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

(11) EP 0 801 180 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
15.10.1997 Bulletin 1997/42

(51) Int. Cl.[6]: **E03D 1/14**, E03D 5/09

(21) Application number: **97105696.5**

(22) Date of filing: **07.04.1997**

(84) Designated Contracting States:
DE ES FR LU NL PT

(30) Priority: **10.04.1996 IT TO960075 U**

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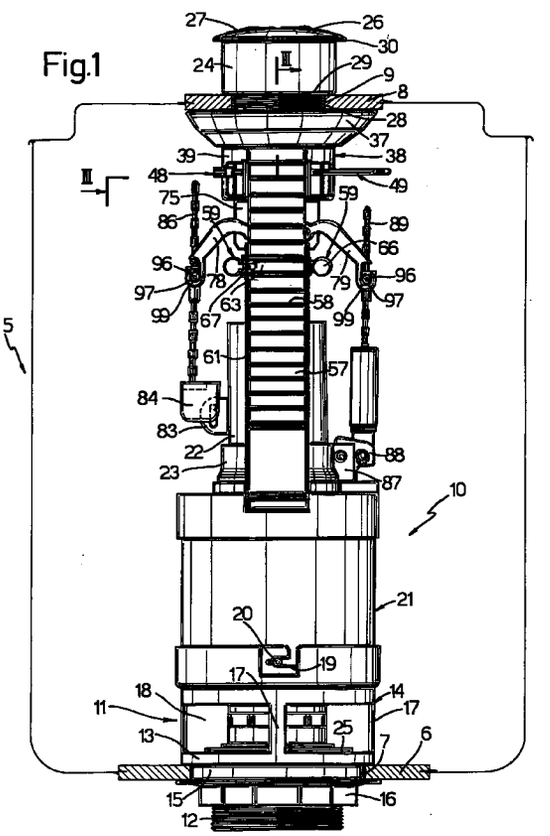
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(54) System for assembling a device for controlling the discharge valve of a lavatory flush tank

(57) The control device (10) includes a body (21) fitted to a discharge fitting (11) inserted inside the drain hole (7) in the bottom (6) of the tank (5); and a support fitting (24) for supporting the push-buttons (26, 27) and inserted inside a hole (9) in the lid (8) of the tank (5). The support fitting (24) is connected to a sleeve (32), which is inserted inside a support (38) connected to the body (21), and which may be locked to or released from the support (38) by setting a member (48) to a first or second position respectively. The support (38) is connected to the body (21) by a toothed bar (58) engaged in various positions by a bolt (59); and the push-buttons (26, 27) activate two levers (78, 79) connected by an articulated joint (93, 94) and in various positions to two control ties (86, 89) comprising a number of grooves (95) engaged in snap-on manner by an element (97) connected in articulated manner to the respective lever (78, 79).

Fig.1



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Description

The present invention relates to a system for assembling a device for controlling the discharge valve of a lavatory flush tank.

Control devices of the above type normally comprise a discharge fitting fixed inside a hole at the bottom of the tank; and a fitting supporting at least one valve control push-button, and fixed inside a hole in the tank lid.

Control devices are known wherein the tank lid is not secured to the tank by the control device, in which case, the push-button fitting may be fitted to the lid or to the body of the device, and the inside of the tank is reached by simply lifting off the lid. To prevent the tank from being opened too easily, however, the lid must be provided with additional fastening means.

Other control devices are known wherein, when assembled, the push-button fitting secures the lid to the tank, and is therefore fitted removably to the lid. To enable access to the tank, however, the push-button fitting must first be removed and then fitted back on, which is a disadvantage on certain types of tank.

It is an object of the present invention to provide a system for assembling the discharge valve control device, which is adaptable to tanks of any type or size, which is highly straightforward, and which provides for overcoming the above drawbacks of known assembly systems.

