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[54] **COUPLING MEANS FOR CONTAINERS SUCH AS TWO ROTATABLY MOUNTED DRUMS**

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[51] **Int. Cl.** **B01f 9/02,** B01f 15/02, B65g 65/62

[58] **Field of Search** ..... 99/234 R, 234 A, 99/234 S, 234 T, 254 R, 254 C, 272, 472, 646; 259/81 R, 81 A, 89, 176, 175, 57; 141/273; 214/52 C, 312, 314

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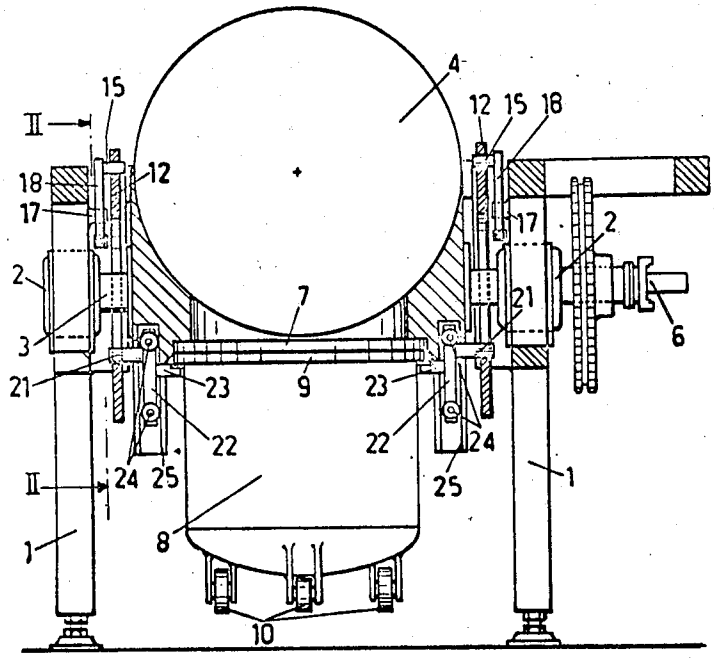
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Primary Examiner—Wayne A. Morse, Jr.
Assistant Examiner—Philip R. Coe

[57] **ABSTRACT**

The present invention is directed to improvements in the coupling mechanism for connecting a rotatably mounted drum to a carrier used to convey a material to be processed in the drum to and from the drum. The coupling mechanism is adapted to connect the input opening of the drum and the discharge end of the carrier in a sealed relationship while simultaneously elevating the carrier so that it may be rotated with the drum. The coupling includes a pair of oppositely disposed slides which are mounted to reciprocate vertically to elevate the carrier and each of these slides is formed with a central passageway which is axially aligned with the axis of rotation when the carrier is in the elevated position. The clamping mechanism which serves to clamp the carrier to the drum is provided with a roller which rotates within the axially aligned passageway of the reciprocally mounted slides when the assembly is rotatably driven.

