

{Description}

{Title of Invention}

Portable Circulating Conveyor Apparatus

{Technical Field}

{0001}

The present invention relates to circulating conveyor apparatuses that circulatingly convey food containers having foods placed thereon, and in particular to a unitized portable circulating conveyor apparatus that is transportable to places such as various special-events spaces and furthermore, easy to install.

{Background Art}

{0002}

Conventional circulating conveyor apparatuses for conveying food products such as sushi are configured such that food products such as various sushi arranged on a plate are placed on the circulating conveyor apparatus from a kitchen set up in a restaurant, and passed in front of customers who pick and take dishes on the circulating conveyor apparatus according to their preferences; the apparatuses have an advantage in that customers can readily take foods such as fresh sushi according to their preferences.

{0003}

Such conventional circulating conveyor apparatuses for conveying food products, however, have been large in installations and also complex in construction because they are designed to assume that customers go out to restaurants to take food products.

{0004}

On the other hand, in various special events where a great many people gather, a conventional system that serves host-prepared meals to guests has a problem in that food products, which are uniform and standardized, do not satisfy an individual preference, nor do preserve their freshness because of previously placed orders and thus, food products requiring preservation of freshness, such as sushi, are not allowed to be served.

{0005}

In these days, also in special events where a great many people gather, the demand for an ordering system grows high in which food products are served at the special-events space according to an individual person's order. In terms of one method for meeting this demand, attention is paid to a method in which a circulating conveyor apparatus for conveying food products is installed at a special-events space to serve, according to the preferences of attendees, foods such as various sushi arranged on a plate with them placed on the

circulating conveyor apparatus.

{0006}

For this reason, a portable conveyor apparatus has been proposed which is capable of serving food products according to the preferences of a great many people, at the same degree of freshness as that of what is taken at a sushi restaurant, at a place such as party (hereinafter, referred to as "related art," and refer to, for example, Patent Document 1).

{Citation List}

{Patent Document}

{0007}

Patent Document 1: JP-UM-H05-26910 (page 2 and Fig. 1)

{Summary of Invention}

{Problems To Be Solved By Invention}

{0008}

The above described related art has a driving mechanism that circulates an endless conveyor; a locking means that locks frame bodies for guiding the conveyor, separated at least in a curved track, together on side faces of the bodies; and stretching means, provided in an unused space in an inner circumference of the frame body, that stretches the endless conveyor. The stretching means is constituted of an

adjustment plate that comes into contact with a crescent chain coupled to the bottom face of the conveyor, and a knob that enables the adjustment plate to be relatively moved relative to a main body, wherein the rotation of the knob enables the length of the chain to be adjusted.

{0009}

However, a problem with the related art is that because stretching means is provided in an unused space in an inner circumference of the frame body, the stretching means needs to be operated by inwardly extending a user's hand from the outside of the frame body, resulting in difficult operation of the apparatus.

{0010}

Further, in tension adjustment of the crescent chain according to the related art, because the construction is such that only the crescent chain coupled to the bottom face of the conveyor are moved and the frame body where a groove for guiding the crescent chain is provided therein remains positioned as it is, misalignment occurs in the relationship between the crescent chain and the groove, resulting in the possibility of the crescent chain being improperly guided. Another problem therewith has been that an adjusting margin for the length of the crescent chain cannot be made large.

{0011}

Embodiments of the present invention are made in view of such problems, and seek to provide, in a unitized portable circulating conveyor apparatus that is transportable and easy to install, a portable circulating conveyor apparatus that provides easy and positive tension adjustments of a crescent chain and in which the tension adjusting margin is unrestricted.

