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- (54) Benævnelse: **SYSTEM FOR TRANSPORTING AND STORING A LIQUID AND FOR TRANSPORTING SAID LIQUID FROM THE CONTAINER TO A DESTINATION OUTSIDE OF THE CONTAINER**
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US-A- 5 370 270
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DESCRIPTION

[0001] The present invention relates to a system for transporting and storing a liquid and for transporting said liquid from the container to a destination outside of the container. The system is in particular suitable for safe transfer of liquids according to a 'closed transfer system', in particular to transfer crop protection products into a sprayer.

[0002] Such a system according to the preamble of claim 1 is well known and commercially available from the applicant. It is described in WO 99/05446. The known systems have a small bore, in the order of several millimetres. Further examples of generic devices are disclosed in WO 94/10081 and WO 2011/096811.

[0003] The aim of the invention is to provide such a system suitable for large diameter bores, in particular exceeding 30mm.

[0004] It has been found that when the known cap assembly is scaled up to a bore having a diameter exceeding 30mm, e.g. to be assembled onto a container comprising a relatively large inlet opening, in particular exceeding 30mm, in particular industry standard containers with 63mm closures, unintentional release of the plug occurs. In order to ensure a closed transfer system, the cap assembly is to be assembled onto the container straight after the filling of the container. Hereafter, the containers are transported to the site where the liquid is to be used. During transport there is a risk of dropping such a container filled with liquid. As the container is closed, liquid sloshing in the container, e.g. as a result of dropping, causes a hydrodynamic load exerted onto the plug of the cap assembly, and hence increases the risk of unintentional release of the plug.

[0005] The invention aims to provide a system suitable for bores comprising a diameter exceeding 30mm.

[0006] This aim is achieved in that a seal cover is provided over the bore, essentially parallel to the plug, which serves to close off the bore airtight. Such an airtight seal cover over the bore, parallel to the plug, counteracts possible hydrodynamic loads caused by sloshing and hence the risk of unintentional release of the plug is significantly reduced.

[0007] Advantageously, the bore is large, e.g. having a diameter exceeding 30mm, in particular 45 mm, in particular 60mm or even larger.

[0008] In a preferred embodiment, the inner wall of the cylindrical body further comprises a seal cover seat at an end adjacent the insert opening, extending around the bore, for a seal cover which serves to close off the bore airtight, and the essentially cylindrical body comprising a seal cover abutment surface for the seal cover, the seal cover abutment surface extending radially adjacent the insert opening, the seal cover being provided with a sealing system with at least one radially deformable seal

element adapted to releasably engage with the seal cover seat, the seal cover being designed such that in a transfer position the seal cover abuts against the seal cover abutment surface and the seal elements abut against the seal cover seat, thereby covering the insert opening airtight.

[0009] The invention is further elucidated in relation to the drawings, in which:

Fig. 1a is a perspective view of a system according to the invention comprising a portion of the container, the cap assembly and part of the coupler assembly, wherein the plug is in a first position;

Fig. 1b is a perspective view of the system of fig. 1a, wherein the coupler assembly has moved towards the plug, the plug still being in a first position;

Fig. 1c is a perspective view of the system of fig. 1a, wherein the male probe of the coupler assembly has been connected to a female part of the cap assembly, wherein the plug is in a fourth position;

Fig. 2 shows a partly open perspective view of a cap assembly according to the invention;

Fig. 3 shows a view of the inside of the cap assembly of fig. 2 cut in halves;

Fig. 4 shows a perspective view of the inside of a cap assembly and a neck portion of a container cut in halves;

Fig. 5 shows a cap assembly including a plug in a perspective view;

Fig. 6 shows an embodiment of a seal cover according to the invention.

[0010] Figs. 1a-1c and figs. 2-6 show different views and details of a similar embodiment of a system of the invention. Same parts are given same reference numerals.

[0011] In figs. 1a-1c, an entire system for transporting and storing a liquid and for transporting said liquid from the container to a destination outside of the container is shown. The system comprises:

- a container for transporting and storing a liquid, comprising a container body provided with a neck portion 2;
- a cap assembly 10 secured on the neck portion for fluidly-tight closing the container body;
- a coupler assembly 30 configured to be mechanically coupled to the cap assembly 10 so as to achieve a coupled configuration for a liquid connection to and/ or from the container, comprising a male probe 31 to be connected to a female part 11 of the cap assembly.

[0012] In particular, the neck portion 2 surrounds an inlet opening 3, in particular an inlet opening having a diameter exceeding 30mm, in particular 45 mm, in particular 60mm or even larger.

[0013] The cap assembly 10, shown in other views in figs. 2-5, comprises the female part 11 and a plug 20, the female part having an essentially cylindrical body comprising two concentric interconnected cylindrical walls 12, 13 defining there between a cylindrical slit 14 having an open end 14a and a closed end 14b where the outer cylindrical wall 13 is connected to the inner cylindrical wall 12. The slit is adapted to receive, at the open end thereof, the neck portion 2 of the container body to provide a fluid-tight closure around the neck portion.

[0014] In the shown embodiment, , the container is positioned with its neck portion downwards, and hence the open end of the cylindrical slit corresponds to top end and the closed end to the bottom end. It is also conceivable that the container is positioned with its neck portion upwards, allowing the the cap assembly to be positioned over the neck portion.

[0015] In the shown embodiment, a seal ring 15 is provided at the closed bottom end of the cylindrical slit 14b to assist the fluid-tight closure of an upper end 2a of the neck portion 2 of the container body by the female part 11 of the cap assembly.

[0016] In the shown embodiment, the cylindrical slit 14 comprises a slit engagement surface 14c, here provided at the outer cylindrical wall. It is also conceivable that the slit engagement surface is provided at the inner cylindrical wall, or at both walls. The slit engagement surface is adapted to engage with a corresponding neck engagement surface 2c at the neck portion 2 of the container body to provide a fluid-tight closure around the neck portion. The slit engagement surface and corresponding neck engagement surface are here formed by cooperating screw thread. Other engagement mechanisms, e.g. involving a rim and a recess, are also conceivable.

