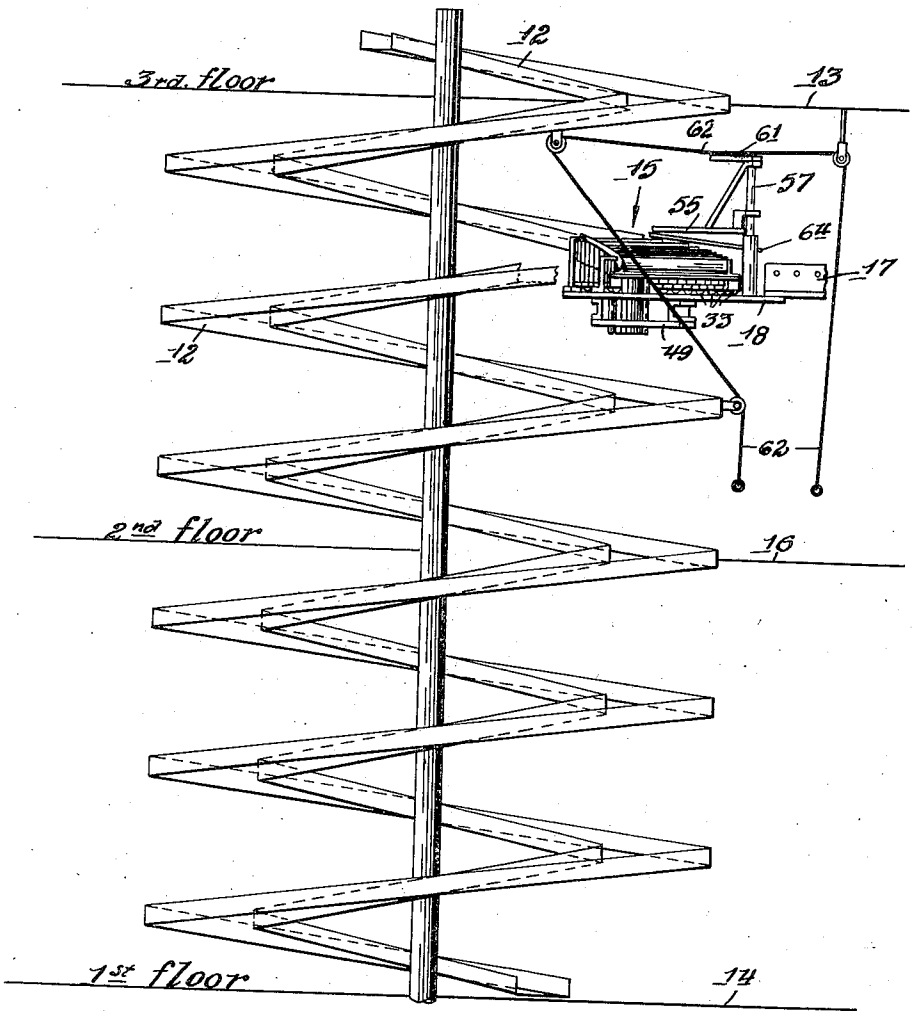
Jan. 18, 1938. E. H. MALTBY 2,105,922

CONVEYER

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Fig. 1



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CONVEYER

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Fig. 3

