

Bung closure

The invention relates to a bung closure for the gas-tight and liquid-tight closure of a bung opening with an internal thread of a container, in particular a steel drum for storing and for transporting in particular hazardous liquid charges, in the form of a cup-shaped basic body made from metal, with a disk-shaped base and an adjoining, upwardly open, tubular ring part, on which an external thread is provided on the outer side, wherein at least one interlocking element in the form of a shaped sheet-metal strip or a tab is provided within the cup-shaped basic body for the fitting of a screwing tool for screwing the bung closure into, and unscrewing same from, the bung opening of the container.

Previously customary bung closures for tight head steel drums are manufactured completely from metal and are generally known per se. A bung closure of this type is known, for example, from the document US 7,287,662. The problem with said known bung closure is that, in certain applications, said bung closure has to be provided with a special, chemical-resistant phenol coating on the lower side coming into contact with the aggressive charge, including the external thread, to provide permanent protection against corrosion. However, this special paint coating can easily be abraded upon repeated unscrewing and screwing down of the bung closures, wherein, firstly, the paint abrasion then drops into the charge and contaminates the latter and, secondly, the abrasion points in the thread are coated too thinly or even no longer at all, and therefore corrosion forms there and the closure stoppers sometimes become highly seized or properly rusted in.

The same problem is described in Japanese document JP H04 239448 A. In the case of the bung closure made from metal that is known therefrom, a correspondingly solid external thread is formed on the outer side of the tubular ring part. In order to minimize a formation of dust and abrasion during the screwing in and unscrewing of the bung closure, a filmy special coating is applied to the internal thread of the container-side bung connector and also to the external thread of the bung closure. Said thin coating is composed of an epoxy resin composition modified with phenol, and of an olefinic hydrocarbon with excellent lubricating properties. This prevents the metallic thread of the bung connector coming into direct contact with the metallic thread of the bung

closure, and therefore metallic abrasion cannot drop into the interior of the container. There is also the risk here that the thin coating itself will be abraded.

In addition, the screw threads of the bung closures have to have a highly accurate fit and low tolerances in order to be screwable in an absolutely tightly closed manner into the bung connectors with comparatively small tightening torques.

The publication DE 35 05 426 C1 describes a classic bung plug made from solid plastic with an external thread for bung containers and with a corresponding internal thread in the bung connector of the filling and emptying opening. A customary depression for the insertion of a screw wrench is provided on the upper side of the bung plug. A thin metal ring for reinforcing the plastics plug is incorporated on the upper edge of said depression. Said metal ring is intended to absorb and support deformation forces acting toward the depression and therefore to avoid deformation of the plastics plug causing an undesirably high level of leakage.

In principle, plastics plugs have the disadvantage that the cams protruding from the side wall of the depression for the insertion of the screw wrench can very rapidly wear down because of the transmission of high torques and may become "lubricated" and completely fail under high loads. This disadvantageous effect is further reinforced in the case of the bung closure made from solid plastic that is known from DE 35 05 426 C1, since the plastics material behind the cams has been removed for the annular groove for inserting the metal ring, and therefore there is no longer any connection there with the solid plastics material of the bung plug and the cams as a result have even less support in the depression. The metal ring used is capable of being able to reduce ovalization of the plug, but said metal ring cannot assist in the transmission of torques, and instead therefore has a rather more weakening and interfering effect.

