

DEVICE FOR FILLING OF A CONTAINER OF COLLAPSIBLE TYPEField of the Invention

The present invention relates to a device for filling a container of a collapsible type with a product in the form of powder or liquid, and more specifically
5 such a device which comprises a filling tube with an end portion, which is insertable into a filling duct of the container to supply a product to the compartment of the container through said filling tube.

10 Background Art

Many different types of container to be filled with products in the form of liquid or powder are currently available.

One type of container is collapsible and comprises
15 two flexible side walls and a bottom wall, which walls are interconnected along a connecting portion to form a compartment whose volume is dependent on the relative position of the walls.

This type of container can, before filling, be in a
20 plane and sealed state. This makes it possible to sterilise the compartment of the container in connection with manufacture and, with maintained sterility, distribute the container to a filling plant, such as a dairy.

25 A container of the type described above is known from WO99/41155 which also discloses a device for filling the container.

Said device comprises a nozzle which is insertable into a filling duct of the container, said filling duct
30 being opened by cutting or a similar operation in connection with filling of the container.

During the actual filling process, said nozzle is thus inserted into the filling duct, after which a product valve is opened to supply the desired product
35 quantity to the compartment of the container through said

nozzle. The compartment will then take a volume which substantially corresponds to the volume of the supplied product. The filling process ensures that penetration of air into the compartment is prevented or at least
5 minimised.

The filling device disclosed in WO99/41155 comprises more specifically a nozzle which is made of an elastic material, such as silicone rubber. The nozzle has an end portion which tapers towards an outlet in the form a gap
10 in the lower end surface of the end portion.

The nozzle is self-closing, which means that the edge portions which define said gap engage each other in the absence of application of outer forces.

During the filling process, the nozzle is, as
15 mentioned above, inserted into the filling duct of the container, after which the product is supplied to the compartment through said nozzle. The product pressure will act to open the nozzle and at the same time to establish a seal between the nozzle and the walls of the
20 filling duct to ensure that air does not penetrate into the container.

Increasing demands are placed on the efficiency of filling devices of the type described above and, thus, also on the speed at which the device allows filling of
25 an individual container.

Faster filling can be achieved with an increased product flow velocity, which results in a higher product pressure. It has been found that an increased product pressure may in some cases result in the product being
30 pressed out of the compartment of the container between the nozzle and the walls of the filling duct. For obvious reasons, this causes problems in maintaining a hygienic environment in the filling device.

There is thus a need for a filling device which
35 allows efficient and rational filling of containers of a collapsible type.

Summery of the Invention

In view of that stated above, it is an object of the present invention to provide a device for filling containers of a collapsible type, which device allows
5 fast filling under hygienic conditions.

To achieve this object, and also other objects that will be evident from the following description, a device with the features defined in claim 1 is provided according to the present invention. Embodiments of the
10 device will de defined in claims 2-14.

More specifically, according to the present invention a device is provided for filling a container of a collapsible type with a product in the form of powder or liquid, said container having a compartment which is
15 defined by flexible walls and whose volume is dependent on the relative position of the walls and which communicates with the surroundings through a filing duct of the container. The device comprises a filling tube with an end portion, which is insertable into said
20 filling duct of the container to supply a product to the compartment of the container through said filling tube. The device is characterised by an end element, which is arranged in an outlet of the end portion and which is movable between a first position, in which the end
25 element sealingly connects to said outlet, and a second position, in which the end element together with the outlet defines a filling passage, and a squeezing means, which is adapted to grasp the end portion and the filling duct when said end portion is inserted into said filling
30 duct to establish a seal between the end portion and the filling duct.

The inventive device ensures that a container of a collapsible type can be filled in a short time without the risk of the product escaping from the container.

35 As mentioned above, the filling passage is defined by the end element when the end element is in its second position. This makes it possible to provide a relatively

large area of the filling passage, which in turn allows a rapid filling process. The filling passage can be arranged to have the shape of a circumferential gap.

At the same time the squeezing means ensures that
5 the product cannot escape from the container during said filling process. To this end, the squeezing means is arranged to grasp the end portion of the filling tube and the filling duct.

