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(54) APPARATUS FOR CONVEYING ARTICLES

(71) We, SKF KUGELLAGERFABRIKEN GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, a German Body Corporate, of Ernst-Sachs-Strasse 2-8, 8720 Schweinfurt 2, German Federal Republic, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention concerns apparatus for conveying an article of a particular size.

According to the invention apparatus for conveying an article of a particular size comprises a plurality of elements each of which is separately mounted for rotation about an axis parallel to the axes of rotation of all the other elements and each having a plurality of radially extending arms, and first and second walls extending on diametrically opposite sides of each element, and adjacent to the elements, the walls and the elements being so shaped and dimensioned that when an article is in contact with an arm of one element one of the walls confines the article against radially outward disengagement from the element while permitting the article to be carried along the said one wall by the element, and when the element is rotated the article is carried into the path of an arm of the next element.

A third wall may extend around and adjacent to one of the elements and interconnect the first and second walls so that an article may be conveyed between the walls.

The first or second wall may have an aperture and means may be provided comprising a member mounted for rotation and having at least one radially extending arm for charging articles to the apparatus through the aperture one at a time.

Another wall may extend parallel to the first wall and may form with the first wall walls of a channel for an article conveyed by the apparatus and a further wall may extend

parallel to the second wall and may form with the second wall walls of a channel for an article conveyed by the apparatus.

An element may have means allowing the rotational position of the arms of that element relative to the rotational position of the arms of another element to be altered.

Two or more rows of elements may be provided, an adjacent pair of rows having adjacent walls interconnected to allow an article to be conveyed between the adjacent rows.

An embodiment of the invention will now be described by way of example and with reference to the accompanying drawings of which:-

Figure 1 is a side view of apparatus and Figure 2 is an end view on a larger scale of one of the elements.

The apparatus shown in Figure 1 is used for conveying articles, such as rolling bearings 6, into and out of a first treatment zone 1 and into and out of a second treatment zone 2. Treatment zone 1 comprises a container supplied with a degreasing agent such as Freon and treatment zone 2 comprises a container filled with a preserving oil.

The apparatus comprises two vertical rows 3 and 4 of element 5, each of which is separately mounted for rotation about an axis 8 parallel to the axes of rotation of all the other elements and each has four radially extending arms 7. Each row 3, 4 has a first wall 14 and a second wall 12 each extending along and adjacent to the elements 5 on diametrically opposite sides of the elements. At the bottom of each row is a third wall 15 which extends around and adjacent to the element 5 at the bottom and which interconnects the first and second walls, 14 and 12.

Extending parallel to the first wall 14 is another wall 18 and extending parallel to the second wall 12 is a further wall 16, each wall 16, 18 being within the rotational periphery

of the elements 5 but axially spaced from the elements 5 and forming with walls 12, 14 respectively the walls of a channel for the articles 6. The adjacent walls 12, 14 between the two rows 3, 4 are interconnected by a wall or trough 21 sloping from row 3 down to row 4. Second wall 12 of row 3 has an inlet aperture 19 and means comprising a member 20, mounted for rotation about an axis parallel to the axes 8 of elements 5 and having four radially extending arms, for charging articles 6 to the apparatus through the aperture one at a time, and a wall or trough 24 sloping down to member 20. First wall 14 of row 4 has an outlet aperture 22 and a wall or trough 23 sloping down from the aperture 22.

Each element 5 is driven in rotation in the same direction, clockwise as shown by arrow 9, and at the same rate as the other elements 5, and the member 20 is driven at the same rate but in the opposite direction - anticlockwise. The articles, rolling bearings 6, are placed on trough 24 and roll down to member 20 which separates them and charges them one at a time into the apparatus between a pair of elements 5. The articles 6 are then conveyed - in this embodiment they drop one at a time - down between second wall 12 and further wall 16 from between a pair of arms 7 of one element 5 to the next element into first treatment zone 1 until they reach the bottom element. Rotation of the bottom element 5 conveys the articles 6 round and then up between first wall 14 and another wall 18. First wall 14 and the elements 5 are so shaped and dimensioned for the particular size of the articles 6, that when an article is in contact with an arm 7 of one element 5 the wall 14 confines the article against radially outward disengagement from the element while permitting the article to be carried along the wall by the element and into the path of an arm of the next upward element. From zone 1 the articles 6 are conveyed up to the sloping wall 21 down which they roll to between a pair of elements 5 and row 4 and are then conveyed down into second treatment zone 2. From zone 2 the articles 6 are conveyed up between first wall 14 and wall 18 of row 4 to outlet aperture 22 and then roll down wall 23.

In the embodiment shown the shape of the wall 14 and parallel wall 18 is a zig-zag, wall 14 extending at 13 to between adjacent pairs of elements 5, wall 18 extending correspondingly at 17. Conceivably the walls could be shaped as smooth curves.

To ensure that each article is carried round by one element 5 into the path of an arm 7 of the next element, the rotational position of the arms of the said one element relative to the rotational position of the

arms of the said next element must be carefully positioned. Referring to Figure 2, an element 5 is shown having means, comprising three arcuate slots 11 and a screw threaded bolt 10 extending through each slot, by which the rotational position of the arms 7 of the element may be altered.

The apparatus shown allows each article to be treated separately and uniformly, with a minimum of loss of treating agent or, if, for example, the article has been heated in an oven, with a minimum of loss of heat, because the elements 5 do not move up or down but merely rotate about a fixed axis.

The apparatus may have three or more rows of elements interconnected for the transfer of articles between rows and the rows need not be straight or vertical but may be directed inclined or horizontal.

The distance between first wall 14 and wall 18, as well as between wall 12 and wall 16, may be adjustable to account for a different sized article.

WHAT WE CLAIM IS:-

1. Apparatus for conveying an article of a particular size, the apparatus comprising a plurality of elements each of which is separately mounted for rotation about an axis parallel to the axes of rotation of all the other elements and each having a plurality of radially extending arms, and first and second walls extending on diametrically opposite sides of each element and adjacent to the elements, the walls and the elements being so shaped and dimensioned that when an article is in contact with an arm of one element one of the walls confines the article against radially outward disengagement from the element while permitting the article to be carried along the said one wall by the element, and when the element is rotated the article is carried into the path of an arm of the next element.

2. Apparatus as claimed in claim 1 wherein a third wall extends around and adjacent to one of the elements and interconnects the first and second walls so that an article may be conveyed between the walls.

3. Apparatus as claimed in claim 1 or 2 wherein the first or second wall has an aperture, and means are provided comprising a member mounted for rotation and having at least one radially extending arm for charging articles to the apparatus through the aperture one at a time.

4. Apparatus as claimed in any one of claims 1 to 3 wherein another wall extends parallel to the first wall and forms with the first wall walls of a channel for an article conveyed by the apparatus.

5. Apparatus as claimed in any preceding claim wherein a further wall extends parallel to the second wall and forms with the second wall walls of a channel for an article conveyed by the apparatus.

6. Apparatus as claimed in any one of claims 1 to 5 wherein an element has means allowing the rotational position of the arms of that element relative to the rotational position of the arms of another element to be altered.
7. Apparatus as claimed in any one of claims 1 to 3 wherein two or more rows of elements are provided, an adjacent pair of rows having adjacent walls interconnected to allow an article to be conveyed between the adjacent rows.
8. Apparatus substantially as herein described with reference to and as shown in the accompanying drawings.

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FIG. 2.

