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(54) Floor drain

(57) A floor drain (22) is described, with a water trap (10) which includes an upwards open outer bowl (2). Within the outer bowl there is provided a vertically adjustable inner bowl (25), as a packing (26) is disposed between inner and outer bowls. The water trap is formed in the bottom of the outer bowl between a downwards

projecting inclining plate (13) and an overflow plate (11), which is disposed in the outlet stub (21). The overflow plate has an upper edge (12) disposed at a level above the level of the lower edge (30) of the pipe connection (28, 29) of the inner bowl, irrespectively of the vertical position of the outer bowl.

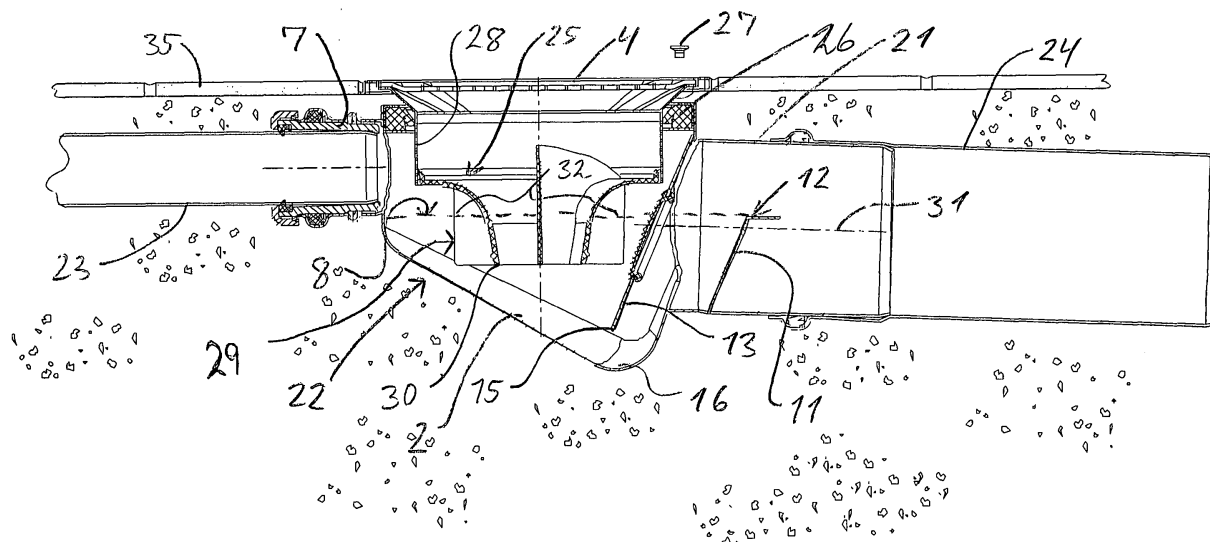


Fig. 3

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Description

[0001] The present invention concerns a floor drain with a water trap and including an up-wards open outer bowl with one or more lateral inlets and one lateral outlet, in which is arranged an overflow plate; and with a

[0002] Floor drains of this type where a stench barrier is achieved because of the water trap and where it is possible to connect one or two drains with the floor drain for establishing a common outlet are known.

[0003] Such floor drains are known e.g. for placing in wet rooms, such as bathrooms, where the inlets are connected with one or more wash basins.

[0004] An example of such a floor drain has been marketed by the firm Blücher Metal ApS through many years.

[0005] The floor drains have functioned satisfactorily and have been used for incorporation in storey partitions and for embedding in floors.

[0006] A floor drain of this type is placed in relation to the surrounding surface with the abutment edge disposed under floor level, so that the grate of the floor drain will have an upper side which is at level with or slightly below level of the surrounding floor surface.

[0007] The abutment surface may be provided directly on the outer bowl, putting great demands on the tolerance accuracy with which the floor drain is placed in a storey partitioning or a floor.

[0008] The water trap will be provided by the interaction between an overflow plate which is arranged in the lower part of the outlet, and which interacts with an internal plate extending at the upper side of the outer bowl downwards with a lower edge at a position which is vertically below the level of the upper side of the overflow plate. By such a water trap there will be a large water surface with stagnant water in the water trap. This may be undesirable due to smell nuisances and risk of evaporation.

[0009] Through many years there has been a wish of making floor drains with as low overall height as possible. It has hitherto been made difficult in the type of floor drains provided with lateral inlets. The desire for low overall height is particularly outspoken for floor drains used for renovating existing buildings. In existing buildings there will often be limited space in a storey partition, or there will also be a desire for cutting so small a recess in a cast floor as possible for placing the floor drain.

