(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 795 652 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
17.09.1997 Bulletin 1997/38

(51) Int. Cl.[6]: **E03F 5/04**

(21) Application number: **97103392.3**

(22) Date of filing: **01.03.1997**

(84) Designated Contracting States:
BE CH DE DK FI FR GB LI NL SE

(30) Priority: **15.03.1996 SE 9600990**

(71) Applicant: **AB SJÖBO BRUK**
S-275 21 Sjöbo (SE)

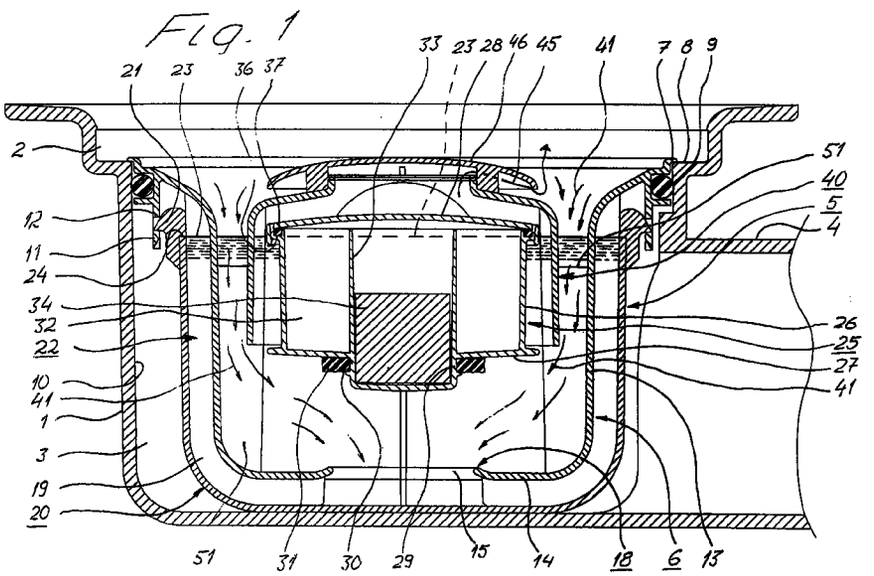
(72) Inventor: **Spanberg, Lars**
245 00 Staffanstorp (SE)

(74) Representative: **Wagner, Karl Heinz**
H. Wagner & Co. AB
Norra Vallgatan 72
211 22 Malmö (SE)

(54) Oil cut-off device for floor drains and similar

(57) The present invention relates to an oil cut-off device for floor drains or similar. The oil cut-off device comprises a screening means (40) and a valve body (25) which is located inside said screening means (40). An aeration opening (44) is located in upper portions of the screening means (40) and said aeration opening (44) is screened off from above by means of a cover (46).

Fig. 1



EP 0 795 652 A2

Description

The present invention relates to an oil cut-off device for floor drains or similar, whereby the floor drain comprises a liquid-containing member and a pipe member which is directed down into liquid in said liquid-containing member such that a liquid seal is defined, whereby the pipe member is adapted to guide liquid down to the liquid seal, whereby the pipe member down below has an opening through which liquid can flow out of said pipe member, whereby a valve seat for a valve body which is located in the pipe member, is provided around the opening, whereby the valve body is provided to float in liquids with higher density than liquid mixed with oil or oil, but sink in liquids which are mixed with oil or consist of oil and thereby have a lower density than the first-mentioned liquids, whereby the valve body is provided to sink to the valve seat and, in cooperation therewith, to close the opening and thereby interrupt the flow of liquid through the floor drain, and whereby at least one screening means is provided in the pipe member and prevents liquid streams, which flow down into the floor drain when the valve body floats in the liquid in the liquid seal, from pressing said valve body in downwards direction to the valve seat.

Oil cut-off devices of the abovementioned type are already known from e.g. SE patent specification 222 843. The cut-off means for the valve body at the oil cut-off device according to said publication is provided with openings for allowing liquid to flow thereinto. However, the cut-off means has no air outlet openings which are located so that air can flow out of the upper portions of the cut-off means such that the liquid surface and the valve body can rise high up in said upper portions. Therefore, the cut-off means of this prior art oil cut-off device can not be used in modern floor drains having a small structural height and wherein it is therefore necessary that the liquid surface and valve body can rise high up in the upper portions of the cut-off means. Consequently, nothing is mentioned in said publication that problems may arise if air outlet openings are located in upper portions of the cut-off means and nothing is mentioned about how to eliminate these problems.

The object of the present invention has been to see to, at oil cut-off devices of the abovementioned type, that the liquid surface and the valve body can rise high up in the cut-off means and simultaneously protect the valve body so that said valve body is not pressed downwards by liquid flowing into the floor drain. This is arrived at according to the invention by providing the oil cut-off device according to the invention with the characterizing features of claim 1.

By locating the air outlet or aeration opening at the top of the cut-off means and by screening off said cut-off means by means of the casing or cover, air may flow out of the cut-off means such that the liquid surface and the valve body can rise high up in said cut-off means, and streams of water are prevented from flowing down into the aeration opening such that they hit the valve body and press it in downwards direction.

The invention will be further described below with reference to the accompanying drawings, wherein

fig. 1 is a vertical section of a floor drain having an oil cut-off device according to the invention, whereby a valve body is situated in an upper opening position;

fig. 2 is a vertical section corresponding to fig. 1, whereby the valve body is situated in a lower closing position;

fig. 3 is a section along the line III-III through the floor drain of fig. 1;

fig. 4 illustrates an enlarged part of the section of the floor drain according to fig. 1; and

fig. 5 illustrates another enlarged part of the section of the floor drain according to fig. 1.