WO 2009/064032 A1 finally discloses a multiplicity of screw caps with a double sealing function for smaller containers, such as bottles, tins or containers from the kitchen or household. The screw caps are provided to be screwed on or unscrewed by hand. The bottle containers can be composed of glass, metal or plastic. The screw lids can be composed of thin sheet metal or of plastic as is customary in everyday use, in particular for foodstuff containers. The screw lids described have a central lid disk, on the edge

of which a double-walled, downwardly open, U-shaped threaded flange edge is molded. Said downwardly open flange edge accommodates, in its interior, the upper mouth edge of the bottle or of the container. A respective thread is formed here in the inner flange edge wall and in the outer flange edge wall. Correspondingly, the mouth edge of the container is also provided on the inside and on the outside with a respective thread which corresponds thereto and has a corresponding thread pitch. By means of the tight contact of the double threads, which intermesh on the inside and outside of the container mouth, between container and screw lid, relatively high sealing forces are intended to be applied with an improved sealing action. This known screw lid is not of the type in question, and therefore, for example, at least one interlocking element within a depression for the insertion of a tool wrench is lacking. In addition, the described double screw connection of the screw lid to the bung connector with only one internal thread cannot be used in the case of a steel drum.

Bung closures, such as, in particular, tight head steel drums, which are used, for example, in the chemical industry for storing and for transporting hazardous liquid charges (chemicals) customarily have to have passed an official design check. In said check, a container is subjected to different tests, such as, for example, an internal pressure test, a stacking test and a drop test, said tests also taking place at low temperatures. Said cold tests are carried out at -20°C, wherein the container is filled with a supercooled liquid which contains a high proportion of antifreezing agents. During said checking tests, the bung closures are inter alia also exposed with regard to the tightness thereof to high loadings.

It is therefore the object of the present invention to overcome the disadvantages of the prior art and to indicate a novel bung closure for bung containers, which bung closure is cost-effective to produce and is provided with rustproofing characteristics of the highest quality (without an additional coating of rustproofing paint), in particular for use for aggressive liquid charges. The novel bung closure here is at the same time also intended to have increased safety aspects and a protective function in the event of a fire (fire and heat impairment).

This object is achieved according to the invention by the features of patent claim 1. The dependent claims contain advantageous embodiments of the bung closure according to the invention. The improved properties with regard to rustproofing and the safety aspects, such as the protective function in the event of a fire (as rupture protection), are explained and described below.

Owing to the fact that the bung closure has a cup-shaped basic body made from metal, with a disk-shaped base and an adjoining, upwardly open, tubular ring part, wherein a plastics layer into which a corresponding external thread is formed – for screwing the bung closure into the bung opening in the bung connector of the steel drum – is applied to the outer side of the ring part, the same stability and strength as in the case of a conventional steel bung closure is ensured. In contrast to the conventional bung closures made from steel, into which, in a complicated additional working step, an external thread has to be rolled or cut, with removal of material, the present bung closure according to the invention has a stable plastics layer, in which the external thread is formed, on the outer side of the tubular ring part. As a result, the bung closure according to the invention is also lighter than conventional steel bung plugs.

In order to produce the “Composite bung closures” according to the invention, the cup-shaped basic body, as a metal blank, is simply inserted into an injection mold, after which a plastics layer, in which, by corresponding predetermination of the shape on the inside of the injection mold, a corresponding external thread is formed is sprayed – at least onto the outer side of the ring part. The plastics material used can be HD-PE (high density polyethylene), nylon or preferably PP (polypropylene). The layer thickness of the sprayed-on plastics layer is approximately 2 mm to 5 mm including the thread, wherein the external thread can be designed as a fine-pitch thread or, in the case of a thicker

plastics layer, as a coarse-pitch thread, in a standardized US version or EP version, depending on customer requirements.

In the case of the conventional steel bung closures, the threads of the bung closure and bung connector have to be manufactured in a highly precise manner and within exacting tolerance ranges, with resultant high reject rates during production. The bung closure according to the invention, in which the external thread is incorporated into the sprayed-on plastics layer, is excused small inaccuracies in the design of the thread of the bung closure, which inaccuracies can be compensated for by the elastic flexibility of the plastics thread. The tolerance ranges can therefore be somewhat larger and the fitting accuracy somewhat lower.