[0017] In the shown embodiment, the outer cylindrical wall 13 is provided with a tamper-evident ring 19, here extending as a continuation of the outer cylindrical wall. This tamper-evident ring has to be removed to be able to remove the cap assembly from the neck portion of the container body. Accordingly, one can determine from the status of the tamper-evident ring whether the cap assembly has been removed from the container or not.

[0018] It is noted that in figs. 2 and 3 the inner cylindrical wall 12 comprises a shallow slit 12c at end 12a adjacent the plug opening 18. In the shown embodiment this is provided for constructive purposes relating to injection moulding.

[0019] The inner wall of the cylindrical body 12 defines an axial bore 16 extending from an insert opening 17 for the male probe through the body to an opposed plug opening 18. The openings of the shown embodiment are of similar dimension. The insert opening and plug opening are provided at opposed ends of the body. When the cap assembly 10 is engaged

with the neck portion 2 of the container body, the inlet opening 3 is within the axial bore 16.

[0020] The inner wall of the cylindrical body 12 comprises a seat 12b adjacent the plug opening 18, extending around the bore 16, for the plug 20 which serves to close off the bore fluid-tight.

[0021] This plug and its operation has extensively been described and disclosed in WO99/05446. The bore of the female part between the insert opening 17 and the seat 12b comprises a shoulder 12d, facing towards the insert opening. The plug 20 is provided with a hooking system with multiple elastic hooking parts 21a, 21b, 21c, 21d, 21e, with corresponding hooking surfaces 21a", 21e". As visible in fig. 1a, at least one of the hooking parts rests in a first position with its hooking surface against the shoulder, in which first position the plug 20 closes off the bore and hence fluidly-tight closes the plug opening of the container body.

[0022] The coupler assembly 30 has a male probe 31 with a head and a recess 33 located behind the head for receiving at least one of the hooking parts of the plug when the male probe is inserted into the bore, in particular at least one of surfaces 21a', 21b', 21c', 21d', 21e' of the hooking parts, so that the plug connects with the male probe. Radially next to the at least one of the hooking parts in its first position there is a space 22 between the hooking part 21a, 21b, 21c, 21d, 21e and the female part 11.

[0023] The at least one hooking part is designed such that - when the male is inserted into the bore - the head 32 of the male probe pushes the hooking part from its first position into this space 22 to a second position which is located radially further outward compared with the first position, in which second position the plug still closes off the bore and hence fluidly-tight closes the plug opening of the container body.

[0024] The at least one hooking part is further designed such that at least one of the hooking parts, after axially passing the head 32 of the male probe towards a bottom of the container body, springs elastically inward to a third position and falls into the recess 33 of the male probe while contact between the hooking surface and the shoulder is maintained and while the contact between hooking surface and shoulder is maintained the plug still closes off the bore and hence fluidly-tight closes the plug opening of the container body.

[0025] The recess 33 in the male probe is such that a radial space is present between the hooking part 21, located in its third position, and the male probe 31, in such a way that inserting the male probe 31 further into the bore 16 towards a bottom of the container body causes the hooking part 21 to pass the shoulder 22 in the bore, the hooking part moves under the influence of a force exerted by the shoulder of the bore on the hooking part to a fourth position, as visible in Fig. 1c, which is located further inward in the recess 33 compared with the third position, such that the plug engaged with the male probe opens the bore and hence allows fluid to pass from and to the container body.

[0026] Advantageously, the connector assembly has been designed such that the plug 20 is

free of the bore 16 when the male probe has been inserted fully into the bore, with at least one of the hooking parts 21 of the plug 20 springing back elastically from the fourth position to the third position when it comes out of the bore.

[0027] The shown male probe has an internal axial passage 101 for passage of the fluid in which one or more ports 105 are provided, each extending from the outer surface of the male probe to an outlet in the axial passage.

[0028] According to the present invention, a seal cover 45 is provided over the bore 16, essentially parallel to the plug 20, which serves to close off the bore airtight. In particular, the shown seal cover 45 comprises a seal surface 40 extending across and parallel to the insert opening 17. The seal cover 45 is shown in detail in fig. 6. Alternative configurations of a seal cover are also conceivable as long as the bore is closed off airtight. For example a topseal or the like can be applied as well.

[0029] In the shown embodiment, the inner wall 12 of the cylindrical body further comprises a seal cover seat 12f at an end 12e adjacent the insert opening 17, extending around the bore 16, for the seal cover 45. Further, in the shown embodiment, the essentially cylindrical body comprises a seal cover abutment surface 12h for the seal cover, the seal cover abutment surface extending radially adjacent the insert opening.

[0030] The seal cover is here provided with a sealing system with at least one radially deformable seal element 41 adapted to releasably engage with the seal cover seat 12f, here is a radially expandable and compressible ring-shaped collar extending perpendicular to the sealing surface of the seal cover. The seal cover is designed such that in a transfer position the seal cover abuts against the seal cover abutment surface 12h and the seal elements abut against the seal cover seat, thereby covering the insert opening airtight.

[0031] Furthermore, in the shown embodiment, the seal cover is provided with a tamper-evident tear ring 42 extending around the essentially cylindrical body, which has to be removed prior to the removal of the seal cover. In this embodiment, the tamper evident ring 42 comprises a rib 42a engaging below a thickened end rim 12g of the inner wall 12

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO9905446A [0002] [0021]
- WO9410081A [0002]
- WO2011096811A [0002]

KRAV

1. System til transport og opbevaring af en væske og til transport af væsken fra beholderen til en destination uden for beholderen, hvilket system omfatter:

