



(86) Date de dépôt PCT/PCT Filing Date: 1993/12/17  
(87) Date publication PCT/PCT Publication Date: 1994/07/07  
(45) Date de délivrance/Issue Date: 2005/10/04  
(85) Entrée phase nationale/National Entry: 1995/06/12  
(86) N° demande PCT/PCT Application No.: FI 1993/000546  
(87) N° publication PCT/PCT Publication No.: 1994/014502  
(30) Priorité/Priority: 1992/12/22 (925836) FI

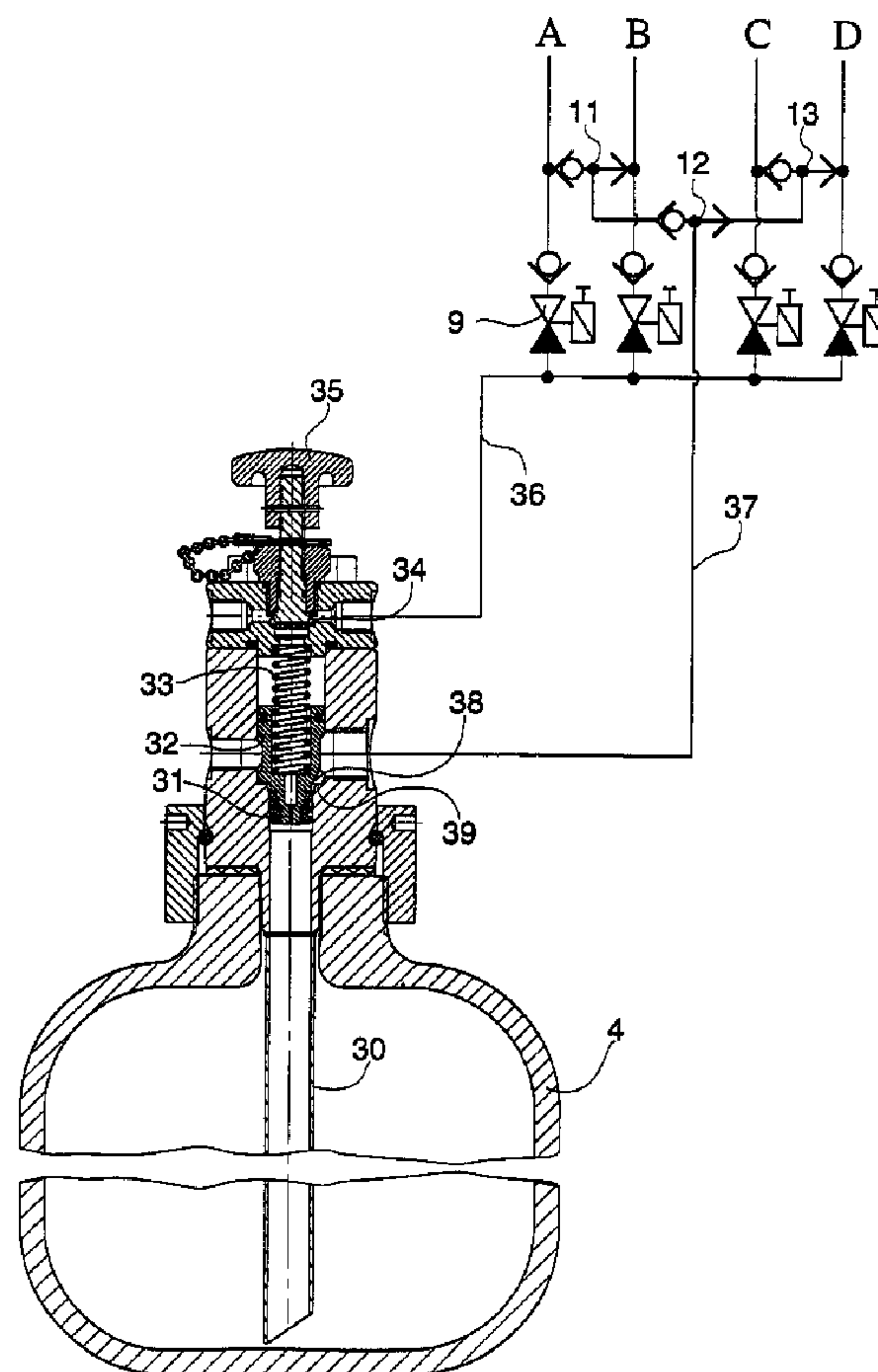
(51) Cl.Int.<sup>7</sup>/Int.Cl.<sup>7</sup> A62C 35/68, A62C 37/36, A62C 35/00