The bung closure according to the invention has a very important advantage over the previously used, conventional steel bung closures. In the event of a fire, if the drums are exposed to a direct flame action and, due to the production of heat with a rise in the temperature and pressure in the liquid charge, there is the great risk of the steel drums bursting – so to say exploding – due to excess pressure, and hazardous, environmentally harmful chemicals may escape, the bung closure according to the invention serves as a safety element or pressure control valve, since the plastics material of the sprayed-on plastics layer with the thread formed therein softens at increased temperatures and is finally squeezed out of the bung connectors because of the excess pressure arising in the interior of the drum, wherein the thread is then so to say “lubricated” in the axial direction, as a result of which the bung closure is squeezed out of the bung opening upward and the hazardous excess pressure can escape from the container without explosion-like destruction of the container – and the hazardous liquid charge remains in the container. In this case, because of the highly temperature-conductive cup-shaped metal basic body, more rapid heating and softening of the thin plastics threaded layer is obtained than by comparison with a solid plastics plug.

In a refinement of the invention, a two-part design of the bung closure according to the invention is provided, in which the upper part not coming into contact with the charge is composed of metal, preferably steel, and the lower part coming into contact with the charge is composed of plastic. Accordingly, the novel “composite bung closure” is structurally distinguished by a novel material structure, in which the advantages of a known solid plastics plug are combined with those of a solid steel plug.

Owing to the fact that a continuous, leakproof plastics layer in which the external thread is formed on the outer side of the ring part is applied to the entire outer surface – the downwardly pointing surface in the normal position – of the cup-shaped basic body (= metal blank) with the disk-shaped base and the tubular ring part, the advantageous construction of a novel composite bung closure is provided, said construction having the effect that a charge which is possibly aggressive to metal (acid) can no longer come into contact with the cup-shaped basic body composed of metal. The plastics layer, which covers the lower side of the cup-shaped basic body, which lower side faces the drum interior, can be designed to be comparatively thin in order to satisfy the function of a rustproof covering. The cup-shaped basic body, which is made from metal or steel, of the composite bung closure according to the invention can be designed to be thinner overall, wherein, nevertheless, the great advantage is retained that the filling factory and also the final customer does not have to undertake any change to the handling and automatic filling and removal system at the existing filling and removal plants. The previous steel bung closures in the automatic industrial-chemistry filling plants are customarily unscrewed from the containers – generally tight-head steel drums – which are supplied empty, by magnetic gripping tools of an automatic screwdriver directly prior to the filling operation, are held by the gripping tool and, directly after the filling operation, are screwed again in a gas-tight and liquid-tight manner into the bung openings of the steel drums by the magnetic screwdrivers. Said magnetic screwdrivers are also frequently used at larger final customers in order to remove the charge.

The optimum tightening torques of the magnetic screwdrivers can be freely preselected and adjusted depending on the shape and material of the respective seal (for example round seal, rectangular seal). An appropriate, chemical-resistant material (EVOH, Viton and the like) is selected for the seal depending on the aggressivity of the charge to be transported.

In an advantageous refinement, a sealing lip, which is also injection-molded on, can be integrated into the outer plastics layer above the external thread just below the upper flange edge of the metallic basic body. Said sealing lip, which is also injection-molded on, can also be composed of a different plastics material than the basic plastics layer and molded on by two-component injection molding. It is then thereby possible to save on attaching a separate seal.

For a fixed connection of plastic on metal, at least the tubular ring part is provided with a roughened surface (for example ribbing, etching) on the outer side, on the contact surface with the outer plastics layer, as a result of which the sprayed-on plastics layer enters into an interlocking-type connection with the metal surface. This makes it possible also to transmit high torques without there being the risk that the thin plastics layer could become detached from the metallic basic body.

Furthermore, it is provided, in a simple refinement of the invention, that, in the cup-shaped basic body of the bung closure according to the invention – in precisely the same manner as in a conventional steel bung closure – an interlocking element in the form of a shaped sheet-metal strip with interlocking arcs on the outer side is welded onto the outer side (surface) of the disk-shaped base within the cup-shaped basic body in a manner known per se. The interlocking element serves for the fitting of the screwing tools.