- en beholder til transport og opbevaring af en væske omfattende et beholderlegeme
5 forsynet med en halsdel (2);
- en hætteindretning (10), der er fastgjort på halsdelen for væsketæt lukning af beholderlegemet;
- en koblingsindretning (30), der er indrettet til at være mekanisk koblet til hætteindretningen (10) for at opnå en koblet konfiguration for en væsketilslutning til og/eller
10 fra beholderen, hvilken koblingsindretning omfattende en hansonde (31), der skal forbindes til en hundel (11) af hætteindretningen;

hvor hætteindretningen (10) omfatter hundelen (11) og en prop (20), hvor hundelen har et i det væsentlige cylindrisk legeme omfattende to koncentriske indbyrdes forbundne cylindriske vægge (12, 13), der danner der mellem en cylindrisk slids (14), der har en åben ende (14a)
15 og en lukket ende (14b), hvor den ydre cylindriske væg (13) er forbundet med den indre cylindriske væg (12), idet spalten er indrettet til at modtage beholderlegemets halsdel (2) for at tilvejebringe en væsketæt lukning omkring halsdelen;

hvor den indvendige væg af det cylindriske legeme (12) definerer en aksial boring (16), der strækker sig fra en indsatsåbning (17) for hansonen gennem legemet til en modstående
20 propåbning (18) ved modstående ender af legemet;

hvor den indvendige væg af det cylindriske legeme (12) omfattende et sæde (12b) ved siden af propåbningen (18) til proppen (20), hvilket sæde strækker sig rundt om boringen (16), hvilken prop tjener til at lukke boringen væsketæt;

hvor boringen af hundelen mellem indsatsåbningen (17) og sædet (12b) omfatter en skulder
25 (12d), der vender mod indsatsåbningen, og hvor proppen (20) er forsynet med et tilslutningssystem med en flerhed af elastiske tilslutningsdele (21a, 21b, 21c, 21d, 21e) med tilsvarende tilslutningsoverflader (21a ", 21e"), hvor mindst en af tilslutningsdelene hviler i en første position med sin tilslutningsoverflade mod skulderen (fig. 1a), i hvilken i første position lukker proppen (20) boringen og derfor væsketæt lukker propåbningen på
30 beholderlegemet;

hvor koblingsindretningen (30) har en hansonde (31) med et hoved og en udsparring (33) placeret bag hovedet til modtagelse af mindst en af proppens tilslutningsdele, når hansonen er indsat i boringen, således proppen forbindes med hansonen,

5 hvor der radiale ved siden af den mindst ene af tilslutningsdelene i sin første position er et rum (22) mellem tilslutningsdelen (21a, 21b, 21c, 21d, 21e) og hundelen (11),

hvor den mindst ene tilslutningsdel er udformet således, at - når hanen er indsat i boringen - skubber hansonens hoved (32) tilslutningsdelen fra sin første position ind i dette rum (22) til en anden position, som er placeret radiale længere udad sammenlignet med den første position, i hvilken anden position proppen stadig lukker boringen og dermed væsketæt lukker
10 beholderlegemets propåbning;

og sådan, at mindst et af tilslutningsdelene, efter aksiale at have passeret hovedet (32) af hansonen mod en bund af beholderlegemet, fjedrer elastisk indad til en tredje position og falder i udsparringen (33) af hansonen mens kontakt mellem tilslutningsoverfladen og skulderen opretholdes, og mens kontakten mellem tilslutningsoverfladen og skulderen
15 opretholdes, lukker proppen stadig boringen og derfor væsketæt lukke beholderlegemets propåbning;

hvor udsparringen (33) i hansonen er sådan, at der er et radiale rum mellem tilslutningsdelen (21), der er placeret i sin tredje position, og hansonen (31) på en sådan måde, at indsættelse af hansonen (31) længere ind i boringen (16) mod bunden af beholderlegemet
20 får tilslutningsdelen (21) til at passere skulderen (22) i boringen, får tilslutningsdelen til at bevæge sig under påvirkning af en kraft, der udøves af skulderen på boring på tilslutningsdelen, til en fjerde position (fig. 1c), som er placeret længere indad i udsparringen (33) sammenlignet med den tredje position, således at proppen, der er i indgreb med hansonen, åbner boringen og dermed tillader væske at passere fra og til beholderlegemet;

25 kendetegnet ved, at der er tilvejebragt et tætningsdæksel (45) over boringen (16), i det væsentlige parallelt med proppen (20), hvilket tætningsdæksel tjener til at lukke boringen lufttæt.

2. System ifølge krav 1, hvor tætningsdækslet (45) omfatter en tætningsflade (40), der strækker sig over og parallelt med indsatsåbningen (17).

30 3. System ifølge krav 1 eller 2, hvor den indre væg (12) af det cylindriske legeme yderligere omfatter et tætningsdækselsæde (12f) ved en ende (12e) ved siden af indsatsåbningen (17), hvilket tætningsdækselsæde for forseglingsdækslet (45) strækker sig omkring boringen (16),

hvor tætningsdækslet er forsynet med et tætningssystem med mindst et radiale deformerbart tætningselement (41), der er indrettet til frigøreligt at gå i indgreb med tætningsdækselsædet (12f).

4. System ifølge et eller flere af de foregående krav, hvor det mindst ene radiale deformerbare tætningselement er en radiale udvidelig og komprimerbar ringformet krave, der strækker sig vinkelret til tætningsoverfladen af tætningsdækslet.
5. System ifølge et eller flere af de foregående krav, hvor tætningsdækslet er forsynet med en manipulationssikker rivering (42), der strækker sig omkring det i det væsentlige cylindriske legeme.
- 10 6. System ifølge et eller flere af de foregående krav, hvor den ydre cylindriske væg (13) er forsynet med en manipulationssikker ring (19), fortrinsvis strækkende sig som en fortsættelse af den ydre cylindriske væg.
- 15 7. System ifølge et eller flere af de foregående krav, hvor en tætningsring (15) er tilvejebragt ved den lukkede ende af den cylindriske slids (14b) for at hjælpe den væsketætte lukning af en øvre ende (2a) af halsdelen (2) af beholderlegemet ved munddelen (11) af hætteindretningen.
- 20 8. System ifølge et eller flere af de foregående krav, hvor den cylindriske slids (14) omfattende en slidsindgrebsflade (14c), der er indrettet til at gå i indgreb med en tilsvarende halsindgrebsflade (2c) ved halsdelen (2) af beholderlegemet for at tilvejebringe en væsketæt lukning omkring halsdelen.
9. System ifølge et eller flere af de foregående krav, hvor koblingsindretningen er udformet således, at proppen (20) er fri for boringen (16), når hansonen er indsat helt i boringen, hvor mindst en af proppens (20) tilslutningsdele (21) elastisk fjeder tilbage fra den fjerde position til den tredje position, når den kommer ud af boringen.
- 25 10. System ifølge et eller flere af de foregående krav, hvor hansonen har en indre aksial passage (101) til passage af væsken, i hvilken passage en eller flere porte (105) er tilvejebragt, hvor hver port strækker sig fra den ydre overflade af hansonen til et udløb i den aksiale passage.

