Sept. 18, 1934. R. E. DE KAY 1,973,750

TRAY CONVEYER

Filed Sept. 5, 1931 2 Sheets-Sheet 1

FIG. 1.

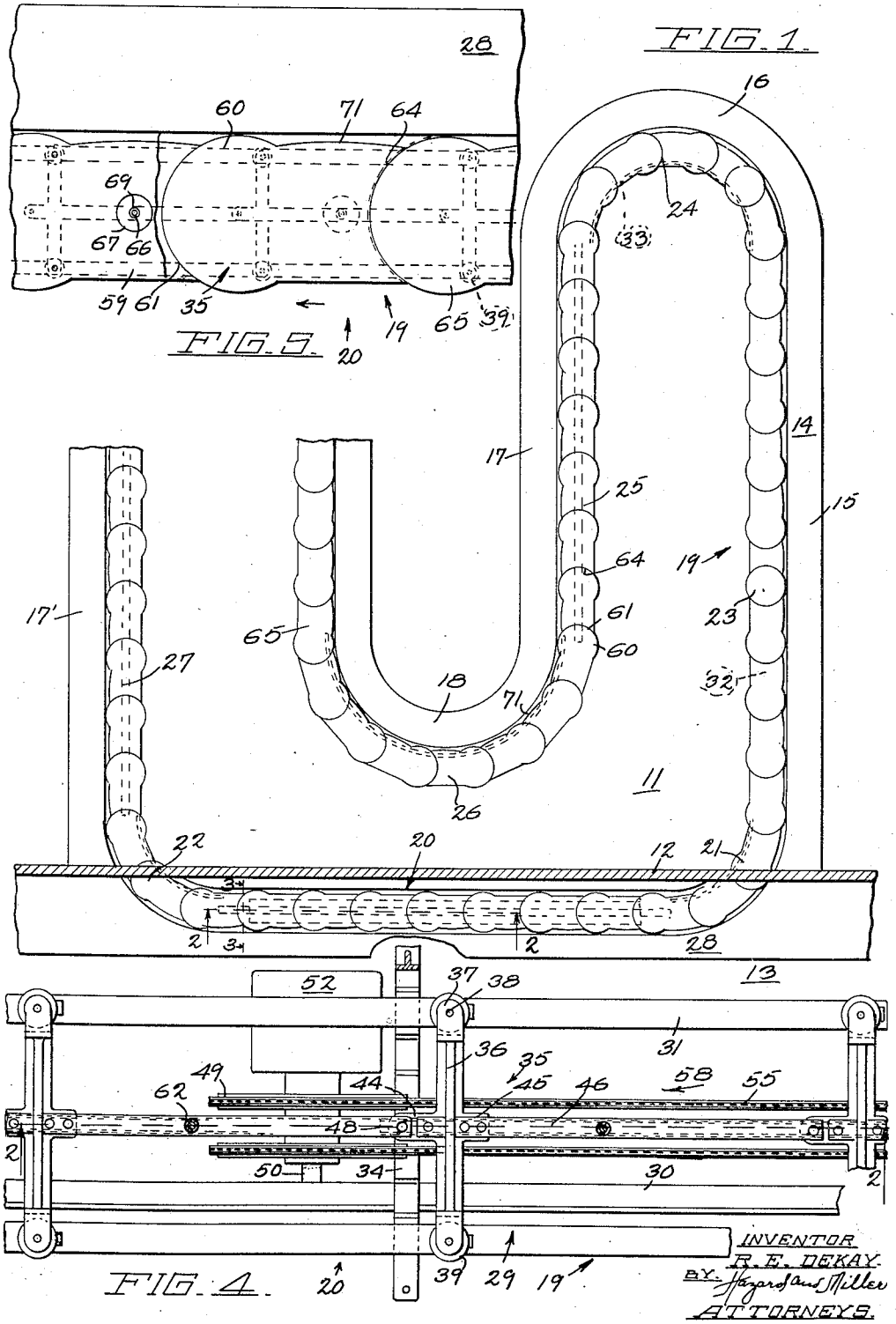


FIG. 5.

FIG. 4.

