

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: **81830057.6**

(51) Int. Cl.³: **E 03 D 1/35**
E 03 D 1/30

(22) Date of filing: **10.04.81**

(30) Priority: **16.04.80 IT 4842380**

(43) Date of publication of application:
28.10.81 Bulletin 81/43

(84) Designated Contracting States:
AT BE CH DE FR GB LI LU NL SE

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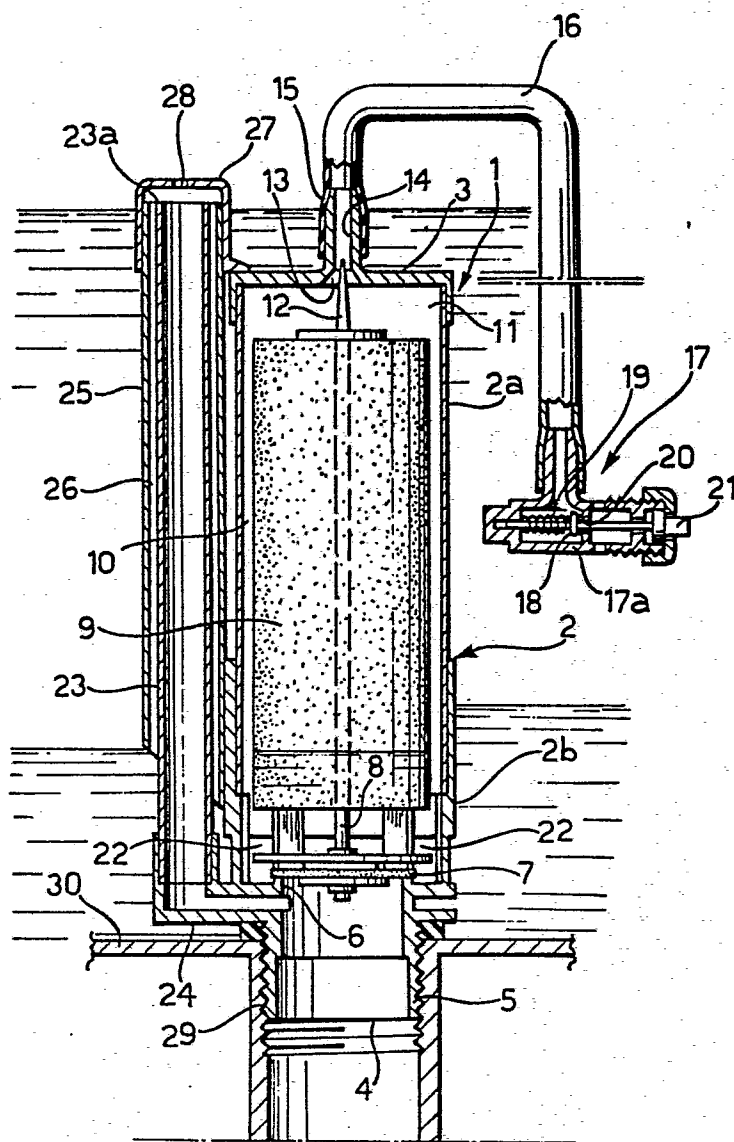
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(54) **Flushing tank discharge device in sanitary fittings.**

(57) A discharge device (1) for flushing tanks in sanitary fitting comprises a cylindrical tubular casing (2) positioned in a flushing tank (30) in such a way as to function as a diving bell.

A cylindrical float (2) and a closing element (7) of discharge valve fixed to the float are movably positioned in the tubular tank. A remote operated relief valve (17) is connected with the upper portion (15) of the tubular casing (2).

FIG. 3



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Flushing tank discharge device in sanitary fittings

The present invention relates to a flushing tank discharge device and particularly to a discharge device with manual remote control.

