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(54) **A device for a check valve.**

(57) A check valve for use in for instance floor sinks, concrete manholes, in sewerage plants etc., comprising a valve box (2) having an upper inlet (3) and a lower inlet (4) and a valve seat (5) near the upper inlet (3) meant to act in conjunction with the upper section (1a) of a moveable valve body (1) in the case of rising water level, i.e. the check valve. The valve body (1) is preferably bush shaped and forms a flow opening (1b), the upper section (1a) of which is connected to the upper inlet (3) by means of a flexible sleeve (6). The lower section (1c) of the bush is at a distance from the upper section (1a) and juts down into any rising water or down into a basin so as to form a gully trap. The valve seat (5) is placed independently of the periphery (3a) of the opening of the upper inlet (3) in the valve box (2), and may in two different embodiments be placed in the shape of a disk (5a) centrally in the opening of the inlet (3) and held by means of struts (7), or to the side of the periphery (3a) of the opening of the inlet (3) when the inlet (3) is laterally directed or horisontal. The actual closing of the check valve occurs when the sleeve, because of trapped air in the case of a rise in the water level, is pressed up together with the valve body to rest against the valve seat, whereby the sleeve covers the inlet (3).

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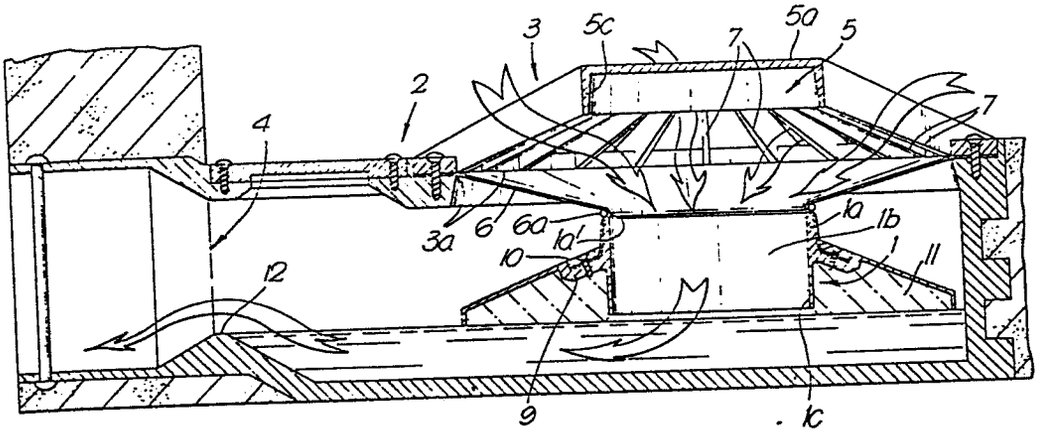
Fig.1.



The present invention concerns a device for a check valve to be used for instance in floor sinks, in concrete manholes, in sewerage plants etc., of the type disclosed in the preamble of the subsequent independent claim 1.

Check valves of the type mentioned above are known from the prior art and have been used, the moveable valve body being constituted by a float which when the fluid level rises, usually due to flow-back in the drain, is pressed with its upper section in sealing contact against a downward directed valve seat near the upper inlet in the valve box. The fluid which runs through the check valve is usually polluted, whereby particles of pollution may be deposited on the top side of the float and the surfaces of the valve seat, respectively. This may principally happen when there is polluted fluid in the manhole or sink in which the valve has been installed, whereby the particles in the fluid may sink and settle on the jointly acting sealing surfaces. Said particles may also harden and form hard coatings on said surfaces, for instance when the fluid level goes down to a level below the valve seat. This happens because of irregular fluid supply to the manhole, sink etc. This may cause leaking in the check valve in the case of possible flow-back of fluid, whereby for instance concrete manholes in sewerage plants or floor sinks in buildings may be flooded, and the polluted fluid may flood basement floors, for instance, or other areas where such sinks or manholes have been placed.

From Norwegian Patent Application No. 822093, having the same inventor as the present application, the above problem has been eliminated by the use of an elastic sleeve, for instance made of rubber, attached peripherally outside the valve seat and designed with a radial annular shoulder directed inward into the opening of the valve seat, continuing in a downward directed conical bush. An elastic o-ring made for instance of rubber, has been provided in the acute angle transitional section between the shoulder and the bush, said bush and

o-ring being meant to act in conjunction with the upper section of the float, whereas the shoulder section is meant to act in conjunction with the inner surface of the valve seat when the float rises in the case of flow-back of fluid in the valve.

This check valve has a relatively great overall height because the valve seat must jut down from the inlet opening of the valve box, and also because the float body has to be designed to have a certain volume to ensure buoyancy and sealing pressure against the sleeve and the valve seat, which also demands a certain height. Moreover, the float should be protected against lateral displacement by means of guides, so that it rests correctly on the sleeve when the fluid level is rising.