According to the present invention, there is provided a system for assembling a device for controlling the discharge valve of a lavatory flush tank, and which comprises a discharge fitting fixed inside a hole in the bottom of said tank, and a support fitting supporting at least one push-button for controlling said valve; said support fitting being inserted inside a hole in a lid of said tank; characterized by comprising selectively adjustable means for securing said lid to said tank or for releasing said lid.

A preferred, non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a partial section of a lavatory flush tank comprising a control device featuring the assembly system according to the invention;

Figure 2 shows a partial half section of the Figure 1 control device in a different assembly position;

Figure 3 shows a partial section of the device along line III-III in Figure 1;

Figure 4 shows a section along line IV-IV in Figure 2;

Figure 5 shows a plan view of a component in Figure 4;

Figure 6 shows a larger-scale section along line VI-VI in Figure 2;

Figure 7 shows a larger-scale section along line VII-VII in Figure 2.

Number 5 in Figure 1 indicates, schematically, a lavatory flush tank comprising a standard cock (not shown) for connection to the water supply pipe, and a standard float (not shown) for controlling the cock. Tank 5 is normally an exposed type, i.e. not fitted into the wall, may be made of ceramic or plastic, and comprises a bottom wall 6 with a hole 7, and a removable lid 8 with a further hole 9. Holes 8 and 9 are fitted with a flush control device 10, the components of which are normally made of rigid plastic.

Device 10 comprises a discharge fitting 11 having an externally-threaded bottom portion 12, a flat shoulder 13, and a larger-diameter top portion 14. Portion 12 is inserted inside hole 7 via the interposition of a seal 15, and is fixed to bottom wall 6 of tank 5 by a threaded ring nut 16; and portion 14 is connected to shoulder 13 by four axial segments 17 defining four openings 18 for allowing water to flow from tank 5 into portion 12.

Portion 14 comprises an L-shaped slot 19 (Figure 1), which is engaged bayonet-fashion by a radial pin 20 fitted to a fixed body 21 forming the fixed part of control device 10. Body 21 is in the form of a hollow cylinder, and houses in vertically-sliding manner an overflow discharge tube 22 having an elastic ring 25 at the bottom for closing the discharge valve (not shown).

When raised on its own, tube 22 provides for partial discharge of the water in tank 5, as described in the patent application filed concurrently by the present Applicant and entitled: "Device for controlling the discharge valve of a lavatory flush tank." As also described in the above application, body 21 houses a vertically-sliding sleeve 23 for controlling total discharge of the water in tank 5, and which is concentric with tube 22 and draws tube 22 with it as it moves upwards.

The control device also comprises a fitting 24 supporting two push-buttons 26 and 27 for respectively controlling partial and total discharge of the water in tank 5. Fitting 24 comprises an externally-threaded bottom portion 28, a shoulder 29, and a top portion 30 for guiding push-buttons 26 and 27 and terminating with a flange 31. Threaded portion 28 of fitting 24 engages a threaded portion 33 (Figures 2 and 3) of a sleeve 32, which comprises a number of axial ribs 34 (Figure 4), two diametrically-opposed tangential grooves 36, and a funnel-shaped portion 37 for engaging the bottom surface of lid 8. By inserting fitting 24 inside hole 9 (Figure 1) in lid 8, and screwing threaded portion 28 inside threaded portion 33 of sleeve 32, lid 8 is therefore fitted removably between shoulder 29 of fitting 24 and the edge of funnel-shaped portion 37.

Control device 10 also comprises a support 38, which, as will be seen more clearly later on, is connected to fixed body 21 and comprises an upper ring 39 in which sleeve 32 is insertable with a small amount of friction on ribs 34; and the inner surface of ring 39 comprises two diametrically-opposed axial ribs 41 (Figure 5), which are engaged between two pairs of ribs 34 on sleeve 32 to limit rotation of sleeve 32 inside ring 39.