(72) Inventeur/Inventor:  
SUNDHOLM, GORAN, FI

(73) Propriétaire/Owner:  
MARIOFF CORPORATION OY, FI

(74) Agent: KIRBY EADES GALE BAKER

(54) Titre : INSTALLATION DE LUTTE CONTRE L'INCENDIE  
(54) Title: INSTALLATION FOR FIGHTING FIRE



(57) Abrégé/Abstract:

The invention relates to an installation comprising a high pressure drive unit for extinguishing liquid. When a fire has broken out in a fire section (A), a low pressure liquid source is connected (9, 10) to the respective fire section and the pressure of this liquid is



**(57) Abrégé(suite)/Abstract(continued):**

utilized both for establishing a connection (11, 12) through a pilot valve means from the respective fire section to the outgoing line (5) of the high pressure drive unit, before this drive unit is activated, and for closing the connections from other fire sections to said outgoing line (5). The invention makes it possible to use cheap low pressure valves (9) in the pilot valve means.

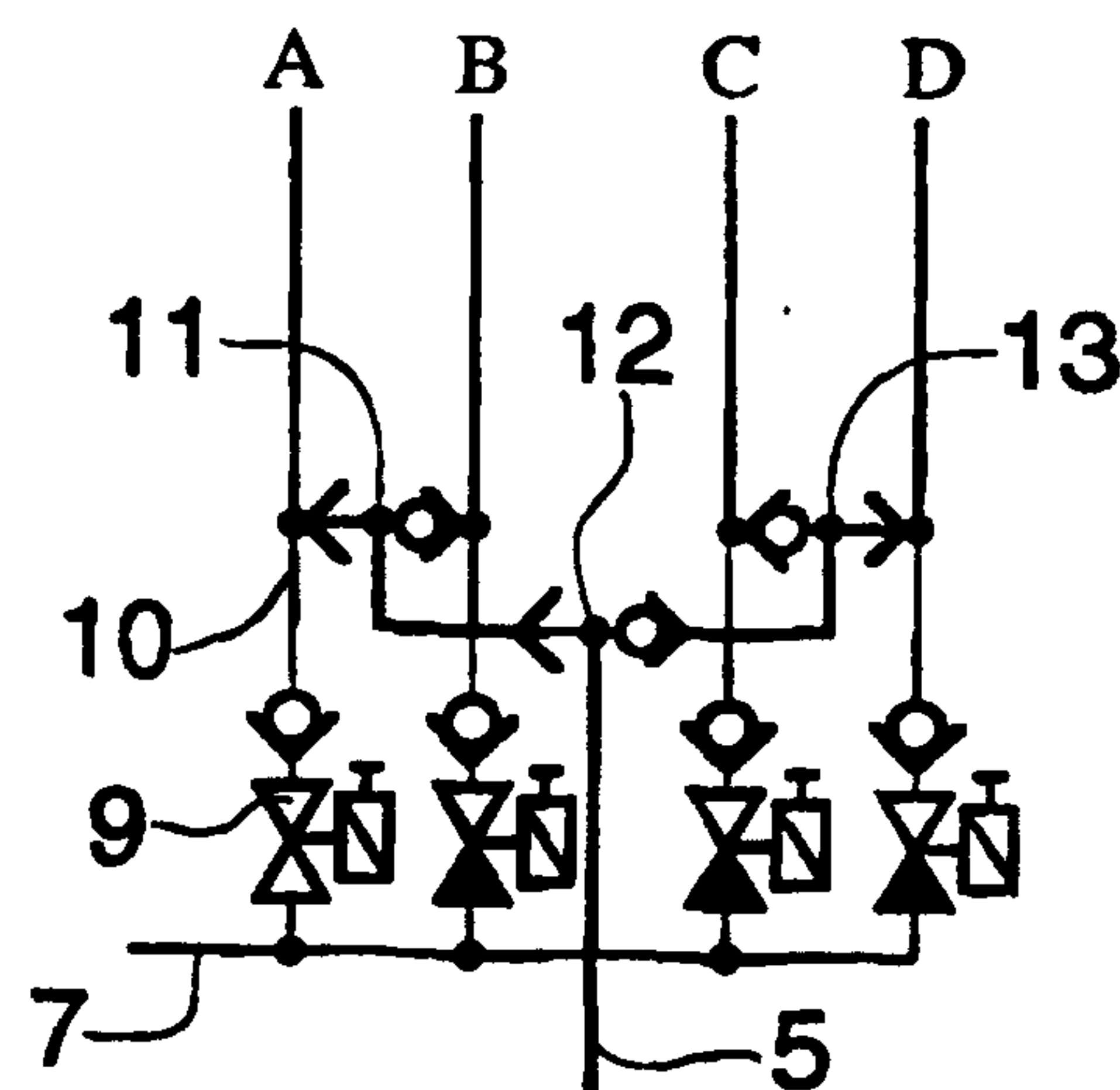


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>5</sup> :</b> <b>A62C 37/36, 35/00, 35/68</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 94/14502</b> <b>(43) International Publication Date:</b> 7 July 1994 (07.07.94)
<b>(21) International Application Number:</b> PCT/FI93/00546 <b>(22) International Filing Date:</b> 17 December 1993 (17.12.93)  <b>(30) Priority Data:</b> 925836                      22 December 1992 (22.12.92)      FI  <b>(71)(72) Applicant and Inventor:</b> SUNDHOLM, Göran [FI/FI]; Ilmari Kiannon kuja 3, FIN-04310 Tuusula (FI).  <b>(74) Agent:</b> VALROS, Frey; Marioff Ky, P.O. Box 25, FIN-01511 Vantaa (FI).		<b>(81) Designated States:</b> AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <div style="text-align: center;"><b>2151584</b> <b>Published</b> <i>With international search report.</i></div>

**(54) Title:** INSTALLATION FOR FIGHTING FIRE**(57) Abstract**

The invention relates to an installation comprising a high pressure drive unit for extinguishing liquid. When a fire has broken out in a fire section (A), a low pressure liquid source is connected (9, 10) to the respective fire section and the pressure of this liquid is utilized both for establishing a connection (11, 12) through a pilot valve means from the respective fire section to the outgoing line (5) of the high pressure drive unit, before this drive unit is activated, and for closing the connections from other fire sections to said outgoing line (5). The invention makes it possible to use cheap low pressure valves (9) in the pilot valve means.