[0010] In order to allow for the low overall height, the prior art floor drains are arranged with the grate disposed directly upon the outer bowl without any possibility of height adjustment. This is a drawback when a floor drain is to be applied and adapted to existing constructions. Furthermore, such a construction will render impossible the use of an existing floor drain if renovation is performed by laying an extra tile or vinyl on a floor where the drain is located.

[0011] By the known constructions, the outlet is

placed on an extended part of the outer bowl of the floor drain. In the extended part at the side of the bowl, the downwards projecting plate will commonly be disposed with a downwards inclining projection, inwards towards the bottom of the outer bowl. The overflow plate will be placed as a semicircular plate which is placed for covering approximately the lower half of a pipe connection that constitutes the lateral outlet.

[0012] It is the purpose of the present invention to indicate a floor drain of the kind mentioned in the introduction, in which the above drawbacks are avoided and which particularly is advantageous in having a low overall height.

[0013] According to the invention, this is achieved with a floor drain which is peculiar in that there is provided an inner bowl which is placed vertically displaceable in the outer bowl, as a packing is disposed there between, that the water trap is formed at the bottom of the outer bowl between a fixed, inclining plated projecting into the outer bowl and the overflow plate which is placed with an upper edge at a level located vertically above the level of a lower edge of a pipe connection projecting down into the outer bowl from the inner bowl, irrespectively of the vertical position of the inner bowl in the outer bowl, and that the overflow plate is disposed in the lower part of an outlet pipe connection and partially covers the outlet opening of the outer bowl.

[0014] As the inner bowl is provided vertically displaceable in the outer bowl, it is possible to achieve adjustment in height. An abutment edge, which is provided at the upper part of the inner bowl, may hereby be disposed at correct floor level, whereby it becomes possible to re-adjust the position of the grate, irrespectively of the position of the outer bowl in a floor construction.

[0015] The water trap will be formed by the inclining plate and the overflow plate. With a water trap thus formed in the bottom of the outer bowl, water will always stand in the pipe connection by normal use. Hereby, there is a limited water surface compared with prior art floor drains, and there is no risk of smell nuisances from drain or sewage pipes.

[0016] As the overflow plate is disposed in the outlet pipe connection itself, and is not a part of the outer bowl, it becomes possible to get sufficiently large flow area ensuring that the floor drain can drain off large momentary amounts of water, but simultaneously be made with a limited shape. Thus there is no need for any extension at the outer bowl itself for establishing flow area. Instead there is used a part of the volume in the outlet pipe connection for forming flow area in the water trap of the floor drain. Hereby, it becomes possible to make the water trap particularly simple, as an outlet pipe connection can be fitted directly on the sidewall of the outer bowl.

[0017] It is possible to make the floor drain with a drain pipe connection which is placed at the same position as in known floor drains and with the same shape and inclination at the underside of the floor drain. Hereby it becomes particularly simple to use as substitution for

prior art floor drains when renovating.

[0018] A particularly simple embodiment is peculiar in that the outer bowl is largely rectangular or cylindric and has a circular upwards directed opening for receiving the inner bowl or the pipe connection of the inner bowl, and that inlet and outlet are formed of largely cylindric pipe connections which are mounted directly on the circumferential surface of the outer bowl.

[0019] The outer bowl will preferably be formed with a circular opening and a circular packing that fit together with an inner bowl having circular shape. However, the displaceable outer and inner bowl may be provided with other cross-sections, when it is possible just to perform vertical displacement with a packing disposed there between for establishing a sealing abutment preventing water from penetrating out between the inner bowl and the outer bowl.

[0020] The pipe connection of the inner bowl engaging the packing will have a constant cross-section over a first part immediately under an abutment surface for the grate. It is preferred that the lower part of the pipe connection has an inwards decreasing flow area, e.g. with a frustrated cone cross-section which either extends rectilinearly or is convergently or divergently tapering. Alternatively, the inner bowl can be made with an upper tubular pipe connection and a lower tubular pipe connection fitted therein with lesser diameter.

[0021] The cross-sectional area in the lower part of the pipe connection will hereby become considerably less than the cross-sectional area in the upper part of the pipe connection at the top of the inner bowl. Preferably, the area may be between 20 and 80% of the cross-sectional area of the inner bowl, whereby the open water surface in the pipe connection is considerably reduced so that the risk of evaporation is minimised.

[0022] Furthermore, the bottom of the outer bowl will slope downwards towards the outlet. The lower edge of the pipe connection of the inner bowl will be placed at a level which is between the lower part of the bottom and the upper part of the bottom. Thus there will be a relatively modest amount of water in the water trap in the bottom of the outer bowl. Furthermore, the amount of water will gather at a position at the outlet opening.

