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(54) **Valve especially for fire extinguishers.**

(57) A valve for use in a fire extinguisher comprises a body 2 accommodating a spindle assembly 6. The valve is released by applying pressure to the spindle assembly 6 which then allows extinguishant fluid to flow through the valve. The valve communicates with an open-ended bore 22 such that accidental release of the valve will not result in "kicking" to one side. A connecting member 26 fits tightly within bore 22 to provide controllable direction of fluid flow from the valve via the connecting member 26. The connecting member comprises two portions 28 answering, on their outer surfaces, to atmospheric pressure such that accidental release of the valve with the connecting member 26 within bore 22 does not result in the connecting member 26 being projected out of the bore 22.

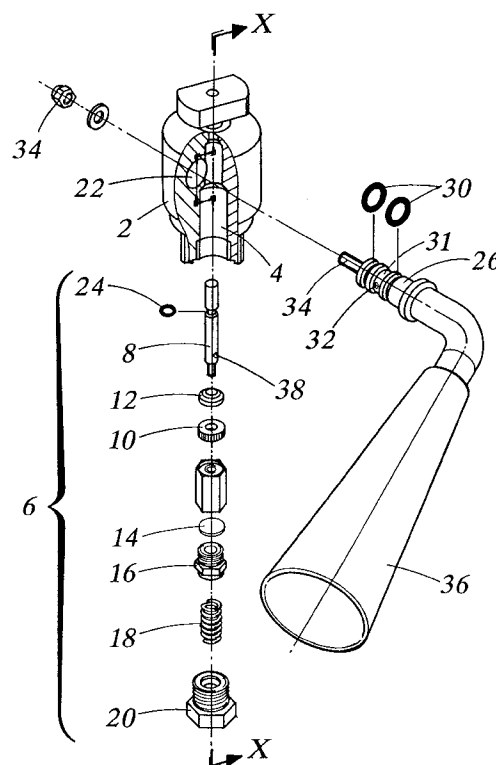


Fig.1

The present invention relates to an assembly for the controllable passage of fluid therethrough and has particular, although no exclusive, relevance to an assembly for use with fire extinguishers.

Conventional fire extinguishers generally comprise a cylindrical body containing the extinguishant material under pressure, and a valve portion which allows release of the extinguishant towards fire under manual operation. Such a fire extinguisher is disclosed, for example, in US patent number 4,862,968.

In this document there is described a fire extinguisher which possesses the cylindrical body and valve portion as outlined above. This document describes a fire extinguisher designed to be discarded after use. The fire extinguisher utilises a stop plate within the discharge mechanism which is intended to prevent accidental operation. On removal of the stop plate, the fire extinguisher is operated by applying pressure to the handle lever which engages with a valve portion. When the valve portion is urged into its "open" position, release of the extinguishant material is effected by virtue of this material being retained under pressure. This release occurs via a single nozzle which will be oriented such as to direct the extinguishant material toward the seat of a fire.

Alternative fire extinguishers are known which employ similar methods of operation to that above. One common style of fire extinguisher has a divergent horn section coupled to the nozzle in the valve portion via a screw thread. The purpose of the horn section is generally to provide a divergent stream of extinguishant material. This serves firstly to enable the operator to cover a wider area of the fire with the material, and secondly to reduce the impact energy of the material onto the seat of the fire. The latter provision will be appreciated because if, for example, the seat of the fire is a liquid, then an intense stream of extinguishant material striking the liquid may cause the liquid to splash and the fire to spread.

However, various shortcomings are manifest with the single-nozzle and horn section type fire extinguishers.

It is not uncommon for known fire extinguishers to be accidentally activated. This occurs even when the extinguisher possesses a safety feature, such as the above-mentioned stop plate. If accidental activation occurs in the case of the single-nozzle extinguisher or the alternative extinguisher to which the horn section has not been connected, then because there is only one exit for the extinguishant material which is retained under pressure, there will be a reaction to its release and this will tend to urge the whole extinguisher assembly in the opposite direction to that of the released material. If the material is held under pressure, and, therefore, also released under a relatively high pressure compared with that of the atmosphere, then this reaction could be substantial. Cases are known of this reaction causing broken

bones or other injuries to the unwary operator.

