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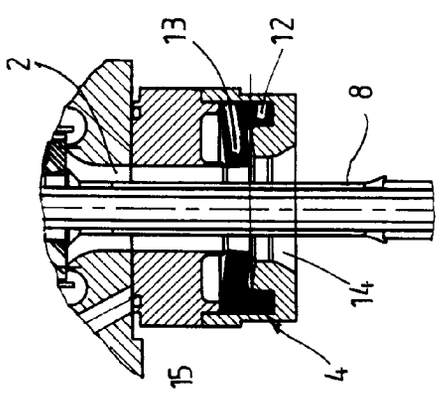
(54) **Improvement to a device for filling bottles.**

(57) A device for filling a bottle provided with a first pipe (2) for feeding in a filling liquid, in which at the outlet of said first pipe (2) a connection piece is provided for pressing the bottle to be filled against it, which connection piece is provided with an opening (11) as the passage for a second pipe (8) for feeding gas into the bottle, wherein the connection piece (4) has a raised edge (12) which is fixed in the filling device, and inside which a resilient flange element (13) is provided, which is elastically deformable at least in a region around said opening (11) under the influence of a bottle (5) pressing against it.

FIG. 8



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This invention relates to a device for filling a bottle, in particular a cap bottle.

Such a device is already known and is provided with a pipe for feeding in a filling liquid. At the outlet of said pipe a connection piece is provided for pressing the bottle to be filled against it.

During the filling each bottle is first gripped by its neck by a gripping element and presented to the filling device. In the process the bottle to be filled is transferred to the filling device until the top edge of the bottle presses against the connection piece and in the course of this takes up such a position that the pipe reaches to a predetermined height into the bottle. The connection piece is then in a rest position. The bottle is then loosely locked in this position through the tensioning of a spring, two locking hooks which are known per se being moved into a mutually engaging position. The connection piece is acted upon here by the rising movement of the bottle pressing against it and then also undergoes a rising movement. When the spring is released again, locking hooks make engaging contact with each other, and the bottle to be filled is then firmly locked, and the bottle to be filled here undergoes a falling movement, as does the connection piece against which the bottle must remain pressed during the filling. For this, the locking device is designed in such a way that the falling distance of the bottle between loose and fixed locking position respectively is smaller than the rising distance between the above-mentioned rest position and the loose locking position. Sufficient remaining pretension is thereby retained on the bottle, in such a way that during the filling the bottle remains pressed against the connection piece, in order in this way to prevent a possible leak.

It is known here to use an O-ring system as the connection piece, with two moving metal pieces which then have to follow this rapid up and down movement of the successive bottles to be filled. The frequency of this alternative movement becomes higher as the filling speed of the bottles increases. After some time the problem occurs that, in addition to fatigue phenomena appearing, a certain play will occur between said pieces, resulting in a gradual decentralization of the pieces, and culminating in a poor filling of the bottles. The repeated contact of the metal pieces with each other also causes an unpleasant noise.

Besides, such a connection piece requires a certain maintenance such as lubrication thereof.

A further disadvantage of such a connection piece comes from the fact that filling fluid flows into grooves present in the O-ring, and this will necessitate a laborious flushing operation afterwards.

The object of the invention is to eliminate the above-mentioned disadvantages. For this purpose, in the filling device according to the invention the connection piece has a raised edge inside which a resilient flange element is provided, said element being elastically deformable at least in its center part under the influence of a bottle pressing against it.

The connection piece is thus fixed in the filling device by means of its raised edge. The up and down movement of the bottle to be filled on successive presentation of the bottle and the loose and fixed locking is followed by said connection piece, but by means of the resilient flange element which is locally elastically deformable, and which acts as a sort of rising and falling membrane. Achieving good fixing of the raised edge of the connection piece during installation of the filling device means that the connection piece can be prevented from shifting as time passes, and a greater operating reliability of the filling device according to the invention is thus ensured.

In addition, owing to the flexibility feature of the flange element, a more supple working of the filling device is obtained.

The connection piece is advantageously made of a rubber material. A fairly cheap embodiment is obtained in this way. Besides, such material has a sound-deadening effect and has good resistance to fatigue phenomena, and it does not require any maintenance per se.

