Feb. 13, 1962 C. J. HEINRICH ETAL 3,020,993

BALL TRANSFER TABLES

Filed April 5, 1960 3 Sheets-Sheet 1

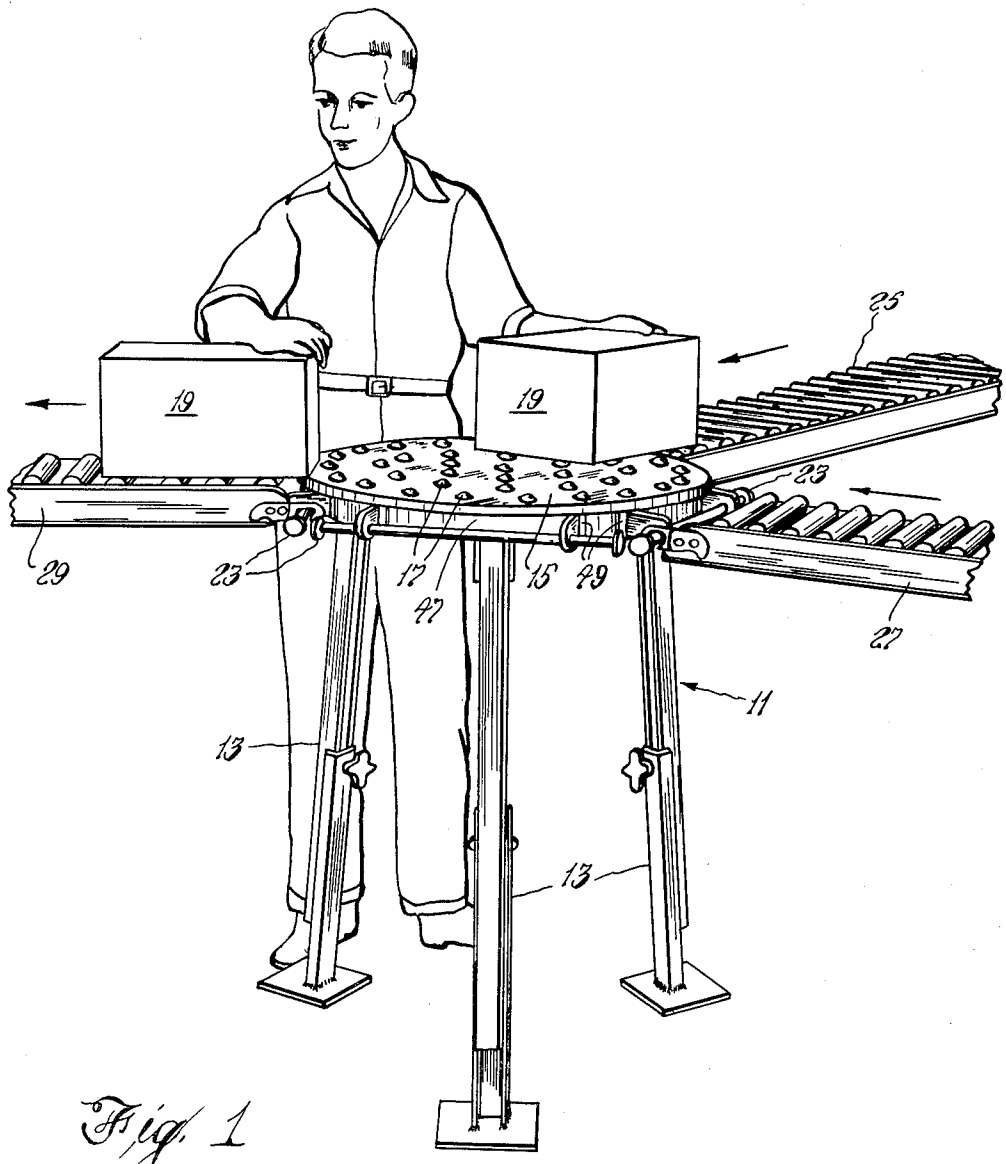

Fig. 1

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Feb. 13, 1962 C. J. HEINRICH ETAL 3,020,993

