



**SEALED DOCKING ARRANGEMENT IN PARTICULAR FOR BAGS
AND A METHOD FOR THE FILLING AND EMPTYING OF
CONTAINERS IN AN ENVIRONMENTALLY-SEALED MANNER**

5 The invention concerns a sealed docking device between two essentially
environmentally isolated receptacles, whereby each receptacle is at least in areas
substantially flexible, in particular sack-shaped, and can be sealed or is sealed with
a coupling element in order that it can be sealed or shut tight and opened when the
coupling elements are tightly connected with one another. Furthermore, the
10 invention concerns said coupling elements as well as a method for essentially
environmentally-isolated filling and emptying of receptacles.

In many areas of industry (such as, for example, food processing, chemical or
pharmaceutical industry), products (as in the form of bulk material or fluids) are
15 decanted from a mainly stationary first receptacle into a transportable second
receptacle, or vice versa, whereby the industry in many cases is anxious to prevent
a contamination of the products and/or the environment by the products. Since
many products are very toxic to the human organism, even in extremely small
quantities, or other products react very sensitively to the effect of air, on the part of
20 the industry effective coupling elements or, respectively, docking devices have
been developed that enable a filling or emptying of a receptacle in an isolated or at
least dust-free state. For this, in the industry receptacles are conventionally filled
via a double-flap technique that, although it proves to be very efficient, is also very
cost-intensive due to the technical design as well as the materials used.

25 For example, known from DE 695 04 581 T2 is a sealed docking device according
to the species between two environmentally-isolated receptacles that comprise a
rigid, annular flange with a door. The flange as well as the door are preferably
produced from a hard plastic material. The receptacles, which can be fashioned in
30 the form of sacks, are preferably comprised of a soft plastic material. Plastic is
suggested in order to keep the material costs low, since the sacks are specified for



the one-time use. What is disadvantageous with this docking device is the (by design) very elaborate fabrication of the flange with its lifter mechanism serving for lifting, which unreasonably increases the production costs for a disposable object and is additionally user-unfriendly since it is unwieldy.

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It is therefore the object of the present invention to further develop the sealed docking device according to the species and the coupling elements belonging to this docking device, as well as the known method for environmentally-isolated filling of receptacles with bulk material or fluids, such that the disadvantages of the prior art are surmounted, and that in particular the handling is simplified and the production costs are reduced.

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This object is inventively achieved with regard to the docking device in that each coupling element is elastically deformable for opening and closing.

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It can also be provided that each coupling element comprises at least one slot or opening that, in the ground state, in particular is sealed tight via at least one sealing element, and can be opened via pressurization, preferably controlled and/or regulated, for filling and/or emptying of the corresponding receptacle.

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It is also inventively proposed that a first coupling element can be connected or provided with a device for pressurization, whereby via pressurization the first coupling element can be opened and, when in sealed connection to the other, second coupling element, forces an opening of the second coupling element.

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An inventive docking device is also inventively characterized by at least one sealing device to secure a coupling element not in arrangement with another coupling element, whereby the sealing device preferably prevents an opening of the slot of the first coupling element given pressurization.

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Among other things, an inventive docking device is characterized by at least one guide device, preferably comprising a stopper (as in the form of a bead), a flat peg, a diaphragm wall and/or the like, and/or at least one groove or recess on one side and/or at least one web or projection on the other side to engage on at least one coupling element and/or one sealing device, whereby the guide device in particular ensures an alignment of the slots of both coupling elements to be contacted with one another.

An inventive docking device is also characterized by at least one securing device to prevent the loosening of a sealed contact of the two coupling elements with one another or of a coupling element with the associated sealing device, whereby the securing device is preferably comprised by the guide device.

Alternatively, it is proposed that the guide device and/or the securing device is or, respectively, are comprised by a first coupling element with the device for pressurization.

Among other things, the inventive docking device is characterized in that in particular the top sides of the coupling elements can be laterally or axially connected. For example, the top sides of two corresponding coupling elements can be shifted sideways, i.e. laterally atop one another, as the case may be with the assistance of guide devices such as, for example, those described in the preceding.

It is also possible to fashion the coupling elements, in particular their top sides, such that the inventive docking device can be obtained via an axial coupling of the coupling elements.

For this, it can be provided that a coupling element comprises at least one axial guide device, in particular an essentially circumferential, continuously or discontinuously axial edge web on the top side provided for coupling, whereby the edge web is dimensioned such that an essentially sealed, tight and/or arrestable

closure is created with the coupling element to be docked. If, for example, the top sides facing one another of corresponding coupling elements form substantially smooth surfaces, an inventive docking device can be sealed via an axial edge web, for example formed from two separate axial individual edge webs along opposite
5 sides of a coupling element, in particular the longitudinal sides.

In a further inventive embodiment, the sides of the coupling elements to be coupled comprise continuous circumferential axial elevations, for example in the form of edges or rims, that can be attached over the entire extent with a second
10 coupling element and thus enable a sealed docking. In this case, at least one of the top sides of the coupling elements to be coupled comprises at least one continuous circumferential axial elevation that can be sealed with a second coupling element over the entire extent. In this manner, it leads to a sealed docking of two coupling elements, without that large surface areas of the sides of the coupling elements
15 facing one another come into contact with one another.

According to a further inventive embodiment, only one coupling element comprises the preceding specified circumferential axial edge or elevation on one side to be coupled, while the side of the second coupling element provided for
20 docking forms an essentially uniform, in particular planar surface, in particular in the area of the coupling with the circumferential edge of the first coupling element.