In one embodiment, said end element is supported by
10 a piston rod arranged in said filling tube, in which case the end element can be movable between said first and second position by axial displacement of said piston rod. A bevel may be arranged adjacent to the connection between said piston rod and said end element. This
15 ensures that the product flowing out of the filling tube through the filling passage is allowed to flow over the end element relatively unimpededly.

In another embodiment, said end element supports an O-ring, which in the first position of the end element
20 engages the outlet. This ensures that the end element in said first position sealingly connects to the outlet.

In a further embodiment, the end element may have a shape tapering from the filling tube. This makes it possible to facilitate the insertion of the end portion
25 of the filling tube into the filling duct of the container. The end element may have the shape of a wedge, in which case a base of the end element can be circular or have the shape of a convex lens, also referred to as a convex-convex lens.

30 In yet another embodiment, said end portion of the filling tube can be made of a rigid material, such as stainless steel. Furthermore the squeezing means may comprise elastic engaging surfaces which are arranged to grasp said filling duct and said end portion. As a
35 result, the squeezing means can be made to carefully grasp the end portion and the filling duct while at the same time a reliable seal is established.

In a further embodiment, said end element has a liquid-repellent surface. This makes it possible to minimise dripping and depositing of product on the walls of the filling duct.

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Brief Description of the Drawings

Embodiments of the present invention will now be described by way of example with reference to the accompanying drawings.

Fig. 1 is a cross-sectional view of an embodiment of an inventive device.

Figs 2 a-b are schematic perspective views which illustrate a method for filling a container by means of an inventive device.

15 Figs 3 a-b are schematic cross-sectional views which illustrate the operation of an end element of the inventive device during the method for filling shown in Figs 2 a-b.

Fig. 4 is a schematic perspective view of one
20 embodiment of an end element.

Fig. 5 is a schematic perspective view of another embodiment of an end element.

Description of Embodiments

25 The present invention relates to a device for
filling a container of a collapsible type.

A container of this type may comprise two opposite side walls and a bottom wall, which walls are interconnected along a connecting portion and define a compartment whose volume is dependent on the relative position of the walls. A filling duct of the container, which filling duct can be defined by said side walls, makes its compartment communicate with surroundings. In the unfilled state of the container, the filling duct can be sealed, in which case the duct is opened before filling. This makes it possible to ensure in a simple way

that containers with sterile compartments are used in the inventive device.

Fig. 1, to which reference is now made, illustrates an embodiment of an inventive device 1 for filling the
5 above described container.

The device 1 comprises as main components a filling tube 2, a squeezing means 3 and an end element 4.

The filling tube 2 is connected to a source (not shown) for the product that is to be supplied to the container and is terminated with an end portion 5. The end portion 5 has an outlet 6.

The end element 4 is arranged in the outlet 6 of the end portion 5 and is movably arranged between a first position, in which the end element 4 sealingly connects to said outlet 6, as shown in Fig. 1, and a second position, in which the end element 4 together with said outlet 6 defines a filling passage 7, which is shown in Fig. 3b. In the embodiment shown, said filling passage 7 takes the shape of a circumferential gap, but it will be appreciated that other shapes are conceivable.

The end element 4 supports a seal 8 in the form of an O-ring. In the first position of the end element 4, said O-ring engages the outlet 6 of the end portion 5 to ensure that the end element 4 sealingly connects to said outlet 6.

The end element 4 is supported by a piston rod 9 arranged centrally in said filling tube 2. The piston rod 9 is axially movable by means of a suitably designed arrangement, and by moving said piston rod 9 in the axial direction, said end element 4 is thus movable between said first and second position.

In the embodiment illustrated, the squeezing means 3 comprises a pair of jaws 10, which are arranged to grasp the end portion 5 of the filling tube 2.

35 The end portion 5 of the filling tube 2 is made of a rigid material, such as stainless steel, and the pair of jaws 4 have elastic engaging surfaces 11.

Figs 2a and b, to which reference is now made, illustrate the method for filling a container 12.

