Oct. 12, 1926. 1,602,669

O. H. HANSEN

TRANSPORTING DEVICE

Filed March 7, 1924

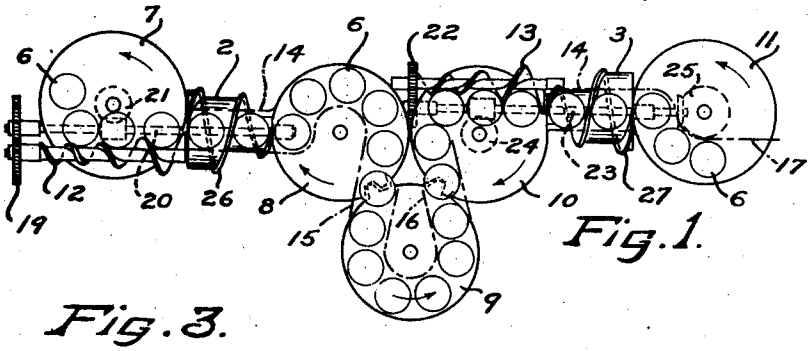


Fig. 1.

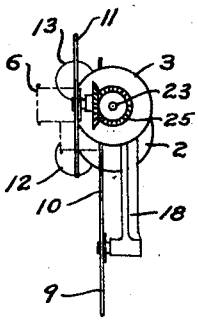
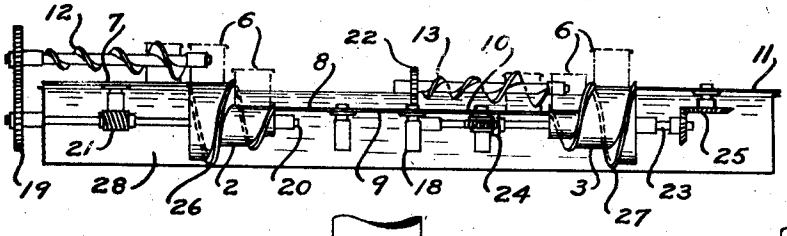


Fig. 2.

Fig. 3.



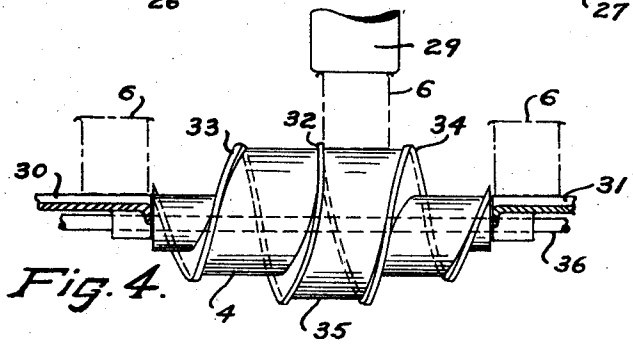


Fig. 4.

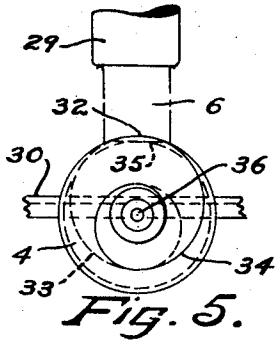


Fig. 5.

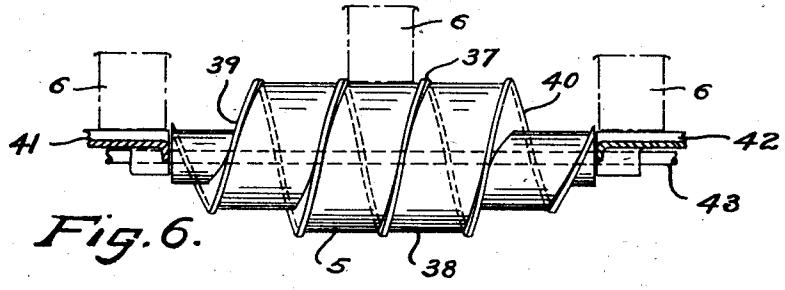


Fig. 6.

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UNITED STATES PATENT OFFICE.

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TRANSPORTING DEVICE.

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This invention relates in general to improvements in the art of transporting objects from one locality to another, and relates more specifically to improved devices for automatically transferring similar objects such as receptacles, in succession from one place to another along a predetermined path.

An object of the invention is to provide an improved transporting device which is simple in construction and efficient in operation.

In certain industries, it is frequently desirable to transport receptacles which contain fluent substances, from one locality to another prior to sealing of the receptacles without spilling any of the fluent contents. In order to avoid spillage of the fluent contents, the receptacles must be gently conducted from place to place and must be positively maintained in upright position even while being transferred from one elevation to another. Any desired changes in the rate of travel of the receptacles, as well as the starting and stopping thereof, must be accomplished gradually, since abrupt changes in speed of travel, or sudden starting and stopping may also cause spillage of the substance.