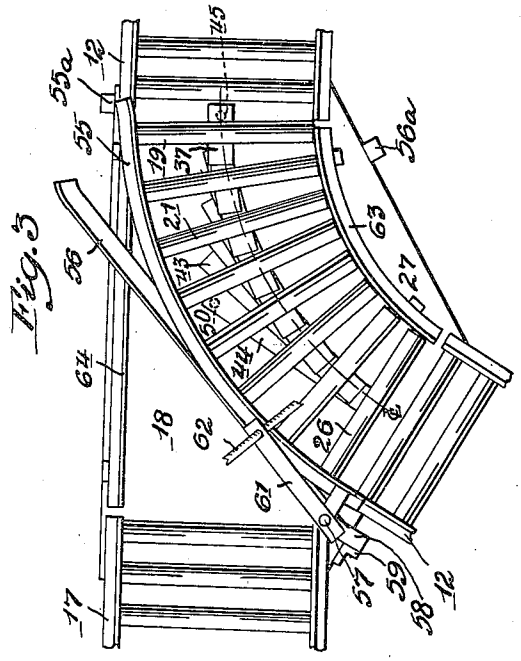


Fig. 4

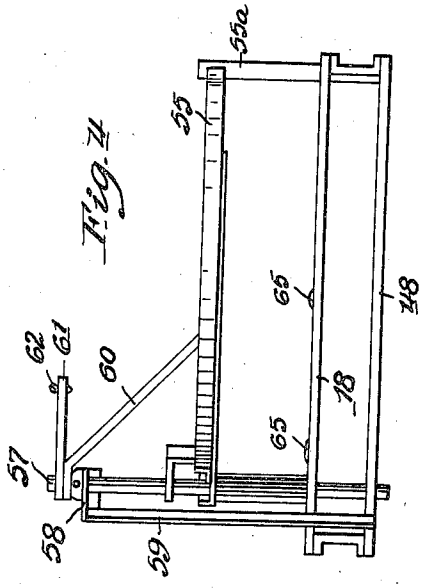
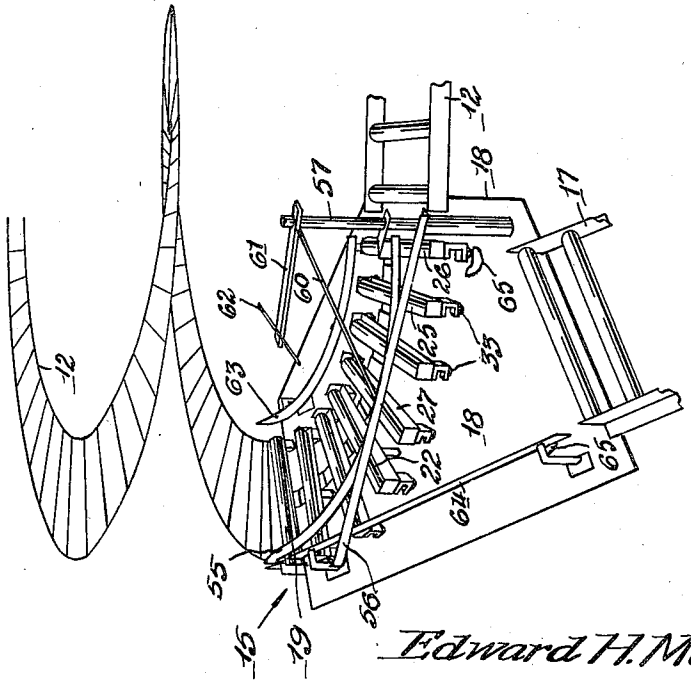


Fig. 2



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CONVEYER

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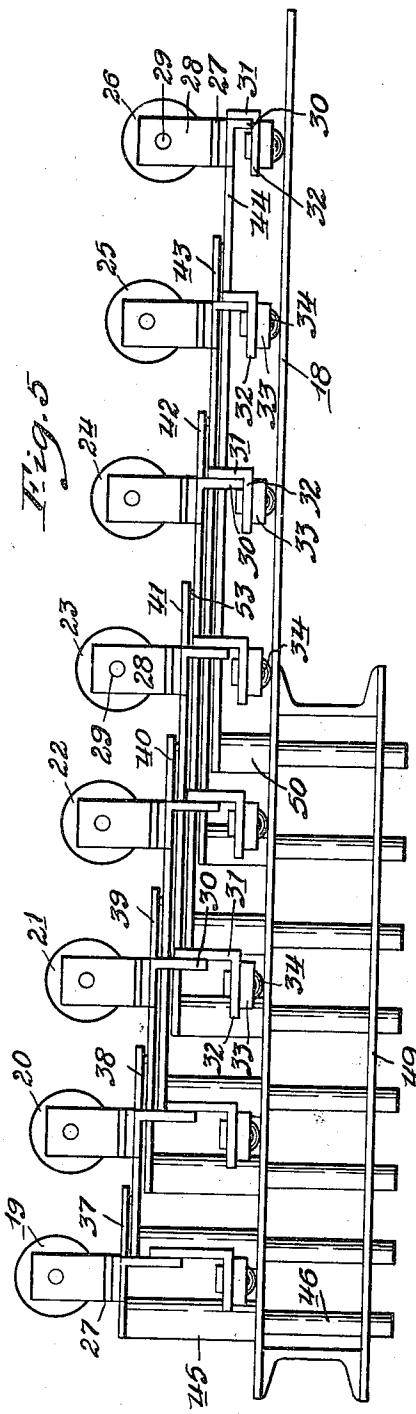


