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

(11) EP 0 960 278 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
19.11.2003 Bulletin 2003/47

(21) Application number: **98903060.6**

(22) Date of filing: **16.02.1998**

(51) Int Cl.[7]: **F15B 1/08**, F15B 1/24

(86) International application number:
PCT/FI98/00140

(87) International publication number:
WO 98/036174 (20.08.1998 Gazette 1998/33)

(54) **PRESSURE ACCUMULATOR**

DRUCKSPEICHER

ACCUMULATEUR HYDRAULIQUE

(84) Designated Contracting States:
AT DE DK ES FR GB IT NL SE

(30) Priority: **14.02.1997 FI 970621**

(43) Date of publication of application:
01.12.1999 Bulletin 1999/48

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Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The invention relates to a hydraulic accumulator for hydraulic systems.

[0002] In hydraulic systems used in vehicles, forest machines, sawing equipment and in a number of other mechanical devices, pressure shocks apperar, due to which components, structures and pipeworks in the system are subjected to hard stress. Mainly, these pressure schocks are caused by stroke-like impacts on hydraulic-driven mechanisms. Since the compression ratio of hydraulic oils is quite small and neither are there any other elasticities in the other system, it is advantageous to use a hydraulic accumulator in the pressure system which, properly dimensioned, takes all pressure peaks and, functioning this way, does not allow the pressure to rise too high in the system, and even the mechnical stress is smaller, so that the hydraulic systems themselves as well as mechanisms needing a hydraulic system can be made lighter in using a pressure accumulator in the hydraulic system.

[0003] The major disadvantage in present pressure accumulators is that several accumulators are needed in the hydraulic system, whereat the price of the system tends to become too high. Especially, on using double-acting cylinders and hydraulic turning gears two accumulators are needed, one for each direction of motion. The development of double-acting pressure accumulators has been obstructed by technical problems by filling the pressure chamber. Especially, the use of mass-produced ready-machined tubes has been problematic, since in order to get overpressure gas into place, needed between the pistons of a double-acting pressure accumulator, it has been a must to machine and weld the cylinder mantle in spite of the risk of deformation and, accordingly, problems of tightness.

[0004] By means of a pressure accumulator as per this invention a crucial improvement of the above presented disadvantages is achieved. In order to realize this, the pressure accumulator as per this invention is characterized in what is described in the introductory chapter of patent claim 1.

[0005] It can be considered the most important advantage of this invention that on using an accumulator as per this invention for a double-acting working cylinder and turning gears only one instead of two accumulators is needed. Due to this fact the system can be purchased at a lower price than before and less space is needed for one accumulator only, the size of space it takes is only a half of the previous volume. There are also less service spots in the system. Further, the weight of the system is smaller, which is of great importance especially for the hydraulic systems of lumber trucks thanks to saved weight and increased load capacity. An advantage of special significance is that in a pressure accumulator as per this invention a favourable ready-machined factory-made cylinder tube can be used that meets the highest demands and whose mantle must neither be machined nor welded, whereat the risk of tube deformation by machining or welding is avoided as well as the risk of leaks in the pressure accumulator.

[0006] In the following the invention is disclosed with reference to the enclosed drawing.

Fig. 1 is a schematic representation of a double-acting hydraulic cylinder 20 combined with pressure accumulator 21.
Fig. 2 is pressure accumulator 21 in resting position.
Fig. 3 is pressure accumulator 21 opened for gas fill.
Fig. 4 is pressure accumulator 21 in operating position so that from the left side of the accumulator illustrated in the figure working pressure is directed towards the accumulator.
Fig. 5 is pressure accumulator 21 in operating position so that from the right side of the accumulator illustrated in the figure working pressure is directed towards the accumulator.
Fig. 6 is pressure accumulator 21 in operating position so that from both sides of the accumulator illustrated in the figure working pressure is directed towards the accumulator.
Fig. 7 is a pressure accumulator in the end of which there is a combination of a service and pressure connection.
Fig. 8 is a pressure accumulator in the end of which the service connection and the pressure connection are separated.

[0007] Figure 1 shows a double-acting hydraulic cylinder 20 the pressure connections 22 and 23 corresponding to its working motions in two directions. Accordingly, to these connections the pressure connections 4 and 10 of the double-acting pressure accumulator 21 are connected. When working pressure enters either of the hydraulic cylinder 20 pressure connections 22 or 23, the same pressure is directected towards pressure connections 4 or 10 in the pressure accumulator and further to pressure chamber 11 or 12 in the pressure accumulator. When there are pressure shocks on either side of the hydraulic cylinder, the pressure accumulator 21 will take the shocks absorbing them by yielding due to the spring effect of the accumulator. The spring effect of the accumulator is produced in filling the pressure chamber 13 with pressurized gas.

