United States Patent [19]

Heckmann

[11] **3,878,874**

[45] **Apr. 22, 1975**

[54] **APPARATUS FOR EVACUATING VESSELS**

[75] Inventor: **Werner Heckmann**, Dortmund, Germany

[73] Assignee: **Holstein & Kappert Maschinenfabrik Phonix G.m.b.H**, Dortmund, Germany

[22] Filed: **Dec. 20, 1972**

[21] Appl. No.: **316,991**

[30] **Foreign Application Priority Data**

Dec. 31, 1971 Germany 2165930

[52] **U.S. Cl.** ..... **141/114**; 53/86; 53/112 R; 141/168; 198/210; 214/1 BH

[51] **Int. Cl.** **B65b 3/16**

[58] **Field of Search** ..... 53/86, 96, 112 R, 386; 141/7, 67, 61, 65, 114, 165, 166, 313, 316, 10, 51, 59, 63, 64, 66, 168, 369, 390, 146; 198/210; 214/1 BC, 1 BH

[56] **References Cited**

UNITED STATES PATENTS

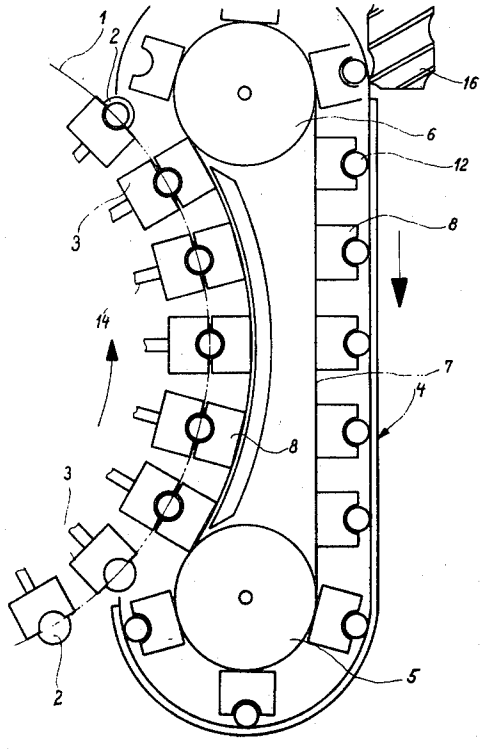
1,817,550	8/1931	Fenn	141/59
2,070,616	2/1937	Nordquist	141/51
2,454,477	10/1948	Ray	53/96
2,642,216	6/1953	Carter	141/59 X
3,185,187	5/1965	Luther	141/61 X
3,298,156	1/1967	Lerner	53/386 X
3,508,373	4/1970	Robinson, Jr.	53/112 RX
3,580,302	5/1971	Riesenberg	141/146 X

Primary Examiner—Richard E. Aegerter
Assistant Examiner—Frederick R. Schmidt
Attorney, Agent, or Firm—Toren, McGeady and Stanger

[57] **ABSTRACT**

Apparatus for evacuating vessels prior to filling them which vessels have deformation-sensitive walls includes a rotating filling machine table and a moving device for introducing vessels to the filling machine table and for moving along a path parallel to the table. Both the filling machine table and the moving device have a plurality of housing members arranged at the same equal spacing. As each vessel is fed to the filling machine table, the housing members on the table combine with the housing members on the moving device and form a housing which laterally encloses the vessel to be evacuated and filled. Matching recesses are formed in the housing members so that a cavity is formed within the housing which at least partly encloses the exterior surface of the vessel. The cavity is sealed from the atmosphere and is arranged so that it is exposed to the same below atmospheric pressure as is the interior of the vessel during evacuation whereby the deformation-sensitive walls are not exposed to differential pressure during evacuation.