The flushing tank discharge device is operated by the opening of an appropriate valve equipping the tank. According to the known art, the valve seat is generally machined near by or right in the tank aperture, while the obturator cooperating with the said valve seat, is connected to a float by means of more or less complicated levers and the like. For a good operation of the flushing tank discharge it is necessary that the valve as well as the means (connecting rods, levers, control devices and the like) for actuating said valve are perfectly working.

The known valves and the respective operating means are made with structural and functional features which not always meet satisfactory requirements. In fact, when the flushing tank is closed the valve tightness is not always sufficiently guaranteed and the valve actuating means, particularly in case of a remote control, are requiring a considerable force to be actuated and therefore are subject to deformations, require often not easy maintenance and setup, due to the uneasy accessibility to the places where they operate.

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The problem being object of the present invention is to overcome all the above technical and economical disadvantages. According to the invention the problem is solved by a flushing tank discharge device comprising:

- 5 - a cylindrical tubular casing having one end closed by a cross wall and the other end open connected with an aperture of a flushing tank,
- a valve seat transversally provided in the said tubular casing at the open end thereof,
- 10 - a float, movable in the said tubular casing between said cross wall and the valve seat,
- a plate like closing element in the said valve seat, connected to said float,
- at least one radial aperture in said tubular casing at
15 the valve seat upstream thereof,
- a remote controlled relief valve connected to an aperture provided in said casing cross wall, said remote controlled relief valve being manually operated.

Advantageously and according to a further feature of the
20 present invention, said device moreover comprises an overflow pipe, extending parallel to said cylindrical tubular casing and communicating with the inner side thereof in a position between the valve seat and said open end, said overflow pipe being longer than said
25 cylindrical tubular casing.

According to a preferred embodiment said float is cylin
drical and has a slightly smaller diameter and a shorter axial length respectively than the internal diameter and the axial length of said cylindrical tubular casing.

30 The device according to the present invention is meant

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to be mounted on a flushing tank in such a way that a portion of the respective cylindrical tubular casing, comprising the open end thereof, is coaxially fitted, fluid tight, into the discharge aperture. As a consequence,
5 the cylindrical tubular casing and the overflow pipe are vertically positioned and the upper end of the overflow pipe overhangs for a predetermined length the upper closed end of the cylindrical tubular casing. Moreover in this condition the plate like closing element is kept
10 in the closure position on the valve seat by its own weight and by the weight of the float, lying on it.

When the flushing tank is filled with water up to a fixed level, the cylindrical tubular casing according to the present invention acts as a diving bell, that is it is
15 not filled with water due to the air trapped mainly in the space between the float and the upper closed end of the cylindrical casing. When the flushing tank has to be discharged it is sufficient to operate the relief valve to cause the trapped air to escape. The water can therefore
20 immediately fill the cylindrical tubular casing. The float is pushed upwardly together with the plate like closing element and the valve seat is opened.

The tank discharge starts immediately when the trapped air is caused to escape through the relief valve which
25 can be operated with an effort as small as desired, without affecting the performance of the device.

Another advantage is represented by the fact that when the tank is full of water, the float anyhow lies with its weight on the plate like closing element pressing on it
30 together with the hydrostatic pressure to keep the same against the valve seat. The lifting of the closing element,

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which is sharp and immediate, can be carried out by the float only when the trapped air in the diving bell is allowed to escape and the water to enter the bell; it could be noticed that the air escaping is obtained by
5 relief means which can be operated with the slightest effort from any desired distance, independently from the water head in the flushing tank.

According to the device of the present invention it is possible to install the tanks at any desired level thus
10 improving its performance due to the increased kinetic force of the falling water.

Furthermore, during the discharge of the water, in view of the suction provided by the diving bell on the float, the plate like closing element is kept spaced from the
15 valve seat.

Further features and advantages of the present invention will become apparent from the description of a preferred embodiment hereinafter made with reference to the drawings in which:

- 20 - Fig. 1 shows a perspective and sectional view of a device according to the invention,
- Fig. 2 shows a schematic modified embodiment of the device of the present invention,
- Figg. 3 and 4 show a schematic view of the same device
25 as in Fig. 1 in different operating positions.

