Feb. 23, 1932. R. E. DE KAY 1,846,632

TRAY CONVEYER

Filed Sept. 16, 1930 2 Sheets-Sheet 1

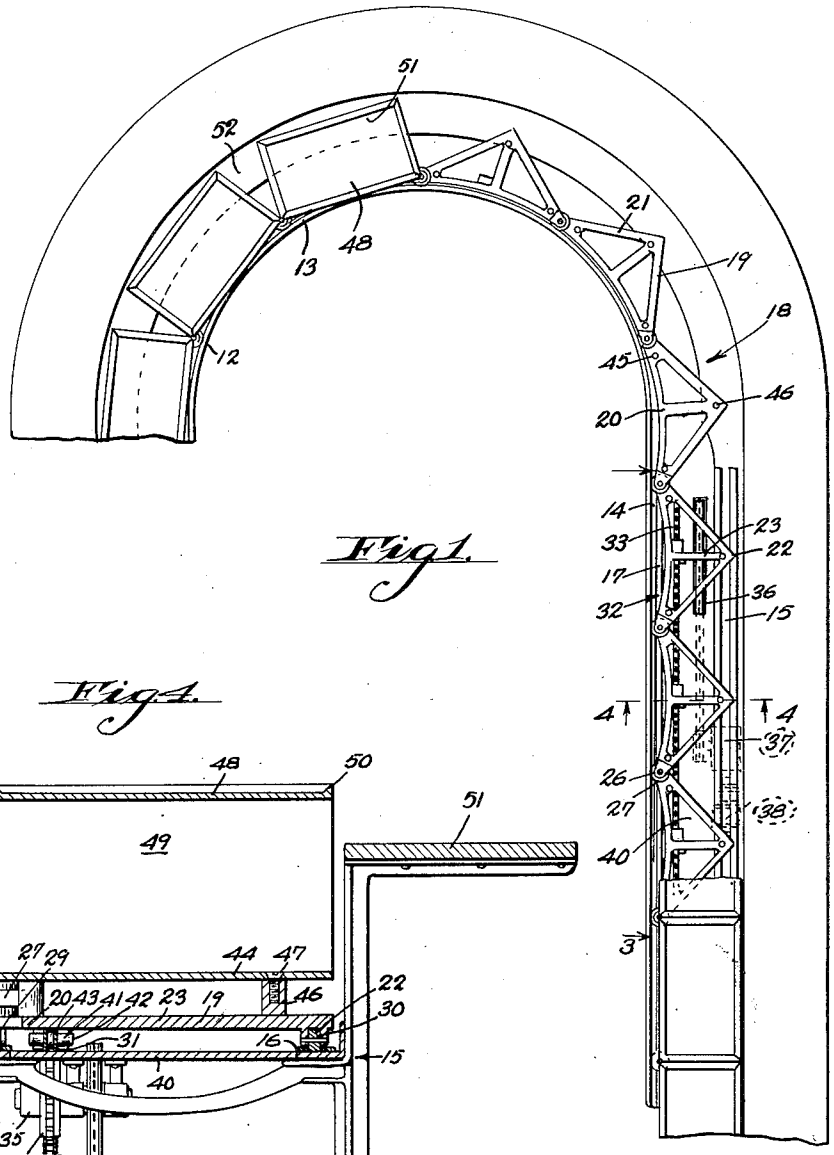
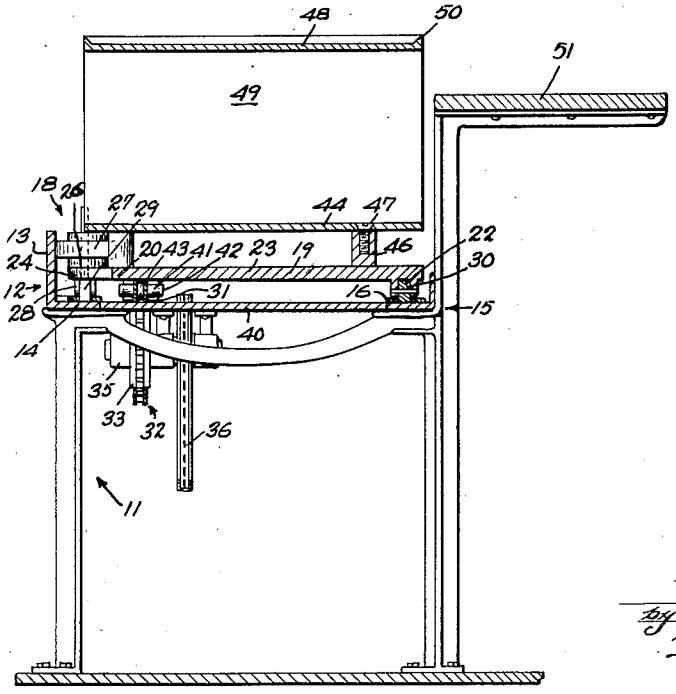