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TRAY CONVEYER

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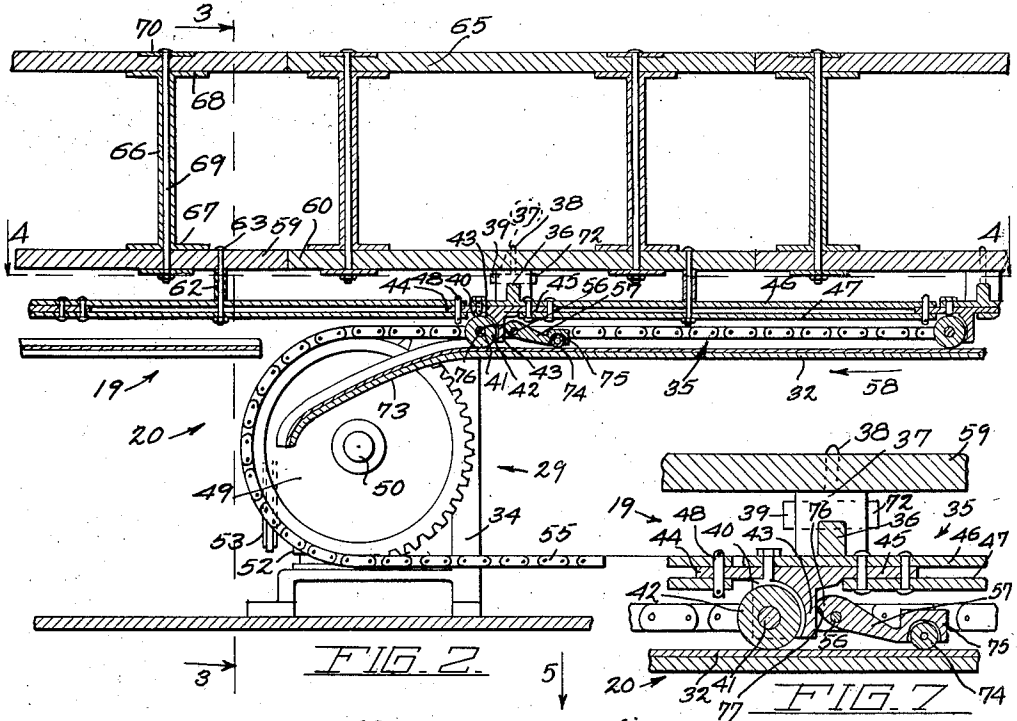


FIG. 2.

FIG. 7.

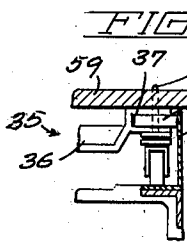


FIG. 6.

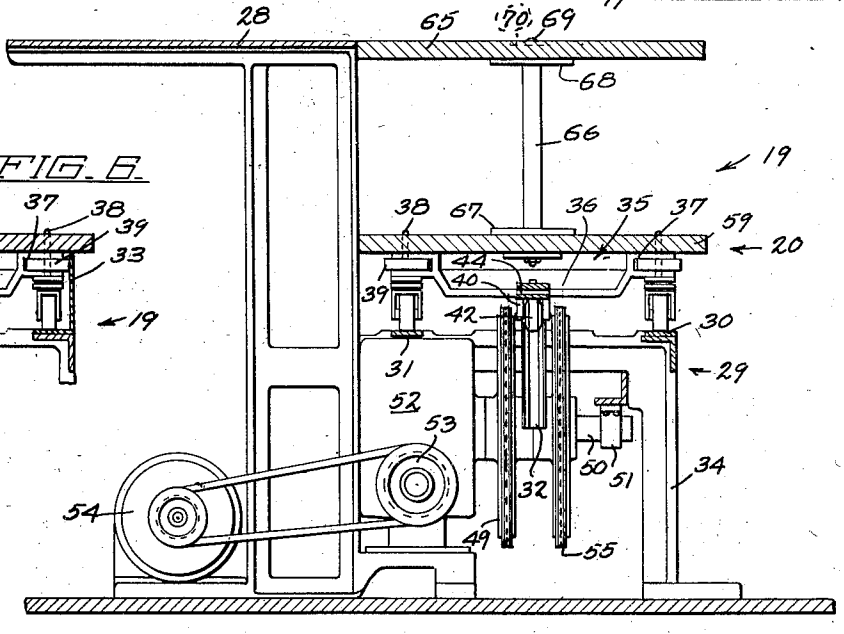


FIG. 3.

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UNITED STATES PATENT OFFICE

1,973,750

TRAY CONVEYER

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Application September 5, 1931, Serial No. 561,414

17 Claims. (Cl. 186—1)

My invention relates to a tray conveyer for self-serving types of restaurants, such as set forth in my patent application, Serial No. 432,286, for Tray conveyer, filed September 16, 1930.