5 Claims, 3 Drawing Figures



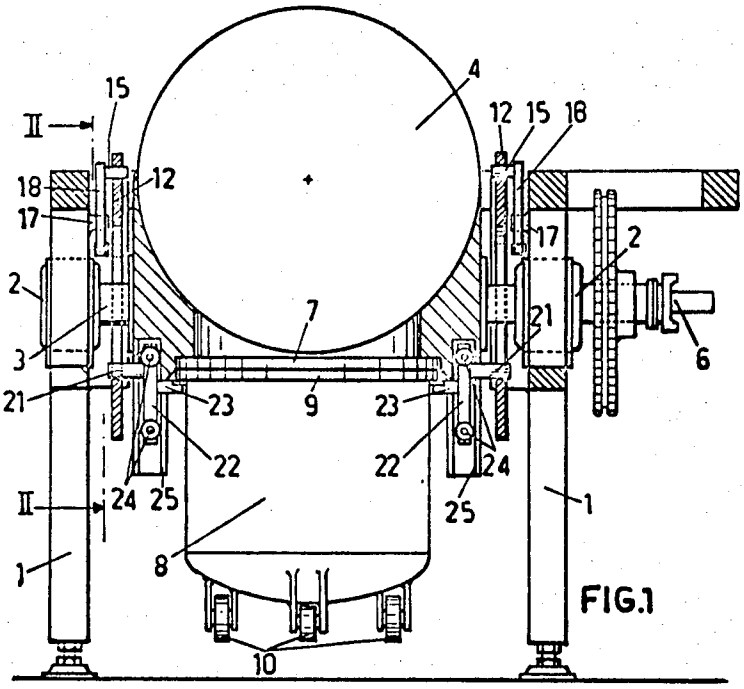

II
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FIG.1

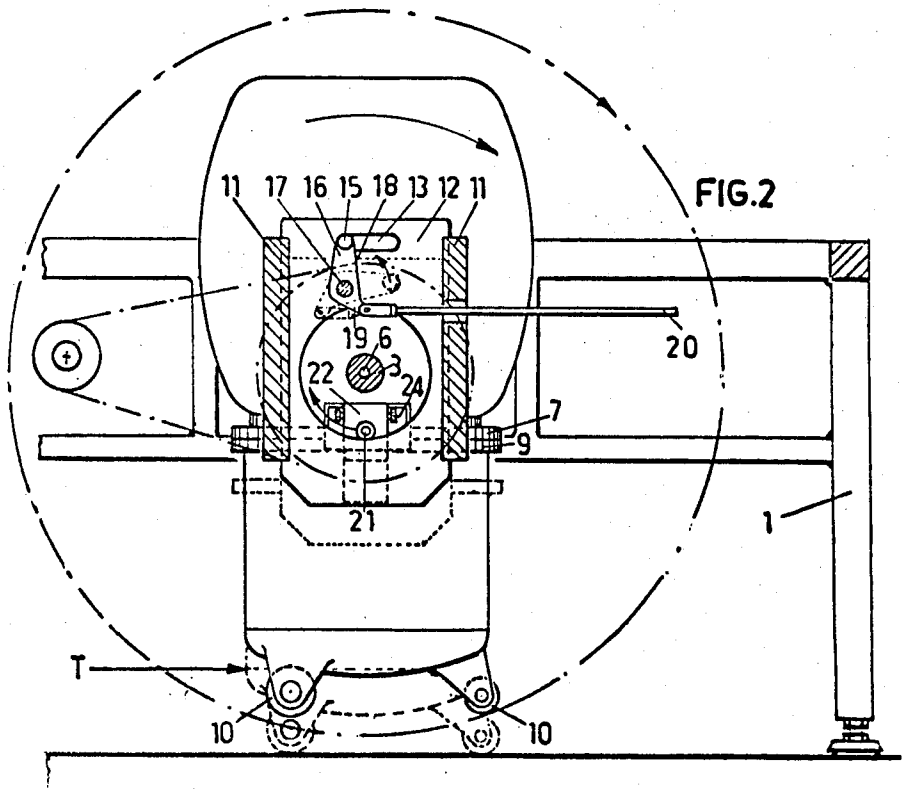

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FIG.2

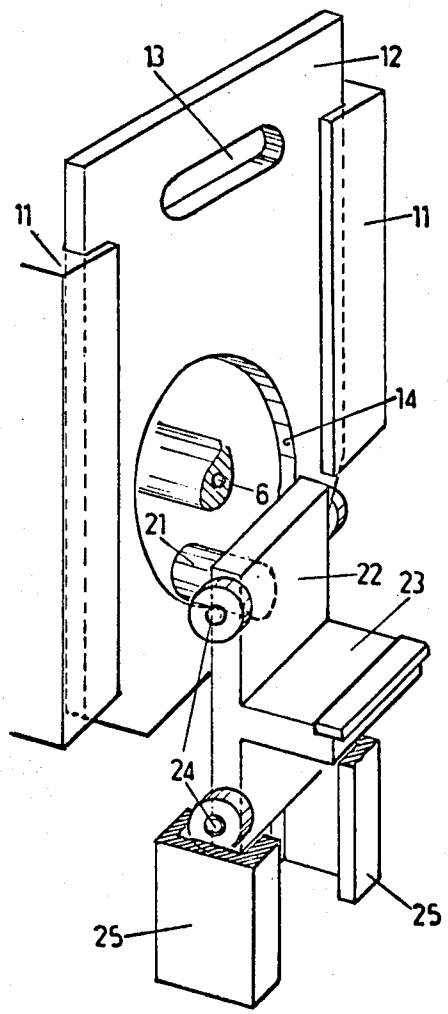


FIG.3

COUPLING MEANS FOR CONTAINERS SUCH AS TWO ROTATABLY MOUNTED DRUMS

The invention relates to an apparatus having a first member, such as a drum, which can be moved over a predetermined path, means for driving the first member along the predetermined path, and a second member such as a vessel, for conveying material to be fed to the drum, which can be connected to the first member to share in its movement.

It is an aim of the invention to provide a simply constructed apparatus of the kind specified ensuring that if a heavyweight second member is used it will follow the first member accurately in its movement over the predetermined path without causing undesirably heavy stressing.

