Nov. 1, 1932. H. E. TWOMLEY 1,885,568

EXTENSIBLE CONVEYER

Filed May 9, 1932 3 Sheets-Sheet 1

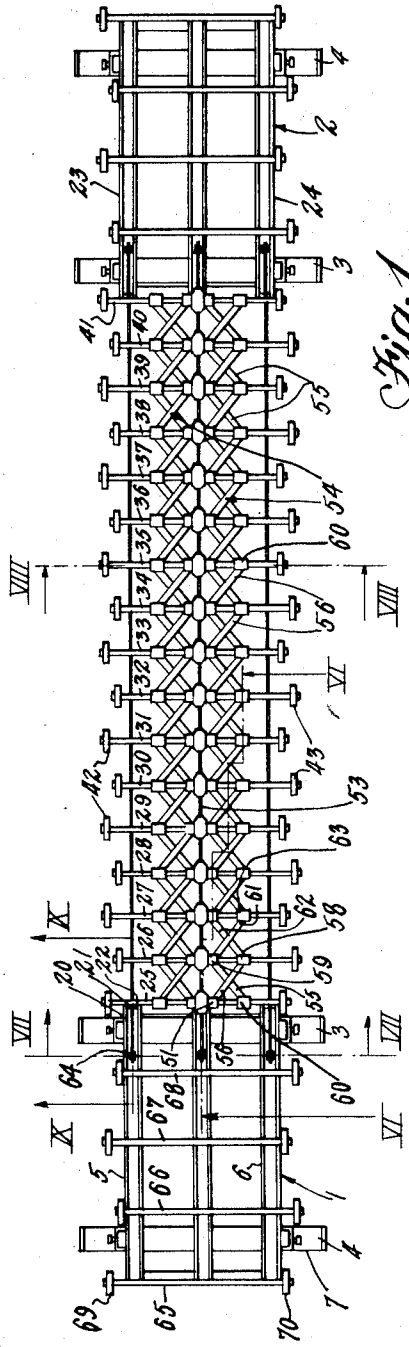


Fig. 1.

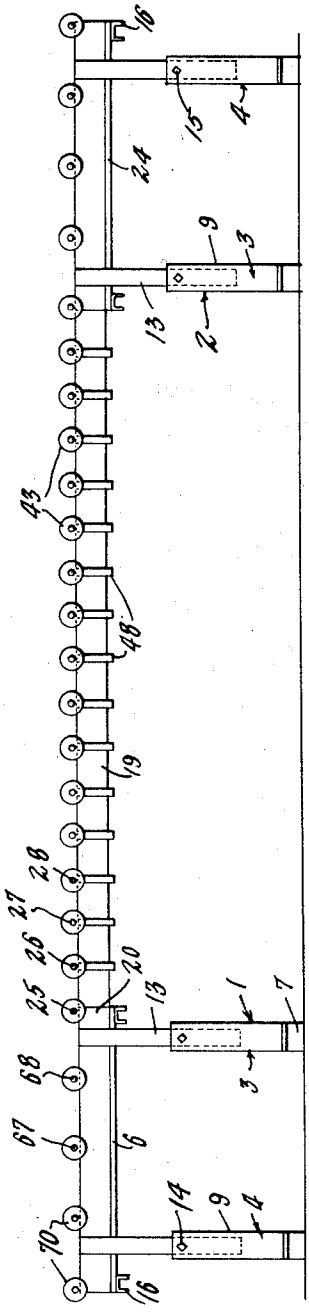


Fig. 2.