## Installation for fighting fire

The present invention relates to an installation for fighting fire, comprising a drive unit for extinguishing liquid.

5 In the Finnish patent application 924752 is described an installation for fighting fire having as a drive unit e.g. a plurality of parallel hydraulic accumulators with an initial charge pressure of e.g. about 200 bar. Such an installation is well suited for  
10 fighting fire e.g. in an engine room of a ship. The engine room is usually divided into a number of separate fire sections or fire zones.

It is desirable to connect the drive unit of the fire fighting installation selectively to that  
15 particular fire section where a fire has started. High pressure guide or pilot valves are available for that purpose but they are unproportionally expensive.

The object of the invention is to provide, for an installation of the kind mentioned above, a new  
20 pilot valve means which is of a simple structure and thus is cheap.

The basic idea of the invention is that after an alarm signal has been received, but before actuating the drive unit of the fire fighting installation, the  
25 desired flow path is opened through the pilot valve means to connect the drive unit for extinguishing liquid to the respective fire section. Thanks to the invention it is possible to use simple and cheap pilot valves dimensioned for low pressure, or alternatively,  
30 small pilot valves intended for high pressure which likewise are cheap.

According to a preferred embodiment of the invention, liquid is in a first step delivered at a  
35 relatively low pressure, e.g. about 20 bar, in order to fill the lines leading to the respective fire



2151584

2

section with liquid and to cool the respective spray heads and nozzles before actuating the drive unit intended for high pressure liquid spraying, and by utilizing the said initial low pressure liquid the connection from the outgoing line of the drive unit is at the same time opened through the pilot valve means to the respective fire section. The said outgoing line is still closed at the drive unit during the initial step of combined low pressure spray and opening said connection through the pilot valve means, and thus it is possible to use pilot valves dimensioned for low pressure.