DRAWINGS

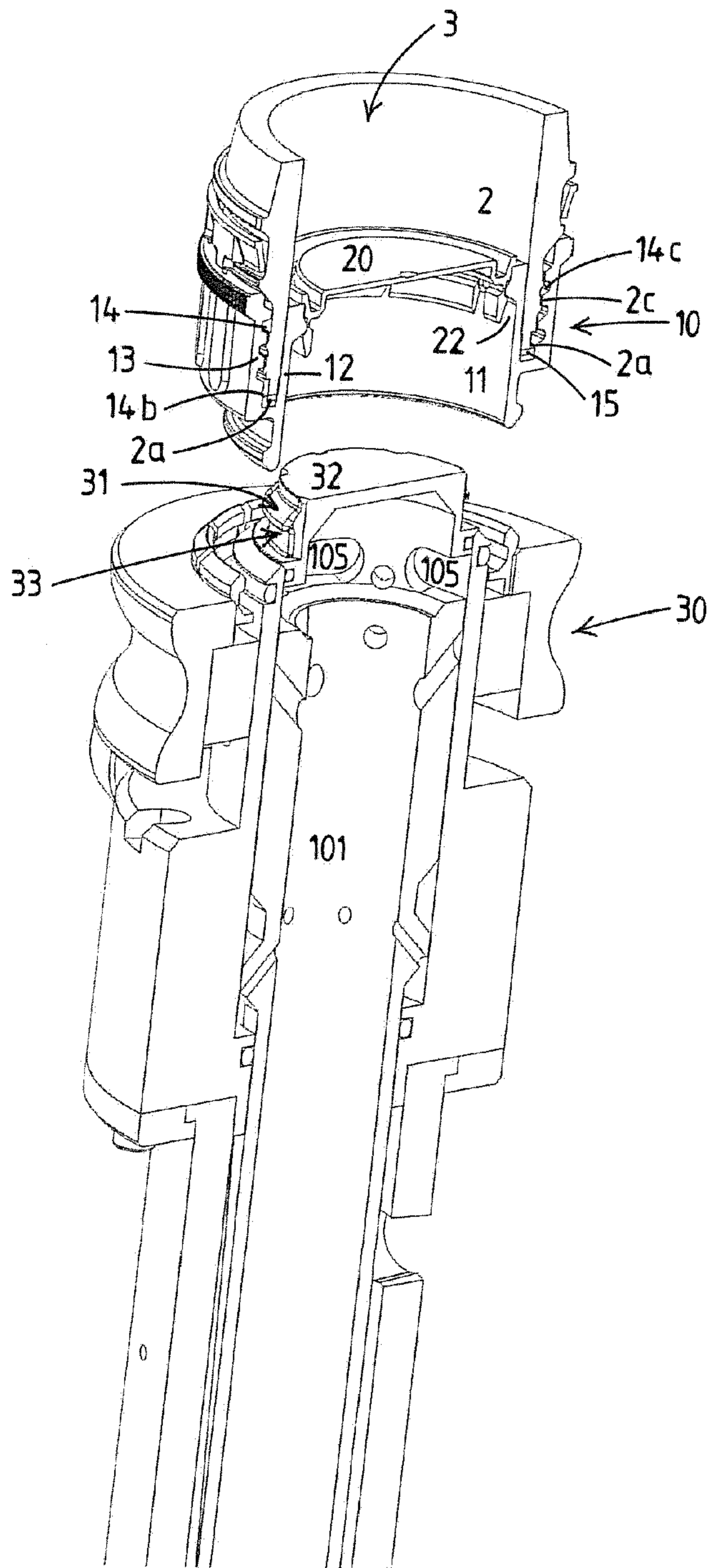


Fig.1a

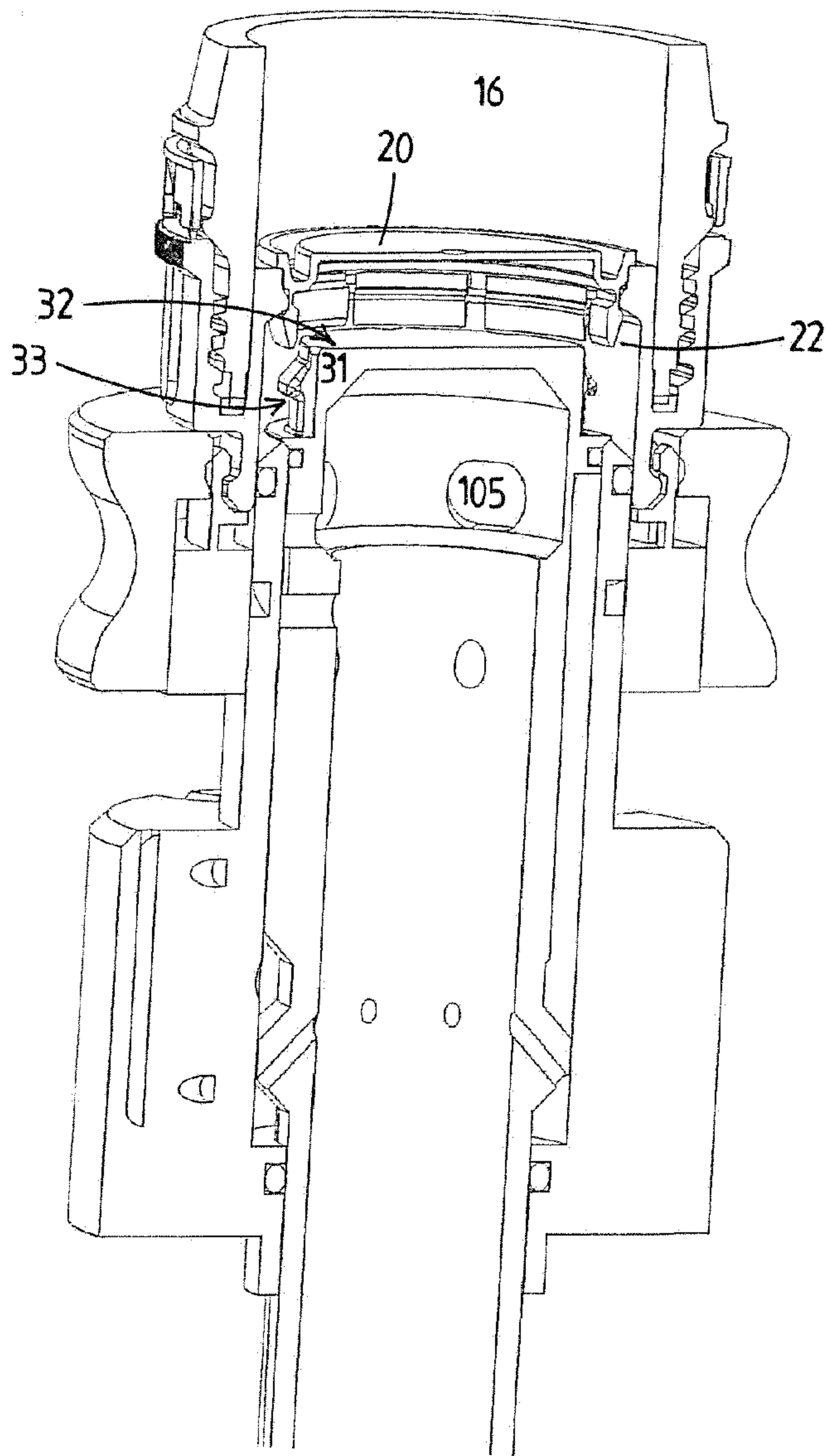


