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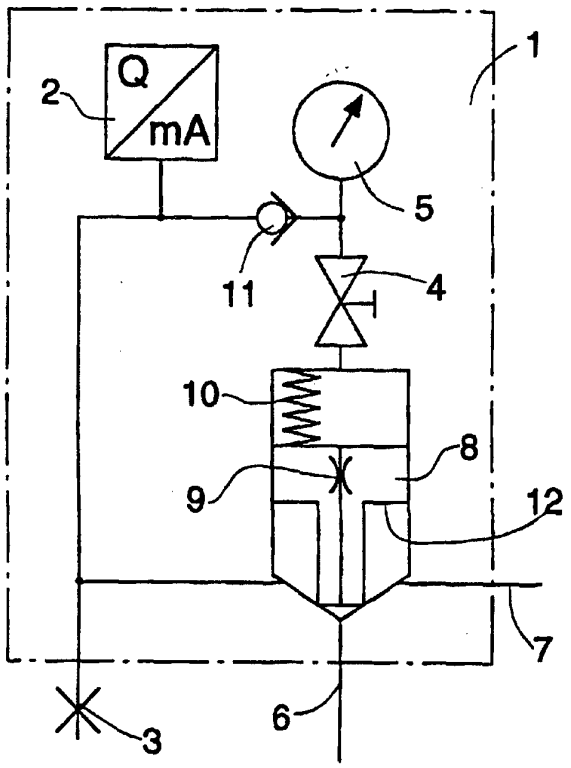
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(54) Title: VALVE

(57) Abstract

The object of the present invention is to provide a new valve for an installation for fighting fire, in particular for such an installation that operates at a high drive pressure. The valve comprises a spindle with an axial throttle (9) dimensioned in such a manner that the pressure fall over the throttle (9), at operating pressure, is sufficiently great to set the spindle in motion from a first position closing direct connection from the inlet (6) of the valve to its outlet towards a second position opening direct connection from the inlet (6) to the outlet (7). The new valve is reliable and of a simple construction.



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Valve

The present invention relates to a valve for an installation for fighting fire, in particular for such an installation that operates with a high drive pressure. The valve comprises a liquid inlet, a liquid outlet and a spindle movable between a first position, in which the spindle closes direct connection from the inlet to the outlet, and a second position, in which the spindle permits direct connection from the inlet to the outlet.

By a high drive or operating pressure is here generally meant a pressure in the range about 50 to about 300 bar, as compared to a drive pressure of generally no more than 10 bar in conventional sprinkler installations.

The object of the invention is to provide a new valve which is of a simple structure and thereby is cheap and which is reliable.

The valve according to the invention is mainly characterized in

that the spindle comprises a through throttle for providing a connection from the inlet via said throttle and an actuator unit, sensitive to a liquid flow, to the outlet, in said first position of the spindle,

that the spindle is forced by a spring into said first position, when the pressure is equal on both sides of the throttle of the spindle, and

that the throttle of the spindle is dimensioned in such a manner that the pressure fall over the throttle, at least by a liquid flow therethrough at the operating pressure of the fire fighting installation, is sufficiently great to set the spindle in motion from said first position towards said second position.

In a preferred embodiment of the invention, spindle further comprises a shoulder face upon which the liquid pressure of the inlet acts after the spindle has moved off its first position, in order to boost the spindle towards its second position.

Said actuator unit preferably comprises a sensor element reacting on change of temperature at stationary and flowing liquid, respectively, said sensor element being positioned in such a way that the flow passage past the element is narrow.

The invention shall in the following be described in more detail with reference to the attached drawing which, by way of example, shows a preferred embodiment.

Figure 1 shows a diagram of a valve according to the invention.

Figure 2 shows a longitudinal section of a preferred embodiment of the valve of figure 1.

Figure 3 shows an end view of a valve block with three valves.

In the drawing the valve is generally indicated by the reference numeral 1. The valve includes a preferably temperature sensitive actuator unit 2, which shall be described in detail later, a test connection 3 which is closed in the drawing, a shut off valve 4, which can be manually operated, and a manometer 5. An inlet liquid line to the valve from the drive unit of the fire fighting installation is indicated by 6 and an outlet line from the valve to at least one but preferably a plurality of spray heads or sprinklers is indicated by 7.

The valve 1 further comprises a movable spindle 8 which has a throttled through connection 9 and which is forced by a spring 10 into abutment against the inlet 6a of the valve when the valve is in a state of rest or stand-by as shown in figures 1 and 2.