The drawings illustrate a floor drain including an outer member 1 with an upper inlet portion 2, a portion 3 located beneath said inlet portion for receiving and carrying an insert and an outlet pipe 4 extending from said insert-carrying portion 3, said outlet pipe 4 being connectable to a discharge system (not shown). The outlet pipe 4 is here directed laterally relative to the insert-carrying portion 3, but may alternatively be directed downwards.

An insert 5 is removably located in the insert-carrying portion 3 of the floor drain. This insert 5 includes a pipe member 6 which at the top has an outwardly directed support flange 7 which is adapted to rest on inwardly directed support surfaces 8 on the outer member 1. At the top, the pipe member 6 also includes a sealing ring 9 which is in contact with downwardly directed surfaces 10 on the outer member 1, so that a sealing is obtained between said outer member 1 and the insert 5. The sealing ring 9 may assist in retaining the insert 5 at the outer member 1.

The upper portions of the pipe member 6 is provided with a number - preferably four - of downwardly directed flanges 11 having holes 12, the purpose of which will be described below.

The pipe member 6 includes downwardly directed wall portions 13 which down below transform into lower, inwardly directed wall portions 14 with a centrally located opening 15. The wall portions 14 define around the opening 15 an obliquely upwards/inwards directed edge portion 16 with a softly rounded end edge 17. This edge portion 16 is adapted to define a valve seat 18 on the pipe member 6.

The pipe member 6 further includes outer or external flange portions 19 - preferably four flange portions - which extend along the downwardly directed and the inwardly directed wall portions 13, 14. The flange portions 19 are inter alia adapted for centering and for

keeping the distance between the pipe member and a member 20 containing liquid. The pipe member 6 is adapted to extend downwards into the liquid-containing member 20, which preferably consists of a trough with hook portions 21 - preferably four - located at the top thereof. These hook portions 21 are adapted to permit snapping of the liquid-containing member 20 onto the downwardly directed flanges 11 of the pipe member 6 by bringing said hook portions 21 into engagement in the holes 12 of said flanges 11.

The insert 5 functions so that liquid - normally water - flows down into the pipe member 6 and gathers in the liquid-containing member 20 until it is filled. The liquid surface 23 is then situated substantially above the lower, inwardly directed wall portions 14 of the pipe member 6, i.e. the pipe member 6 extends far down into the liquid-containing member 20, whereby a liquid seal 22 - normally called water seal or odour or stench trap - is defined, which prevents odours in the discharge system from rising through the floor drain.

If more liquid flows down into the pipe member 6 - after the liquid-containing member 20 is filled - liquid will flow over the upper edge 24 thereof and down into the outer member 1 and through the outlet pipe 4 into the discharge system.

For preventing oil or liquids mixed with oil from flowing out through the floor drain, the pipe member 6 includes a valve body 25 which is adapted to close the opening 15 in cooperation with the valve seat 18. This valve body 25 has such a density that it floats in liquids having higher density than liquid mixed with oil or oil and that it sinks in liquids mixed with oil or consisting of oil. The valve body 25 may e.g. have a density of about 9,5 kg/dm^3, which means that it floats in water (with about one tenth above the surface) but sinks in water mixed with oil or in oil, e.g. when fuel oils or Diesel oil flows down into the floor drain.

When the valve body 25 sinks, it is brought in contact with the valve seat 18 so that said valve body closes the opening 15 and thus, it is ensured that the liquid mixed with oil or the oil can not flow out into the discharge system through the floor drain.

The valve body 25 consists e.g. of a substantially cylindrical hollow body 26, which down below is sealed or closed by an underside 27 and at the top by a cap 28.

The underside 27 has a downwardly directed retaining member 29 which is tubular in shape and which has an outer or external seat 30 for a sealing ring 31. At the top thereof, said sealing ring 31 engages the underside 27 and it is adapted to cooperate down below with the seat 18 for closing the opening 15.

The inner space 32 of the valve body has an upwardly open member 33 into which a weight 34 can be inserted from above. Lower portions of the upwardly open member 33 are situated in inner parts of the retaining member 29, so that the weight 34 can be located as far below as possible in the valve body 25. This means that the valve body 25 can be given a very low centre of gravity.

The upwardly open member 33 may be cylindrical and the weight 34 may be a cylindrical body of metallic material.

The cylindrical hollow body 26 has at the top a seat 36 for a sealing ring 37 which is adapted to provide a sealing between said cylindrical hollow body 26 and the cap 28. The cap 28 can preferably be snapped onto the cylindrical hollow body 26 so that it can be removed when required for change of weight 34. Furthermore, the cylindrical hollow body 26 has down below a lateral, outwardly directed guide flange 38 and the cap 28 defines at the top another guide flange 39 by having a lateral, outwardly directed shape.

The sealing ring 31 preferably consists of a soft material, which can be formed into the rounded end edge 17 of the valve seat 18 and which also is capable of engaging the valve seat 18 around contaminants adhering thereto. This sealing ring 31 may consist of oil resistant cellular rubber material.

In the pipe member 6 there is provided a screening means 40 which is adapted to prevent liquid streams 41, which from above flow down into the pipe member 6, from hitting the valve body 25. Hereby, it is prevented that the valve body 25, when it floats in liquid, is pressed down to the seat 18, and thus, there is no risk that the valve body 25 unintentionally can interrupt the flow through the floor drain.