The initial spraying of low pressure liquid as well as establishing the connection from the respective fire section to the main drive unit of the installation can, alternatively, be accomplished by means of e.g. a hydraulic accumulator which can be charged to either a high pressure or a low pressure. If the accumulator is charged to a high pressure, the connection thereof to the respective outgoing fire section line is arranged through a small high pressure valve which passes a small flow of liquid. Instead of a separate hydraulic accumulator it is also possible to for this purpose use the main drive unit itself which preferably comprises a plurality of hydraulic accumulators coupled in parallel, whereat thus the drive unit at first is connected to the pilot valve means through a small high pressure valve in order to, before commencing the main extinguishing procedure, open such a connection from the respective fire section to the main drive unit that is capable of passing the whole liquid delivery capacity of the drive unit.

By a small high pressure valve, which acts as a pilot valve within the pilot valve means, is here meant a valve having a pass flow aperture diameter of

the order e.g. 2 mm. In comparison, if one were to actuate the drive unit directly at full power, the pilot valve means would require high pressure valves having a pass flow aperture diameter of about 40 mm.

5           It is essential to perform the establishment of the desired connection in the pilot valve means, intended for the main extinguishing process, by means of a small power, i.e. either by utilizing a low drive pressure, whereat the amount of liquid can be relatively great, although considerably  
10 smaller than the main flow during the main extinguishing process, or by utilizing a high pressure and a small amount of liquid.

          In one particular embodiment there is provided installation for fighting fire comprising a drive unit for  
15 extinguishing liquid including: a pressure source, a main feed line connected to said pressure source, and a pilot valve means, having outgoing lines to a plurality of fire sections connectable to said pressure source, for connecting said  
20 pressure source to one said outgoing line to one said fire section for opening a connection between said one fire section and said main feed line of said drive unit and closing connections between all other said fire sections and said main feed line of said drive unit.

          In the following the invention shall be described in more  
25 detail with reference to the attached drawings which, by way of example, shows preferable embodiments of the invention.

          Figure 1 shows a fire fighting installation in inactive state.

          Figure 2 illustrates the function of the pilot valve  
30 means when a fire has started.

          Figure 3 shows, as a partial longitudinal section, a practical embodiment of a pilot valve means in the state of figure 2.

3a

Figure 4 shows an embodiment utilizing high pressure guiding.

In figure 1 a drive unit for delivering high pressure extinguishing liquid in a fire fighting installation is generally indicated by the reference numeral 1. A pilot valve means leads from the drive unit 1 to four fire sections A, B, C and D. A liquid pump with an operating pressure of e.g. 15 to 20 bar is indicated by 2 and a high pressure liquid pump with an operating pressure of e.g. 200 bar is indicated by

2151584

4

3. The high pressure pump 3 is arranged to charge a plurality of hydraulic accumulators 4 which preferably are of a structure as described in the Finnish patent application 924752. The outgoing line of the drive unit 1 is indicated by 5 and a shut-off valve in the line 5 is indicated by 6. The valve 6 is usually open, as in figure 1.

Figure 1 shows the installation in inactive state of stand-by.

10 In figure 2, a fire has broken out in fire section A. The pump 2 has been activated to deliver liquid through its feed line 7 (alternatively, e.g. in case of electric power fall-out, initial pilot liquid can be delivered by a low pressure hydraulic accumulator 8), through the opened valve 9 and a subsequent back valve to the line 10 which leads to spray heads or sprinklers in the fire section A. The pressure in the line 10 moves a first change valve 11, positioned between the feed line to the fire section A and the feed line to the fire section B, from the position shown in figure 1 to the position shown in figure 2, and a second change valve 12 likewise from the position shown in figure 1 to the position shown in figure 2. The delivery of low pressure liquid to the fire section A thus opens the connection from the feed line 5 of the high pressure drive unit 1, when the hydraulic accumulators 4 are not yet activated, to the fire section A, while the connections from the feed line 5 of the drive unit 1 to the fire sections B, C and D are closed.

The high pressure unit 1 can now be activated at will. The valve 9, as well as the corresponding valves to the fire sections B, C and D, can be of a simple and cheap structure.