In an advantageous embodiment of the filling device according to the invention, the external surface of said resilient flange element slopes down towards the inside of the connection piece. This ensures that during flushing, sterilizing, in short, during treatment with maintenance products, the latter do not remain lying on the surface of the connection piece, but are discharged under the influence of their own weight along the slope of the connection piece to the central opening thereof.

According to a particularly advantageous embodiment of the filling device according to the invention, the connection piece is annular with a virtually L-shaped section, the side leg of the section forming the resilient flange element being elastically deformable over virtually its entire length. A T-shaped section is also an advantageous embodiment. In this case it is advantageous for said resilient flange element to be sloping, and in particular to have a gradient of no more than 10°. A uniform flow-off of the maintenance products is thus ensured. This design also has the advantage of being fairly simple and also hygienic, due to the fact that the absence of grooves and the like prevents any residual fluid from adhering to the connection piece.

It is also advantageous for the raised edges to have a greater rigidity than the resilient flange element. This emphasizes the specific functioning of both functional parts of the connection piece, in particular more sturdy fixing function for the raised edges, on the one hand, and more flexible flap-over movement for the resilient flange element, on the other.

The invention also relates to use of the connection piece per se in a device for filling a bottle, in par-

ticular the filling device according to the invention.

Other details and special features will emerge from the description which follows of a special example of an embodiment of a device according to the invention with reference to the appended drawings.

Figure 1 shows a general sectional view of an embodiment of a filling device with connection piece according to the invention.

Figures 2 to 5 show schematically locking elements used in the filling device according to the invention, in successive working positions.

Figure 6 shows a top view of the connection piece according to the invention, for use in the filling device according to Figure 1.

Figure 7 shows a cross-section of the connection piece according to Figure 6.

Figures 8 to 10 show a detail view of the filling device with connection piece according to Figure 1, with successive positions of the connection piece during the filling.

The same reference numbers relate to the same or to corresponding elements.

In general, the invention relates to a device for filling a bottle, for example a cap bottle, and in particular the invention relates to a connection piece to be used in such a filling device.

Figure 1 shows a cross-section of a filling device according to the invention. In such a filling device a gaseous liquid from a shut-off liquid tank 1, for example an annular boiler, has to be transferred to a bottle 5 through a feed pipe 2 and a filling element 3. The filling device 10 shown is designed in particular for cap bottles.

In order to be filled, a bottle 5 is presented to the filling device by a holder 21, for example a gripper holding the bottle by its neck 12. The holder 21 moves the bottle in a vertical movement to the filling element 3 of the filling device under the guidance of a cam 23 by means of a roller 22 coupled to the holder. The upgoing movement of the roller 22 on the guide cam 23 tensions a spring 27 fitted on a rod 24. The bottle is thus pressed against a connection piece 4 in the filling element 3. Said connection piece 4 is in a rest position up to that moment. A certain respective first position herewith corresponds between the two locking elements 25 and 26, which form part of a locking mechanism 30 which is known per se. Further tensioning of the spring 27 under the influence of the above-mentioned guide cam will, however, cause the bottle 5 to press harder against the connection piece 4, as a result of which the latter is in turn placed under tension.

The deflection of the spring also causes a movement of a locking element 25, rigidly connected thereto, relative to a second locking element 26, both intended for engaging in each other and thus for establishing a locked filling position, in order to ensure reliable filling of the bottle. Both locking elements are formed by, for example, hooks which are known per se, and each has a respective contact surface 31, 32 which on locking press against each other, and to this end they have a section fitting into each other, as shown in Figures 2 to 5.

The maximum deflection of the roller 22 determined by the configuration of the guide cam gives rise to a maximum tensioning of the spring 27. At this moment the two locking elements 25 and 26 are ready to engage in each other, and their respective contact surfaces 31 and 32 are situated at a particular rest distance D opposite each other. This situation determines a so-called loose locking, to which a second position of the locking elements relative to each other corresponds. The spring 27 is then released externally.

At this moment the locking elements 25 and 26 come into contact with each other through their respective contact surfaces 31 and 32, and the above-mentioned distance D is reduced to zero. This situation determines a so-called fixed locking, and herewith a third position of the locking elements relative to each other.