Fig. 5

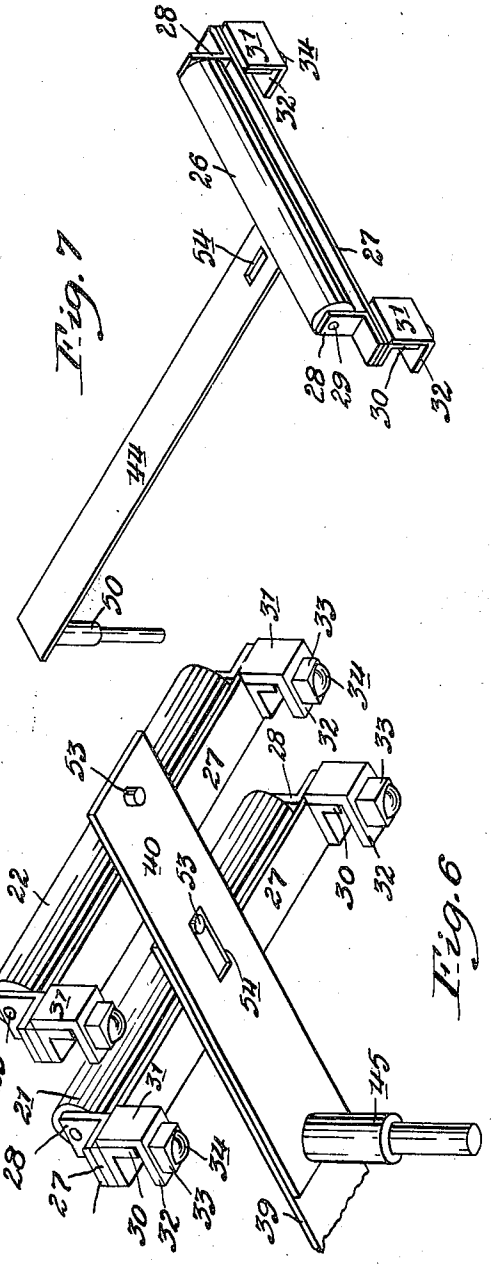


Fig. 7

Fig. 6

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CONVEYER

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Fig. 8

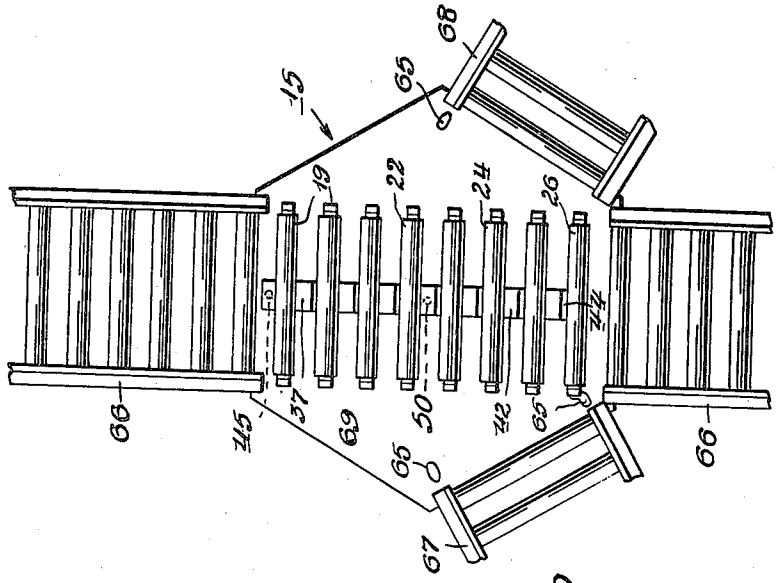


Fig. 10

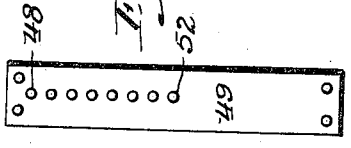


Fig. 9

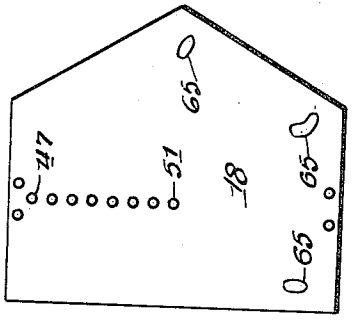
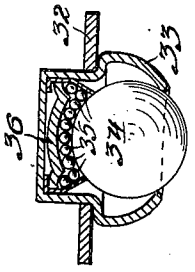