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EXTENSIBLE CONVEYER

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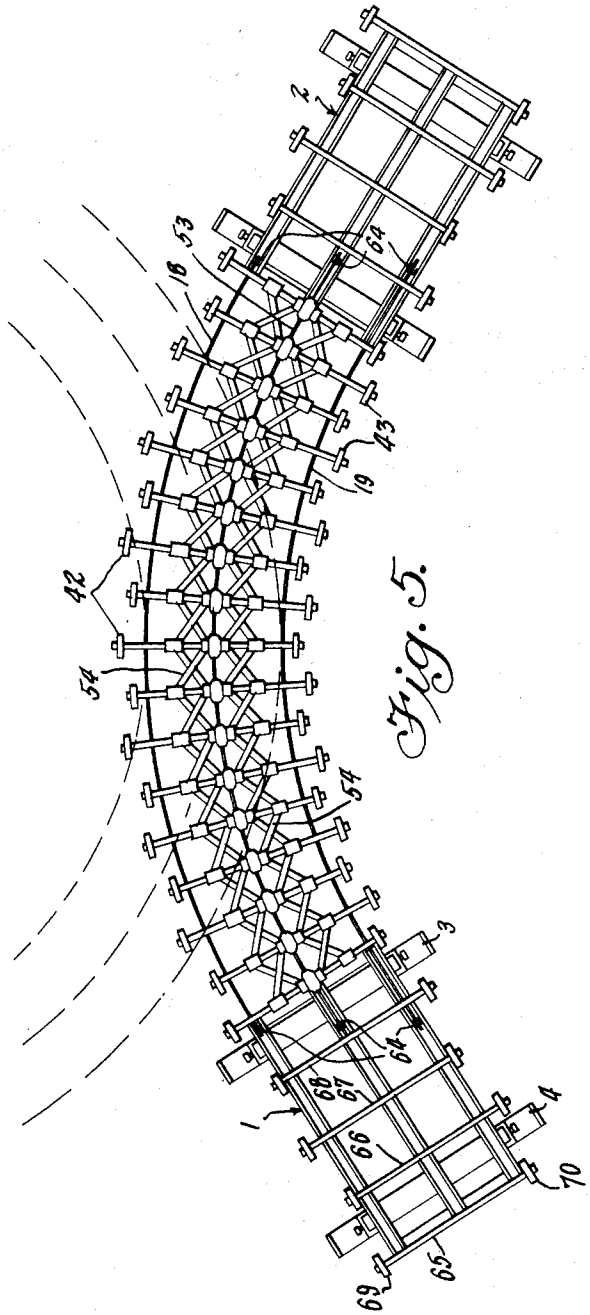



Fig. 5.

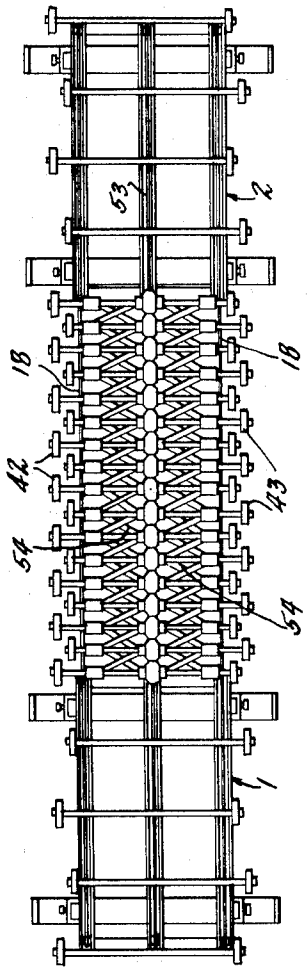



Fig. 3.

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EXTENSIBLE CONVEYER

Filed May 9, 1932 3 Sheets-Sheet 3

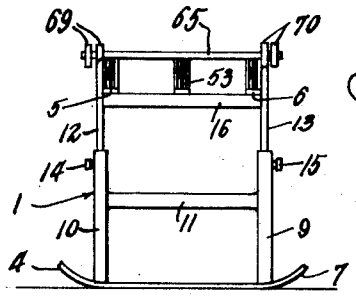



Fig. 4.