The objective of the present invention is to avoid the above drawbacks, namely to provide a check valve with a lower overall height in the vertical direction, while also avoiding the float body itself and special guides for the latter, which could also mean simpler production and a lower production price.

According to the invention, this has been attained by means of the distinctive features disclosed in the characterizing clause in the followig independent claim 1, and in the subsequent dependent claims.

Two examples of embodiment of the invention will be discussed in the following with reference to the drawing, where

fig. 1 shows a check valve with an upward directed inlet and a horisontally directed outlet,

fig. 2 shows a detail of the check valve in a closed position,

figs. 3 and 4 show the second embodiment of the check valve

with a horisontally directed inlet and outlet in open and closed position respectively.

The check valve as shown in fig. 1 and 2 consists of a moveable valve body 1 in a valve box 2 with an upper inlet 3 and a lower outlet 4, and a valve seat 5 near the upper inlet 3 meant to act in conjunction with the upper section 1a of the moveable valve body 1 in the case of a rise in the fluid level, that is, flow-back in the valve. The moveable valve body 1 has a downward directed flow-opening 1b, the upper section 1a of which is connected to the upper inlet 3 by means of a flexible sleeve 6, attached to an outward jutting flange 9 near the middle section of the valve body 1 by means of a clamping ring 10 with screws. The valve body 1 is, as shown in the drawing, designed as an open bush, the lower part 1c of which is at a distance from the upper section 1a. The valve seat 5 consists of a disc or an upside-down plate 5a placed centrally in the opening of the upper inlet 3 and held by means of the strut 7 to the edges of the opening. The sleeve 6, which is preferably pre-shaped and manufactured in an elastic material such as rubber, extends up along the upper section 1a of the valve body 1 and onwards to the periphery 3a of the opening of the inlet 3, and is pressed against and to some extent in past the upper edge 1a' of the flow opening 1b by means of an elastic o-ring placed outside the sleeve 6. The valve seat 5, that is 5a in the embodiment shown in fig. 1, has been provided with a downward diverging annular wall 5c with a somewhat greater opening diameter than the outer diameter of the o-ring 6a, whereby the valve body, on being moved upwards, will press the o-ring 6a and the sleeve 6 to rest against the annular wall 5c of the valve seat 5a. Thus the inlet 3 of the valve box 2 will be closed by the sleeve 6 which is attached to the periphery 3a of the opening of the inlet 3, to rest sealingly against the annular wall 5c of the valve seat 5a, as shown in fig. 5.

The actual raising of the valve body 1 is achieved by air being trapped between the outer wall of the valve body 1 and

the sleeve 6, as the water rises up past the lower edge or part 1c of the valve body 1. In the case of a continual rise in the fluid level, the air will be pressed against the sleeve 6 and raise the latter, and thereby also the valve body 1, up towards the valve seat 5a, whereby the inlet 3 is closed.

In practical experiments it has been demonstrated that only minimum amounts of air are sufficient to raise the sleeve and the valve body in the initial phase, whereupon the water pressure in the rising water acts in conjunction with the air to achieve said raising.

In order to acchieve an incipient raising of the valve body 1, an annular buoyancy body 11 may of course be placed near the lower section 1c of the valve body 1.

In order to provide a gully trap in the check valve, the outlet 4 of the valve box 2 may of course be provided with a sill 12 extending somewhat higher than the lower edge of the valve body 1 in the lower position of the latter.

In the second embodiment of the check valve, as shown in fig. 3 and 4, the valve box 2 has been provided with a horisontal inlet 3 and a horisontal outlet 4 at a lower level than the inlet. The valve seat 5 here consists of a section 5b of the side wall 3b of the upper inlet 3 above the periphery 3a of the opening of the inlet, to which the upper edge of the sleeve 6 is attached. The sleeve 6 is attached to the valve body 1 in the same way as described in connection with the embodiment in fig. 1. The valve body 1 is hinged by means of an lever 8 to the valve box 2 near the periphery 3a of the opening so as to steer the valve body 1 from a lower flow position upwards to a swung-up upper closing position.

In both the embodiments shown of the check valve, a situation is achieved where flowing fluid keeps the surface of the sleeve 6 which rests against the valve seat 5, clean. In

addition to this, because of the above-mentioned o-ring 6 a, the sleeve 6 will be rolled in to rest sealingly between the annular side-wall 5c of the valve seat 5a, whereby any deposition which may have hardened because of drying out, will be freed from the sleeve 6 and fall down, thereby not preventing sealing. Said deposition may occur as a result of the check valve being of water with particles in it sinking on to the sleeve and staying there.