Fig 1.

Fig 4.



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TRAY CONVEYER

Filed Sept. 16, 1930 2 Sheets-Sheet 2

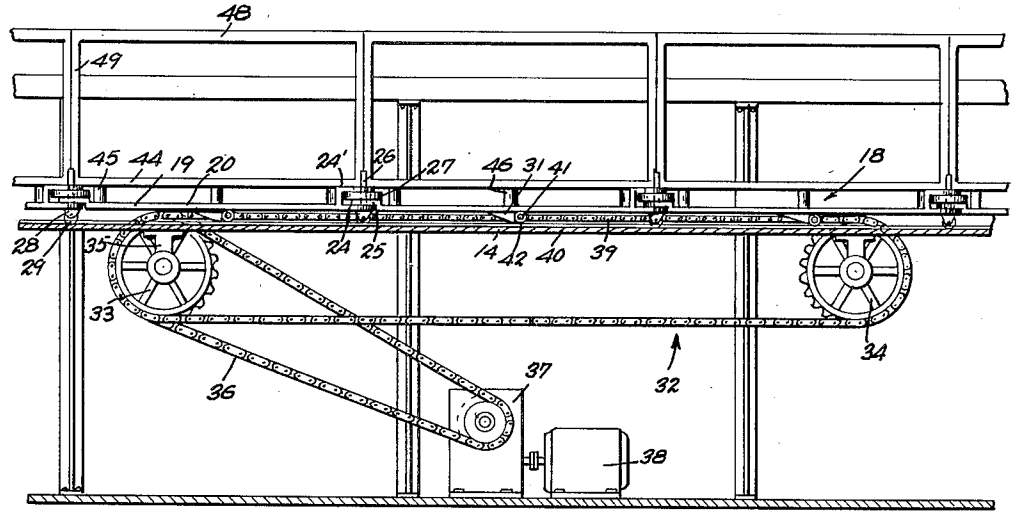


Fig. 3.

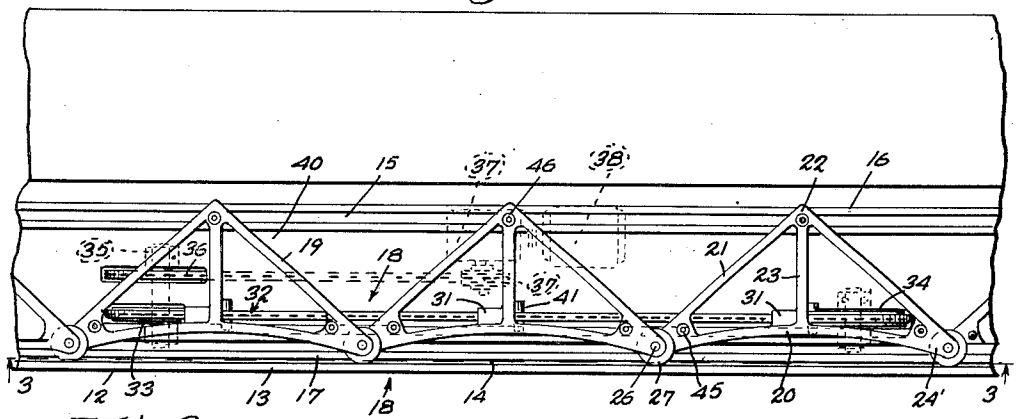


Fig. 2.