{Means for Solving the Problems}

{0012}

A portable circulating conveyor apparatus according to an aspect of the present invention comprises, in a unitized portable circulating conveyor apparatus that includes a circulating conveyor track, a circulating conveyor track unit that constitutes the circulating conveyor track, the track unit including a straight conveyor track section, a drive unit including a curved conveyor track section and connected to one side of the straight conveyor track section, a driving mechanism and a base, and a driven unit including a curved conveyor track section and connected to the other side of the straight conveyor track section, a driven mechanism and a base, wherein the curved conveyor track section, and the driven mechanism, of the driven unit are connected relatively movably in the direction of a straight conveyor track relative to the straight conveyor track section, and wherein the driven unit is provided with a clamper

device that prevents or allows relative movement of the curved conveyor track section and the driven mechanism relative to the base. The clamper device is a device, attached to an expansion mechanism, that includes a cylindrical outer member, and an inner member that is assembled so as to be linearly extendable from and retractable to the inside of the outer member. The clamper device includes a clamp mechanism, disposed within the outer member, that prevents relative movement in at least one of two directions in which the inner member extends and retracts relative to the outer member, and an unclamp mechanism that disables a function of the clamp mechanism which prevents relative movement of the inner member relative to the outer member and then enables the relative movement of the inner member relative to the outer member, wherein the outer member is fixedly attached to the base of the driven unit, and the inner member is fixedly attached to the curved conveyor track section of the driven unit and disposed so as to be operable from an outer circumferential side of the curved conveyor track section and not to project from the curved conveyor track section.

According to the example embodiments, a portable circulating conveyor apparatus can be provided in which tension adjustment of a crescent chain is easy and positive, and the size of the tension adjusting margin is not restricted.

{0013}

The portable circulating conveyor apparatus according to embodiments of the present invention is characterized in that a fitting recess and a magnetic material portion are provided at both ends of the straight conveyor track section, and the protrusion that fits into the recess and a magnet catcher are provided at a portion of the base of each of the drive unit and the driven unit, the portion being located toward the straight conveyor track section to which each base thereof is connected.

According to the example embodiments, the connection and disengagement of the straight conveyor track section relative to the drive unit and the driven unit can be made very easily, and the portable circulating conveyor apparatus can be reduced in weight because of elimination of the need of separately prepared connection members for connecting the track to the units.

{0014}

According to the example embodiments, in addition to the fact that the tension adjustment of the crescent chain is easy and positive and the size of the tension adjusting margin is not restricted, the clamper device does not project from the driven unit, and thus there is no obstacle to handle the portable

circulating conveyor apparatus, allowing for reduction in size of the apparatus.

{Brief Description of Drawings}

{0015}

{Fig. 1} Fig. 1 is a view showing an overall configuration of a unitized portable circulating conveyor apparatus in an embodiment according to the present invention; Fig. 1 (a) is a plan view thereof; Fig. 1 (b), a front view thereof; and Fig. 1 (c), an A-A cross-section thereof.

{Fig. 2} Fig. 2 is an illustrative diagram for illustrating a straight conveyor track section of the portable circulating conveyor apparatus; Fig. 2 (a) is a plan view thereof; Fig. 2 (b), a B-B cross-section thereof; Fig. 2 (c), a C-C cross-section thereof; and Fig. 2 (d), a D-D cross-section thereof.

{Fig. 3} Fig. 3 is an illustrative diagram for illustrating a drive unit of the portable circulating conveyor apparatus; Fig. 3 (a) is a plan view thereof; Fig. 3 (b), a front view thereof; Fig. 3 (c), a side view thereof; and Fig. 3 (d), an E-E cross-section thereof.

{Fig. 4} Fig. 4 is an illustrative diagram for illustrating a driven unit of the portable circulating conveyor apparatus; Fig. 4 (a) is a plan view thereof; Fig. 4 (b), a front view thereof; and Fig. 4 (c), a side view thereof.

{Fig. 5} Fig. 5 is an illustrative diagram for illustrating a joint base that connects the straight conveyor track sections together; Fig. 5 (a) is a plan view thereof; and Fig. 5 (b), a side view thereof.

{Fig. 6} Fig. 6 is an illustrative diagram for illustrating a crescent chain for use in the portable circulating conveyor apparatus; Fig. 5 (a) is a plan view thereof; and Fig. 5 (b), a front view thereof.

{Fig. 7} Fig. 7 is an illustrative diagram for illustrating one example of a clamper device fitted to the driven unit.

#### {Description of Embodiments}

{0016}

An embodiment for a unitized portable circulating conveyor apparatus according to the present invention will be described below.

