Feb. 23, 1932. E. GROTH 1,846,390

LIVE ROLLER CURVE FOR CONVEYERS

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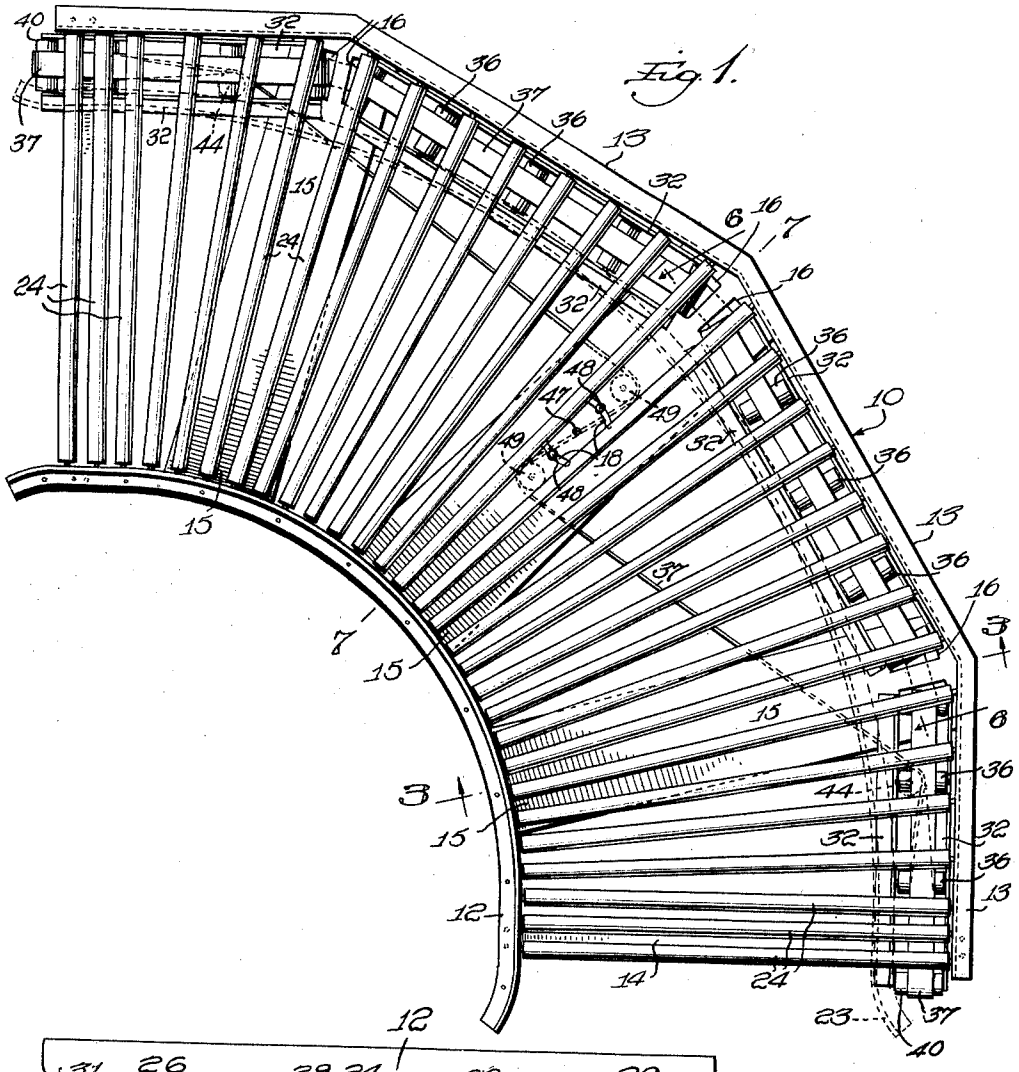


Fig. 1.