Support 38 also comprises an oblong transverse

plate 42, which is connected to ring 39 by two curved-horizontal-section segments 43 alternating with two diametrically-opposed flat walls 46. Each wall 46 comprises a curved portion forming a transverse guide 47 (Figure 3); the two guides 47 are parallel, specular, and semicircular in section; and the two ribs 41 are slightly offset with respect to the center-line of guides 47, and provide for positioning sleeve 32 (Figure 4) with the two grooves 36 substantially facing the two guides 47.

Control device 10 comprises selectively adjustable means in turn comprising a connecting member 48 having two parallel arms 49, which are inserted inside the two guides 47 of support 38, and slide transversely with respect to support 38. Member 48 also comprises a crosspiece 51 for connecting the two arms 49, and which is gripped manually to move member 48 and is therefore located outside support 38.

Arms 49 are flexible, are normally held resting radially against guides 47, and each comprise a portion 52 of such a thickness as to fit entirely inside respective guide 47. A further portion 53 of each arm 49, adjacent to crosspiece 51, is thicker, so as to project inwards of ring 39; and member 48 comprises two pairs of elastic appendixes 54 and 56 on the ends of arms 49 and on crosspiece 51 respectively.

To release lid 8 (Figures 1 and 2) with respect to tank 5, on one side, fitting 24 of push-buttons 26, 27 is inserted inside hole 9 in lid 8, and threaded portion 28 is screwed inside threaded portion 33 of sleeve 32, so that lid 8 is fixed between flange 31 of fitting 24 and the edge of funnel-shaped portion 37.

On the other side, member 48 (Figure 4) is positioned, with no tools required, with portions 52 of arms 49 inside guides 47, so that appendixes 54 of arms 49 engage respective edges of guides 47, as shown by the dotted lines in Figure 4; and sleeve 32, together with lid 8 and fitting 24, is inserted inside ring 39 of support 38. As portions 52 of arms 49 fail to engage grooves 36, lid 8 simply rests on tank 5, together with sleeve 32 and fitting 24.

Conversely, to secure lid 8 to tank 5, sleeve 32 is inserted inside ring 39 so that grooves 36 are located at guides 47; by means of crosspiece 51, member 48 is moved transversely into the Figure 4 position in which appendixes 56 engage respective edges of walls 46; portions 53 of arms 49 are now positioned at guides 47 to engage grooves 36 of sleeve 32, which is thus secured to support 38; lid 8 is fitted on to tank 5; and fitting 24 is screwed inside sleeve 32 to lock lid 8 to tank 5. In this case, to enable access to the inside of tank 5, fitting 24 must obviously be unscrewed and withdrawn.

The assembly system also provides for adapting control device 10 to tanks 5 of different heights, for which purpose, fixed body 21 is connected to support 38 by adjusting means comprising two diametrically-opposed uprights 57 integral with body 21, two toothed bars 58 integral with support 38, and two bolts 59 for locking bars 58 to uprights 57.

More specifically, each upright 57 has a C-shaped section, the cavity of which houses a respective toothed bar 58. The two wings 61 of each upright 57 comprise two corresponding aligned openings 62 corresponding in size to the section of the gap between two adjacent teeth on bar 58. And each bolt 59 comprises a central portion 63 of a width corresponding to the width of the gap between the teeth on bar 58; two shoulders 64 which are arrested against one of wings 61; a hand-operated gripping portion 66 adjacent to shoulders 64; and a forked portion with two elastic hook-shaped tabs 67 which snap on to the other of wings 61.

To assemble, bars 58 are first fitted in the required longitudinal position inside the cavities of uprights 57; and, with no tools required, each bolt 59 is inserted through one of openings 62 in upright 57, inside the gap between two adjacent teeth on bar 58, and through the other opening 62, so that tabs 67 snap on to the other side of the second opening 62 to connect support 38 rigidly to body 21.

