

Transport container with clamping disk

The invention relates to a container for the transport and the storage of liquids, with an inner container made of plastic for holding liquid and with an outer container made of plastic with a rigid lower bottom, a rigid shell and a rigid container top.

Such containers are known as IBCs (Intermediate Bulk Containers) and include a pallet so that they can be easily moved by forklift trucks. The liquid can be filled into and again removed from the inner container via a socket on the inner container and a dip tube. Such containers are often used for flammable, highly toxic, high purity and highly acidic liquids, for example for the semiconductor industry.

From DE 195 35 707 A1 a disposable and reusable container is known, which has an inner container on the upper side of which a filler neck is integrally formed, the end section of which projects outwards from the container top of the outer container. The filler neck is held in an opening in the rigid container top by means of a slotted clamping ring, the opening edge of the container top resting against the upper side of the inner container. The filler neck is closed with a screw cap.

During use of the container, changes in shape can occur on the inner container. For example, increased filling temperatures and the subsequent cooling phase can cause a vacuum in the inner container, which results in deformation of the inner container. The varying filling level of the inner container can also cause deformation. Such deformation also alters to a certain extent the exact position of the socket opening, which can be critical during filling and emptying because operators often wear protective clothing and protective gloves due to the hazardous contents, making fine motor handling difficult. The precise location of the socket relative to the container top is another problem. As a result of vibration during transport, the connection between the socket and the container top can loosen, causing the socket to move loosely and wobble in the opening, making it difficult to fill and remove liquid.

A German utility model application having the file number 20 2022 101 418.3 exists for the present patent application. The German Patent and Trademark Office has conducted a prior art search on this utility model application. The search report mentions two documents DE 10 2009 016 451 B3 and US 4 164 304 A, which are assigned to category A (documents defining the technological background).

It is the object of the invention to specify a container for the transport and the storage of liquids, which is simple in construction and improves handling when filling and emptying the inner container.

This object is solved by the combination of features of claim 1. Advantageous embodiments are specified in the dependent claims.

In the invention, the socket, which is formed integrally with the inner container, has an external thread and an internal thread. A clamping disk with an internal thread can be screwed to the external thread of the socket, thereby clamping the container top at the edge of its opening. In this way, the socket is fixed to the rigid container top and cannot change its position relative to the outer container, even if deformation occurs on the inner container as a result of pressure differences or a variable filling level. Handling during filling and emptying is thus facilitated and the risk of spilling problematic liquids is avoided. Furthermore, the invention comprises a screw lock which interacts with the external thread of the socket and the internal thread of the clamping disk and is suitable for preventing unintentional loosening of the clamping disk and the socket. This measure also increases the safety of the container, because loosening or disconnection of the screw connection due to vibration during transport or when unscrewing the sealing plug is prevented.

According to an embodiment of the invention, at least the rigid container top consists of electrically conductive plastic. The conductivity is generated, for example, in such a way that electrically conductive carbon black particles or aluminum particles are admixed to the plastic. The electrical conductivity is adjusted in such a way as to dissipate electrical charges which may be generated as a result of frictional electricity during filling and emptying of

the inner container. The screwed connection of the container top to the inner container advantageously has a triple function, namely on the one hand the precise stationary fixing of the tube receptacle relative to the outer container, on the other hand protection against unintentional loosening of the container top from the socket and furthermore the avoidance of hazards due to electrical discharges.

Another embodiment provides that an electrically insulating sealing ring is arranged between the tube receptacle and the socket, and that the tube receptacle, which is made of electrically conductive plastic, comprises an electrically conductive contact element that is electrically conductively connected to the clamping disk. Such a sealing ring, for example made of TPE (thermoplastic elastomer), provides a liquid-tight seal between the inner container and the outside world. With the aid of the electrically conductive contact element, the electrically insulating seal is bridged so that continuous electrical conductivity is ensured between the tube receptacle, the clamping disk and the container top, further reducing the risk of spontaneous electrical discharge.