It is normally sufficient for an environmentally-isolated filling when at least the circumferential axial elevation and an edge or border of the open passage or slot on
25 the top side of the coupling element can be (in particular sealed) attached with the top side of a second coupling element to be docked, whereby in particular at least the circumferential axial elevation of the top side of the second coupling element and the edge or border of the open passage or slot of the top side of the first coupling element can be attached (in particular sealed) with the edge or border of
30 the open passage or slot of the top side of the second coupling element. This embodiment enables an inventive docking device to be fashioned from two

essentially identical coupling elements, whereby the necessity does not apply to have to keep ready respective differently fashioned coupling elements that, however, correspond with regard to their fit.

- 5 An axial edge web, continuous or discontinuous, can be attached to the inner and/or outer wall of the circumferential axial elevation, in particular to the outer wall of the same, in order to affix the coupling elements. The continuous or discontinuous edge web (provided as a guide device) on the top side of the coupling element can thereby be placed on the side walls of the same, or be an
- 10 integral component of the coupling element. If, for example, the axial extension of the side wall of the coupling element forms the continuous edge or elevation to attach to the second coupling element, the axial edge web serving as a guide device exists on the outside of the circumferential edge and axially protrudes over this.
- 15 In addition to the edge webs, or also alternatively, the inventive coupling elements can be affixed via arresting devices. For example, docked coupling elements can comprise rails or plug modules positioned adjacent to one another via which (for purposes of affixing) a connector block can be guided or, respectively, that can be plugged into one another. It is also possible to arrest coupling elements in a known
- 20 manner via clamp fasteners or clips, in particular temporarily.

- In a further preferred embodiment, at least one side of at least one coupling element of an inventive docking device, in particular the side provided for docking, comprises at least in areas an adhesion and/or bonding layer. Preferred adhesion
- 25 and bonding agents are those that normally allow a decoupling of coupling elements connected with one another but that at the same time possess a sufficient adhesion property in order to, for example, preferably permanently bind bulk material not completely decanted. If the coupling ensues via the previously specified circumferential edges or, respectively, circumferential elevations adjacent
- 30 to one another, an adhesion or bonding agent is preferably only provided in the region sealed by this circumferential edge of the top side of a coupling element to

be docked. In an embodiment, both of the sides of the coupling elements to be coupled are provided with an adhesion or bonding agent. However, it is as a rule completely sufficient for coupling to provide only the side of the first coupling element with an adhesion or bonding agent. In this manner it is already frequently
5 prevented that bulk material remaining in or on the passage slot and not completely transferred contaminate the environment upon decoupling of the coupling elements, for example after the end of a filling event. Dust-like or fine-particle products that remain in the area of the coupling elements after the filling event are bound with the aid of the bonding agent and can therefore no longer escape into the
10 environment. The use of an adhesion or bonding layer has proven to be of great value, in particular in the handling of products that can cause damage to the environment or health. It has likewise proven to be advantageous to use a bonding layer that can be detached from its base. For example, bonding ribbons or films adhesive on both sides are suitable, whereby the adhesive properties of the
15 respective film sides are preferably adapted to their specific use in order to achieve a reliable and permanent connection to the adhesive base, meaning, for example, the top side of the coupling element, and on the other hand to ensure with the second adhesion or bonding layer the prevention of a residual contamination with bulk material.

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According to a further inventive embodiment, it is provided that a coupling element, essentially environmentally isolated, is connected with or can be connected with at least one (in particular translucent or transparent) flexible receptacle comprising at least one extraction device, in particular in the form of a
25 spoon, a spatula or a sealable receptacle, in particular for sample extraction.

It can thereby be provided that the extraction device is connected or can be connected at least in regions with the flexible receptacle, in particular at its back or bottom end. In that a extraction device is already provided in a flexible receptacle,
30 smaller quantities of material can also already (in a safe and simple manner) be extracted from a receptacle that possesses a corresponding inventive coupling

element with which an inventive docking device can be fashioned. The receptacle provided for the sample extraction and comprising the extraction device is preferably adapted with regard to its size to the respective required sample quantity and the necessary extraction device. In this manner, the sample quantities can be
5 extracted from a receptacle for the purpose of further analysis without damaging it, or without having to effect another permanent opening or, respectively, sealing device of the receptacle. The necessity is thereby likewise done away with to have to work in specially prepared or, respectively, isolated rooms that, for example, comprise a permanent air extraction, in particular given the sampling of substances
10 posing a risk to health and/or environmentally dangerous.

Additionally, an inventive docking device is characterized in that each receptacle is attached, in particular bonded to the corresponding coupling element in the region of its slot.

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It can thereby be provided that each receptacle is attached to the corresponding coupling element at the inner surface of the slot.

It is further proposed that the slot is effected as a simple slot or cross-slot.

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It is also thereby proposed that at least one, in particular every coupling element comprises a food-compatible plastic such as EPDM, and/or silicon, or that at least one, in particular every coupling element is essentially comprised of bulk material material [sic], in particular polyethylene or polypropylene [sic], or that at least one,
25 in particular every coupling element, at least in areas, in particular at the locations that can come in contact with bulk material, comprises a coating that comprises bulk material material [sic] or is substantially comprised of bulk material material [sic], in particular polyethylene or polypropylene. LD-polypropylene is in this context also particularly preferably resorted to as a component or material for the
30 coupling element or a coating of the same. This inventive approach has, for example, proven to be advantageous in the decanting of plastic granulates, for

example in processing devices such as extruders or injection molding devices. The material of the coupling element or, respectively, its coating can thereby be adapted to a plurality of (for example, granulated) plastic materials to be decanted, in particular when, for example, high-purity plastic products are to be produced
5 such as are used, among other things, for electrical insulation. Even abrasion of the coupling elements generated in the decanting or particles chipped by this have no disadvantageous effect on the purity of the bulk material material [sic] in this inventive embodiment.

