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(54) **Backflow flap**

(57) Self-switching, one-way, pneumatic valve for preventing pressure drops in the water drainage pipes of sanitary facilities connected to the sewerage system, or for other uses, of the type which comprises a body (3) with a through-opening (303) which is positioned on the pipe (1) to be closed off and which on the side directed towards this pipe pivotably supports via an upper pivot a shut-off disc (8) which is directed downwards and which normally closes the said through-opening, **characterized in that** said through-opening (303) is located in an inclined plane in a diagonally sloping arrangement, with the deepest part situated at the bottom, opposite to the less deep part where the said shut-off disc (8) is hinged, which disc, as a result of said arrangement, when at rest reliably remains in the condition for closing off said through-opening, even if the axis of the valve body and/or the hinge of the shut-off member are not perfectly horizontal.

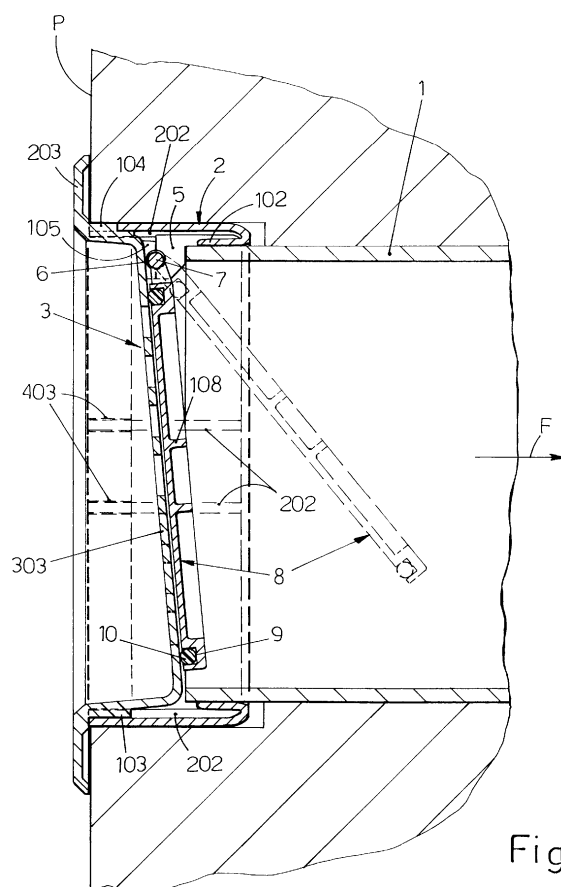


Fig.1

## Description

**[0001]** The invention relates to a self-switching, one-way, pneumatic valve, in particular suitable for preventing the formation of pressure drops and consequent siphoning or auto-siphoning effects in the water drainage pipes of hygiene and sanitary facilities connected to the sewerage system, or for other uses. The prior art sector closest to the invention is that described in Italian industrial design patents Nos. 237,261 and 240,790 dated 1995 and 1996, respectively, which have expired following lapsing of the maximum term. The first of the said patents relates to the installation, branched off from the vertical pipe for drainage of the waste water from hygiene and sanitary facilities, kitchens, bathrooms and the like in buildings, of a normally closed one-way valve mounted on the wall of one of the rooms with said facilities or in the attic area, said valve opening automatically during drainage of the water from the bathrooms or kitchens, in order to prevent the formation of a pressure drop in the vertical drainage pipe, which would result in emptying of the drainage siphons of the various user facilities, so that they are no longer able to perform their function of sealing off the sewage waste gases which would therefore permeate the premises. By fitting the said one-way valve, it is possible to avoid providing the pipe for draining the user waste water into the sewer with a ventilation outlet which is usually open and situated above the roof of the building, with major advantages during the renovation of apartments in blocks of flats; thus it is not required to intervene in the adjoining properties in order to provide access for accommodating the said breather pipe which must be brought up to roof level. In the second of said patents, the said one-way valve is positioned directly behind the WC or immediately downstream of the siphon of any user facility in a bathroom, kitchen, laundry room or other user facilities which periodically discharge water into the sewer. The one-way valve of the known type is made usually of stainless steel and requires the use of several shearing dies and subsequent operations and machines for performing finishing and assembly, and for these reasons is very costly. The same valve is provided with a plate-like shut-off member which is hinged at the top and which, under its own weight, usually assumes a vertical closing position against an annular seal positioned between the said shut-off member and the aperture or opening of the valve body to be closed off. Such a valve, in addition to the abovementioned high cost, also involves problems as regards installation since it is difficult to arrange the shut-off member so that it is correctly pointing downwards in the vertical position, with the result of possible incorrect operation of the valve itself.