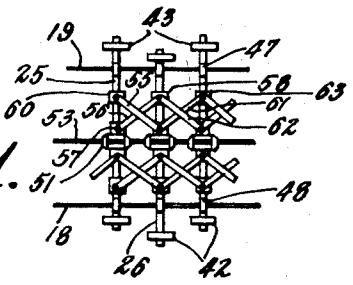



Fig. 11.

Fig. 7.

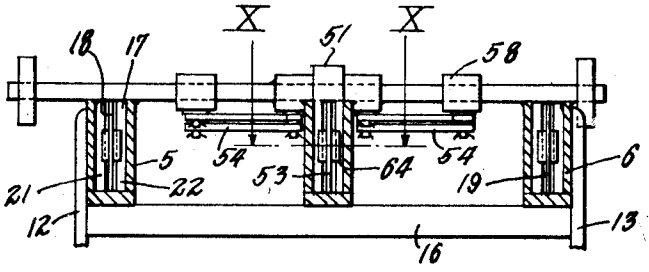



Fig. 10.



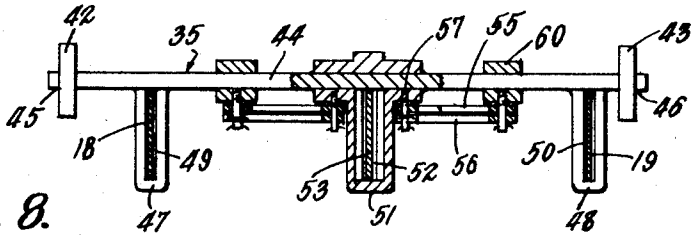



Fig. 8.

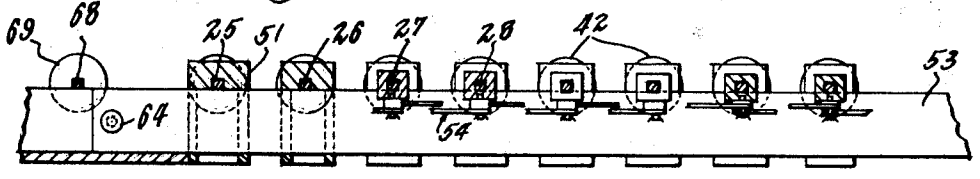



Fig. 6.

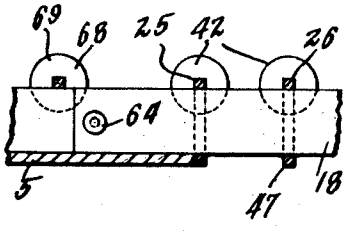



Fig. 9.

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# UNITED STATES PATENT OFFICE

HERBERT E. TWOMLEY, OF RIVERSIDE, CALIFORNIA, ASSIGNOR TO CLARA B. PARKER, EXECUTRIX OF THE ESTATE OF GEORGE D. PARKER, DECEASED

## EXTENSIBLE CONVEYER

Application filed May 9, 1932. Serial No. 610,027.

My invention relates to conveyer systems and has particular reference to a conveyer which may be extended or collapsed to fit various lengths of travel desired for parcels passing thereover. In parcel handling systems, particularly in the loading and stacking of parcels, boxes, and the like, in warehouses or railway cars, it frequently occurs that the point at which the boxes or parcels are desired to be delivered, changes during the loading or unloading operations. For example, in loading a railway freight car, it is desirable that the parcels be delivered through the doorway of the car to a point near one end of the car as the load is started, while as the car becomes full, its delivery point is closer to the door of the car.

Heretofore, it has been necessary to deliver the parcels to some convenient point at which they must be transported by hand to the particular place where loading or stacking is to be done and in the instance of a railway car such point of delivery would be the door, requiring the carrying of the parcels from the door to the ends of the car.

Also, it frequently occurs that the point of delivery is not in direct alignment with the conveyer loading point, it being necessary to transport the parcels around turns, curves, and the like, to deliver them at the most convenient point.

It is, therefore, an object of this invention to provide a conveyer which may be extended or collapsed to locate the point of delivery at varying positions.