An object and feature of my present invention is to arrange the tray conveyer in a path with reverse bends in order that a larger number of people may be seated at the counters in substantially the same floor area of restaurant. In connection with making the reverse bends of the traveling conveyer, another feature of my invention relates to the particular mounting of the individual trays on their carriages and the operation of these carriages on the track.

Another feature of my invention relates to the drive of the tray conveyer, this drive being positioned on a section having a straight line of travel and preferably located in the pantry of a restaurant where the used and dirty dishes may be taken from the conveyer and the fresh food supplied to the conveyer.

In connection with the track construction, an object and feature of my invention is the employment of flat side tracks on the straight away portions and on the curved sections, and a center grooved guide track on the straight sections only. In connection with these tracks I provide carriages having three wheels, two lateral wheels to operate on the flat tracks, these wheels being casters to permit swiveling, and a center fixed wheel to engage in the grooved guide track. Each individual carriage is constructed with these wheels substantially in the same transverse line, each carriage, therefore, having an elongated tail piece which has a pivotal connection with the projecting tongue of the next succeeding carriage. This construction guides the trays on the straight away sections but at the curved sections of the track there are vertical guide tracks on the outside of the curve which engage rollers mounted on the vertical axis. For simplicity of construction these rollers are mounted on the pivot pin of the caster. These rollers with the curved outside track give a reverse turn to the conveyer and the trays.

Another object and feature of my invention relates to the drive mechanism, this using two comparatively short driving chains located, as above mentioned, in the pantry, with their upper runs operating on both sides of the central journaled guide track. These chains have interconnecting links and on such links there are pusher levers which engage downwardly extending abutment structures, such abutments being preferably directly behind the central supporting wheel of each carriage.

Another feature of my invention relates to the mounting of the trays, these being secured on two opposite sides by the pivot pin of the side casters and having an attaching bolt securing the trailing end of each tray to the tail piece of each carriage, the leading portion of each tray extending considerably in front of the supporting wheels of the carriage on which such tray is mounted.

Another object and featurue of my invention consists of a gradual pickup of the drive of the conveyer chain by the driving chain so that there is no abrupt or jerky action in the engagement of the pusher devices and for this purpose I utilize cam levers which are pivotally mounted on an axle between the two drive chains, this lever having a weighted end which is actuated by curved sections of a central guide track to bring the cammed end of the lever into gradual engagement with the abutments on the conveyer chain. This causes a gradual taking up of the driving force between the driving chains and the conveyer chains. By this construction and having the guide track curved at the end in which the drive chain disconnects from the conveyer chain, I obtain a gradual release of the drive.

My invention is illustrated in connection with the accompanying drawings, in which:

Fig. 1 is a plan showing a portion of a restaurant with my invention installed therein;

Fig. 2 is a detailed partial vertical section on the line 2—2 of Figs. 1 or 4 in the direction of the arrows;

Fig. 3 is a vertical transverse section on the lines 3—3 of Figs. 1 or 2 in the direction of the arrows;

Fig. 4 is a horizontal section on the line 4—4 of Fig. 2 in the direction of the arrows;

Fig. 5 is a detailed plan taken in the direction of the arrow 5 of Fig. 3 showing several of the trays;

Fig. 6 is a detailed vertical section of a portion of the track at one of the turns;

Fig. 7 is an enlarged vertical section showing, in particular, the cam lever for transmitting the drive from the drive chains to the conveyer chain.

Referring first to the general construction, the restaurant portion of the building in which my invention is housed is indicated by the numeral 11, there being a wall 12 with a pantry 13, this being connected to the kitchen and to the scullery. There is an elongated counter 14 which is illustrated as having a straight section 15 at right angles to the wall 12, a reverse turn 16, a

second straight section 17, and another reverse bend 18. These straight and reverse bend sections may continue to the capacity of the floor area of the restaurant, there being again another straight away section 17' terminating at the wall or partition 12. This gives an elongated counter where people may obtain the restaurant service.