**[0002]** The invention intends to overcome this problem together with other problems of the prior art by providing the aforementioned valve with a mouth or through-opening positioned in an inclined plane in a diagonally sloping arrangement so that the shut-off disc, when at rest, reliably remains in the closing condition, even if the axis of

the valve body and/or the hinge of the shut-off member are not perfectly horizontal. The said inclined configuration of the mouth or through-opening of the valve forms in the body of the said valve clearly visible macroscopic reference points which facilitate correct installation of the said valve. A further improvement consists in manufacturing the valve by means of plastic injection in a single mould with several patterns, with a small number of components and easy and rapid assembly and therefore significantly lower production costs.

**[0003]** Further characteristic features of the invention and the advantages arising therefrom will emerge more clearly from the following description of a preferred embodiment thereof provided by way of a non-limiting example in the figures of the three accompanying sets of drawings in which:

- Fig. 1 shows, laterally and with parts cross-sectioned, the valve installed, with the shut-off member shown in continuous lines in the normally closed position and shown in broken lines in the open position;
- Figs. 2 and 3 show the valve broken down into its various components, in a side view and cross-sectional view, respectively, as per Fig. 1 and in a rear perspective view.

**[0004]** In Figure 1, 1 denotes the pipe or duct on which the valve according to the invention must be mounted and the arrow F indicates the direction in which the said pressure drop effect occurs inside the said pipe 1 and the direction in which it must be possible to open the shut-off disc of the said valve. The valve comprises a tubular inlet sleeve 2, with a round cross-section, which has one end 102 formed in any direct or indirect manner, with a sphincter-like configuration as in the example described here, or also by means of seals and/or sealing means, not shown, for providing the sealed connection with the accessible end of the pipe 1. The connection may be formed on the outside of the end of the pipe 1, as shown in the example according to Figure 1, or may be formed on the inside of this same end of a pipe 1 which is also different from that shown, without thereby departing from the scope of protection of the invention.

**[0005]** The other end of the inlet sleeve 2 is designed for sealed engagement with the outer annular portion 103 of the body of a grille 3 provided with a flange 203 for resting against the wall or surface P in which the pipe 1 opens out and raised at the rear so as to be able if necessary to introduce sealing material there, such as silicone or a seal made of soft material (not shown). The grille 3 has a grille-like through-opening in a plane 303 located inside the inlet sleeve 2 with an inclined arrangement, with the deepest part being situated at the bottom. This condition can be easily verified by the user and where necessary may be made clearer by means of reference marks and/or writing (not shown) provided on any one of the visible parts of the grille 3.

**[0006]** 202 denotes ribs which are provided in pairs

which are angularly spaced at the same distance from each other and along the generatrix, on the inner side surface of the inlet sleeve 2, these being useful as pressure points for the extractors used to remove the said inlet sleeve from the forming mould. The ribs 202 are inserted in corresponding recesses 403 (see also Figs. 2 and 3) in the annular part 103 of the body of the grille 3. The inlet sleeve 2 and the grille 3 must be joined together in a predefined relative angular arrangement and the said ribs 202 and the said recesses 403 are able to ensure this condition with a predefined matching form and/or angular arrangement and/or may envisage the presence of a slit 4 on the outer edge of the inlet sleeve 2, suitable for engagement with a corresponding relief 104 provided on the said annular part 103 of the grille body 3. This predefined relative angular arrangement of the parts 2 and 3 is required in order to align and arrange opposite each other pairs of fastening lugs 5, which are formed as one piece with and project from the inner side surface of the inlet sleeve 2, and a corresponding pair of fastening lugs 105 formed in relief and as one piece on the smaller depth part of the surface with the through-opening 303 of the grille 3, these pairs of fastening lugs 5, 105 being designed to form with their end faces arranged opposite each other and together substantially round seats 6 which are able to receive with play, and therefore freely rotatably, the cylindrical ends of a pin 7 formed tangentially and integrally on connecting flanges 107 on the circumference of a shut-off disc 8 also made by means of plastic injection moulding and provided on its side directed towards the grille with an annular peripheral groove 9 for sealingly seating an elastomer ring 10 which projects partly from said groove and which sealingly cooperates with a corresponding flat and closed peripheral part of the grille-like surface 303 of the grille 3. The opposite side of the shut-off disc 8 is suitably ribbed, as indicated by 108.