[0023] It is preferred that the inclining plate is disposed in the outer bowl at a position in front of the outlet opening, extending obliquely downwards and inwards from a position above the outlet opening and having a lower edge at a position shortly above the lower part of the bottom. Hereby a slotted passage is formed between the bottom and the lower edge of the inclining plate, enhancing liquid flow through the floor drain. A cleansing effect and simultaneously the possibility for the floor drain removing a large liquid flow are achieved.

[0024] In order to get as low overall height as possible, the packing formed between the outer bowl and the inner bowl will be placed in a groove in the outer bowl which partially overlaps the upper part of the lateral inlet of the outer bowl. As water inflow through the connecting

pipes of the inlets will normally not have such character that the inlets are entirely filled with liquid, it will not be detrimental for the capacity of the floor drain that the upper part is covered by the packing. Thus it becomes possible to make floor drains with standard sizes for the inlet pipe connections without needing to increase the overall height with a height corresponding to the groove used for accommodating the packing.

[0025] According to a further embodiment, the floor drain is peculiar in that the inner bowl at its upper side includes the abutment edge for the grate which is fastened by screws to the inner bowl. By this construction, the grate can be secured to the floor drain in a secure way.

[0026] According to a further embodiment, the floor drain is peculiar in that the vertical distance between the levels of the upper edge of the overflow plate and the lower edge of the inclining plate is at least 50 mm and preferably between 50 and 80 mm. Hereby rules for approved floor drains are complied with. It is preferred that the overflow plate has its upper edge placed approximately at a horizontal centre plane for the outlet connecting pipe. In this way, the needed height on the water trap is established in a floor drain with small height.

[0027] The invention will now be explained with reference to the accompanying drawing, where:

- Fig. 1 shows view partly in section of a prior art construction for a floor drain;
- Fig. 2 a view from above of the floor drain in Fig. 1;
- Fig. 3 shows a view, partly in section, of a floor drain according to the invention mounted in a cast floor;
- Fig. 4 shows a side view of the floor drain according to the invention shown in Fig. 1;
- Fig. 5 shows a second side view, partly in section, of the floor drain shown in Fig. 4;
- Fig. 6 shows a perspective view of the floor drain shown in Figs. 4 and 5;
- Fig. 7 shows a view from above of the floor drain shown in Figs. 4 - 6;
- Fig. 8 shows a perspective view of a further embodiment of a floor drain according to the invention, and
- Fig. 9 shows a perspective view of a further embodiment of the floor drain according to the invention.

[0028] In the following, identical or corresponding elements will be provided with the same designation, and therefore there will not be given any explanation in connection With each single Figure.

[0029] Fig. 1 shows a prior art floor drain 1 which is formed by an outer bowl 2 having an upwards directed opening 3. The opening 3 is covered by a grate 4 which is loosely provided upon an annular abutment edge 5 at the upper circumferential edge of the outer bowl 2. The outer bowl is provided with inlets 6 including tubular inlet

pipe connections 7 which are mounted on the sidewall of the outer bowl at a position over a level 8 for water 9 standing in a water trap 10 which is provided in the bottom of the floor drain.

[0030] A part of the sidewall forms an overflow plate 11. The upper side edge 12 of the overflow plate defines the level 8 for the water surface. An inclining plate 13 extends from the upper side of the outer bowl obliquely downwards and into the outer bowl for forming a through-flow channel 14. Between the lower edge 15 of the inclining plate 13 and a lower bottom 16 in the outer bowl, a slotted passage 17 is formed, extending over the width of the outer bowl.

[0031] The level 8 for the water surface is located at a position below the inlets 6 and the inlet pipe connections 7. The inlet pipe connections 7 are disposed with spacing from an upper edge 18 on the outer bowl.

[0032] The drain bowl is furthermore provided with an outlet 19. The outlet 19 includes an extended part 20 at the side of the outer bowl. An outlet pipe connection 21 is mounted on the extension 20 for connection to a drain pipe.

[0033] In Fig. 2 is seen that the floor drain is provided with three inlet pipe connections 7 and an outlet pipe connection 21. Furthermore, it is seen that the floor drain is made with rectangular shape and is covered by a rectangular grate 4.

[0034] In Fig. 3 is illustrated a floor drain 22 according to the invention. An inlet pipe connection 7 is illustrated, which is connected with an inlet pipe 23 which, for example, is connected with the waste pipe from a wash basin. The outlet pipe connection 21 is connected with a drain pipe 24 leading to the sewer.

[0035] It appears that within the outer bowl 2 there is provided an inner bowl 25. Between the inner bowl and the outer bowl there is provided a packing 26 enabling vertical displacement of the inner bowl 25 in relation to the outer bowl 2. The grate 4 may be fastened to the inner bowl 25 by means of screws 27.

[0036] At its upper end, the inner bowl 25 includes a tubular pipe connection 28 and, at its lower end, a tubular pipe connection 29 with smaller diameter than the tubular pipe connection 28. The lower tubular pipe connection is terminated by a lower edge 30. This lower edge 30 is placed at a level which is below the level of the upper edge 12 for the overflow plate 11.