Another object of the invention is to provide a conveyer which is both extensible and collapsible to vary the delivery point, and which is also flexible to permit the conveyer to be arranged around curves, permitting the delivery point to be arranged at any suitable position independent of the direction from which the parcels may be fed.

Another object of the invention is to provide a flexible and extensible conveyer which is relatively light, permitting ready manipulation of the same into any desired contour and to any desired extended or collapsed position.

Another object of the invention is to provide a flexible and extensible conveyer, in which the conveyer is rigid in a vertical direction but flexible in a lateral or horizontal direction, permitting the same to be readily positioned in any desired contour, and in which parcel engaging rollers are automatically spaced evenly along the length of the conveyer, irrespective of the extension or collapsing thereof.

Another object of the invention is to provide a conveyer of the type set forth in the preceding paragraph, in which, when the conveyer is positioned with a curved contour, the parcel engaging rollers will be automatically arranged with their axes forming equally spaced radii emanating from a common center which represents the center of the curved contour of the conveyer.

Other objects and advatnages will be apparent from a study of the following specifications, read in connection with the accompanying drawings, wherein

Figure 1 is a top plan view of a conveyer constructed in accordance with my invention;

Figure 2 is a side elevational view of the conveyer shown in Figure 1;

Figure 3 is a top plan view of the conveyer shown in Figure 1 shown in collapsed position;

Figure 4 is an end view of the conveyer shown in Figure 1;

Figure 5 is a top plan view of the conveyer shown in Figure 1, when in an extended and curved position;

Figure 6 is a detail sectional view, taken along line VI—VI of Figure 1;

Figure 7 is a detail, sectional view of the conveyer, taken along line VII—VII of Figure 1;

Figure 8 is a detail sectional view, taken along line VIII—VIII of Figure 1;

Figure 9 is a detail, sectional view, taken along line IX—IX of Figure 1;

Figure 10 is a detail, sectional view, taken along line X—X on Figure 7; and

Figure 11 is a bottom plan view of a section of the conveyer shown in Figure 1.

Referring to the drawings, I have illustrated my conveyer as comprising a pair of

end frames 1 and 2, each of which is constructed of a pair of leg frames 3 and 4 spaced from each other in the direction of travel of the parcels over the conveyer by a pair of longitudinal struts 5 and 6, respectively. The leg frames 3 and 4 are each constructed as shown in Figure 4 of a suitable base 7 which may be formed of a flat strip of steel, or other suitable material, from which rises a pair of tubular legs 9 and 10 rigidly secured at their bottom ends to the base 7 and having a lateral brace 11 extending between the legs to insure rigidity of construction of the frame. The hollow leg members 9 and 10 are illustrated as receiving telescopically therein a pair of leg bars 12 and 13, respectively, the bars being held in any desired telescoped relation with the tubular legs 9 and 10 by means of set screws 14 and 15, respectively threaded through the legs 10 and 9 into engagement with the leg bars 12 and 13.

The upper end of the leg bar 12 is illustrated as being welded, or otherwise suitably secured, to the longitudinal strut 5, while the leg bar 13 is secured to the opposite strut 6, a suitable lateral cross brace 16 being secured between the leg bars 12 and 13 immediately below the struts 5 and 6 and, if desired, may constitute recesses upon which the struts may contact.

By referring particularly to Figure 7, it will be observed that the strut 5 is formed of a member having a substantially U-shaped cross section, having an open top 17 which forms a suitable slideway for a longitudinal joist 18. The strut 6 is similarly constructed to form a slideway for another longitudinal joist 19.

By referring particularly to Figures 1 and 2, it will be observed that the longitudinal joist 18 is formed of an elongated strip or band of thin flexible material having considerable width so as to provide a construction which is rigid in a vertical direction but flexible in a lateral or horizontal direction. I prefer to employ a strip or ribbon of steel as the joist 18, which not only has the characteristic of flexibility, but is also more resilient, tending to return the joint after flexing to a straight line configuration.