The check valve shown in fig. 1 and 2 may profitably be used in the outlet from tanks full of fluid and immersed in water, where the difference in pressure between the contained liquid and the surrounding water will steer the check valve from an open position to a closed position and vice versa.

Patent Claims

1. A device for a check valve for utilization for instance in floor sinks, in concrete manholes, in sewerage plants etc., comprising a moveable valve body (1) in a valve box (2) having an upper inlet (3) and a lower outlet (4), and a valve seat (5) near the upper inlet (3) meant to act in conjunctin with the upper section (1a) of the moveable valve body (1) in the case of a rise in water level, that is, flow-back in the valve, characterised in that the moveable valve body (1) has a downward directed flow opening (1b), the upper section (1a) of which is connected to the upper inlet (3) by means of a flexible sleeve (6), the lower part (1c) of which has a distance from the upper section (1a), and in that the valve seat (5) is placed independently of the periphery (3a) of the opening of the upper section (3) in the valve box (2), said valve body being raised by air trapped in the valve box (2) in the case of flow-back, so as to rest sealingly against the valve seat (5), said valve box being pressed against the underside of the sleeve (6) and raising this because of the rising water level, the sleeve (6) at the same time blocking the inlet (3).

2. A device according to-claim 1, characterised in that the valve seat (5) comprises a disk (5a) placed centrally in the opening of the upper inlet (3), said disk being held by struts (7).

3. A device according to claim 1, characterised in that the valve seat (5) comprises a section (5b) of the side-wall (3b) of the upper inlet (3) above the periphery (3a) of the opening of said inlet in the case of a laterally directed inlet (3), and that the valve body (1) is hinged to the valve box (2) by means of a lever (8) near the periphery (3a) of the opening so as to steer the valve body (1) from a lower flow position to a swung-up upper closing position.

4. A device according to claims 1, 2 or 3, c h a r a c t e r i s e d in that the sleeve (6) is attached to the valve body (1) below the upper edge (1a') of the flow opening (1b), extending up along the upper section (1a) of the valve body (1) and onwards to the periphery (3a) of the opening of the inlet (3), an o-ring being placed on the outside of the sleeve (6) so as to press the latter against said edge (1a'), and so as to act in conjunction with an inner surface on a downward diverging annular wall (5c) on the valve seat (5) when the valve body (1) is raised.

5. A device according to claim 1, c h a r a c t e r i s e d in that the sleeve (6) is pre-formed and made of an elastic material such as rubber, which is known per se.

6. A device according to claim 1, c h a r a c t e r i s e d in that the valve body (1) is shaped as an open bush with flange (9) jutting out near its middle section, to which flange the sleeve (6) is attached by means of a clamping ring (10).

7. A device according to claim 1, c h a r a c t e r i s e d in that a buoyancy body (11) is attached to the valve body so as to ensure raising of the latter in the case of a rise in water level.

8. A device according to claim 1, c h a r a c t e r i s e d in that the lower edge (1c') of the valve body (1) juts down below the upper edge of a sill (12) provided near the outlet (4) of the valve box (2) so as to form a gully trap.