[0008] Figure 2 shows schematically the pressure accumulator 21, where it has two separate end chambers 11 and 12. The pressure of the hydraulic system is conveyed to these end chambers from two different spots in the system. Pressure chamber 13 contains high-pressure gas. Pressure chamber 13 is separated from end chambers 11 and 12 by pistons 2 and 5 which are fitted with pressure packings 3 and 6. Piston 5 has a hole 14 running throuhg the piston and joining pressure chamber 13 and pressure chamber 12 together. Into hole 14 the gas filling tube 9 and valve 8 are fitted, through which pressure chamber 13 is filled with pressure gas. End

part 7 of pressure accumulator 21 is detachable for filling.

[0009] Figure 3 shows schematically the pressure accumulator 21, where the end part, illustrated in figure 2, has been detached for refill of pressure chamber 13 with pressurized gas. For gas refill the gas hose of the filling equipment is connected to filling tube 9. Valve 8 is then opened and a proper quantity of gas is let in into chamber 13 and then valve 8 is closed and the end part 7 as per fig. 2 reassembled.

[0010] Figure 4 shows schematically the pressure accumulator 21 so that in a hydraulic system furnished with pressure accumulator 21, pressure prevails in that part of the system which is connected to end chamber 12 of pressure accumulator 21. Due to pressure piston 5 has moved towards pressure chamber 13 making the gas in the pressure chamber to compress and the pressure to rise further. Due to the spring effect of compressed gas in pressure chamber 13 the hydraulic fluid pressure variations will be received in a favourable way so that the impacts of the shocks get effectively softened and absorbed.

[0011] Figure 5 shows schematically the pressure accumulator 21 so that in a hydraulic system furnished with pressure accumulator 21, pressure prevails in that part of the system which is connected to the end chamber 11 of pressure accumulator 21. Due to pressure the piston 2 has moved towards pressure chamber 13 making the gas in the pressure chamber to compress and the pressure to rise further. Due to the spring effect of compressed gas in pressure chamber 13 the hydraulic fluid pressure variations will be received in a favourable way so that the impacts of the shocks get effectively softened and absorbed.

[0012] Figure 6 shows schematically the pressure accumulator 21 so that in any hydraulic system furnished with pressure accumulator 21, pressure prevails in both the system parts whhich are connected to end chamber 11 and 12 of pressure accumulator 21. Due to the pressure piston 2 and piston 5 have moved towards pressure chamber 13 making the gas in the pressure chamber to compress and the pressure to rise further. Due to the spring effect of compressed gas in pressure chamber 13 the hydraulic fluid pressure variations will be received in a favourable way so that the impacts of the shocks get effectively softened and absorbed.

[0013] In figure 7 the end part 7 of the illustrated pressure accumulator 21 is furnished with a closing, leak-proof acces hole 16, through which service of the accumulator can be carried out, its function checked and pressure chamber 13 refilled without detaching end part 7 and the pressure pipes. End part 7 is fixed to the end of a tubular pressure connection 10 and the real pressure joint 17 arranged in the side face of this pressure connection 10.

[0014] In figure 8 the closing access hole 16 and the pressure connection are fixed separately from each other in the end part 7 of the illustrated pressure accumulator 21.

[0015] Especially, it is worth noting that a pressure accumulator according to this invention can be accomplished as a piston accumulator as well as a membran accumulator. Instead of the double-acting accumulator presented in the introductory chapter, the accumulator can be a multifunction unit. Anyhow, it is worth noting that the above presentation of the invention is made with reference to only one of its advantageous embodiments. It is by no means meant to confine the invention to this design only but several modifications are possible within the inventional concept determined in the following patent claims.

Claims

1. A multifunction pressure accumulator (21) comprised of a pressure-proof reservoir having at least two hydraulic pressure connections (4,10) and at least two leak-proof partition walls (2),(5) moving or flexing due to hydraulic pressures conveyed to the reservoir and a pressure chamber (13) formed by means of said partition walls and filled with gas, whereby for refilling of the gas pressure chamber (13) a gas filling channel (14) is equipped with a valve (8) and is taken to the pressure chamber side at least through one partition wall, and whereby the accumulator (21) reservoir body (7) comprises an access hole (16) through which the pressure in the chamber (13) can be measured and the gas filling to said chamber can be carried out along the channel (14) running through the partition wall.

2. An accumulator according to claim 1 **characterized in that** an end part (7) of the accumulator's reservoir comprises separately the access hole (16) and a pressure hole (17).

3. An accumulator according to claim 1 and 2 **characterized in that** an end part (7) of the reservoir can be detached from the reservoir body (15).

Patentansprüche

1. Ein Drucksammler (21) für mehrere Zwecke bestehend aus einem druckbeständigen Behälter, versehen mit wenigstens zwei Anschlüssen (4,10) für den hydraulischen Druck, und wenigstens von zwei dichten, durch Wirkung der aus dem Behälter übertragenen hydraulischen Drücken beweglichen oder elastischen Zwischenwänden (2,(5), und von einem, mit Hilfe der erwähnten Wänden geformten und mit Gas gefüllten Druckkammer (13), wobei, um Gas nachzufüllen, der Druckkammer einen Nachfüllungskanal (14) hat, der mit einem Ventil (8) versehen und wenigsten durch einer Zwischen-

wand auf die Seite des Druckammers genommen ist, und wobei der Behälterkörper (7) des Drucksammlers (21) eine Zugangsöffnung hat, durch die der Druck im Kammer (13) gemessen werden kann, und Nachfüllen vom Gas in den erwähnten Kammer entlang dem, durch die Zwischenwand laufenden Kanal (14) geschehen kann.