In the state of stand-by of the valve the pressure in the inlet line can preferably be kept relatively low, e.g. about 15 bar. The connection from the inlet line 6 through the throttle 9, the chamber containing the spindle 8, including the spring 10, the valve 4, a back valve 11 and the actuator unit 2 to the outlet line 7 is under pressure, but since the spray heads connected to the outlet line 7 are inactive, i.e. closed, there is no liquid flow in this connection. The pressure is equal on both sides of the spindle 8 and the spindle is held by the spring 10 in the position shown in figures 1 and 2.

When one or several spray heads connected to the outlet line 7 are activated as a result of a fire in their respective action range, there occurs a small liquid flow through the said connection 6a-9-4-11-2-7. The actuator unit 2 is arranged to react upon this liquid flow to produce a signal for activating the drive unit of the fire fighting installation, e.g. a pump or a unit of hydraulic accumulators, to full operating pressure. As the full operating pressure is active in the inlet line 6, the pressure fall over the throttle 9 increases so much that the spindle 8 is driven off its position of stand-by, i.e. the spindle 8 is driven upwards in figure 1 and to the left in figure 2, and as soon as the spindle is off abutment against the inlet 6a of the valve, the pressure in the inlet line 6 acts on a shoulder face 12 provided on the spindle 8 and thereby rapidly drives the spindle to the opposite end position, with a direct open connection from the inlet line 6 to the outlet line 7.

When the fire has been extinguished, the valve 4 can be closed. The liquid flow through the connection 9-11-2 then stops and the same pressure will act on both sides of the spindle 8 whereat the spring 10 drives the spindle back to the position shown in

figures 1 and 2.

The actuator unit 2 preferably comprises a temperature sensitive element 13 which reacts by producing an actuating signal on the basis of that temperature change which occurs when the sensor element 13 is surrounded either by stationary liquid or by flowing liquid. This principle is known as such.

However, a novelty of the valve according to the invention is to arrange that amount of liquid which, stationary or flowing, respectively, surrounds the sensor element 13 to be considerably smaller than in known applications, whereby that mutual interaction between the liquid and the sensor element, which is required for obtaining a signal, is quickly achieved. In the valve according to the invention this is preferably obtained by positioning the sensor element 13 in such a way in a channel 14 that the flow passage past the sensor element 13 is narrow. Thus one obtains a desired quick activation to full operating pressure in the inlet line 6, and the sensor element can preferably also be utilized for disconnecting the operating pressure from the line 6 when the extinguishing procedure has been completed.

The valve 4 can be manually operated and is in open position in figure 2. When the valve 4 is in shut position, the gap 15 is closed.

As illustrated in figure 3, a plurality of valves can be joined to form a block with a common inlet line 6 and a common actuator unit 2. Each valve can serve a fire section of its own.

Claims

1. A valve for a fire fighting installation, in particular for an installation operating at a high pressure, the valve comprising a liquid inlet, a liquid outlet and a spindle movable between a first position, in which the spindle closes direct connection from the inlet to the outlet, and a second position, in which the spindle permits direct connection from the inlet to the outlet, characterized in

that the spindle (8) comprises a through throttle (9) for providing a connection from the inlet (6) via said throttle (9) and an actuator unit (2), sensitive to a liquid flow, to the outlet, in said first position of the spindle (8),

that the spindle (8) is forced by a spring into said first position, when the pressure is equal on both sides of the throttle (9) of the spindle, and

that the throttle (9) of the spindle is dimensioned in such a manner that the pressure fall over the throttle (9), at least by a liquid flow therethrough at the operating pressure of the fire fighting installation, is sufficiently great to set the spindle in motion from said first position towards said second position.

2. A valve according to claim 1, characterized in that the spindle (8) comprises a shoulder face (12) upon which the liquid pressure of the inlet (6) acts after the spindle (8) has moved off its first position, in order to boost the spindle towards its second position.

3. A valve according to claim 1, characterized in that a manually operable shut-off valve (4) is included in said connection (6-9-2-7).

4. A valve according to claim 1, characterized in that said actuator unit (2) comprises a sensor element (13) reacting on change of temperature at stationary and flowing liquid, respectively, said sensor element (13) being positioned in such a way that the flow passage past the element (13) is narrow.