In another refinement of the invention, a respective integrated interlocking element in the form of an upwardly curved sheet-metal strip is formed from the disk-shaped base on two diametrically opposite sides within the cup-shaped basic body as a stop element for the customary screw wrench for bung closures. As a result, the known, welded-in interlocking element in the form of the specially shaped sheet-metal strip with interlocking arcs on the outer side can be completely dispensed with. The complicated production and the process to weld in the separate component are entirely omitted. The manufacturing process of the integrated, interlocking stop elements according to the invention takes place directly during the shaping (punching, pressing, pushing, deep-drawing) of the metallic cup-shaped basic body by a punching operation for the two sheet-metal strips which are bent upward in a tongue-shaped or tab-shaped manner. For the fixing support of said sheet-metal strips and for closing the resultant cutout in the disk-shaped base and possibly edge of the cup-shaped basic body, the two integrated interlocking elements or upwardly bent sheet-metal-strip tabs are insert molded in a completely leakproof manner with plastic in the direction of the tubular ring part, wherein said insert molding is then an integrated part of the continuous, leakproof plastics layer below the disk-shaped base.

In a preferred refinement of the invention, it is provided that a respective integrated interlocking element in the form of a sheet-metal tab curved upward and inward is formed from the tubular ring part and partially from the disk-shaped base on at least two diametrically opposite sides within the cup-shaped basic body, said sheet-metal tab being fixedly connected at its upper end to the tubular ring part or to the upper flange edge and being fixedly connected at its lower end to the disk-shaped base. The cutouts in the tubular ring part and in the disk-shaped base of the metallic basic body, which cutouts are produced by the sheet-metal tabs being pushed out, are filled in an interlocking and completely leakproof manner with plastics material projecting therein from the outer, tubular or lower, disk-shaped plastics layer. In terms of manufacturing, the production of the two-part bung closure according to the invention is distinguished in that a cup-shaped basic body (= blank) made from metal, with a disk-shaped base and an adjoining, upwardly open, tubular ring part, is preformed with integrated interlocking elements in the form of curved metal tabs which are pushed out, and then a cup-shaped plastics part which is matched thereto and likewise has a disk-shaped base and an adjoining, upwardly open, tubular ring part with an external thread is premanufactured in an injection mold, after which the cup-shaped plastics part is pulled over the cup-shaped metal basic body and is nonreleasably fixedly latched and connected to corresponding undercuts in the tubular ring part via a snap-on/latching connection.

This advantageous refinement can be produced not only in a simple and more cost-effective manner in terms of manufacturing (fewer components), but also high torques can be transmitted without there being the risk of the six welding points of the known interlocking element, which is welded in separately, being detached. The omission of the welded-in sheet-metal strip means that the surface of the disk-shaped base of the metallic cup-shaped basic body is very smooth and, as a result, for example, even simple screwing tools with a pneumatic suction holder (vacuum) could advantageously be used. Of course, the cup-shaped metal basic body can also be insert molded as an insert in a corresponding injection mold in order to form the outer cup-shaped plastics part.

The invention is explained and described in more detail below with reference to exemplary embodiments which are illustrated in the drawings, in which:

Figure 1 shows a bung closure according to the invention in a perspective view,

- Figure 2 shows another preferred embodiment of the bung closure according to the invention in a perspective view,
- Figure 3 shows the metallic cup-shaped basic body of the bung closure according to figure 2,
- Figure 4 shows the outer cup-shaped plastics part of the bung closure according to figure 2,
- Figure 5 shows a top view of the metallic cup-shaped basic body,
- Figure 6 shows a perspective view from below of the outer cup-shaped plastics part,
- Figure 7 shows a side view of the bung closure according to figure 2,
- Figure 8 shows a cross-sectional illustration according to intersecting line A-A in figure 7, and
- Figure 9 shows a partial cutout of the bung closure according to the intersecting line B-B in figure 5.

