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(54) **SIMPLE EFFECT CYLINDER WITH OIL STORAGE**

(57) Simple effect cylinder with oil storage comprising: two chambers separated from each other by a one-piston plunger; said piston plunger; wherein the first chamber comprises a rod of the piston and a first opening for inlet/outlet of oil, the second chamber comprises a second opening for inlet/outlet of oil, wherein both chambers are reservoir of the oil operating the cylinder; where-

in each opening of each chamber is able for the inlet/outlet of oil, according to the plunger movement; wherein one of the chambers comprises an air breather. The cylinder may comprise an air breather at the top of the chamber comprising it. The second opening for inlet/outlet of oil may be located in a lower end of the second chamber and the first chamber may comprise an air breather.

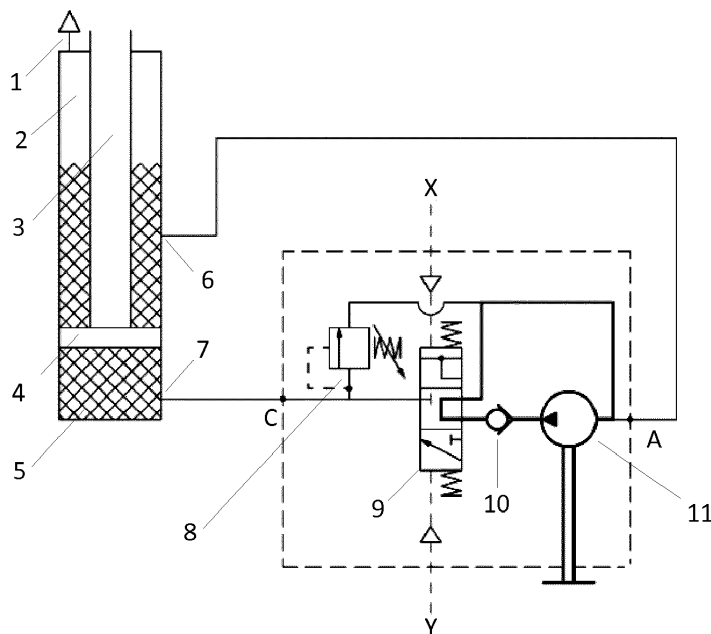


Fig. 1

Description

Technical field

[0001] The present disclosure relates to a simple effect cylinder able for reserving a fluid and to an activation system of simple effect cylinders without resorting to oil tank for the storage thereof. The oil storage is carried out inside the upper/lower chamber of the simple effect cylinder.

Background

[0002] Known systems use a tank for storing the necessary oil for activating the hydraulic system of the vehicle, machine, mechanism, among others. These systems, in particular the double effect cylinders, are characterised by a high weight on the equipment incorporating said cylinders, and are also characterised for being demanding in terms of maintenance and costs, being that one of the reasons is because the seals suffer pressure peaks at the limit of the extension movement and there is a significant exchange of air with the exterior, therefore, pollution of the system is considerable.

[0003] These facts illustrate the technical problem to be solved by the present disclosure.

General description

[0004] The system presented in this description consists of using a pump with a flow directional valve, of pressure control and anti-return integrated in a single body, and having the capacity of executing the bypass function of pneumatic or mechanical activation. The installation consists of connecting only two hoses; the intake one and the pressure one directly to the upper and lower chamber of the cylinder, respectively. The simple effect cylinder should preferably have a very small breather with air filter in the upper part thereof preventing the fluid contamination with atmosphere impurities and allowing the volume variation without pressurising or depressurizing therefore not creating movement resistance, nor hindering the pump suction preventing the cavitation thereof.

[0005] A simple effect cylinder means a cylinder that is activated by one side only carrying out work only in that direction. This schematic arrangement allows the user to execute functions of empty bypass, moving upwards, moving upwards with overpressure annulled by the pressure control valve, moving downwards and end-of-stroke. The end-of-stroke in this scheme needs no extra components or mechanical, pneumatic or hydraulic connections for proper functioning, because it is integrated in the simple effect cylinder. After the total movement of the simple effect cylinder, the oil coming in, comes out totally so that the simple effect cylinder extension no longer occurs.

[0006] The present disclosure refers to a simple effect cylinder for storing a fluid comprising:

two chambers separated from each other by a one-piston plunger;
wherein the first chamber comprises a piston shaft and a first opening for inlet/outlet of fluid,
the second chamber comprises a second opening for inlet/outlet of fluids,
wherein both the chambers are the operating fluid reservoir;
wherein each opening of each chamber is able for inlet or outlet of fluid, whether the plunger moves upwards or downwards.