A further advantageous embodiment is characterized in that an anti-rotation lock is provided which interacts with the contact element, the tube receptacle and the clamping disk and is suitable for preventing relative rotation of the tube receptacle and the clamping disk. With the aid of this anti-rotation lock, the tube receptacle is fixed to the clamping disk. This clamping disk, in turn, is secured against unintentional loosening by the screw lock mentioned further above. This means that even if a sealing plug is firmly seated in the tube receptacle, for example because it is screwed in very tightly or the threaded connection has become rigid due to deformation, the tube receptacle is not moved when this sealing plug is unscrewed, thus improving the safety of the entire container. For example, this prevents liquid from sloshing out. The interaction of the screw lock and the anti-rotation lock thus ensures that even if the sealing plug is relatively tight, the tube receptacle and the clamping disk do not come loose from the screwed connection, resulting in increased safety for the entire container.

According to a preferred embodiment, the inner container with the integral socket is made

of HDPE in a blow molding process or a plastic rotational molding process.

Embodiments of the invention are explained below with reference to the figures.

Fig. 1 shows a transport container for the transport and the storage of liquids in a perspective exploded view.

Fig. 2 shows a schematic cross-section through the container.

Fig. 3 shows an exploded view showing parts of the device for filling and/or emptying the inner container, as well as a section of the container top and the socket of the inner container.

Fig. 4 shows the contact ring with contact arms in various partial views.

Fig. 5 shows a partial cross-section in the assembled state of the device for filling and/or emptying the inner container.

Fig. 6 shows a schematic detailed view of detent cams and locking cams.

Fig. 7 shows another embodiment with contact lugs on the contact ring.

Fig. 8 shows another example with contact lugs on the tube receptacle, and

Fig. 9 shows the detent toothing on the contact ring and the tube receptacle.

Fig. 1 shows in a perspective exploded view parts of a transport container 10 according to the invention for the transport and the storage of liquids. In Fig. 2, a cross-section through the transport container 10 is shown. This transport container 10 comprises an outer container 12 made of electrically conductive plastic, preferably PE, having a rigid lower bottom 14 resting on a pallet 16 that has the dimensions of a Euro pallet. The outer

container 12 further comprises a rigid shell 18 and a rigid container top 20 or lid. Housed within the outer container 12 is an inner container 22 made of plastic, preferably high purity HDPE, for holding liquid. At least one device 24 for filling and/or emptying the inner container 22 is connected to the rigid container top 20 and the inner container 22. A dip tube 25 forming part of this device 24 extends into the interior of the inner container 22. The inner container 22 is filled and emptied via this dip tube 25. An electrical ground connection 13 is provided for discharging electrical charges from the outer container 12.

Fig. 3 shows in an exploded view further details of said device 24 and its attachment to the container top 20 and the inner container 22. An upwardly open socket 28 is integrally formed on the inner container 22. Said socket 28 has an external thread 30 and an internal thread 32. The inner container 22 is formed by a blow molding or rotational molding process in which the socket 28 is formed with its threads 30, 32 and at least one detent element 40. The rigid container top 20 includes an opening 34 surrounding the socket 28 with clearance.

The device 24 includes a clamping disk 36 having an internal thread 38, which is adapted to be threadedly engaged with the external thread 30 of the socket 28 during assembly, thereby clamping the container top 20 at the edge of its opening 34.

At least one first detent element 40 is formed at the bottom of the external thread 30. On the side of the clamping disk 36 facing the socket 28, at least one second detent element 42 is formed in the lower region of the internal thread 38. A screw lock is formed with the aid of these two detent elements 40, 42, wherein the detent elements 40, 42 latch with one another when screwing in clockwise direction, given a clockwise threading, of the clamping disk 36 with the socket 28. During this latching operation, a positive fit is formed which prevents the clamping disk 36 from detaching from the socket 28 after the screw connection is established. The clamping disk 36 includes peripheral recesses 44, in which a tool (not shown) can engage in order to be able to perform the screwing with sufficient torque. Preferably, the first detent element is formed as a protruding detent cam 40 on the lower circumference of the external thread 30 of the socket 28 and the second detent

element on the clamping disk 36 is formed as a locking cam 42 on the lower circumference of the internal thread 38. The formation of the detent cam 40 on the core cylinder of the external thread 30 has the advantage that a reliable latching takes place even in the event of thickness variations of the container top 20. However, it is also possible to form the first detent element 40 on the end face of the inner container 22, which then faces a second detent element 42 formed on the end face of the clamping disk 36.