As shown in Fig. 2a, a container 12 is first positioned under the inventive device 1. The filling duct 13 of the container 12 has been opened by cutting or a similar operation, whereby the compartment of the container 12 communicates with the surroundings through said filling duct 13.

The positioning of containers can be performed in various ways, for instance by means of an arrangement of laterally movable gripping means, from which the containers are suspended (not shown).

In Fig. 2b, the end portion 5 of the filling tube 2 is inserted into the filling duct 13 of the container 12 with the end element 4 in its first position. The squeezing means 3 has been activated so that its pair of jaws 10 grasps the end portion 5 and thus also the filling duct 13. Since the end portion 5 of the filling tube 2 is made of a rigid material while the engaging surfaces 11 of the pair of jaws 10 are elastic, a reliable seal is established between said filling duct 13 and said end portion 5, which does not risk damaging the side walls of the container 1, which define said filling duct 13.

As mentioned above, the end element 4 is in its first position when the end portion 5 of the filling tube 2 is inserted into the filling duct 13 of the container 1, which is shown more distinctly in Fig. 3a.

When the squeezing means 3 has been activated so that its pair of jaws 10 grasps the filling duct 13 and the end portion 5 of the filling tube 2, the end element 4 can be moved to its second position, which is shown in Fig. 3b. The product will then flow out of the thus defined filling passage 7 and into the compartment of the container 12. During the filling process, the compartment of the container 12 will be expanded in response to the entering product like a balloon which is being inflated.

The seal provided by the squeezing means 3 ensures that products cannot be pressed out of the container 12 between the filling duct 13 and the end portion 5 of the filling tube 2.

5 The filling process is terminated by the end element
4 again being moved to its first position, after which
the pair of jaws 10 of the squeezing means 3 is opened
and the end portion 5 is pulled out of the filling duct
13 of the container 12. Subsequently the filling duct 13
10 can be sealed in a suitable manner, for instance by a
heat sealing process.

It will be appreciated that the time required for filling a container 12 with the product in question is dependent on the flow velocity of the product and also the area of the filling passage 7. Since the end element 4 is movable between said first and second position, said area can be adjusted as desired, by moving the end element 4 to a suitable position between said first and second position. In particular, the inventive device 1 makes it possible to provide a relatively large area of the filling passage 7, which for obvious reasons has a positive effect on the filling time of a container 1. In the current context it should be noted that the squeezing means 3 ensures that the rapid filling of the container 12 can be performed without the product escaping from the compartment of the container 12.

The end element 4 can be designed in various ways and be given a shape tapering from the filling tube 2 in order to facilitate the insertion of the end portion 5 of the filling tube 2 into the filling duct 13 of the container 12.

The end element 4 shown in Fig. 1 comprises an upper part 14 and a lower part 15 in the shape of a tapering wedge, which is to be seen more clearly in Fig. 4.

35 The upper part 14 has been given a shape which
substantially corresponds to the shape of a convex lens.

The upper part 14 further has a central through hole 16, which is enclosed by a bevel 17.

As mentioned above, the lower part 15 has the shape of a tapering wedge. The upper side of the lower part 15 thus forms a base which has a shape which, similarly to the upper part 14, substantially corresponds to the shape of a convex lens. A peripheral groove 18 is formed in the upper side of the lower part. Finally, a central, threaded non-through hole 19 is formed in said lower part 15.

The piston rod 9 has a connecting portion 22 provided with a thread 20 and a stop lug 21. To connect the end element 4 to the piston rod 9, the connecting portion 22 of the piston rod 9 is inserted through the hole 16 in the upper part 14 until the upper part is made to engage said stop lug 21. Then the connecting portion 22 of the piston rod 9 is screwed into the threaded hole 19 of the lower part 15. A seal 8 in the form of an O-ring is arranged in the peripheral groove 18 of the lower part 15, which O-ring thus will be squeezed against the upper part 14. The O-ring ensures, as described above, that the end element 4, when in said first position, sealingly connects to the outlet 6 of the end portion 5 of the filling tube 2.