[0037] In the floor drain according to the invention, the overflow plate 11 is placed in the drain pipe connection 21 and extends to a position immediately above a centre plane 31 through the drain pipe connection 21. It is seen that the lower edge 30 of the inner bowl pipe connection will be situated at a level below the water level 8.

[0038] In the floor drain according to the invention, the water surface designated by 32 will be open to the ambient surroundings via the grate 4 of the floor drain. The area of the water surface 32 will be less than the area of the water surface laid free in the prior art floor drain according to Fig. 1. By dimensioning the pipe connec-

tion/pipe connection sections 28, 29 with greater or lesser cross-sectional area it is possible to reduce the water surface area.

[0039] As it appears from Figs. 3, 4 and 5, the inlet pipe connections 7 are disposed close to the upper edge 18 of the outer bowl 2. The packing 26, which is disposed in a groove within the outer bowl, will thus be placed in a position that partly covers the upper part of the laterally directed inlets 6.

[0040] As it particularly appears from Figs. 4 and 5, the overflow plate 11 is disposed in the lower part of the outlet pipe connection 21 and partly covers the outlet opening 33 of the outer bowl. In Fig. 6, a weld 34 illustrates the position of the overflow plate 11 inside the outlet pipe connection 21.

[0041] Fig. 7 corresponds essentially to Fig. 2 and shows that the floor drain according to the invention is provided with three inlet pipe connections 7 and an outlet pipe connection 21 and is designed with a rectangular cross-section which is covered by a rectangular grate 4. The grate 4 will, however, as distinguished from the embodiment shown in Fig. 2, be provided vertically displacing, so that it can be placed at a level which is adapted to the surrounding floor surface 35 (see Fig. 3).

[0042] Figs. 8 and 9 shown alternative embodiments of the floor drain according to the invention. The floor drain in Fig. 8 has a circular grate 4. The circular grate 4 is placed on the circular abutment edge 5 at the upper end of the inner bowl 25.

[0043] The embodiment shown in Fig. 9 illustrates a four-sided grate 4 which is disposed over an outer bowl having a circular upper circumferential edge. The grate 4 is placed on an inner bowl (not shown) provided vertically displacing in the outer bowl 2, and which has an abutment edge (not shown) for supporting the grate 4.

[0044] In Figs. 8 and 9, circular flanges 36 are shown, intended for connecting the floor drain to a floor membrane, e.g. a floor vinyl.

[0045] The above is a description of embodiments of the floor drain according to the invention. Other embodiments for the floor drain are, however, possible in the light of the subsequent patent claims.