Oblong plate 42 of support 38 comprises an opening 68 housing a funnel-shaped guide 69 through which extend two coaxial bottom portions 73 and 74 of two push rods 71 and 72 fitted to push-buttons 26 and 27. Plate 42 also comprises two parallel wings 75 (Figure 3) perpendicular to plate 42, and which are fitted with two parallel pins 76 and 77 (Figure 2) on which pivot two transmission levers 78 and 79. Levers 78 and 79 comprise respective operating arms 81 and 82 extending towards the axis of support 38, and which are engaged by portions 73 and 74 of push rods 71 and 72.

At the top, tube 22 comprises a radial tab 83 connected by a slot and pin to a plate 84 comprising a bent portion fitted integrally to a first tie 86, which is raised by lever 78 to raise tube 22; and sleeve 23 comprises a pair of radial tabs 87 connected by an intermediate member 88 to a second tie 89, which is raised by lever 79 to raise sleeve 23 together with tube 22.

Each lever 78, 79 comprises a second arm 91, 92 connected to the respective tie by an articulated joint 93, 94. More specifically, each tie 86, 89 comprises a number of grooves 95 separated by a distance equal to the spacing of the teeth on bars 58; and each articulated joint 93, 94 comprises a pair of pins 96 (Figures 6 and 7) fitted to a C-shaped intermediate element 97 comprising two pairs of inner projections 98, which, with no tools required, click inside two adjacent grooves 95 of respective tie 86, 89.

Finally, each arm 91, 92 of levers 78 and 79 comprises a pair of parallel hook-shaped appendixes 99 (see also Figure 1), which are engaged by the two pins 96 of respective intermediate element 97 to connect the articulated joint 93, 94 of arm 91, 92 of each lever 78, 79 to respective tie 86, 89 in a number of positions of tie 86, 89 corresponding to the connection positions of uprights 57 and bars 58. In Figures 1 and 2, levers 78 and 79 are connected in the two limit positions of ties 86 and 89.

As compared with known systems, the advantages of the assembly system according to the present inven-

tion will be clear from the foregoing description. In particular, lid 8 may be so assembled as to be either locked to or simply rest on tank 5. Moreover, fitting 24 supporting push-buttons 26 and 27, and levers 78 and 79 may be connected to fixed body 21 and to ties 86 and 89 in a number of different positions to adapt to tanks 5 of different heights. Finally, assembly and connection as described above may be adjusted with no tools required.

Clearly, changes may be made to the assembly system as described and illustrated herein without, however, departing from the scope of the present invention. For example, connecting member 48 may comprise only one arm; bolts 59 and the teeth of bars 58 may have a different section; and ties 86 and 89 may comprise holes or notches engaged by a pin inserted inside a respective hole in each of arms 91, 92, and which therefore acts as the intermediate element of the articulated joint.

Claims

1. A system for assembling a device for controlling the discharge valve of a lavatory flush tank, and which comprises a discharge fitting (11) fixed inside a hole (7) in the bottom (6) of said tank (5), and a support fitting (24) supporting at least one push-button (26, 27) for controlling said valve; said support fitting (24) being inserted inside a hole (9) in a lid (8) of said tank (5); characterized by comprising selectively adjustable means (48) for securing said lid (8) to said tank (5) or for releasing said lid (8).

2. A system as claimed in Claim 1, characterized in that said support fitting (24) is connectable to a sleeve (32) to secure said lid (8); said sleeve (32) being inserted inside an annular portion (39) of a support (38) connected to a fixed body (21) of said device (10).

3. A system as claimed in Claim 2, characterized in that said adjustable means comprise a member (48) which slides transversely along said support (38) to make and release the connection to said sleeve (32).

4. A system as claimed in Claim 3, characterized in that said member (48) comprises a pair of parallel arms (49) which slide along two transverse guides (47) perpendicular to the axis of said annular portion (39); said guides (47) being diametrically-opposite with respect to said axis; and said arms (49) being connected by a crosspiece (51) outside said support (38) and which is gripped manually.