The system is, however, designed in such a way that the distance D thus travelled back downwards by the bottle 5 held by the holder 21 between said second and third positions of the locking elements 25 and 26 is smaller than the distance covered by the bottle upwards between the above-mentioned first and second positions respectively of the locking elements 25 and 26. This difference in distance produces a pre-tension on the top edge of the bottle 5, which is exerted directly on the bottle 5 by the connection piece 4. This pre-tension ensures a sturdy and also tight connection of the bottle to the filling device by means of the connection piece 4. Leaks at the connection between bottle 5 and filling device are thus avoided, which produces a reliable filling of the bottle.

Each of Figures 2 to 5 shows a detail view of the locking elements 25 and 26 used in the filling device according to the invention. These are, for example, hook-shaped, the hook-shaped part 33, 34 of both locking elements facing each other for the purpose of being able to engage in each other as shown in these figures. For this, for example the first locking element 25 is moved as described above in the direction of arrow F from a rest position, shown in Figure 2, to the second locking element 26. When the front surface 35 of the first locking element 25 reaches the level of the bottom surface 36 of the second locking element 26, as shown in Figure 3, a second roller 37, to which the second locking element 26 is connected in such a way that it cannot rotate, will be subjected to rotation under the influence of a second guide cam 38. On account of the non-rotational connection between the second roller 37 and the second locking element 26, it will consequently also move through an angle θ (as shown in Figure 4, in such a way that the first locking element 25 can continue its upward movement. The

first locking element 25 can thus return to a straight position after moving backwards through an angle θ, thanks to the roller 37 turning backwards, and ultimately reaches an extreme position which is shown in Figure 5. The respective hook-shaped parts 33 and 34 are here engaged relative to each other with a certain distance D between their respective contact surfaces 31 and 32 ("loose locking"). In the end the, for example, flat contact surfaces 31 and 32 go against each other in the manner already described earlier (position with D distance zero not shown in the drawings), with the result that the "fixed locking" is obtained.

The connection piece 4 will now be described in greater detail with reference to Figures 6 and 7. Figure 6 is a top view of the connection piece 4 according to the invention. It is annular and shows a virtually central opening 11 provided for fitting a pipe 2 of the filling device. The connection piece 4 is advantageously made in one piece, which greatly simplifies its manufacture.

Figure 7 shows a cross-section of the connection piece 4 along the line VII-VII in Figure 6. This figure shows that the annular connection piece has a virtually L-shaped cross-section, of which one leg of the section serves as a raised edge 12, and the other leg as a resilient flange element 13. The connection piece 4 is fixed in the outlet of the filling device by means of its raised edge 12. The resilient flange element 13 is advantageously made slanting towards the interior 14 of the connection piece 4. The external top surface 15 of said one leg here forms an angle α with the face containing the external top periphery 16 of the connection piece 4. This angle α is preferably no greater than 10°, and is, for example, approximately 7°. This gradient means that accumulations of a product, such as, for example, a flushing product, are prevented from occurring on the external surface 15 of the connection piece 4. In the case of caustic flushing products, for example, corrosion of the connection piece 4 is thus prevented. The angle β formed by the virtually flat end 17 of the resilient flange element 13 and a direction which is at right angles to said face comprising the upper periphery 16 lies, for example, between 0 and 6° and is, by way of example, approximately 4°. The angle β is in this case preferably smaller than the angle α, and a better seal will thereby be ensured.

Said one leg of the raised edge 12 can also have such a configuration that it extends further past the resilient flange element in such a way that the connection piece 4 has a virtually T-shaped cross-section.

Figures 8 to 10 show respectively successive positions of the connection piece 4 according to the invention in a detail view of Figure 1. Each of the successive positions corresponds to the positions of the locking elements 25, 26 described earlier in Figures 2, 3 or 5 and to said D = 0 position. These Figures 8 to 10 show that the connection piece 4 is fitted concentrically with its opening 11 round the gas feed pipe 8, at the outlet of the liquid feed pipe 2.

In this case Figure 8 thus represents a rest position of the connection piece 4 in the filling device according to the invention. The connection piece 4 is thus found as shown in Figures 6 and 7. On presentation of the bottle 5 to the filling device, it is introduced by means of the already discussed interaction between holder 21 and locking mechanism 25, 26 into a space 15, which is provided for the neck 6 of the bottle in the filling element 3, until it is against the connection piece 4. Moving the bottle further upwards causes the connection piece 4 to be subjected to an upward pushing force from the bottle 5, which force is transmitted along the top edge 7 of the bottle to the resilient flange part 13 of the connection piece 4. Due to the flexibility property of this part 13 of the connection piece 4, said resilient flange part 13 follows the further upward movement of the bottle 5, in a sort of flap-over movement like a membrane, but the raised edge 12 well fixed in the filling device remains virtually motionless, as can be seen from Figure 9. In this transition movement according to Figure 9 the filling device is in the above-mentioned "loose locking position".