Furthermore, in the case of the horn section type extinguisher, if the horn section is not coupled fast to the valve portion, then if the extinguishant material is released under sufficient pressure, the coupling may become untenable and the horn assembly be projected dangerously rapidly away from the fire extinguisher.

It is thus an object of the present invention to at least alleviate the above shortcomings by providing an assembly for the controllable passage of fluid therethrough, comprising: a body portion defining a through-bore and; a pressure-releasable means disposed within the through-bore for enabling or preventing passage of fluid through the through-bore; characterised by a further bore having two open ends and which face in opposite directions arranged to communicate with the through-bore at a position between the two open ends; and a connecting member for axial engagement with the further bore, the connecting member defining first and second portions for engagement within the further bore, and further defining, between the first and second portions, a conduit for allowing the flow of fluid from the through-bore through the connecting member.

By provision of an open-ended further bore, reactive force on the assembly by the accidental release of fluid is obviated, because such release will occur in two opposing directions and so substantially no net reaction will take place. Furthermore, by provision of an open-ended further bore engaging with the connecting member in this way, those parts of the first and second portions of the connecting member not directly adjacent the conduit answer always to atmospheric pressure, and hence when fluid is released by the valve, the connecting member will not be subject to any net force likely to expel the connecting member from the open-ended bore; any pressure generated must dissipate via the conduit.

Preferably the connecting member determines the direction of fluid flow on exiting the valve assembly. Thus the connecting member may be arranged to form any suitable type of nozzle, such as a conical horn.

Preferably, the connecting member has formed, between the first and second portions, a recess in which the conduit is formed.

The present invention also provides a connecting member for use with such an assembly, the connecting member defining first and second portions for engagement within the further bore, and further defining, between the first and second portions, a conduit for allowing the flow of fluid from the through-bore through the connecting member.

The invention will not be described, by way of example only, with reference to the following drawings, of which:

Figure 1 shows an exploded perspective view of

an assembly in accordance with the present invention;

Figure 2 illustrates schematically a section along part of line X-X of Figure 1;

Figure 3 illustrates schematically a section of Figure 2 taken along Y-Y, and;

Figure 4 shows an alternative assembly arrangement to that shown in Figure 3.

The description of the present invention is herein made with reference to use of the invention in application to fire extinguishers. It will be appreciated by those skilled in the art that such an invention may find application in any suitable situation in which a fluid exists in an assembly under pressure.

Reference to Figure 1 illustrates that an assembly in accordance with the present invention includes a body portion 2. The body portion 2 is manufactured as a brass moulding, although any method of manufacture and suitable material may alternatively be employed. The criteria to be met by the body portion 2 is that it must be sufficiently sturdy to withstand operation under such pressure as is exerted by extinguishant fluid (not shown).

The body portion 2 defines a through-bore 4 within which is disposed a pressure-releasable means in this example a spindle valve shown generally as 6. The spindle valve 6 includes a spindle 8 communicating with a valve seal 10 via a washer 12. A bursting disc arrangement 14 is held in engagement with the spindle by a nut 16. When the spindle valve 6 is seated within the through-bore 4, it is held in resilient engagement therewith by spring 18 and spring retaining nut 20. The nut 20 and body portion 2 have threads provided to enable a locking engagement therebetween. Reference also to figures 2 and 3 illustrates more clearly the cooperation of spindle valve 6 with the body portion 2.

The lower end of the body portion 2, with which nut 20 engages, is arranged to form a threaded spigot onto which may be screwed a cylinder (not shown) containing fire extinguishant fluid under pressure. It will be apparent that both the force of spring 18 and the pressure exerted by the extinguishant fluid act to urge the spindle 8 in an upward direction as shown in the figures such that the seal 10 is in close contact with the inner wall of through-bore 4 such that the spindle valve 6 is "closed", that is no extinguishant fluid may flow through the through-bore 4.

To "open" the spindle valve 6, sufficient pressure must be exerted on the spindle 8 to cause the seal 10 and washer 12 to disengage from the inner wall of the through-bore 4.