With reference to the above figures, a discharge device, indicated as a whole with 1, for flushing tanks according to the present invention, includes a cylindrical tubular casing 2, having one end closed by a cross wall 3 and the
30 other end 4 open to be fitted into a discharge aperture 29

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in the flushing tank 30.

Particularly, a transversally reduced portion 5 provided in the said cylindrical tubular casing 2, comprises the said open end 4, which will engage, f.i. by screwing, 5 with the discharge aperture 29 of the flushing tank 30. At said portion 5, inside the cylindrical tubular casing 2, a transversally defined valve seat 6 cooperates with a membrane plate like closing element 7.

This element 7 is assembled on a stem 8, coaxially fixed 10 in any conventional way to the lower wall of a cylindrical float 9. This float 9 is positioned inside the cylindrical tubular casing 2, where it is movable driven in axial direction and having a shorter axial length and a smaller diameter than the said casing. Thus a thin air space 10 15 is defined by the float 9 and the inner wall of the cylindrical tubular casing 2, while a space 11 is defined by the upper end of the float 9 and the closed end, having a predetermined volume when the element 7 is in closure position of the respective valve seat 6.

20 The appropriate choice of a suitable air space between the float 9 and the inner wall of said cylindrical tubular casing 2 could be sufficient for the guided movements of the float 9 and the element 7 with respect to the valve seat 6. Nevertheless, to increase the reliability 25 of said guided movements, the float 9 is advantageously provided with a rod shaped projection 12, axially overhanging the upper wall of the float and engaging a guide, f.i. a hole 13, in the closed end 3 of the cylindrical casing 2.

30 A relief aperture 14 is provided in the closed end 3 connected with the end of a duct 16, preferably in

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flexible material, having the other end assembled on a nonreturn relief valve group, schematically shown by 17, and manually operated. Said relief valve group comprises a casing 17a having a guided movable membrane 18 inside it, operated by a spring 19, against an aperture 20, provided in said casing 17. The membrane 18 can be moved away from the aperture 20 by a pushbutton 21 engaged in the casing 17a of said relief valve group.

At the valve seat 6 and the side thereof turned towards the closed end 3, radial apertures 22 are provided in the wall of the cylindrical tubular casing 2. The axial extension of the apertures 22 are preferably smaller than the distance between the element 7 and the inferior wall of the float 9.

An overflow duct 23 is parallel to the cylindrical tubular casing 2, laterally to it. This overflow duct 23 communicates in the lower part with the inside of the cylindrical tubular casing 2, in a position thereof between the valve seat 6 and the open end 4. The overflow duct 23 is sufficiently long as to allow its upper end 23a to overhang for a predetermined section the closed end 3 of the cylindrical tubular casing 2.

In order to facilitate the assembly of the various elements of the device 1 according to the present invention, the cylindrical tubular casing 2 consists of two pieces 2a, 2b.

The device 1 is assembled on a flushing tank 30 so that the portion 5 of the cylindrical tubular casing 2 is tight inserted in the discharge aperture 29 of the tank 30 and this insertion is advantageously carried out until the shoulder 5a, defined by the portion 5 and the tubular

casing 2, contacts the tank floor 30a.

As a consequence the valve seat 6 and the relative element 7 are coaxially positioned near the said discharge aperture 29.

5 When the tank 30 is empty, the element 7 is in closure position on the respective valve seat 6 and is maintained in closure position by the weight of the float 9. The position of the relief valve group 17 is the most accessible and convenient for the user.

10 When the flushing tank 30 is filled with water, up to a level fixed by the position of the overflow duct 23, the fundamentally diving bell performance of the cylindrical tubular casing 2 can be easily observed. The said casing 2, even though completely dipped in the
15 water, is in fact not flooded with water because of an air quantity trapped in the spaces 10 and 11.