To this end according to the invention an apparatus of the kind specified is characterised by a guide member for guiding the second member over its path determined by the connection to the first member during the movement thereof.

In an apparatus of the kind specified, having a motor-driven drum which can be rotated around an axis of rotation, and a displaceable conveying vessel which can be connected in sealing-tight relationship to the drum, according to the invention the guide member has an internal cylindrical wall portion which, during drum rotation, is aligned by its centre line with the axis of rotation of the drum and acts as a guide path for a member always occupying the same or substantially the same place in relation to the vessel during rotation. The guiding of this member along the guide path formed by the cylindrical wall portion not only satisfactorily guides the vessel, but also locks it in its connected position.

If the apparatus according to the invention is provided with conveying means for displacing the vessel between a predetermined starting position, in which the vessel is brought up to the apparatus, and a connecting position suitable for sealing-tight connection to the drum, advantageously according to the invention the member occupying the same or substantially the same place in relation to the vessel during rotation is brought up by the conveying means. The purpose of these means is to move the vessel into its correct fixed connected position in relation to the treatment apparatus. This applies more particularly when the conveying means comprise a lifting device for lifting the vessel out of a predetermined starting position into its connecting position suitable for sealing-tight connection to the drum. The lifting device, or more generally speaking the conveying means, can therefore move the member which always occupies the same place into its correct place in relation to the guide member.

Very simply according to the invention the guide member belonging to the treatment apparatus also forms part of the lifting device, which is in that case included in the treatment apparatus. In that case according to the invention the guide member takes the form of a member which can be moved substantially vertically and whose internal cylindrical wall portion acts in its lowest position as the supporting member for supporting the member which always occupies the same or substantially the same position in relation to the vessel during rotation, and in its highest position acts as the guide path for the member. In a very simple construction according to the invention the member which always occupies the same or substantially the same place in relation to the vessel forms part of a gripping member which can be displaced vertically by the aforementioned member via the guide member and during its upward movement grips a vessel which is in the aforementioned predetermined starting position and lifts it into its aforementioned connecting position, and during its downward movement returns a vessel which is in the aforementioned connecting position to the starting position. Conveniently, to automate the apparatus according to the invention, it is completed by conveying means for moving a vessel into its aforementioned predetermined starting position and moving a vessel out of such position.

A detailed description will now be given of a non-limitative exemplary embodiment of the invention, namely an apparatus for moving boned, brine-injected ham, with reference to the accompanying drawings, wherein:

FIG. 1 is a partly sectional front elevation of the treatment apparatus according to the invention;

FIG. 2 is a section, taken along the line II—II in FIG. 1, and

FIG. 3 shows, to an enlarged scale and in perspective, a detail of the apparatus illustrated in FIGS. 1 and 2 which is of importance to the invention.

The apparatus illustrated, for moving boned, brine-injected hams, mainly consists of a fixed frame 1 having a spindle 3 which is supported in bearings 2 and attached to a drum 4. Attached to the spindle 3 is a sprocket wheel 5 for rotatably driving the spindle 3 in any suitable manner, or instance, via a hydraulic motor (not shown). The spindle 3 is formed with an axial bore 6 which discharges at one end into the drum 4 and can be connected at its other end to a vacuum pump (not shown).

The drum 4 can be connected in sealing-tight relationship via a flange 7 to a conveying vessel 8 having a similar flange 9 to this end. The conveying vessel 8 takes the form of a carriage having wheels or rollers 10 and can be driven from outside the apparatus into its starting position (shown in chain lines in FIG. 2) beneath the drum 4.

As will be explained in greater detail hereinafter, the vessel 8 must be lifted out of this starting position into its connecting position (shown in solid lines in FIGS. 1 and 2), in which the vessel is so connected in sealing-tight relationship to the drum 4 that a vacuum can be set up inside the drum and the vessel connected thereto via the axial bore 6 in the spindle 3. The apparatus in then ready to rotate the drum 4 with the vessel 8 connected thereto.

To lift the vessel 8 from its starting position into its connecting position, the machine has a lifting device which will now be described in detail.

Disposed on the supporting frame 1 is a two-part vertical guide 11 for a guide plate 12 which can be moved in the vertical direction (cf. more particularly FIG. 3). The top portion of the guide plate 12 is formed with a horizontal straight slot 13 and has thereunder a round aperture having an internal cylindrical wall portion 14.

The slot 13 guides a pin 15 which is inserted therein parallel with the spindle 3 and is disposed at one end 16 of a tumbler 18 hinging around a hinge pin 17 disposed on the supporting frame 1. At its other end 19 the tumbler 18 is hingeably connected to a connecting rod 20.