The present invention contemplates provision of devices for automatically transporting open receptacles containing fluent substances, in any desired direction, without danger of spillage. With the aid of the present improvements, the receptacles may be lowered, elevated or caused to travel in a straight or an irregular definite path either at a uniform, accelerated or decelerated rate of speed, without spilling the contents. The improved apparatus is capable of transporting relatively frail receptacles and other objects without damaging the same, and is extremely simple and compact in construction and efficient in operation. These and other specific objects and advantages of the present invention and the manner of attaining the same, will be apparent from the following description.

A clear conception of several embodiments of the present invention and of the operation of devices constructed in accordance therewith, may be had by referring to the drawing accompanying and forming part of this specification, in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a fragmentary somewhat diagrammatic plan view of a water exhaust box or sterilizer especially adapted for the treatment of food laden containers or cans.

Fig. 2 is a fragmentary somewhat diagrammatic side elevation of the water exhaust box.

Fig. 3 is a fragmentary somewhat diagrammatic longitudinal vertical section through the water exhaust box.

Fig. 4 is a fragmentary enlarged side elevation of an improved transporting device associated with a can closing machine.

Fig. 5 is a fragmentary enlarged end view of the transporting device and closing machine.

Fig. 6 is a fragmentary enlarged side elevation of an improved transporting device adapted to meet special conditions of transportation.

Referring specifically to Figs. 1 to 3 inclusive, the water exhaust box or sterilizer disclosed therein embodies various novel features which form no part of the present invention, and comprises in general an open hot water receptacle, container or box 28; mechanism for automatically supplying food laden open cans or receptacles 6 in succession at one end of and above the box 28; mechanism for automatically lowering the successive receptacles 6 into the liquid in the box 28; mechanism for automatically conveying the successive receptacles 6 along a definite circuitous path within the liquid in the box 28; mechanism for automatically elevating the treated receptacles 6 from within the box 28; and mechanism for delivering the treated receptacles 6 successively from the machine in a horizontal plane located above the box 28. The water within the receptacle or box 28 is maintained at the desired temperature in any convenient manner and may be supplied and withdrawn as desired through suitable piping.

The receptacle supply mechanism comprises a horizontal can supply disk 7 rotatable about a vertical axis by means of worm gearing 21, and a variable pitch feed element or screw 12 located above the disk

7 and rotatable about a horizontal axis by means of spur gearing 19. The gearing 19, 21 is associated with a horizontal power shaft 20 located below the disk 7 and disposed longitudinally within the box 28, this shaft being continuously rotated at a definite speed in any suitable manner. The receptacle lowering mechanism comprises an element or rotor 2 secured to the shaft 20 and consisting of a helical spiral can supporting portion or surface having straight line generatrices parallel to the shaft 20, and a helical spiral can urging portion or rib 26 located adjacent to the can supporting surface. The can receiving end of the rotor 2 has maximum radius and is located closely adjacent to the smooth periphery of the can supply disk 7 and to the delivery end of the feed screw 12. The can delivery end of the rotor 2 has minimum radius and is located below the surface of the liquid in the box 28. Stationary parallel can guides 14, shown diagrammatically in Fig. 1, are disposed above the rotor 2 and serve to prevent tilting of the receptacles 6 as they advance along the rotor 2.

The mechanism for automatically conveying the receptacles 6 along a definite circuitous path through the water in the box 28, comprises a series of three horizontal disks 8, 9, 10 having intermeshing peripheral teeth or other means such as gears, for imparting continuous rotation thereto about vertical axes, and a variable pitch discharge element or screw 13. The upper surfaces of the disks 8, 9, 10 lie in a common horizontal plane, the disks being maintained in proper relative position by means of a frame 18. The periphery of the disk 8 is located closely adjacent to the delivery end of the can lowering rotor 2, and the peripheries of the disks 8, 10 are provided with teeth which mesh with the similar teeth on the periphery of the disk 9 as shown in Fig. 1. Stationary can guides 15, 16, shown diagrammatically in Fig. 1, are disposed above the disks 8, 9, 10 and serve to gently conduct the cans 6 in succession from the disk 8 to the disk 9 and from the disk 9 to the disk 10. The discharge element or screw 13 is located above the disk 10 and is rotatable about a horizontal axis by means of spur gearing 22. The disk 10 is rotated by means of worm gearing 24, the gearing 22, 24 being associated with a horizontal power shaft 23 disposed longitudinally within the box 28 and rotatable in any suitable manner.