5. A system as claimed in Claim 4, characterized in that said sleeve (32) comprises two diametrically-opposed grooves (36) which are engaged by said arms (49) when said arms (49) are moved into a lock position.

6. A system as claimed in Claim 5, characterized in that, close to said crosspiece (51), said arms (49) comprise a thicker portion (53); each of said grooves (36) being engaged by said thicker portion (53) when said crosspiece (51) is moved towards the axis of said annular portion (39).

7. A system as claimed in one of the foregoing Claims from 3 to 6, characterized in that said sleeve (32) is threaded internally to receive a threaded portion (28) of said support fitting (24), and comprises a funnel-shaped portion (37) for engaging the inner surface of said lid (8).

8. A system as claimed in Claim 7, characterized in that said support (38) comprises a transverse plate (42) having an opening (68) for the passage of at least one push rod (71, 72) for activating said valve.

9. A system as claimed in Claim 8, characterized in that said opening (68) comprises a funnel-shaped guide (69) for guiding a pair of push rods (71, 72) having at least one portion (73, 74) coaxial with said axis; said push rods (71, 72) being activated to discharge different quantities of water.

10. A system as claimed in Claim 9, characterized in that said plate (42) comprises at least one perpendicular wing (75); said coaxial portions (73, 74) acting on two arms (81, 82) of two levers (78, 79) pivoting on two parallel pins (76, 77) fitted to said wing (75).

11. A system as claimed in one of the foregoing Claims from 2 to 10, characterized in that said fixed body (21) is connected to said support (38) by adjusting means (57-59) for adapting the control device (10) to tanks (5) of different sizes.

12. A system as claimed in Claim 11, characterized in that said adjusting means (57-59) comprise at least one upright (57) integral with said fixed body (21); at least one toothed bar (58) integral with said support (38); and a lock bolt (59).

13. A system as claimed in Claim 12, characterized in that said fixed body (21) comprises two diametrically-opposed, C-section uprights (57); said support (38) supporting two toothed bars (58), each housed in the concavity of a respective upright (57) and locked by a respective bolt (59).

14. A system as claimed in Claim 13, characterized in that each of said uprights (57) comprises two wings (61) having two aligned openings (62) corresponding in size to the gap between two adjacent teeth on the respective toothed bar (58); each bolt (59) com-

prising a portion (63) of a width corresponding to the width of said gap, and which is engaged between two adjacent teeth on the respective toothed bar (58) and inside said openings (62).

15. A system as claimed in Claim 14, characterized in that each of said bolts (59) also comprises at least one shoulder (64) which is arrested against one of said wings (61) of said upright (57); a grip portion (66) gripped manually and located adjacent to said shoulder (64); and a forked portion having two elastic tabs (67) which click on to the other of said wings (61) of said upright (57).