When the spindle valve 6 is open, extinguishant fluid flows through the through-bore 4 past the seal 10 and into a further bore 22. Fluid is prevented from exiting the through-bore 4 at its top and by annular seal 24.

The bore 22 is an open bore which communicates

with the through-bore 4 at a position between the ends of the bore 22.

It will be appreciated that with the assembly in the "open" position, extinguishant fluid will flow via the through-bore 4 and further bore 22 and exit the assembly in two opposite directions, the effect of this being that the net reaction on the assembly caused by two equal and opposite discharges will be negligible. If, in the present example, the extinguishant fluid is chosen to be carbon dioxide in liquid and/or gas phase, then a vapour pressure of around 8.8×10^6 Pa is not uncommon at room temperature. It will be appreciated that if only one exit port were available for the escape of fluid, as is the case with hitherto known extinguishers, then a substantial reaction could be generated by the release of fluid. With a typical carbon dioxide fire extinguisher weighing in the order of 5kg when full, such reaction may easily cause physical harm to an unwary operator.

Referring now to figures 1-4, it will be seen that there is provided a connecting member, in this example, cylindrical discharge horn connector 26 arranged to fit within the bore 22 in axial engagement therewith. The connector 26 has first and second portions such as annular seats 28 which provide mountings for O-rings 30 such that when connector 26 is situated within the bore 22, the O-rings 30 form a tight seal between the periphery of both ends of connector 26 and the inner wall of bore 22. By forming the bore 22 and connector 26 in circular cross-section, the connector 26 is able to swivel about its axis within bore 22.

Connector 26 has formed within it and situated between annular seats 28 thereof a recess 31 in which is formed conduit, in this, example through-bore 32. The through-bore 32 is open-ended such that one end communicates with the through-bore 4 via bore 22 and the other end answers to atmospheric pressure.

It will be seen from the figures that when the connector 26 is positioned within bore 22 and the spindle valve 6 is "open", then fluid flows via the through-bore 4 into the recess 31. The fluid then flows via conduit 32 and exits the whole assembly.

Because on either side of the recess 31 and conduit 32 remote from the communication with through-bore 4, each of the annular seats 28 and O-rings 30 answers only to atmospheric pressure, shown particularly in figure 4, then it will be apparent that the connector 26 will have no net force acting thereon which would cause it to be expelled from bore 22. Whatever the pressure at which extinguishant fluid is caused to flow through the conduit 32, there will be no net force acting on connector 26 in either direction along its axis. Thus, unlike the hitherto known nozzle-type connections, operation of the current assembly may be safely effected without any securing of the connector 26 within bore 22.

However, as an added safety precaution, a lock-

ing assembly 34 is provided for the assembly, but it will be appreciated that should the locking assembly 34 become accidentally detached, safe operation of the assembly is possible. Any suitable locking engagement to hold connector 26 within bore 22 will be effective.

The direction of exit of the extinguishant fluid via the connector 26 may be governed by providing the end of the connector 26 remote from the bore 22 with a divergent conical horn 36.

With particular reference once more to figures 1 and 3, the aforementioned bursting disc arrangement 14 will be described in further detail. It will be appreciated by those skilled in the art that the purpose of such a bursting disc arrangement 14 is to provide a safety mechanism in any situation where material is held under increased pressure. In adverse conditions, such as greatly elevated temperatures, such material will tend to expand. However, because, as in the present example, the extinguishant material is contained within a cylinder (not shown), then it is possible that the cylinder could rupture or even explode. To avoid such a situation, a bursting disc arrangement 14 is employed such that the pressure of the contained extinguishant exceeds a predetermined amount, the disc ruptures and the extinguishant material escapes safely via the ruptured disc.

In the construction currently described, it is the location of the bursting disc arrangement 14 which is important. Unlike known bursting disc arrangements, the bursting disc arrangement 14 of the current construction is clamped between spindle 8 and nut 16, such that if the disc should rupture, the passage for the extinguishant material to exit the assembly is via spindle 8 and port 38 therein and hence on via bore 22. Thus it will be seen that by employing such a bursting disc arrangement 14 located as detailed in the drawings, the discharge of extinguishant both of a controlled and an uncontrolled nature occur via the same routes, i.e. bore 22.