35 Between the feed lines to the fire sections C and D is provided a third change valve 13 which in the



present case has not moved. The positions of the change valves 12 and 13 in figure 1 indicate that the previous activation, e.g. in order to test the installation, has occurred in the fire section D which in figure 1 is in connection to the feed line 5 of the drive unit 1, while the connections to the fire sections A, B and C are closed.

The valve arrangement 11, 12, 13 can be of a simple structure. Figure 3 shows one embodiment where the change valves 11, 12 and 13 comprise a movable sleeve 21, 22 and 23, respectively, with one end closed. If desirable, the pilot valve means can without difficulty be extended to serve a larger number of fire sections, utilizing the same principle.

Figures 1-3 show a favourable embodiment of the invention. It is, however, possible to replace the low pressure valves 9 by small high pressure valves, whereat it for the initial low pressure liquid spraying and simultaneous establishing of the respective connection via the change valves 11, 12 and 13, respectively, is possible to use a hydraulic high pressure accumulator which is not shown in the drawing but which could replace the low pressure hydraulic accumulator 8 and be charged by the high pressure pump 3. The valves 11, 12 and 13 could in principle also be actuated by means of pressurized gas, if it is considered unnecessary to initially cool the nozzles and the spray heads and to fill the feed lines with liquid before the high pressure drive unit 1 is activated.

Alternatively, it is further possible to utilize the hydraulic high pressure accumulators for establishing a connection to a respective fire section. An example is shown in figure 4.

From the bottom region of a hydraulic accumulator 4 runs a pipe 30, preferably provided with

2151584

6

apertures in its wall, as presented in the Finnish patent application 924752, to a valve structure at the outlet end of the accumulator 4. From the pipe 30 leads a throttled connection 31 in a valve spindle 32, which is forced against the outlet end of the pipe 30 by a spring 33, to a narrow gap 34 between the spindle end of a manually operable valve 35 and the housing of the outlet valve structure. From the passage 34 there is a line 36 to a pilot valve means which in principle is of the same kind as the one shown in figures 1-3. The line 36 corresponds to the line 7 or to the feed line of the hydraulic low pressure accumulator 8 in figure 1, while the line 37 in figure 4 corresponds to the main feed line 5 in figure 1.

In figure 4 the installation is in a state of stand-by, whereat the pressure in the line 36 is the same as in the accumulator 4, via the connection 31-34. The line 36 can be filled with liquid but there is no liquid flow in the line 36, because the valves 9 to the fire sections A, B, C and D are all closed.

It shall again be assumed that there is a fire in the fire section A. Alarm results in that the respective valve 9 is opened and liquid flows from the line 36 to the section A and at the same time the valves 11 and 12 are moved to the positions of figure 2 in the same way as described earlier, establishing connection from the section A to the line 37. The pressure in the line 37 has access, via a groove 38 or the like formed in the valve spindle 32, to act on a face 39 of the spindle 32, in a direction against the spring 33, whereat the force effected by the pressure on said face 39 together with the force effected by the pressure in the accumulator 4, due to the pressure fall over the throttle 31, drive the valve spindle 32 upwards from the position shown in figure 4, so that there is a direct connection from the outlet of the

pipe 30 to the line 37, for full delivery of liquid to section A.

5 The embodiment shown in figure 4 can without difficulty be extended to comprise a plurality of hydraulic accumulators 4, e.g. as shown in figure 1. This embodiment has an additional advantage in that it is fully workable independently of electric power supply; the valve symbols in figure 4 indicate that the valves in first place are intended to be operated automatically, eg. electrically, with a possibility to be manually operated, as a reserve. With suitable dimensions for the throttles at 31 and 34 the valves 9 in figure 4 can be low pressure valves, like in figures 1-3, or alternatively high pressure valves with a small pass flow aperture.

15 The spray heads, including nozzles, of the installation, in the respective fire sections A, B, C and D can preferably be of such constructions that are presented e.g. i the international patent applications PCT/FI92/00060, PCT/FI92/00155 and PCT/FI92/00156.



**CLAIMS:**

1. Installation for fighting fire comprising a drive unit for extinguishing liquid including:

5 a pressure source,

a main feed line connected to said pressure source, and

a pilot valve means, having outgoing lines to a plurality of fire sections connectable to said pressure source, for connecting said pressure source to one said outgoing line to  
10 one said fire section for opening a connection between said one fire section and said main feed line of said drive unit and closing connections between all other said fire sections and said main feed line of said drive unit.