{Embodiment}

{0017}

The unitized portable circulating conveyor apparatus according to the embodiment of the present invention will be described with reference to Figs 1 through 7.

{0018}

An overall configuration of the unitized portable circulating conveyor apparatus with its assembling completed

will first be described with reference to Fig. 1.

{0019}

Note that an illustration for a crescent chain 40 to be described later is not provided in Fig. 1. In a portable circulating conveyor apparatus 1, a circulating conveyor track unit 2 that constitutes a circulating conveyor track comprises mainly a straight conveyor track section 10; a drive unit 20 including a curved conveyor track section 21 bent and connected to one side of the straight conveyor track section 10, a driving mechanism 22 (refer to Fig. 3 for the drive mechanism 22) and a base 23; and a driven unit 30 including a curved conveyor track section 31 bent and connected to the other side of the straight conveyor track section 10, a driven mechanism 32 (refer to Fig. 4 for the driven mechanism 32) and a base 33.

Note that for the straight conveyor track section 10, the same two straight conveyor track sections are disposed in two rows in parallel (two rows are each disposed in the upward and downward directions in Fig. 1 (a)), at each of which longitudinal row ends the curved conveyor track sections 21 and 31 are connected to the straight conveyor track sections, but one of the straight conveyor track sections 10 will be described for brevity of description.

{0020}

Cross-sections of the straight conveyor track section

10 and the curved conveyor track sections 21, 31 are made up of guide rails 10a, 21a and 31a formed into shapes as shown in Fig. 1 (c) so that the crescent chain 40 to be described later (refer to Fig. 6) may be placed on the straight conveyor track section 10 and the curved conveyor track sections 21, 31; the crescent chain 40 (refer to Fig. 6) to be described later is placed on these guide rails 10a, 21a and 31a. The crescent chain 40, which is driven by a drive means to be described later is configured or designed to be caused to circulate, for example, clockwise, thereby causing sushi to circulate, the sushi being placed on a sushi plate serving as a food product placing container placed on the crescent chain 40.

Note that the circulating conveyor means may use, not limited to the crescent chain, a conveying member such as a roller-type conveyor.

{0021}

The curved conveyor track section 31 and the driven mechanism 32 of the driven unit 30 are relatively movably connected to the straight conveyor track section 10 in the left and right straight directions as shown in arrows. The driven unit 30 is provided with a clamper device 50 that prevents or allows relative movement of the curved conveyor track section 31 and the driven mechanism 32 relative to the base 33.

{0022}

Because of this, a portable circulating conveyor apparatus can be provided in which tension adjustment of the crescent chain 40 to be described later (refer to Fig. 6) is made easily and positively, and the tension adjusting margin is unrestricted.

{0023}

Referring to Fig. 2, cross-sectional shapes for the guide rails 10a, 21a and 31a of the straight conveyor track section 10, the curved conveyor track 21 of the drive unit 20, and the curved conveyor track section 31 of the driven unit 30, will be described by exemplifying the guide rail 10a.

{0024}

The guide rail 10a is formed of a long member made of a metal plate such as a thin stainless steel plate; formed in an upper portion of the rail is a first groove 11 that is upwardly open, of substantially rectangular C-shape, and shallow in depth; and formed in the central portion in the crosswise direction of the bottom of this first groove is a likewise upwardly open, of substantially rectangular C-shape, a second groove 12 that is recessed downwardly. On both end sides in the crosswise direction of the guide rail 10a, upwardly projecting, hollow, trapezoidal projection portions 9, 9 are each formed of a rising face of the first groove 11, a face

extending in the crosswise direction outwardly from the rising face, and a side wall 13. A bottom 15 of the guide rail 10a is substantially flat.

As shown in Fig. 2, in the bottom on both sides of the guide rail 10a of the straight conveyor track section 10 in the longitudinal direction, fitting recesses 14, 14 are provided on opposing sides in the crosswise direction relative to the center second groove 12. On the other hand, as shown in Figs. 3 and 4, protrusions 24, 24 and 34, 34 that fit into the recesses 14, 14 are provided at a portion of each of the bases 23, 33 of the drive unit 20 and the driven unit 30, the portion being located toward the straight conveyor track section 10 to which each base thereof is connected. A bottom face 15a between the two recesses 14, 14 is made of a magnetic material. Further, magnet catchers 25, 35 are provided between the protrusions 24, 24 and between the protrusions 34, 34, as will be described later.