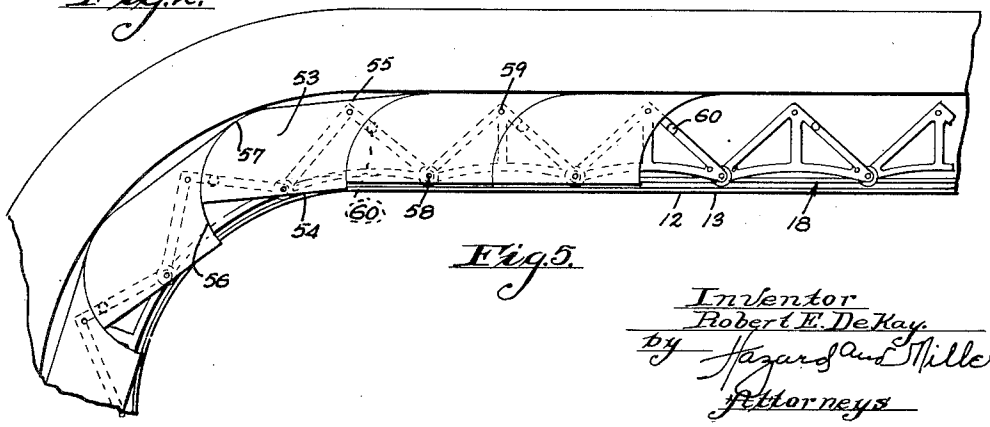


Fig. 5.

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UNITED STATES PATENT OFFICE

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TRAY CONVEYER

Application filed September 16, 1930. Serial No. 482,286.

My invention pertains to a tray conveyer of the type used in certain restaurants in which there is an endless chain of trays on which foods are placed, and the customers seated at long tables remove the different articles of food as they pass by on the trays.

In such type of tray conveyer the drive for the trays has usually been noisy and, therefore, disagreeable to the customers; and, moreover, there has frequently been a binding action at the reverse turns at opposite ends of the conveyer requiring a large amount of power to operate the trays.

An object of my invention is to have the drive for the conveyer comparatively short whereby this may be located in the kitchen or serving compartment and, hence, not be objectionable to the customers. In this connection a further object of my invention is to drive the endless chain supporting the trays by an endless chain drive, this driving chain being driven by an electric motor or other suitable means, preferably through reduction gearing, and to cause the driving chain to react against the conveying chain and to drive such chain with the trays.

A more specific object and feature of my invention is providing the conveyer chain with a series of abutment lugs which may be engaged by driving pins or rollers on the driving chain, being comparatively short and adapted to engage only several links of the conveyer chain.

Another feature of my invention is the employment of triangular links in the conveyer chain, these links being connected together at the corners adjacent the base and having the apex extending outwardly. The links are supported on rollers, one at the apex and one adjacent each of the corners of the base. In this manner of support the individual links ride on the rollers. In addition, there are rollers on the vertical pivot pins connecting the links adjacent the base, and at the turns these rollers which rotate in a horizontal plane bear against the inner vertical rail but it is not necessary for this to bear against the rail on the straight portions of the run. The stresses of these horizontal rollers bearing against the rails at the turn and this being above the plane of the links tends to maintain such links in a horizontal plane without an upward tilt at the turn.

Another detail feature of my invention comprises in one case the form of trays, these being made in the form of a double deck, if desired, the upper being for the food and the lower for the dirty dishes removed by the attendants; and a further detail feature in the form of the trays is in the curved joint, this joint accommodating the curvature of the ends of the conveyer.

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

Fig. 1 is a plan partly broken away of part of the tray conveyer.

Fig. 2 is an enlarged plan with parts broken away showing the driving features of the invention.

Fig. 3 is a vertical, longitudinal section on the line 3—3 of Fig. 2 in the direction of the arrows.

Fig. 4 is a vertical, transverse, enlarged section on the line 4—4 of Fig. 1 in the direction of the arrows.

Fig. 5 is a modified form showing a different type of tray.