In figure 1, the reference number 10 denotes a bung closure according to the invention which has a cup-shaped basic body 12 made from metal, with a disk-shaped base 14 and an adjoining, upwardly open, tubular ring part 16 with an upper flange edge 26, wherein a tubular plastics layer 18 in which a corresponding external thread 20 is formed – for screwing the bung closure 10 into the bung opening in the bung connector of a steel drum – is applied to the outer side of the ring part 16. In the case of the two-part structural design of the bung closure 10 according to the invention, the upper part with the cup-shaped basic body 12 and welded-in interlocking element 22 – as in the case of customary steel bung plugs – is composed as before of metal or steel, while the lower part coming into contact with the charge is now composed of plastic. The plastics material is preferably composed of HDPE (high density polyethylene), but can just as

readily be selected from another suitable plastic, such as, for example, nylon or polypropylene (PP).

The metallic basic body 12 with the welded-in interlocking element 22 and the two interlocking arcs 24 for the use of a corresponding tool wrench furthermore permits customary handling with magnetic screwdrivers.

In the case of the two-part composite bung closure according to the invention, on the other side the liquid charge still only comes into contact with the sprayed-on plastics layer 18, 30 and no longer with the metallic basic body which is susceptible to rust. This makes it possible to dispense with a complicated and cost-intensive special coating, for example as corrosion protection for the metallic basic body. For the upper side (surface) of the composite bung closure, which side does not come into contact with the aggressive charge, a simple zinc coating or paint coating suffices against normal environmental influences, (rain, sun, wind). In the case of this variant embodiment, a separate sealing ring 28 is provided above the plastics external thread 20 and directly below the upper metallic flange edge 26.

Figure 2 shows another preferred refinement of the invention, in which two diametrically opposite, integrated interlocking elements 34 for the use of a tool wrench are provided within the cup-shaped basic body 12, said interlocking elements being formed from the disk-shaped base 14 by a punching operation as sheet-metal strips which are bent upward in a tongue-shaped manner. This makes it possible to completely save on the known, specially formed sheet-metal strip 22 which is welded in with six welding points and has interlocking arcs 24 on the outer side. The complicated production and the operation to weld in the separate component 22 are therefore entirely dispensed with.

The manufacturing operation of the integrated interlocking elements 34 according to the invention takes place directly during the shaping (punching, pressing, pushing, deep-drawing) of the metallic cup-shaped basic body 12, for example by a punching operation for the two U-shaped, upwardly bent sheet-metal strips. For the support of the two integrated interlocking elements 34 or upwardly bent sheet-metal strips and for tightly closing the resultant cutout in the disk-shaped base 14 of the cup-shaped basic body 12, said two integrated interlocking elements 34 or upwardly bent sheet-metal strips are insert molded with plastic in the direction of the tubular ring part 16, wherein said insert

molding is then an integrated rear filling part 36 of the continuous, leakproof plastics layer 30 below the disk-shaped base 14.

This advantageous embodiment with integrated interlocking elements can not only be produced simply and cost-effectively in terms of manufacturing (few components), but also high torques can be transmitted without there being the risk of the welding points of the welded-in, separate (known) interlocking elements being detached. The omission of the welded-in, known sheet-metal strip enables the surface of the disk-shaped base of the metallic cup-shaped basic body 12 to be smooth and flat without unevennesses caused by the welded-on, known sheet-metal strips, and, as a result, simple, automatic screwing tools with, for example, a pneumatic suction holder (vacuum) could advantageously also be used.