A tube receptacle 26 has an external thread 46 in its upper region, which can be screwed to the internal thread 32 of the socket 28. The tube receptacle 26 supports the dip tube 25, which is shown greatly shortened. A contact ring 50, which is made of electrically conductive plastic, rests on an end face 49 of the tube receptacle 26. On its underside facing the tube receptacle 26, the contact ring 50 has first detent means 52, for example a detent toothing. These detent means 52 cooperate with second detent means 54 present on the end face 49, for example also a detent toothing. A sealing plug 56 having an external thread 58 is used for liquid-tight sealing of the inner container 22. The external thread 58 is screwed into the internal thread 48 of the tube receptacle 26. With this screw connection, a stationary locking of the contact ring 50 is effected by the first detent means 52 and the second detent means 54, so that the rotational position of the contact ring 50 and the tube receptacle 26 is clearly fixed. The pitch of the detent means 52, 54 defines the angular resolution for the rotational position of the contact ring 50. For example, the angular resolution is increased by a small tooth pitch of the detent toothing.

In the example shown in Fig. 3, the contact ring 50 has contact arms 60 bent radially outward and downward along its circumference, which include third detent means (not shown in Fig.3). These third detent means cooperate with fourth detent means 64 along the circumference at the clamping disk 36 and engage therein during screwing. In this manner, relative rotation of the tube receptacle 26 with respect to the clamping disc 36 and thus relative to the socket 28 is prevented.

Fig. 4 shows further details in several partial illustrations, in particular how the contact ring 50 latches with the clamping disk 36. In the lower image part, the device 24 is shown in the

assembled state. In the middle part, detail C is shown enlarged. The upper image part shows the contact ring 50 with the contact arms 60, and below that a magnified view E of a contact arm 60. Each contact arm 60 includes a detent element 66. This detent element 66 engages in gaps 68 between adjacent detent cams 64 that form the fourth detent means along the circumference of the clamping disk 36. The contact ring 50 is made of flexible plastic material and is clicked onto the ring comprising the detent cams 64, with the contact arms 60 engaging under the detent cams 64.

When assembling the parts according to Figs. 3 and 4, first the clamping disk 36 is screwed with its internal thread 38 to the external thread 30 with the aid of a tool engaging in the recesses 44, wherein on the one hand, the container top 20 is clamped and, on the other hand, the first detent element 40 slides elastically over the second detent element 42 and locks into place to form a screw lock. Then the tube receptacle 26 is inserted into the socket 28 and its external thread 46 is screwed into the internal thread 32. The contact ring 50 is then placed on the end face 49 of the tube receptacle 26, with the first detent means 52 coming into contact with the second detent means 54 of the tube receptacle 26. The contact arms 60 engage over the ring of detent cams 64 and the detent element 66 engage in gaps 68 between the detent cams 64, thereby fixing the rotational position of the contact ring 50. Finally, the external thread 58 of the sealing plug 56 is screwed to the internal thread 48 of the tube receptacle 26. With the aid of the anti-rotation lock, on the one hand, that is formed by the first detent means 52 on the contact ring 50 and the second detent means 54 on the tube receptacle 26 as well as the third detent means 66 and the fourth detent means 64, and of the screw lock comprising the first detent element 40 and the second detent element 42, on the other hand, an unintentional loosening or disconnection of the connection of the clamping disk 36 and the tube receptacle 26 from the socket 28 is not possible when unscrewing the sealing plug 56 in the counterclockwise direction for releasing the sealing plug 56, for example for filling or emptying the inner container 22. In this way, on the one hand, the position of the tube receptacle 26 is clearly and precisely fixed and, on the other hand, the rotational position with respect to the tube receptacle 26 cannot change, which improves the handling and the safety of the entire container.