[0007] In an embodiment, the inlet/outlet is located in the second chamber/plunger chamber and functions as inlet when the fluid circulates in the direction of A to C and functions as outlet when the fluid circulates from C to A; when the inlet/outlet is located in the first chamber/plunger chamber of the rod it functions as outlet when the fluid circulates from A to C and as inlet when the fluid circulates from C to A.

[0008] In an embodiment, the second opening for inlet/outlet of fluid may be located in a lower end of the second chamber.

[0009] In an embodiment, said cylinder may further comprise a breather unit and air filter.

[0010] In an embodiment, said cylinder may comprise an electronic unit for determining when the plunger goes through the first opening for inlet/outlet of fluid.

[0011] In an embodiment, the piston plunger may comprise a segment or set of segments, being that said segment or said set of segments may be formed by a metal alloy, composite, or seal capable of withstanding wear by friction, pressure and/or temperature demands.

[0012] In an embodiment, the cylinder herein disclosed may comprise a connection to a flow directional valve that may be activated pneumatically or hydraulically.

[0013] In an embodiment, the flow directional valve may be of the 3/3 type.

[0014] In an embodiment, the fluid may be oil.

[0015] The present disclosure further refers to an equipment comprising the cylinder herein disclosed.

[0016] In an embodiment, the equipment may be a construction equipment or, a mining equipment or, a forest equipment. In an embodiment, the end-of-stroke scheme may be applied in telescopic cylinders, making the larger tube to be the last to expand.

[0017] In an embodiment, the schematic arrangement is applicable to a cylinder, two cylinders or more, as well as to cylinders of tilting scissors for vehicles.

[0018] The cylinder without oil tank herein disclosed presents the advantage of suffering a huge reduction in the number of components, thus presenting, it allows a significant weight reduction, less maintenance, less cost and greater reliability, because the seals don't suffer pressure peaks in the extension movement limit and

there is very little exchange of air with the exterior, therefore, the pollution of the system is minimal, since the oil functions in closed circuit.

[0019] A simple effect cylinder with oil storage is described comprising:

two chambers separated from each other by a one-piston plunger;
said piston plunger;
wherein the first chamber comprises a piston rod and a first opening for inlet/outlet of oil,
the second chamber comprises a second opening for inlet/outlet of oil,
wherein both chambers are reservoir of the oil operating the cylinder;
wherein each opening of each chamber is able for the inlet or outlet of oil, according to the plunger movement;
wherein one of the chambers comprises an air breather.

[0020] In an embodiment, the air breather is at the top of the chamber comprising it.

[0021] In an embodiment, the second opening for inlet/outlet of oil is located in a lower end of the second chamber and wherein the first chamber comprises an air breather.

[0022] An embodiment comprises an electronic unit for determining when the plunger goes through the first opening for inlet/outlet of oil.

[0023] In an embodiment, the piston plunger comprises a segment or a set of segments.

[0024] In an embodiment, the segment or set of segments is formed by a metal alloy, composite, or seal capable of withstanding wear by friction, the pressure and/or temperature demands.

[0025] In an embodiment, the cylinder is configured so that the piston plunger returns by gravity.

[0026] An embodiment comprises a connection to a flow directional valve and said flow directional valve.

[0027] In an embodiment, the flow directional valve is activated pneumatically or hydraulically.

[0028] In an embodiment, the flow directional valve is of the 3/3 type.

[0029] An embodiment comprises a pump with flow directional valve.

[0030] An embodiment comprises an anti-return valve of the oil through the pump.

[0031] An embodiment comprises a pressure control valve in the pump.

[0032] In an embodiment, the equipment is a construction equipment or, a mining equipment or, a forest equipment.

[0033] In an embodiment, the equipment is a vehicle equipment.

Description of the drawings

[0034] For an easier understanding of the disclosure figures are appended, which, represent preferential embodiments that should not be seen as limiting the scope of the present disclosure.

Figure 1 - Hydraulic scheme representing the bypass system wherein the fluid circulation is represented in bold and wherein:

- 1 - represents an air breather unit and air filter;
- 2 - represents the rod chamber/upper chamber of the cylinder/first chamber;
- 3 - represents the piston rod;
- 4 - represents the piston plunger;
- 5 - represents the plunger chamber/lower chamber of the cylinder/second chamber;
- 6 - represents an inlet point or an outlet point of the fluid;
- 7 - represents an inlet point or an outlet point of the fluid;
- 8 - represents a pressure control valve;
- 9 - represents a 3/3 flow directional valve (3 ways; 3 positions) activated pneumatically or hydraulically (X, Y);
- 10 - represents an anti-return valve;
- 11 - represents a pump.