**[0007]** The valve according to the invention is assembled with the grille 3 arranged in a plane and directed upwards with the grille-like surface 303 on which the disc 8 is positioned, said disc being retained via the pin 7 by the fastening lug 105 on the same grille 3. At this point the inlet sleeve 2 is mounted on the body 103 of the grille, aligning the two parts together in the manner described and this joint may be made irreversible using adhesives and/or by providing the said parts 2 and 3 with interlocking means which can be easily realized by persons skilled in the art.

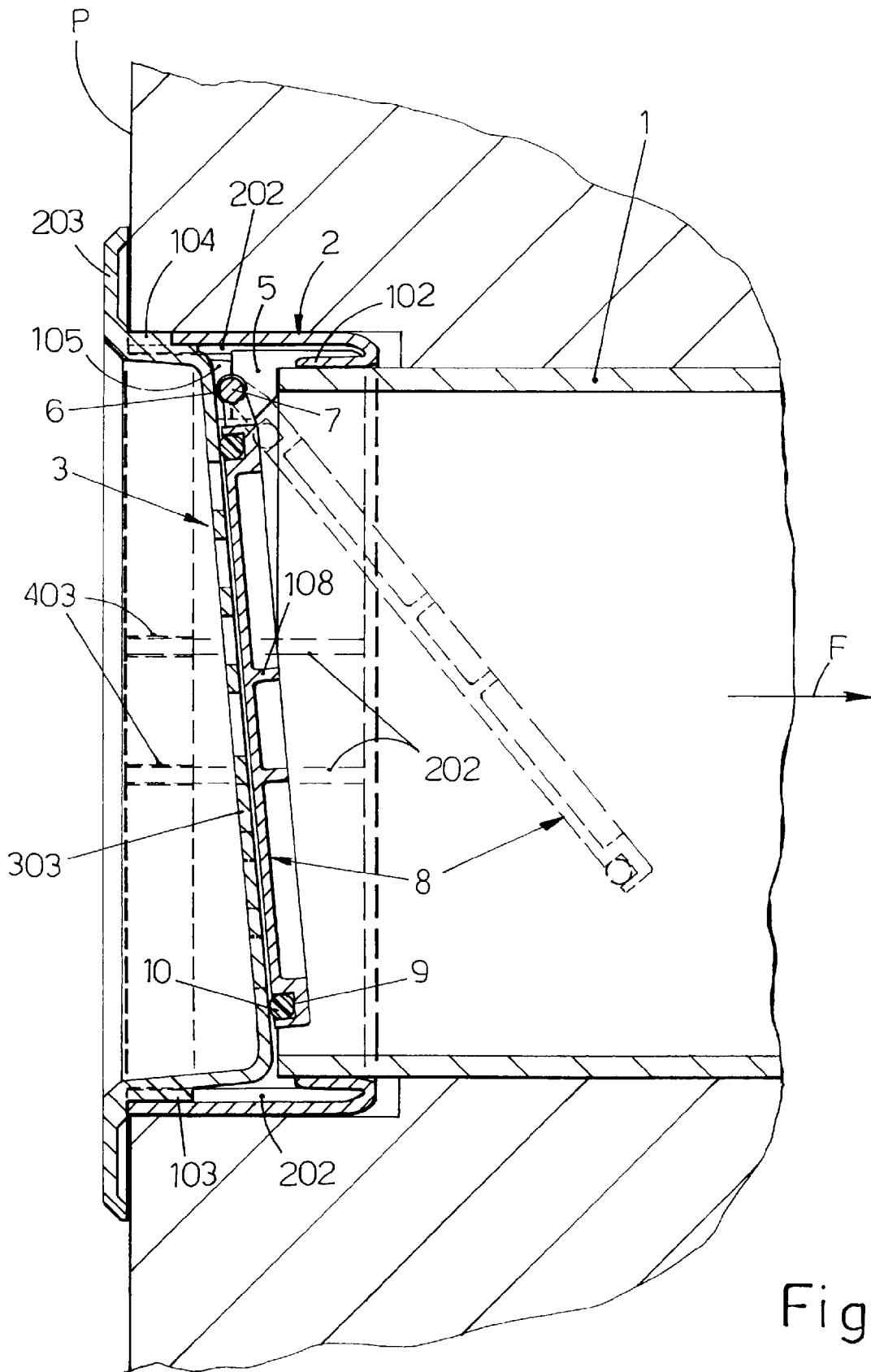
**[0008]** From Figure 1 it can be seen how the shut-off disc 8 remains in the closed position under its own weight and how this is calculated so that, when there is a pressure drop in the direction of the arrow F, the same disc 8 moves away from the grille-like surface 303 of the valve, opening it and allowing air to pass towards the drainage pipes. As soon as the said pressure drop ceases, the disc 8 returns by means of its own weight into the lowered position for closing the valve.

