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(54) Improved by-pass valve for a fluid-supply group, in particular fuels

Verbessertes Umgehungs-Ventil für eine Flüssigkeitsabgabe-Vorrichtung, insbesondere für Kraftstoffe

Soupape de bypass améliorée pour dispositif de distribution de liquides, en particulier de carburants

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Description

The present invention relates to a by-pass valve according to the preamble of claim 1 for a fluid-supply group, in particular fuel, which, equipped with a ledging flange on the main shutter, which co-operates with the valve body, and a double auxiliary shutter reactivated by a spring which opens the shutter in correspondence with a certain pressure value lower than the operating value, permits the fluid to be recycled, with the supply pistol closed, at a pressure which is still lower than the operating pressure i.e. when the pistol is open, and also permits the supply to be blocked by recycling the whole fluid circulation in the presence of gaseous contents exceeding a preset limit, guaranteeing in the meantime that the hydraulic circuit of the supply group is always full of fluid even when the supply pump is deactivated.

As is known, a fuel-supply group generally consists of a supply pump which, activated by an electric motor, removes the fuel from the cistern by means of a filter and sends it to a centrifugal degasser from which the degassed fuel is sent, through a relief valve and relative volume measuring devices, to the supply pistol. In order to avoid, however, overpressures in the supply group when the supply pistol is closed, a by-pass valve is generally used, through which the degassed fuel is recycled by the suction of said pump to which a small quantity of fuel rich in gas, leaving the gas extraction pipe of said centrifugal degasser, is also sent, once it has been decanted from this gas in a reflux tank.

Now, as the accuracy of the volume measurement of the fluid or fuel supplied with this supply group is influenced by the percentage of gas or air contained in the fluid itself, it is clear that, if this percentage exceeds the degassing capacity of the centrifugal degasser, it will alter this measurement to an unacceptable degree. It is therefore necessary to be able to block the supply when the content of air or gas in the fuel to be supplied exceeds certain values.

Various devices for blocking the supply in the case of fluid or fuel with a high content of air or gas, are already known in the present art.

One of these known devices consists of an infra-red ray switch which is based on the different refraction index of the fuel with or without gas or air in the fuel itself. This device is very expensive however and also creates considerable complications with respect to construction and obstruction.

Another known device comprises a large degassing chamber with a vent into the atmosphere regulated by a floating device which is activated in the presence of certain percentages of gas or air. This latter device, apart from requiring extremely large and therefore large degassing chambers, is also quite inaccurate, especially with fuels having a high viscosity, and is also influenced by variations in the operating pressure.

A by-pass valve according to the preamble of claim 1 is known from US-A 3,715,863 where a pump/air separator apparatus for use in dispensing gasoline is dis-

closed which includes an air separator of the cyclone type in which air and a low percentage of gasoline are removed from the pressurized gasoline by the air separator, with the air being vented to the atmosphere and the gasoline being returned to the suction side of the pump.

The purpose of the present invention is to overcome the above drawbacks and consequently provide a device for blocking the supply in the presence of excess gas or air, which is economical, easy to construct and install and above all which not produces large obstructions.

This is achieved by the invention as defined in the claims with a double auxiliary shutter, operating between the hydraulic circuit after the centrifugal degasser and the suction pipe of the pump, which is reactivated by a spring which opens the shutter at a certain pressure value which is lower than the operating value with the supply pistol open.

In this way, in fact, when the presence of a harmful quantity of gas or air in the fuel reduces, during the supply, the pressure of said fuel, the above spring opens the double auxiliary shutter which thus by-passes the whole circulation of the suction pump by interrupting the supply. On the other hand the other shutter of this double auxiliary shutter, closed by the spring when the pump is deactivated, guarantees that the hydraulic circuit of the supply group is always full of fuel, as must be the case to avoid an irregular supply for the starting of the group.

According to another characteristic of the present invention, the main shutter of the by-pass valve is equipped with a ledging flange which co-operates with the valve body.

In this way, when the supply pistol is closed, owing to the greater active surface occupied by said flange, a pressure is created in the hydraulic circuit, which is always less than the operating pressure with the supply pistol open. This, as well as causing a lesser current absorption for activating the pump and also less stress on the pump organs, permits a reduction in noise during these functioning phases with the pistol closed.