The screening means 40 preferably includes a cylindrical member 42 with a larger diameter than the valve body 25. This cylindrical member 42 is open down below and has an upper wall portion 43 with preferably a centrally located aeration opening 44 which is adapted to permit air (see arrow 45, fig. 1) to flow out of the screening means 40 when liquid and the valve body 25 rise therein. The aeration opening 44 is located so that the liquid streams 41 coming from above can not flow into the screening means 40 from above to such an extent that they affect the valve body 25 in downwards direction towards the valve seat 30. In order to prevent or obstruct the flow of liquid streams 41 into the screening means 40, the aeration opening 44 may be screened off from above by a casing or cover 46. This casing or cover 46 comprises downwardly directed mounting flanges 47 - preferably four such mounting flanges - which makes it possible to snap the cover 46 onto a collar 48 which is provided extending upwards from the upper wall portion 43 around the aeration opening 44.

The cover 46 is provided to define a laterally directed air slit 49 with the upper wall portion 43 such that air 45 can flow out of the aeration opening 44 in a lateral direction. The cover 46 is also provided such that lower parts of the air slit 49 lie on a level below the upper edge 50 of the collar 48.

The screening means 40 is removably mounted in the pipe member 6 and has outwardly and downwardly directed support legs 51 - preferably four such support legs - which down below are adapted to engage the lower, inwardly directed wall portions 14 of said pipe

member 6 so that said legs 51 determine the elevation of the screening means 40 in the pipe member 6. The support legs 51 are preferably also adapted to center the screening means 40 relative to the pipe member 6.

The support legs 51 can form guide portions 52 for guiding the valve body 25 during its movement between its upper position - in which it floats in the liquid - and its lower position - in which it cooperates with the seat 18. Said guide portions 52 preferably include members 53 which are located inside the screening means 40 and which may be connected with the cylindrical member 42 as well as with the upper wall portion 43.

As is apparent from fig. 2, the screening means 40 is designed and located so that it from above covers and receives the major part of the valve body 25 when said valve body floats in the liquid in the liquid seal 22 so that the liquid streams 41 flowing downwards pass said valve body 25 externally thereof in downwards direction towards the opening 15, whereby liquid will flow out of the water seal 22 via the upper edge 24 of the liquid-containing member 20.

The invention is not limited to the embodiment described above and illustrated in the drawings, but may vary within the scope of the following claims. As not specifically described alternatives one should mention that the oil cut-off device may be used in other types of floor drains than the type shown and it may also be used in roof drains. The valve body 25 may be of another design than what is illustrated and the screening means 40 may also be designed otherwise than what is shown and may also consist of more than one member. The screening means 40 may e.g. be provided so that upper portions thereof are located above the liquid surface 23 in the liquid seal 22, while lower portions thereof are located below said liquid surface 23. Furthermore, the screening means 40 may be mounted so that its upper portions are situated in level with upper portions of the pipe member 6 and it may be somewhat higher than half the height of the pipe member 6. If there is an aeration opening 44 in the screening means 40, said opening 44 should preferably be located above the liquid surface 23 in the liquid seal 22.

Claims

1. Oil cut-off device for floor drains or similar,

   whereby the floor drain comprises a liquid-containing member (20) and a pipe member (6) which is directed down into liquid in said liquid-contaning member (20) such that a liquid seal (22) is defined,

   whereby the pipe member (6) is adapted to guide liquid down to the liquid seal (22),

   whereby the pipe member (6) down below has an opening (15) through which liquid can flow out of said pipe member (6),

   whereby a valve seat (18) for a valve body (25) which is located in the pipe member (6), is provided around the opening (15),

   whereby the valve body (25) is provided to float in liquids with higher density than liquid mixed with oil or oil, but sink in liquids which are mixed with oil or consist of oil and thereby have a lower density than the firstmentioned liquids,

   whereby the valve body (25) is provided to sink to the valve seat (18) and, in cooperation therewith, to close the opening (15) and thereby interrupt the flow of liquid through the floor drain, and

   whereby at least one screening means (40) is provided in the pipe member (6) and prevents liquid streams (41), which flow down into the floor drain when the valve body (25) floats in the liquid in the liquid seal (22) from pressing said valve body (25) in downwards direction to the valve seat (18),
   characterized in

   that the screening means (40) includes a cover (46) which from above screens off at least one aeration opening (44) which is located at the top of said screening means (40) and adapted to permit air (45) to flow out of said screening means (40) when the liquid surface (23) in the liquid seal (22) and the valve body (25) rise in the screening means (40), and that the cover (46) is located so that liquid streams (41) can not flow into the screening means (40) through the aeration opening (44) to such an extent that they press the valve body (25) in downwards direction to the valve seat (18).

2. Oil cut-off device according to claim 1, **characterized in** that the cover (46) is provided to define a laterally directed air slit (49) such that air (45) can flow out through the aeration opening (44) in at least one lateral direction.

3. Oil cut-off device according to claim 2, **characterized in** that the upper wall portion (14) has an upwardly directed collar (48) which is located around the aeration opening (44), that the cover (46) has downwardly directed mounting flanges (47) through which said cover (46) can be snapped onto the collar (48), and that the cover (46) is provided so that lower portions of the air slit (49) are located at a level beneath an upper edge (50) of the collar (48).