It will be appreciated by those skilled in the art that the term "fluid" as utilised in the above description is apt to cover such materials as may be employed in any of the liquid, gas, powder and the like phases. The basic requirement for such materials is an ability to be fluent within the assembly.

It will be apparent to those skilled in the art that the aforementioned bursting disc arrangement 14 is included as a safety precaution. Any such assembly designed to operate under pressure advantageously includes such a safety feature.

Claims

1. An assembly for the controllable passage of fluid therethrough comprising: a body portion (2) defining a through-bore (4) and; a pressure releas-

able means (8) disposed within the through-bore (4) for enabling or preventing passage of fluid through the through-bore (4); characterised by a further bore (22) having two open ends which face in opposite directions and arranged to communicate with the through-bore (4) at a position between the two open ends; and a connecting member (26) arranged for axial engagement with the further bore (22), the connecting member (26) defining first and second portions (28,30) for engagement within the further bore (22), and further defining, between the first and second portions (28,30), a conduit (32) for allowing flow of fluid from the through-bore through the connecting member.

2. An assembly according to claim 1 wherein the connecting member (26) determines the direction of fluid flow on exiting the assembly.
3. An assembly according to either one of the preceding claims wherein the connecting member (26) includes a conical horn (36).
4. An assembly according to any one of the preceding claims wherein the connecting member (26) has formed, between the first and second portions (28,30), a recess (31) in which the conduit (32) is at least partially accommodated.
5. An assembly according to any one of the preceding claims wherein the pressure-releasable means (8) comprises a resilient valve.
6. An assembly according to any one of the preceding claims wherein the first and second portions (28,30) include annular seals (30).
7. An assembly according to any one of the preceding claims wherein the through-bore (4) and the further bore (22) lie along orthogonal axes and the position of communication therebetween is at a point of intersection of the said axes.
8. An assembly according to any one of the preceding claims further including a bursting disc (14) disposed within the through-bore (4) for enabling passage of fluid therethrough in dependence upon the disc (14) being ruptured under the pressure of said fluid.
9. A connecting member (26) for use with an assembly according to claim 1, the connecting member defining first and second portions (28,30) for engagement with the further bore (22), and further defining, between the first and second portions (28,30), a conduit (32) for allowing the flow of fluid from the through-bore (4) through the connect-

ing member (26).

- 10.** A connecting member (26) as claimed in claim 9 including a conical horn for determining the direction of fluid flow on exiting the assembly.