In my invention I employ a series of cross frames designated 11 which may be of any suitable type, and on one side there is an inner rail 12, which is illustrated in the form of an angle, having a vertical flange 13 and a horizontal flange 14. On the straight runs there is an outer track 15, also formed of an angle and this is provided on the horizontal flange with guides 16. The flange 14 on the straight portion of the track is also provided with guides 17.

The conveyer chain designated generally at 18 comprises a series of individual links 19. Each link is triangular and may be considered as having a base 20, this base being curved, such curvature conforming with the curved inner rail at the ends. Each link has sides 21 joining at the apex 22. A brace 23 extends between the base and the apex. The links are secured together by providing one end of each link with lower and upper ears 24 and 24', the lower ears being preferably in the base of the link and providing the other

end of the link with an offset top 25 fitted between the ears, there being a pin 26 extending upwardly through the ears and carrying the roller 27 below the upper ear 24' (note Fig. 3). This roller thus rotates on a vertical axis and engages the vertical web 13 of the inner rail.

Substantially directly below each pin 26 on the corners of the triangular links there are a pair of depending lugs 28 having a roller 29 journaled therein, such roller running on the horizontal flange 14 of the angular track 12 and operating between the parallel guides 17 on the straight run. At the apex 22 of each triangular link there is a similarly mounted roller 30, such roller operating on the horizontal flange of the angular track 15 and between the guides 16 on the straight run, but having no guides whatever on the turn.

The drive for the conveyer chain comprises a series of abutment lugs 31 which depend from each link and are positioned adjacent the junction point of the brace 23 and the base 20 of each link. An endless drive chain 32 is operated by a driven sprocket wheel 33 carried by an idler sprocket wheel 34, these being supported in suitable journal brackets 35, the shaft of the drive sprocket being itself driven by a chain or belt drive 36 from a reduction gear 37, which latter is operated by an electric motor 38.

The upper run 39 of the drive chain operates over a board 40 mounted on the transverse frames 11 and such board holds the chain in a horizontal position so that the rollers 41 carried by a pin 42 on outwardly extending lugs 43 on the drive chain engage the lugs 31 on the links of the conveyer chain. The lugs and links are so spaced that they interengage and, hence, the drive chain, which is comparatively short, exerts a complete drive for operating the endless conveyer chain. As above mentioned, as this drive chain is comparatively short it may be located in the kitchen or service department and thus the noise of the drive will not inconvenience the customers and, moreover, such drive is readily accessible for oiling and for observation.

It will be noted that the drive for the conveyer chain is comparatively close to the inner rail 12 and that the outer rollers 30 at the apex of the links are not supported or guided at the turns. While the inner rollers 29 run on the horizontal flange on the inner rail of the turns they are not guided by the parallel guide strips 17. The tension exerted on the triangular links is sufficient to maintain these links in a horizontal position at the turns.

In the illustration shown in Figs. 1 and 4 there is a lower tray 44 which is preferably formed of wood and is supported on two studs 45 which are adjacent the corners of the base of the triangular link, and by a third stud 46 adjacent the apex of the triangular link, these under trays being illustrated as secured to the studs 45 and 46 by screws 47. The upper trays 48 are supported above the lower trays by end boards 49 or the like, and these upper trays are illustrated as having a rim 50 to lessen the danger of the dishes of food falling off the upper tray. It will be noted that this upper tray is slightly above the service and dining table 51 from which the customers may partake their meals. It will be apparent that the upper tray may be supported in any suitable manner from the lower tray. In this illustration the upper and lower trays are illustrated as rectangular so that at the turns there is a V-shaped space 52 formed, but this is no particular inconvenience to customers seated at the end of the table.

In the construction illustrated in Fig. 5 I utilize substantially the same type of conveyer chain with the same type of links and drive, but in this case the individual trays 53. These are provided with inner and outer straight, parallel edges 54 and 55. Each tray at one end has a concave curve 56 and the edge of the adjacent tray is convex, as indicated at 57. These trays are attached to the triangular links by two studs 58 and 59, one being adjacent the pivot point of the links and the other adjacent the apex, and in order to support the overhanging part of each tray there is a stud 60 on each link, which has a sliding motion relative to the tray supported thereon. This sliding motion is comparatively short and the under side of the tray may be protected by a strip of wearing metal. In this type of construction the curvature of the adjacent ends of the trays allows the outer portion adjacent the customers to be completely closed, thus eliminating any danger of the customer having his hand pinched between the adjacent trays, or in the removal of food having this drop between the consecutive trays.