2. Ein Drucksammler gemäss Patentanspruch 1 **gekennzeichnet dadurch, dass** ein Teil am Ende des Drucksammlerbehälters gesondert mit Zugangsöffnung (16) und mit einer Drucköffnung (17) versehen ist.

3. Ein Drucksammler gemäss Patentanspruch 1 und 2 **gekennzeichnet et dadurch, dass** ein Endteil (7) des Behälters vom Behälterkörper (15) losgemacht werden kann.

Revendications

1. Un accumulateur de pression (21) multifonctions comprenant un réservoir résistant à la pression muni d'au moins deux raccords pression hydrauliques (4; 10) et d'au moins deux parois de séparation étanches (2), (5), mobiles ou flexibles sous l'influence des pressions hydrauliques véhiculées vers le réservoir, et une chambre de pression (13) formée au moyen desdites parois de séparation et remplie de gaz, où, dans le but de recharger la chambre de pression (13), une conduite de remplissage de gaz (14) est munie d'une soupape (8) et amenée du côté de la chambre de pression au moins à travers l'une des parois de séparation, et où un trou d'accès (16) a été prévu dans le corps (7) du réservoir de l'accumulateur (21) permettant de mesurer la pression dans la chambre (13) et d'effectuer le remplissage en gaz de ladite chambre le long la conduite (14) traversant la paroi de séparation.

2. Un accumulateur selon la revendication 1, **caractérisé en ce qu'**une extrémité (7) du réservoir de l'accumulateur comprend et un trou d'accès (16) et un trou pour mesurer la pression (17).

3. Un accumulateur selon les revendications 1 et 2, **caractérisé en ce qu'**une extrémité (7) du réservoir peut être détâchée du corps du réservoir (15).