Fig. 5 shows a partial cross-section in the assembled state of the device 24 for filling and/or emptying the inner container 22. Identical parts are designated identically. The socket 28 formed on the inner container 22 receives with its internal thread 32 the tube receptacle 26 with the external thread 46. The clamping disk 36 clamps the container top 20, with an annular fluid-tight seal 68 providing a sealing (for example, seal 68 is made of a thermoplastic elastomer molded on flat). An electrically insulating sealing ring 70 (for example, also made of thermoplastic elastomer) is arranged between tube receptacle 26 and socket 28. The tube receptacle 26, the clamping disk 36 and also the container top 20 are made of electrically conductive plastic for dissipating electrical charges. The inner container 22 made of HDPE is electrically non-conductive. Therefore, the important contact element in the form of the contact ring 50 is required, which establishes the necessary electrically conductive connection between tube receptacle 26 via the clamping disk 36 and the container top 20. The sealing plug 56 is screwed with its external thread 58 into the internal thread 48 of the tube receptacle 26 and is sealed in a liquid-tight manner via a further annular seal 72. The tube receptacle 26 has a further internal thread 74. This internal thread 74 is firmly connected to an external thread of an adapter device (not shown) during filling and/or emptying of the inner container 22, via which adapter device the liquid to be filled in is removed from a tank or the liquid to be removed is supplied to a further device.

Fig. 6 shows a schematic illustration as a cross-section through the socket 28 at the level of the detent cam 40 and the locking cam 42 of the clamping disk 36 in the screwed state (cf. Fig. 3). The detent cam 40 has a run-up slope 40a, a plateau portion 40b and a descending edge 40c. The locking cam 42 has a run-up slope 42a, a plateau portion 42b and a detent nose 42c. When screwed in the direction of arrow P1, the run-up slopes 40a and 42a slide over each other, with the locking cam 42 yielding elastically relative to the material of the socket 28. After sliding over the plateau section 40b, the detent nose 42c engages resiliently at the descending edge 40c and locks in the opposite direction. The engagement of the detent nose 42c can be felt by an operator, as a result of which the handling is further improved.

Fig. 7 shows another embodiment in which the contact element is formed as a contact ring 76 with lugs 78. Screws 80 engage as fasteners in gaps 68 between detent cams 64 through the lugs 78 provided with threads 79, thus establishing an electrical contact. The screws 80 may be made of electrically conductive plastic. As in the embodiment according to Fig. 3, the contact ring 76 can comprise a detent toothing and the tube receptacle 26 can also comprise a detent toothing, so that an exact angular position can be set when the contact ring 76 and the tube receptacle 26 are latched with one another.

Fig. 8 shows another embodiment, wherein lugs 78 are formed along with the tube receptacle 26 at the edge and have electrical conductivity. With their respective tips, the screws 80 can be brought into electrical and mechanical resilient contact with the surface of the electrically conductive clamping disk 36. To prevent relative rotation of the tube receptacle 26 and the clamping disk 36, the tip of the respective screw 80 engages in the gap 68 between adjacent detent cams 64. In Fig. 8, a plurality of coding holes 82 can be seen. Corresponding coding pins engage in these when the tube receptacle 26 is connected to the adapter device during filling/emptying and prevent incorrect operation.

Fig. 9 shows details of the detent toothing of the contact ring 50 and the tube receptacle 26 (cf. also Fig. 3). The first detent means on the contact ring 50, identified with 52, comprise a ring of projecting detent teeth 52a, and the second detent means on the circumference of the tube receptacle 26, identified with 54, comprise a further ring of projecting detent teeth 54a. During latching, the opposing detent teeth 52a, 54a engage in the recesses of adjacent teeth and prevent mutual rotation of the contact ring 50 and the tube receptacle 26.

List of reference signs

10	transport container
12	outer container
13	electrical ground connection
14	lower bottom
15	pallet
18	shell
20	container top
22	inner container
24	device for filling and/or emptying
25	dip tube
26	tube receptacle
28	socket
30	external thread
32	internal thread
34	opening
36	clamping disk
38	internal thread
40	first detent element, detent cam
40a	run-up slope
40b	plateau portion
40c	edge
42	second detent element, locking cam
42a	run-up slope
42b	plateau portion
42c	detent nose
44	recess
46	external thread
48	internal thread
49	end face

50	contact element, contact ring
52	first detent element, detent toothing
52a	detent tooth
54	second detent means, detent toothing
54a	detent tooth
56	sealing plug
58	external thread
60	contact arm
64	fourth detent means, detent cam
66	third detent means, detent element
68	gaps
70	electrically insulating sealing ring
72	sealing ring
74	further internal thread
76	contact ring
78	lugs
79	thread
80	screw
82	coding hole