45 Claims

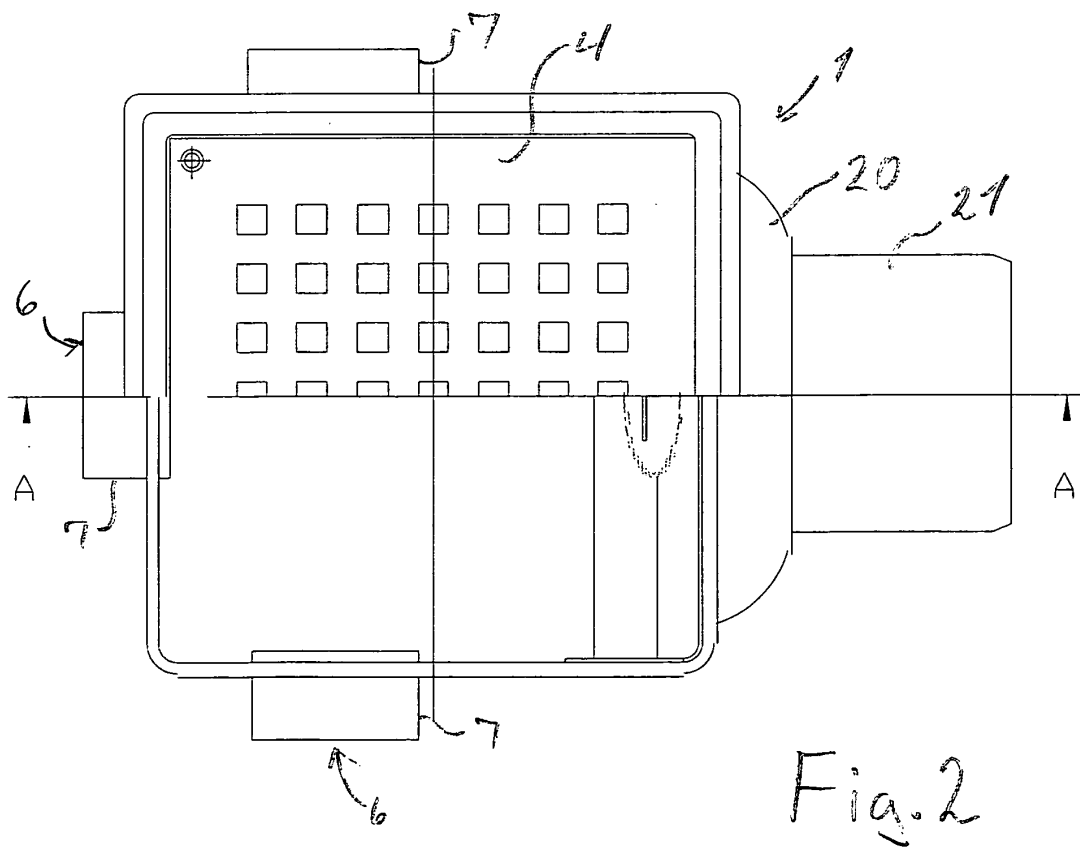
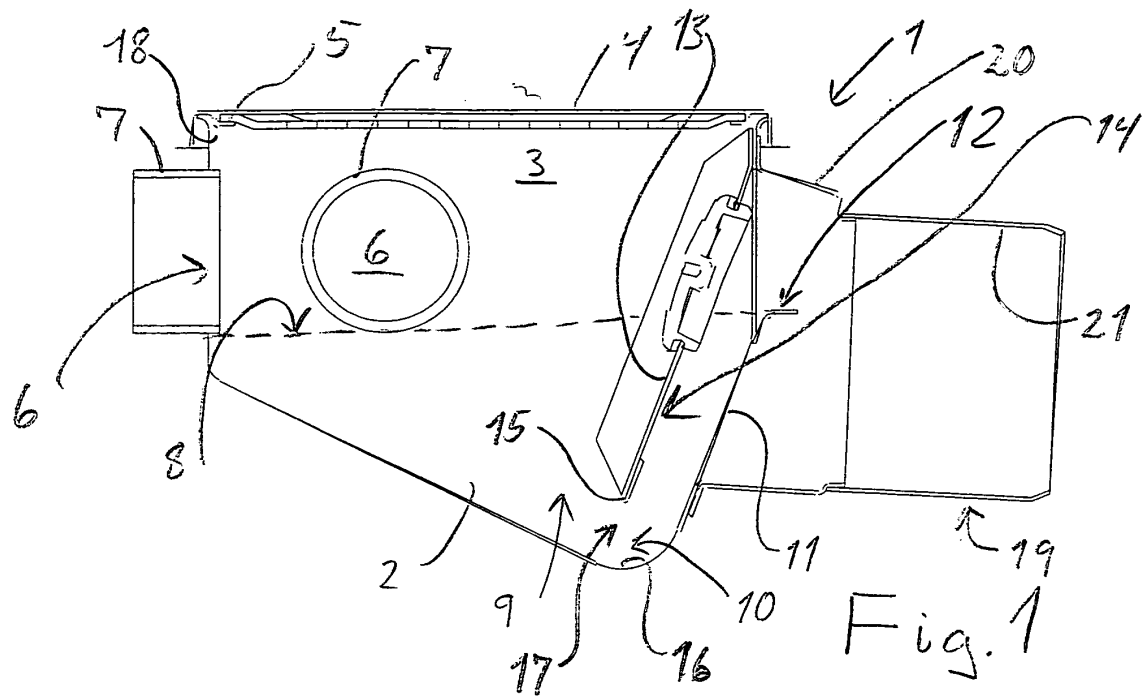
1. A floor drain with a water trap and including an upwards open outer bowl with one or more lateral inlets and one lateral outlet, in which is arranged an overflow plate, and with a abutment edge for supporting a grate for the floor drain, **characterized in that** there is provided an inner bowl which is placed vertically displaceable in the outer bowl, as a packing is disposed there between, that the water trap is formed at the bottom of the outer bowl between a fixed, inclining plated projecting into the outer bowl and the overflow plate which is placed with an upper edge at a level located vertically above the

level of a lower edge of a pipe connection projecting down into the outer bowl from the inner bowl, irrespectively of the vertical position of the inner bowl in the outer bowl, and that the overflow plate is disposed in the lower part of an outlet pipe connection and partially covers the outlet opening of the outer bowl.