As illustrated most clearly in FIG. 2, a force exerted on the tie-rod 20 exerts to the right via the tumbler 18 and the pin 15 borne thereby a lifting force on the guide plate 12 which lifts it out of its lowest position (shown in chain lines in FIG. 2) into its top position (shown in continuous lines). The tie-rod 20 can be moved to the right, as viewed in FIG. 2, to perform this lifting movement via a double-acting hydraulic actuator (not shown).

The round opening, below the slot 13 in the guide plate 12, with its cylindrical wall portion 14 transmits the lifting movement exerted on the guide plate 12 to a roller 21, bearing against the wall portion 14, of a gripping member 22 (shown to a larger scale in FIG. 3). On its side remote from the roller 21 the gripping member 22 has a projecting portion 23 via which it can engage behind or beneath projecting flange 9 of a vessel 8, as shown most clearly in FIG. 1. FIG. 3 shows the situation after the wall portion 14 of the guide plate 12 and the roller 21 have lifted the gripping member 22 into its highest position. A conveying vessel 8 (not shown in FIG. 3 to simplify the drawing) bearing via its flange 9 against the projecting portion 23 of the gripping member 22 is then in its aforementioned connecting position, in which it is connected in sealing-tight relationship to the drum 4 by co-operation between the guide plate 12 and the gripping member 22 (cf. the position of guide plate 12, gripping member 22 and vessel 4 shown in continuous lines in FIG. 2). To prevent the gripping member from being subjected to an excessive tilting force during its movement in the vertical direction, it runs via guide rollers 24 in a two-part guide 25.

In the connecting position of a vessel 8, the roller 21 assumes a fixed position in relation to the vessel 8, due to the rigid connection of the roller 21 via the gripping member 22, the projecting portion 23 and the flange 9 of the vessel. When the vessel, together with the drum 4 connected thereto, rotates around the axis 3, therefore, the centre line of the roller 21, parallel with the axis 3, describes a cylindrical plane. This fact is used in dimensioning the guide plate 12 and the gripping member 22, the centre line of the cylindrical wall portion 14 of the guide plate 21 being aligned with the axis of rotation of the spindle 3 in the top position of the guide plate 12 (associated with the coupling position of the vessel 8, cf. more particularly FIGS. 2 and 4). Consequently, the roller 21 of a gripping member 22 corotating with the drum 4 and a vessel 8 is guided along the cylindrical portion 14 of the guide plate 12 which remains stationary in such top position during rotation. During rotation, the wall portion 14 always exerts via the roller 21 and the gripping member 22 a radial inwardly directed force on the flange 9 of the vessel 8, which therefore remains rigidly connected to the drum, even if no vacuum were to be applied.

Since the guide plate 12 can be moved only in one direction, namely the vertical direction, the roller 21 and therefore the gripping member 22 and the vessel 8 can be displaced in relation to the drum only when the vessel is immediately thereabove or therebelow. In the first-mentioned case, the vessel presses by its whole weight against the drum flange 7, so that there is no risk that the connection between the drum and the vessel may be broken. In the second-mentioned case (shown in continuous lines in FIGS. 1 and 2), after the removal of the vacuum from the drum and vessel, the connection can be broken by cancelling out the force exerted to the right on the tie-rod 20 and driving the tie-rod 20 to the left, so that the guide plate 12 and the gripping member 22 are driven downwards.

In the bottom position of the gripping member 22 its projecting portion 23 is free of the flange 9 of the vessel, which comes to a stop in its starting position during the downward movement of the gripping member. By means of a conveying device of any suitable kind, shown diagrammatically by a horizontal arrow T in FIG. 2, the vessel can then be moved away and replaced by the next vessel. If the conveying device is automatic, its control must of course be adapted to the control cycle of the apparatu described, for instance, by connection to the control system of the rotating apparatus.

The apparatus described operates as follows.

A conveying device T adapted to the operational cycle of the treatment system moves a vessel 8 containing brine-injected ham to be treated by the apparatus into its starting position below flange 7 of drum 4 (shown in chain lines in FIG. 2). The apparatus is then set into operation, for instance, via a signal transmitter which co-operates with the conveying device T and delivers a starting signal to the treatment apparatus. If no special conveying device T is used, the operators can of course deliver a starting signal of this kind to the treatment apparatus.

