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(54) **CLOSURE HAVING A MANDREL FOR A CONTAINER**

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(57) **ABSTRACT**

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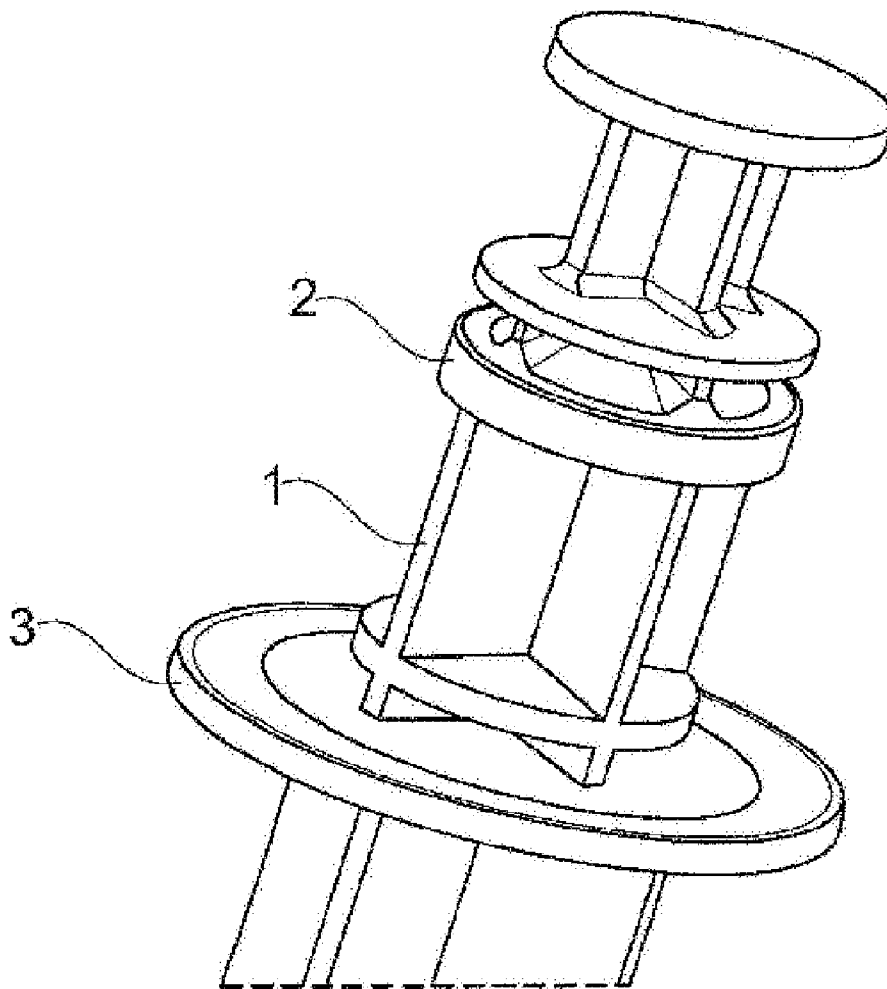
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The invention relates to a method for producing a mandrel (1) for a container closure, characterized in that the mandrel (1) is first produced in an injection moulding process and separately therefrom at least one seal (2) is produced and thereafter fixed on the mandrel (1), or that the mandrel (1) is first produced in an injection moulding tool by injection moulding process and at least one seal (2) is produced from a different material in the same injection moulding tool, likewise in an injection moulding process.

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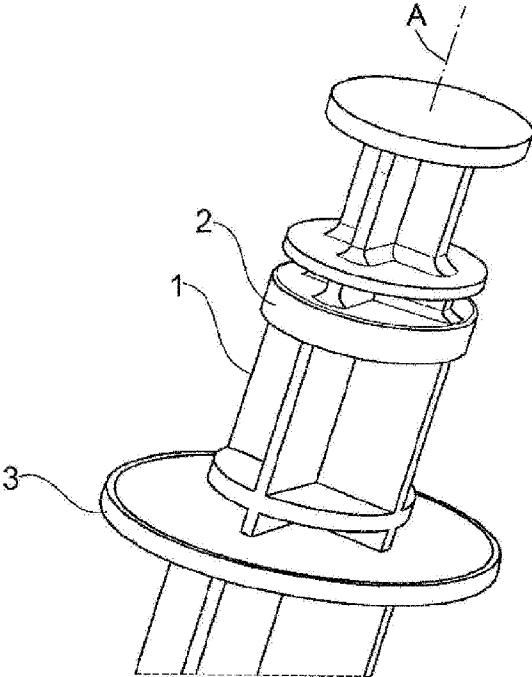