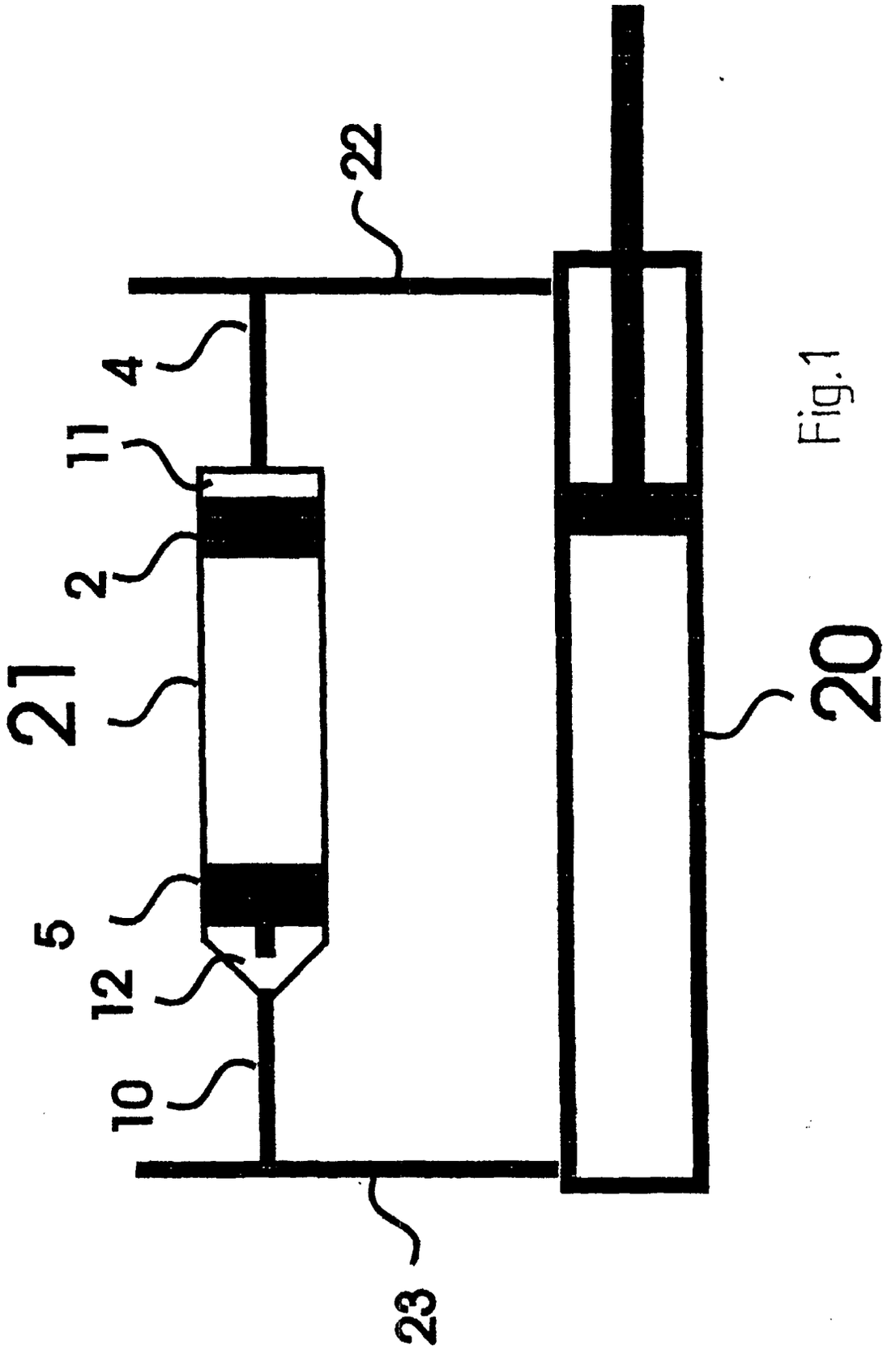


Fig.1

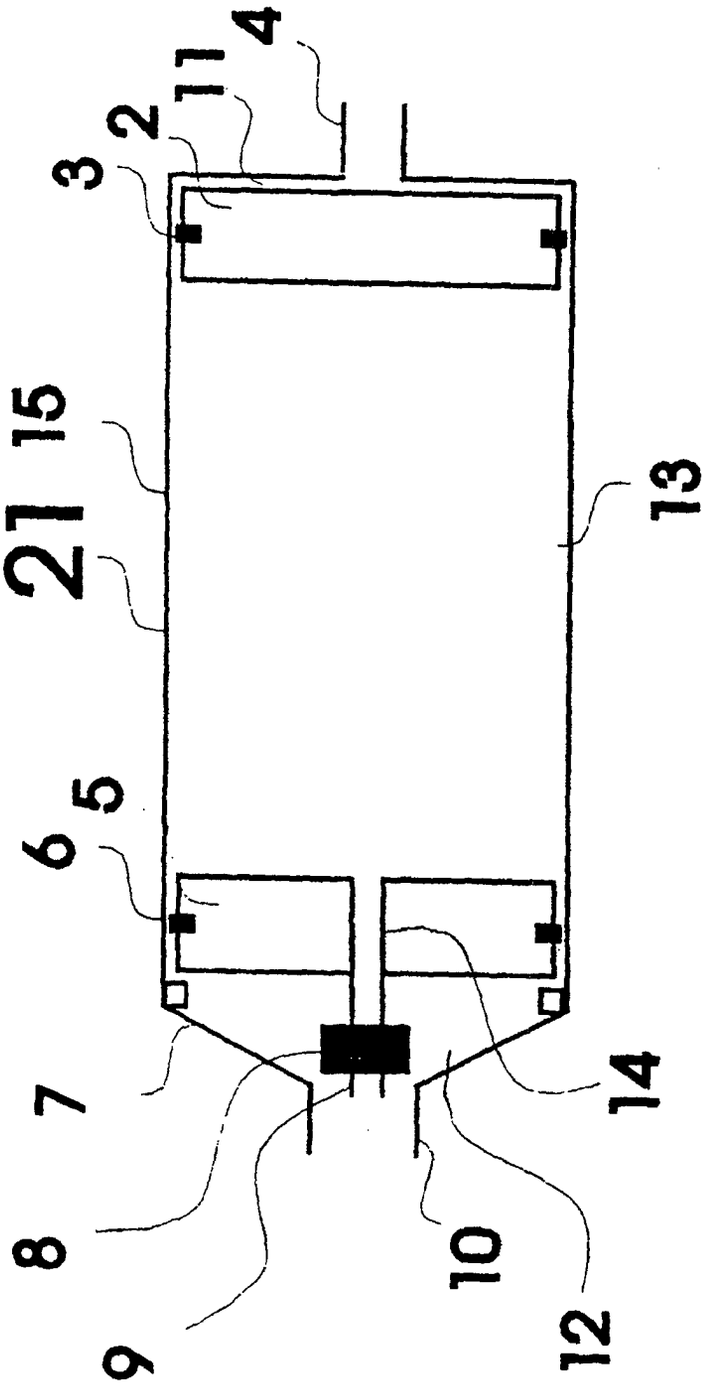