10 It is also inventively proposed that each coupling element comprises at least one spring element, preferably made of metal.

Also, an inventive docking device is characterized in that the receptacles, the coupling elements and/or the sealing devices are commonly recyclable.

15 Finally, it can be provided according to the invention that the receptacle to be emptied is part of a filling or production unit, and that the receptacle to be filled comprises a sack or container receptacle, or that the receptacle to be emptied represents a sack or a container receptacle, and that the receptacle to be filled [sic]
20 is a part of a production unit.

Furthermore, a coupling element for environmentally-isolated filling and/or emptying of receptacles is inventively [sic] that is firmly or detachably connected or can be connected in an essentially environmentally isolated manner on a first
25 side with at least one receptacle (substantially flexible at least in areas), whereby the coupling element is elastically deformable at least in areas and comprises a second side, in particular a top side that can be essentially tightly and in particular reversibly docked to a second side, in particular a top side of a second coupling element, whereby the stated coupling element is sealed in the ground state and can
30 be reversibly opened under elastic deformation, in particular over at least one slot,

such that a passage exists from the first side of the coupling element to the second side of the coupling element.

It can hereby be inventively provided that the top side of the coupling element
5 comprises at least one continuous circumferential axial elevation that can be attached, in particular sealed with a second coupling element over the entire extent.

A preferred embodiment of the invention is further characterized in that the circumferential axial elevation and an edge or border of the openable passage or
10 slot on the top side of the coupling element can be attached (in particular sealed) with the top side of a second coupling element to be docked, whereby in particular at least the circumferential axial elevation of the top side of the first coupling element and the edge or border of the openable passage or slot of the top side of the first coupling element can be attached (in particular sealed) with the edge or
15 border of the openable passage or slot of the top side of the second coupling element.

Thereby present in a further embodiment is an essentially axial guide device, in particular a continuous circumferential or discontinuous axial edge web on the top
20 side of the aforementioned coupling element, in particular on the circumferential axial elevation for formation of a sealed, tight and/or arrestable closure with a dockable second coupling element.

In a preferred embodiment, the coupling element possesses at least one guide
25 device comprising at least one groove or recess or at least one web or projection, in particular in the area of a side surface connecting the top and bottom side, to engage on a second coupling element additional information a sealing device.

Particularly preferred are also such embodiments that are characterized in that at
30 least one side of the coupling element, in particular the second side provided for environmentally-isolated docking [sic] to a second coupling element, comprise at

least in regions adhesive agent and/or a glue, in particular an adhesion or bonding layer. Suitable adhesion or bonding agents themselves do not generally contribute to the contamination of the bulk material, and are in particular food- and/or pharmaceutical-compliant or, respectively, unproblematic from food- and medical-
5 legal points of view.

Furthermore, it can be inventively provided that the peripheral edge region of the acceptance opening of the flexible receptacle is sealed or can be sealed with the circumferential edge (in particular the walls closely adjacent to one another in the
10 ground state) of the passage at least adjacent to the first side, with the surface of the first side, or with the side connecting the first and second side, with or without assistance of a clamping belt or elastic.

The inventive coupling element is further characterized by an in particular
15 circumferential, continuous or discontinuous axial edge on the second side of the aforementioned coupling element to form a sealing and/or positive-fit closure with a dockable second coupling element.

In an embodiment, an inventive coupling element is provided that provides at least
20 one (in particular translucent or transparent) flexible receptacle, connected with this in an environmentally-isolated manner, in which at least one extraction device is provided, in particular in the form of a spoon, spatula or in particular sealable receptacle.

25 The object concerning the method for (in particular environmentally-isolated) filling and/or emptying of receptacles is inventively achieved in that the coupling element is elastically deformable at least in regions, in particular comprises an elastic base body and a second side, in particular a top side, that is essentially tightly and in particular reversibly dockable with a second side, in particular a top
30 side of a second coupling element, whereby the aforementioned coupling element is sealed in the ground state, and under elastic deformation at least one passage can

be reversibly opened, in particular in the aforementioned elastic base body, such that a passage exists from the first side of the coupling element to the second side of the coupling element.

- 5 It can hereby be inventively provided that the first and/or second coupling element is sealed tight via at least one sealing device, for example a sealing clamp, before the formation of a docking device.

According to a particularly preferred embodiment, it is provided that each coupling
10 element comprises at least one slot, whereby a first coupling element is charged with pressure to form an opening, and whereby a second coupling element, located in sealed connection with the first coupling element, is charged with pressure to form an opening, whereby a passage from the first receptacle to the second receptacle is fashioned.

- 15 It is of particular advantage when the receptacle to be emptied is multiply, momentarily charged with pressure during the emptying event.

The first receptacle can also inventively be stationary, and the second receptacle
20 can be portable.

According to a further inventive embodiment, the second receptacle is only flexibly implemented in the area of the second coupling element.

- 25 Furthermore, it can be inventively provided that the second receptacle is a component of a filling or production device, or is connected with a production device, and that the first receptacle is filled via the filling or production device, or that the production device is filled via the first receptacle.

- 30 A method has proven to be particularly advantageous in which one slides the second coupling element over the first coupling element such that it seals, whereby

one slides the top side of the second coupling element over the top side of the first coupling element, in particular laterally, such that it seals, whereby in particular opposite [sic] second guide devices (in particular in the form of edges, in particular lengthwise edges) of the second coupling element engage in corresponding first
5 guide devices located on the opposite side (in particular in the form of grooves) of the first coupling element.