Figure 10 shows how, corresponding to the above-mentioned D = 0 position of the locking elements 25 and 26, the connection piece 4 comes to rest on the above-mentioned fixed locking of the locking elements 25 and 26, i.e. the latter engage in each other and their contact surfaces 31 and 32 lie against each other. It is clear to see that the connection piece 4 is not in the rest position shown in Figure 8 but, because of the resilient nature of the flange part 13 of the connection piece 4, has come back like a membrane in an intermediate position between the latter and that of Figure 9. Said connection piece 4 is thus under pretension. This pretension causes a good seal to be obtained between the bottle 5 to be filled and the outlet of the liquid feed pipe. This consequently means that the filling of the bottle can start, and can be carried out in an extremely reliable manner.

When the filling of the bottle 5 has been completed, the bottle is removed, and the connection piece 4 is returned through the resilient properties of the flange element 13 to its initial rest position shown in Figure 5. Due to the fact that increasingly high filling frequencies are having to be achieved, such a connection piece is, of course, acted upon quite frequently, and it undergoes a fairly large number of successive flap-over movements. This could lead to fatigue of the material of the connection piece. In this case the resilient flange element 13 is elastically deformable at least in a region around the opening 11, but preferably over virtually its entire dimension up to the vicinity of the raised edge 12. The connection piece 4 is to this end advantageously made of a rubber material, for ex-

ample a silicone rubber. In particular, rubber No. SK 72, made by Universal Rubber, was found to give satisfactory results. For it was found that with this selection of material the connection piece 4 is particularly resistant to fatigue phenomena of the material.

It goes without saying that the scope of protection of this patent application is in no way limited to the embodiments described above. These serve only as examples, and further variants of embodiments or potential applications can be conceived without going beyond the scope of this patent application.

For example, the pure rubber material of the resilient flange element of the connection piece can be replaced by rubber material containing a spring.

Claims

1. A device for filling a bottle, in particular a cap bottle, provided with a first pipe (2) for feeding in a filling liquid, in which at the outlet of said first pipe (2), virtually concentric therewith, a connection piece is provided for pressing the bottle to be filled against it, which connection piece is provided with an opening (11) as the passage for a second pipe (8) for feeding gas into the bottle, wherein the connection piece (4) has a raised edge (12) which is fixed in the filling device, and inside which a resilient flange element (13) is provided, said element being elastically deformable at least in a region around said opening (11) under the influence of a bottle (5) pressing against it.

2. The device as claimed in claim 1, wherein the connection piece (4) is made of a rubber material.

3. The device as claimed in one of claims 1 and 2, wherein the external surface (15) of said resilient flange element (13) slopes down towards the inside (14) of the connection piece (4), while the raised edge (12) is directed downstream.

4. The device as claimed in one of claims 1 to 3, wherein the connection piece (4) is annular with a virtually L-shaped section, the side leg of the section forming the resilient flange element (13) being elastically deformable over virtually its entire length.

5. The device as claimed in one of claims 1 to 3, wherein the connection piece (4) is annular with a virtually T-shaped section, the side leg of the section forming the resilient flange element (13) being elastically deformable over virtually its entire length.

6. The device as claimed in one of claims 3 to 5, wherein the sloping resilient flange element (13) has a gradient (α) which is not greater than 10° relative to the face containing the external base periphery (16) of the raised edge (12).

7. The device as claimed in one of claims 1 to 6, wherein the connection piece (4) is made in one piece.

8. The device as claimed in one of claims 1 to 7, wherein the raised edge (12) is of greater rigidity than the resilient flange element (13).

9. A connection piece for use in a device for filling a bottle, in particular a cap bottle, wherein the connection piece (4) has a raised edge (12) containing a resilient flange element (13) which is elastically deformable at least in a region around a virtually central opening (11).

10. The connection piece as claimed in claim 9, wherein it is made of a rubber material.

11. The connection piece as claimed in claim 9, wherein the rubber material used is homogeneous.

12. The connection piece as claimed in one of claims 8 to 11, wherein the external surface (15) of the resilient flange element (13) slopes towards the inside (14) of the connection piece.