Fig.1b

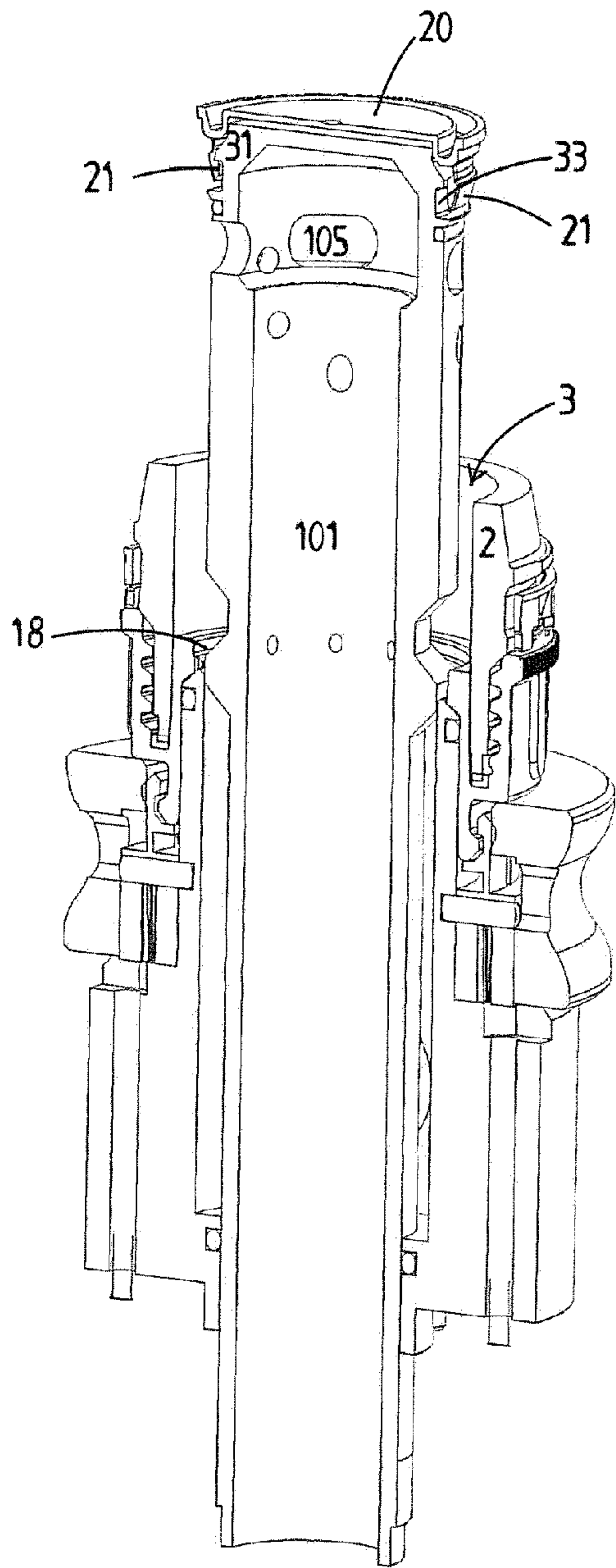


Fig.1c