It can hereby be inventively provided that a sealing device sealing the first coupling element tight, in particular a sealing clamp, is shifted downwards by the
10 first coupling element upon insertion of the edges of the second coupling element into the grooves of the first coupling element.

It has proven to be particularly preferred that the top sides of the coupling elements are axially connected, in particular via at least one axial guide device.

15 The invention is thus based on the realization that, via the embodiment according to the present invention of a docking device to fill or, respectively, empty receptacles flexible at least in regions, an effective contamination-free decanting of bulk material and/or fluids is ensured, a simpler (in terms of design) assembly
20 offers a high reliability and security since defects due to technical shortcomings are nearly eliminated, and at the same time lower production and material costs result in that the coupling elements to open the entrance to the receptacles connected therewith are elastically deformable.

25 Additionally, given the filling or, respectively, emptying of receptacles, an inventive docking device provides the whole cross-section in the passage opening, whereas the use of double flaps in the known double-flap technology reduces the cross-section.

30 The inventive docking devices as well as coupling elements are in particular suited for environmentally-isolated filling of flexible receptacles directly from filling or

production systems. These docking devices and coupling elements can also be used reliably and without problems in order to, for example, be able to fill or, respectively, empty sacks, production systems, formulation systems, extruders and injection molding and glass shaping machines without contamination. In particular
5 when it is necessary to ensure that exclusively the materials provided for the production are used, for example in the introduction of educt materials in the synthesis of pharmaceutical products, the inventive docking device has or, respectively, the inventive coupling elements have proven to be extremely advantageous. For example, high-purity plastics can also be obtained, in that via
10 the inventive docking device granulate is directly filled into a plastic processing system, for example an extruder. Thus filling or, respectively, emptying stations in production systems can be fashioned substantially more simply and more cost-effectively with the inventive docking device without having to accept losses with regard to contamination-free work. The inventive coupling elements and docking
15 devices thus ensure both that the environment is not polluted with bulk material residues and that the bulk material to be transferred is not contaminated by substances and particles from the environment. Surprisingly, it was also found in this context that residual contaminations can be completely prevented via adaptation of the material or, respectively, coating used for the inventive docking
20 devices and coupling elements to the bulk material material [sic] to be decanted. In these castes [sic], even abrasion in the coupling elements ensuing in the decanting does not lead to a contamination of the bulk material, for example in the case of polymer granulate. The inventive coupling elements or, respectively, docking devices thus contribute both to environmental and product protection.
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Further features and advantages of the invention result from the specification below, in which an exemplary embodiment of an inventive docking device is explained in detail using schematic drawings. Thereby shown are:

30 Figure 1 a perspective view of a first coupling element in the closed state;

- Figure 2 a plan view of the first coupling element of Figure 1 in the partially-opened state;
- Figure 3 a perspective view of a sealing clamp;
- 5 Figure 4 a perspective view of the sealing clamp of Figure 3 in effective connection with the first coupling element of Figure 1 and 2;
- Figure 5 a perspective view of a second coupling element;
- 10 Figure 6 a perspective view of an inventive docking device comprising two coupling elements and two flexible receptacles;
- Figure 7 a perspective view of a first and second coupling element of an alternative inventive docking device;
- 15 Figure 8 a perspective view of a first coupling element according to Figure 7; and
- 20 Figure 9 a perspective view of a second coupling element according to Figure 7.

As is to be learned from Figure 1, an inventive docking device comprises a first coupling element 1 in the form of an elastomer body (fashioned oblong) with a side length L that comprises a groove 3 (fashioned rectangular) in each of its side surfaces 2. The grooves 3 are arranged in the side surfaces 2 such that on each side surface, respectively one web 6 of the height h and the depth t is fashioned, both by the underside 4 of the elastomer body with regard to the groove 3 and by the top side 5 with regard to the groove 3, such that the front side 7 as well as the back side 8 of the elastomer body respectively exhibit a maximum width b in comparison to their minimal dimension of $b-2t$ in the area of the grooves 3. In the

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elastomer body, a passage or, respectively, slot 9 is applied centrically between the side surfaces, said passage or, respectively, slot 9 being implemented continuously from the top side 5 to the underside 4 and extending over a length that is less than the side length L of the elastomer body, [sic] preferably can be in the range of 50 to 600 mm. A receptacle, for example in the form of a sack 10, is attached to the first coupling element 1, whereby the sack 10 can, for example, be bonded with the inner surface (see Figure 2) of the elastomer body formed by the passage or, respectively, slot 9.

10 According to Figure 1, the first coupling element 1 is exposed to no external forces whatsoever, and is thus located in its closed state in which the passage or, respectively, slot 9 is sealed tight. In this closed state, the inside of the sack 10 is sealed from the environment. For this purpose, the inner surface 11 of the slot 9 can be provided with additional sealing elements (not shown) such as lips or beads.

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In Figure 2, a partially open state of the first coupling element 1 is shown that results when the first coupling element 1 is charged with a force on its front side 7 and back side 8, as indicated by the arrow D in Figure 2. In this open state, the sack 10 bonded to the inner surface 11 of the slot of the first coupling element 1 can be filled or emptied such that it is metered. If the externally applied force is removed from the first coupling element, it goes back to its closed state shown in Figure 1.

Shown in Figure 3 is a sealing device in the form of a sealing clamp 12 for the first coupling element as a further component of the inventive docking device. This sealing clamp 12 comprises a base plate 13 (fashioned from essentially dimensionally stable material, for example hard plastic) with walls 14 of side length L arranged at a lateral distance b from one another. Edges 15 are molded on the walls 14 such that a recess 16 forms on the walls 14 on both sides of the base plate 13. The recesses 16 are thereby dimensioned with a height h and a depth t

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such that the sealing clamp 12 can be directed over the first coupling element 1 with friction-fit to engage the webs 6 in the recesses 16.