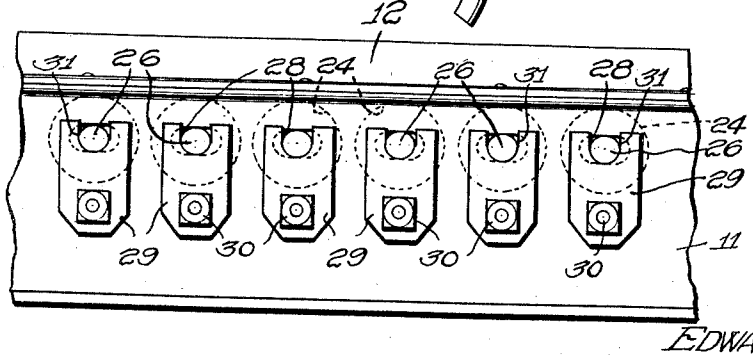


Fig. 2.

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Fig. 3.

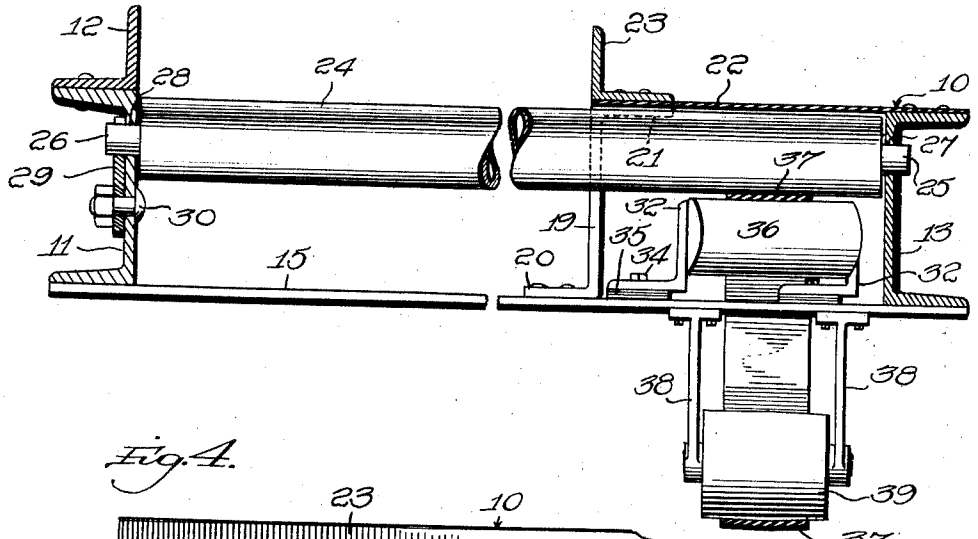



Fig. 4.

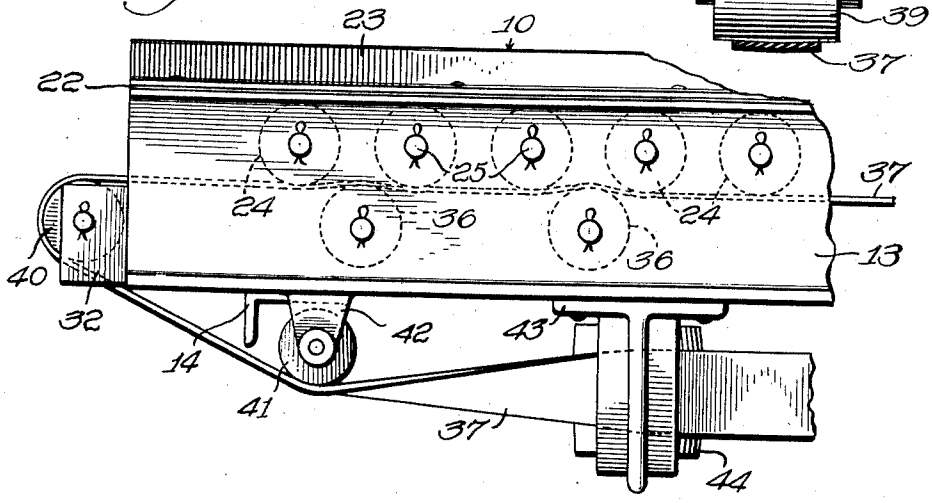
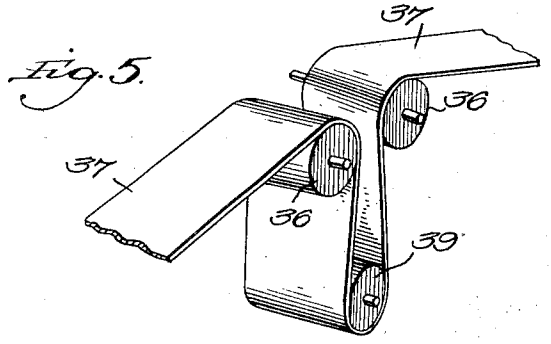



Fig. 5.