BALL TRANSFER TABLES

Filed April 5, 1960 3 Sheets-Sheet 2

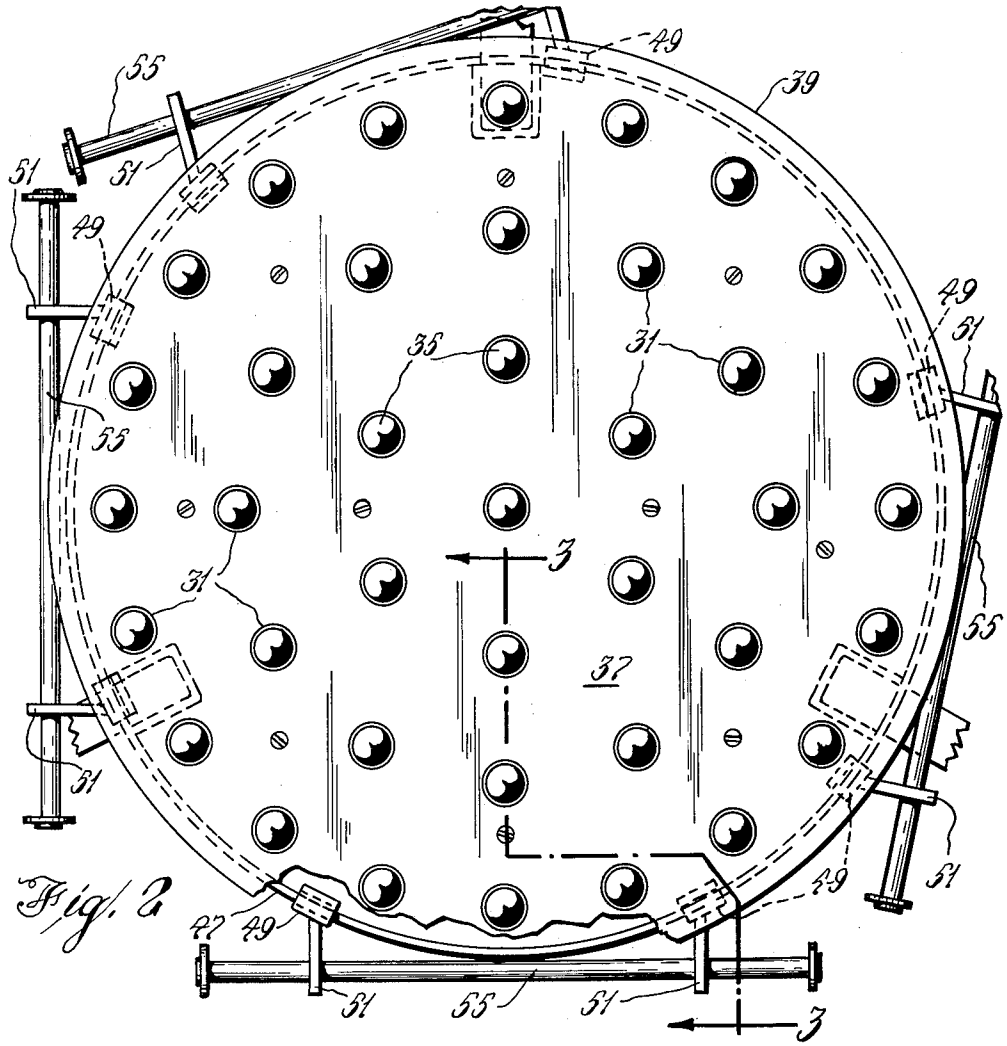

Fig. 2

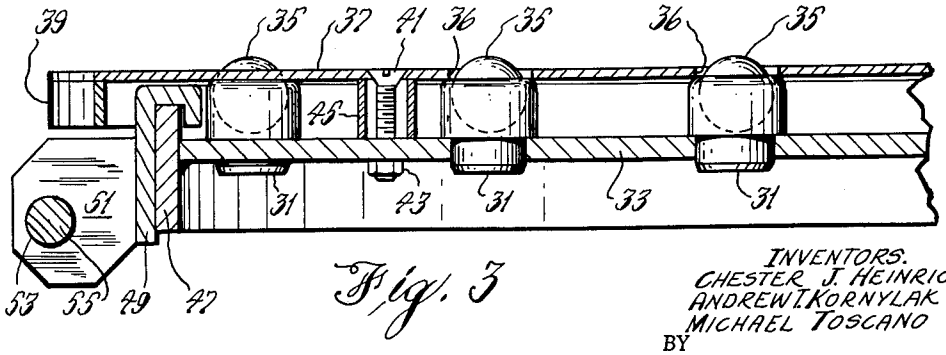

Fig. 3

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Feb. 13, 1962 C. J. HEINRICH ETAL 3,020,993