The tray conveyer designated generally 19 has a straight section 20 running through the pantry compartment, there being curved sections 21 and 22 where the conveyer turns, and has a straight section 23 beside the straight section 15 of the counter, a reverse curve 24 following the curve 16 of the counter, a second straight section 25 beside the section 17 of the counter, a reverse turn portion 26 adjacent the reverse bend 18. The conveyer then follows the counter with a straight portion 27 leading to the turn 22 leading to the pantry. It will thus be seen that provision must be made in the track and in the carriages which support the trays for properly handling the trays not only on the straight sections but on the curved sections which have reverse turns. There is also a counter 28 in the pantry compartment 13.

Dealing first with the track construction, this employs a suitable framing 29 (note Fig. 3) on which there are two flat tracks 30 and 31. This framing is substantially the same at each section of the track and the flat tracks 30 follow the distance of the full conveyer. On the straight sections of the conveyer there is a central grooved or channel-shaped track 32, this being midway between the side tracks 30 and 31.

At the turns in the conveyer there is an outside vertical track 33 which is illustrated as being made by using an angle, the horizontal portion of which forms one of the flat tracks 30 or 31 and the vertical portion of which forms the vertical track, this being for guidance purposes at the corners or turns. A series of supporting legs 34 form a mounting for the counter 14.

Referring next to the construction of the individual carriages, these carriages are designated generally at 35 and have a transverse beam 36. This bar has a pair of ears 37 at its opposite ends, through which ears extend a pivot pin 38 of the casters 39, these casters being of the usual construction and preferably made of the ball bearing type.

At the center of the cross bar 36 there are a pair of forwardly projecting ears 40 in which there is mounted a horizontal axle 41 with a wheel 42 mounted thereon. This wheel can not swivel and is guided in the channel-shaped guide track 32. Immediately behind this wheel there is a downwardly extending abutment 43 for driving the carriage. Each carriage has a tongue 44 extending forwardly of the wheel 42 and forwardly of the casters 39. There is also a tail piece 45, the tail piece being illustrated as having upper and lower rods 46 and 47, these rods being pivotally connected to the projecting tongue by a pivot 48, this allowing the turn at the corners.

The driving connection for the individual carriages (note particularly Figs. 2 and 3) comprise two sprocket wheels 49, both being mounted on a common horizontal drive shaft 50. This drive shaft is indicated as having a journal 51 in the frame structure 29 and having its other end connected into a gear box 52, this gear box having a reduction train of gears and having a drive wheel 53 extending outwardly from the gear case, this having a suitable drive connection to an electric motor 54. There are a pair of sprocket wheels at opposite ends of the driving section of the conveyer and over these sprocket wheels operate endless chains 55. These chains at intervals have axles 56 connected between the chains and on these axles there are driving cam levers 57. The upper run of the chain is positioned so that these driving levers engage the downwardly extending abutments 43 on the carriages and, hence, move the carriages in a forward direction, such being that of the arrow 58 (Fig. 2). By this construction the relatively short length of drive chain may operate in the pantry and hence the noise of this will not annoy the customers.

The mounting of the trays on the carriages is as follows, having reference particularly to Figs. 2, 3, and 4. The trays have a bottom board 59, such board having the pivots 38 of the casters forming dowels for the board. Thus the board is supported at two opposite sides, and this is adjacent the bulbous end 60 which has a convex curve 61. This curve is formed with the pivot 48 as the center. Extending upwardly from the tail piece there is a spacing tube 62 with a bolt 63 bolting the rear portion of the board 59 to the tail piece. The trailing edge of the board has a concave curve 64 which is concentric to the curve 61, being struck on the same center.

The bottom board 59 of the tray is intended to be used only for the return to the pantry of the dirty dishes and cutlery, these being removed from the counter by attendants who work on the side of the conveyer opposite the counter and reach over the conveyer to take the dishes off the counter. The service trays employ upper tray boards 65. These boards are supported by two tubular pedestals 66 which have an enlarged base 67 bearing on the lower boards 59 and an upper flange 68. A bolt 69 extends through the upper and lower boards and through these pedestals and is preferably provided with enlarged washers 70 at opposite ends of the bolt, one being below the lower board and the other on the top of the upper board. These boards have the same shape, being provided with the partly circular end 60 with the convex curve, and the concave curve at the trailing end. The outer side next to the counters has a convex curvature 71 to accommodate the tray boards at the return bends of the counters.

It will be noted that the trays are guided in their longitudinal or straight section travel by the central guide track 32 but this guide track is omitted at the bends and reverse turns, the carriages and hence the trays being kept properly spaced from the counters and running on the flat tracks 30 and 31 by the vertical guide tracks 33. In the case of the return bend 24 these must be on the inside of the conveyer, that is, on the side opposite the counter, and in the return bend 28 they must be on the side adjacent the counter so that the horizontal rollers 39 which are journaled on the caster pins 38 may engage such vertical section of the track and maintain the casters rolling on the flat tracks 30 and 31.