In short, the by-pass valve for a fluid-supply group, in particular fuel-supply, comprising a hydraulic circuit wherein a supply pump, activated by a motor, removes the fuel from a cistern by means of a filter and sends it to a centrifugal degasser from which the degassed fuel is sent, through a relief valve and relative volume measuring devices, to a supply pistol, said by-pass valve consisting of a valve body within which a main shutter reactivated by a spring recycles the degassed fuel to the suction pipe of said pump, with the supply pistol closed, is characterized, according to the present invention, in that said main shutter is equipped with a ledging flange which co-operates with said valve body and a double auxiliary shutter activated by a spring opening said auxiliary shutter in correspondence with a certain pressure value of the fuel which is lower than that of the operating pressure with the pistol open, is activated

between the hydraulic circuit after the centrifugal degasser and suction pipe of said pump.

The invention can be better explained by referring to the enclosed drawings which illustrate a preferred embodiment and which are not however limiting, as technical and constructive variations can be made which are still included within the scope of the present invention. For example, the double auxiliary shutter, instead of being assembled inside the main shutter of the by-pass valve, can also be inserted inside the hydraulic circuit as an additional device at any point of the hydraulic circuit before said volume measuring devices.

In the following drawings:

Fig. 1 shows a schematic and partially sectional view of a fuel supply group under normal functioning, using a by-pass valve according to the present invention;

Fig.2 shows a partial sectional view and on an enlarged scale of the supply group of Fig.1 functioning in the presence of an excess of gas or air;

Fig.3 shows a partial sectional view of the by-pass valve of Fig.2 functioning when the pump is deactivated;

Fig.4 shows an analogous section of Fig.3 functioning with the supply pistol closed.

With reference to the Figures, 1 indicates the pump of the fluid supply group which, activated by a motor not shown in the figure, removes, through the suction pipe 2 and filter 3, the fuel 4 from the cistern 5 and sends it to a centrifugal degasser 6 which separates its liquid or degassed fuel phase 7 from the gaseous or air phase 8 by means of the gas extraction pipe 9. The small amount of fuel contained in said gaseous or air phase 8 is then decanted from the gas in a reflux tank 10 and recovered by sending it, through pipe 11, for suction by the pump 2. The degassed fuel 7 is on the other hand sent, through pipe 12, to a chamber 13 and, through the relief valve 14 whose shutter 15 is closed by the spring 16, the volume measuring device 17 and flexible pipe 18, to a supply pistol 19. Said chamber 13 is also connected to a by-pass valve 20 whose main shutter 21 is closed by a spring 22 and is opened only when the supply pistol 19 is closed and consequently the pressure in the chamber 13 becomes higher than the load produced by the spring 22.

The main shutter 21 is also equipped, on the external periphery and before the discharge channel 23, with a ledging flange 24 which co-operates with the valve body 25 of said by-pass valve 20. The main shutter 21 is also hollow and inside is a double auxiliary shutter 26 activated by a spring 27 which controls with its plate 28 the communication opening 29 between the chamber 13 and discharge channel 23, and with a second plate 30 the closing of said opening 29.

Fig. 1 illustrates the normal supply condition with the pistol open, with the main shutter 21 and plate 28 of

the double auxiliary shutter 26 both in a closed position: in this case all the degassed fuel 7 is sent to the supply pistol 19 through the relief valve 14 which is kept open by the pressure of the fuel itself.

Fig. 2 on the other hand illustrates the functioning of the by-pass valve 20 in the presence of an excess of air or gas in the fuel which, by causing a reduction in the pressure in the chamber 13, permits the plate 28 to be raised by the spring 27 with the consequent opening of the outlet 29 through which all the fuel 7 is recycled, also through the discharge channel 23, in pipe 11 to the suction of the pump 1: the relief valve 14 closes and the supply is therefore blocked by the pistol 19.

On the other hand, at the end of each fuel supply, with the consequent closing of the pistol 19, there is an increase in pressure in the chamber 13 which, as shown in Fig.3, causes the opening of the main shutter 21 of the by-pass valve 20 with the consequent discharge of all the fuel 7, through the slits 31 of the shutter itself and the discharge channel 23, into pipe 11 and subsequent recycling to the pump 1. During the opening of the shutter 21, the pressure of the fuel 7 in the chamber 32, acting against the greater surface of the flange 24, increases the opening, consequently reducing the pressure in the chamber 13 and subsequently the pressure of the fuel 7 itself.

Finally, when there is no supply and pump 1 is inoperative and pistol 19 is closed, the pressure in the chamber 13 becomes equal to the atmospheric pressure with the result that the relief valve closes; on the other hand, as shown in Fig. 4, the absence of pressure in the chamber 13 also causes, by means of spring 27, the closing of the outlet 29 with the plate 30 of the double auxiliary shutter 26: the partial emptying of the hydraulic circuit is thus avoided, which therefore always remains full of fuel even during the stand-by phase of the supply group, thus avoiding, as already mentioned, the distribution of a certain percentage of air or gas at the beginning of each supply.