{0025}

This allows for very easy connection and disengagement of the straight conveyor track section 10 relative to the drive unit 20 and the driven unit 30, and allows for reduction in weight of the portable circulating conveyor apparatus because of elimination of the need of separately prepared connection members for connecting the track to the units.

{0026}

As shown in Fig. 1, in the present embodiment, the straight conveyor track section 10 is configured by the two guide rails 10a connected in series. The two guide rails 10a are of the same construction, and the fitting recesses 14, 14 are provided in their bottoms on both longitudinal sides.

{0027}

Note that whether the straight conveyor track section 10 is formed of one guide rail, or alternatively, of two or more of the guiderails connected in series, is determined as a matter of design choice based on a factor such as the length of the straight conveyor rack 10.

{0028}

In situations where the straight conveyor track section 10 is configured by connecting the two guide rails 10a in series, a joint base 8 is placed at joints of the two guide rails 10a, 10a, as shown in Figs 1 and 5.

{0029}

The joint base 8, which is substantially rectangular in shape, is formed so as to support the two straight conveyor track sections 10, 10 disposed in parallel. As shown in Fig. 5, on the top face of the joint base 8, projection portions 16, 16 that fit into the recesses 14, 14 of the two guide rails 10a are provided on both sides of the joint base relative to

a center line O.

{0030}

Additionally, between the projection portions 16, 16, magnet catchers 17, 17 are provided on the sides of the joint base to which the straight conveyor track sections 10, 10 are connected, and magnetically coupled to the bottom face 15a of the straight conveyor track section 10. The magnet catcher 17, which includes, for example, fastening screws 19 on both sides of a cover member 18 containing a thin permanent magnet, are fixedly attached via the fastening screws 19 to the joint base 8, and magnetically coupled to the bottom face 15a, made of a magnetic material, between the recesses 14, 14 of the guide rail 10a.

{0031}

Note that the shape of the magnet catcher 17 is not limited to a particular one, but the point is that it may be any one that attracts the magnetic material.

{0032}

Referring to Fig. 3, the drive unit 20 will next be described.

{0033}

The drive unit 20 is constituted of mainly, the curved conveyor track section 21, the driving mechanism 22 and the base 23. A guide rail 21a of the curved conveyor track 21 is

placed on and fixedly supported by the base 23. The cross-section shape of the guide rail 21a is the same as that of the above described guide rail 10a, and includes the first groove 11 and the second groove 12. The driving mechanism 22 includes a sprocket 26 and an electric motor 27 that drive the crescent chain 40 to be described later. The sprocket 26 is horizontally placed above the base 23 so as to rotate about the curvature center O, is configured or designed to be driven by the electric motor 27, to thereby drive the crescent chain 40.

{0034}

The base 23 is of planar shape slightly smaller than that of the guide rail 21a, and the portion of the base which is connected to the guide rail 10a of the straight conveyor track section 10 is projected from the guide rail 21a. On the top face of the projection portion, designated by 23a, the protrusions 24, 24 that fit into the recesses 14, 14 of the guide rail 10a are provided. And a magnet catcher 25 is provided between the protrusions 24, 24. The magnet catcher 25, which is the same as the above described magnet catcher 17, is fixedly attached via fastening screws to a projection portion 23a of the base 23 and magnetically coupled to the bottom face 15a, made of the magnetic material, between the recesses 14, 14 of the guide rail 10a.

{0035}

Referring to Fig. 4, the driven unit 30 will next be described.

{0036}

The driven unit 30 is constituted of mainly, the curved conveyor track section 31, the driven mechanism 32 and the base 33.