4. Oil cut-off device for floor drains or similar,

   whereby the floor drain comprises a liquid-con-

taining member (20) and a pipe member (6) which is directed down into liquid in said liquid-contaning member (20) such that a liquid seal (22) is defined,

whereby the pipe member (6) is adapted to guide liquid down to the liquid seal (22),

whereby the pipe member (6) down below has an opening (15) through which liquid can flow out of said pipe member (6),

whereby a valve seat (18) for a valve body (25) which is located in the pipe member (6), is provided around the opening (15),

whereby the valve body (25) is provided to float in liquids with higher density than liquid mixed with oil or oil, but sink in liquids which are mixed with oil or consist of oil and thereby have a lower density than the firstmentioned liquids,

whereby the valve body (25) is provided to sink to the valve seat (18) and, in cooperation therewith, to close the opening (15) and thereby interrupt the flow of liquid through the floor drain, and whereby at least one screening means (40) is provided in the pipe member (6) and prevents liquid streams (41), which flow down into the floor drain when the valve body (25) floats in the liquid in the liquid seal (22) from pressing said valve body (25) in downwards direction to the valve seat (18),
characterized in

that the screening means (40) is removably positioned in the pipe member (6) and has outwardly and downwardly directed support legs (51) which are adapted to engage lower, inwardly directed wall portions (14) of said pipe member (6) for determining the elevation of the screening means (40) in said pipe member (6), whereby said support legs (51) preferably also are adapted to center said screening means (40) relative to said pipe member (6).

5. Oil cut-off device according to claim 4, **characterized in** that the support legs (51) of the screening means (40) define guide portions (52) for guiding the valve body (25) during its movements in vertical direction between an upper position in which it floats in liquid in the liquid seal (22) and a lower position in which it cooperates with the seat (18).

6. Oil cut-off device according to claim 5, **characterized in** that the guide portions (52) include members (53) located inside the screening means (40).

7. Oil cut-off device for floor drains or similar,

whereby the floor drain comprises a liquid-containing member (20) and a pipe member (6) which is directed down into liquid in said liquid-contaning member (20) such that a liquid seal (22) is defined,

whereby the pipe member (6) is adapted to guide liquid down to the liquid seal (22),

whereby the pipe member (6) down below has an opening (15) through which liquid can flow out of said pipe member (6),

whereby a valve seat (18) for a valve body (25) which is located in the pipe member (6), is provided around the opening (15),

whereby the valve body (25) is provided to float in liquids with higher density than liquid mixed with oil or oil, but sink in liquids which are mixed with oil or consist of oil and thereby have a lower density than the firstmentioned liquids,

whereby the valve body (25) is provided to sink to the valve seat (18) and, in cooperation therewith, to close the opening (15) and thereby interrupt the flow of liquid through the floor drain,

whereby at least one screening means (40) is provided in the pipe member (6) and prevents liquid streams (41), which flow down into the floor drain when the valve body (25) floats in the liquid in the liquid seal (22) from pressing said valve body (25) in downwards direction to the valve seat (18), and

whereby the valve body (25) down below is provided with a sealing ring (31) which is adapted to be brought in contact with the valve seat (18) for closing the opening (15) in the pipe member (6),
characterized in

that the sealing ring (31) consists of such soft material that it can adapt itself to contaminants adhering to the valve seat (18) and thereby engage said valve seat (18) around said contaminants.

8. Oil cut-off device according to claim 7, **characterized in** that the sealing ring (31) consists of such soft material that it can adapt itself to the softly rounded shape of an end edge (17) of such an obliquely upwards/inwards directed edge portion (16) of the valve seat (18) which is defined by the pipe member (6) around the opening (15).

9. Oil cut-off device according to claim 7 or 8, **charac-**

terized in that the sealing ring (31) consists of an oil resistant cellular rubber material.

10. Oil cut-off device for floor drains or similar,

whereby the floor drain comprises a liquid-containing member (20) and a pipe member (6) which is directed down into liquid in said liquid-contaning member (20) such that a liquid seal (22) is defined,

whereby the pipe member (6) is adapted to guide liquid down to the liquid seal (22),

whereby the pipe member (6) down below has an opening (15) through which liquid can flow out of said pipe member (6),

whereby a valve seat (18) for a valve body (25) which is located in the pipe member (6), is provided around the opening (15),

whereby the valve body (25) is provided to float in liquids with higher density than liquid mixed with oil or oil, but sink in liquids which are mixed with oil or consist of oil and thereby have a lower density than the firstmentioned liquids,

whereby the valve body (25) is provided to sink to the valve seat (18) and, in cooperation therewith, to close the opening (15) and thereby interrupt the flow of liquid through the floor drain, and

whereby at least one screening means (40) is provided in the pipe member (6) and prevents liquid streams (41), which flow down into the floor drain when the valve body (25) floats in the liquid in the liquid seal (22) from pressing said valve body (25) in downwards direction to the valve seat (18),
characterized in

that the valve body (25) includes a cap (28) which can be sealingly connected thereto and which permits opening of the valve body (25) at the top thereof for removable location of a weight (34) in lower portions of an inner space in said valve body (25), said weight being adapted to give said valve body (25) a predetermined weight.

11. Oil cut-off device according to claim 10, **characterized in** that the inner space (32) of the valve body (25) includes an in upwards direction open member (33) which is designed to receive and position the weight (34) and that lower portions of said upwardly open member (33) are situated in a retaining member (29) which is directed downwards from an underside (27) of the valve body (25) and on which a sealing ring (31) forming part of said valve body (25) is mounted externally, whereby said valve body (25) attains a low centre of gravity.