When the tank discharge is required, it is sufficient to push the button 21 of the relief valve group 17 thus causing the relief of the air trapped in the cylindrical
20 tubular casing 2. Simultaneously to the air relief, the cylindrical tubular casing 2 is filled with water. Therefore the float 9 undergoes the classic upward thrust, causing the element 7 to move away from the valve seat 6. During the discharge period of the tank 30 the float 9
25 remains within the cylindrical tubular casing 2 and in its higher position because of the suction by the diving bell on the float.

Once the water level in the tank decreases to uncover the apertures 22, the air can flow into the cylindrical
30 tubular casing 2 and therefore bring again the float 9 and the herewith joint element 7 in the closure position

on the valve seat 6.

Fig. 2 shows a modified embodiment of the device previously described.

The overflow duct 23 extends coaxially within the cylindrical tubular casing 2; in this case, as it is clearly shown, the overflow duct 23 coaxially passes even through the float 9, representing a valid guide element hereof when axially moved. According to the fundamental feature, which still remains, one end of the overflow duct must be open below the valve seat 6 and the other end open above the upper closed end 3 of the cylindrical tubular casing 2.

With reference to Fig. 1, 25 indicates a tube surrounding the overflow duct 23 forming herewith an air space 26. This tube 25 is closed by a wall 27 overhanging for a predetermined section the open end 23a of the duct 23. A small hole 28 is provided in the wall 27.

This tube 25 forms practically a diving bell for the overflow duct 23 and the small hole 28 allows to interrupt the possible siphon action which would occur should a large water quantity reach the upper edge of the overflow duct 23. The peculiar task of the tube 25 is to prevent air inlet in the overflow duct 16 and to usefully contribute to the water discharge during almost all the level decrease in the tank.

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C L A I M S

1. Discharge device for flushing tanks in sanitary fittings comprising:

- a cylindrical tubular casing (2) having one end closed by a cross wall (3) and the other end (4) open,
5 connected with a discharge aperture (29) of a flushing(30);
- a valve seat (6) transversally provided in said tubular casing (2) at the open end (4) thereof;
- a float (9) movable positioned in said tubular casing (2) between the closed end (3) thereof and the
10 valve seat (6);
- a plate like closing element (7) for said valve seat (6) connected to said float (9);
- at least one radial aperture (22) in said tubular casing (2) at the valve seat (6) upstream thereof;
- 15 - a remote controlled relief valve (17) connected to an aperture (14) provided in said casing cross wall(3) and manually operated.

2. Device according to claim 1 comprising an overflow duct (23) extending parallel to said cylindrical tubular casing (2) and communicating with the inner side thereof in a position between said valve seat (6) and said open
5 end (4).

3. Device according to claim 1, characterized in that said plate like closing element (7) is provided with a stem (8) fixed to said float (9).

4. Device according to claim 2, characterized in that said float (9) is manually driven in axial direction with respect to the said cylindrical tubular casing (2).