For better understanding, the metallic cup-shaped basic body 12 is illustrated once again separately in figure 3. The disk-shaped base 14 is adjoined on the outer side by a protruding, tubular ring part 16 which ends on the upper side with an upper flange edge 26. Two diametrically opposite sheet-metal tabs 40 as integrated interlocking elements for the attachment of a tool wrench are formed inward into the metal cup from the ring part 16 and the base 14. In the center of the disk-shaped base 14, a bore 50 can be provided centrally, optionally for the use of a special degassing or ventilation device. Said bore 50 is normally covered and sealed from below by the cup-shaped plastics part 38, which is illustrated separately in figure 4. The cup-shaped plastics part 38 can be sprayed directly onto the metallic basic body 12, which is inserted as an insert, in a corresponding injection mold, or can be premanufactured separately as an individual part in a simple injection mold. The premanufactured cup-shaped plastics part 38 is then pulled over the metallic basic body 12 and pressed thereon such that the inwardly pointing, round interlocking projections 48 latch from the outside into the corresponding, round interlocking cutouts 46 (for example bores or punched-out portions) in the tubular ring part 16 of the metallic basic body 12 in an interlocking and fixed manner. At the same time, the integrated rear fillings 36 of the cup-shaped plastics part 38 snap into the two formations behind the sheet-metal tabs 40 and latch there. The effect achieved by this advantageous refinement and connection of plastics cup and metallic basic body is that the torques required for fixedly screwing in and unscrewing the bung closures are very readily transmitted to the outer thread 20 of the tubular plastics layer 18 – precisely

to the location at which said torques are used. An undesirable slipping or rotation of the metallic basic body within the cup-shaped plastics part is therefore prevented.

Figure 5 once again shows a top view of the metallic basic body 12. It can be seen that the sheet-metal tabs 40 are fixedly connected toward the center to the disk-shaped base 14 and are fixedly connected toward the edge to the tubular ring part 16 and to the upper flange edge 26, and therefore said sheet-metal tabs provide a stable and fixed abutment for the use of a screwing tool, such as, for example, a torque wrench.

Figure 6 shows the outer cup-shaped plastics part 38 in a perspective view from below. The diametrically opposite, integrated rear fillings and two cutouts, which are located next to each other and have lateral projections as a snap-on/latching connection 42 in the recesses of the sheet-metal tabs 40 of the metallic basic body 12 can be seen. Said cutouts do not necessarily have to be realized and are merely provided here for the purpose of saving on plastics material and reduced shrinkage. In this embodiment of the cup-shaped plastics part 38, an integrated sealing lip 32 (sealing ring), which is also injection-molded on, is provided at the upper end of the external thread 20.

Figure 7 shows the bung plug 10 in a side view with a separate sealing ring 28. A cross-sectional illustration along the intersecting line A-A is illustrated in figure 8. The section here runs precisely through the rear fillings 36 of the cup-shaped plastics part 38 with the disk-shaped plastics layer 30. Figure 9 finally shows a partial cutout of the bung closure according to the intersecting line B-B (in figure 5) through the tubular ring part 16 of the metallic basic body and the tubular plastics layer 18 with the external thread 20 of the cup-shaped plastics part. The cutouts for saving on material can be seen in the integrated rear filling 36. The rear filling has lateral projections for the snap-on/latching connection 42 to the metallic basic body.

In an advantageous manner, the version with a separately premanufactured plastics cup can best be realized with the preferred embodiment. The interlocking connections on the inside of the external thread ensure a secure support on the metallic basic body, and the plastics projections 48 engaging like a pin in the outer side in an interlocking manner in the metallic basic body transmit the maximum torques at a direct location behind the plastics thread 20 for a reliable and firm screwing in and unscrewing of the composite bung closures according to the invention. The bung closures according to the

invention can be manufactured in all sizes, such as, for example, 2", 3" and $\frac{3}{4}$ " (2" closures S 70 x 6 mm, $\frac{3}{4}$ " closures S 38 x 6 mm, and 2" closures S 56 x 4 mm as per the VCI standard) or 2" buttress, BCS 56 x 4, or now ISO G2 x 11.5 (2" NPS) with a coarse-pitch or fine-pitch thread.