12. Oil cut-off device according to claim 10 or 11, **characterized in** that the weight is a metal body (34).

13. Oil cut-off device for floor drains or similar,

whereby the floor drain comprises a liquid-containing member (20) and a pipe member (6) which is directed down into liquid in said liquid-contaning member (20) such that a liquid seal (22) is defined,

whereby the pipe member (6) is adapted to guide liquid down to the liquid seal (22),

whereby the pipe member (6) down below has an opening (15) through which liquid can flow out of said pipe member (6),

whereby a valve seat (18) for a valve body (25) which is located in the pipe member (6), is provided around the opening (15),

whereby the valve body (25) is provided to float in liquids with higher density than liquid mixed with oil or oil, but sink in liquids which are mixed with oil or consist of oil and thereby have a lower density than the firstmentioned liquids,

whereby the valve body (25) is provided to sink to the valve seat (18) and, in cooperation therewith, to close the opening (15) and thereby interrupt the flow of liquid through the floor drain, and

whereby at least one screening means (40) is provided in the pipe member (6) and prevents liquid streams (41), which flow down into the floor drain when the valve body (25) floats in the liquid in the liquid seal (22) from pressing said valve body (25) in downwards direction to the valve seat (18),
characterized in

that the valve body (25) has a substantially cylindrical hollow body (26) which down below is sealed or closed by an underside (27) and at the top by a removable cap (28), that the cylindrical hollow body (26) down below is provided with a lateral, outwardly directed, annular guide flange (38), and that the cylindrical hollow body (26) at the top has a lateral, outwardly directed guide flange (39) which preferably is defined by the cap (28), whereby said annular guide flanges (38, 39) are adapted to cooperate with

guide portions (52) which are provided on the screening means (40) and which preferably are defined by support legs (51) for said screening means (40).

14. Oil cut-off device for floor drains or similar,

whereby the floor drain comprises a liquid-containing member (20) and a pipe member (6) which is directed down into liquid in said liquid-contaning member (20) such that a liquid seal (22) is defined,

whereby the pipe member (6) is adapted to guide liquid down to the liquid seal (22),

whereby the pipe member (6) down below has an opening (15) through which liquid can flow out of said pipe member (6),

whereby a valve seat (18) for a valve body (25) which is located in the pipe member (6), is provided around the opening (15),

whereby the valve body (25) is provided to float in liquids with higher density than liquid mixed with oil or oil, but sink in liquids which are mixed with oil or consist of oil and thereby have a lower density than the firstmentioned liquids,

whereby the valve body (25) is provided to sink to the valve seat (18) and, in cooperation therewith, to close the opening (15) and thereby interrupt the flow of liquid through the floor drain, and

whereby at least one screening means (40) is provided in the pipe member (6) and prevents liquid streams (41), which flow down into the floor drain when the valve body (25) floats in the liquid in the liquid seal (22) from pressing said valve body (25) in downwards direction to the valve seat (18),
characterized in

that the liquid-containing member (20) is located on the pipe member (6) and that the pipe member (6) is provided as an insert (5) in an outer member (1) of a floor drain or similar, whereby said insert (5) besides said pipe member (6) also includes said liquid-containing member (20), the valve body (25) and the screening means (40) and whereby said insert (5) is removably mounted in said outer member (1).