5 In Figure 4, an assembly is shown in which the sealing clamp 12 of Figure 3 is mounted on the first coupling element 1 of Figure 1 and 2 in order to prevent (via the form stability of the sealing clamp 12) an unintentional opening of the slot 9 of the first coupling element 1, and thus of the sack 10. Given a more or less sliding precision of register, the sealing clamp 12 or the first coupling element 1 can respectively comprise a small bead, tooth or the like (not shown) that engages in a
10 correspondingly fashioned negative form (likewise not shown) of the first coupling element 1 or, respectively, of the sealing clamp 12 in order to prevent such an unwanted sliding and opening of the sack 10, whereby this connection can however be released via light expended pressure.

15 Figure 5 shows a second coupling element 17' of the inventive docking device, made from an elastomer body that is designed essentially analogous to the sealing clamp 12, with a base plate 13', walls 14' and edges 15' to provide recesses 16'. However, the base plate 13' additionally comprises a continuous slot 9' similar to the first coupling element 1, on whose inner surface is attached (for example
20 bonded) a flexible second receptacle in the form of a sack 10'. The second coupling element 17' additionally comprises on its front side 7' a stopper 18' in the form of a diaphragm wall.

Figure 6 shows an inventive docking device 20 that is comprised of a first coupling
25 element 1 according to Figure 1 or, respectively, 4 and a second coupling element 17'' corresponding to coupling element 17' according to Figure 5, however without stopper 18' in the form of a diaphragm wall on the side 7'. The reference characters used in Figure 6 have the meaning previously discussed in Figures 4 and 5. A docking is achieved in that one slides the top sides 5 of the coupling elements
30 1 and 17'' laterally on top of one another. Naturally, it is likewise possible to

provide a docking device with a second coupling element analogous to the coupling element 17', which possesses a stopper 18'.

A first and second coupling element 1', 17''' of an alternative embodiment of a docking device 20' just before the docking is to be learned from Figure 7. While the coupling elements 1, 17'' are guided sideways or, respectively, laterally over one another in the docking device according to Figure 6 to form a sealed unit, the coupling elements 1', 17''', in particular their top sides 5' and 5'', are fashioned such that an axial docking ensues. The flexible receptacles typically attached to the undersides 4' and 4'' such that they are sealed from the environment have, for reasons of better clarity, not been shown. The top side 5' of the first coupling element 1' possesses a contour shape that substantially corresponds to that of the top side 5'' of the second coupling element 17'''. In the case of the environmentally-sealed docking, the circumferential edges 22 and 24 thereby come to lie atop one another. With guide rails 26 and 28 on the opposite longitudinal sides of the coupling element 1', the axial docking is eased, the existing docking device is substantially stabilized, and the environment impermeability is increased. Flexible receptacles can either be connected directly with the slots 9'' (sealed in the ground state of the connection elements) or, respectively, with their passage walls, similar to Figures 1, 4 and 5. Alternatively, the circumferential edge 30, 32 on the undersides 4' and 4'' of the coupling elements 1' and 17''' can also be used in order to attach a flexible receptacle from the inside as well as preferably from the outside, for example under elastic initial tension, such that it is sealed from the environment. Such an attached receptacle can, for example, also be attached with a band, belt or a buckle on the circumferential edge. In this manner, the reuse of the coupling element is achieved in a very simple manner. The connection of the coupling elements 1' and 17''' can in particular be stabilized by affixing elements 34 and 36, in particular on the opposite sides of the coupling elements 1' and 17'''. For example, a sealing clamp (not shown) can be guided, in particular with perfect fit, via affixing elements 34 and 36 comprising groove-shaped recesses. In a particularly preferred embodiment, this sealing element is fashioned with gripping

surfaces or, respectively, gripping elements via which an elastic deformation of the coupling elements 1' and 17''' of the docking device can be achieved particularly simply. The affixing elements 34 and 36 can be fashioned fundamentally identical or, as shown in Fig. 7, different. In general, arbitrary forms are possible as long as they allow or, respectively, enable an affixing and/or elastic deformation of the connection elements.

Figure 8 shows a first coupling element 1' from the view of the top side 5'. The guide rails 26 and 28 mounted on the longitudinal sides are placed on the circumferential edge 30. The narrow sides comprise affixing elements 34. The slot 9'' extends in the central direction substantially parallel to the longitudinal sides of the coupling element. The shown coupling element 1'' is located in the ground state, according to which the slot 9'' is closed. In a preferred embodiment, in particular the top side 5' or parts thereof is provided (not shown) with an adhesion layer to affix residual bulk material. In that the guide rails 26 and 28 are only located on the longitudinal sides of the coupling element 1', in addition to the axial docking the shown embodiment also enables a sideways sliding or, respectively, docking of the coupling elements. A docking available via the combination of lateral and axial relative motions of the coupling elements is also possible.

In Figure 9, the coupling element 17''' is shown from its top side 5'', comprising slot 9'''.

A filling event using a coupling element shown in Fig. 5 or, respectively, a docking device based thereupon is subsequently specified.