{0037}

A guide rail 31a of the curved conveyor track section 31 is constituted of a stationary portion 31a-1 located toward the straight conveyor track section 10 and a movable portion 31a-2 located opposite the straight conveyor track section 10. The stationary portion 31a-1 is placed on and fixedly attached to the base 33. The movable portion 31a-2 is placed on the base 33 and relatively movably supported thereon via a slide rail assembly 36. The cross-section shape of the guide rail 31a is the same as that of the above described guide rail 10a, and includes the first groove 11 and the second groove 12.

{0038}

On the side face of the stationary portion 31a-1 which faces the movable portion 31a-2, on both sides in the crosswise direction, rods 37, 37 are provided to and protrude from the stationary portion. Guide bores 38, 38 are provided in the movable portion 31a-2 so as to correspondingly receive these

rods 37, 37. The fit of the rods 37, 37 in the guide bores 38, 38 ensures movement of the movable portion 31a-2 in a predetermined direction.

As shown in Fig. 4 (c), the slide rail assembly 36 is constituted of, for example, a pair of guide plates 36a, 36a extending downwardly from the movable portion 31a-2, rollers 36b, 36b having the axis perpendicular relative to the guide plates 36a, 36a as a rotation axis, and cross-sectional rectangular C-shaped guide rails 36c, 36c that is provided in the base 33 and configured to house the rollers 36b, 36b. This restricts movement of the movable portion 31a-2 in a direction other than its movement direction, achieving smooth movement with less friction.

{0039}

The driven mechanism 32 includes a driven sprocket 39, which drives the crescent chain 40 to be described later in cooperation with the sprocket 26 of the drive unit 20. The driven sprocket 39 is fitted to the movable portion 31a-2 of the guide rail 31a and disposed horizontally so as to rotate about the curvature center O.

{0040}

Thus, if the movable portion 31a-2 of the guide rail 31a is moved to, for example, a side opposite to the drive unit 20, then the driven sprocket 39 is also moved in a similar

fashion, allowing the crescent chain 40 to be tensioned.

{0041}

The base 33 is of planar shape slightly smaller than that of the guide rail 31a, and the portion of the base which is connected to the guide rail 10a of the straight conveyor track section 10 is projected from the guide rail 31a. On the top face of the projection portion, designated by 33a, the protrusions 34, 34 that fit into the recesses 14, 14 of the guide rail 10a are provided. And a magnet catcher 35 is provided between the protrusions 34, 34. The magnet catcher 35, which is the same as the above described magnet catcher 17, is fixedly attached via fastening screws to the protrusion 33a of the base 33 and magnetically coupled to the bottom face 15a, made of the magnetic material, between the recesses 14, 14 of the guide rail 10a.

{0042}

Provided to the base 33 of the driven unit 30 is the clamper device 50 that prevents or allow relative movement of the movable portion 31a-2 of the guide rail 31a and the driven sprocket 39 relative to the base 33. The clamper device 50 will be described later in detail.

{0043}

Referring to Fig. 6, the crescent chain 40 will next be described.

{0044}

The crescent chain 40 includes a chain section having a large number of links 41 continuously linked together in a circular fashion, and a substantially crescent-shaped tray plate 42 provided on the top end of each link 41.

{0045}

Referring to Fig. 7, one example of the clamper device 50 will next be described, and it should, of course, be understood that the clamper device 50 according to the present invention is not limited to that shown in Fig. 7.

{0046}

As shown in Fig. 4, the clamper device 50, which is fitted to the base 33 of the driven unit 30, prevents or allows relative movement of the movable portion 31a-2 of the guide rail 31a and the driven sprocket 39 relative to the base 33. The device is operable from the outer circumference side of the curved conveyor track section 31, and is disposed so as not to project from the curved conveyor track section 31.

{0047}

Further, an inner member 52 is fixedly attached via a holder 54 to the movable portion 31a-2 of the guide rail 31a.

In addition, a spacer collar 86 is fitted in a space between opposing retainers 62, 62 for a pair of clamp mechanisms 60a, 60b. Thus, while the spacer collar 86 keeps the retainers

62, 62 spaced apart from each other at a predetermined distance, the retainers are to be securely fastened by a fastening screw 85 with them axially sandwiched by a first fastening ring 81 and a second fastening ring 83.