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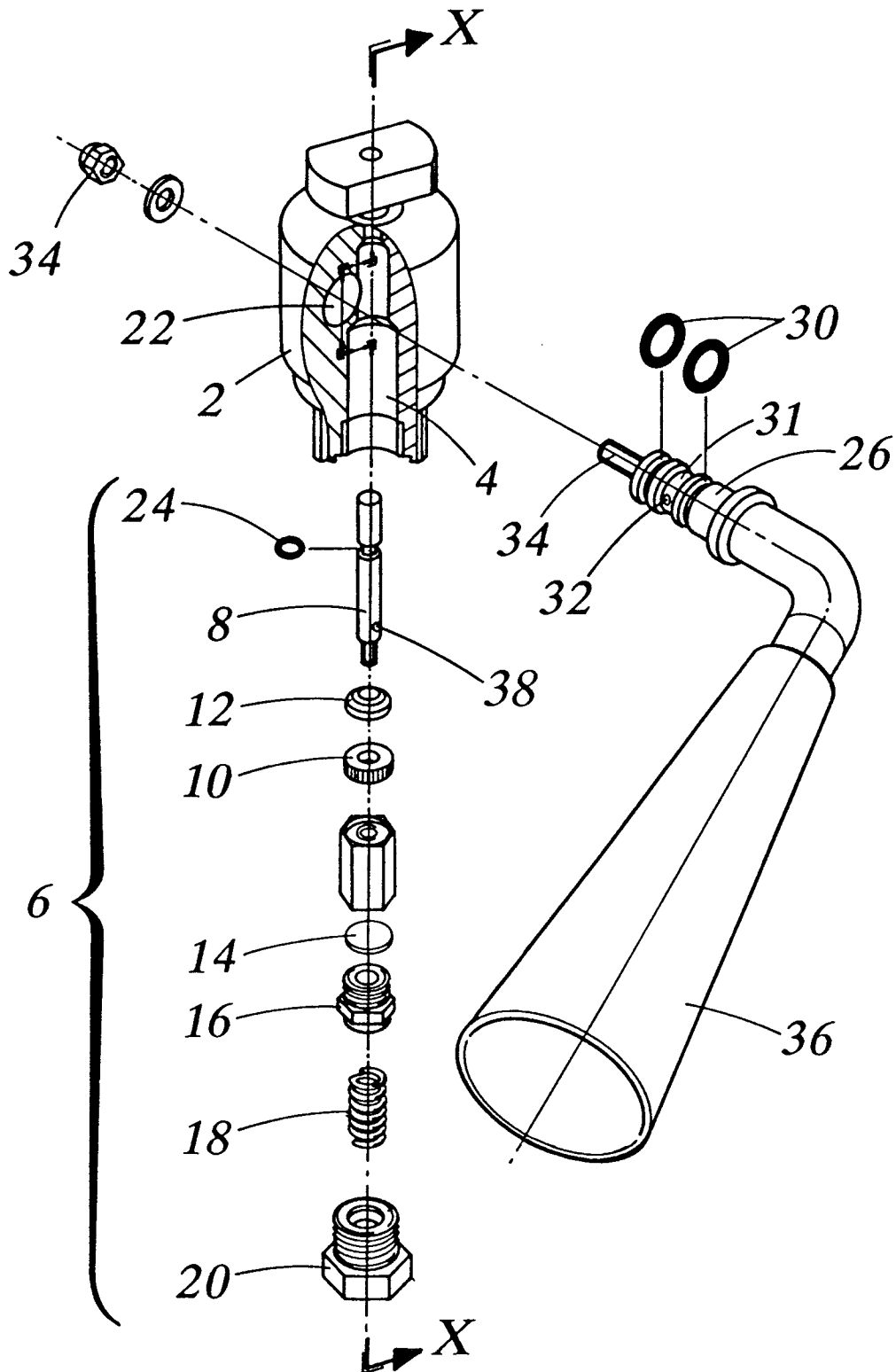