Fig.2

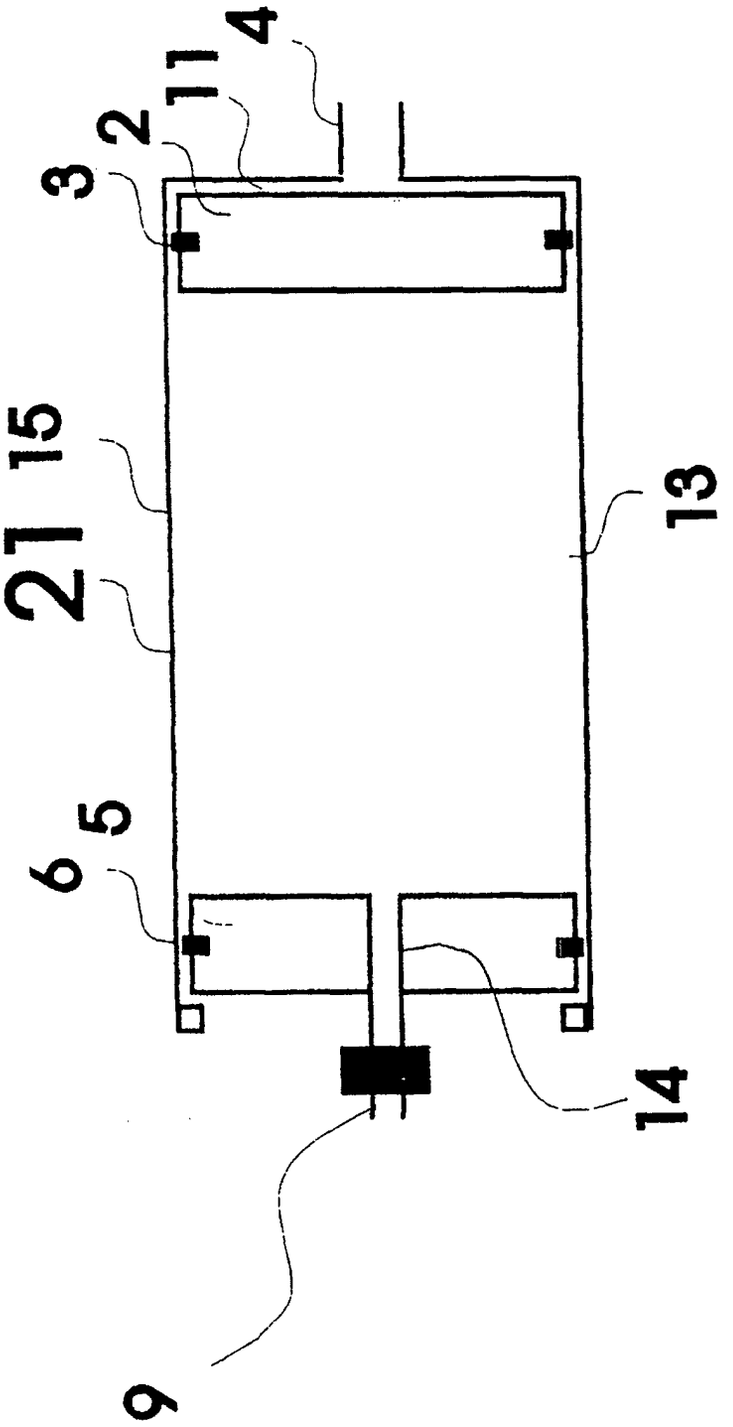


Fig.3