List of reference numbers

- 10** Bung closure
- 12** Basic body made from metal (10)
- 14** Disk-shaped base (12)
- 16** Tubular ring part (12)
- 18** Tubular plastics layer (16)
- 20** External thread (18)
- 22** Interlocking element (14)
- 24** Interlocking arc (22)
- 26** Upper flange edge (16)
- 28** Sealing ring (optional)
- 30** Disk-shaped plastics layer (12)
- 32** Sealing lip (20), which is also injection-molded on
- 34** Integrated interlocking element
- 36** Integrated rear filling (30)
- 38** Cup-shaped plastics part
- 40** Sheet-metal tab (14/16)
- 42** Snap-on/latching connection
- 44** Plastics projections (18, 30)
- 46** Interlocking cutouts
- 48** Interlocking projections
- 50** Central recess (bore)

Patent claims

1.) A bung closure (10) for the gas-tight and liquid-tight closure of a bung opening with an internal thread of a container, in particular a steel drum for storing and for transporting in particular hazardous liquid charges, in the form of a cup-shaped basic body (12) made from metal, with a disk-shaped base (14) and an adjoining, upwardly open, tubular ring part (16), on the outer side of which an external thread (20) is provided, wherein at least one interlocking element (22) in the form of a shaped sheet-metal strip or a tab is provided within the cup-shaped basic body (12) for the fitting of a screwing tool for screwing the bung closure into, and unscrewing same from, the bung opening of the container,

characterized in that

a stable plastics layer (18) in which a corresponding external thread (20) is formed from the outside – for screwing the bung closure (10) into the internal thread of the bung opening is provided on the outer side of the ring part (16), wherein the plastics-covered outer side of the ring part (16) of the cup-shaped basic body (12) made from metal remains completely free of any thread formations.

2.) The bung closure (10) as claimed in claim 1,

characterized in that

a continuous, leakproof plastics layer (18) in which the external thread (20) on the outer side of the ring part (16) is outwardly formed is applied to the entire outer surface of the cup-shaped basic body (12) (= metal blank) with the disk-shaped base (14) and the tubular ring part (16).

3.) The bung closure (10) as claimed in claim 1 or 2,

characterized by

a two-part cup-shaped design, in which an upper cup-shaped part (12) not coming into contact with the charge is composed of metal (= metal blank), preferably steel, and a lower cup-shaped part coming into contact with the charge is composed of plastic (18).

4.) The bung closure (10) as claimed in claim 1, 2 or 3,

characterized in that

an interlocking element (22) in the form of a sheet-metal strip with interlocking arcs (24) on the outer side is welded onto the outer side of the disk-shaped base (14) within the cup-shaped basic body (12).

5.) The bung closure (10) as claimed in claim 1, 2, 3 or 4,

characterized in that

the continuous, stable plastics layer (18) with the external thread (20) on the outer side is sprayed onto the entire outer surface of the cup-shaped metallic basic body (12) with the disk-shaped base (14) and the tubular ring part (16).

6.) The bung closure (10) as claimed in claim 5,

characterized in that

at least the tubular ring part (14) of the metallic basic body (12) is provided with a roughened surface on the outer side, on the contact surface with the outer plastics layer (18), as a result of which the sprayed-on plastics layer (18) enters into a frictional- and interlocking-type connection with the metal surface.

7.) The bung closure (10) as claimed in one of the preceding claims 1 to 6,

characterized in that

onto the cup-shaped basic body (12) made from metal, with the disk-shaped base (14), with the adjoining, upwardly open, tubular ring part (16) and the interlocking elements (34) integrated therein, a cup-shaped plastics part (38) which is matched thereto, is premanufactured by injection molding and has a disk-shaped base (30) and an adjoining, upwardly open, tubular ring part (18) with an external thread (20) is pulled and is nonreleasably fixedly latched thereon and connected to corresponding undercuts via a snap-on/latching connection (42).