5. Device according to claim 4, characterized in that said float (9) is cylindrical and has a slightly smaller dia

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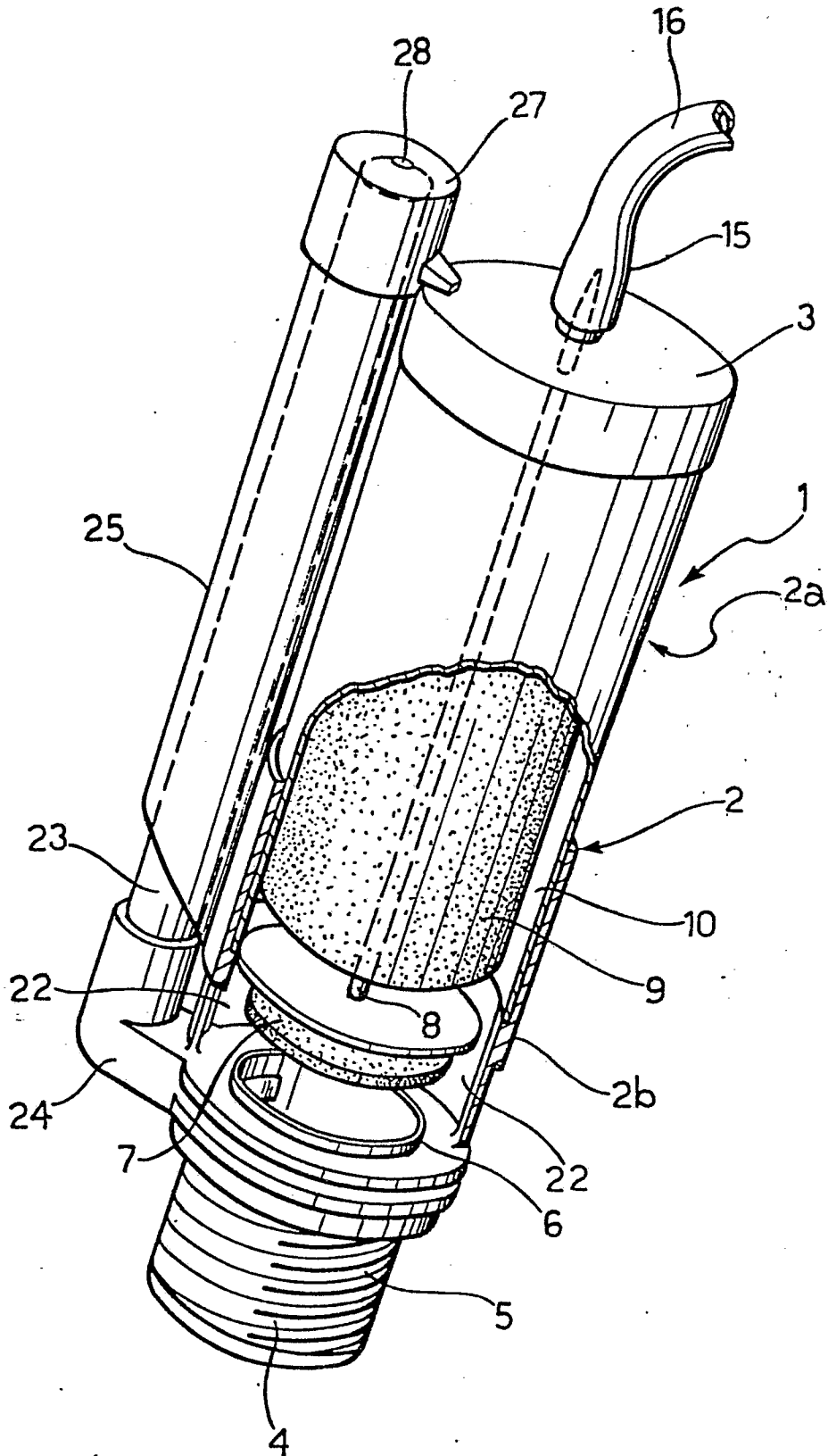
meter of the said cylindrical tubular casing (2), delimiting herewith a thin air space (10).

6. Device according to claim 1, characterized in that said relief aperture (14) is connected with said relief valve members (17) by a flexible duct (16). -

7. Device according to any of the previous claims, characterized in that said cylindrical tubular casing (2) consists of two pieces (2a,2b) removable coaxially fluid tight connected.