An unclamp mechanism 70, which is engaged with taper cores 63, 63 of each of the clamp mechanisms 60a, 60b, includes an unclamp pin 71 capable of moving the taper cores 63, 63 against biasing force of springs 87, 87; an unclamp knob 72 disposed at an exposed portion of the inner member 52 to be located outside an outer member 51; and an unclamp rod 73 that links between the unclamp pin 71 and the unclamp knob 72. The unclamp rod 73 is inserted into the inner member 52.

Operation of the clasper device 50 according to the present invention will next be described.

In situations where the device is extended, the unclamp knob 72 is caused to move rightward (which refers to the right direction in Fig. 7, and the same applies hereinafter). Then, the unclamp pin 71 is moved rightward via the unclamp rod 73, causing the taper core 63 of one clamp mechanism 60b to move rightward, thereby releasing the lock. If extended in this condition, then the device can be smoothly extended, and its extension action can be done with a single hand of a user.

If the unclamp knob 72 is released from the user's hand, then the unclamp pin 71 is pushed backward by the spring force

of the spring 87, returning the clasper device to its clamped condition.

In situations where the device is retracted, the unclamp knob 72 is caused to move leftward (which refers to the left direction in Fig. 7, and the same applies hereinafter). Then, the unclamp rod 73 moves leftward via the unclamp pin 71, causing the taper core 63 of one clamp mechanism 60a to move leftward, thereby releasing the lock. The device, if retracted in this condition, can be smoothly retracted, and its retraction action can be done by a single hand of the user.

If the unclamp knob 72 is released from the user's hand, then the unclamp pin 71 is pushed backward by the spring force of the spring 87, returning the clasper device to its clamped condition.

{0048}

The recesses 14, 14 at the right end of the two guide rails 10a disposed between the joint base 8 and the drive unit 20, are next fitted to the protrusions 24, 24 of the projection portion 23a provided on the base 23 of the drive unit 20. Further, the recesses 14, 14 at the left end of the two guide rails 10a are fitted to protrusions 16, 16 of the joint base 8.

{0049}

In addition, the recesses 14, 14 at the left end of the

two guide rails 10a disposed between the joint base 8 and the driven unit 30 are fitted to the protrusions 34, 34 of the projection portion 33a provided on the base 33 of the driven unit 30. Further, the recesses 14, 14 at the right end of the two guide rails 10a are fitted to the protrusions 16, 16 of the joint base 8. This completes the joint work of the circulating conveyor track unit 2.

{0050}

As described above, jointing the straight conveyor track section 10, the drive unit 20 and the driven unit 30 together is a simple work because the jointing is made in a protrusion/recess engagement. Further, in terms of the joint between the straight conveyor track section 10 and the drive unit 20 and that between the straight conveyor track section 10 and the driven unit 30, misalignment in the crosswise direction is prevented by the engagement of the protrusion with the recess. Moreover, misalignment in the upward and downward direction is prevented by the magnetic coupling between the bottom face 15a, made of the magnetic material, located between the recesses 14, 14 of the guide rail 10a and the magnetic catcher 35 each provided in the joint base 8, the drive unit 20 and the driven unit 30.

{0051}

The unclamp knob 72 of the clamber device 50 is next caused

to move rightward, and the unclamp pin 71 is caused to move rightward via the unclamp rod 73. And the lock of one clamp mechanism 60b is released, causing the inner member 52 to extend, thereby properly tensioning the crescent chain 40. If the unclamp knob 72 is released from the hand of the user, then the unclamp pin 71 is pushed backward by the spring force of the spring 87 and the device returns to its clamped condition, thereby allowing the crescent chain 40 to be maintained in proper tension.

{0052}

And the rotation of the electric motor 27 causes the crescent chain 40 to rotate along the grooves of the rails. In this situation, for example, by placing sushi arranged on a plate on the tray plate 42, the portable circulating conveyor apparatus according to the present invention can be utilized for the rotary sushi purpose.

{0053}

The portable circulating conveyor apparatus according to the present embodiment, configured as described above, has the following operation and advantageous effects.