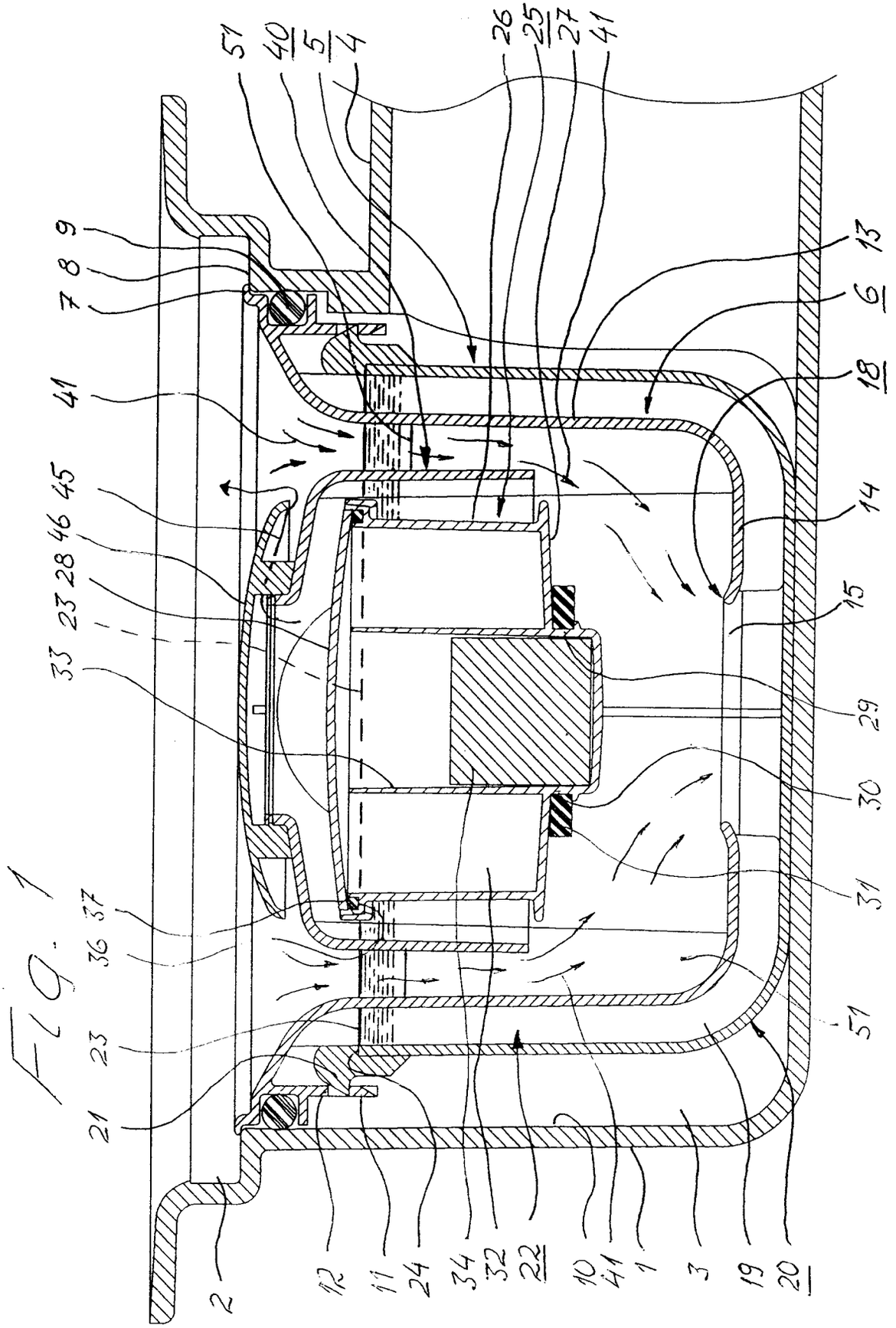

51
40
5
4
26
25
27
41
7
8
9
41
45
46
28
23
33
13
6
18
14
15
29
30
31
51
37
36
23
21
2
12
11
24
34
32
22
10
41
1
3
19
20