It will be observed that the U-shaped strut 5 is sufficiently tall to accommodate the width of the joist 18, but that the channel of the U is relatively narrow so that only slight lateral movement is permitted the joist while in the channel of the strut 5. Preferably, the inner end 20 of the strut 5 is provided with filler blocks 21 and 22, to narrow the entrance to the channel of the strut 5 to a slot having a width slightly in excess of the thickness of the joist ribbon 18 to permit the joist to slide therethrough but permitting substantially no twisting or other lateral movement.

The end frame 2 is substantially identical with the end frame 1 in that it has longitudinal struts 23 and 24 formed with relatively narrow channels, in which the opposite ends of the longitudinal joists 18 and 19 may pass, respectively.

The assembly of the joists 18 and 19 with the end frames 1 and 2, forms a track upon which a plurality of axles may be mounted to support suitable parcel engaging rollers over which parcels may pass along the length of the conveyer. I have illustrated a plurality of such axles at 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40 and 41, each of the axles extending laterally across the joists 18 and 19 and bearing upon its outer ends, respectively, a pair of parcel engaging rollers 42 and 43. One of the axles 35 is illustrated in Figure 8 as being formed of a suitable bar 44 having bearings 45 and 46 formed upon opposite ends thereof to mount the rollers 42 and 43, respectively. A pair of lugs 47 and 48 are formed upon, or secured to, the underneath side of the bar 44 to extend downwardly therefrom, the lugs 47 and 48 being spaced from each other the same amount as the struts 5 and 6 are spaced from each other to thereby align slotted openings 49 and 50, respectively, in the lugs with the joists 18 and 19. The slots 49 and 50 are preferably of such size as will readily permit the joists to slide therethrough, but which will effectively prevent any lateral movement of the joists, and thus each of the axes with its legs constitutes a brace holding the joists on edge to obtain the greatest benefit from the rigidity provided by the width of the joists, but permitting full flexing laterally of the joists.

It will also be observed that a third lug 51 is provided, depending from the center of the bar 44, constituting the axle, the lug 51 being similar to the lugs 47 and 48 except that it has a slot or opening 52 therein considerably wider than the thickness of a ribbon runner 53 arranged to slide therethrough. The runner 53 may be constructed of a third ribbon of steel, or similar material, similar in all respects to the joists 18 and 19 so that in effect the runner 53 constitutes a third joist for the conveyer. The slot 52 on each of the lugs 51 is constructed with converging walls at either end of the lug to form a relatively narrow entrance passageway through which the runner 53 enters the lug 51, so that again the condition of maintaining the ribbon or runner 53 on edge, utilizing its rigidity in the vertical direction, is accomplished.

The axles 25, 26, 27, etc., are therefore freely slidable along the joists 18 and 19 and along the runner 53. However, it is desirable that the axles be evenly spaced along the length of the conveyer, and for this purpose, I have illustrated a pair of lazy tong constructions to interlink the axles.

The lazy tong construction upon one side of the central runner 53 is illustrated as formed of a plurality of sections 54, each of which is formed by a pair of cross links. One pair is illustrated as being composed of the links 55 and 56, being illustrated as having one of its ends pivotally fixed to the lug housing 51, as is indicated at 57, while the other end of this link is connected to a slide 58 mounted upon the ends of the adjacent axle. The link 55 is in turn pivotally fixed at one end to the adjacent axle, as is indicated at 59, while its opposite end is connected to a slide 60 mounted upon the first axle. In like manner, the ends of the adjacent set of axles are interconnected by links 61 and 62, the link 61 being pivotally fixed to the axle 26 upon the same pivot which secures the link 55, while the outer end of this link connects to a slide 63 on the adjacent axle. Also, the link 62 is pivotally fixed to the adjacent axle 27, while its opposite end is pivoted upon the same slide 58 to which the link 56 is secured. Thus the assembly of the links in between successive axles along the length of the conveyer, constitutes a lazy tong which insures that upon the movement of any one of the axles relative to its adjacent axle, all of the remaining axles become equally spaced along the length of the conveyer between the end frames.