In reception of the starting signal makes the hydraulic actuator (not shown) exert a force to the right, as viewed in FIG. 2, on the tie-rod 20 so that the tumbler 18 is pulled out of its position shown in chain lines in FIG. 2, the tumbler pin 15 moving to the left in the slot 13 in the guide plate 12. The guide plate 12 is therefore driven upwards so that the gripping member 22 bearing via the roller 21 against the underside of the cylindrical inside wall 14 is also lifted. During this upward movement, the gripping member 12 grips via its projecting portion 23 beneath the projecting flange 9 of the vessel 8, so that the latter is lifted and moved into its connecting position (shown in continuous lines in FIGS. 1 and 2). As clearly illustrated in FIG. 1, all the parts and members 11–25 inclusive of the treatment apparatus are disposed both on one side (the left-hand side in FIG. 1) and the other side (the right-hand side in FIG. 1); the identical members on both sides of the apparatus are identically operated, so that the vessel 8 is lifted correctly into its connecting position. The lifting function of the guide plate 12 and the gripping member 22 is therefore terminated.

When the vessel 8 has been raised into its connecting position, a vacuum is set up in the drum and vessel via the bore 6 in the spindle 3; as soon as the vacuum has reached its required value, the spindle 3 starts to be driven in rotation via the sprocket wheel 5 so that the drum 4 and the vessel 8 are slowly rotated as a unit. The roller 21 of the gripping member 22 rigidly connected to the drum 4 and the vessel 8 moves along the cylindrical inside wall 14 of the guide plate 12 and is guided in its rotary movement by the wall 14.

This is why the plate 12 is called a guide plate. Although in the embodiment described this plate forms part of the lifting device used, the lifting function can clearly also be performed by other members. For instance, the vessel can be lifted out of its starting position into its connecting position by a lift or other hoisting device disposed below the treatment apparatus, two guide rollers 21 disposed on the vessel being shifted

during this movement into the opening in the plates **12** bounded by the cylindrical wall portion **14**, the rollers and plates also briefly moving in relation to one another in the horizontal plane to make this possible. The locking of the vessel in its position connected to the drum by the guide plate **12** can of course also be performed in other ways. Clearly, however, as a rule the embodiment described is preferable, in which the guide plate **12** forms a guide member, a part of the lifting device, and a locking member.

During the rotation of the drum **4** and the vessel **8** for several minutes at a speed of 8–14 r.p.m., the contents of the vessel inside the drum and the vessel experience a tumbling movement which will not be described in greater detail.

As soon as rotation has terminated and the vessel has returned to its connecting position (shown in continuous lines in FIGS. **1** and **2**), first the vacuum in the vessel and drum is cancelled out. Then the double-acting actuator (not shown) drives the tie-rod **20** to the left, so that the guide plate **12** (then again acting as part of a lifting device) slides down in the guides **11** and therefore also lowers the gripping member **22** and the vessel **8** borne thereby. The vessel **8** then moves back into its starting position and can then be removed by the conveying device T and replaced by the next vessel **8** with its contents.

It has already been stated in relation to the various function of the guide plate **12** that there are other possible ways of producing the lifting and locking effects performed thereby. However, it is also clear that other modifications can be made to the shape, function and arrangement of the parts of the treatment apparatus described hereinbefore and illustrated in the drawings without exceeding the scope of the invention.

We claim:

1. In a mixing apparatus having a first vessel mounted for rotation about an axis and a second vessel mountable on said first vessel for rotation with said first vessel about said axis, the improvement of guide means having a guide surface extending circumferentially about said axis and follower means extending between said second vessel and said guide surface, said follower means engaging said guide surface and securing said first and second vessels in sealed relationship with one another at all rotational positions of said first and second vessels with respect to said axis.

2. A mixing apparatus as claimed in claim **1** wherein said guide means is mounted for movement between a first position in which the guide surface extends circumferentially as aforesaid and a second position in which the centre of gravitation of said guide surface is offset with respect to said axis and means for moving said guide means to and from said first and second positions to move said vessels into and out of sealed relationship with one another.

3. A mixing apparatus as claimed in claim **2** wherein said second position is lower than said first position and said means for moving said guide means serves to elevate said second vessel into engagement with said first vessel.

4. A mixing apparatus as claimed in claim **3** wherein said guide means includes a plate member having a circular opening therein, the peripheral edge of said circular opening forming said guide surface, and slide means for mounting said plate for movement between said elevated and lowered position of said guide surface, said follower means including means for engaging said second vessel and elevating it into sealing engagement with said first vessel in response to movement of said guide plate from said lowered to said elevated position.

5. A mixing apparatus as claimed in claim **1** wherein said follower means incudes clamping means for clamping said second vessel in said sealed relationship with respect to said first vessel.

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