The guide track 32 at its opposite ends is provided with downwardly extending cam shaped curves 73. These extend between the sprocket wheels 49. The cam driving lever 57 pivoted on the axle 56 between the two drive chains has a roller 74 housed in a weighted end 75, this roller running in the track 32 and being guided by the curved ends 73 of this track. This action gradually brings the cammed end 76 of the lever 57

into engagement with the surface 77 of the abutments 43. This action and construction causes a gradual pickup of the driving force between the endless conveyer carrying the trays and the drive chains. Therefore, if there is any looseness or inexactness in the distance apart of the various abutments, this is compensated for by the action of the cam levers 57. The weighted end 75 of these levers tends to cause the rear ends of the levers to drop so that as the upper run of the drive chain carries these levers upwardly they engage the forward cammed end 73, and if there is a slackness in the carrier chain, they engage the abutment, and then by being pressed forward gradually thrust this slightly forward in reference to the axle 56. This being done gradually prevents the abrupt jolt or jar which might be given by a non-yielding driving device on the drive chain engaging the abutments on the conveyer chain.

While I illustrate and describe my invention as being particularly adapted for restaurant use and for having trays on the conveyer chain, it will be readily understood that the device may be used for many other purposes in the conveying art. Also that the trays could be modified and other constructions used in the place of those illustrated, all of which changes and uses would come within the spirit of my invention.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. In a tray conveyer, the combination of an elongated counter having straight sections, certain of said sections being joined by return bends and certain of these bends being in a reverse direction from the adjacent bend, an elongated track having straight and return bend sections positioned substantially parallel to the counter, an endless chain of connected carriages, each carriage having a tray supported thereon, the ends of the trays forming a sliding fit one with the next, means to move a section of the chain and hence the chain as a whole, and means to guide the carriages at the return bends of the track.

2. In a tray conveyer, a pair of parallel tracks, an endless chain having a plurality of carriages, each carriage having a transverse beam with wheels mounted thereon operating in said tracks, the trailing end of one carriage being connected to the forward end of the adjacent carriage close to said beam, a pusher abutment extending downwardly below said beam, an endless drive chain having its upper run operating between the tracks and having a pusher means thereon to engage each of said abutments for moving the carrier chain.

3. In a tray conveyer, a track having parallel side rails and a center guide rail, an endless carrier chain formed of connected carriages, each carriage having a transverse beam with rollers thereon to bear on the side tracks and a center roller operating in the center guide track, a drive chain formed of two endless chains having their upper runs on opposite sides of the guide track, a thrust abutment extending downwardly from each carriage, and a pusher means connecting the drive chains and engaging the thrust abutment for moving the carrier chain.

4. In a tray conveyer as claimed in claim 3, the center track having a pair of open sections with sprocket wheels extending upwardly on each side of said section, and the pusher means connecting the drive chains passing up and down through such open sections.

5. In a tray conveyer, a pair of parallel flat surface side rails, a center guide track having a pair of open sections, a pair of parallel endless drive chains having two pair of sprocket wheels extending upwardly on opposite sides of the open sections of the guide track and having sprocket chains thereon, the upper run of said chains operating on opposite sides of the guide track and above such track, a plurality of axles connecting the parallel drive chains having cams thereon, an endless carrier chain having carriages, each carriage having a transverse beam with casters on the end operating on the flat tracks, a center fixed roller operating in a guide track, and thrust abutments on each carriage to be engaged by the cams on the drive chains.

6. In a tray conveyer as claimed in claim 5, each carriage having a short tongue extending forwardly of the transverse beam, and a tail piece extending rearwardly, the tongues and the tail pieces being pivotally connected to the adjacent carriages, each carriage having a tray secured to the upper ends of the transverse beams and secured to a tail piece.

7. In a tray conveyer, a plurality of connected carriages, each having a tray thereon, each tray having one end with a convex curve greater than a semi-circle and the opposite end with a concave curve less than a semi-circle with sides joining the ends of such curves, the convex-curved end interfitting with the concave end on an adjacent tray and the concave end interfitting with the convex curve of another adjacent tray, a counter positioned on one side of the trays and having a curve, one side of each tray having a convex curve, such side being adjacent the counter.