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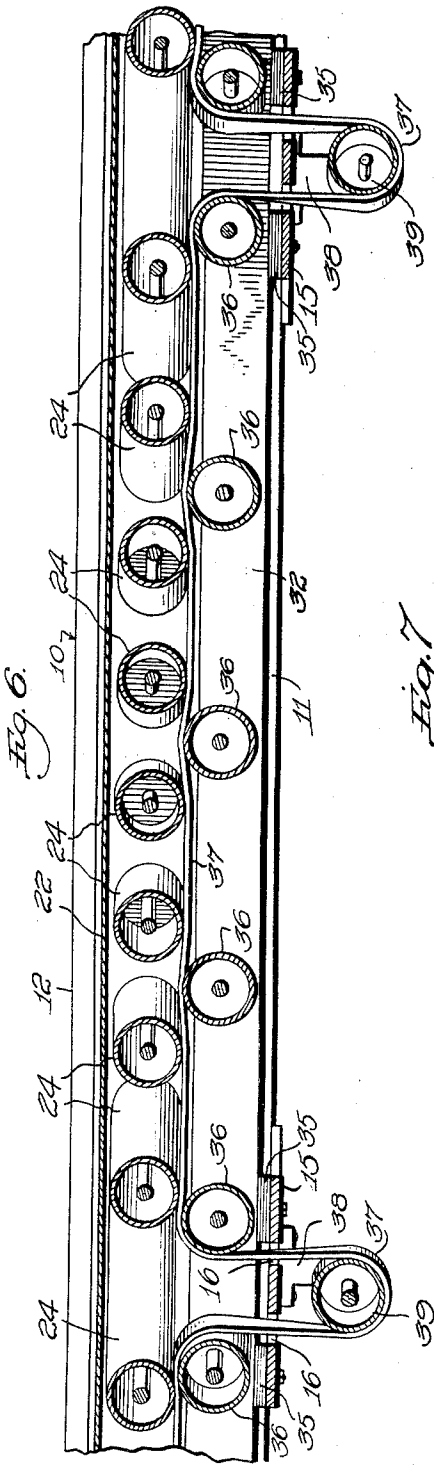


Fig. 6.

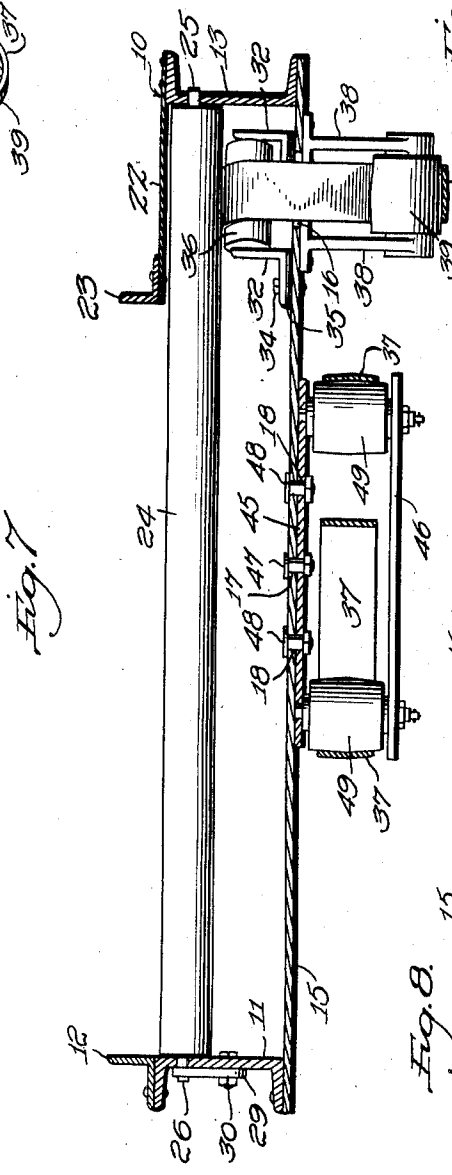


Fig. 7.