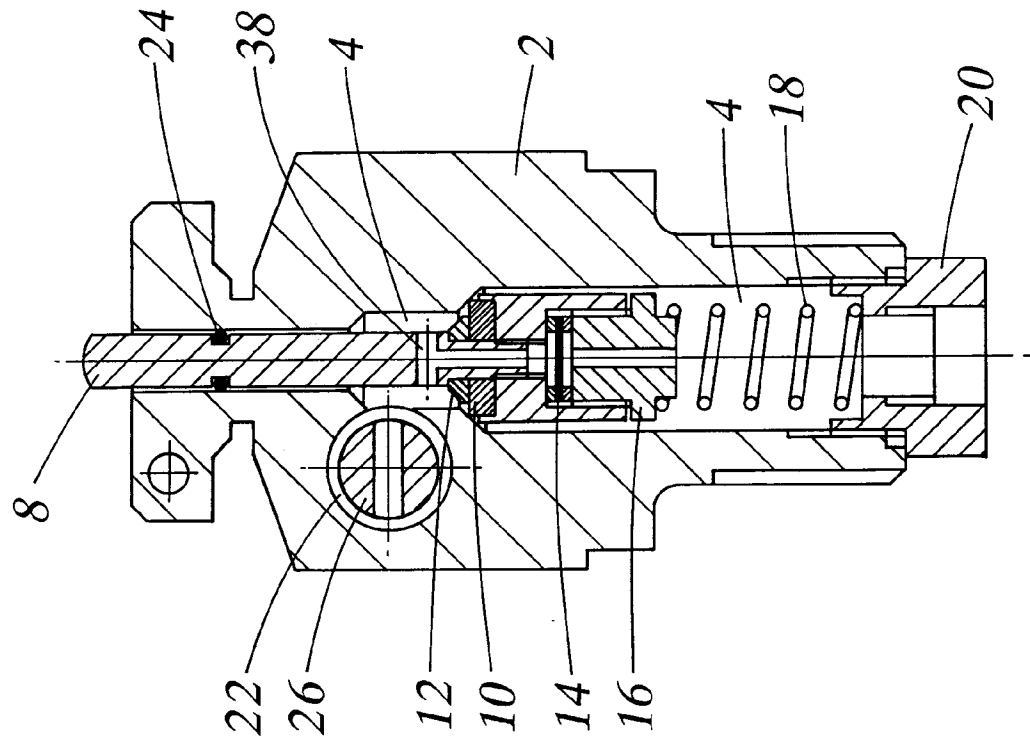
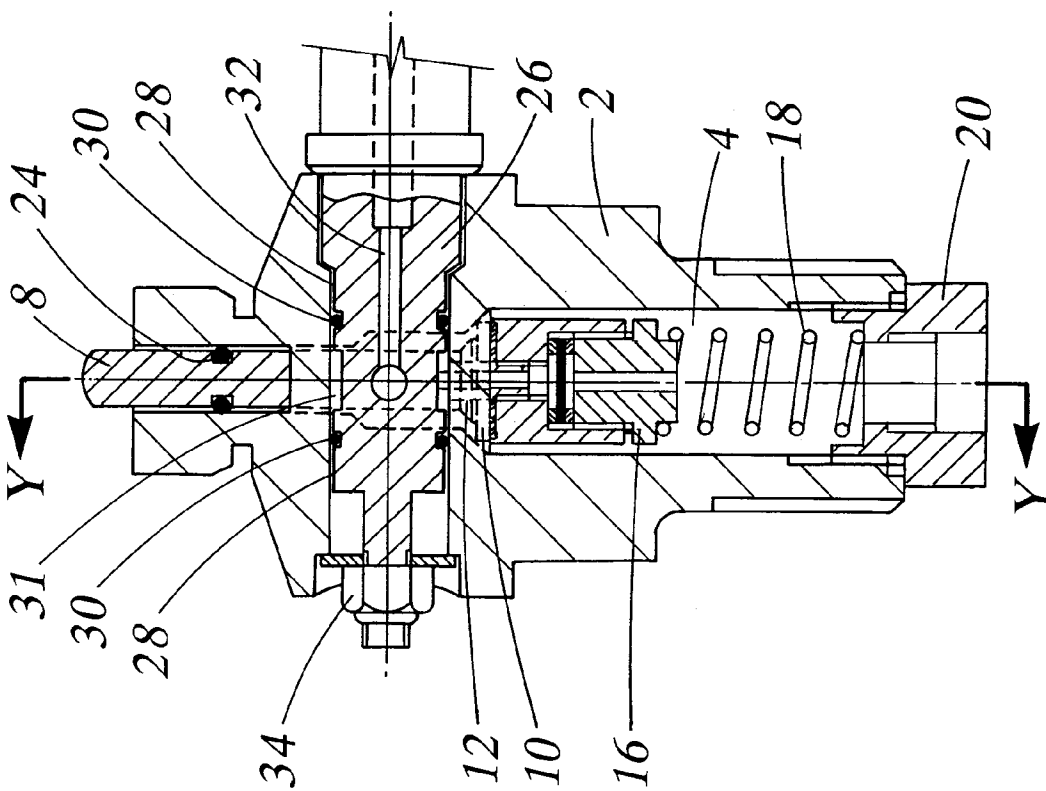