4 Claims, 3 Drawing Figures



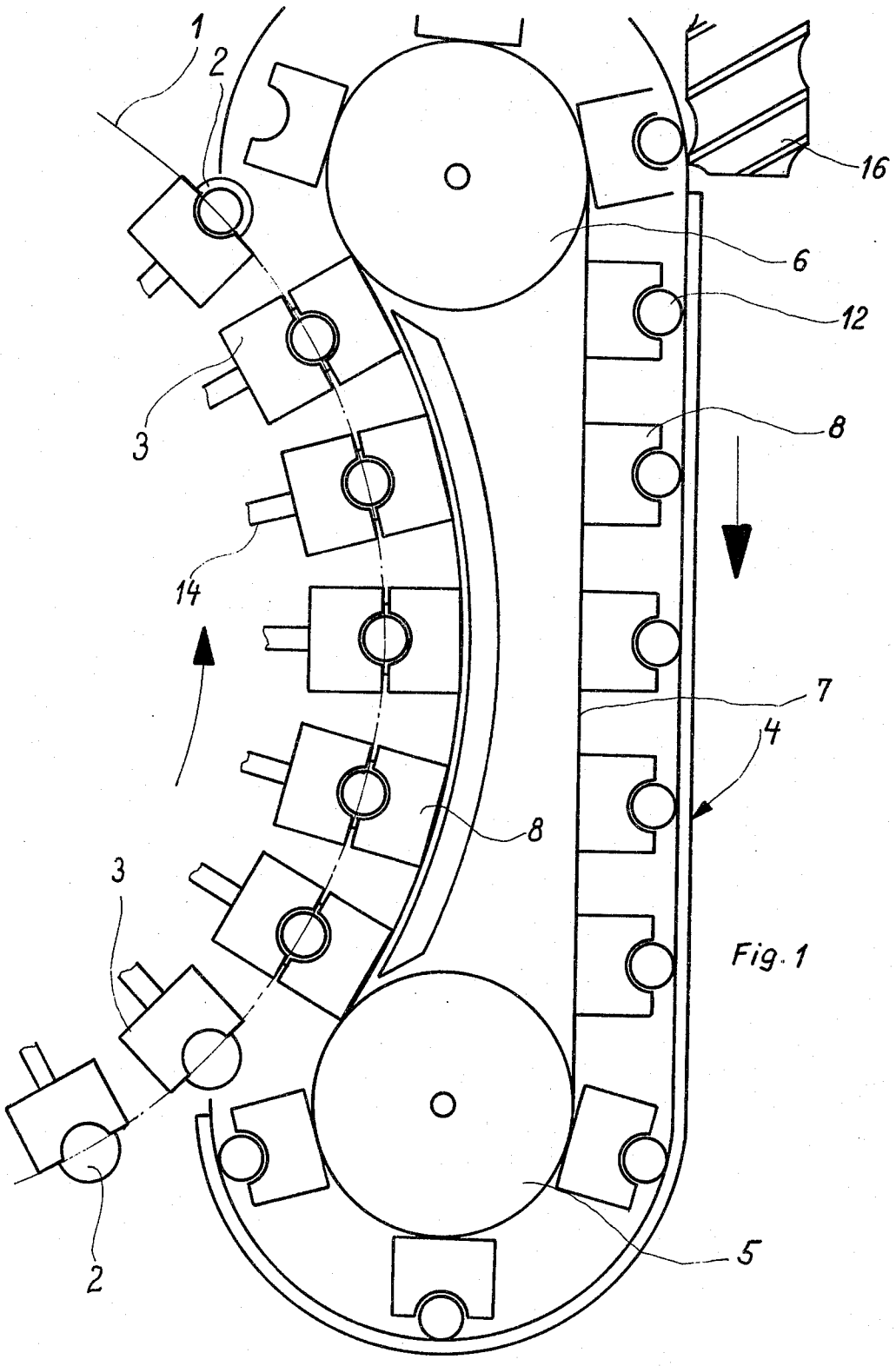


Fig. 1

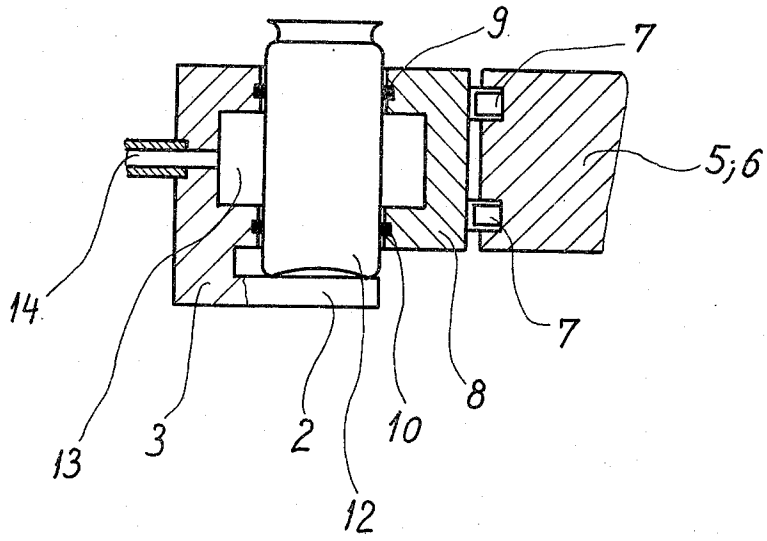


Fig.2

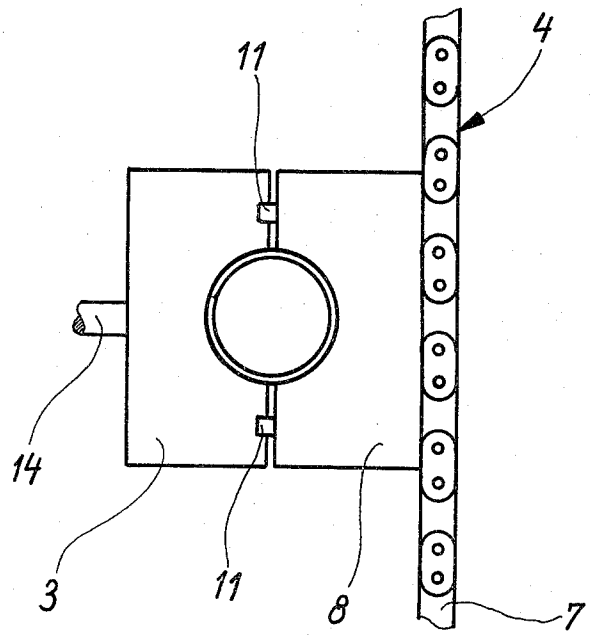


Fig.3

APPARATUS FOR EVACUATING VESSELS

SUMMARY OF THE INVENTION

The present invention is directed to apparatus for evacuating vessels with deformation-sensitive walls and, more particularly, it concerns the arrangement of housing members which laterally enclose a vessel when it is to be evacuated so that its walls are not exposed to differential pressure.

The filling of oxygen-sensitive beverages into vessels or containers requires that the air contained in the vessel or container be reduced to a minimum before the filling is effected. In known filling devices such as in U.S. Pat. No. 3,212,537, this is achieved by evacuating the vessel before filling takes place. Such an evacuation operation is successful only with vessels having stable walls which can withstand differential pressure conditions. This method cannot be used in conventional machines for filling vessels with deformation-sensitive walls.

As a result, it has been suggested in the filling of plastic containers under sub-atmospheric pressure conditions, where the vessels have an elastic characteristic, that is, they are deformation-sensitive, to equip the filling element with a sealing bell jar which encloses the vessel and seals it from the outside atmosphere so that the space enclosing the vessel can be connected to a sub-atmospheric pressure source. This proposed arrangement has the disadvantage that it requires very considerable expenditures for the filling equipment which frequently have a hundred or more filling stations.

Moreover, such an arrangement requires a relatively great overall height for the filling machine, since the bell jars are rigidly connected with the filling member and the vessels can be introduced into the filling machine only under the bell jar. This requires that there must be a distance between the support surface for the vessel and the centering tulip of the filling element which is at least twice the height of the vessel. Further, the output of the filling machine is considerably reduced because of the prolonged pressurizing procedure.

Therefore, it is the primary object of the present invention to overcome the disadvantages experienced in the past and to provide an effective evacuation procedure for below atmospheric filling of vessels which have deformation-sensitive walls. In accordance with the invention, the reduced pressures acting on the exterior surface of the vessel walls is maintained only during the evacuation operation.