From the above description, together with the drawings, it will be seen that I have developed an efficient type of drive for the endless type of chain conveyer carrying trays in the longer and comparatively short section of drive chain as required, and even if there is a certain amount of wear so that one or more lugs on the conveyer or driving chain carrying most of the load, this is of no consequence whatever as the drive is longer for a short distance and then the load will be carried by other lugs so that the wear will be more or less evenly distributed throughout the whole conveyer.

At the turns the horizontal flange of the outer track 15 is widened to support the outer roller but the guides 16 do not extend around the curve. The guides 17 of the inner track are also omitted at the turn, thus the outer and inner rollers on each link are free to follow the curvature of the tracks. The

horizontal roller 27 mounted on the vertical pivot pin 26 bears on the vertical flange 13 of the inner rail 12 at the turns but this roller does not need to contact with this flange on the straight portions of the track. With my construction there is no tendency of the outer portion of the links with their trays to tilt upwardly at the turn.

One of the features in making the endless chain links triangular in shape is that these may be readily adapted to support opposite sides of the trays carried thereby, one side or edge of the tray being supported on the base and the opposite side at the apex of each link.

Another feature relates to the drive and to the guide means, especially on the curves. In these curves, the bases of the links are adjacent the curved, vertical track and have a roller at the connections between the links positioned, in effect, above the links. Therefore, these rollers tend to prevent an upward tilt of the outer portion of the chain at the curves, that is, at the apex, and thus prevent a tendency for the trays to tilt upwardly on the outer portions at the curved ends of the track.

Another feature of using the triangular links relates to the power drive for only a section of the endless chain, and it will be noted, referring to Figs. 1, 2, and 4 particularly, that this drive connection is adjacent the base of the links. This, therefore, brings the driving force close to the pivots connecting adjacent links, tending to maintain the chain in a straight line and reduce the friction on the lateral guides.

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

I claim:

1. A conveyer having an endless conveyer chain with substantially triangular links connected at the ends of their bases and operating in a horizontal plane with the apexes outwardly, an endless drive chain, and means to interconnect the drive chain and the links of the conveyer chain adjacent the base of such links, the portions of the chains interconnecting being materially less than the total length of the conveyer chain.

2. A conveyer having a conveyer chain formed of triangular links connected at the ends of their bases operating in a horizontal plane, the apexes of the links being outwardly disposed and each link having a supporting roller adjacent its apex and its base, tracks to support said rollers, an endless drive chain, and means to interconnect the drive chain and a relatively short portion of the conveyer chain, said interconnection being adjacent the base of the links.

3. A conveyer having an endless conveyer chain with triangular-shaped links connected at the ends of their bases and adapted to support trays on opposite sides, with their apexes outwardly, tracks to support said links, each link having rollers adjacent the apexes and adjacent links having a roller support adjacent the connection, an endless drive chain having an upper run in proximity to a minor section only of the conveyer chain, and means to interengage said chains adjacent the base of the links to actuate the conveyer chain continuously by the drive chain.

4. A conveyer having an endless conveyer chain with triangular shaped links to support trays on opposite sides operating in a horizontal plane, tracks to support said links, such links being pivotally connected together adjacent their base and having rollers underneath the said pivot and each link having a supporting roller at its apex, an endless drive chain materially shorter than the conveyer chain and having a run in proximity to a small section of the conveyer chain, and means to interconnect said chains adjacent the base of the links to actuate the conveyer chain continuously by the drive chain.

5. A conveyer as claimed in claim 4, the said tracks having guides for the rollers on the straight run of the conveyer chain and a curved, vertical, supporting structure having an engagement with the base of the links at the turns of the conveyer chain.

6. A conveyer having a guide track with a vertical supporting surface, an endless conveyer chain having a series of links, the said links being pivotally connected together at the ends of their base, a roller mounted on the pivot connecting the links and above said links and bearing against the supporting surface of said track, and means to drive the said conveyer chain, said roller preventing the outer portion of the links tilting upwardly.