It will also be observed that a similar construction is provided upon the opposite side of the central runner 53 so that the ends of the axles on one side of the runner will be equally spaced relative to each other, while the ends of the axles on the opposite sides of the runner will also be equally spaced relative to each other, but since two lazy tong constructions are employed, it is not necessary that the spacing of the axles upon one side of the runner be the same as the spacing of the axles upon the other side of the runner. By reason of the construction of the central runner 51 on each of the axles which engage the central runner through a considerable longitudinal distance, each of these axles will be maintained perpendicular to that part of the runner 53 which threads through the lug associated with that axle. Thus, as is illustrated in Figure 5, when the entire conveyer structure is curved or flexed to form a curved configuration, the central runner 53 will insure that each of the axles lies perpendicular to the adjacent portion of the runner 53 and it follows that the axis of the axle will coincide with a radius of the circle formed by the curve of the conveyer. Also, since the lazy tong constructions insure equal spacing of the axles along the length of the conveyer, it follows that the axes of the axles coincide with equally spaced radii emanating from the center of the circle formed by the arc of curvature of the conveyer. Thus any parcel which is placed upon the rollers of the conveyer will be automatically caused to "track" around the curve formed by the conveyer.

It will also be observed that due to the lazy tong construction, and the construction permitting relative sliding of each of the axles upon the joists and runner, the effective length of the conveyer may be extended or shortened, and independent of the elongation of the conveyer, the axles will be automatically evenly spaced along the length of the conveyer.

It will be observed that the end frames 1 and 2 are made considerably long so as to provide for receiving the ends of the joists and runner when the conveyer is in collapsed position, as is shown in Figure 3, but when the conveyer is extended, the joists and runner will be substantially withdrawn from the struts forming the longitudinal members of the end frames. If desired, complete disengagement between the joists and their struts may be prevented by providing a pin or button 64 of sufficient thickness to prevent complete withdrawal of the end of the joist or runner.

It will be observed that a plurality of additional axles 65, 66, 67, 68, are provided upon the end frame 1, each mounting a pair of rollers 69 and 70 to support parcels during their passage over the end frame.

In employing my conveyer, one of the end frames, for example end frame 1, may be placed at any desired location at which parcels are to enter the conveyer, for example, end frame 1 may be placed at the end of a fixed conveyer used to feed parcels to the loading or unloading point. The conveyer may then be elongated by drawing out the opposite end frame 2 to locate the same at any desired position which may be in direct longitudinal alignment with the end frame 1, as is indicated in Figure 1, or may be located out of alignment with the end frame 1 at any desired position, as is indicated in Figure 5.

Thus parcels which are delivered to the entrance end of the frame 1 will pass over the flexible conveyer and be delivered from the exit end of the frame 2 at the position which it is desired to receive the parcel. If the distance required for the delivery from my conveyer is less than the full elongated length of the conveyer, my conveyer may be shortened by collapsing the same, as is indicated in Figure 3, to any desired length between the maximum and minimum length of the conveyer. Thus as the loading position changes the conveyer may be lengthened or shortened, as desired, to insure delivery of the parcels at the most desirable location.

Also, by reason of the flexibility of the conveyer unit, the delivery end of the conveyer may be placed at any position, independent of its alignment with the entrance end of the conveyer. For example, in unloading the car,

the entrance end of the conveyer may be aligned with the doorway opening to the car, while the delivery end may be aligned with the longitudinal axis of the car to deliver parcels to the end of the car.

It will also be observed that the assembled structure is rigid in a vertical direction, due to the arrangement of the ribbon joists and runner on edge, though no interference occurs to the ready flexing of the conveyer unit into any desired curve or combination of curved configurations.