2. Installation according to claim 1, characterized in  
15 that the outgoing lines from the pilot valve means to the fire sections are interconnected pairwise by means of a change valve and that these change valves are interconnected pairwise by means of a change valve which is in direct or indirect connection to the outgoing main feed line of the drive unit.

20 3. Installation according to claim 2, characterized in that the change elements of the change valves are axially movable sleeves.

4. Installation according to claim 1, characterized in that said pressure source is a liquid source having a low  
25 operating pressure in relation to the operating pressure of the drive unit.

5. Installation according to claim 4, characterized in that the liquid source is connectable to a respective outgoing fire section line through a low pressure valve.

30 6. Installation according to claim 1, characterized in that said pressure source is a high pressure liquid source and that it is connectable to a respective outgoing fire section line through a high pressure valve.



7. Installation according to claim 6, characterized in that said high pressure liquid source is a hydraulic accumulator or the like, separate from the drive unit of the installation.

5 8. Installation according to claim 6, characterized in that said high pressure liquid source is the drive unit of the installation.

10 9. Installation according to claim 8, characterized in that an initial pilot liquid flow is made to pass through a throttle in a spindle an outlet valve of the high pressure liquid source and that the pressure in a main outgoing line of the liquid source, after establishing connection to a respective fire section, is arranged together with the pressure fall over said throttle, to drive said spindle to  
15 open direct connection from the liquid source to its main outgoing line.

20 10. Installation according to claim 9, characterized in that said pressure in the main outgoing line is arranged to act through a groove or the like on a face provided on said spindle.