In accordance with the present invention, a feeding device introduces the vessels onto a moving filling machine table and both the feeding device and the table are provided with housing members which combine to form a housing which laterally encloses the vessel as the feeding device moves along a path in parallel with the path of the table. Matching recesses are formed in each of the housing members so that the housing forms a cavity at least partly enclosing the exterior surface of the vessel and sealing the enclosed portion from the atmosphere. Further, the cavity is connected to a conduit which, in turn, is connected to the evacuation equipment so that both the cavity and the interior of the vessel are maintained at the same reduced pressure.

In this way the evacuation of a vessel with deformation-sensitive walls can be performed in a relatively simple manner. In this arrangement, it is possible to dispense with the bell jars used in the past, which had to enclose the vessel during the entire filling process.

In a preferred embodiment of the invention, the feeding device is formed as a conveyor element travelling around a pair of spaced guide wheels with the conveyor element supporting the spaced housing members and arranged to pass in parallel with a portion of the path of movement of the filling machine table.

To supply vessels to the feeding device, a dividing worm is provided, spaced from the location at which the device travels in parallel with the filling machine table, for supplying the vessels at equally spaced distances to the feeding device.

Furthermore, in the device described above, it has been found to be advantageous to control the operation of evacuation by control members positioned in the path of the housing members when they are joined together to form a housing and to interconnect the cavity in the housing with the evacuation valve for the vessels so that the same below atmospheric pressure exists within the vessel and in the cavity in the housing which laterally encloses the vessel. When the evacuation valve is contacted by the control member, preferably after the vessels have entered the path of the filling machine table and the housing has been formed, the evacuation operation is commenced. At the same time, the cavity laterally enclosing the vessel is exposed to the same reduced pressure.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a simplefied top view representing a vessel filling machine and a vessel feeding device embodying the present invention;

FIG. **2** is an enlarged sectional view of the joint path of travel of the filling machine and the feeding device; and

FIG. **3** is a partial top view of the filling machine and the feed device moving along their joint path of travel.

DETAILED DESCRIPTION OF THE INVENTION

In FIG. **1**, a portion of a filling machine table is shown travelling along a turning circle **1** with vessel stand trays **2** and housing members **3** combined and arranged at equal intervals on the turning circle. Positioned along a portion of the path of the turning circle is a vessel feeding device **4** which moves around a pair of guide wheels **5, 6.** The feeding device includes a conveyor element **7** passing around the guide wheels so that a portion of its path of movement on one side between the guide wheels is in parallel with a portion of the path of the turning circle **1.** The conveyor element **7** is designed as a chain member and a plurality of housing members **8** are secured to it so that the intervals between the housing members **8** correspond to the intervals between the housing members **3** as they pass along the same parallel paths of movement. Each of the housing members **3, 8** forms half of a housing within which a vessel is held as it is passed from the feeding device

4 to the filling machine. As can be seen in FIGS. 2 and 3, each of the housing members 3, 8 is provided with highly elastic sealing members 9, 10 and 11 so that a seal is provided between the surface of the housing member and the surface of the vessel, note FIG. 2, and between the contacting surfaces of the housing members, note FIG. 3. Each of the housing members 3, 8 has a matching recess and the recesses combine to form an annular cavity 13 laterally enclosing a portion of the exterior surface of the vessel 12 positioned within the housing. The cavity 13 is connected through a conduit 14 to a sub-atmospheric pressure source or to an evacuation valve for the filling machine, not shown.

In FIG. 1 the arrows indicate the direction of movement of the feeding device 4 and the filling machine.