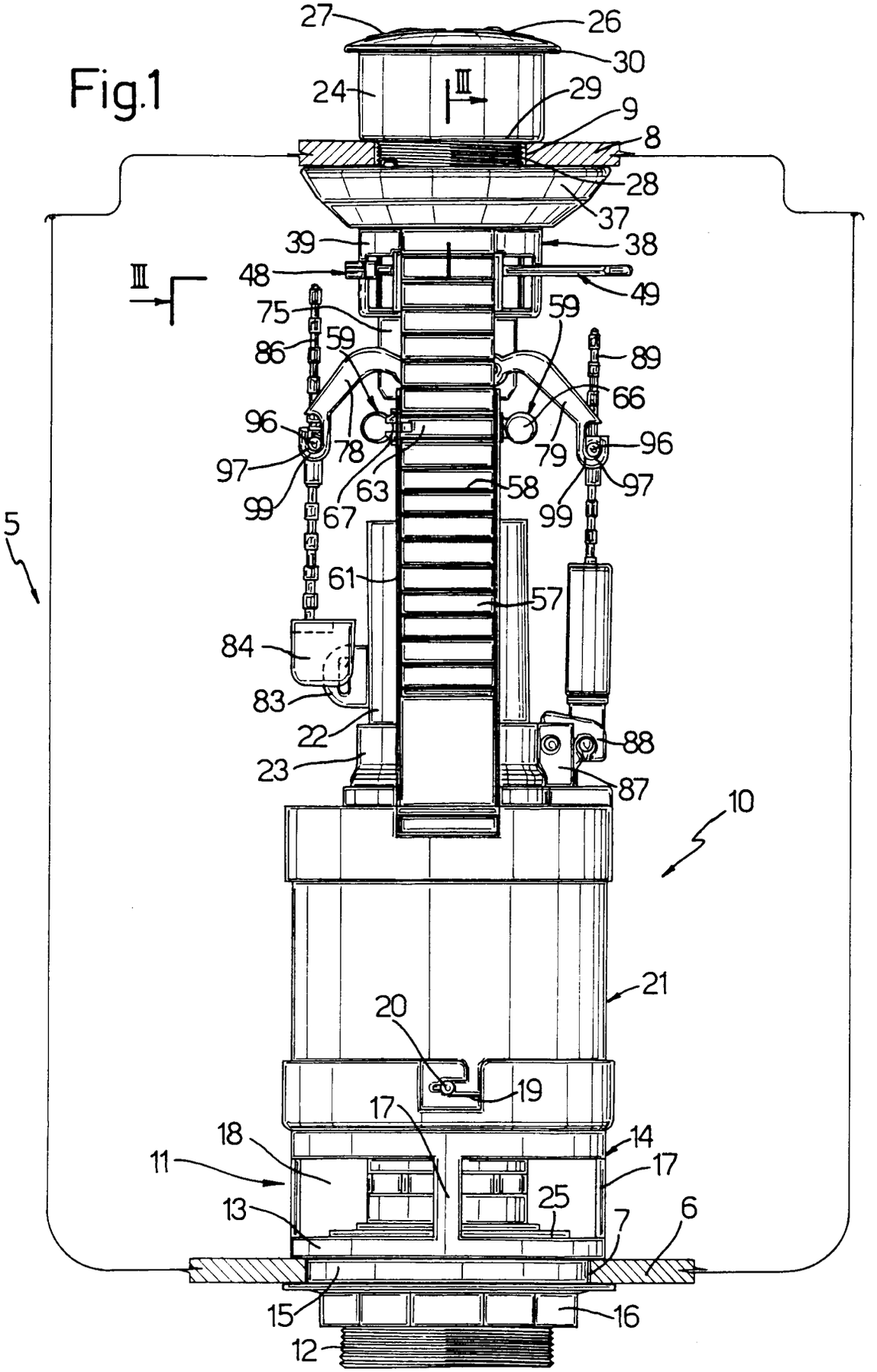
16. A system as claimed in Claim 10 and one of the foregoing Claims from 11 to 15, wherein each of said levers (78, 79) comprises a second arm (91, 92) connected by an articulated joint (93, 94) to a control tie (86, 89); characterized in that each of said articulated joints (93, 94) comprises intermediate means (96, 97) permitting said connection in a number of positions of said tie (86, 89).

17. A system as claimed in Claim 16, characterized in that said tie (86, 89) comprises a number of grooves (95); said intermediate means (96, 97) comprising a pin (96) engaging said second arm (91, 92) and fitted to a C-shaped element (97) which clicks into at least one of said grooves (95).

18. A system as claimed in Claim 17, characterized in that said grooves (95) have the same spacing as the teeth on said toothed bar (58); said C-shaped element (97) comprising at least a pair of projections (98) which click inside a groove (95) on said tie (86, 89).

19. A system as claimed in Claim 18, characterized in that said C-shaped element (97) comprises a pair of opposite pins (96); said second arm (91, 92) comprising a pair of hook-shaped parallel appendixes (99) engaging said pair of pins (96).