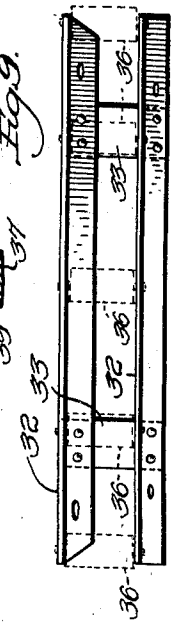


Fig. 9.

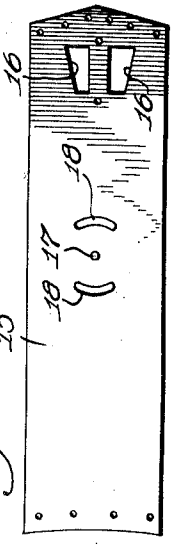


Fig. 8.

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# UNITED STATES PATENT OFFICE

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## LIVE ROLLER CURVE FOR CONVEYERS

Application filed October 11, 1929. Serial No. 398,964.

This invention relates to live roller curves for conveyers.

In the manufacture and installation of article and package conveyers, it frequently is necessary to provide means for effecting movement of the articles or packages around corners, and it further is frequently necessary to provide positive drive means for the conveyer to effect such movement. In such constructions, it is desirable to arrange the rollers of the curves radially so as to effect a true arcuate movement of the articles or packages, but it has been found to be quite difficult to provide practical and efficient means for positively driving the radial rollers. Means have been developed for accomplishing this result, but such constructions usually are rather complicated and expensive to manufacture.

An important object of the present invention is to provide a novel live roller curve for conveyers which is relatively simple and cheap to manufacture and which is efficient in operation.

A further object is to provide novel drive means for a plurality of radially arranged conveyer rollers whereby articles or packages may be readily conveyed around curves in a substantially true arcuate path, and with a minimum of friction.

A further object is to provide novel means for employing an endless belt as means for driving the rollers of a live roller conveyer curve.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawings I have shown one embodiment of the invention. In this showing,

Figure 1 is a plan view of a conveyer curve, parts being omitted,

Figure 2 is a fragmentary inside elevation of a portion of the curve,

Figure 3 is a section taken substantially on line 3—3 of Figure 1,

Figure 4 is a fragmentary side elevation of one end of the conveyer curve,

Figure 5 is a fragmentary perspective view of a portion of the endless belt drive means,

Figure 6 is a section taken substantially on line 6—6 of Figure 1,

Figure 7 is a transverse sectional view on line 7—7 of Figure 1,

Figure 8 is a plan view of one of the tie plates, and,

Figure 9 is a plan view of a pair of roller supporting rails.

Referring to Figure 1, the numeral 10 designates a live roller conveyer curve as a whole, the opposite ends of which are adapted to be connected to straight conveyer sections whereby packages or articles may be conveyed around a curved path to be transferred from one of the straight conveyer sections to the other.

Referring to Figures 2 and 3, the numeral 11 designates an arcuate channel rail forming the inner supporting means for the conveyer rollers to be described, and an angle iron guide rail 12 is mounted above and secured to the support 11 as shown. The outer support for the conveyer rollers comprises a plurality of channel rails 13, similar in cross section to the support 11. The rails 13 form outside supports for the conveyer roller, as stated, and a series of the supports 13 is employed, and arranged at an angle to each other to extend around the outside of the curve. It will be apparent that the angularity of the supports 13 with respect to each other and the number of supports 13 employed will depend upon the particular circumstances involved, such as the number of arcuate degrees of movement to be transmitted to the articles, the radius of the curve, etc.