BALL TRANSFER TABLES

Filed April 5, 1960 3 Sheets-Sheet 3

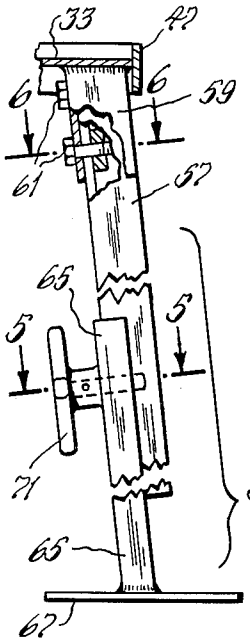

Fig. 4

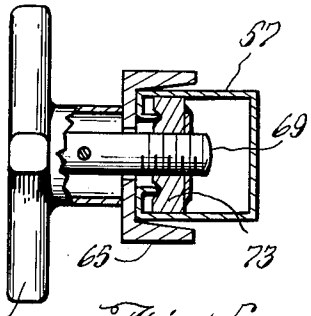

Fig. 5

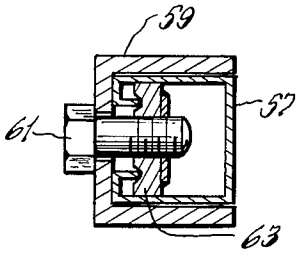

Fig. 6

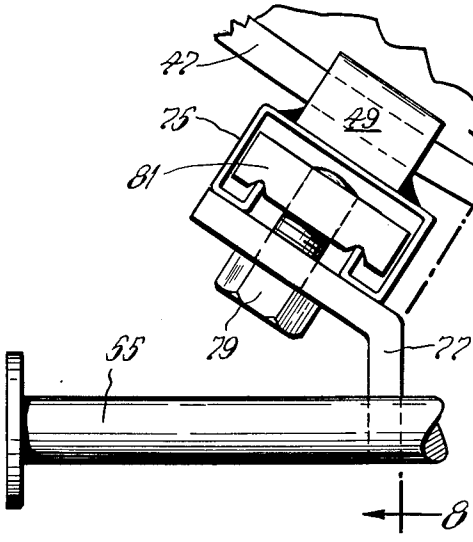

Fig. 7

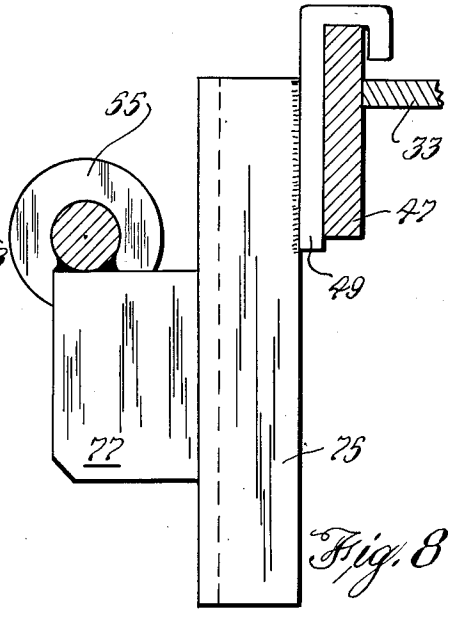

Fig. 8

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BALL TRANSFER TABLES

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Filed Apr. 5, 1960, Ser. No. 20,232
4 Claims. (Cl. 193—38)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to improvements in material handling conveyors, and more particularly pertains to ball transfer tables having readily variable angular attachments for skate wheel conveyors, whereby materials can be moved readily over two or more intersecting skate wheel conveyors, and the angularity of the conveyors can be changed readily in either a vertical or a horizontal plane.