2. Floor drain according to claim 1, **characterized in that** the packing between the outer bowl and the inner bowl is placed in a groove in the outer bowl which partially overlaps the upper part of the lateral inlet or inlets. 10
3. Floor drain according to claim 1 or 2, **characterized in that** bottom of the outer bowl inclines downwards towards the outlet, and that the lower part of the pipe connection has cross-sectional area which is between 20% and 80% of the cross-sectional area of the inner bowl, and that the lower edge of the pipe connection is disposed at a level below the upper part of the bottom. 15 20
4. Floor drain according to any preceding claim, **characterized in that** the inclining plate is disposed in the outer bowl at a position in front of the outlet opening, extending obliquely downwards and inwards from a position above the outlet opening and having a lower edge at a position shortly above the lower part of the bottom, as a slotted passage is formed hereby between the bottom and the lower edge of the inclining plate. 25 30
5. Floor drain according to any preceding claim, **characterized in that** the outer bowl is largely rectangular or cylindric and has a circular, upwards directed aperture for receiving the inner bowl or the pipe connection of the inner bowl, and that inlet and outlet are formed by largely cylindric pipe connections that are mounted directly on the circumferential surface of the outer bowl. 35 40
6. Floor drain according to any preceding claim, **characterized in that** the upper side of the inner bowl includes the abutment edge for the grate which is fastened by screws to the inner bowl. 45
7. Floor drain according to any preceding claim, **characterized in that** the vertical distance between the levels of the upper edge of the overflow plate and the lower edge of the inclining plate is at least 50 mm and preferably between 50 and 80 mm. 50
8. Floor drain according to any preceding claim, **characterized in that** the lower part of the pipe connection of the inner bowl has an inwards decreasing cross-sectional area, e.g. with a cross-section of a truncated cone, which is either extending rectiline-

arly or is convergently or divergently tapering.

9. Floor drain according to any preceding claim, **characterized in that** the inner bowl is made with an upper tubular pipe connection and a lower tubular pipe connection with lesser diameter mounted therein.