The receptacle elevating mechanism comprises an element or rotor 3 secured to the shaft 23 and consisting of a helical spiral can supporting portion or surface having straight line generatrices parallel to the shaft 23, and a helical spiral can urging portion or rib 27 located adjacent to the can supporting surface. The can receiving end of the rotor 3 has minimum radius and is located below the surface of the water in the box 28 and closely adjacent to the toothed periphery of the disk 10. The can delivery end of the rotor 3 has maximum radius and projects above the surface of the liquid in the box 28. Stationary parallel can guides 14, shown diagrammatically in Fig. 1, are disposed above the rotor 3 and serve to prevent tilting of the receptacle 6 advancing along the rotor 3.

The mechanism for delivering the treated receptacles 6 from the machine comprises a horizontal can discharge disk 11 rotatable about a vertical axis by means of bevel gearing 25 associated with the power shaft 23. The top of the disk 11 is located above the top of the box 28 and the smooth periphery of the disk 11 is movable in close proximity to the upper portion of the elevating rotor 3 having maximum radius. A stationary can discharge guide 17, shown diagrammatically in Fig. 1, is located above the disk 11.

During normal operation of the water exhaust box or sterilizer of Figs. 1 to 3, motion is imparted to the various elements through the power shafts 20, 23 in an obvious manner. The several disks 7, 8, 9, 10, 11 are being rotated continuously about their vertical central axes, in the directions indicated by the arrows in Fig. 1, and the rotor elements 2, 3, 12, 13 are being continuously rotated about their horizontal axes. The receptacles 6 which have previously been supplied with fluent substance, are delivered in succession upon the rotating disk 7 and are carried thereby against the side of the rotating conveyer screw 12. The conveying projections of the screw 12, by virtue of their increasing pitch, quickly transport the receptacles 6 in properly spaced relation upon the helical spiral supporting surface of the lowering rotor 2. The helical spiral projection 26 of the rotating rotor 2 eventually engages the successive receptacles 6 and quickly urges them downwardly between the stationary parallel guides 14 toward the smaller end of the rotor 2 and into the liquid bath within the box 28. As the successive receptacles 6 are thus gradually lowered into the liquid bath, they are automatically transferred to the first submerged disk 8 and from thence successively to the second and third submerged disks 9, 10 by means of the transfer guides 15, 16 whereupon the treating process has been completed.

The treated receptacles 6 are successively delivered against the side of the rotating conveyer screw 13 which quickly transports the receptacles 6 in properly spaced relation upon the smaller submerged end of the helical spiral supporting surface of the elevating rotor 3. The helical spiral conveying projection 27 of the rotating rotor 3 eventually engages the successive receptacles

6 and quickly urges them upwardly between the stationary parallel guides 14 toward the upper portion of the larger end of the rotor 3. From the rotor 3, the successive treated receptacles 6 are delivered upon the horiontal discharge disk 11 from which they are automatically removed by means of the stationary conducting guide 17. It will thus be noted that the successive cans 6 are automatically and quickly delivered to, through and from the machine and are quickly lowered into and elevated from the treating bath, while being maintained in upright position and without spilling of their contents. The various transfers are gentle and the operation of the machine is never interrupted except by lack of power or of receptacles 6.

Referring specifically to Figs. 4 and 5, the can closing machine 29 has been illustrated diagrammatically and is capable of quickly crimping covers upon open ended sanitary cans while these cans are held momentarily stationary. The transporting rotor 4 is mounted upon a rotary supporting shaft 36 and comprises a pair of oppositely disposed helical spiral can supporting surfaces which merge into a medial cylindrical supporting surface 35, and a pair of oppositely disposed and directed helical spiral conveying ribs 33, 34 which merge into a medial straight rib portion 32. A can supply runway 30 terminates adjacent to one end of the rotor 4 and the can discharge runway is located closely adjacent to the opposite end of the rotor 4.

During normal operation of the can closing machine, the filled receptacles or cans 6 are delivered in succession and in upright position from the runway 30 upon the smaller end of the helical spiral supporting surface at the supply end of the rotor 4 and are eventually urged by the helical spiral rib 33 upwardly along this surface. As the receptacles 6 reach the cylindrical surface 35, the straight portion 32 of the rib becomes effective to momentarily stop advancement of the successive cans in direct alinement with the plunger of the closing machine 29 which acts to apply a closure in a well known manner. The successive sealed receptacles 6 are automatically subsequently advanced by the helical spiral rib 34, downwardly along the spiral helical supporting surface at the discharge end of the rotor 4 and are eventually delivered upon the discharge runway 31. The receptacles 6 during their advancement along the top of the rotor 4 are guided by means of stationary parallel guides similar to the guides 14 of Fig. 1, these guides having been omitted for clearness. It will thus be noted that the successive filled receptacles 6 are automatically and gradually elevated, momentarily stopped, and subsequently lowered from the closing machine 29, while being maintained in upright position and without spilling any of the fluent contents.