A filling of the second sack 10' with bulk material (not shown) from the first sack 10 is specified in the following:

The bulk material is initially located in sack 10, which is held closed by the sealing clamp 12 as indicated in Figure 4. In order to decant the bulk material into the sack 10' located at the second coupling element 17', one simply shifts the second coupling element 17' over the first coupling element 1, in that the edges 15' of the second coupling element 17' is [sic] inserted into the grooves 3 of the first coupling element 1, and at the same time the sealing clamp 12 is slid downwards on its seat on the first coupling element 1. The grooves 3, in combination with the edges 15 engaging therein and the webs 6 of the first coupling element 1 lying in the recesses 16' of the second coupling element 17', thereby act as a guide device, while the grooves 3 as well as the edges 15' positioned therein simultaneously serve as a securing device for axially securing against a detaching of the coupling elements 1, 17' from one another when the sacks 10 and 10' are arranged perpendicular to one another for decanting. The second coupling element 17' is correctly mounted on the first coupling element 1 when the front side 7 of the first coupling element 1 abuts against the stopper 18' on the front side 7' of the second coupling element 17', and thus the slot 9 comes to lie exactly over the slot 9'.

If the front sides 7, 7' and the back sides 8, 8' of the coupling elements 1, 17' are directly or indirectly charged with pressure via the respective other coupling element 17', 1, the slots 9, 9' spread apart and the bulk material can arrive in the second sack 10' from the first sack 10. The charged pressure can hereby be regulated such that a finely dosed filling of the second sack 10' or, respectively, emptying of the first sack 10 is possible. Via the flexible design of the coupling elements 1, 17', the emptying of the first sack 10 or, respectively, the filling of the second sack 10' can additionally be made easier in that, via multiple brief pressure charges, the first sack [sic] 10 breathes [sic] similar to a bellows, whereby on the one hand bulk material that possibly adheres to the walls of the first sack 10 can be detached, and on the other hand a higher packing density is achieved in

the second sack 10' to be filled, since bulk material bonds (not shown) are destroyed by the corresponding flexing work.

5 In the coupling elements 1, 1', 17', 17'', spring elements (not shown), preferably made from metal, can be arranged in the periphery of the slots 9, 9', 9'', said spring elements being able to be injection molded with an elastomer during the production and displacing the coupling elements 1, 1', 17', 17'' in specific directions via exertion of pressure in a lightly pre-stressed state. Additionally, for the same purpose additional collars made from an elastically deformable material
10 can be arranged around the coupling elements 1, 1', 17', 17''. Likewise, grooves, recesses, webs, edges and the like can be arranged on the top sides of the coupling elements instead of the side walls.

Naturally, both receptacles do not have to be implemented in the form of sacks.
15 For example, the inventive docking device is particularly advantageous in the case of the filling of a first, sack-like receptacle directly from a production device, for example with tablets or pills. For this purpose, the second receptacle could only be implemented flexibly in the area of its coupling element in order to enable an opening and closing of the coupling element for deformation of the same. In such
20 a case, it would also be of advantage to apply pressure to open the coupling elements at the first coupling element connected with the sack-like receptacle, such that this first coupling element would be designated as an active part and [sic] to transfer aforementioned pressure to the second coupling element connected with the production device that would then assessed as a passive part.

25 The features of the invention disclosed in the preceding specification, the drawings and the claims can be essential both individually and in any arbitrary combination for the realization of the invention in its various embodiments.

Claims

1. Sealed docking device between two essentially environmentally isolated receptacles (10, 10'), whereby each receptacle (10, 10') is at least in areas
5 substantially flexible, in particular sack-shaped, and can be sealed or is sealed with a coupling element (1, 17') in order that it can be sealed or shut tight and opened when the coupling elements (1, 17') are tightly connected with one another, characterized in that
10 each coupling element (1, 17') is elastically deformable for opening and closing.
2. Docking device according to claim 1, characterized in that
each coupling element (1, 17') comprises at east one slot (9, 9') that is
15 sealed tight in the ground state, in particular via at least one sealing element, and can be opened via pressurization, preferably controlled and/or regulated, for filling and/or emptying of the corresponding receptacle (10, 10').
3. Docking device according to claim 1 or 2, characterized in that
20 a first coupling element (1) can be connected or provided with a device for pressurization, whereby the coupling element (1) can be opened via pressurization and, when connected to another, second coupling element (17'), an opening of the second coupling element (17') is forced.
- 25 4. Docking device according to any of the preceding claims, characterized by at least one sealing device (12) to secure a coupling element (1) not connected with another coupling element (17'), whereby preferably the sealing device (12) prevents an opening of the slot (9) of the first coupling
30 element (1) given pressurization.
5. Docking device according to any of the preceding claims, characterized by

- at least one guide device (3, 6, 15, 15', 16, 16', 18'), preferably comprising a stopper (18'), as in the form of a bead, a flat peg, a diaphragm wall and/or the like, and/or at least one groove (3) or recess (16, 16') on the one side and/or at least one web (6) or projection (15, 15') on the other side to engage on at least one coupling element (1, 17') and/or a sealing device (12), whereby the guide device (3, 6, 15, 15', 16, 16', 18') in particular ensures an alignment of the slots (9, 9') of both coupling elements (1, 17') to be connected with one another.
- 5
- 10 6. Docking device according to any of the preceding claims, characterized by at least one sealing device (3, 15, 15') to prevent the detaching of a sealed connection of both coupling elements (1, 17') with one another, or a coupling element (1) with the sealing device (12) belonging thereto, whereby the sealing device (3, 15, 15') is preferably comprised by the
- 15 guide device (3, 6, 15, 15', 16, 16', 18').
7. Docking device according to one of the claims 5 or 6, characterized in that the guide device (3, 6) and/or the sealing device (3) is or, respectively, are comprised by a first coupling element (1) with the device for
- 20 pressurization.
8. Docking device according to any of the preceding claims, characterized in that the top sides (5, 5', 5'') of the coupling elements (1, 1', 17', 17'', 17''') can be laterally or axially connected.
- 25
9. Docking device according to claim 8, characterized in that at least one of the top sides (5, 5', 5'') of the coupling elements (1, 1', 17', 17'', 17''') to be coupled comprises at least one continuous circumferential axial elevation (22) that can be attached over the entire extent with in particular the top side of a second coupling element.
- 30