Claims

1. A container (10) for the transport and the storage of liquids,

with an inner container (22) made of plastic for holding liquid,

an outer container (12) made of plastic with a rigid lower bottom (14), a rigid shell (18) and a rigid container top (20),

at least one upwardly open socket (28) on the top of the inner container (22) for filling and/or emptying the inner container (22), the socket (28) being formed integrally with the inner container (22) and having an external thread (30) and an internal thread (32), and the container top (20) including an opening (34) which surrounds the socket (28) with clearance,

a clamping disk (36) with an internal thread (38), which can be screwed to the external thread (30) of the socket (28), thereby clamping the container top (20) at the edge of its opening (34),

a screw lock which cooperates with the external thread (30) of the socket (28) and the internal thread (38) of the clamping disk (36) and is suitable for preventing unintentional loosening of the clamping disk (36) and the socket (28),

a tube receptacle (26) supporting a dip tube (25) and having an internal thread (48) and an external thread (46) which can be screwed into the internal thread (32) of the socket (28),

and with a sealing plug (56) with an external thread (58), which can be screwed into the internal thread (48) of the tube receptacle (26) and closes the latter in a liquid-tight manner.

2. The container according to claim 1, characterized in that the screw lock comprises:

at least one first detent element (40) on the socket (28) and at least one second detent element (42) on the side of the clamping disk (36) facing the socket (28),

wherein, when screwing the internal thread (38) of the clamping disk (36) onto the external thread (30) of the socket (28), the first detent element (40) and the second detent element (42) are latched with one another to prevent loosening of the screw connection.

3. The container according to claim 2, characterized in that the first detent element (40) is formed integrally with the inner container (22).

4. The container according to claim 3, characterized in that the first detent element is formed as a detent cam (40) on the cylindrical shaft at the bottom of the external thread (30) of the socket (28) and the second detent element on the clamping disk (36) is formed as a locking cam (42) on the lower circumference of the internal thread (38) of the clamping disk (36).

5. The container according to one of the preceding claims, characterized in that at least the rigid container top (20) is made of electrically conductive plastic.

6. The container according to one of the preceding claims, characterized in that an electrically insulating sealing ring (70) is arranged between the tube receptacle (26) and the socket (28), and in that the tube receptacle (26), which is made of electrically conductive plastic, comprises an electrically conductive contact element (50, 76, 78) which is electrically conductively connected to the clamping disk (36).

7. The container according to claim 6, characterized in that an anti-rotation lock is provided which cooperates with the contact element (50, 76, 78), the tube receptacle (26) and the clamping disk (36) and is suitable for preventing relative rotation of the tube

receptacle (26) and the clamping disk (36).

8. The container according to claim 7, characterized in that the contact element is configured as a contact lug (76, 78) which can be fixed on the upper side of the clamping disk (36) by means of an electrically conductive fastening element (80).

9. The container according to claim 7, characterized in that the anti-rotation lock comprises:

first detent means (52) on the contact element formed as a contact ring (50) and

second detent means (54) on the tube receptacle (26),

wherein, when the contact ring (50) is clamped between the sealing plug (56) and the tube receptacle (26), the first detent means (52) and the second detent means (54) are latched with one another to prevent rotation of the contact ring (50) relative to the tube receptacle (26).

10. The container according to claim 9, characterized in that the anti-rotation lock has a locking lug (78) projecting radially from the contact ring (76), which locking lug (78) can be fixed in the edge region of the clamping disk (36) after the tube receptacle (26) has been screwed to the socket (28) in order to prevent relative rotation of the tube receptacle (26) with respect to the clamping disk (36).

11. The container according to claim 9, characterized in that the contact ring (50) comprises radially outwardly directed contact arms (60) on its circumference, the contact arms (60) having third detent means (66) that cooperate with fourth detent means (64) on the clamping disk (36) to prevent relative rotation of the tube receptacle (26) with respect to the clamping disk (36).

12. The container according to claim 11, characterized in that the third detent means

on the contact arm (60) have detent element (66) that engage in gaps between outer detent cams (64) of the fourth detent means on the clamping disk (36).

13. The container according to one of the preceding claims, characterized in that the sealing plug (56) is made of electrically conductive plastic.