8.) The bung closure (10) as claimed in one of the preceding claims 1 to 7,

characterized in that

a peripheral sealing seat for the insertion of a separate sealing ring is formed in the outer plastics layer (18) above the external thread (20) and directly below an upper flange edge (26) of the metallic basic body (12).

9.) The bung closure (10) as claimed in one of the preceding claims 1 to 7,

characterized in that

the outer plastics layer (18) has an integrated sealing lip (32), which is also injection-molded on, above the external thread (20) and directly below the upper flange edge (26) of the metallic basic body (12).

10.) The bung closure (10) as claimed in claim 9,

characterized in that

the sealing lip (32), which is also injection-molded on, is composed of a different plastics material than the plastics layer (18) made from basic plastic, and is formed by two-component injection molding.

11.) The bung closure (10) as claimed in one of the preceding claims 1 to 9,

characterized in that

a respective integrated interlocking element (34) in the form of a curved, upwardly protruding sheet-metal strip is formed from the disk-shaped base (14) and/or from the tubular ring part (16) on at least two diametrically opposite sides within the cup-shaped metallic basic body (12).

12.) The bung closure (10) as claimed in claim 11,

characterized in that

the integrated interlocking elements (34) are at least partially backed in a supporting manner with plastic in the direction of the tubular ring part (16), wherein said rear filling (36) is an integrated part of the continuous, leakproof plastics layer (30) below the disk-shaped base (14).

13.) The bung closure (10) as claimed in one of the preceding claims 1 to 12,

characterized in that

a respective integrated interlocking element (34) in the form of an inwardly curved sheet-metal tab (40) is formed from the tubular ring part (16) and partially from the disk-shaped base (14) on at least two diametrically opposite sides within the cup-shaped metallic basic body (12), said sheet-metal tab being connected fixedly at its upper end to the tubular ring part (16) or to the upper flange edge (26) and being fixedly connected at its lower end to the disk-shaped base (14).

14.) The bung closure (10) as claimed in one of the preceding claims 1 to 13,

characterized in that

a pin-like plastics projection (44) which is integrated into the plastics layer (18) is formed on at least two diametrically opposite sides on the inner side of the plastics layer (18) – approximately opposite the external thread (20), said plastics projection engaging in an interlocking manner from the outside with a precise fit into the cutouts in the ring part (16) and optionally partially in the disk-shaped base (14), which cutouts are formed by the formation of the inwardly curved sheet-metal tabs (40).

15.) A method for producing a two-part bung closure for the gas-tight and liquid-tight closure of the bung opening of a container, in particular a steel drum for storing and for transporting in particular hazardous liquid charges,

characterized in that

a cup-shaped basic body (= blank) made from metal, with a disk-shaped base and an adjoining, upwardly open, tubular ring part is inserted into an injection mold, after which a plastics layer is permanently sprayed at least onto the outer side of the tubular ring part, wherein – by corresponding predetermination of the shape on the inside of the injection mold - a corresponding external thread is formed in the plastics layer.

16.) A method for producing a two-part bung closure for the gas-tight and liquid-tight closure of the bung opening of a container, in particular a steel drum for storing and for transporting in particular hazardous liquid charges,

characterized in that

a cup-shaped basic body (= blank) made from metal, with a disk-shaped base, integrated interlocking elements and an adjoining, upwardly open, tubular ring part is preformed and then a cup-shaped plastics part which is matched thereto and has a disk-shaped base and an adjoining, upwardly open, tubular ring part with an external thread is premanufactured in an injection mold, after which the cup-shaped plastics part is pulled over the cup-shaped metal basic body and is nonreleasably fixedly latched and connected to corresponding undercuts via a snap-on/latching connection.