Fig.1


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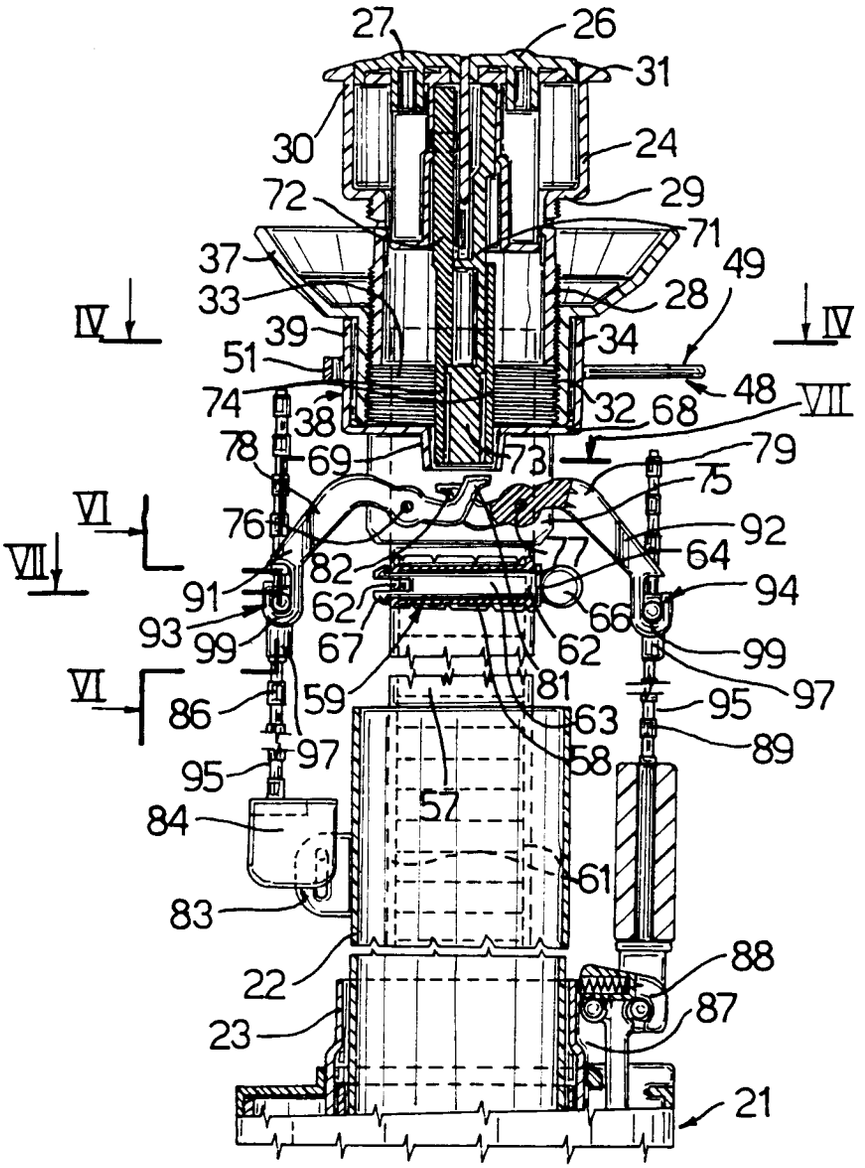