Fig. 1

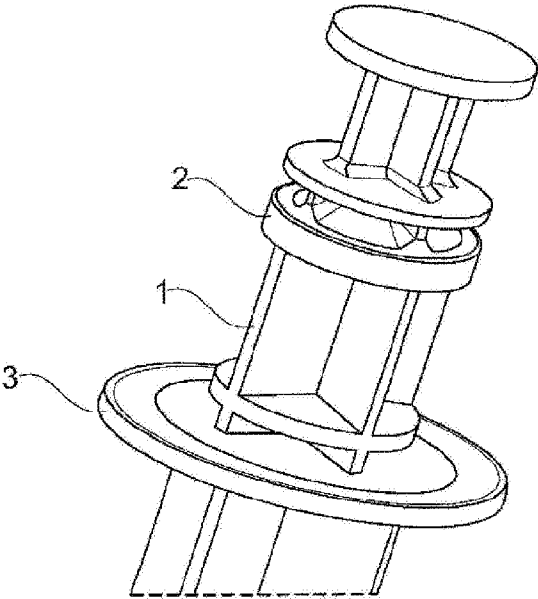


Fig. 2

### CLOSURE HAVING A MANDREL FOR A CONTAINER

**[0001]** The invention relates to a container closure with a pin, the pin, and a method of making such a pin according to the features of the preambles of the independent claims.

**[0002]** A container closure for a container having a so-called push-pull closure is known from EP 1 737 743 [US 2008/0067721], and the container closure (reference numeral 2) has in the sleeve part (reference numeral 1) a displaceable pin (reference numeral 9) with a tearing and piercing device (reference numeral 10).

**[0003]** This displaceably mounted pin must be sealed against its external surroundings (in the case of EP 1 737 74) for example relative to the additional chamber (reference numeral 8) or a chamber formed by a safety cap (reference numeral 15).

**[0004]** No sealing measures are known from this prior art.

**[0005]** Therefore the object of the invention is to provide a closure having a pin for a container, or the pin itself, by which the sealing measures are implemented. Moreover a method should be provided of making such a pin for a closure for a container that is for sealing purposes.

**[0006]** For this purpose according to the invention the pin (also referred to as the piercing spike) viewed along its axial length has at least one circumferential seal, preferably has two circumferential seals disposed at a defined distance relative to one another.

**[0007]** The seal, preferably the at least two seals, bear against the housing of the closure for the container. As a result it is possible for the pin to be movable in the housing and for the chamber filled with a material to be sealed in its first position against the external surroundings. If the pin is displaced by manual action, the seal, preferably both seals, the opening in the housing, which hitherto has been closed by the seal and the pin, is exposed. As a result for example a liquid that has previously been mixed with the material can be removed from the container (for example by drinking) via the closure of the container.

**[0008]** Furthermore two alternative methods are specified of making such a pin for a container closure.

**[0009]** On the one hand according to the invention first of all the pin itself is produced from the suitable plastic material by injection molding and separately therefrom at least one seal, preferably both seals, and then is secured on the pin.

**[0010]** As an alternative to this it is conceivable that first of all the pin is again produced from a suitable plastic material by injection molding in an injection mold, and then in the same injection mold the seal, preferably both seals, is produced from a different material from that of the pin, also by injection molding.

**[0011]** The two variants for configuration of a pin for a container closure that have been produced in different ways are illustrated in the two FIGS. 1 and 2 and are explained below.

**[0012]** To the extent that details are shown, FIG. 1 shows a pin for a container closure. The closure is for a container forming a chamber filled with a material, and a pin 1 is movable in the housing and can pierce a cover of an opening in the housing so that the material from the chamber in the housing can enter the container. Purely by way of example, for such a closure reference may be made to EP 1 737 743. However, the use of the closure according to the invention as described here as well as the use of the pin and also the method of making such a pin are in no way restricted to this

prior art, so that the pin can also be used for comparable configurations of such a closure for a container.