13. The connection piece as claimed in claim 12, wherein it is annular with a virtually L-shaped section, of which one leg forms the resilient flange element (13) and the other leg forms the raised edge (12), said one leg being elastically deformable over virtually its entire length.

14. The connection piece as claimed in claim 12, wherein it is annular with a virtually T-shaped section, of which one leg forms the resilient flange element (13) and the other leg forms the raised edge (12), said one leg being elastically deformable over virtually its entire length.

15. The connection piece as claimed in one of claims 12 and 13, wherein the sloping resilient flange element (13) has a gradient (α) not greater than 10° relative to the face containing the external base periphery (16) of the raised edge (12).

16. The connection piece as claimed in one of claims 8 to 15, wherein it is made in one piece.

17. The connection piece as claimed in one of claims 8 to 16, wherein the raised edge (12) is of greater rigidity than the resilient flange element (13).

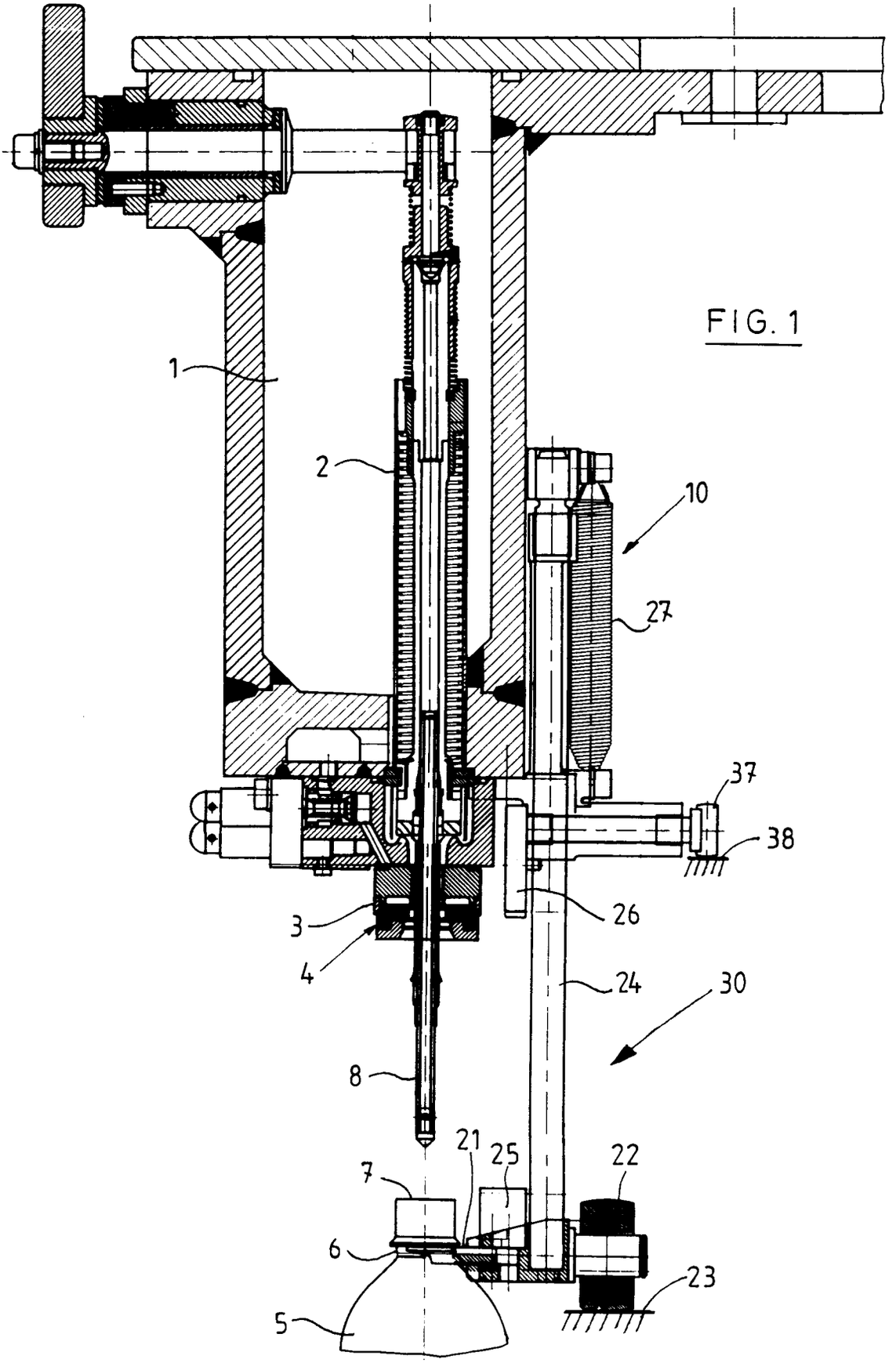


FIG. 1

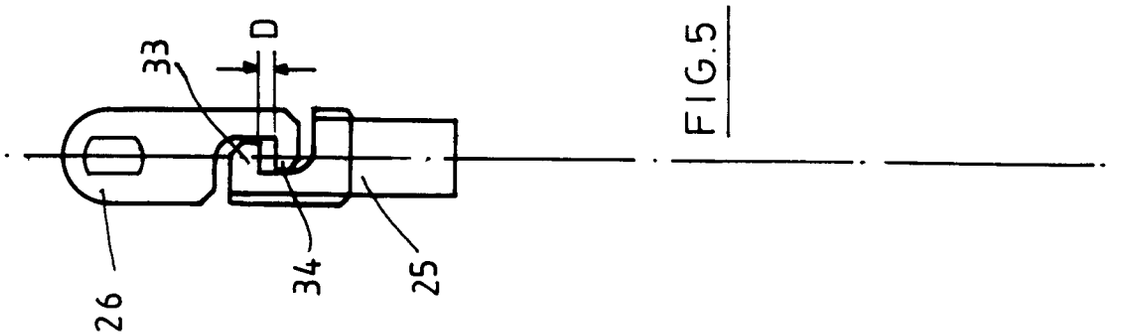


FIG.5