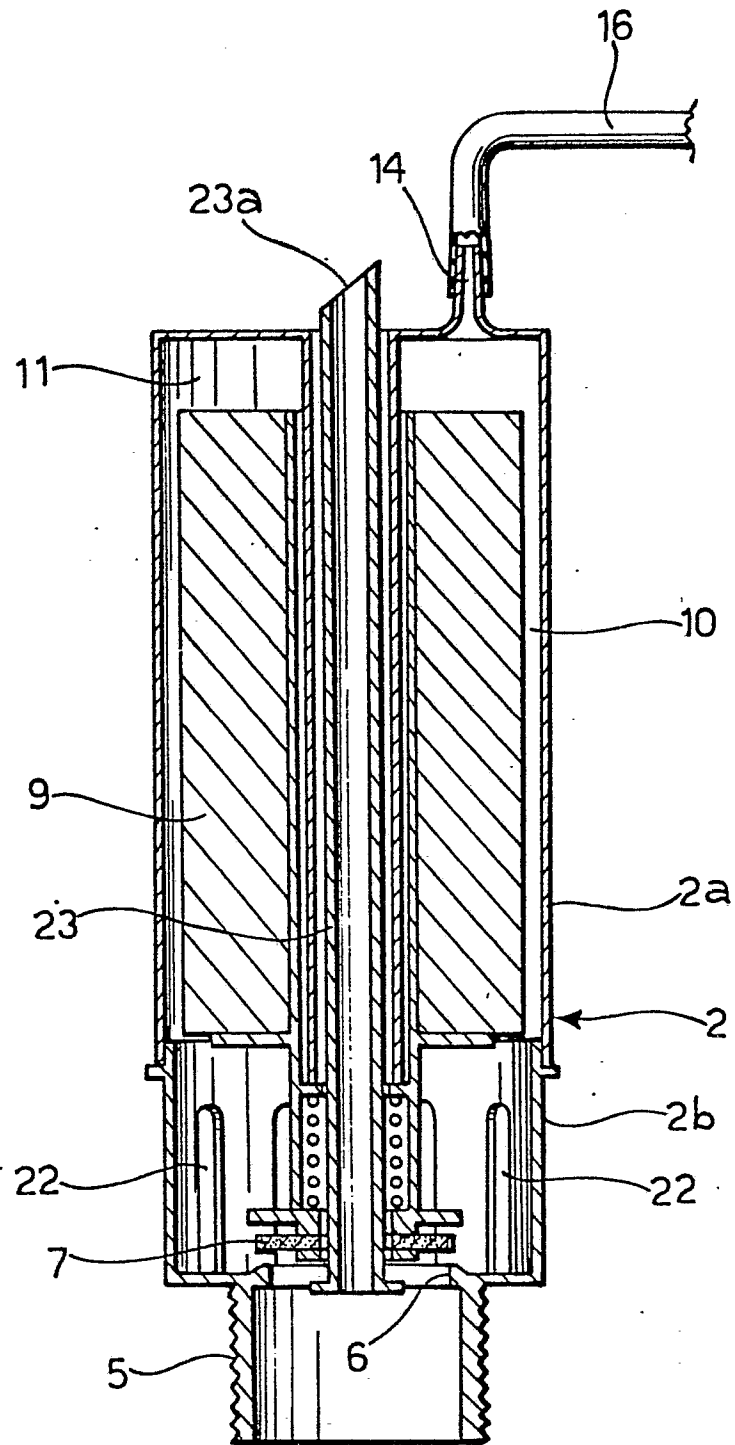
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FIG. 1