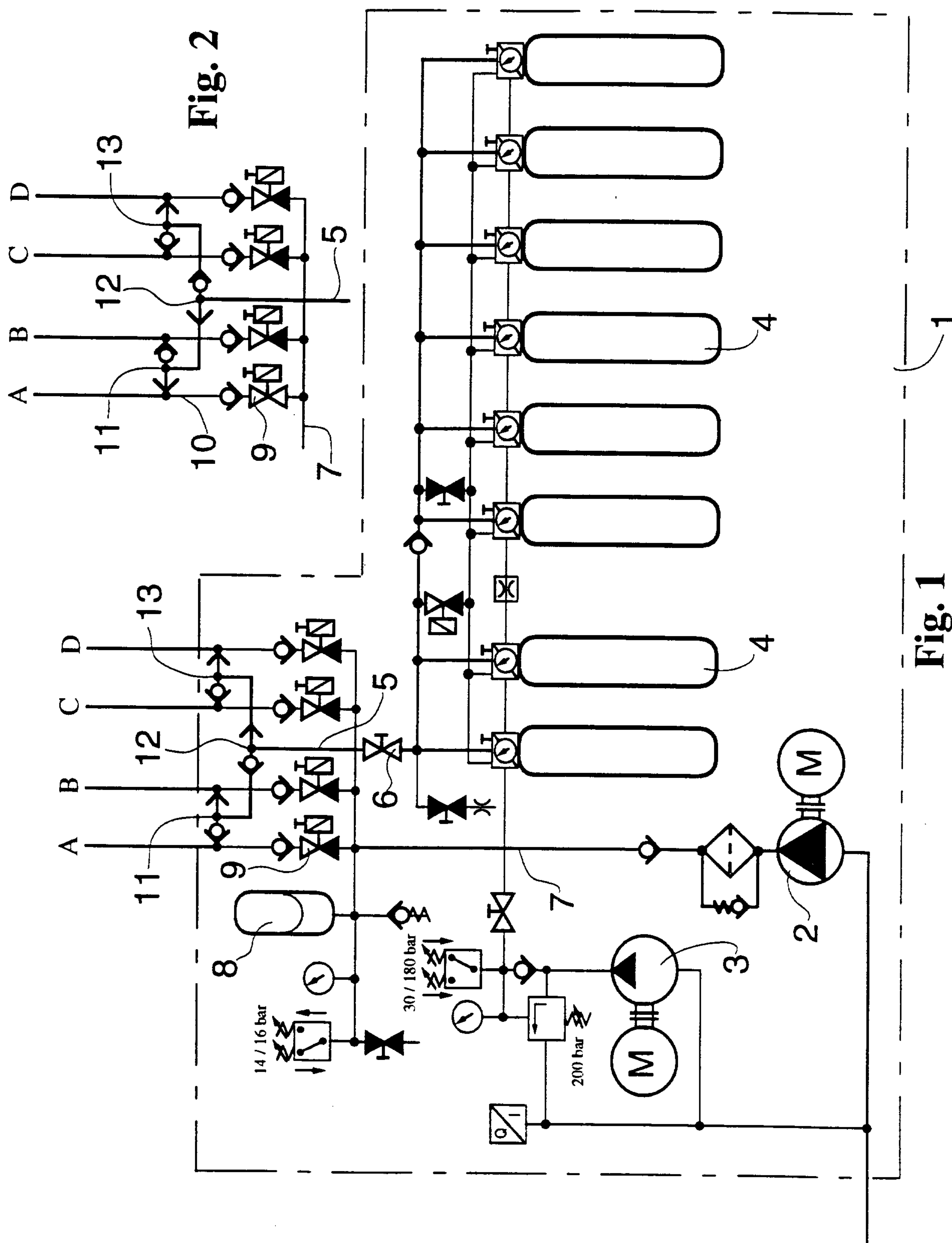


Fig. 1

Fig. 2

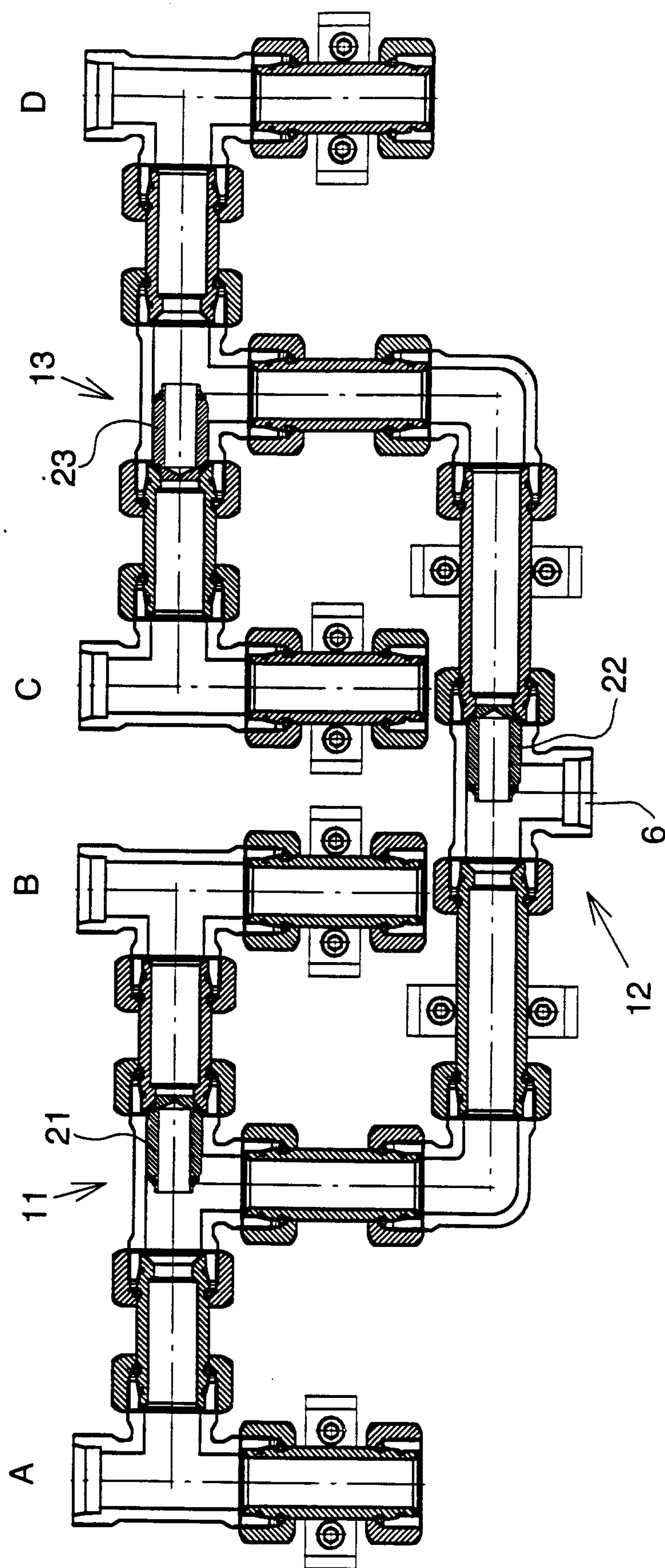