**[0009]** It is understood that the one-way valve as de-

scribed may be subject to all those minor modifications which achieve the same useful result and which employ the same inventive idea, these referring for example to the fact that the sealing ring 10 has a form different from that shown and/or is differently provided on the grille-like surface 303 of the valve so as to operate in a static position.

## 10 Claims

1. Self-switching, one-way, pneumatic valve for preventing the formation of pressure drops and consequent siphoning or auto-siphoning effects in the water drainage pipes of sanitary facilities connected to the sewerage system, or for other uses, of the type which comprises a body (3) with a through-opening (303) which is positioned on the pipe (1) to be closed off and which on the side directed towards this pipe pivotably supports via an upper pivot a shut-off disc (8) which is directed downwards and which normally closes the said through-opening, **characterized in that** said through-opening (303) is located in an inclined plane in a diagonally sloping arrangement, with the deepest part situated at the bottom, opposite to the less deep part where the said shut-off disc (8) is hinged, which disc, as a result of said arrangement, when at rest, remains reliably in the condition for closing off said through-opening, even if the axis of the valve body and/or the hinge of the shut-off member are not perfectly horizontal.
2. One-way valve according to Claim 1, **characterized in that** it is made completely by means of injection moulding of a suitable plastic, also inside a mould with several patterns, and **in that** it is basically composed of at least three parts, namely a grille (3) with the said through-opening (303), a tubular sleeve (2) to be fixed to the body of the said grille (3) and useful for sealingly mounting the valve in question on the pipe (1) to be closed off, and a shut-off disc (8), and **characterized in that** it comprises an annular seal (10) to be arranged between this disc (8) and the said grille (3).
3. One-way valve according to the preceding claims, **characterized in that** the tubular sleeve (2) is provided with a reference mark (4) designed to cooperate with a corresponding reference mark (104) on the body of the grille (3) when the two parts are fixed together, so as to ensure the relative alignment of inner fastening lugs (5, 105) which are formed as one piece with the said two parts and which form seats (6) for freely rotatably supporting the pivot pin (7) of the shut-off disc (8).