An end element 4 formed in the manner described above thus has a shape which facilitates the insertion of the end portion 5 of the filling tube 2 into the filling duct 13. An opening means (not shown) can be arranged for initial separation of the walls of the filling duct 13. This opening means may comprise suction cups which stick to the respective duct walls, which suction cups are then separated for separation of the duct walls.

The bevel 17 which encloses the hole 16 formed in the upper part 14 ensures that the product flowing out of the filling tube 2 through the filling passage 7 is allowed to flow over the end element 4 relatively unimpededly. This eliminates, or in any case reduces, the

tendency of the product flowing out to impinge on the upper side of the end element and be deflected upwards or sideways.

It will be appreciated that the present invention is
5 not limited to the shown embodiment.

For example, the end element 4 may have a liquid-repellent surface. This minimises the risk of dripping and depositing of product on the walls of the filling duct 13 after completion of the filling and removal of
10 the end portion 5 of the filling tube 2 from the filling duct 13 of the container 12. Of course, this helps to maintain good hygienic conditions in connection with the filling process.

To prevent the product from depositing on the walls
15 of the filling duct 13 in connection with removal of the end portion 5 of the filling tube 2, this can alternatively be dimensioned in such a manner relative to the filling duct 13 that removal of the end portion 5 is allowed without contact with the walls of the filling
20 duct 13.

It is also conceivable to give the end element 4 a different shape. It can thus be in the shape of a tapering wedge with a circular base, as illustrated in Fig. 7. The round base shape results in the product, when
25 flowing over the end element 4, having a symmetric flow pattern, thereby making it possible to completely eliminate the tendency of the product flowing out to be deflected upwards or sideways.

Several modifications and variations are thus
30 feasible, which means that the present invention is exclusively defined by the appended claims.

CLAIMS

1. A device for filling a container (12) of a
5 collapsible type with a product in the form of powder or
liquid, said container (12) having a compartment which is
defined by flexible walls and whose volume is dependent
on the relative position of the walls and which
communicates with the surroundings through a filling duct
10 (13) of the container (12), comprising
a filling tube (2) with an end portion (5), which is
insertable into said filling duct (13) of the container
(12) to supply a product to the compartment of the
container (12) through said filling tube (2),
15 c h a r a c t e r i s e d in that the device further
comprises
an end element (4), which is arranged in an outlet
(6) of the end portion (5) and which is movable between a
first position, in which the end element (4) sealingly
20 connects to said outlet (6), and a second position, in
which the end element (4) together with the outlet (6)
defines a filling passage (7), and
a squeezing means (3), which is adapted to grasp the
end portion (5) and the filling duct (13) when said end
25 portion (5) is inserted into said filling duct (13) to
establish a seal between the end portion (5) and the
filling duct (13),
said end portion (5) of the filling tube (2) being
made of a rigid material.
- 30 2. A device as claimed in claim 1, in which said
filling passage (7) has the shape of a circumferential
gap.
3. A device as claimed in claim 1 or 2, in which
said end element (4) is supported by a piston rod (9)
35 arranged in said filling tube (2).

4. A device as claimed in claim 3, in which the end element (4) is movable between said first and second position by axial movement of said piston rod (9).

5. A device as claimed in claim 3 or 4, in which a bevel (17) is arranged adjacent to the connection between said piston rod (9) and said end element (4).

6. A device as claimed in any one of the preceding claims, in which said end element (4) supports a seal (8), which when the end element (4) is arranged in said first position engages the outlet (6).

7. A device as claimed in any one of the preceding claims, in which the end element (4) has a shape tapering from the filling tube (2).

8. A device as claimed in any one of the preceding claims, in which the end element (4) has the shape of a wedge.

9. A device as claimed in claim 8, in which the end element (4) has a circular base.

10. A device as claimed in claim 8, in which the end element (4) has a base in the shape of a convex lens.

11. A device as claimed in claim 11, in which said material is stainless steel.

12. A device as claimed in any one of the preceding claims, in which said squeezing means (3) comprises elastic engaging surfaces (11) which are arranged to grasp said filling duct (13) and said end portion (5).

13. A device as claimed in any one of the preceding claims, in which said end element (4) has a liquid-repellent surface.