10. Docking device according to claim 9, characterized in that
at least the circumferential axial elevation (22) and an edge or border (38)
of the openable passage or slot (9'') on the top side (5') of the coupling
5 element can be attached, in particular sealed, with the top side (5'') of a
second coupling element (17''') to be docked, whereby in particular at least
the circumferential axial elevation (22) of the top side of the first coupling
element (1') can be connected, in particular sealed, with the circumferential
axial elevation (24) of the top side of the second coupling element (17'''),
10 and the edge or border (38) of the openable passage or slot (9'') of the top
side (5') of the first coupling element (1') can be connected with the edge
or border (40) of the openable passage or slot (9''') of the top side (5'') of
the second coupling element (17''').
- 15 11. Docking device according to any of the claims 8 through 10, characterized
in that
a coupling element comprises at least one guide device (26, 28), in
particular a substantially circumferential, continuous or discontinuous edge
web on the top side provided for coupling, whereby the guide device, in
20 particular the edge web, is dimensioned such that an essentially sealed,
tight and/or arrestable closure is created with a second coupling element to
be docked.
- 25 12. Docking device according to any of the preceding claims, characterized in
that
at least one side, in particular the side provided for docking, of at least one
coupling element at least in areas an adhesion or bonding layer.
- 30 13. Docking device according to any of the preceding claims, characterized in
that

5 a coupling element is connected or can be connected in an essentially environmentally-isolated manner with at least one (in particular translucent or transparent) flexible receptacle comprising at least one extraction device, in particular in the form of a spoon, a spatula or an in particular sealable receptacle, in particular for sample extraction.

14. Docking device according to claim 13, characterized in that the extraction device can be connected or is connected with the flexible receptacle, at least in areas, in particular to its back or bottom end.

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15. Docking device according to any of the preceding claims, characterized in that each receptacle (10, 10') is connected, in particular bonded to the corresponding (coupling element (1, 17')), preferably in the area of its slot (9, 9').

15

16. Docking device according to claim 15, characterized in that each receptacle (10, 10') is attached to the inner surface of the slot (9, 9') of the corresponding coupling element (1, 17').

20

17. Docking device according to any of the preceding claims, characterized in that the slot (9, 9') is effected as a simple slot or cross-slot.

25 18. Docking device according to any of the preceding claims, characterized in that at least one, in particular every coupling element (1, 17') comprises a food-compliant plastic such as EPDM and/or silicon, or that at least one, in particular every coupling element comprises bulk material material [sic] or is substantially comprised of bulk material material [sic] in particular 30 polyethylene or polypropylene [sic], or that at least one, in particular every

coupling element, at least in regions, in particular at the locations that can contact bulk material, respectively comprises a coating that comprises bulk material material [sic] or is substantially comprised of bulk material material [sic], in particular polyethylene or polypropylene.

5

19. Docking device according to any of the preceding claims, characterized in that
each coupling element (1, 17') comprises at least one spring element, preferably made from metal.

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20. Docking device according to any of the preceding claims, characterized in that
the receptacles (10, 10'), the coupling elements (1, 17') and/or the sealing device (12) are commonly recyclable, in particular unmixed.

15

21. Docking device according to any of the preceding claims, characterized in that
the receptacle to be emptied is part of a filling or production unit, and the receptacle to be filled comprises a sack or container receptacle, or that the
20 receptacle to be emptied comprises a sack or container receptacle and the receptacle to be filled comprises [sic] a part of a production unit.

20

22. Coupling element for environmentally-isolated filling and/or emptying of receptacles that are or can be firmly or detachably connected in an
25 essentially environmentally-isolated manner on a first side, in particular the underside, with at least one receptacle substantially flexible at least in areas, characterized in that
the coupling element (1, 1') is elastically deformable at least in areas, and comprises a second side, in particular a top side, that can be essentially
30 tightly and in particular reversibly docked to a second side, in particular a top side of a second coupling element (17', 17'', 17'''), whereby the

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aforementioned coupling element is sealed in the ground state and can be reversibly opened under elastic deformation, in particular over at least one slot (9, 9', 9'', 9'''), such that a passage exists from the first side of the coupling element to the second side of the coupling element.

5

23. Coupling element according to claim 22, characterized in that the top side of the coupling element comprises at least one continuous circumferential axial elevation that can be attached (in particular sealed) with a second coupling element over the entire extent.

10

24. Coupling element according to claim 23, characterized in that the circumferential axial elevation (22) and an edge or border (38) of the openable passage or slot (9'') on the top side (5') of the coupling element can be attached, in particular sealed, with the top side (5'') of a second coupling element (17''') to be docked, whereby in particular at least the circumferential axial elevation (22) of the top side (5') of the first coupling element (1') can be connected, in particular sealed, with the circumferential axial elevation (24) of the top side of the second coupling element (17'''), and the edge or border (38) of the openable passage or slot (9'') of the top side (5') of the first coupling element (1') can be connected with the edge or border (40) of the openable passage or slot (9''') of the top side (5'') of the second coupling element (17''').

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25. Coupling element according to any of the claims 22 through 24, characterized by an essentially axial guide device (26, 28), in particular a continuous circumferential or discontinuous axial edge web on the top side of the aforementioned coupling element, in particular on the circumferential axial elevation for creating a sealed, tight and/or arrestable closure with a second dockable coupling element.