8. In a tray conveyer, a plurality of interconnected carriages, each carriage having a transverse beam, a tongue extending forwardly therefrom, and a tail piece extending rearwardly, the tongue being connected to the tail piece of an adjacent carriage, a tray on each carriage having pins on opposite ends of the transverse beam supporting the tray, and a central bolt from the tail piece engaging the end of the tray.

9. In a tray conveyer as claimed in claim 8, the end of the tray having the pins being convex and having a curvature greater than a semi-circle, and the end of the tray having the bolts being concave and less than a semi-circle, with sides connecting the convex and concave ends.

10. In a tray conveyer, a pair of flat parallel tracks, a plurality of carriages operating thereon, each carriage having a transverse beam with casters on opposite ends of the beam, a short tongue extending forwardly from each beam, and an elongated tail piece extending rearwardly, the tongues and the tail pieces of adjacent carriages being pivotally connected, a tray mounted on each carriage having pins on opposite ends of the transverse beam engaging the tray, and a bolt at the rear end being connected to the tail piece, the forward end of each tray being convex and the rear end concave, with sides connecting said ends.

11. In a tray conveyer as claimed in claim 10, an upper tray connected to the lower tray by pedestals, said upper tray having its forward end with a convex curve greater than a semi-circle, and its rear end with the concave curve less

than a semi-circle, with sides connecting said ends.

12. In a tray conveyer, a track having parallel rails, an endless chain formed of carriages having rollers running on the rails, a central trough-shaped rail, each carriage having a depending central thrust abutment positioned equidistant between the rails and a roller mounted adjacent the bottom operating in the trough-shaped rail, a pair of parallel endless drive chains positioned between the tracks and having their upper runs on opposite sides of the thrust abutment of the carriages and equidistant therefrom, connections between the two chains, and said connections having pusher devices thereon engaging said abutments.

13. In a tray conveyer, a track having parallel rails, a central trough-shaped track, said latter track having cut sections with the ends adjacent the cut bent downwardly to form a pair of cams with a straight connecting section, an endless chain to pull carriages having rollers running on the parallel rails, and a central roller operating in the trough-shaped rail, a depending thrust abutment adjacent said central roller, a pair of parallel endless drive chains positioned between the tracks and having their upper runs on opposite sides of the thrust abutment of the carriages and equidistant therefrom, connections between said chains, and said connections having a pusher device thereon engaging said abutment, the cam sections of the trough-shaped track forming guides for the pusher device.

14. In a tray conveyer, a plurality of carriages, each pivotally connected to the adjacent carriage by a forward and a vertical pivot, a tray on each carriage, the forward end of each tray having a convex edge formed on a radius from the forward pivot, such radius being greater than the width of the tray, each tray having the opposite end formed on a concave curve of slightly greater radius whereby the convex and concave ends of adjacent trays may interfit, the convex end having an arc greater than 180 degrees and the concave end an arc of less than 180 degrees, a track having a pair of parallel side rails and a center rail, the carriage having a pair of side caster wheels to run on the side tracks positioned adjacent the forward end of the carriage, each carriage also having a center wheel at the forward end positioned closely adjacent to the point of pivot of the forward end of the carriage with the rear end of the adjacent carriage.

15. In a tray conveyer, a track having parallel rails, a carriage having a pair of opposite wheels to each run on a track, said carriage having a forward end extending but slightly forward of the transverse line of the wheels, and a trailing end extending a considerable distance rearwardly of the transverse line of the wheels, an adjacent carriage pivoted to the forward and the rearward portion of the carriage, a center track positioned between the side tracks, and a center wheel on the carriage positioned closely adjacent the forward pivot of the carriage.

16. In a tray conveyer as claimed in claim 15, one of the side tracks having a vertical section on a curve, and the carriage having a wheel mounted on a vertical axis substantially vertically above one of the side wheels to engage with the vertical section.

17. In a tray conveyer, a track having parallel rails, a carriage having a pair of opposite wheels to each run on a track, said carriage having a forward end extending but slightly forward of the transverse line of the wheels, and a trailing end extending a considerable distance rearwardly of the transverse line of the wheels, an adjacent carriage pivoted to the forward and the rearward portion of the carriage, one of the side tracks having a vertical section on a curve, and the carriage having a wheel mounted on a vertical axis substantially vertically above one of the side wheels to engage with the vertical section.

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