Fig. 11



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Patented Jan. 18, 1938 2,105,922

UNITED STATES PATENT OFFICE

2,105,922

CONVEYER

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Application November 26, 1934, Serial No. 754,721

14 Claims. (Cl. 193—36)

In connection with spiral conveyers having a plurality of vertically spaced convolutions, it is frequently desirable to take off or divert the loads or feed them to the main conveyer at one or more points intermediate the ends of the main conveyer. The switch devices heretofore provided have been cumbersome, relatively difficult to operate and have occupied such space that they are unsuited for use with a spiral conveyer where the available space is small, as in cases where the pitch or vertical spacing of the convolutions is of relatively small size.

It is an object of the present invention to provide a compact, smoothly operating section of a spiral conveyer which may be quickly and easily moved laterally to switch loads to or from a branch conveyer, chute or place of deposit for the load.

A particular object is to provide a novel section of rollers adapted to constitute a part of a spiral or curved conveyer and having individual rollers which are relatively movable to extend at various angles to each other.

Another object of the invention is to provide novel and efficient supporting and guiding means for individually movable rollers in a switch of the type in which said rollers are adapted to extend radially to a curve or in parallel relation to each other to form a straight section.

A further object is to provide a switch having individually movable rollers at the junction of intersecting conveyers and novel mechanism for guiding the loads along said rollers to either of the intersecting conveyers.

Other objects are to facilitate the movement of such a switch and render it more durable by providing antifriction supports for the rollers and a novel arrangement of pivoted and interconnected arms adapted to coordinate the movement of the individual rollers and retain them at all times approximately radially to the curve formed by the switch.

Referring to the accompanying drawings which illustrate the best form of my device at present known to me;

Figure 1 is a diagrammatic illustration of a typical spiral conveyer with my improved takeoff or switch, a portion of the spiral being broken away to more clearly show the switch;

Fig. 2 is a perspective view of the switch, main spiral conveyer and branch conveyer;

Fig. 3 is a plan view of the switch and adjacent portions of the spiral and branch conveyers;

Fig. 4 is a side elevation particularly showing the movable guide rails and actuating mechanism;

Fig. 5 is a side elevation illustrating the switch in detail with the supporting and guiding mechanism for the several rollers;

Fig. 6 is an isometric bottom view illustrating a pair of the roller assemblies and their guiding arms;

Fig. 7 is a similar view of one of the rollers and arm, as seen from the top;

Fig. 8 is a plan view showing my improved switch in connection with a straight main conveyer and a pair of branch or intersecting conveyers;

Fig. 9 is a plan view of a supporting plate for the switch rollers;

Fig. 10 is a plan view of one of the frame members with perforations for the roller guide pivots, and

Fig. 11 is a central vertical section through one of the ball casters for supporting the rollers.

Referring to Fig. 1, the numeral 12 indicates the spiral conveyer down which the loads, usually in the form of packages or other containers of goods, may be carried from the third floor 13 to the first floor 14. One of my improved switches 15 forms a part of the main conveyer and is adapted in one position to divert the loads to a branch conveyer 17 located at a second floor 16.

In the construction of the switch 15, shown in detail in Figs. 2 to 11 inclusive, a smooth metal plate 18 of size and shape suitable to support a series of conveyer rollers, indicated by the numerals 19 to 26 respectively, is mounted on a suitable frame to extend substantially horizontally or at a slight incline. Extending parallel to and beneath each of the rollers 19 to 26 is a rigid bar 27 carrying on its ends upstanding, flanged members 28 which support the axial shafts or studs 29 upon which the rollers are journaled in a manner well known in this art. Rigidly secured to each end of each of the bars 27 is an angle clip having a downwardly projecting flange 30 which overlaps and is secured to a flange 31 on a foot piece 32. Each foot piece 32 has mounted on its bottom a ball caster 33, preferably constructed as illustrated in Fig. 11, to reduce friction to a minimum. The caster illustrated has a relatively large spherical member 34 confined by a casing which is flanged inward to retain the said member. A multiplicity of relatively small balls 35 are revolubly mounted between the upper surface of the member 34 and a concavely spherical seat 36. It will be understood that the contacting surfaces of the mem-

bers 34, 35 and 36 are hard and durable and that the member 34 is free to rotate in all directions in use.