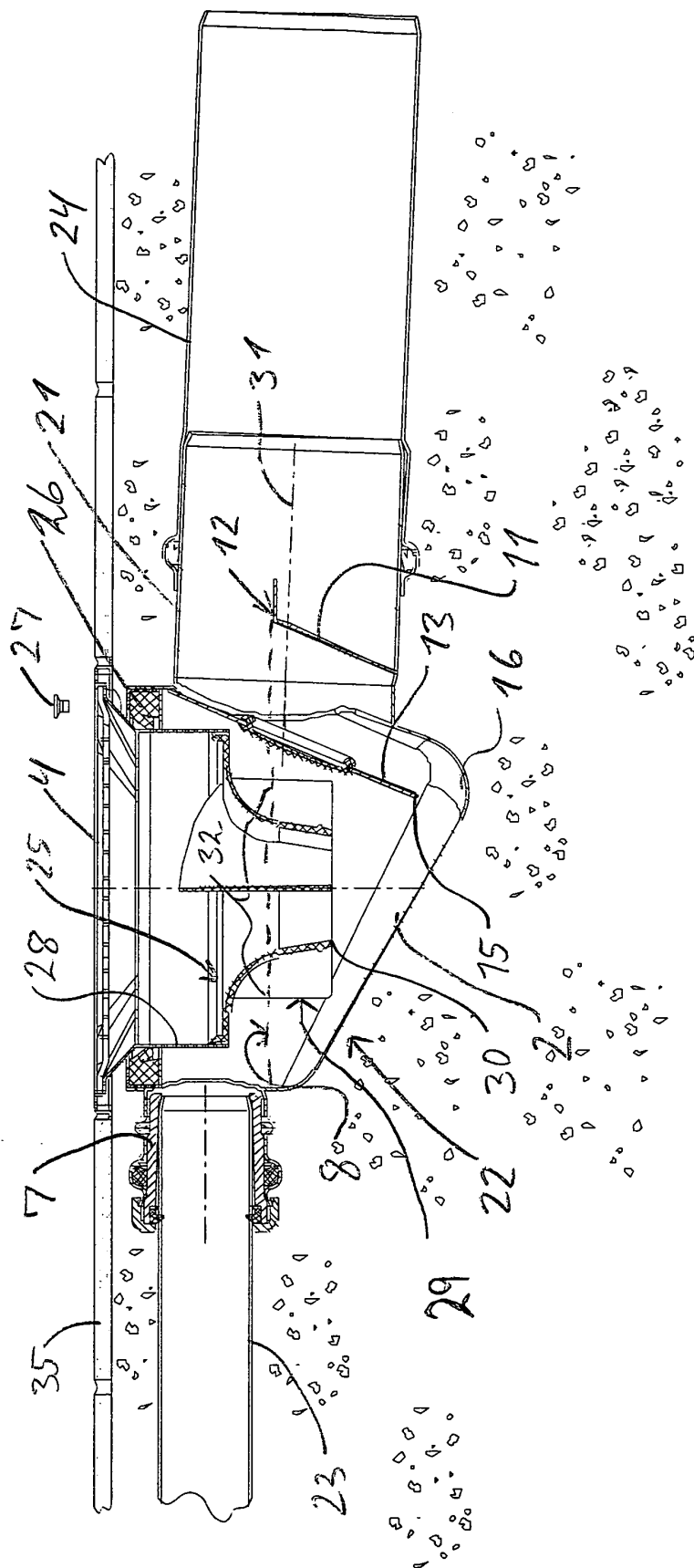
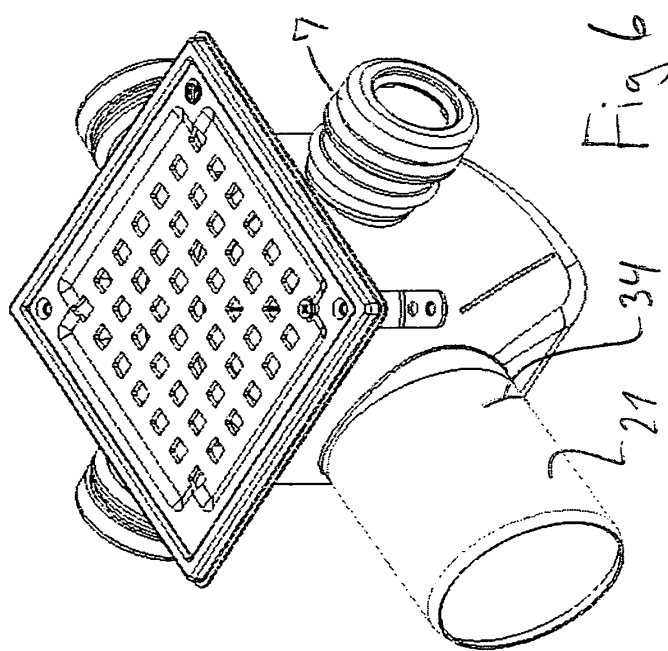
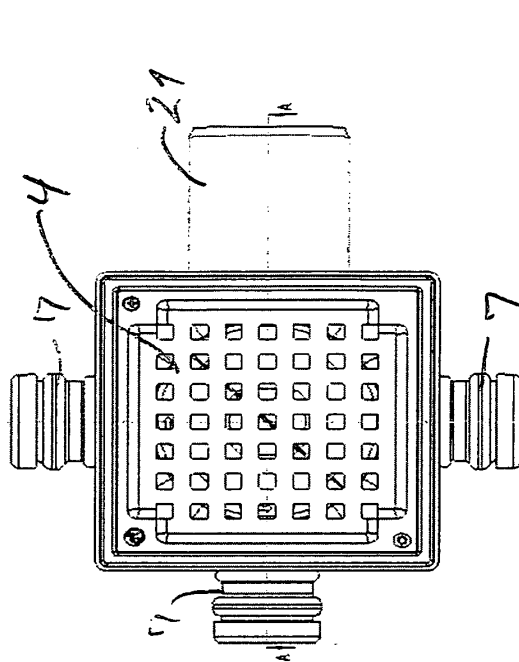
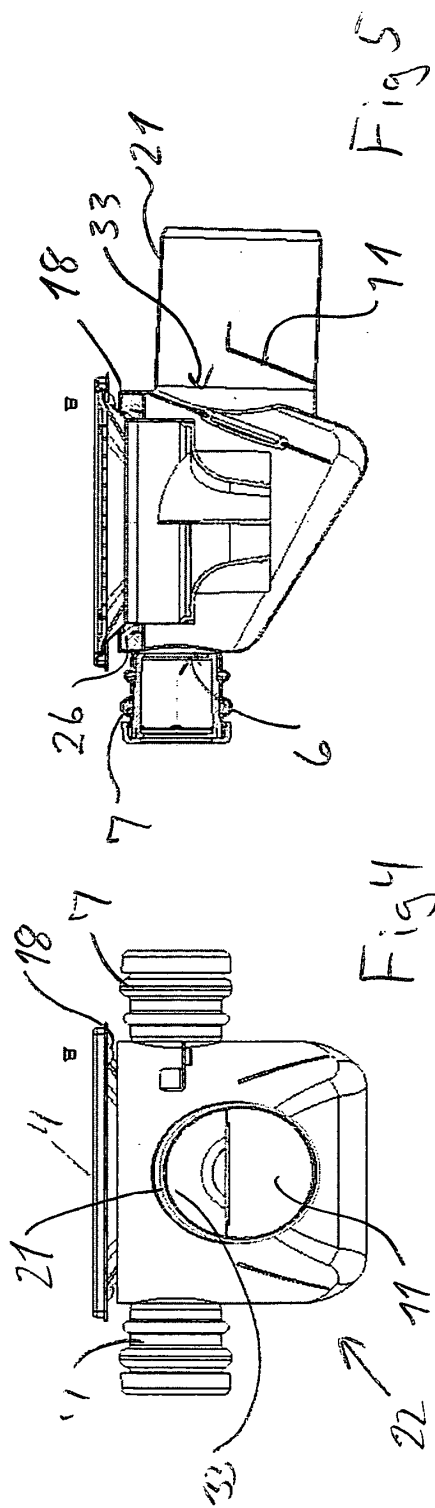