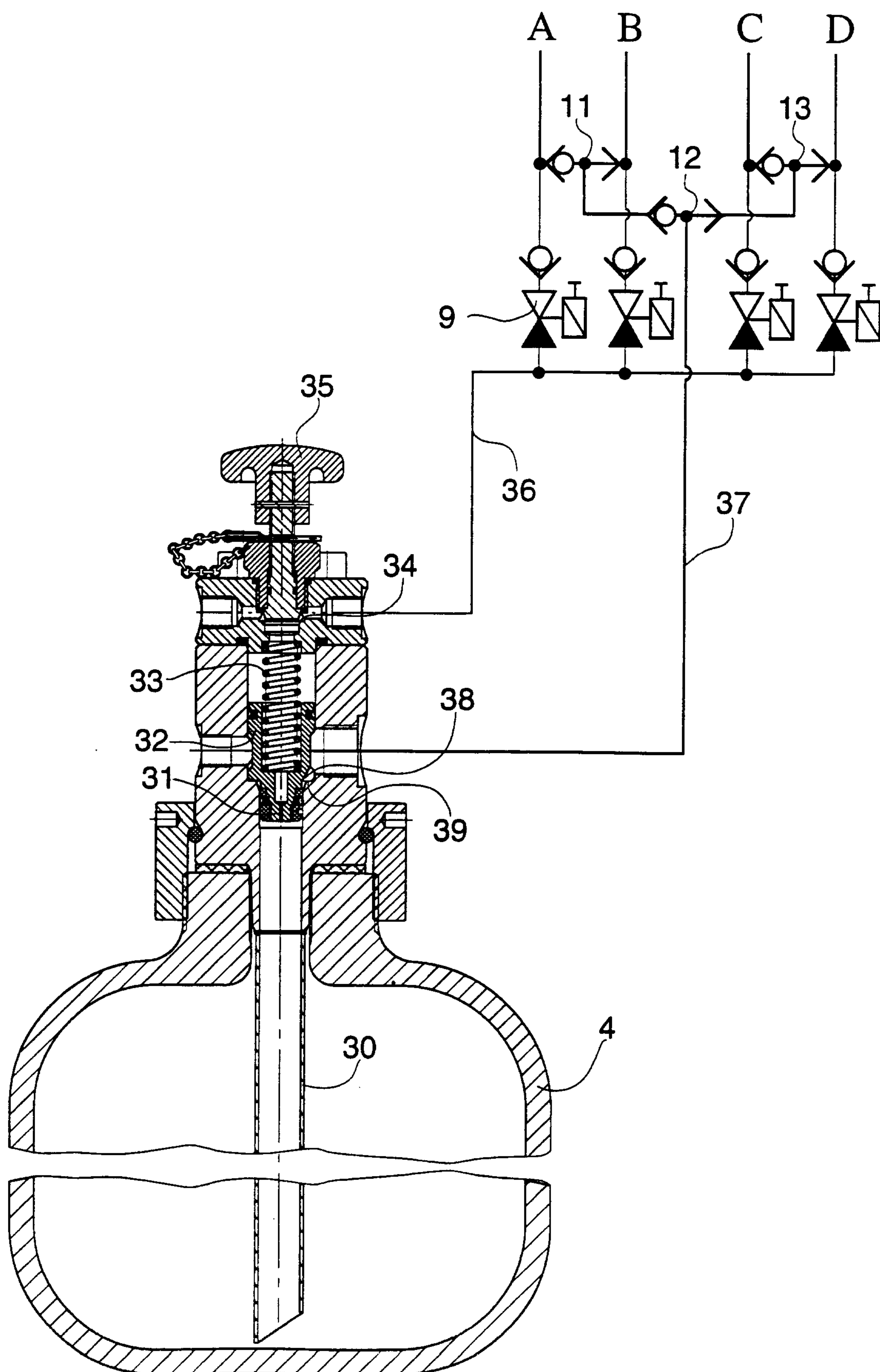


Fig. 3



**Fig. 4**