Figure 2 - Hydraulic scheme representing the system moving upwards. Fluid circulation in the direction A-C, represented in bold.

Figure 3 - Hydraulic scheme representing the system moving upwards with overpressure annulled by the pressure control valve. Lines with fluid circulation represented in bold.

Figure 4 - Hydraulic scheme representing the system on end-of-stroke. Fluid circulation in the direction A-C, represented in bold.

Figure 5 - Hydraulic scheme representing the system moving downwards. Fluid circulation in the direction C-A, represented in bold.

Detailed description

[0035] For the purposes of a correct understanding of the disclosure herein presented, the mentioned simple effect cylinder may comprise the following elements in the constitution thereof: a rod chamber/upper chamber/first chamber (2), a plunger chamber/lower chamber/second chamber (5), a mobile piston and two inlets/outlets of fluid (6, 7), being that one inlet/outlet (6) is located in the plunger chamber (5) and functions as inlet when the fluid circulates in the direction of A to C and functions as outlet when the fluid circulates from C to A;

while the inlet/outlet (7) is located in the rod chamber (2) and functions as outlet when the fluid circulates from A to C and as inlet when the fluid circulates from C to A.

[0036] The terms rod chamber or upper chamber of the cylinder (2), lower chamber of the cylinder (5) and mobile piston should be understood as explained below. Rod chamber or upper chamber of the cylinder (2) means the internal space of the cylinder located immediately above the piston plunger (4), comprising the piston rod (3), an inlet/outlet (6) of fluid and optionally an air breather and air filter (1). Plunger chamber or lower chamber of the cylinder (5) means the internal space of the cylinder located immediately below the piston plunger (4) and comprising an inlet/outlet (7) of fluid. Mobile piston means the set formed by the plunger (4) and by the rod (3) of the piston.

[0037] In an embodiment, the lower chamber of the cylinder (5) is filled with fluid while the rod chamber of the cylinder (2) is partially filled with fluid. In this embodiment it occurs when the system is on end-of-stroke or when the system is moving upwards.

[0038] In an embodiment, the upper chamber functions as a tank and is not empty, having typically an amount of oil necessary for the proper functioning of the system and that can be about 15% of oil or more.

[0039] In an embodiment, the piston plunger (4) may present one or more segments in the constitution thereof.

[0040] In an embodiment, the simple effect cylinder may present an electronic system for detecting the end-of-stroke mode.

[0041] Figure 1 represents an embodiment of the present disclosure. Said figure represents the system in a situation wherein the fluid circulation is made through the pump (11), of the anti-return valve (10) and the 3/3 valve (3 ways; 3 positions) (9) when it is in the resting position. This embodiment describes a situation designated as bypass.

[0042] An embodiment is represented in figure 2. In this figure, the system is represented executing the moving upwards function of the piston. To carry out the piston moving upwards, the pump (11) allows the fluid circulation in the direction of A to C, passing through the anti-return valve (10) and through the 3/3 valve (3 ways; 3 positions) (9), so that the fluid enters the lower chamber of the cylinder (5) through the inlet/outlet of the fluid (7). Introducing fluid in the lower chamber of the cylinder (5) allows the piston to move upwards and the consequent outlet of fluid from the upper part of the cylinder (2) through the inlet/outlet of the fluid (6). The fluid removed from the upper part of the cylinder (2) is reintroduced in the engine (11) and returns to the cylinder by the course previously described. Therefore, it is possible the mobile piston of the cylinder to continue executing the moving upwards function. In this embodiment, 3/3 valve (3 ways; 3 positions) (9) is activated pneumatically in the direction of Y to X.

[0043] Figure 3 represents an embodiment of the present disclosure. The figure represents the system car-

rying out the moving upwards function on overpressure. In a situation where system overpressure exists, the same is annulled when the pressure control valve is activated (8), allowing the fluid to circulate in the direction of A to C, transiting through the pressure control valve (8) and returning to the pump (11), thereby eliminating the overpressure exerted in the cylinder. This embodiment occurs when the system exceeds working pressure. Working pressure may be defined and adjustable to operation. Therefore, working pressure may be defined by the client and it may be adjustable. In general the valve 8 may be tuned with a pressure 10% superior to the maximum system pressure.