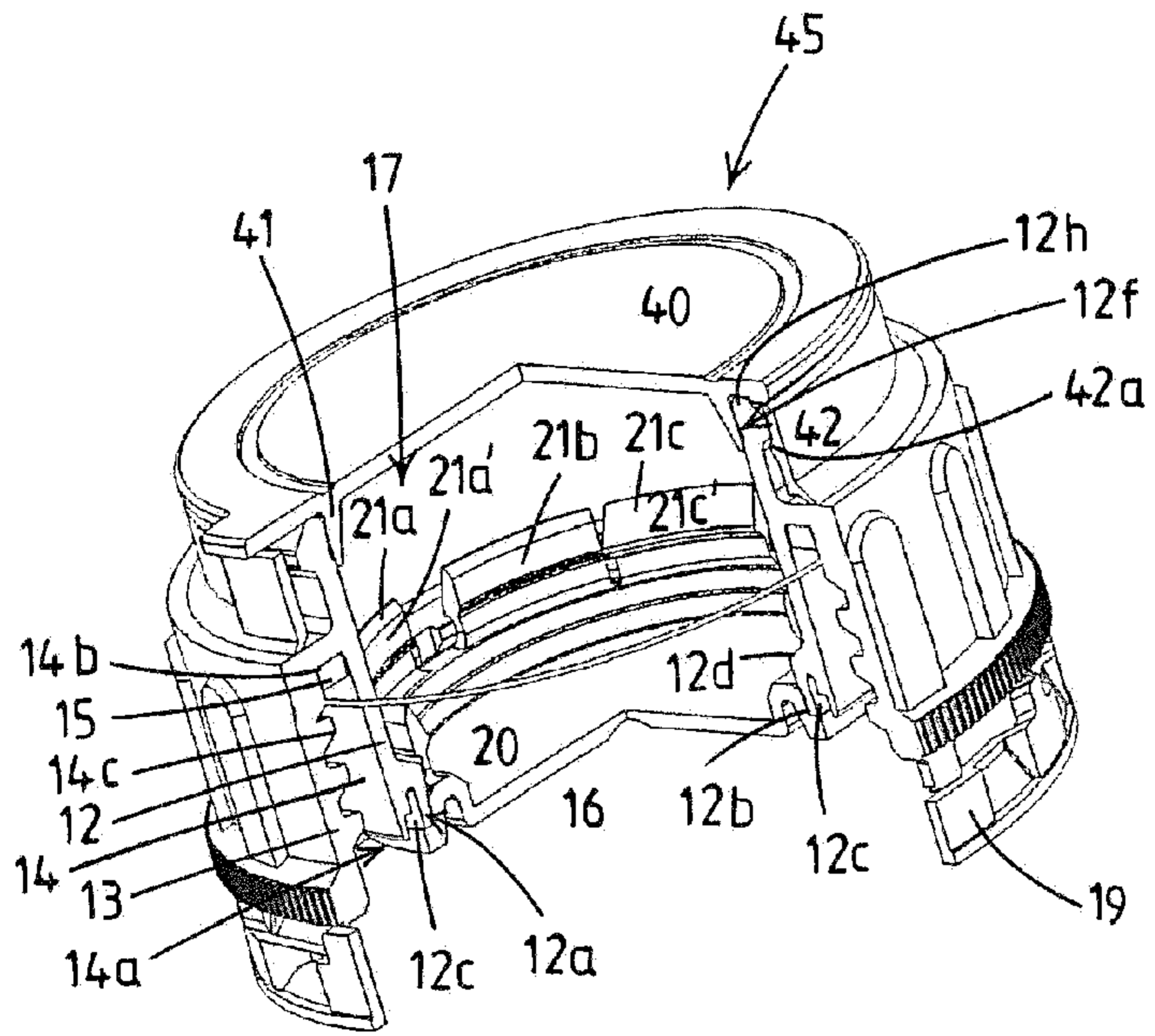


Fig.2

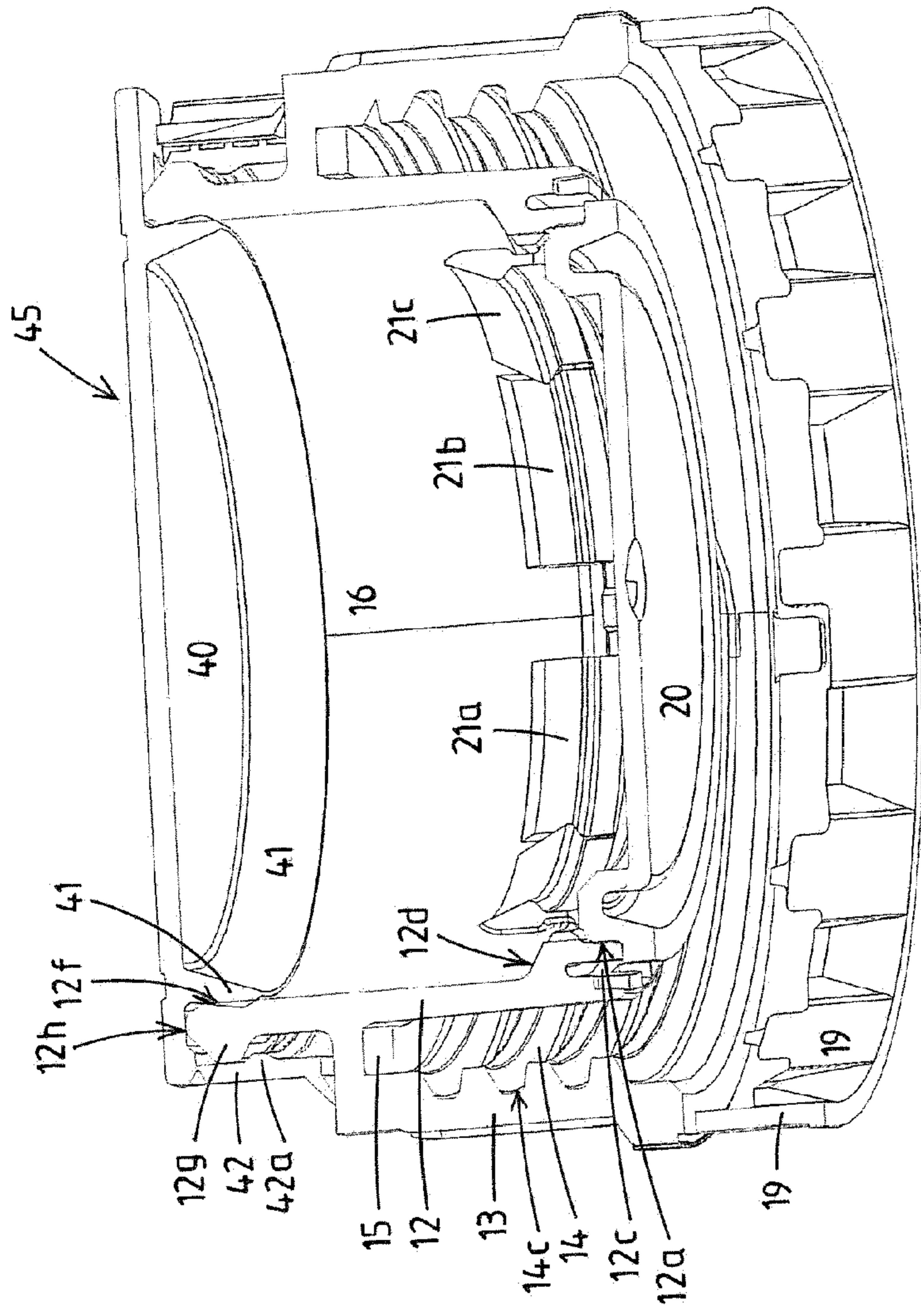