The vessels 12 to be filled, supplied in close succession, are properly spaced apart by a dividing worm 16 and are introduced to the housing members 8 as they pass around the guide wheel 6 and commence their movement toward guide wheel 5 prior to moving along the parallel path of travel with the filling machine. As the housing members 8 pass around the guide wheel 5, they move into matching engagement with the housing members 3 on the filling machine table and the vessels are then positioned on the filling machine circle 1 and they are enclosed by the matching housing members 3, 8 which combine to form the housing laterally enclosing the vessels. With the housing members in matching engagement, the evacuation valve is opened by a control member, not shown, and the interior of the vessel is evacuated. At the same time, the cavity 13 within the housing formed by the housing members 3, 8 is connected to a reduced pressure source or to the conduit connected to the evacuation valve. In this way, the same reduced pressure conditions are established within the interior of the vessel 12 and within the cavity 13 laterally enclosing a portion of its exterior surface. Due to this arrangement, there is no pressure differential acting on the vessel wall and deformation of the wall is impossible. When the evacuation operation has been completed, the evacuation valve is closed and the housing members 8 secured on the conveyor element 7 are separated from the housing members 3 on the filling machine and the vessels are positioned on the stand trays 2 on the filling machine. As the filling machine continues its path of movement, the vessels are filled.

While the invention has been described using a rotating filling machine, a battery filling machine having stand trays combined with housing members can be moved into matching engagement with similar housing members positioned on an intermittent feeding device, so that the vessels to be evacuated are laterally enclosed in a similar manner.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventinve principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. Apparatus for evacuating vessels which have deformation-sensitive walls, prior to filling the vessels, comprising a machine including a movable member, spaced vessel trays mounted on said movable member for movement along a first path of travel, and a device for feeding vessels to said vessel trays and arranged to move in cooperating relation with said movable member on said machine, wherein the improvement comprises that said device for feeding vessels is separate from said movable member and moves along a second path of travel different from the first path of travel of said movable member, said device includes a plurality of uniformly spaced first housing members movable thereon along the second path of travel and only a part of the second path of travel being arranged to move in side-by-side relation with the first path of travel of said vessel trays, said movable member includes a plurality of uniformly spaced second housing members each associated with a different one of said vessel trays and said second housing members spaced apart at the same spacing as said first housing members, each said first housing member arranged to move into matching engagement with one of said second housing members as it passes along the part of the second path of travel which is in side-by-side relation with the first path of travel of said vessel trays for forming, in combination with said vessel tray within said second housing member with which it matches, a housing for the vessel supplied by said device for feeding vessels, each said first housing member and said second housing member having a recess formed therein so that said recesses in matching ones of said first housing member and second housing member combine to form a continuous cavity at least partly encircling the deformation-sensitive walls of the vessel supplied by said device, means associated with said first and second housing members and arranged to cooperate with the vessels supplied by said device so that the portion of the vessels enclosed by said cavities are sealed from the atmosphere, conduit means for connecting the cavities to a sub-atmospheric pressure, means for evacuating the vessels held in the matching ones of said first housing members and second housing members, means for actuating said means for evacuating the vessels, said conduit means connected to the cavities in the matching ones of said first housing members and second housing members and said means for evacuating the vessels being connected so that when the evacuation of a vessel is effected the same sub-atmospheric pressure is exposed to said cavity in the matching ones of said first housing members and second housing members for exposing the interior and exterior of the vessel to the same sub-atmospheric pressure.

2. Apparatus, as set forth in claim 1, wherein said device for feeding vessels comprises a pair of spaced guide wheels, an endless conveyor supporting said first housing members in spaced relationship thereon and arranged to move over said guide wheels so that said first housing members for the part of the second path of travel which is in side-by-side relation with the first path of travel of said second housing members move along a path parallel with the paths of said vessel stand trays and said second housing members on said machine.

3. Apparatus, as set forth in claim 2, wherein a dividing worm is associated with said device for feeding vessels at a position spaced from its parallel path of movement with said machine for delivering vessels at spaced intervals corresponding to the spacing of said first housing members on said conveyor member.

4. Apparatus, as set forth in claim 1, wherein each of said first and second housings arranged in matching engagement with the other has a facing surface directed toward the facing surface of the other, said means associated with said first and second housing members for

effecting a seal from the atmosphere comprises elastic sealing material arranged in the facing surfaces of said first and second housing members and in the surfaces of said first and second housing members which contact the vessel held within said housing so that said cavity formed in said housing is completely encircled by said sealing material.

* * * * *