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Fig.2

Fig.3

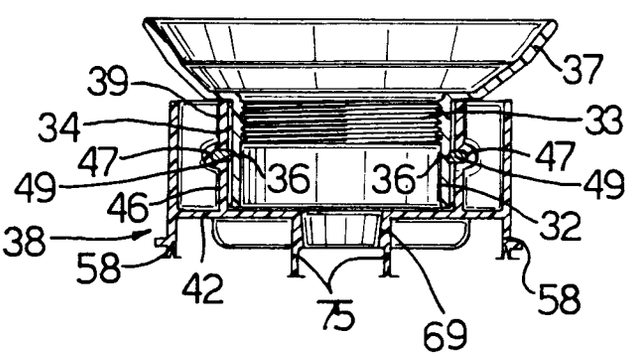

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Fig.4

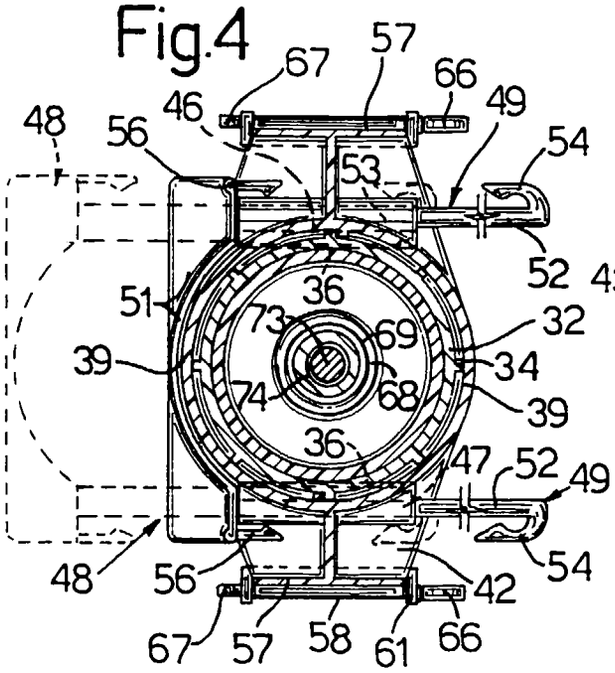


Fig.5

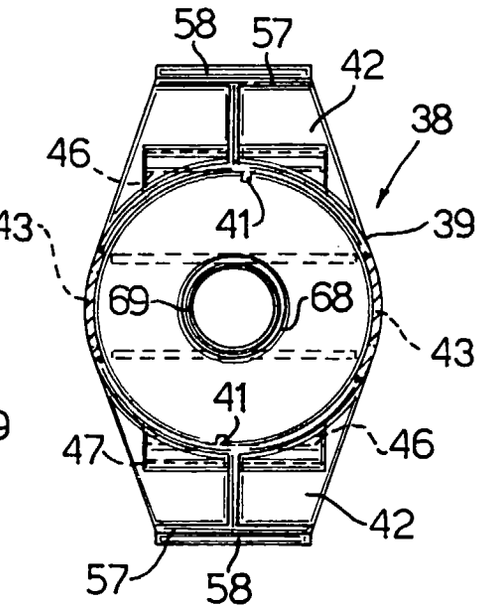


Fig.6

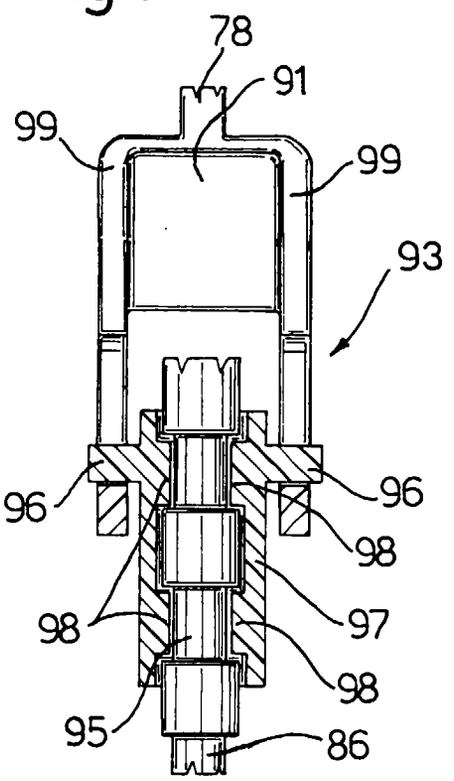


Fig.7