7. A conveyer having an inner and an outer track, the inner track having a vertical supporting surface, the outer track having a horizontal supporting surface, a conveyer chain having a series of triangular-shaped links to support opposite sides of a tray pivotally connected together at the ends of their base, a horizontal roller on each pivot above each link to engage the vertical supporting surface, each link adjacent the apex having a vertical roller to engage the horizontal supporting surface, and means to continuously operate the conveyer chain, and said horizontal roller preventing the outer portions of the links from tilting up.

8. A conveyer as claimed in claim 7, the inner track having a horizontal supporting surface with rollers on each link adjacent the ends of the base operating on the said surface.

9. A conveyer having an inner and outer supporting track, the inner track having a vertical and a horizontal supporting surface and the outer track having a horizontal supporting surface, said track having straight

runs and connecting curves, an endless conveyer chain formed of a series of links each substantially triangular in shape to support opposite sides of a tray, the links being pivotally connected together adjacent their ends at the base, a roller on each pivot bearing against the vertical surface of the inner track above each link, vertical rollers connected to each link and bearing on the horizontal surface of the inner track, a vertical roller connected to each link at its apex and bearing on the horizotal surface of the outer track, said tracks having guides for the rollers on the straight run, said link operating in a horizontal plane, an endless drive chain having a short run in proximity to a small portion of one of the straight sections of the conveyer chain, means to interconnect adjacent the base of the links, said chains to effect a continuous drive of the conveyer chain from the drive chain.

10. A conveyer as claimed in claim 9, the said links having a plurality of trays mounted thereon, said trays being superposed on each link.

11. In a conveyer an endless conveyer chain having a series of triangular-shaped links pivotally connected together, an upper and a lower tray connected to each link, said chain having a straight run with curved ends, the trays on adjacent links being adapted to meet on the straight run and form an open section on the curves.

12. In a conveyer having an endless conveyer chain with a series of triangular links pivotally connected together and operating on a horizontal plane, a tray secured to each link and having a sliding support on the adjacent link, said trays having curved adjoining edges, said edges forming a sliding joint along the curved portion of the travel of the endless chain.

13. A conveyer having an endless chain with substantially triangular horizontal links connected at their base and with the apexes outwardly, such links being adapted to support trays from the base and the apexes, an endless drive chain having its upper run adjacent the conveyer chain, and means forming an interconnection between the drive chain and the conveyer chain adjacent the base portions of the links, the drive chain engaging only a minor part of the length of the conveyer chain.

14. A conveyer having an endless conveyer chain formed of substantially triangular horizontal links pivotally connected together at the ends of their bases and with their apexes outwardly, said links being adapted to support trays from their bases and apexes on opposite sides of the trays, vertical guide tracks adjacent the bases of the links, with means on the chain to engage such tracks, an endless drive chain having a straight upper run parallel to the conveyer chain, with means to interconnect the drive and the conveyer chain adjacent the base of the links.

15. A conveyer as claimed in claim 14, the means to engage the tracks comprising horizontal rollers mounted on the vertical pivot pins connecting the links, said rollers being above the major portion of the plane of the links and adapted on the curved portions of the track to prevent the apexes of the links from lifting.

16. A conveyer having an endless conveyer chain formed of triangular-shaped links pivotally connected together by vertical pivots adjacent their bases, their apexes being outwardly, a tray supported from each link by a support adjacent the base and adjacent the apex of each link, thereby supporting the trays on opposite sides, horizontal tracks below the links, each link having a vertical roller to operate on the tracks, said rollers being adjacent the bases and the apexes, an endless drive chain having a straight upper run parallel to the conveyer chain, and means to interconnect the drive and conveyer chain adjacent the bases of the lines.

17. A conveyer as claimed in claim 16, the vertical pivots connecting the links each having a horizontal roller thereon, the inner track having a vertical guide surface engaging said rollers, said rollers being positioned above the major portion of each link and preventing the tilting upwardly of the links and the trays at the turns of the conveyer.

In testimony whereof I have signed my name to this specification.

ROBERT E. DE KAY.