The outer ends of the inner and outer supports 11 and 13 are connected to each other by tie plates 14, which may be formed of angle iron, as indicated in Figure 4. The connecting points of the individual straight sections of the outer support 13 are connected to the inner support 11 by tie plates 15, which may be formed of flat steel plates, as indicated in Figures 3, 6 and 7. Each of the tie plates 15 is provided adjacent its outer end with spaced tapered openings 16 for a purpose to be described. The central tie plate 15 is further provided with an opening 17 and

a pair of arcuate slots 18 concentric to the opening 17.

Each of the tie plates 14 and 15 is provided with an upstanding support 19 having a bottom foot 20 secured to the tie plate. The upper end of each support is provided with a horizontal extension 21 supporting the inner end of a cover plate 22, and the outer edge of this plate is secured to the top flange of the support 13 as indicated in Figure 3. An angle iron guide rail 23 also is supported by the supports 19, the guide rail being seated against the upper face of the cover plate 22. In Figure 1 of the drawings, the cover plate 22 and the guide rail 23 have been omitted for the purpose of illustration, the latter element being shown in broken lines. It will be apparent that the guide rails 12 and 23 define the inner and outer limits of the arcuate path of the conveyer curve, and they operate to insure proper movement of articles and packages around the curve.

The articles are supported for movement around the curve by a plurality of load supporting conveyer rollers 24 having stub shafts 25 and 26 at their ends. The rollers 24 are radially arranged with respect to the center of curvature of the guide rails 12 and 23 as clearly shown in Figure 1. The stub shafts 25 are journalled in circular openings 27 formed in the web of the support 13 while the stub shafts 26 extend through horizontally elongated openings 28 formed in the web of the inner support 11.

The elongated openings 28 are provided to permit adjustment of the load supporting rollers 24 to vary the positions of such rollers from the true radial positions illustrated in Figure 1, when such adjustment is desired or necessary to facilitate the movement of packages or articles around the conveyer curves. In order to secure the stub shafts 26 in adjusted positions, a plate 29 is secured by a bolt 30 to the support 11 beneath each of the stub shafts 26. Each adjusting plate 29 is provided in its upper end with a notch 31 having a semi-circular lower end receiving the stub shaft 26. By loosening the nut of the bolt 30, each plate 29 may be moved slightly to vary the position of the stub shaft 26 to secure the adjustment referred to, whereupon the nut of the bolt 30 may be tightened.

Means are provided for driving all of the load supporting rollers 24 to facilitate movement of the packages or articles. As shown in Figures 1, 3 and 7, a pair of angle iron rails 32 is mounted parallel to each of the sections of the outer support 13, and these rails preferably are connected to each other by tie plates 33. The rails 32 have their bottom flanges secured by bolts 34 to the tie plates 14 and 15, and shims 35 are preferably arranged beneath the rails 32 for a purpose to be described. A plurality of rollers 36 is journalled between each pair of rails 32, as shown in Figure 7. One of the rollers 36 preferably is employed between every other pair of load supporting rollers 24, as shown in Figure 6, and a roller 36 is arranged outwardly of the outermost roller 24 associated with each section of the support 13.

A drive belt 37 passes over the rollers 36 in contact therewith, and as shown in Figure 6, the belt 37 is adapted to contact with the rollers 24 to effect rotation thereof. The top surface of the belt preferably extends above the lower limits of the rollers 24, this position being determined by the height of the rollers 36 according to the thickness of the shims 35 previously described.

It will be apparent that the rollers 36 associated with each section of the support 13 are arranged in alinement with each other and at an angle to the corresponding rollers associated with the other sections of the support 13, and means is provided for effecting the change in the direction of travel of the upper run of the belt 37. Referring to Figures 3, 6 and 7, the numeral 38 designates a bearing bracket secured to and depending from each of the tie plates 15. A pulley 39 is rotatably supported by each of the brackets 38, and the axis of each pulley 39 bisects the angle defined by the axes of the adjacent pair of rollers 36. As previously stated, each of the tie plates 15 is provided with openings 16, and the belt 37 extends through these openings and around the pulley 39 arranged therebelow, and by this means, angular movement of the belt 37 is effected whereby the belt is provided with straight sections passing over the rollers 36 of each section of the support 13.