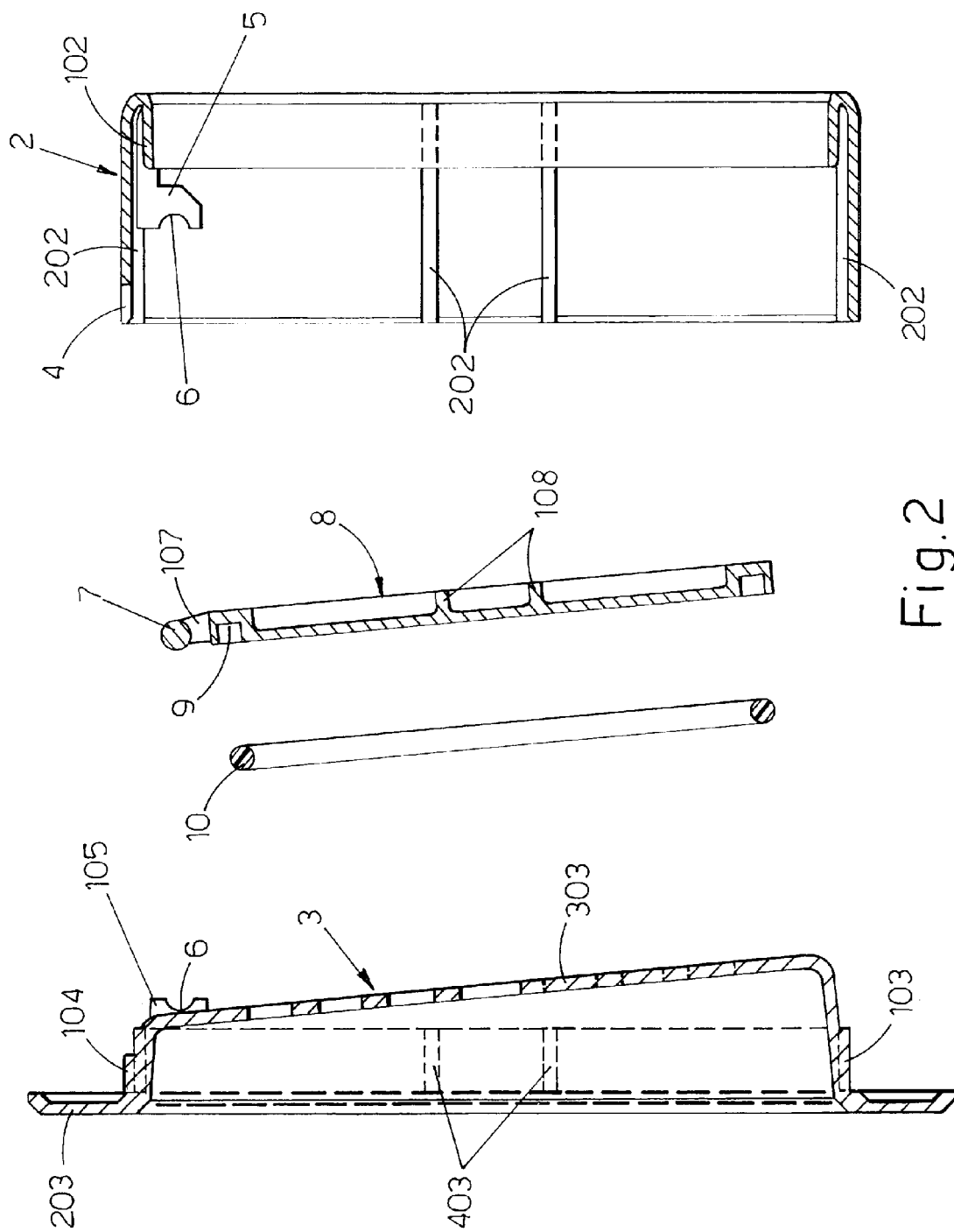
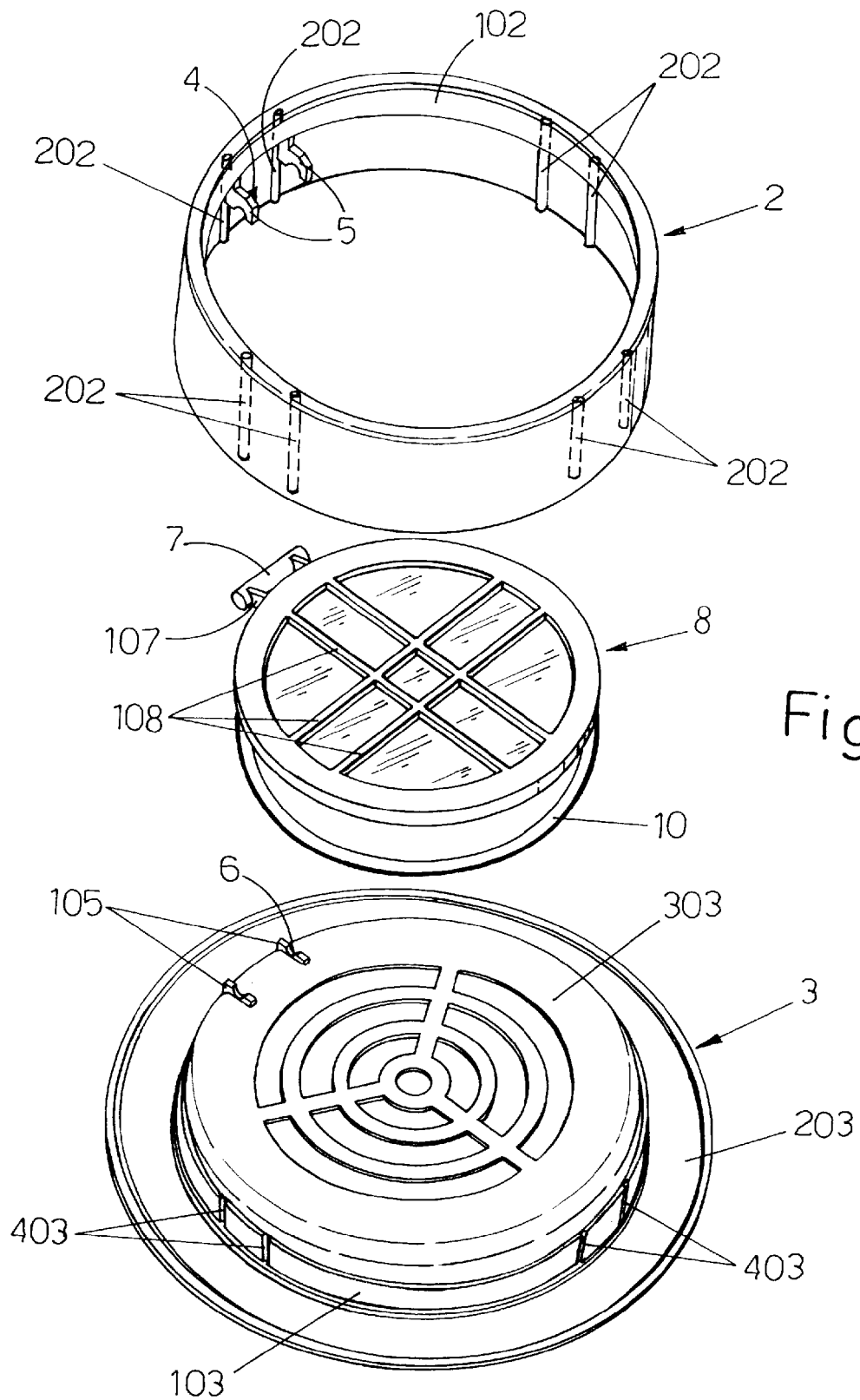


Fig. 2





## EUROPEAN SEARCH REPORT

Application Number  
EP 10 15 8514

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 23257 A A.D. 1910 (RICHARDSON WILLIAM HENRY [GB]) 10 August 1911 (1911-08-10) * the whole document *	1,2	INV. E03F7/04
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X	EP 0 278 746 A2 (EARL RAYMOND FREDERICK) 17 August 1988 (1988-08-17) * the whole document *	1	
X	AU 511 424 B2 (BJAERE ELEMENT AB) 21 August 1980 (1980-08-21) * the whole document *	1	
X	US 3 815 629 A (OBERHOLTZER J) 11 June 1974 (1974-06-11) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			E03F E03C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 June 2010	Examiner Geisenhofer, Michael
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... &amp; : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 15 8514

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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29-06-2010

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**REFERENCES CITED IN THE DESCRIPTION**

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- IT 240790 [0001]