To guide the several rollers 19 to 26 in different arcs on the plate 18, I provide arms 37, 38, 39, 40, 41, 42, 43 and 44 extending in overlapping relation to each other and movable in planes substantially parallel to the plate 18. Projecting downward from one end of the arm 37 is a pivotal support 45 having a reduced stud or pin 46 fitting in a perforation 47 in the plate 18 and in a perforation 48 in a plate 49 extending parallel to the plate 18 (see Figs. 5, 9 and 10). The arm 37 is rigidly secured to the bottom of the bar 27 supporting the roller 19 and extends at right angles to said bar. The arms 38 to 44 are progressively longer than the arm 37 and each has a pivotal support similar to the support 45 and is connected to one of the roller supports 27 so as to guide the several rollers in arcs having radii of different lengths and with centers spaced longitudinally of the conveyer. Thus the roller 26 is guided by the arm 44 of greatest length and this arm has a pivotal support 50 of the smallest dimension vertically and having bearings in a perforation 51 (Fig. 9) in the plate 18 and a perforation 52 in the plate 49 (Fig. 10). Similar perforations in the plates 18 and 49 afford bearings for the pivotal supports for the arms 38 to 43 inclusive, the several pivotal axes being in a common vertical plane. As clearly shown in Fig. 5, the flanges 30 and 31 for the several rollers are of various heights and overlap sufficiently to give the desired slope to the rollers and to compensate for the thickness of the arms 37 to 43 inclusive.

Each of the arms 37 to 43 inclusive is provided near its free end with a downwardly projecting stud 53 engaging in a slot 54 formed in the immediately subjacent arm. The slots 54 are elongated longitudinally of the arms to permit movement of the several rollers in the required arcs.

As best shown in Figs. 2, 3 and 4, I provide guide rails 55 and 56 having a common pivotal support 57 mounted near the junction of the branch conveyer 17 with the main conveyer 12. The rail 55 is curved to conform to the curve of the outer side of the spiral and the rail 56 is substantially straight to guide the loads from the spiral in a straight line along the switch section when the latter is actuated to connect with the branch conveyer 17. The rails 55 and 56 are rigidly connected together to swing above the switch section and are rigidly secured to the pivotal support 57 which has bearings in the plates 18 and 49 at its lower end and a bearing 58 supported on an angle bar 59 projecting above the conveyer. An oblique brace member 60 connects the upper end of the pivotal support 57 to the rails 55 and 56 at a point removed from the pivot. To facilitate actuating these rails from one operative position to the other, a lever 61 is fixed on the upper end of the pivotal support 57 and is arranged to be actuated by a flexible cable 62. This cable may be trained over guide pulleys, as in Fig. 1, where the switch section is located at such elevation that its upper surface is inaccessible to the operator.

To coact with the movable guide rails 55 and 56, stationary guide rails 63 and 64 are provided, as indicated in Figs. 2 and 3, these rails being supported in obvious manner on the plate 18 and at such an elevation above the tops of the rollers as to permit the passage of the movable guide rails above. A stop 55*a* is provided for the free end of the rail 55 and a similar stop 56*a* for the rail 56. To frictionally retain the section of the rollers in operative positions, small lugs 65 are mounted on or formed in the plate 18 and are so located that a pair of said lugs are adapted to receive the ball casters supporting the roller 26 between them in each operative position of the switch. Thus one pair of the lugs 65 frictionally retains the switch in its curved position and another pair retains the switch in its straight position against accidental movement. These lugs 65 project only slightly from the face of the plate 18 so as to permit the ball casters to pass over them with the desired ease when the switch is operated.