Also, by arranging the leg frames to telescopically receive the legs 12 and 13, one end of the conveyer may be elevated above the height of the other end of the conveyer so as to provide an inclined conveyer along which parcels may travel by gravity.

While I have shown and described the preferred embodiment of my invention, it is to be understood that I do not desire to be limited to any of the details of construction shown herein, except as defined in the appended claims.

I claim:

1. In a conveyer structure, a plurality of thin ribbon joists having considerable width and set upon edge in spaced parallel relation to each other extending longitudinally of said conveyer, a plurality of parcel supporting axles slidably mounted upon said joists in spaced relation along the length of said conveyer, and a lazy tong construction interconnecting adjacent axles for extension and contraction longitudinally of said joists to evenly space said axles along said joists in any of the extended or contracted positions.

2. In a conveyer structure, a plurality of joists extending in spaced parallel relation to each other, said joists being rigid in a vertical direction but flexible in a horizontal direction, a plurality of parcel supporting axles slidably mounted upon said joists and extending across said joists in spaced relation to each other along the length of said conveyer, a pair of lazy tong constructions one on each side of the center of said axles for extension and contraction longitudinally of said conveyer, said lazy tong constructions interconnecting adjacent axles to evenly space the associated ends of said axles in any of the extended or contracted positions of said lazy tongs.

3. In a conveyer structure, a plurality of joists extending in spaced parallel relation to each other longitudinally of said conveyer, a plurality of parcel supporting rollers mounted upon axes extending transversely across said joists and supported thereon, a lazy tong construction interconnecting adjacent roller axes for extension and contraction longitudinally of said joists, and a pair of end frames including longitudinal struts telescopically receiving the ends of said joists to form a parcel entrance conveyer section for said conveyer, said end frames having a plurality of parcel supporting rollers thereon for guiding parcels to the rollers on said joists.

4. In a conveyer structure, a pair of end frames having a pair of spaced parallel struts extending longitudinally relative to the conveyer structure, a thin ribbon joist telescopically engaged in each of said struts and extending longitudinally of said conveyer, a plurality of parcel supporting axles extending transversely of said joists, a parcel engaging axle rigidly secured to each of said end frames, and a lazy tong construction interconnecting said rigidly secured axle with each of the remaining axles whereby extension or contraction of said lazy tong evenly spaces said axles along the length of said joists.

5. In a conveyer structure, a pair of end frames having a pair of spaced parallel struts extending longitudinally relative to the conveyer structure, a thin ribbon joist telescopically engaged in each of said struts and extending longitudinally of said conveyer, a plurality of parcel supporting axles extending transversely of said joists, a parcel engaging axle rigidly secured to each of said end frames, a lazy tong construction interconnecting said rigidly secured axle with each of the remaining axles whereby extension or contraction of said lazy tong evenly spaces said axles along the length of said joists, and a central runner formed of a thin ribbon extending longitudinally of said conveyer and slidably engaging each of said axles to maintain said axles coincident with radii of a curve formed by flexing said joists and runner in a lateral direction.

6. In a conveyer structure, a pair of end frames having a pair of spaced parallel struts extending longitudinally relative to the conveyer structure, a pair of thin ribbon joists each of considerable width and mounted upon edge, said joists extending in spaced parallel relation longitudinally of said conveyer, a central runner also comprising a ribbon joist of considerable width extending parallel to said joists and between the same, a plurality of parcel supporting axles extending across said joist and said runner and slidably mounted thereon, a pair of lazy tong structures one on each side of said runner interconnecting adjacent axles for extension and contraction longitudinally of said conveyer to evenly space the ends of said axles upon one side of the runner and the other to evenly space the ends of the axles on the other side of said runner, whereby the effective length of said conveyer may be varied or bent into curved configuration with the axles evenly spaced therealong at all times.

Signed at Riverside, California, this 22 day of April, 1932.

HERBERT E. TWOMLEY.