{0054}

In the unitized portable circulating conveyor apparatus 1 that includes a circulating conveyor track, the circulating conveyor track unit 2 that constitutes the circulating conveyor

track includes the straight conveyor track section 10; the drive unit 20 including the curved conveyor track section 21 bent and connected to one side of the straight conveyor track section 10, the driving mechanism 22 and the base 23; and the driven unit 30 including the curved conveyor track section 31 bent and connected to the other side of the straight conveyor track section 10, the driven mechanism 32, and the base 33. The driven unit 20 is relatively movably connected in the direction of the straight conveyor track relative to the straight conveyor track section 10. The driven unit 20 is provided with the clamber device 50 that prevents or allows relative movement of the curved conveyor track section 31 relative to the base 33, whereby the portable circulating conveyor apparatus 1 can be provided which ensures easy and positive tension adjustment of the crescent chain 40 and does not restrict the size of the tension adjusting margin.

{0055}

In the portable circulating conveyor apparatus 1, the fitting recesses 14 and the magnetic material portion 15a are provided on both ends of the straight conveyor track section 10, and the protrusions 24, 34 that fit into the recesses 14 and the magnet catchers 25, 35 are provided at a portion of each of the bases 23, 33 of the drive unit 20 and the driven unit 30, the portion being located toward the straight conveyor

track section to which each base thereof is connected, thereby allowing for very easy connection and disengagement of the straight conveyor track section 10 relative to the drive unit 20 and the driven unit 30, and allowing for reduction in weight of the portable circulating conveyor apparatus 1 because of elimination of the need of separately prepared connection members for connecting the track to the units. In addition, relative movement between the straight conveyor track section 10 and the driven unit 30 can be made positively and steadily in the condition in which the magnetic attractive force is exerted.

{0056}

The clasper device 50 of the portable circulating conveyor apparatus 1 is a clasper device, attached to an expansion mechanism, that includes the cylindrical outer member 51, and the inner member 52 that is assembled so as to be linearly extendable from and retractable to the inside of the outer member 51. The clasper device includes the clamp mechanism 60, disposed within the outer member 51, that prevents relative movement in at least one of two directions in which the inner member 52 extends and retracts relative to the outer member 51, and the unclamp mechanism 70 that disables a function of the clamp mechanism 60 which prevents relative movement of the inner member 52 relative to the outer member

51 and then enables the relative movement of the inner member 52 relative to the outer member 51. The outer member 51 is fixedly attached to the base 33 of the driven unit 30, and the inner member 52 is fixedly attached to the curved conveyor track section 31 of the driven unit 30 and disposed so as to be operable from an outer circumferential side of the curved conveyor track section 31 and not to project from the curved conveyor track section 31, whereby in addition to the fact that the tension adjustment of the crescent chain 40 is easy and positive and the size of the tension adjusting margin is not restricted, the clamper device 50 does not project from the driven unit 30, and thus there is no obstacle to handle the portable circulating conveyor apparatus 1, allowing for reduction in size of the portable circulating conveyor apparatus 1.

{0057}

In the forgoing description, the embodiment according to the present invention has been described with reference to the drawings. However, for specific configurations the present invention is not limited to the embodiment and includes possible modifications and additions that do not depart from the spirit and the scope of the invention.

{0058}

In the present embodiment, for example, the straight conveyor track section 10 is formed of two guide rails connected

in series, and whether the straight conveyor track section 10 is formed of one guide rail, or alternatively, of two or more of the guide rails connected in series is determined as a matter of design choice based on a factor such as the length of the straight conveyor track section 10. In situations where it is formed of one guide rail, the joint base 8 may be deleted.

{0059}

Further, in the present embodiment, a circulating conveyor means employs, for example, a crescent chain, but may use, not limited to the crescent chain, a conveying member such as a roller-type conveyor.

{0060}

Moreover, in the present embodiment, for example, the magnetic material portion 15a is provided to the straight conveyor track section 10, while the magnet catchers 25, 35 are provided to the drive unit 20 and the driven unit 30, but the invention is not limited to these arrangements, and the magnet catchers may be provided to the straight conveyor track section 10 and the magnetic material portion may be provided to the drive unit 20 and the driven unit 30.