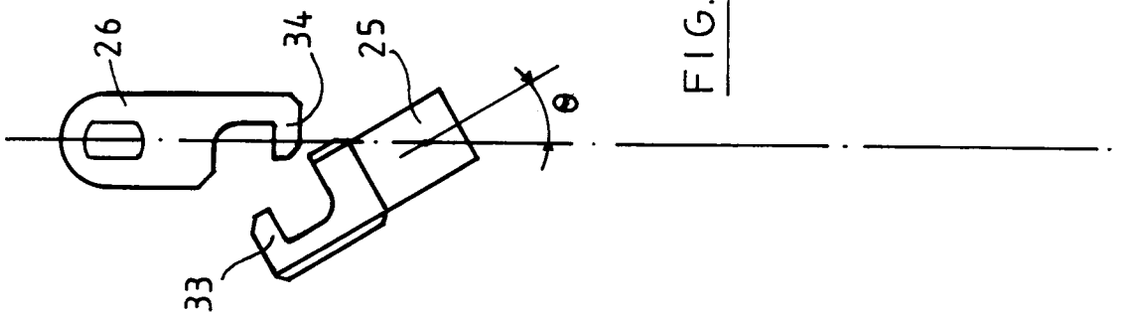


FIG.4

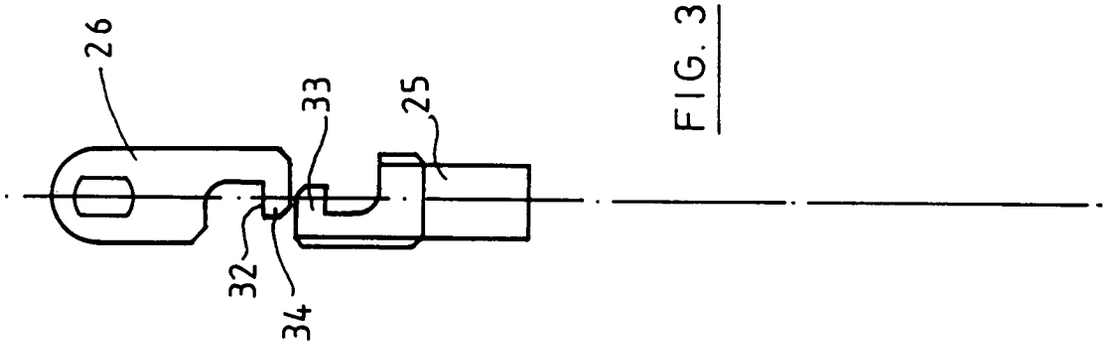


FIG. 3

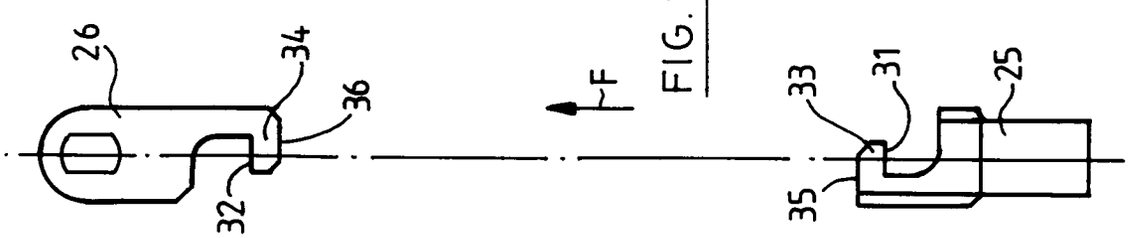


FIG. 2

FIG. 7

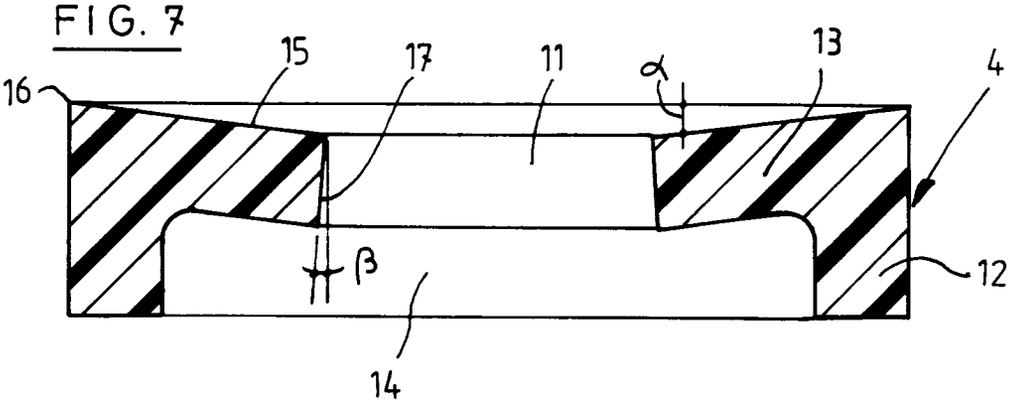


FIG. 6

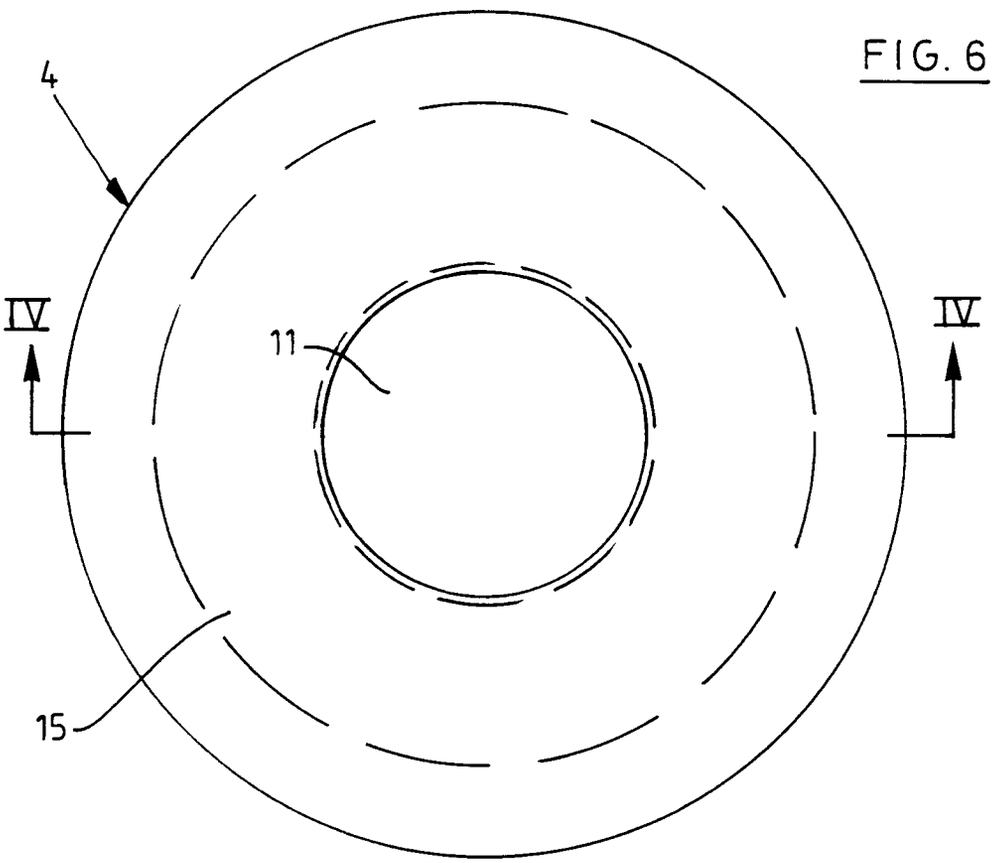


FIG. 10

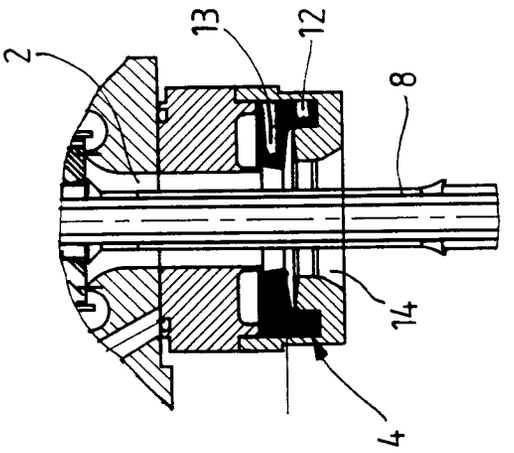


FIG. 9

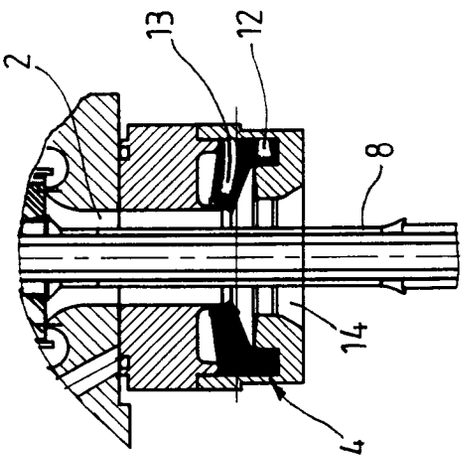
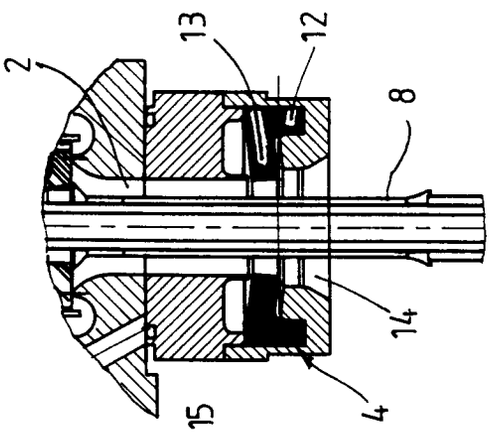


FIG. 8



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EUROPEAN SEARCH REPORT

Application Number

EP 92 87 0054

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	EP-A-0 080 774 (CROWN CORK & SEAL COMPANY, INC.) * abstract; figure 4 *	1,2,4	B67C3/26
Y	US-A-2 761 607 (AYARS) * column 4, line 19 - line 45; figures 1,2 *	1,2,4	
X	FR-A-1 528 477 (CHAPUIS) * figures 1,2 *	9-11,13	
A	FR-A-2 294 124 (ETABLISSEMENTS CHELLE) * figure 1 *	1,9	
A	CH-A-431 306 (ETABLISSEMENTS CHELLE) * figure 3 *	1,9	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	DE-A-3 713 015 (HOLSTEIN UND KAPPERT AG) * figures *	1,9	B67C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	08 SEPTEMBER 1992	MARTINEZ NAVAR

CATEGORY OF CITED DOCUMENTS

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