FIG. 1

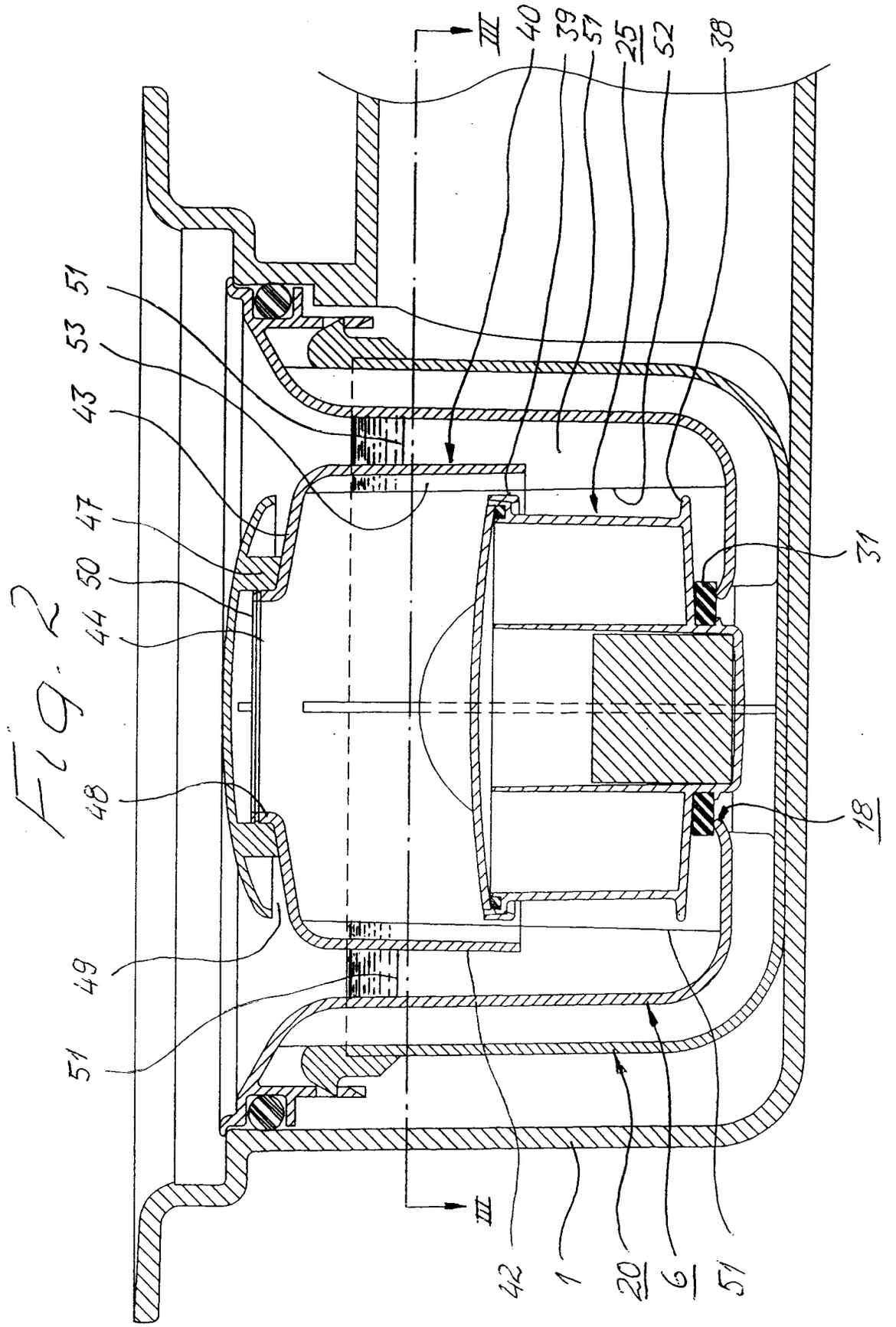


Fig. 2

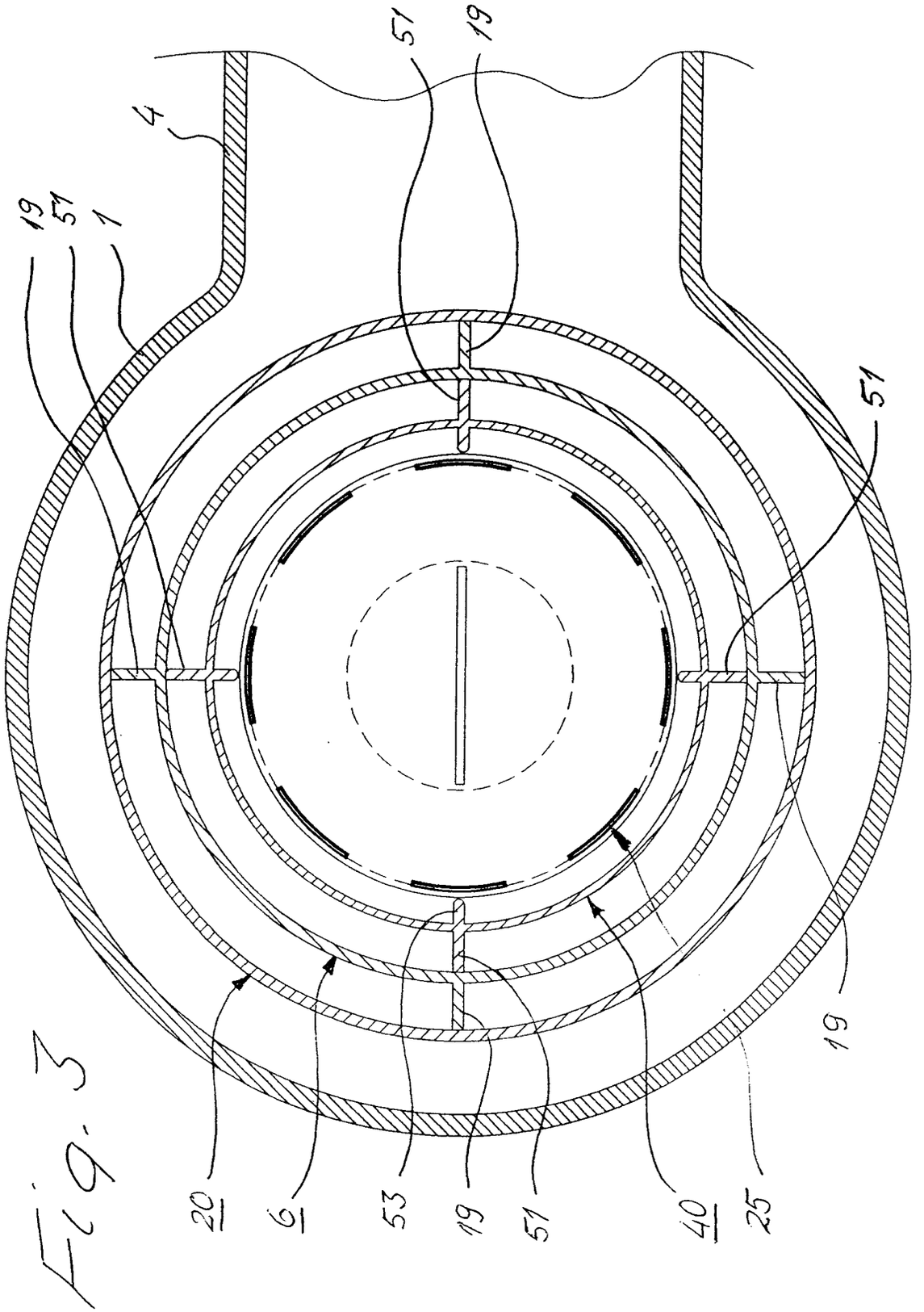