Another typical use of my invention is shown in Fig. 8 wherein a main, straight conveyer is indicated by the numeral 66 and two branch conveyers by the numerals 67 and 68 respectively. In this arrangement, the supporting plate 69 for the movable section 15 of rollers is substantially hexagonal in plan and said switch section of rollers may be moved from the straight position illustrated to such curved positions as to connect with and deliver loads to or from (depending on the direction of the slope) either of the branch conveyers 67 and 68.

Operation

With a curved or spiral main conveyer the switch section 15 of rollers may be normally retained in a curved position, such as that shown in Figs. 2 and 3. The end roller 26 is held in proper alignment with the curve by the lugs 65 between which the supporting ball casters for said roller are positioned and the other rollers 19 to 25 are retained in proper radial positions by the interengaging studs 53 and slots 54. Travel of the load along the main conveyer is now guided by the side rails, including the stationary rail 53 and movable rail 55. When it is desired to take off or divert loads from the main conveyer to the branch conveyer 17, the free end of the switch section is moved laterally of the curve to a new position in alignment with the branch conveyer and each of the individually supported rollers 19 to 26 moves on its own arc and radius to the new position in which the rollers, instead of being radial in a curve, are disposed in parallel relation to each other. To guide the loads to the branch conveyer over the switch, the lever 61 is actuated to swing the guide rails 55 and 56 to such position that the latter rail is disposed in continuation of the side rail of the conveyer 17 and in parallel, spaced relation to the stationary rail 64.

It will be evident from Fig. 3 that the center lines of the arms 37 to 44 inclusive are all tangential to the center line of the curve formed by the rollers 19 to 26 and said arms may be, within the spirit of this invention, so located as to be substantially tangential to any of a number of arcs having a common center with the conveyer curve.

Movement of the switch section from one position to the other is accomplished with ease and with a minimum of wear by reason of my arrangement of the anti-friction supports for the individual rollers and the positive guide for each roller afforded by the arms 37 to 44 inclusive with their freely turning pivots. The connections between the rollers including the studs 53 engaging in the slots 54 insure the retention of each roller in its proper, substantially radial, relation to the

curve formed by the entire group. The entire structure is so compact that it is peculiarly adapted for use in a spiral conveyer where the clearance between convolutions is small and where the bodily substitution of a diverter section for a section of the main conveyer would be impossible or impractical. It will be understood, however, that my invention is not limited in its use to a spiral conveyer but is adapted for use wherever a movable roller switch is required or desirable.

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

1. The combination with a spiral conveyer having a plurality of vertically spaced convolutions, of a switch comprising, a section of individually and laterally movable rollers for supporting loads, connected together for movement in unison and adapted to form a part of said spiral conveyer in one position and in another position to form a branch conveyer, a supporting plate extending beneath all of said rollers and means for supporting said rollers independently of each other on said plate, said independent supports and plate being formed to maintain the axes of said rollers substantially horizontal in both of said positions.

2. In a device of the class described, a main conveyer, a branch conveyer arranged to intersect said main conveyer and an articulated section of said main conveyer movable to connect said main conveyer to said branch conveyer comprising, a substantially horizontal, supporting plate, a series of rollers, pairs of legs spacing said rollers at progressively decreasing heights from said plate down the conveyer, said rollers and legs being movable laterally across and parallel to said plate, a series of radius arms severally connected to said rollers respectively for guiding them upon said plate and means connecting said rollers together for movement in unison.

3. In a device of the class described, a main conveyer, a branch conveyer arranged to intersect said main conveyer and an articulated section of said main conveyer movable to connect said main conveyer to said branch conveyer comprising, a supporting plate, a series of rollers, means supporting said rollers for relative movement upon said plate, a series of radius arms, each rigidly connected to one of said rollers at one end and extending at right angles thereto and pivotally supported at the other end on said plate and means projecting from each of said arms to slidably engage the adjacent arms whereby said arms are joined together for movement in unison.

4. In a device of the class described, a main conveyer, a plurality of branch conveyers arranged to connect with said main conveyer and an articulated section of said main conveyer movable to connect said main conveyer with either of said branch conveyers comprising, a supporting plate, a series of rollers, means supporting said rollers for relative movement on said plate, a series of radius arms, each rigidly connected to the supporting means for one of said rollers at one end and having a fixed pivot near its other end to swing substantially parallel to said plate and means operatively connecting said arms together for movement in unison.