{0061}

Additionally, in the present embodiment, for example, what is shown in Fig. 7 is given as the clamper device 50, but an illustration shown in Fig. 7 is merely an exemplary one,

and it should, of course, be understood that another known clamper device is applicable to the device 50. In brief, any suitable device may be used that can move the driven sprocket 39 of the driven unit 30.

{REFERENCE SIGNS}

{0062}

- 1 Portable circulating conveyor apparatus
- 2 Circulating conveyor track unit
- 8 Joint base
- 9 Trapezoidal projection portion
- 10 Straight conveyor track section
- 10a Guide rail
- 11 First groove
- 12 Second groove
- 13 Side wall
- 14 Recess
- 15 Bottom
- 15a Bottom face made of a magnetic material
- 16 Protrusion
- 17 Magnet catcher
- 18 Cover member
- 19 Fastening screw
- 20 Drive unit
- 21 Curved conveyor track section

21a Guide rail  
22 Driving mechanism  
23 Base  
23a Projection portion  
24 Protrusion  
25 Magnet catcher  
26 Sprocket  
27 Electric motor  
30 Driven unit  
31 Curved conveyor track section  
31a Guide rail  
31a-1 Stationary portion  
31a-2 Movable portion  
32 Driven mechanism  
33 Base  
34 Protrusion  
35 Magnet catcher  
36 Slide rail assembly  
37 Rod  
38 Guide bore  
39 Driven sprocket  
40 Crescent chain  
41 Link  
42 Tray plate

43 Upper Plate  
44 Lower plate  
45 Pin  
50 Clamper device  
51 Outer member  
52 Inner member  
53 Holder  
54 Holder  
60 Clamp mechanism  
61 Rolling element  
62 Retainer  
63 Taper core  
70 Unclamp mechanism  
71 Unclamp pin  
72 Unclamp knob  
73 Unclamp rod  
80 Assembly guide  
81 First fastening ring  
82 Guide shaft  
83 Second fastening ring  
84 Fastening screw  
85 Fastening screw  
86 Spacer collar  
87 Spring

{Claims}

{Claim 1}

In a unitized portable circulating conveyor apparatus that includes a circulating conveyor track, a portable circulating conveyor apparatus comprising:

a circulating conveyor track unit that constitutes the circulating conveyor track, the track unit including

a straight conveyor track section,

a drive unit including a curved conveyor track section and connected to one side of the straight conveyor track section, a driving mechanism and a base, and

a driven unit including a curved conveyor track section and connected to the other side of the straight conveyor track section, a driven mechanism and a base,

wherein the curved conveyor track section, and the driven mechanism, of the driven unit are connected relatively movably in the direction of a straight conveyor track relative to the straight conveyor track section,

wherein the driven unit is provided with a clamper device that prevents or allows relative movement of the curved conveyor track section and the driven mechanism relative to the base,

wherein the clamper device is a device, attached to an expansion mechanism, that includes a cylindrical outer member,

and an inner member that is assembled so as to be linearly extendable from and retractable to the inside of the outer member,

the clamper device including

a clamp mechanism, disposed within the outer member, that prevents relative movement in at least one of two directions in which the inner member extends and retracts relative to the outer member, and

an unclamp mechanism that disables a function of the clamp mechanism which prevents relative movement of the inner member relative to the outer member and then enables the relative movement of the inner member relative to the outer member,

wherein the outer member is fixedly attached to the base of the driven unit, and the inner member is fixedly attached to the curved conveyor track section of the driven unit and disposed so as to be operable from an outer circumferential side of the curved conveyor track section and not to project from the curved conveyor track section.

{Claim 2}

The portable circulating conveyor apparatus according to claim 1,

wherein a fitting recess and a magnetic material portion are provided at both ends of the straight conveyor track section,

and

wherein a protrusion that fits into the recess and a magnet catcher are provided at a portion of the base of each of the drive unit and the driven unit, the portion being located toward the straight conveyor track section to which each base thereof is connected.