Fig. 3

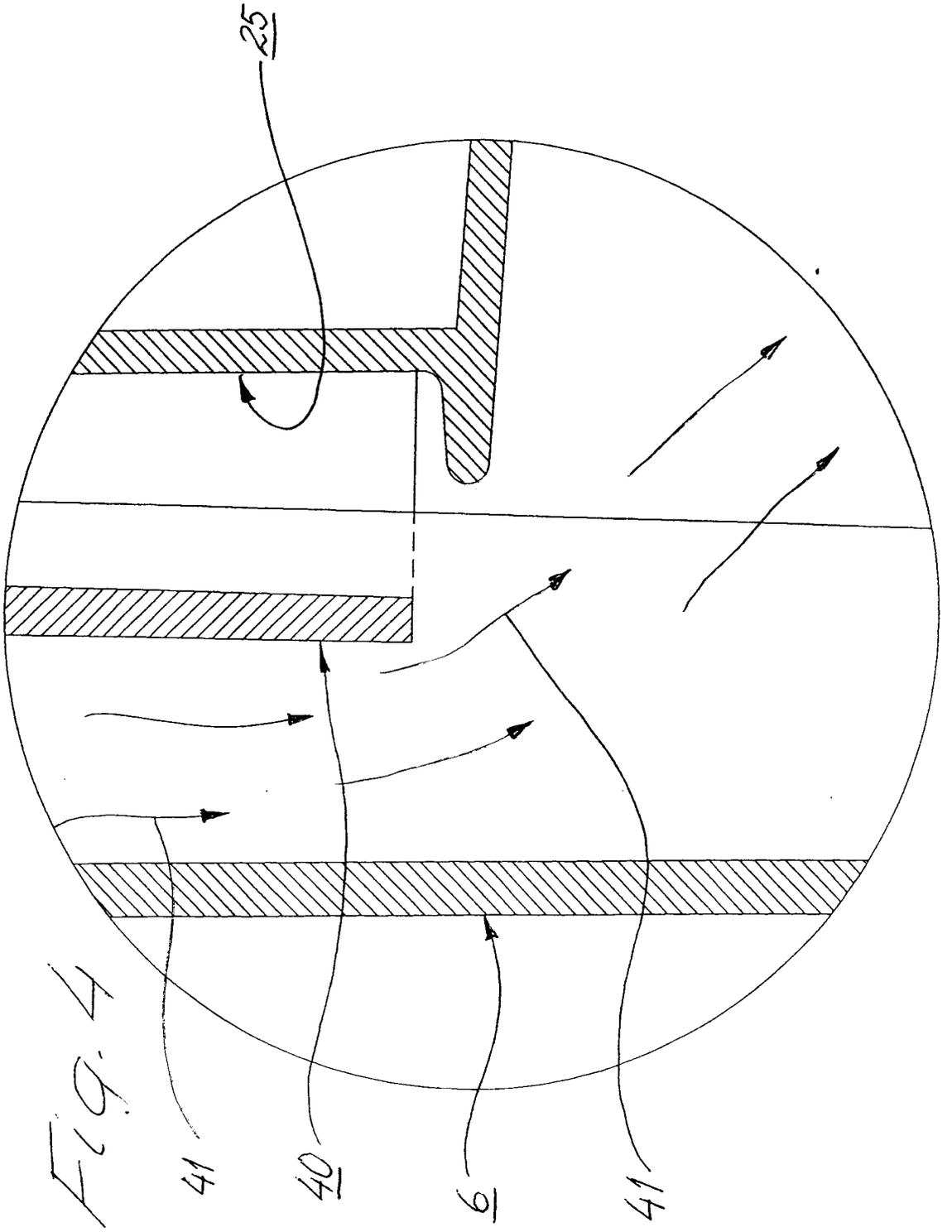


Fig. 4

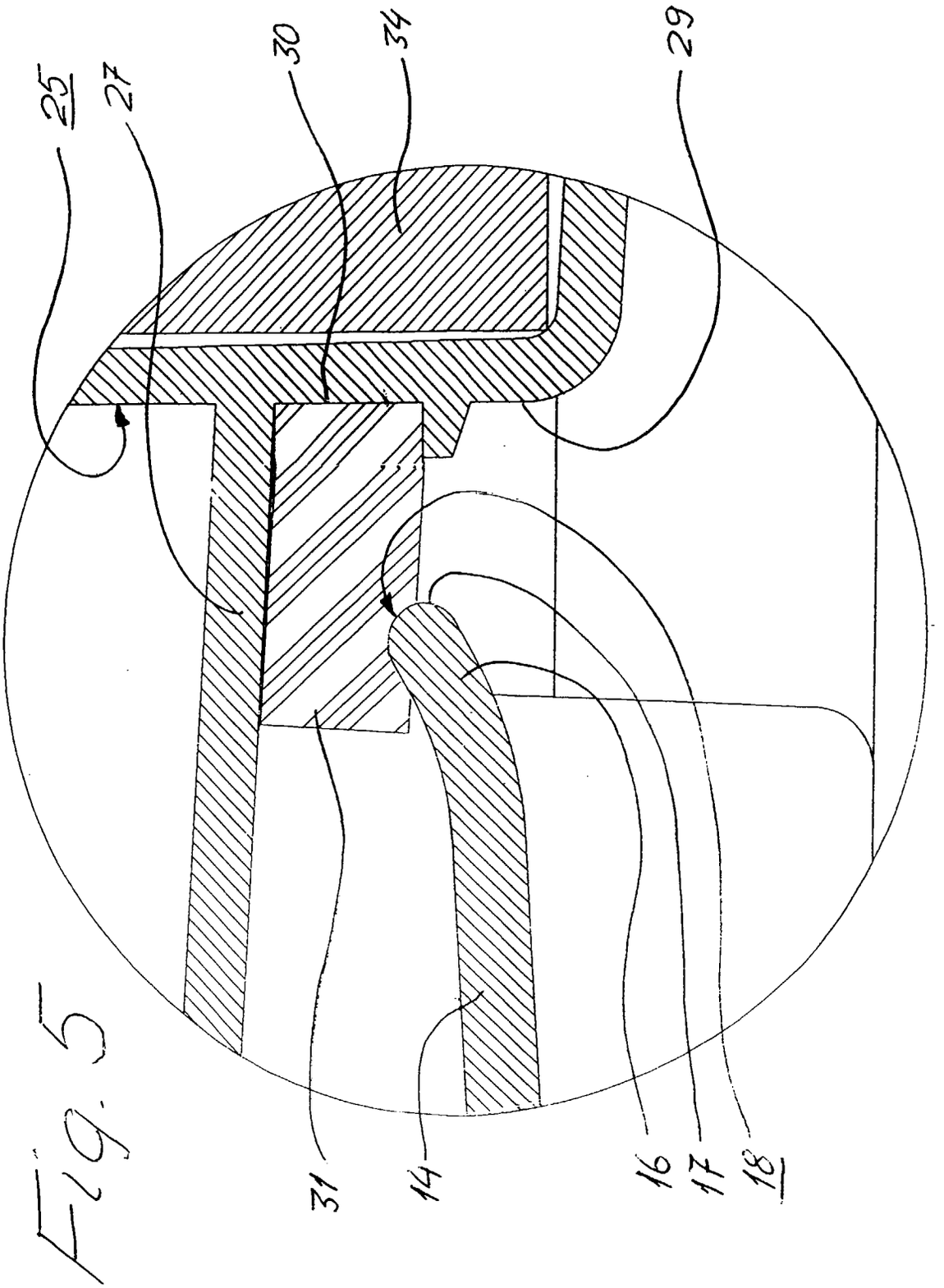


Fig. 5