by rollers 14 and 15 and these rollers are preferably arranged to support the several units at an angle of about 5° to the horizontal. The rollers 18 may be held under the bias of the spring 28 in position to direct the load units to the left along the guide rail 12 and when the solenoid 26 is energized the several rollers 18 may be turned about their vertical axes, in unison, to direct the load units to the right along the guide rail 13.

When the rollers 18 are turned to the left, as indicated in Fig. 1, all load units in engagement therewith will be directed along the path defined by the power actuated rollers 14 which are not only inclined laterally of the path but also disposed with the vertical planes through their axes severally disposed at such oblique angle to the rail 12 as to bias the load units toward this rail. Thus when the rollers 18 are turned to the left, each load unit engaged thereby is allowed to tilt laterally toward the rail 12 and is carried by the power-actuated rollers 14 to the receiving section 16.

The positions of the power-actuated rollers 15 relative to the guide rail 13 are similar to those of the rollers 14 relative to the rail 12. When it is desired to convey the load units to the receiving section 17, the solenoid 26 is energized to actuate the bar 23 and several arms 24 connected to the vertical shafts 20 in the appropriate direction to turn the idler rollers 18 to the right. Thereupon these rollers direct the load units to the right and

the power-actuated rollers 15 carry the load units along the rail 13 to the receiving section 17. The solenoid 26 is included in an electric circuit (not shown) which may be extended to any remote point of control where a switch may be located and operated either manually or automatically by electronic controls of suitable or conventional construction to close the solenoid circuit at appropriate times.

By operating the load supporting rollers 14 and 15 at a higher peripheral speed than the lineal speed of the belt 7, I cause the several load units 10 to be separated one from another and from those remaining on the feeding section or conveyor. This separation is effected as each unit reaches the receiving end of the switch conveyors. I thereby eliminate possible interference with the turning and tilting of the units to the left or to the right due to frictional contact of one unit with another. By supporting the switch conveyors at an incline downward from the feeding conveyor, I increase the influence of the idler switch rollers 18 in effecting the turning of the load units to the right or left relative to their initial direction of travel and I thereby facilitate the controlled change in the direction of travel of all load units which are supported on one or more of the rollers 18.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A conveyor comprising, switch conveyors affording diverging paths for load units, switch rollers disposed in a row along a central line of division between said switch conveyors and severally projecting above the adjacent top surfaces of said conveyors for rolling engagement with the bottom surfaces of the load units, said switch rollers being formed to tilt the load units laterally for support on an adjacent switch conveyor and being supported for oscillating movement about substantially vertical axes and means for turning said switch rollers about said axes to selectively direct load units to either of said switch conveyors.

2. A conveyor comprising, a feeding section having means for supporting and moving load units along a determined path at a predetermined speed, switch conveyors affording diverging paths for load units extending from said feeding section, said switch conveyors being power actuated to move the load units at a higher speed than said feeding section, switch rollers disposed in a row along a central line of devision between said switch conveyors and projecting above the adjacent top surfaces thereof for rolling engagement with the bottom surfaces of the load units, said switch rollers being formed to tilt the load units laterally for support on an adjacent switch conveyor and being supported for oscillating movement about substantially vertical axes and means for turning said switch rollers in unison about said axes to selectively direct load units to either of said switch conveyors.

3. A conveyor switch comprising, conveyors affording diverging paths for load units, said conveyors being inclined laterally outward and downward from an elevated central line of division extending longitudinally between said conveyors, a row of switch rollers disposed between said conveyors along said central line of division and projecting above the adjacent top surfaces of the conveyors for rolling engagement with the bottom surfaces of the load units, said switch rollers being suported for oscillating movement about substantialy vertical axes and means for turning

said switch rollers in unison about said axes to selectively direct load units to either of said conveyors.

4. A conveyor switch comprising, conveyors affording diverging paths for load units, said conveyors being power-actuated to move the load units and being inclined laterally outward and downward from an elevated central line of division extending longitudinally between said conveyors, switch idler rollers disposed between said conveyors and projecting above the adjacent top surfaces thereof for rolling engagement with the bottom surfaces of the load units when said surfaces are disposed substantially horizontally and the load units being free of the switch rollers when supported on either of said conveyors, said switch rollers being supported for oscillating movement about substantially vertical axes and means for turning said switch rollers in unison about said axes to selectively direct load units to either of said conveyors.

5. A conveyor switch comprising, conveyors affording diverging paths for load units and each comprising a multiplicity of load supporting rollers longitudinally inclined to tilt and direct the load units laterally outward relative to said paths, a guide rail extending along the outer side of each of said conveyors for sliding engagement with the load units, a row of switch idler rollers disposed between said conveyors along a central line of division between them and severally projecting above the adjacent top surfaces of said load supporting rollers for rolling engagement with the bottom surfaces of the load units, the several switch rollers being supported for oscillating movement about substantially vertical axes and means for turning said switch rollers about said substantially vertical axes to selectively direct units to either of said conveyors.

6. A conveyor switch comprising, conveyors affording diverging paths for load units, a guide rail extending along the outer side of each of said conveyors, each of said conveyors comprising a multiplicity of load supporting rollers disposed at such oblique angles to said rails respectively as to direct the load units laterally outward and obliquely toward and along said rails, a row of switch idler rollers disposed between said conveyors along a central line of division between them and severally projecting above the adjacent top surfaces of said load supporting rollers for rolling engagement with the bottom surfaces of the load units, the several switch rollers being supported for oscillating movement about substantially vertical axes and means for turning said switch rollers about said substantially vertical axes to selectively direct units to either of said conveyors.

7. A conveyor comprising, a feeding section having means for supporting and moving load units along a determined path, switch conveyors affording diverging paths for load units extending from said feeding section and each comprising a multiplicity of power actuated load supporting rollers longitudinally inclined to tilt and direct the load units laterally outward, a row of switch idler rollers disposed between said switch conveyors along a central line of division between them and severally projecting above the adjacent top surfaces of said load supporting rollers for rolling engagement with the bottom surfaces of the load units, the several switch idler rollers being supported for oscillating movement about substantially vertical axes and electro-magnetic means operatively connected to said switch rollers

for turning them about said substantially vertical axes to selectively direct units to either of said switch conveyors.

8. A conveyor comprising, a feeding section having means for supporting and moving load units along a determined path, switch conveyors affording diverging paths for load units extending from said feeding section and each comprising a multiplicity of load supporting rollers longitudinally inclined to tilt the load units laterally outward from a relatively elevated central line of division between said switch conveyors, a row of switch rollers disposed between said switch conveyors along said central line of division and projecting above the adjacent top surfaces of said load supporting rollers for rolling engagement with the bottom surfaces of the load units, the several switch rollers being supported for oscillating movement about substantially vertical axes and means for turning said switch rollers about said axes to selectively direct load units received from said feeding section to either of said switch conveyors.

9. A conveyor comprising, a feeding section having means for supporting and moving load units along a determined path, switch conveyors affording diverging paths for load units extending from said feeding section and each comprising a multiplicity of power actuated rollers longitudinally inclined to tilt the load units laterally outward from a relatively elevated central line of division between said switch conveyors, a row of switch rollers disposed between said switch conveyors along said central line of division and projecting above the adjacent top surfaces of said power actuated rollers for rolling engagement with the bottom surfaces of the load units, the several switch rollers being supported for oscillating movement about substantially vertical axes and electro-magnetic means for turning said switch rollers about said axes to selectively direct units received from said feeding section to either of said switch conveyors.

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