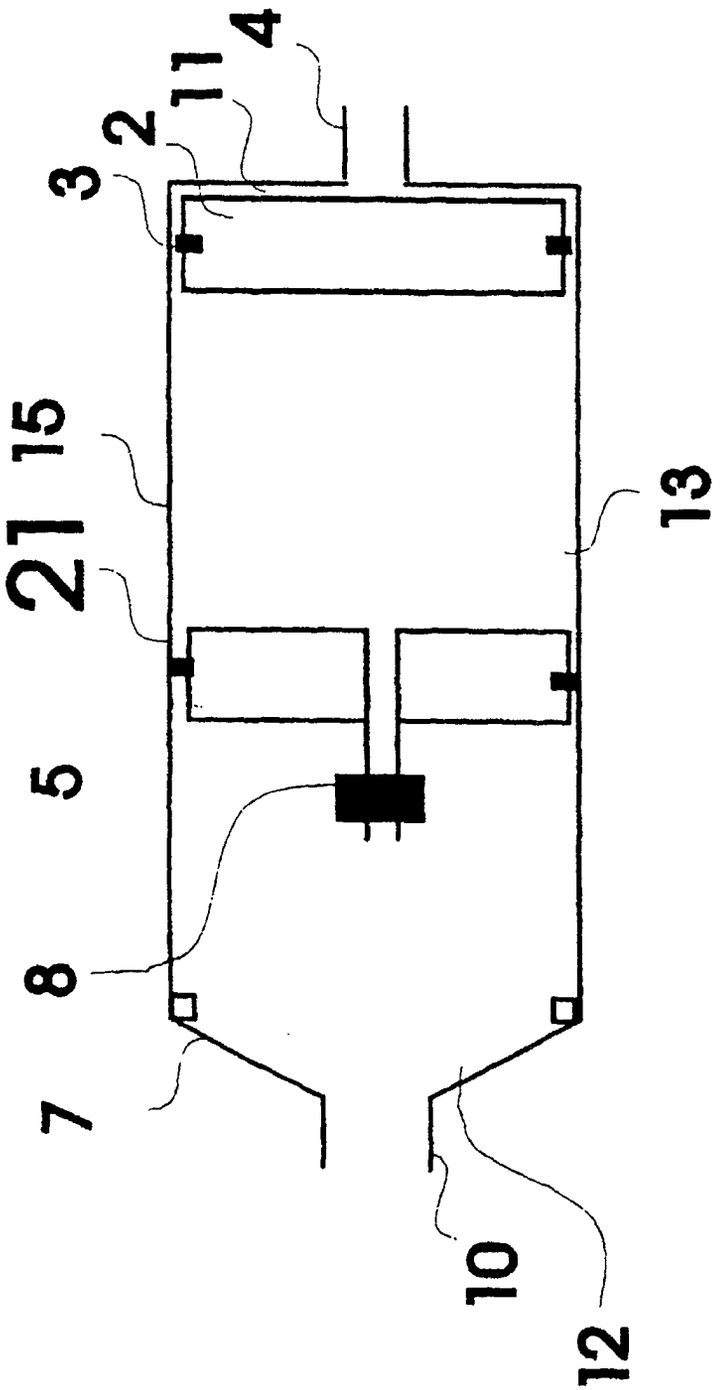


Fig.4

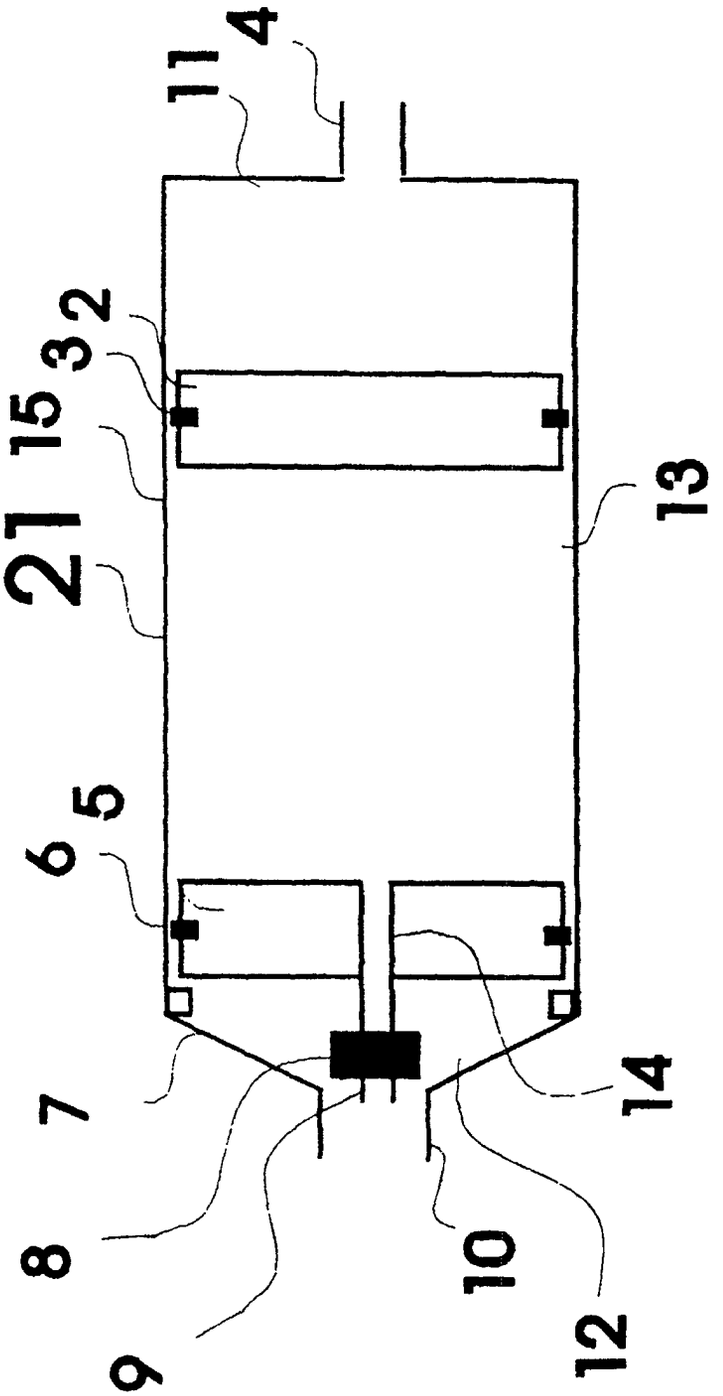