Referring specifically to Fig. 6, the can transporting element illustrated therein comprises a rotor 5 mounted upon a rotary horizontal shaft 43 between stationary can feed and discharge runways 41, 42 respectively. The rotor 5 has a pair of oppositely disposed can elevating and lowering surfaces of helical spiral formation which merge into a cylindrical medial can supporting surface of relatively large diameter. Helical spiral can feed and discharge ribs 39, 40 merge into a helical medial conveyer rib 37 of uniform pitch associated with the medial cylindrical drum surface 38. Parallel can guides similar to the guides 14 of Fig. 1, are preferably disposed above the rotor 5.

During normal operation of the transporting device of Fig. 6, the cans or receptacles 6 are delivered in succession and in upright position from the runway 41 upon the smaller end of the enlarging helical spiral supporting surface at the feed end of the rotor 5. The helical spiral conveying rib 39 eventually urges the successive receptacles 6 upwardly along the feed end of the rotor 5 and delivers the receptacles upon the cylindrical drum portion 38 along which the cans are advanced at a uniform rate of speed by means of the helical rib 37. The cans or receptacles 6 are subsequently delivered from the cylindrical drum portion 38 upon the diminishing helical spiral supporting surface at the discharge end of the rotor 5 and are urged downwardly therealong by means of the helical spiral discharge rib 40 which eventually discharges the cans upon the runway 42. It will thus be noted that the successive receptacles 6 are automatically gradually elevated, advanced in a horizontal plane and at a constant rate of speed, and subsequently lowered to the initial level, while being maintained in upright position. This transporting device is especially applicable to high speed can filling machines wherein the receptacles would be supplied with fluent substance during transporation thereof along the cylindrical drum portion 38.

From the foregoing description, it will be apparent that the present invention has numerous adaptations and permits rapid but gradual elevation or lowering of open ended upright receptacles 6 in an extremely short distance of travel. By slight modification of the supporting and guiding portions of the rotor, almost any desired condition of transportation is attainable without danger of spilling the contents of the cans. The device acting as it does upon the relatively rigid lower extremities of the cans will not damage the same and is especially adapted

for transportation of relatively frail containers such as sanitary cans.

It should be understood that it is not desired to limit the invention by the specific disclosures herein made, for various modifications within the scope of the claims may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:—

1. In a transporting device, a conveying element having a helical portion of varying effective radius formed to retain cylindrical cans with their axes vertical and to urge said cans longitudinally of the element axis, and means for moving said element about said axis.

2. In a transporting device, a conveying element having a helical portion of varying effective radius formed to engage and to retain cylindrical cans with their axes vertical and at variable distances from the element axis, and means for moving said element about said axis.

3. In a transporting device, a rotor having a helical spiral portion adapted to retain cylindrical cans with their axes vertical and variable distances from the rotor axis, and means for rotating said rotor about said axis.

4. In transporting device, a conveying element having a helical portion of varying effective radius formed to urge cylindrical cans longitudinally of the element axis and having another portion of varying effective radius formed to retain said cans with their axes vertical and at variable distances from the element axis, and means for moving said element about said axis.

5. In a transporting device, a rotor having a helical spiral portion formed to urge cylindrical cans longitudinally of the rotor axis and having another helical spiral portion formed to retain said cans with their axes vertical at variable distances from the rotor axis, and means for rotating said rotor about said axis.

6. In a transporting device, a rotor having a helical projection of varying effective radius formed to urge cylindrical cans longitudinally of the rotor axis at variable speed, means for maintaining said cans with their axes vertical, and means for rotating said rotor about said axis at constant speed.

7. In a transporting device, a rotor having a helical surface of varying effective radius formed to support cylindrical cans with their axes vertical at variable distances above the rotor axis, and means for rotating said rotor at a predetermined speed.

8. In a transporting device, a rotor having a helical spiral surface formed with straight line generatrices parallel to the rotor axis and adapted to support objects at variable distances above said axis, and means for rotating said rotor about said axis.

9. In a transporting device, a horizontal rotor having a helical spiral surface formed with horizontal straight line generatrices parallel to the horizontal rotor axis and adapted to solely support objects at variable distances above said axis, and means for rotating said rotor about said axis at uniform speed.

10. In a transporting device, a rotor having a helical spiral surface formed with straight line generatrices parallel to the rotor axis and having a projection contiguous with and extending outwardly beyond said surface, and means for rotating said rotor about said axis.

11. In a transporting device, a horizontal rotor having a helical spiral object supporting surface formed with straight line generatrices parallel to the rotor axis and having a helical spiral object urging portion contiguous with said surface, means for rotating said rotor, and a stationary object guide located above said rotor and extending parallel to said rotor axis.

12. In a transporting device, a rotor having a helical spiral surface formed with straight line generatrices parallel to the rotor axis and adapted to support objects at variable distances above said axis, and a guide adjacent to said surface extending parallel to said axis.

In testimony whereof, the signature of the inventor is affixed hereto.

OSWALD H. HANSEN.