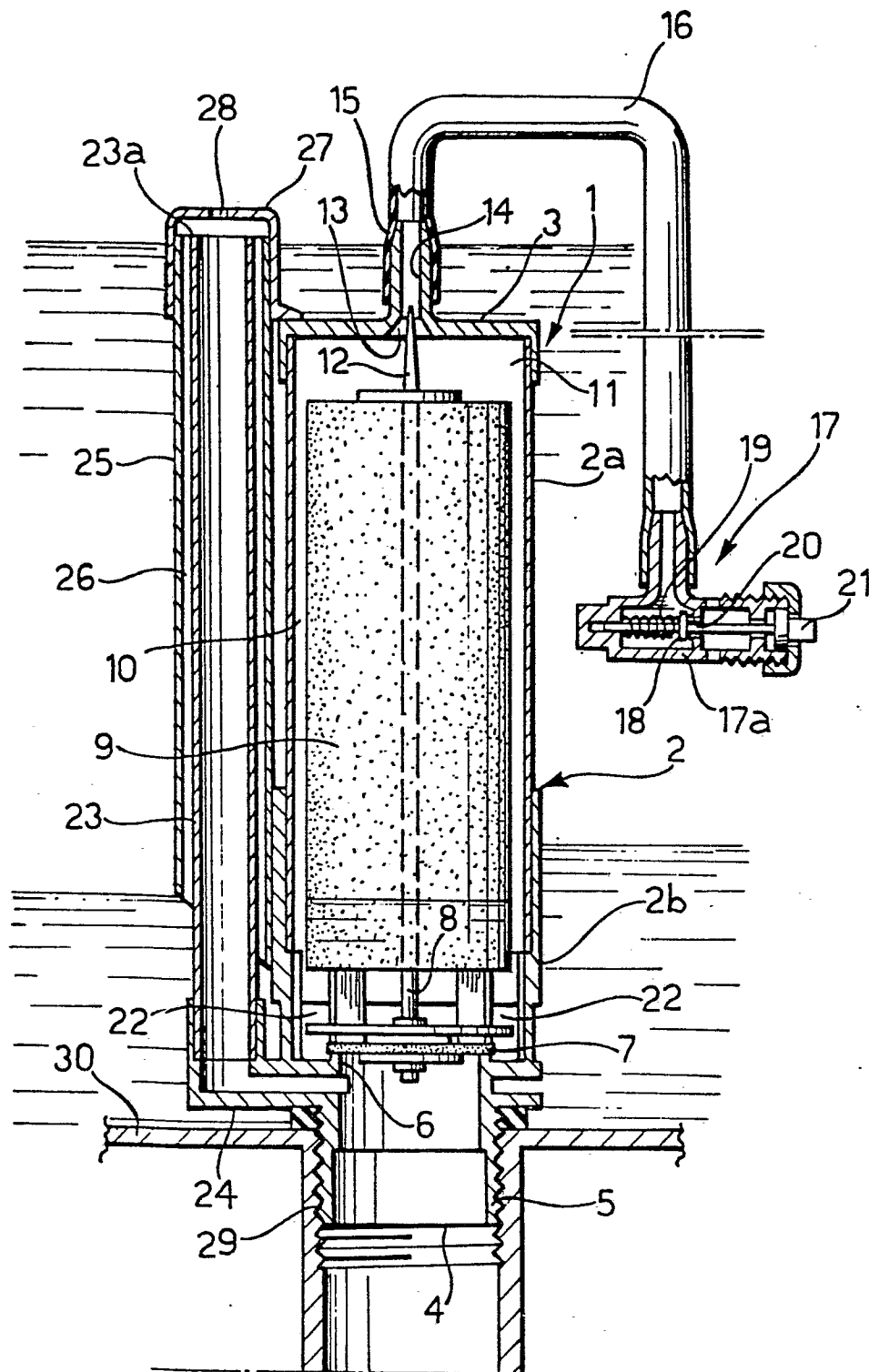
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FIG. 2