Fig.5

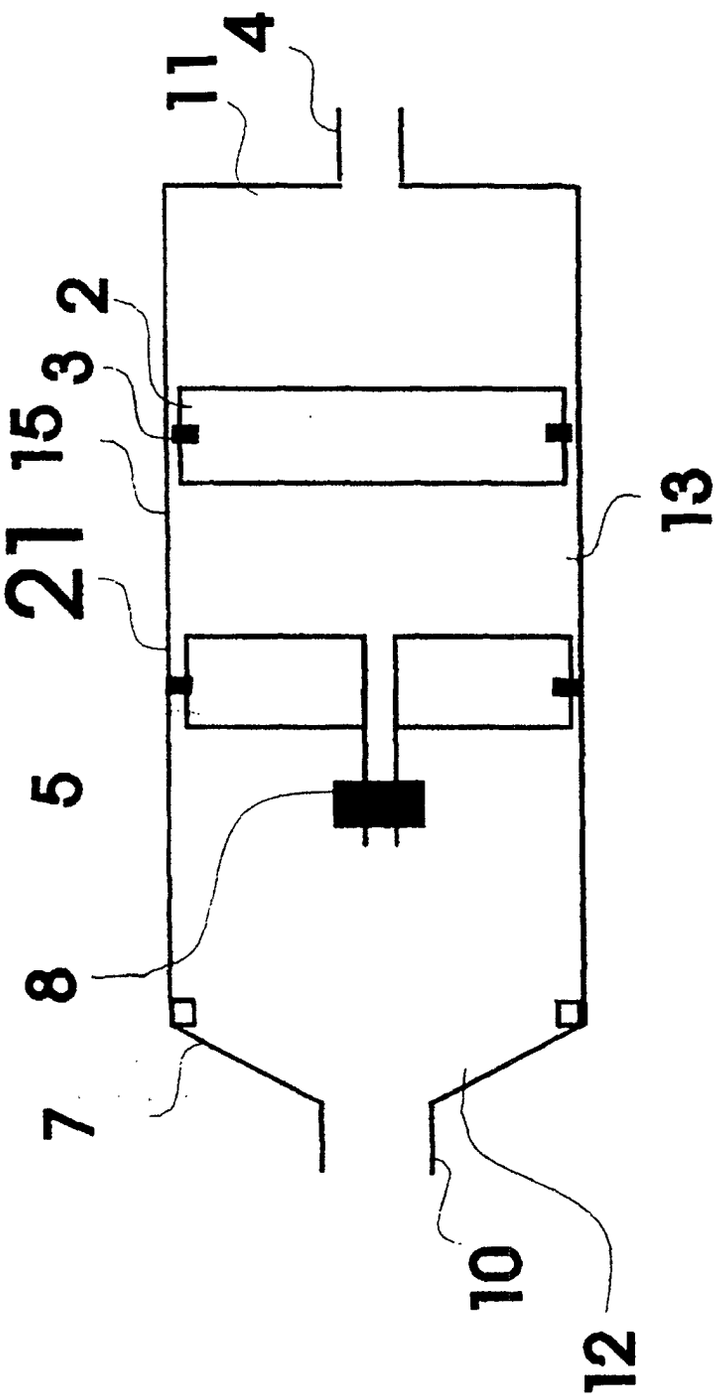


Fig.6