Claims

1. By-pass valve (20) for a fluid-supply group, in particular fuel, comprising a hydraulic circuit wherein a supply pump (1), activated by a motor, removes the fuel (4) from a cistern (5) by means of a filter (3) and sends it to a centrifugal degasser (6) from which the degassed fuel (7) is sent, through a relief valve (14) and relative volume measuring devices (17), to a supply pistol (19), said by-pass valve (20) consisting of a valve body (25) within which a main shutter (21) activated by a spring (22) for recycling the degassed fuel (7) to the suction pipe (2) of said pump (1), with the supply pistol (19) closed, characterized in that said main shutter (21) is equipped with a ledging flange (24) which co-operates with said valve body (25) and an auxiliary shutter (26) activated by a spring (27) for opening said auxiliary shutter (26) in correspondence with a certain pres-

sure value of the fuel which is lower than that of the operating pressure with the pistol (19) open, for circulating fuel between the hydraulic circuit after the centrifugal degasser (6) and suction pipe (2) of said pump (1).

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2. By-pass valve (20) according to claim 1, characterized in that said auxiliary shutter (26) is situated outside the valve between the hydraulic circuit after the centrifugal degasser (6) and the suction pipe (2) of the pump. (1)

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Patentansprüche

1. Umgehungsventil (20) für eine Flüssigkeitszapfvorrichtung, insbesondere für Kraftstoff, mit einem Hydraulikkreis, in dem eine von einem Motor angetriebene Förderpumpe (1) den Kraftstoff (4) mittels eines Filters (3) aus einem Tank (5) entnimmt und einer Zentrifugal-Gasabscheidevorrichtung (6) zuleitet, von welcher der entgaste Kraftstoff (7) über ein Entlastungsventil (14) und eine Relativmengenmeßvorrichtung (17) einer Zapfpistole (19) zugeführt wird, wobei das Umgehungsventil (20) ein Ventilgehäuse (25) umfaßt, in dem ein von einer Feder (22) aktivierter Hauptverschluß (21) den entgasten Kraftstoff (7) bei geschlossener Zapfpistole (19) zum Ansaugrohr (2) der genannten Pumpe (1) zurückzuleiten vermag, dadurch gekennzeichnet, daß der Hauptverschluß (21) mit einem leistenartigen Flansch (24), der mit dem genannten Ventilgehäuse (25) zusammenwirkt, und einem Hilfsverschluß (26) versehen ist, der von einer Feder (27) zum Öffnen des Hilfsverschlusses (26) entsprechend einem bestimmten Druckwert des Kraftstoffs aktiviert wird, der niedriger ist als der des Betriebsdrucks bei geöffneter Pistole (19), um Kraftstoff zwischen dem Hydraulikkreis stromab von der Zentrifugal-Gasabscheidevorrichtung (6) und dem Ansaugrohr (2) der genannten Pumpe (1) zu leiten.
2. Umgehungsventil (20) nach Anspruch 1, dadurch gekennzeichnet, daß der genannte Hilfsverschluß (26) außerhalb des Ventils zwischen dem Hydraulikkreis stromab vom Zentrifugal-Gasabscheidevorrichtung (6) und dem Ansaugrohr (2) der Pumpe (1) angeordnet ist.

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Revendications

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1. Vanne de dérivation (20) pour un groupe de distribution de fluide, en particulier de carburant, comprenant un circuit hydraulique dans lequel une pompe de distribution (1) actionnée par un moteur extrait le carburant (4) d'une citerne (5) au moyen d'un filtre (3) et l'envoie à un dispositif de dégazage centrifuge (6) à partir duquel le carburant dégazé (7) est envoyé, à travers une vanne de décharge

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(14) et des dispositifs (17) de mesure de volume relatif, à un pistolet de distribution (19), ladite vanne de dérivation (20) consistant en un corps (25) de vanne à l'intérieur duquel se trouve un obturateur principal (21) actionné par un ressort (22) pour recycler le carburant dégazé (7) vers le tuyau d'aspiration (2) de ladite pompe (1), le pistolet de distribution (19) étant fermé, caractérisé en ce que ledit obturateur principal (21) est équipé d'un rebord formant saillie (24) qui coopère avec ledit corps (25) de vanne et un obturateur auxiliaire (26) actionné par un ressort (27) pour ouvrir ledit obturateur auxiliaire (26) en correspondance avec une certaine valeur de pression du carburant qui est inférieure à celle de la pression de fonctionnement avec le pistolet (19) ouvert pour faire circuler le carburant entre le circuit hydraulique après le dispositif de dégazage centrifuge (6) et le tube d'aspiration (2) de ladite pompe (1).