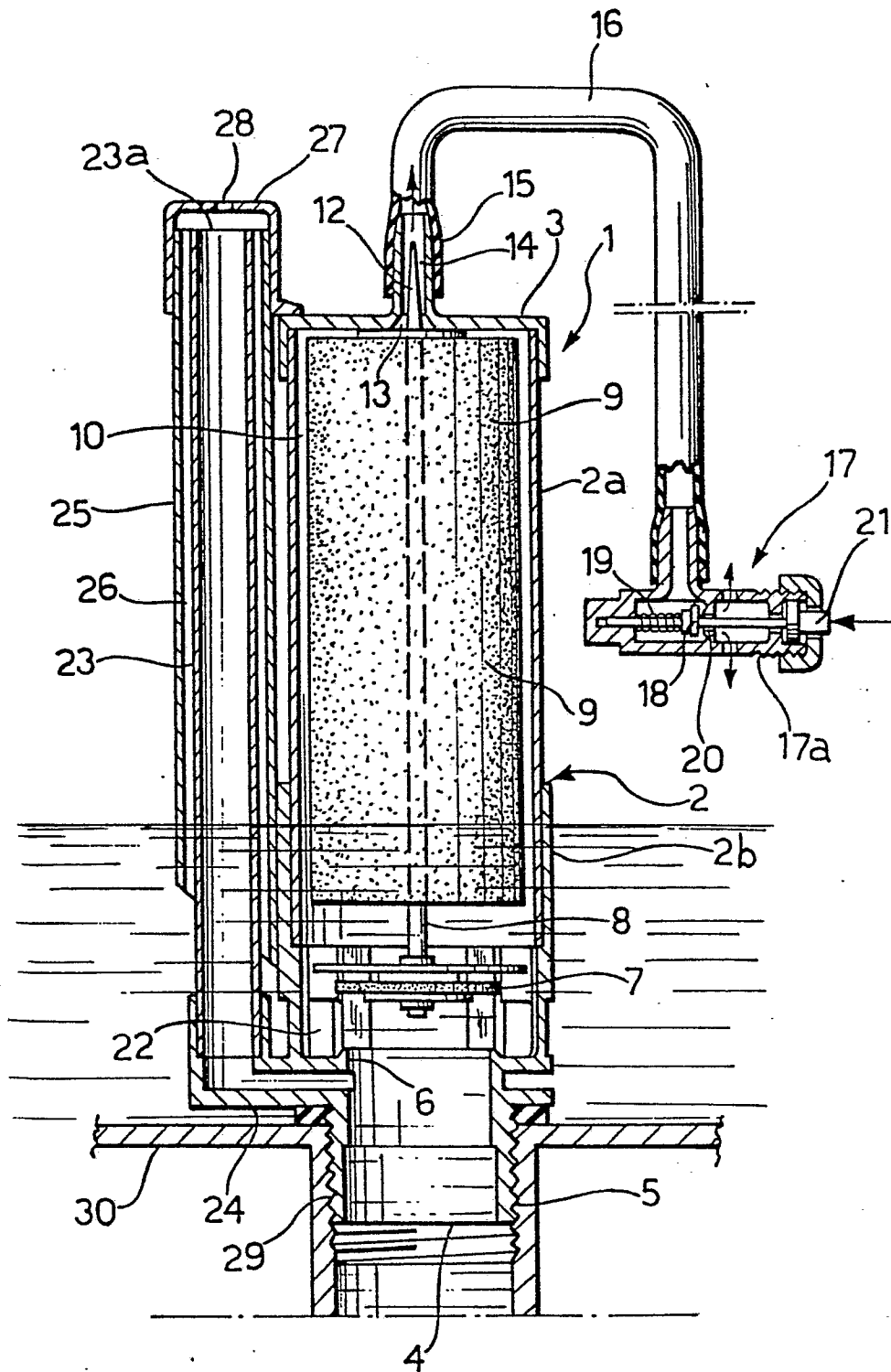
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FIG. 3



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FIG. 4





DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>DE - A - 2 931 487 (NARUSZEWICH)</u> * Page 11; page 12; page 13; page 15, lines 22-25; page 16, lines 1-5; figures 1 and 2 * ---	1	E 03 D 1/35 E 03 D 1/30
	<u>FR - A - 2 161 707 (CARRARA)</u> * Page 2, lines 14-37; page 3, lines 1-16; figures 1-3 * ---	1,3,4,5	
	<u>DE - C - 273 405 (GEBERT)</u> * Page 1, lines 28-66; page 2, lines 1-17; figure 1 * ---	1,6	TECHNICAL FIELDS SEARCHED (Int. Cl.)
	<u>DE - C - 215 516 (PFISTER)</u> * Page 1, lines 63-70; page 2, lines 1-15; page 2, lines 41-73; figure 1 * -----	1,6	E 03 D
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&: member of the same patent family, corresponding document
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
The Hague	29.07.1981	HANNAART	