**[0013]** The pin 1 that is illustrated in FIG. 1 has a plate-shaped upper end, and the lower end is cut off in FIG. 1 and is not illustrated or explained in greater detail. The lower region is in any case configured in such a way that it is suitable for piercing the cover of the opening in the housing. At least one seal 2 is located axially between the upper and lower ends of the pin 1, and in the embodiment of FIG. 1 two seals 2 and 3 are provided that are spaced apart from one another. The two seals 2 and 3 can have the same shapes and/or can be made of the same material. In the embodiment according to FIG. 1 the seal 2 has a smaller diameter than the seal 3, the opposite also being conceivable. It is important that the seal 2, in particular the two seals 2 and 3, is/are designed so as to be adapted to the shape of the pin 1 and not only relative to the pin 1 that they engage, but also fit with the housing of the closure of the container and thus effect the required sealing effect in one position of the pin 1 with respect to the housing of the closure.

**[0014]** In the embodiment of FIG. 1, first of all the pin 1 is produced by injection molding in an injection mold. Then at least the second seal 2, preferably the two seals 2 and 3, is/are also produced by an injection-molding process in the same injection mold. This requires a two-part tool and a two-step injection-molding process. The choice of the material for the pin 1 on the one hand and the seal 2, or the two seals 2 and 3 on the other hand, depends upon the purpose for which they are to be used. In particular the pin 1 is made of a hard plastic material in order to be able to withstand the pressure forces acting on it during axial displacement. The material for the seal 2 depends upon the sealing function.

**[0015]** FIG. 2 shows in principle the same construction of the pin 1 as in FIG. 1, but with the difference that the pin 1 is produced separately from the seal 2, in particular the two seals 2 and 3. If the parts are manufactured separately from each other, they can then be assembled. In this case the contact shapes of the seal 2 are generally complementary to the shape of the pin 1. For example it may be mentioned here that one of the two seals 2 and 3 (or also both seals 2 and 3) is an O-ring (of round cross-section) and the shape in the pin 1 is a circumferential groove of approximately semicircular cross-section. These contact shapes are only given by way of example and could of course also be designed differently.

**[0016]** These seals can for example be designed as separate components and can be assembled after the production of the one- or two-part pin. Such separate components are for example O-rings or the like. In this connection the pin has for example a circumferential groove into which the seal is fitted by positive engagement.

**[0017]** However, the radially circumferential seal can also be produced by injection molding. In this case it is conceivable that the radially circumferential seal is produced, in particular injection molded, in the same tool in a two-part method together with the production of the pin. Because of the different functions different requirements applied to the pin and the seal, they are preferably made of different materials, in particular plastic materials. The pin itself is made of a hard plastic material that ensures that the forces acting on it (piercing forces) can be transmitted. Since the seal must perform a sealing function, it is made of a resiliently deformable plastic material.

**[0018]** Whereas on the one hand it is conceivable that the pin and the seal, preferably the two seals, are produced in the same injection mold, it is also conceivable that first of all the

pin is produced in a first injection mold and then the already produced pin is placed in a further tool and then is overmolded with the preferably resiliently deformable plastic material.

**[0019]** As a rule, as in the above-described prior art, the pin is in two parts, and at least one of the two parts of the pin has one seal. Furthermore it is conceivable that on one part of the two-part pin there are two seals and then in the second part no seal is present, and it is also conceivable that each part of the pin has its own seal. Alternatively the pin can be configured in one piece and can have the seal.

1. A closure for a container having a housing forming with the closure a chamber filled with a material, a pin being movable in the housing and able to pierce a cover of an opening in the housing so that the material from the chamber in the housing can exit the container, wherein the pin has along its axial length at least one seal that is supported on the housing.

2. The closure according to claim 1, wherein the pin has along its axial length two seals that bear against the housing.

3. The closure according to claim 1, wherein the seal is a component that can be fixed separately on the pin.

4. The closure according to claim 1, wherein the seal is integral with the pin.

5. A pin for a container closure, wherein the pin has at least one seal along its axial length.

6. A pin according to claim 5, wherein the pin has two seals along its axial length.

7. The pin according to claim 5, wherein the seal is a component that can be fixed separately on the pin.

8. The pin according to claim 5, wherein the seal is unitary with the pin.

9. A method of making a pin for a container closure, the method comprising the steps of:

first of all making the pin by injection molding and separately therefrom making at least one seal and then fixing the made seal on the pin.

10. The method of making a pin for a container closure according to claim 9, wherein first of all the pin is produced by injection molding in an injection mold and in the same injection mold at least one seal is produced from a different material also by injection molding.

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