30

26. Coupling element according to claim 22, characterized by
at least one guide device (3, 6, 15, 15', 16, 16', 18') comprising at least one
groove (3) or recess (16, 16') or at least one web (6) or projection (17, 17'),
in particular in the region of at least one of the surfaces connecting the top-
and undersides, to engage in a second coupling element and/or a sealing
device (12).
27. Connection element according to any of the claims 22 through 26,
characterized in that
at least one side of the coupling element, in particular the second side
provided for environmentally-isolated docking to a second coupling
element, comprises at least in areas an adhesion agent and/or a glue, in
particular an adhesive and/or bonding layer.
28. Coupling element according to any of the claims 22 through 27,
characterized in that
the peripheral edge region of the intake opening of the flexible receptacle
on the first side (4, 4', 4'') of the coupling element is connected or can be
connected tight with the circumferential edge, in particular the walls
(tightly adjacent to one another in the ground state) of the passage (9, 9',
9'') at least adjacent to the first side, with the surface of the first side or with
the sides connecting the first and second side, with or without assistance of
a clamping belt or elastic.
29. Coupling element according to any of the claims 22 through 28,
characterized by
at least one (in particular translucent or transparent) flexible receptacle,
connected with this in an environmentally-isolated manner, in which is
present at least one extraction device, in particular in the form of a spoon,
spatula or (in particular sealable) receptacle.

30. Coupling element according to claim 29, characterized in that the extraction device can be or is connected with the flexible receptacle, in particular to a back or lower end.
- 5 31. Coupling element according to any of the claims 22 through 30, characterized in that
it comprises a food-compliant plastic such as EPDM and/or silicon, or that
the aforementioned coupling element comprises bulk material material [sic]
or is substantially comprised of bulk material material [sic] in particular
10 polyethylene or polypropylene [sic], or that the aforementioned coupling
element, at least in regions, in particular at the locations that can contact
bulk material, comprises a coating that comprises bulk material material
[sic] or is substantially comprised of bulk material material [sic], in
particular polyethylene or polypropylene.
- 15 32. Method for (in particular environmentally-isolated) filling and/or emptying
of receptacles, characterized in that
every receptacle is substantially flexible at least in areas, in particular
adjacent to a coupling element, in particular is sack-like, in that
20 a) the opening of a first receptacle with a first coupling element and
the opening of a second receptacle with a second coupling element that are
respectively elastically deformable for opening and closing, in particular
essentially environmentally-isolated, are permanently or reversibly
connected;
25 b) the first and second coupling elements can be tightly sealed or are
sealed and can be opened to form a docking device, in particular to form a
docking device according to the claims 1 through 21, in particular are
laterally or axially connected;
c) the first and/or second coupling element are elastically deformed to
30 form a passage in the first and in the second coupling element; and

d) the content of the first receptacle is partially or completely transferred through the common passage into the second receptacle, or vice versa.

- 5 33. Method according to claim 32, characterized in that the first and/or second coupling element is sealed tight before the formation of a docking device via at least one sealing device.
- 10 34. Method according to claim 32 or 33, characterized in that each coupling element comprises at least one slot, whereby a first coupling element is charged with pressure to form an opening, whereby an opening of a second coupling element located in sealed connection with the first coupling element is forced to form a passage from the first receptacle to the second receptacle.
- 15 35. Method according to any of the claim 32 or 33, characterized in that each coupling element comprises at least one slot, whereby a first coupling element is charged with pressure to form an opening, and whereby a second coupling element located in sealed connection with the first coupling element is charged with pressure to form an opening, whereby a passage is
- 20 formed from the first receptacle to the second receptacle.
- 25 36. Method according to any of the claims 32 through 35, characterized in that the receptacle to be emptied is multiply, briefly charged with pressure during the emptying event.
37. Method according to any of the claims 32 through 36, characterized in that the first receptacle is stationary and the second receptacle is transportable.
- 30 38. Method according to any of the claims 32 through 37, characterized in that

the second receptacle is implemented flexibly only in the area of the second coupling element.

- 5 39. Method according to any of the claims 32 through 38, characterized in that the second receptacle is a component of a filling or production device, or is connected with a production device, and that the first receptacle is filled via the filling or production device, or that the production device is filled via the first receptacle.
- 10 40. Method according to any of the claims 32 through 39, characterized in that the top side of the second coupling element is slid, in particular laterally, over the top side of the first coupling element such that it seals, whereby in particular opposite second guide devices, in particular in the form of edges, in particular longitudinal edges of the second coupling element engage in
15 corresponding first guide devices of the first coupling element, in particular located on opposite sides, in particular in the form of grooves of the first coupling element.
- 20 41. Method according to claim 40, characterized in that a sealing device sealing the first coupling element tight, in particular a sealing clamp, is slid down by the first coupling element upon insertion of the edges of the second coupling element into the grooves of the first coupling element.
- 25 42. Method according to one of the claims 40 or 41, characterized in that the second coupling element comprises on a front side a stopper, whereby the first coupling element is inserted into the second coupling element, in particular until it abuts on this stopper.
- 30 43. Method according to any of the claims 32 through 39, characterized in that

the top sides of the coupling elements are axially coupled, and in particular affixed via at least one axial guide device.

- 5 44. Use of docking devices according to any of the claims 1 through 21, or of coupling elements according to any of the claims 22 through 31, for (in particular environmentally-isolated) filling of flexible receptacles, in particular from filling or production systems.
- 10 45. Use of docking devices according to any of the claims 1 through 21, or of coupling elements according to any of the claims 22 through 31, for (in particular environmentally-isolated) filling of production systems, in particular of formulation systems, extruders, injection molding or blow molding machines.
- 15 46. Use of docking devices according to any of the claims 1 through 21, or of coupling elements according to any of the claims 22 through 31, for (in particular environmentally-isolated) filling and/or emptying of pharmaceutical output, intermediate or end products.