In a preferred embodiment of the invention, a circular ball transfer table is provided with a rotatable flange member, which is coupled to a plurality of skate wheel conveyors by means of permitting feed at any desired angle.

It was observed, during cargo replenishment operations with vertical pocket conveyor equipment, that pacakaged goods had to be furnished quickly from a number of locations in a refrigerated cargo compartment to a central location in the hatch square area of a ship deck level. The method used was the placing of a single skate wheel conveyor, running from the loading station for a vertical pocket conveyor to a point just inside the door of the cargo compartment. From this point, as many as three or four skate wheel conveyors diverged to different areas of the cargo compartment, since different types of material were stored in different areas. It was therefore necessary to station a man at the convergent point of these conveyors. He was compelled to lift the goods from the divergent conveyors and to place them manually on the single conveyor leading to the loading point for the vertical pocket conveyor. Such manual lifting and placement was very tiring and time-consuming, and the resulting tonnage transfer rates were low. The use of 45° and 90° commercial conveyor turns was unsatisfactory, as such turns were clumsy to handle, could only be used by joining two conveyors at one time, and were not adapted to be positioned at optimum feed angles.

These disadvantages have been overcome by the subject conveyor system, wherein a circular ball transfer table is provided with a depending peripheral skirt that carries means to secure a plurality of skate wheel conveyors at any desired angle.

A principal object of the invention is to provide an improved ball transfer table and skate wheel conveyor cargo handling means.

Another object is to provide means to attach a plurality of skate wheel conveyors to a ball transfer table at a plurality of angles, radially and elevation-wise.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of a ball transfer table and a plurality of coupled skate wheel conveyors, showing a preferred embodiment of the invention;

FIG. 2 is a plan view of the ball transfer table, partly broken away to show details thereof;

FIG. 3 is an enlarged section taken on the line 3—3 of FIG. 2;

FIG. 4 is an elevation of a leg of the ball transfer table, partly broken away to show details thereof;

FIG. 5 is an enlarged section taken on the line 5—5 of FIG. 4;

FIG. 6 is an enlarged section taken on the line 6—6 of FIG. 4;

FIG. 7 is a fragmentary view of a roller or skate-wheel conveyor bracket;

FIG. 8 is a section taken on the line 8—8 of FIG. 7.

Similar numerals refer to similar parts throughout the several views.

As shown in FIG. 1, a ball transfer table 11 is carried on legs 13 that can be adjusted in height to maintain gravity feed. The table surface 15 carries a multiplicity of ball units 17 that afford a plane rest surface of minimum friction, whereby containers 19 or the like can be moved facilely. The table 11 is further provided with a circumferential apron 47 which holds a plurality of tie rods 23. Roller type conveyors 25, 27 and 29, or equivalent gravity type conveyors, can thus be secured to the tie rods 23 to permit confluent feed of containers 19, as shown, or divergent feed of such containers.

Preferably, a total of thirty nine ball transfer units 31 are inserted in a series of concentric rings of holes in a support base 33. Twenty ball transfer units are inserted in an outer row, proximate the periphery of the base, twelve ball transfer units comprise the second ring, six ball transfer units comprise the third ring, and a single ball transfer unit is provided in the center. This provides a substantially uniform and equally-spaced arrangement, but different spacings and arrangements may be preferred for particular uses. A ball 35 is seated rotatably in each unit 31.

Removable top plate 37 is a disc having a depending peripheral skirt 39, and is of somewhat larger diameter than the diameter of base 33. Openings 36 in plate 37 correspond with the positions of the units 31, so that a portion of each ball 35 protrudes above the upper surface of plate 37, as shown in FIGS. 1, 2 and 3. The plate 37 is seated on the upper lip of the housing member of each unit 31, and is secured to base 33 by means of flush-head bolts 41 and nuts 43. Spacer rings 45 provide further support for plate 37 on base 33 at each bolt and nut.

Apron 47 is a band secured to base 33 as by welding, said apron 47 encircling said base 33 and forming flanges extending above and below the plane of said base. Inverted U shaped fixtures 49 are hooked over the upper flange of the apron 47, and are slidable thereon. Face plates 51 are secured to fixtures 49 as by welding, extending outwardly therefrom to provide a bearing hole 53 for a tie rod 55, each tie rod 55 having its ends extending through a pair of such holes 53, as shown.