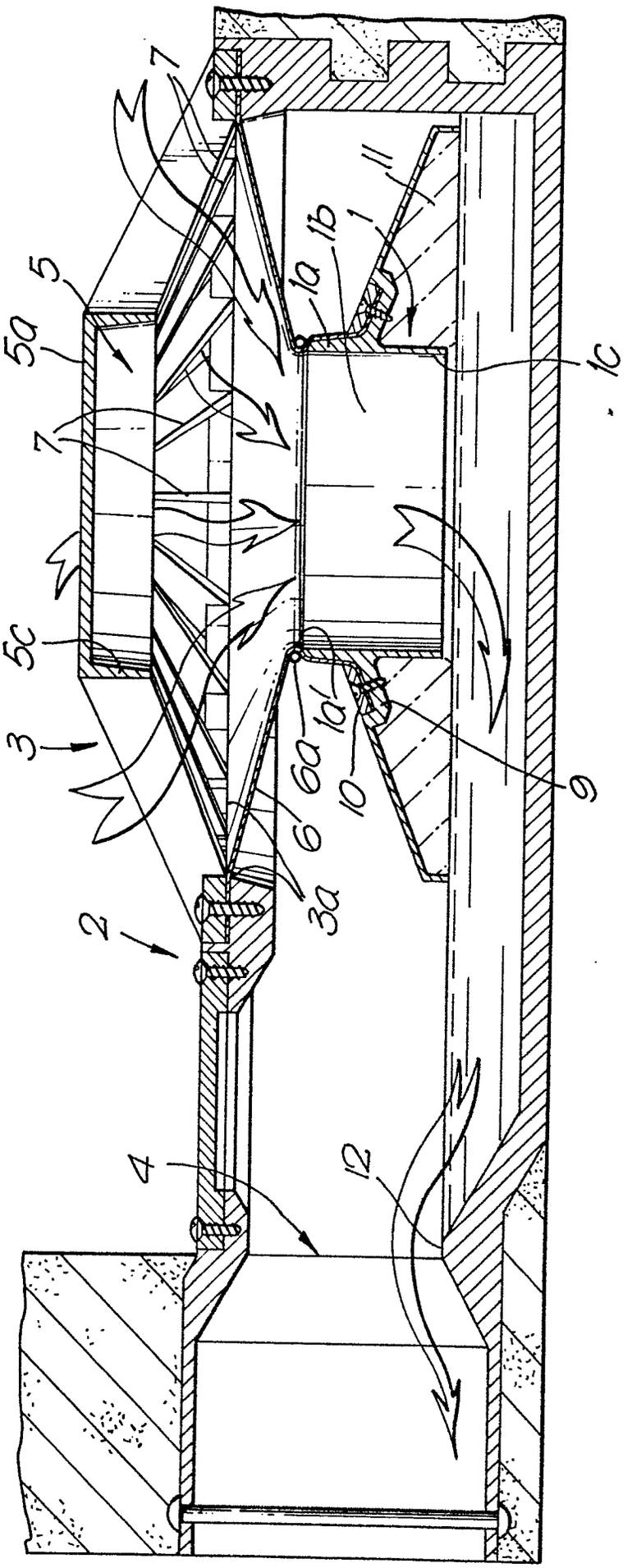


Fig. 1.

Fig.2.

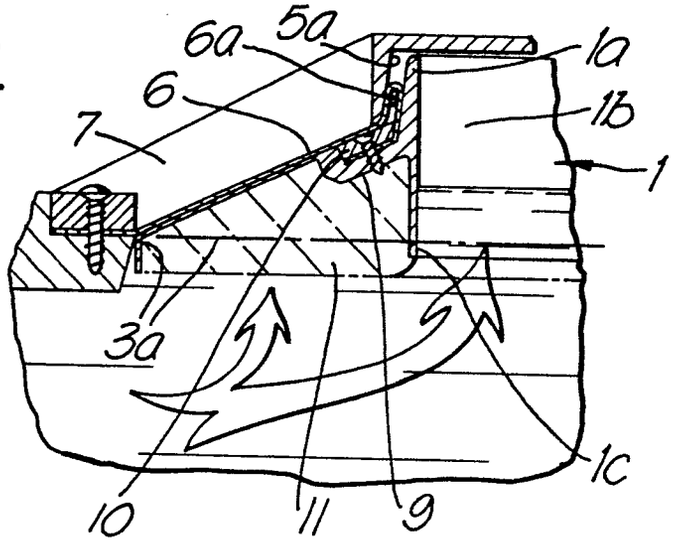


Fig.3.

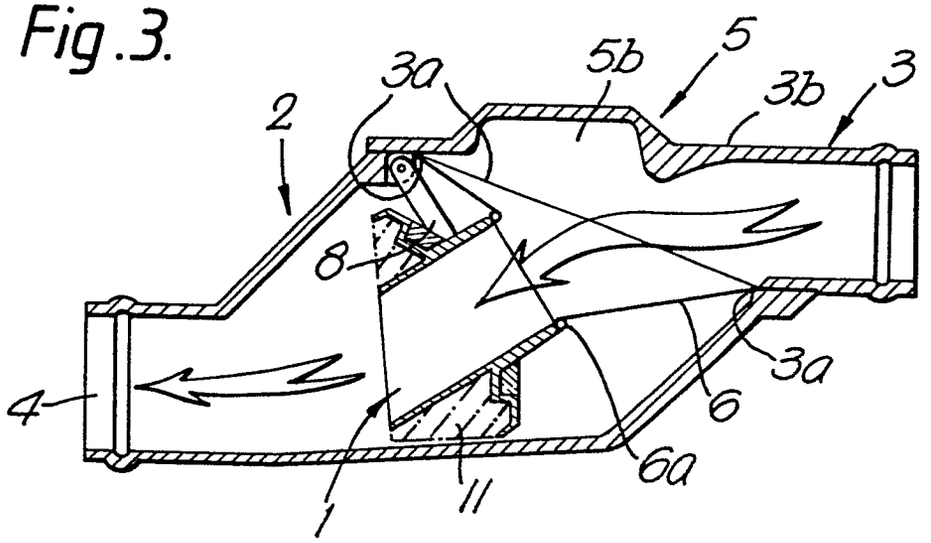


Fig.4.