Fig.1



SECTION Y-Y

Fig. 3



SECTION X-X

Fig. 2

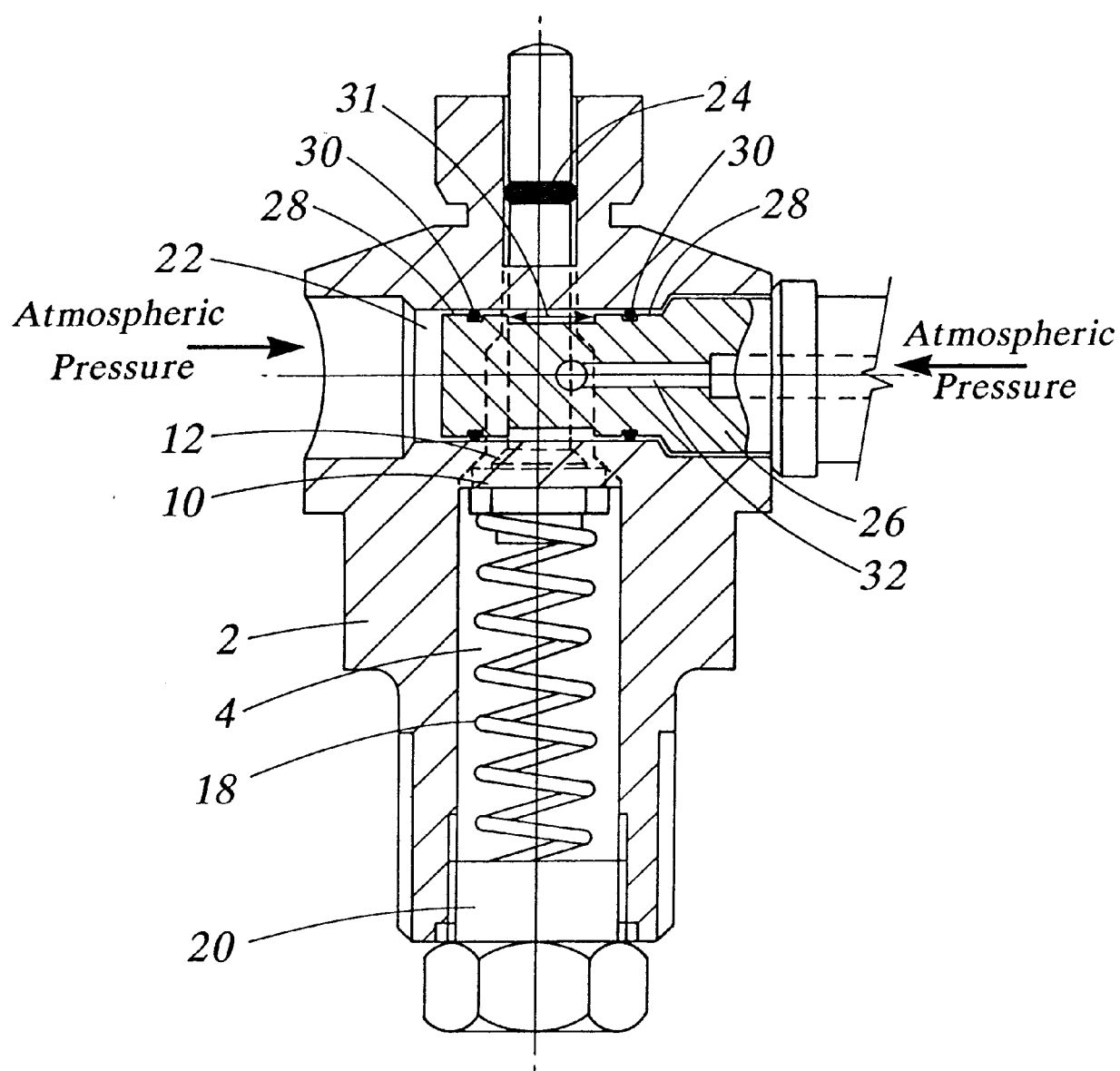


Fig. 4



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 93 30 0947

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	CH-A-444 204 (REYNOLDS TUBE COMPANY LTD) * column 1, line 34 - column 3, line 22; figures 1-3,5 *	1-3,5-7, 9,10	A62C13/64
X	US-A-3 389 753 (HOWARD) * column 2, line 18 - column 18; figures *	1-3,5-7, 9,10	
A	US-A-4 805 701 (MOUNTFORD) * column 3, line 60 - column 4, line 10; figures 2,3 *	1-6	
A	DE-U-8 621 035 (R. & G. SCHMÖLE METALLWERKE GMBH & CO) * page 5, paragraph 5 - page 6, last paragraph; figure 2 *	1,8	
A	GB-A-2 062 104 (THE COMMONWEALTH INDUSTRIAL GASES TTD) * page 1, line 51 - line 94; figure 1 *	1,8	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A62C F16K
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23 JUNE 1993	Examiner CHRISTENSEN J.T.
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