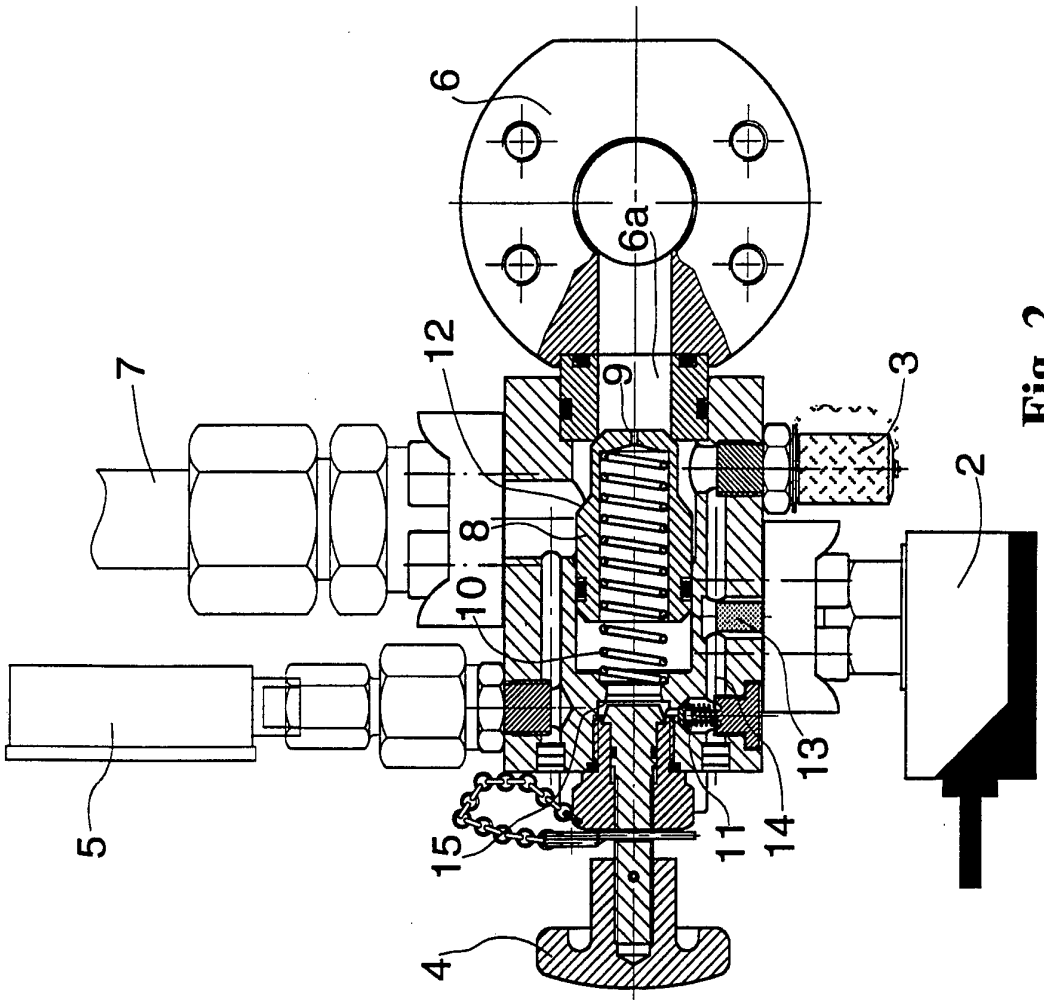


Fig. 2

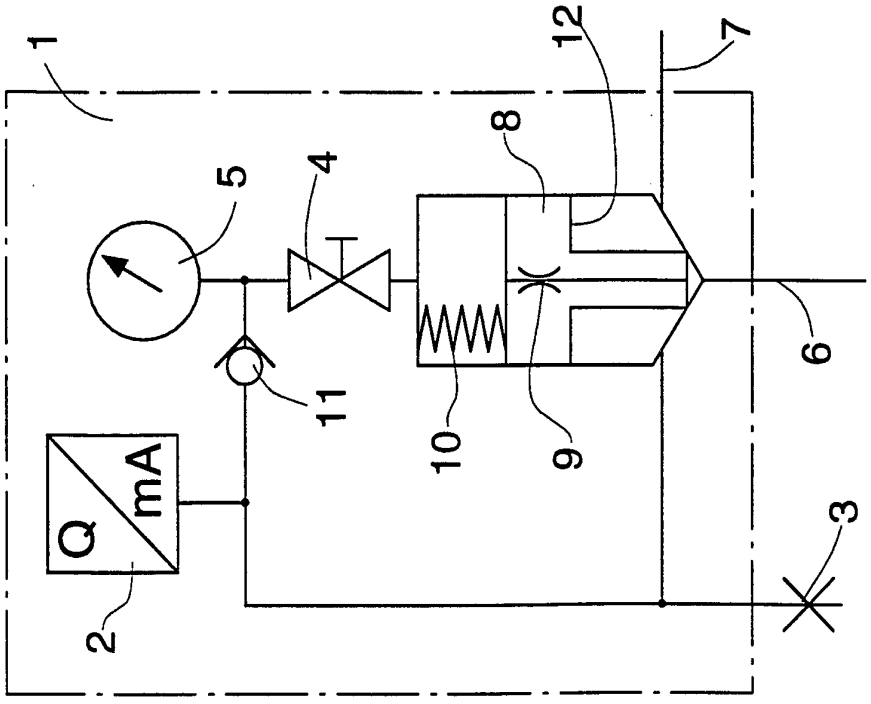


Fig. 1

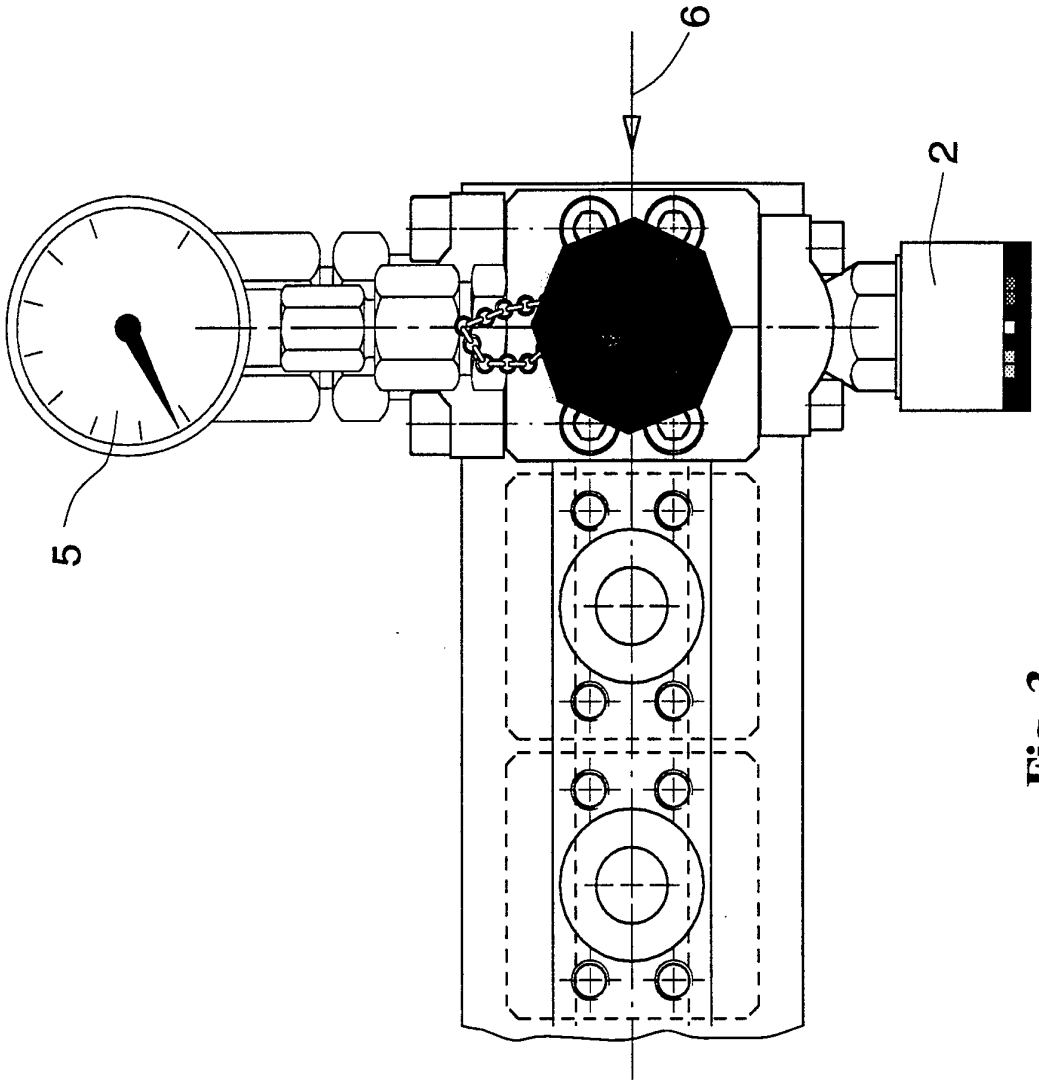


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 93/00547

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: A62C 35/68, F16K 31/122
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: A62C, F16K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SE, B, 414423 (DANSK INDUSTRI SYNDIKAT AS), 28 July 1980 (28.07.80), figures 1-3, claim 1	1-4
A	GB, A, 2161586 (TARGET ROCK CORPORATION), 15 January 1986 (15.01.86), figure 1, abstract	1
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

Information on patent family members

26/02/94

International application No.
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