Fig.3

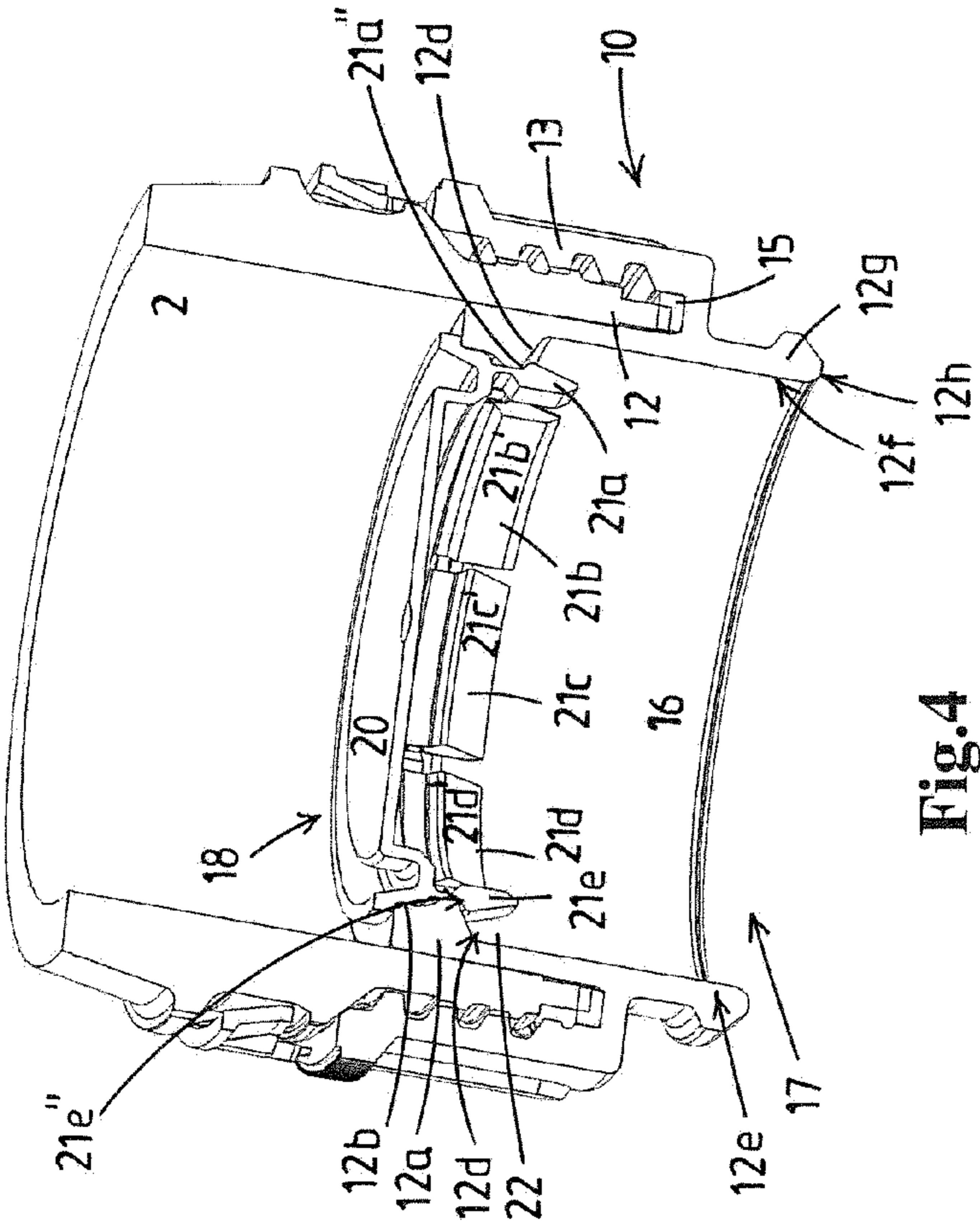


Fig.4