The rails 32 associated with the end portions of the conveyer curve are extended beyond the extremities of the support 13 to rotatably support end rollers 40 over which the extremities of the upper run of the belt 37 pass, as shown in Figure 4. After passing around the rollers 40, the lower run of the belt passes around pulleys 41 journalled in bearings 42 carried by and depending from the rails 32. A bearing bracket 43 is arranged inwardly of and spaced from the bearing 42, and is preferably supported by the adjacent pairs of rails 32. Each bearing bracket 43 supports a pulley 44 having its axis arranged vertically, and accordingly it will be apparent that the belt 37 passes through a quarter twist between the pulleys 41 and 44.

Referring to Figure 7, the numerals 45 and 46 designate a pair of parallel plates, the former of which is arranged beneath and contacts with the central tie plate 15. The plate 45 is pivotally connected to the plate 15 referred to by a bolt 47, while bolts 48 pass through the plate 45 and through the arcuate slots 18, illustrated in Figure 8. It will be apparent that the angular position

of the plates 45 and 46 may be varied, for a purpose to be described, by loosening the bolts 48 and swinging the plates 45 and 46 about the axis of the bolt 47.

Pulleys 49 are journalled between the end portions of the plates 45 and 46, and the belt 37 passes around these pulleys in the manner indicated in Figure 1. It will be apparent that the lower run of the belt is arranged vertically throughout its travel between the two pulleys 44 and around the pulleys 49. The belt is adapted to be properly tensioned by adjustment of the plates 45 and 46 in the manner previously described.

The operation of the apparatus is as follows:

As previously stated, the extremities of the live roller curve are adapted to be arranged in alinement with straight conveyer sections whereby articles are adapted to be transmitted between the latter. The upper run of the belt 37 is supported upon the rollers 36 whereby the belt is held in frictional engagement with the lower portions of the rollers 24, and accordingly the latter will be positively driven to effect movement of the articles around the conveyer curve. No power source has been illustrated for the belt, but it will be apparent that this element may be driven in any desired manner.

The belt supporting rollers 36 associated with each individual section of the support 13 are arranged in alinement with each other, and through such portion of the conveyer, the upper run of the belt 37 travels in a straight line. At the extremity of each of such straight sections, the belt passes downwardly through one of the openings 16, thence around the corresponding pulley 39, and upwardly through the next opening 16 to complete its movement through the next straight section. The axis of each roller 39 bisects the angle defined by the axes of the adjacent rollers 36, as will be apparent, and the structure described has been found effective for changing the path of travel of the belt in the angular manner referred to.

The means disclosed for driving the load supporting roller is effective for use in connection with a conveyer curve the rollers of the individual sections of which are arranged parallel to each other. For example, the rollers 24 corresponding in position to the individual section of the support 13 may be arranged parallel to each other and at an angle to the rollers of the adjacent sections whereby the belt 37 will travel at right angles to the load supporting rollers driven thereby. As is well known however, it is desirable from a practical standpoint to arrange the load supporting rollers radially in order to effect the movement of articles around the conveyer curve with the least friction and wear.

While the majority of the rollers 24 are arranged with their axes at acute angles to the straight sections of the upper run of the belt 37, it has been found that such arrangement does not affect the operation of the belt, the latter remaining in proper traveling relationship with respect to its pulleys and transmitting rotative forces to the load supporting rollers to effect the movement of articles and packages thereover. Accordingly the driving means is effective for driving radial rollers, and in eliminating the use of gearing and similar connecting means between the load supporting rollers, which provides the simplest possible form of drive means for a live roller curve, and a structure which is capable of manufacture at a reasonable cost.

The tension of the belt against the load supporting rollers readily may be varied by inserting or removing shims 35. The tension of the belt also is subject to longitudinal adjustment by swinging the plates 45 and 46 about the axis of the bolt 47 in the manner previously referred to.