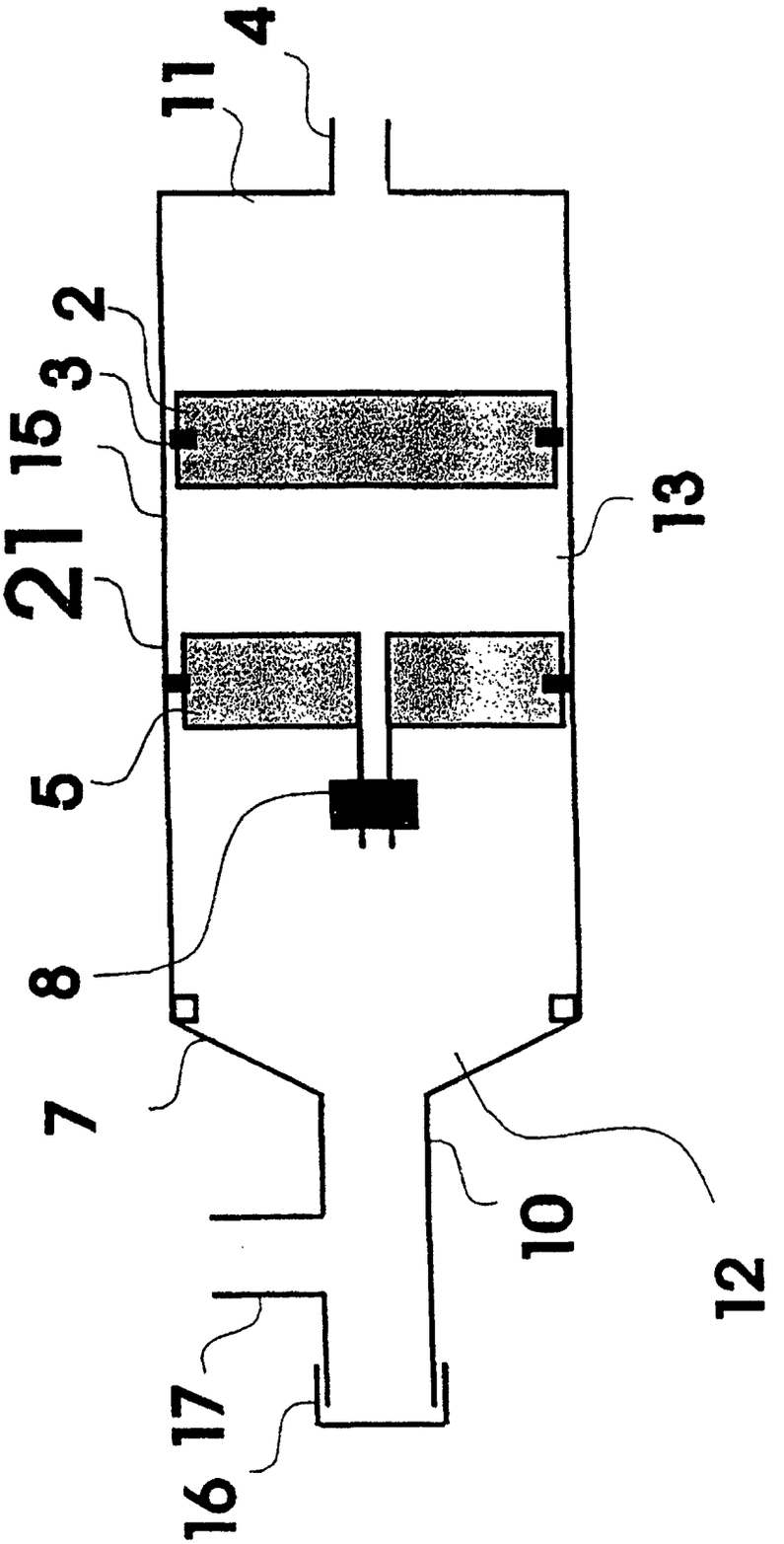


Fig.7

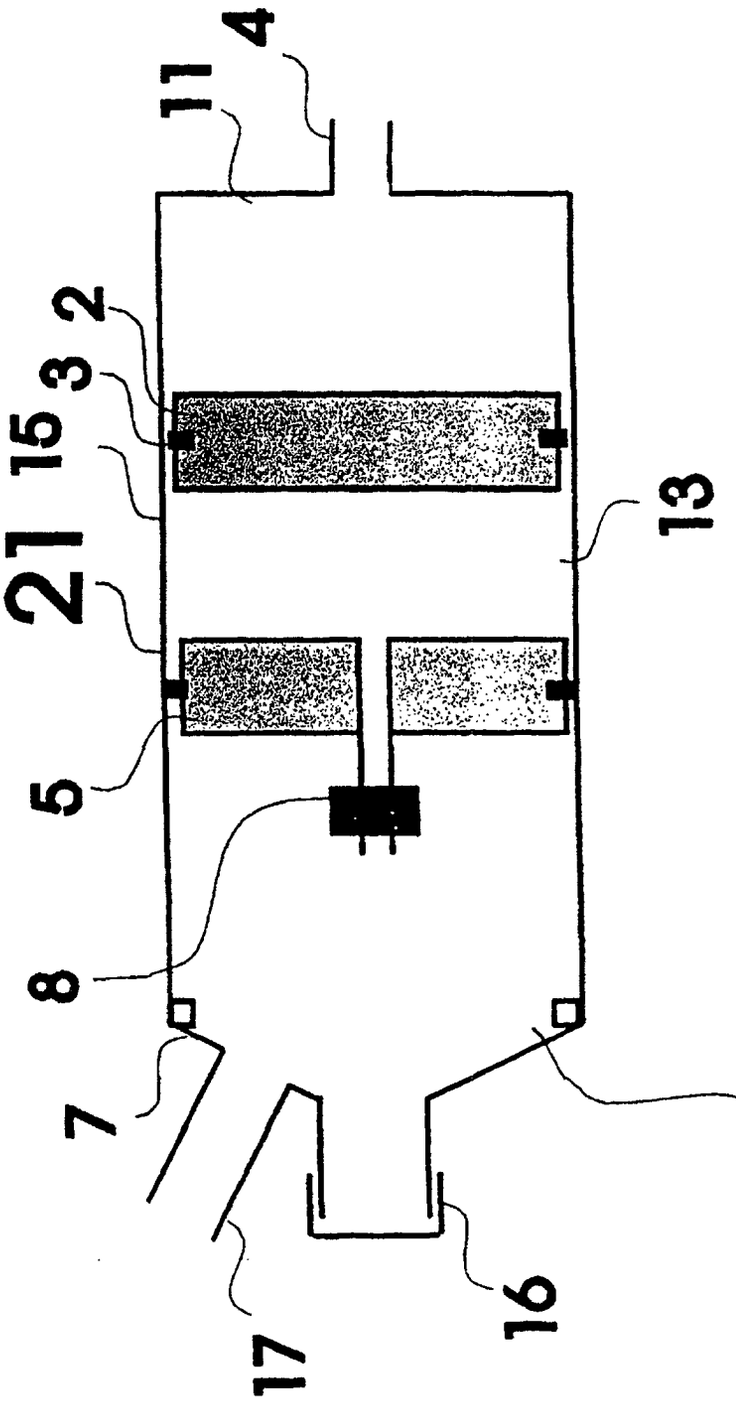


Fig.8