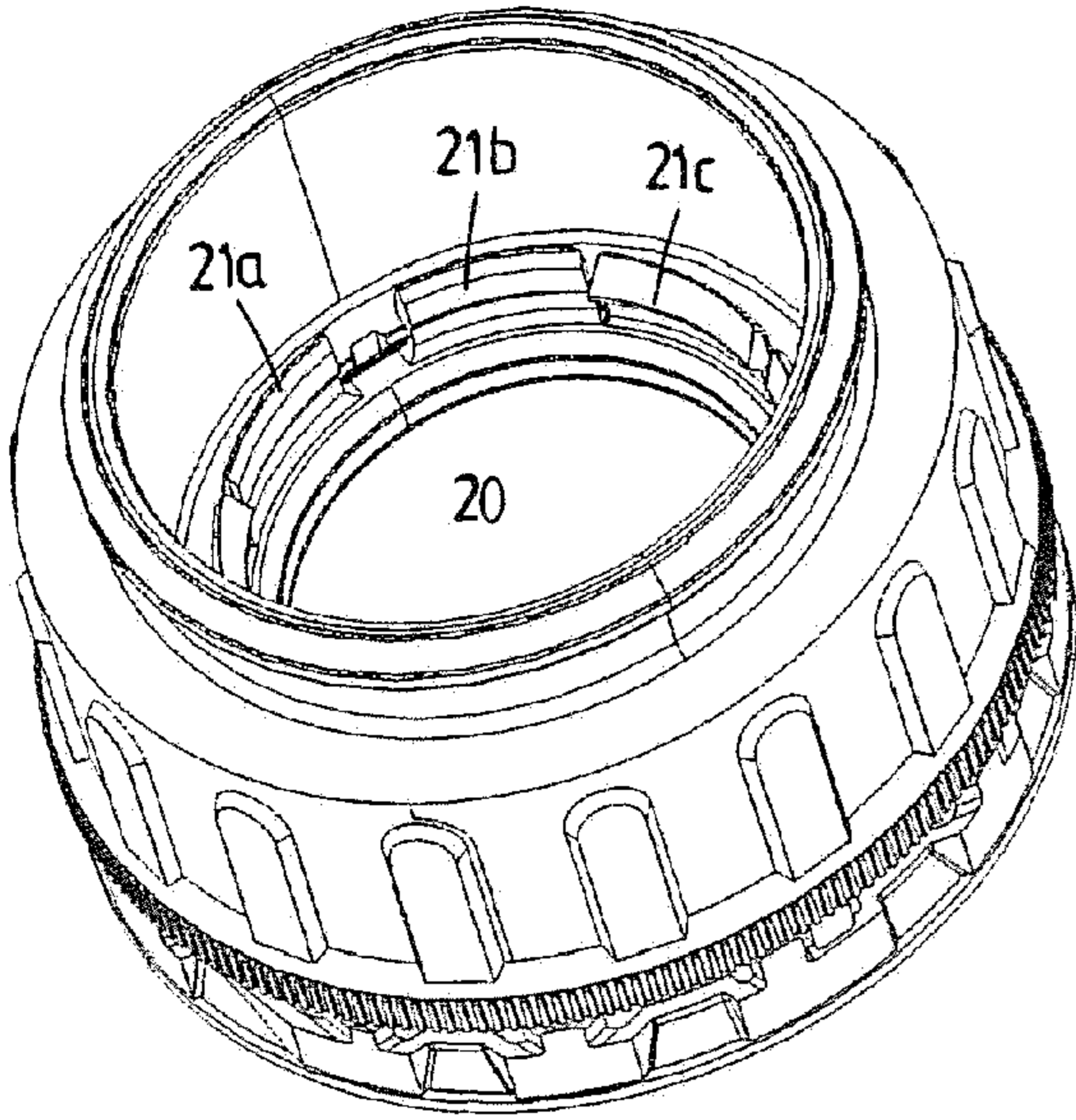


Fig.5

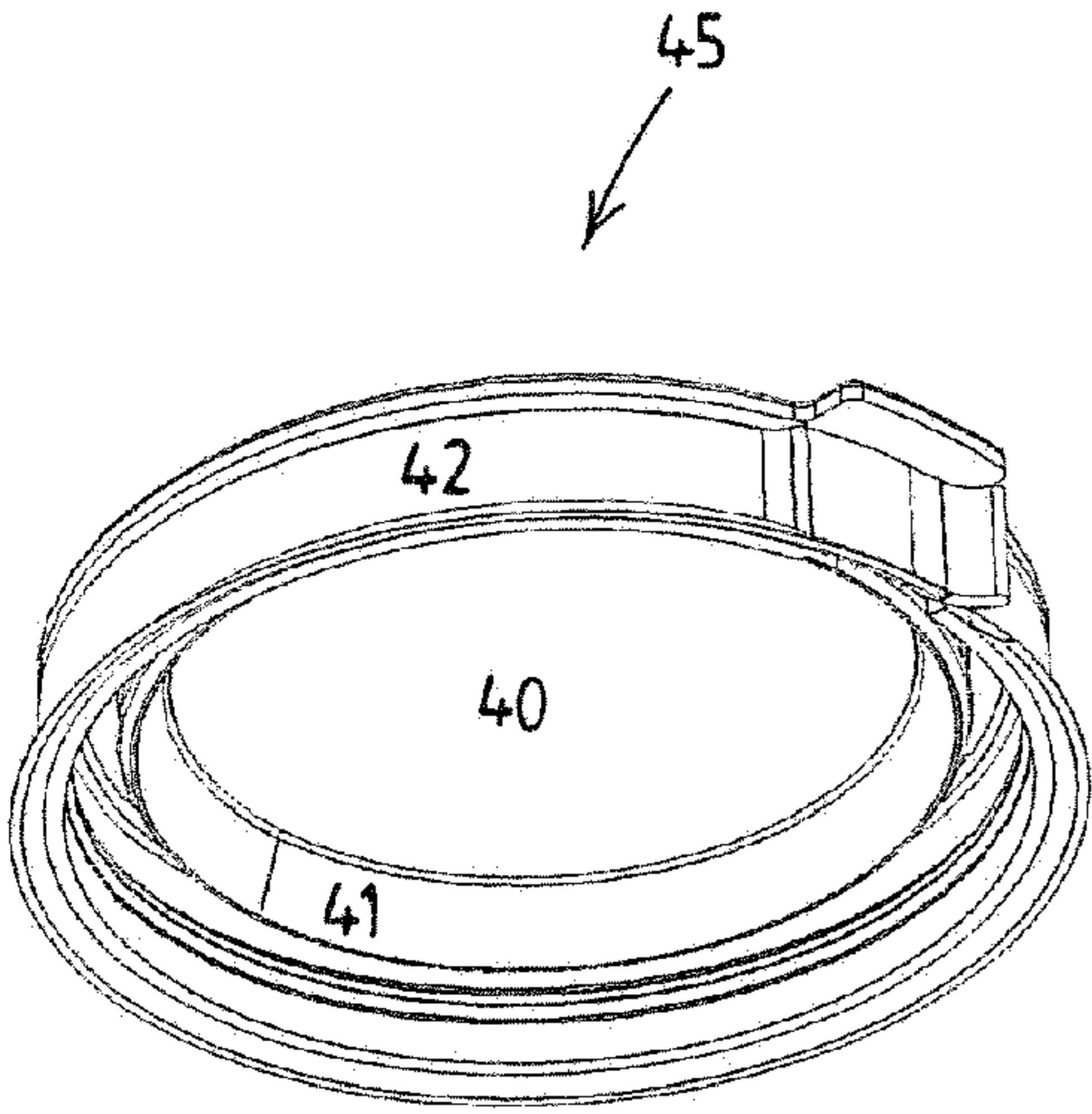


Fig.6