2. Vanne de dérivation (20) selon la revendication 1, caractérisé en ce que ledit obturateur auxiliaire (26) est situé à l'extérieur de la vanne entre le circuit hydraulique après le dispositif de dégazage centrifuge (6) et le tube d'aspiration (2) de la pompe (1).

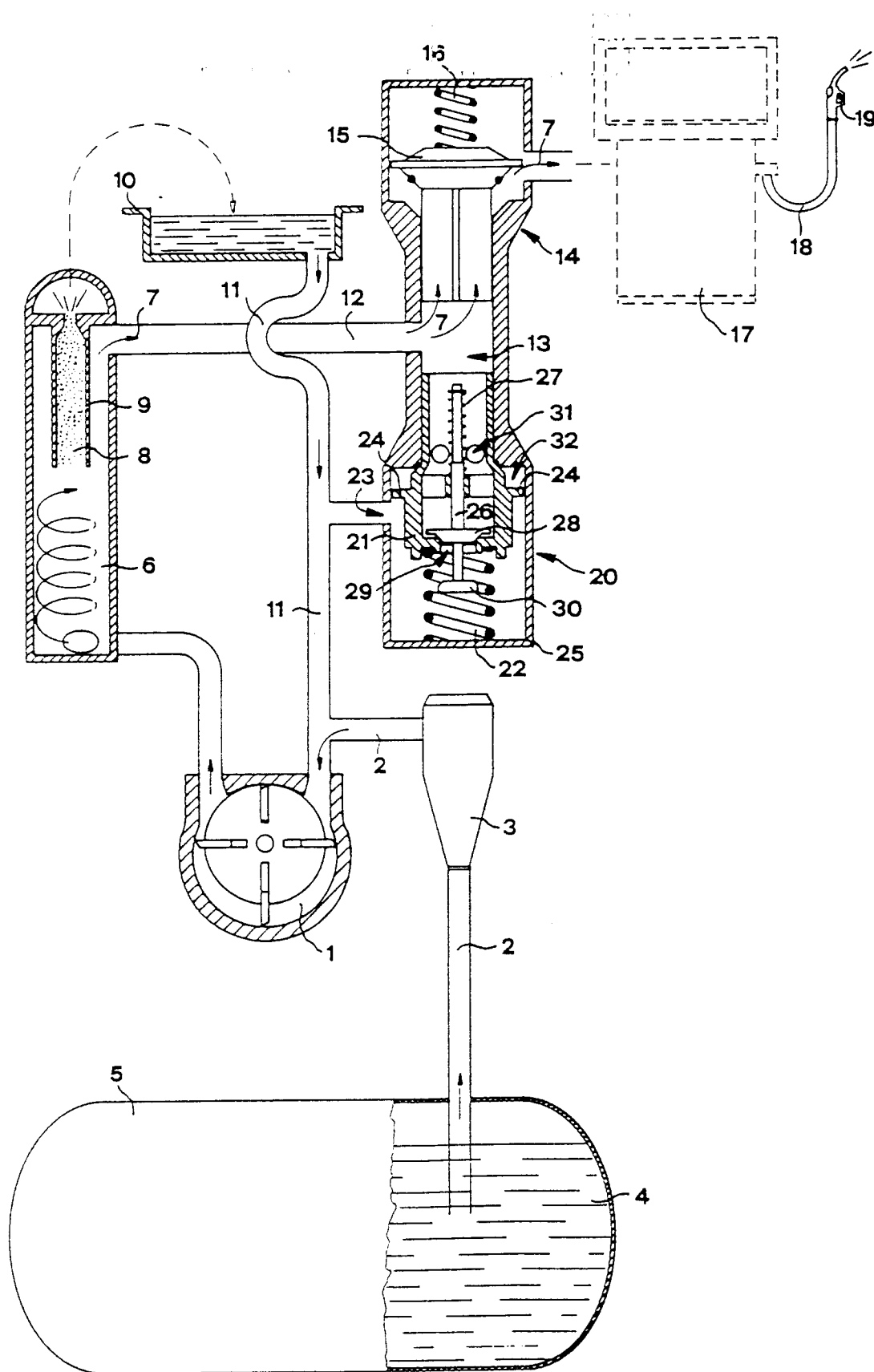


Fig. 1

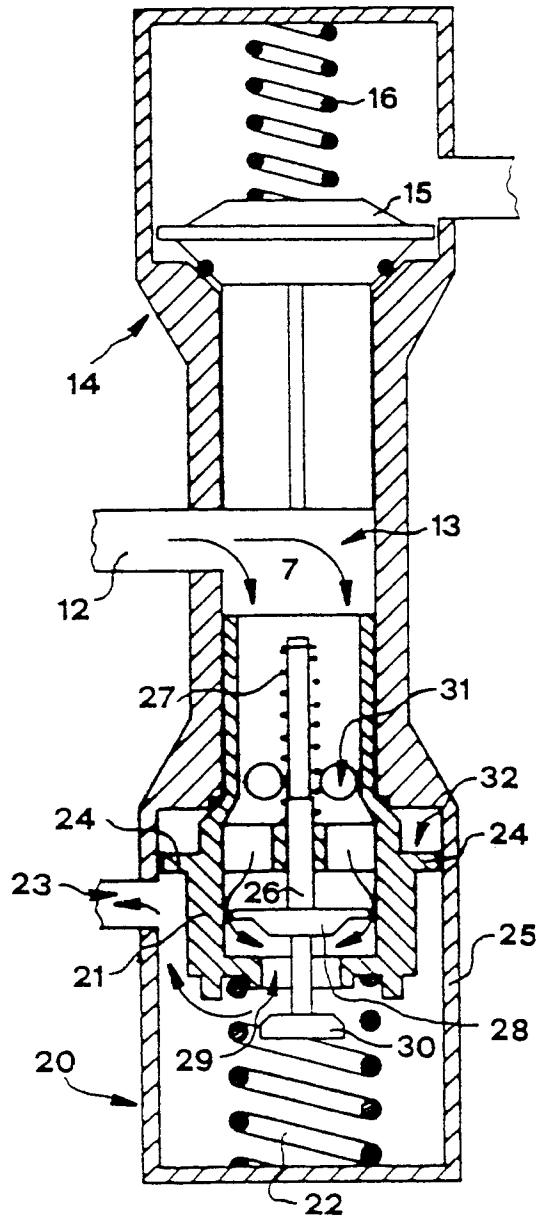


Fig. 2

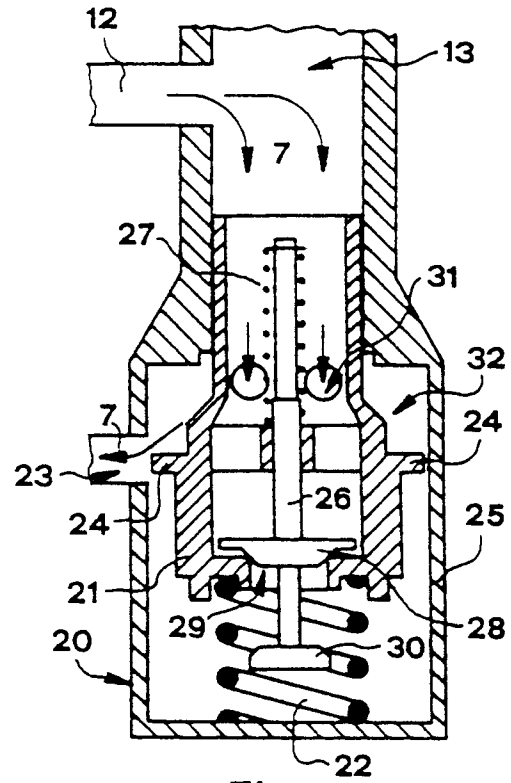


Fig. 3

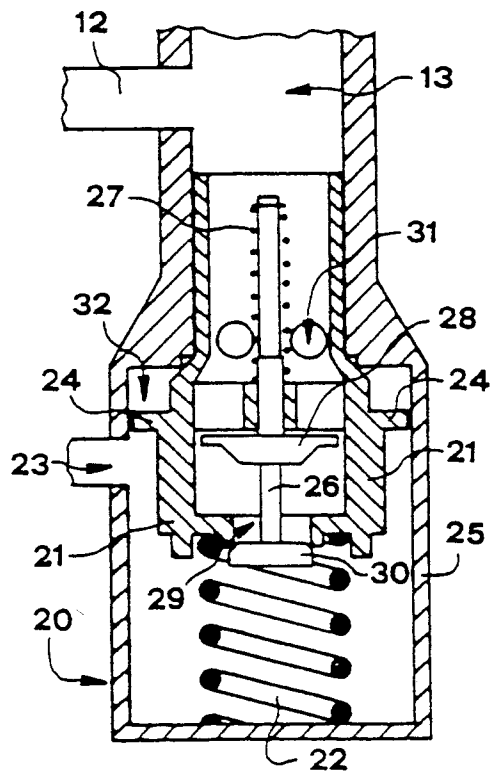


Fig. 4