5. A roller conveyer section comprising, a series of rollers, a radius arm secured to each of said rollers near one end and having a fixed pivot near the other end, said radius arms being relatively movable in arcs about the axes of their pivots and means connecting said radius arms together for movement in unison, said rollers being movable from positions in spaced, substantially parallel relation to each other to positions forming a curve with the rollers extending substantially radially to each other.

6. A roller conveyer section comprising, a series of rollers, radius arms of progressively increasing lengths severally connected to the successive rollers of said section and pivotally supported independently of each other, said radius arms extending longitudinally of the conveyer and having pivot centers spaced apart along the conveyer, said rollers being movable under the guidance of said arms in arcs having different radii.

7. In a device of the class described, a plurality of rollers, a supporting member extending longitudinally of each roller, anti-friction casters for supporting each of said members, a plate affording a guiding and supporting surface for said casters and radius arms severally connected to said roller-supporting members respectively and pivoted to swing in substantially parallel relation to said plate, the several pivotal axes for said arms being spaced apart longitudinally of the conveyer and said arms being of unequal length and progressively longer from one end of the group of rollers to the other.

8. In a device of the class described, a plurality of rollers, a supporting member extending longitudinally of each roller, anti-friction casters for supporting each of said members, a plate affording a guiding and supporting surface for said casters, radius arms severally connected near one end to said roller-supporting members respectively and severally having fixed pivots near their other ends to guide the several rollers in different arcs upon said plate, the several pivotal axes for said arms being spaced apart longitudinally of the conveyer and means connecting each of said arms to the adjacent arms for movement in unison.

9. In a device of the class described, a plurality of rollers, a supporting member extending longitudinally of each roller, anti-friction casters for supporting each of said members, a plate affording a guiding and supporting surface for said casters, radius arms severally connected to said roller-supporting members respectively, extending substantially at right angles thereto, and pivoted to guide the several rollers in different arcs upon said plate, said arms being of unequal length and progressively longer from one end of the group of rollers to the other and means connecting each of said arms to the adjacent arm.

10. In a spiral conveyer, a section of rollers severally adapted to extend radially as a spiral portion of said conveyer, fixed means extending beneath and at one side of said spiral portion of the conveyer for guiding and supporting the individual rollers of said section for movement laterally from said spiral, pairs of legs spacing the individual rollers of said section in parallel relation to said guiding and supporting member above the same and at progressively decreasing heights therefrom down the conveyer, said legs being movable upon the top of said fixed guiding and supporting means and means connecting said rollers together for lateral movement to divert loads from said conveyer.

11. In a spiral conveyer, a section of rollers severally adapted to extend radially as a portion

of said conveyer, a plane, horizontal plate for supporting the individual rollers of said section for movement laterally from said spiral, pairs of legs spacing the individual rollers of said section in parallel relation to said plate and at progressively decreasing heights therefrom down the conveyer, said legs being movable upon and across the top surface of said plate and means connecting said rollers together for lateral movement to divert loads from said conveyer.

12. In a spiral conveyer, a section of rollers severally adapted to extend radially as a spiral portion of said conveyer, fixed means extending beneath and at one side of said spiral portion of the conveyer for guiding and supporting the individual rollers of said section for movement laterally from said spiral, pairs of legs spacing the individual rollers of said section in parallel relation above said guiding and supporting means and at progressively decreasing heights therefrom down the conveyer and arms severally connecting said rollers together and to said guiding and supporting means, said arms permitting lateral movement of the rollers of said section to divert loads from said conveyer.

13. A roller conveyer switch comprising, a series of load supporting rollers, individual and separate supports for said rollers respectively, an arm secured to each of said supports, a fixed pivot for each of said arms, said arms being relatively movable to different angular positions severally about the axes of their pivots and means connecting the several arms together for movement in unison, said rollers being relatively movable, each under the guidance of one of said arms to form different curves.

14. A roller conveyer section comprising, a series of relatively movable, load supporting rollers and arms of progressively increasing lengths severally connected to the successive rollers of said section and each having a fixed pivot near a fixed end of the section, each of said rollers being movable under the guidance of one of said arms only and being maintained thereby with its axis radial to curves formed by the section.

EDWARD H. MALTBY.