Fig. 3



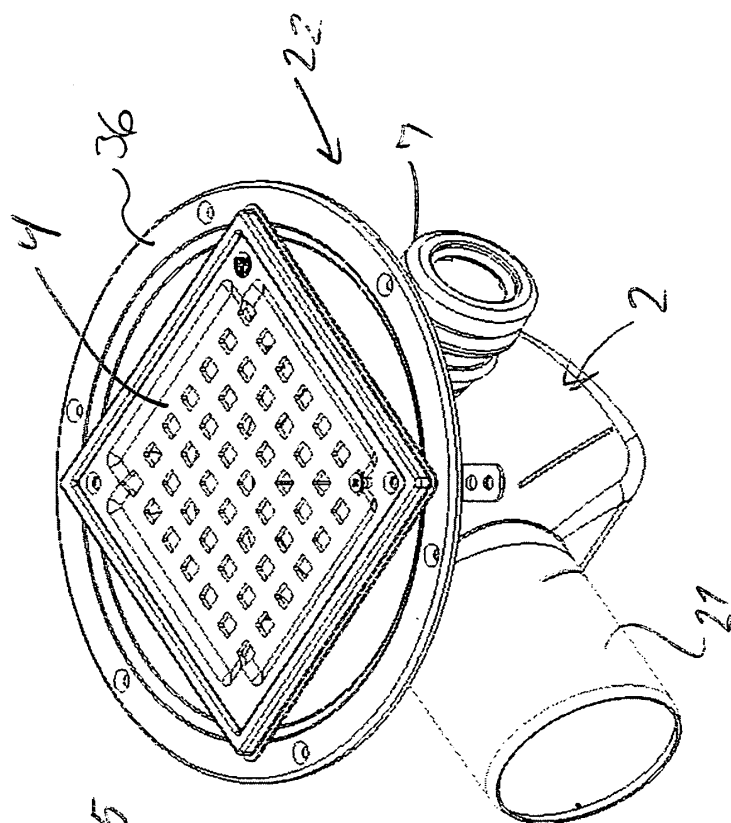


Fig. 9

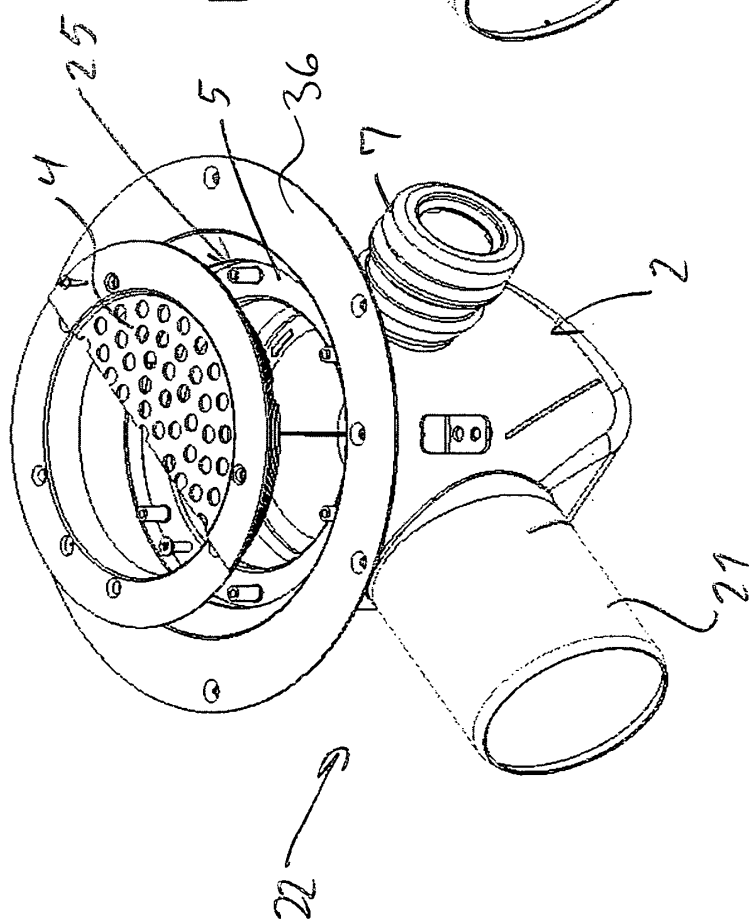


Fig. 8