The tripod leg structure shown in FIG. 1 is preferred. As shown in FIGS. 4 to 6, each leg comprises a channel member 57. Bracket 59, which is U-shaped, has one end welded to the nether face of base 33, proximate apron 47. The legs of bracket 59 encase the side walls of channel member 57, as shown in FIG. 6, and bolts 61 and nuts 63 secure the channel member to its bracket. The adjustability of the height of each leg is afforded by channel member 65, which encases the side walls of member 57 and which terminates in a floor plate 67. Members 57 and 65 are secured together by means of the bolt 69 of knob 71, which carries nut 73 to compress said members together.

In the modified form of bracket structure shown in FIGS. 7 and 8, vertical adjustability of the tie rods 55 is provided. A channel member 75 depends from each fixture 49, being welded thereto. Bracket 77 is secured

to member 75 by bolt 79 and nut 81, and tie rod 55 is in turn welded to said bracket 77.

In a typical application of the ball transfer table of the subject invention, a straight conveyor run is set up in a refrigerator compartment of a ship, the run being set up from a loading station for a vertical pocket conveyor or for a cargo net. This site is usually near the center area of a cargo hatch in the hold or between deck levels. This conveyor run extends just inside the cargo door opening, where the ball transfer table is located and attached to the end of this conveyor run. To any or all of the remaining brackets on the ball transfer table, conveyors are attached at any practical desired horizontal angle, with the center line of the conveyor defining a radius of the table. When ready for operation, one man is stationed at the outermost end of each of the divergent conveyors. These men pick containers from their storage place, place the containers on their conveyor, and push the container toward the man stationed at the ball transfer table. This man reroutes the container to the outgoing conveyor merely by pushing it in the proper direction, and no manual lifting (which would tend to decrease tonnage handling rates and to constitute an adverse personnel and cargo safety factor) is involved. If it is necessary to change the angle of one of the convergent conveyors, this is accomplished easily by swinging the conveyor on its movable bracket, which is self contained in the ball transfer table unit. Changes in vertical angles of the convergent conveyors are accomplished similarly by moving the outermost end of such conveyors up or down, and in the modification shown in FIGS. 7 and 8, the height of the tie rod can be adjusted so that the conveyors and the table surface are at proper relative elevation.

Another typical use of the ball transfer table unit is at a T conveyor intersection, where a container entering the T from any leg can be routed easily over either of the other two legs. A further use of the table unit can be that aboard an aircraft carrier at a segregation point after a transfer of cargo at sea. With the use of vertical pocket conveyors or tray lift conveyors, items are delivered from several different hold levels, and enter into the same cargo net while it is being loaded on the supply ship for transfer at sea to the aircraft carrier. When the aircraft carrier receives this net load, all like items must be segregated for transfer to their respective stowage spaces. This is easily accomplished by moving all incoming material on a common lead-in conveyor line to the ball transfer table unit, and then routing like material over its proper divergent conveyor from the ball transfer table unit to its designated "like item" accumulation point.

It is thus evident that the ball transfer table unit of the subject invention can be used facilely for concentration or dispersion of supplies, that it is more flexible in operation than prior devices, that it affords a simple self-contained unit without loose external parts, and that it provides ready adjustment means for needed vertical or horizontal accommodations.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

We claim:

1. A ball transfer table unit comprising a table base provided with a plurality of universal bearing means spaced at predetermined distances on the upper surface thereof, a top plate secured to said base and having openings therethrough corresponding with the positions of said bearing means to permit said bearing means to extend above said openings, an encircling apron secured to the peripheral edge of said base and providing flanges extending above and below said base, and a plurality of tie rods adapted to secure an end of a gravity conveyor, and means to secure said tie rods slidably upon the upper flange of said apron.

2. The combination of claim 1 in which said tie rods securing means each comprises a pair of inverted U shaped hangar brackets seated on the upper flange of said apron, a tie rod being fastened to such pair of brackets.

3. The combination of claim 2 further comprising means to vary the height of said table unit.

4. The combination of claim 2 further comprising means to vary the level of said tie rods relative the level of said top plate.

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