Under some conditions, it has been found advisable to adjust the positions of the rollers 24 so that they are not truly radially arranged, and such adjustment tends more effectively to cause the articles to travel in a true arcuate path around the curve. Accordingly the adjusting plates 29 illustrated in Figure 2 are employed, and the adjustment referred to may be secured by loosening the nut of the bolts 30 and moving the upper ends of the plates 29, thus moving the stub shafts 26 toward one end of the slot 28. Of course, the rails 12 and 23 act as guides for articles passing around the conveyer, but the adjustment of the rollers referred to is adapted to cause articles to travel around the curve without frictionally engaging the guide rails to any material extent.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. In a live roller curve for conveyers, a plurality of radially arranged load supporting rollers defining a substantially arcuate path of travel for artices on the curve, a plurality of sets of pulleys arranged adjacent said rollers, the pulleys of each set being arranged parallel and in alinement with each other and at an angle to the pulleys of each adjacent set, a driving element adapted to travel over said pulleys in driving connection with said rollers, and means for changing the direction of movement of said element between each adjacent set of pulleys.

2. In a live roller curve for conveyers, a

plurality of radially arranged load supporting rollers defining a substantially arcuate path of travel for articles on the curve, a plurality of sets of pulleys arranged adjacent and in a plane substantially parallel to said rollers, the pulleys of each set being arranged parallel and in alinement with each other and at an angle to the pulleys of each adjacent set, a driving belt having one run thereof adapted to travel between and in contact with said pulleys and said rollers to effect rotation of the latter, and means arranged between the sets of pulleys for changing the direction of movement of said run of said belt to cause it to travel in alinement with the pulleys of each set.

3. In a live roller curve for conveyers, a plurality of radially arranged load supporting rollers lying substantially in a common plane and defining a substantially arcuate path of travel for articles on the curve, a plurality of sets of pulleys lying beneath and adjacent the outer ends of said rollers, the pulleys of each set being arranged parallel and in alinement with each other and at an angle to the pulleys of each adjacent set, a belt adapted to travel over said pulleys in driving connection with said rollers, a pulley arranged below said first named pulleys and lying in a plane bisecting the angle between the adjacent pulleys of each adjacent set, said belt passing beneath said last named pulleys to change its direction of movement between said sets of pulleys, and means for tensioning said belt.

4. Apparatus constructed in accordance with claim 3 wherein one run of said belt is arranged in driving connection with said rollers, horizontal pulleys arranged at the extremities of the curve and over which the last named run of said belt passes, vertical pulleys arranged inwardly of and beneath said horizontal pulleys to effect a quarter twist in the lower run of said belt to place the latter in vertical position, said tensioning means lying in the lower run of said belt between said vertical pulleys.

5. In a live roller curve for conveyers, a plurality of radially arranged load supporting rollers lying substantially in a common plane and defining a substantially arcuate path of travel for articles on the curve, a plurality of sets of pulleys lying beneath and adjacent one end of the rollers, the pulleys of each set being arranged parallel and in alinement with each other and at an angle to the pulleys of each adjacent set, a flat endless belt having one run adapted to travel over said pulleys in driving connection with said rollers, a pulley arranged below said first named pulleys and lying in a plane bisecting the angle between the adjacent pulleys of each adjacent set, said belt passing beneath said last named pulleys to change its direction of movement between said sets of pulleys, a pair of end pulleys lying beyond the respective ends of the arcuate path defined by said rollers and around which the upper run of said belt passes, guide pulleys arranged inwardly of and beneath said pair of pulleys to effect a quarter twist in the lower run of said belt to place the latter in vertical position, a pivoted member arranged between said guide pulleys, and a pair of tensioning pulleys carried by said member and adapted to contact with opposite sides of the lower run of said belt.

6. In a live roller conveyer, a conveyer section including a plurality of rollers arranged substantially radially with respect to a common center to define an arcuate path for articles traveling thereon, a pulley arranged adjacent each end of said section, an endless belt passing around said pulleys, the portion of the belt intermediate said pulleys having one face contacting with a plurality of said rollers and traveling in a straight line substantially at right angles to a radius through said common center substantially centrally of said conveyer section, and idler rollers contacting with the opposite side of the portion of the belt between said pulleys for maintaining the belt in driving engagement with said last named rollers, said idler rollers being arranged parallel to and in alinement with each other.

In testimony whereof I affix my signature.

EDWARD GROTH.