[0044] In an embodiment, different systems may need different working pressures.

[0045] In an embodiment, 3/3 valve (3 ways; 3 positions) (9) is activated pneumatically in the direction of Y to X.

[0046] Figure 4 corresponds to an embodiment of the present disclosure wherein the system is on end-of-stroke. In this embodiment, the cylinder piston is in the maximum extension thereof. The maximum extension of the cylinder piston occurs when the plunger thereof exceeds the inlet/outlet (6) of the fluid when it circulates in the direction A to C and when the lower chamber of the cylinder (5) is full with the fluid. In this embodiment, 3/3 valve (3 ways; 3 positions) (9) is activated pneumatically in the direction of Y to X.

[0047] Figure 5 further represents an embodiment of the present disclosure. In this case, the figure represents the system operating moving downwards. In this embodiment, the moving downwards of the piston occurs by gravity and without any intervention or action of the pump (11). In figure 5, the fluid is removed from the lower chamber of the cylinder (5) through the inlet/outlet (7), is transferred to the 3/3 valve (3 ways; 3 positions) (9), which is activated pneumatically in the direction of X to Y, and enters the rod chamber of the cylinder (2) through the inlet/outlet (6). Therefore, the lower chamber of the cylinder (5) is emptied of fluid that will afterwards fill in the rod chamber of the cylinder (2). Filling in the rod chamber (2) allows the cylinder piston to return to the initial position thereof, by gravity. In this embodiment, the fluid circulates in the direction of C to A.

[0048] Throughout the description and claims the word "comprises" and variations thereof, are not intended to exclude other technical features, as other components, or steps. Additional objects, advantages and features of the disclosure will become apparent to those skilled in the art upon examination of the description or may be learned by practice of the invention. The following examples and figures are provided for illustrating the description and should not be seen as limiting the scope of the disclosure. Besides, the present disclosure encompasses all possible combinations of specific or preferential embodiments herein described.

[0049] Although merely particular embodiments of the disclosure have been represented and described herein

a person with ordinary skill in the art will know how to introduce modifications and replace some technical features with equivalent ones, depending on the requisites of each situation, without departing from the basic disclosure as defined in the appended claims.

[0050] The presented embodiments are combinable. The following claims set out particular embodiments of the disclosure.

Claims

1. Simple effect cylinder with oil storage comprising:

two chambers separated from each other by a one-piston plunger;
said piston plunger;
wherein the first chamber comprises a rod of the piston and a first opening for inlet/outlet of oil, the second chamber comprises a second opening for inlet/outlet of oil,
wherein both chambers are reservoir of the oil operating the cylinder;
wherein each opening of each chamber is able for the inlet or outlet of oil, according to the piston movement;
wherein one of the chambers comprises an air breather.

2. Cylinder according to the previous claim, wherein the air breather is at the top of the chamber comprising it.

3. Cylinder according to any of the previous claims for lifting cargo, wherein the second opening for inlet/outlet of oil is located in a lower end of the second chamber and wherein the first chamber comprises an air breather.

4. Cylinder according to the previous claims comprising an electronic unit for determining when the plunger goes through the first opening for inlet/outlet of oil.

5. Cylinder according to any of the previous claims wherein the piston plunger comprises a segment or a set of segments.

6. Cylinder according to the previous claim wherein the segment or set of segments is formed by a metal alloy, composite, or seal capable of withstanding wear by friction, the pressure and/or temperature demands.

7. Cylinder according to any of the previous claims configured so that the piston plunger returns by gravity.

8. Equipment comprising the cylinder according to any of the previous claims, comprising a connection to a

flow directional valve and said flow directional valve.

9. Equipment according to the previous claim wherein the flow directional valve is activated pneumatically or hydraulically.

10. Equipment according to claims 8 or 9 wherein the flow directional valve is of the 3/3 type.

11. Equipment according to any of claims 8-10, comprising a pump with flow directional valve.

12. Equipment according to the previous claim, comprising an anti-return valve of the oil through the pump.

13. Equipment according to any of the previous claims 11-12, comprising a pressure control valve in the pump.

14. Equipment according to any of the claims 8-13 wherein the equipment is a construction equipment or, a mining equipment or, a forest equipment.

15. Equipment according to any of the claims 8-14 wherein the equipment is a vehicle equipment.

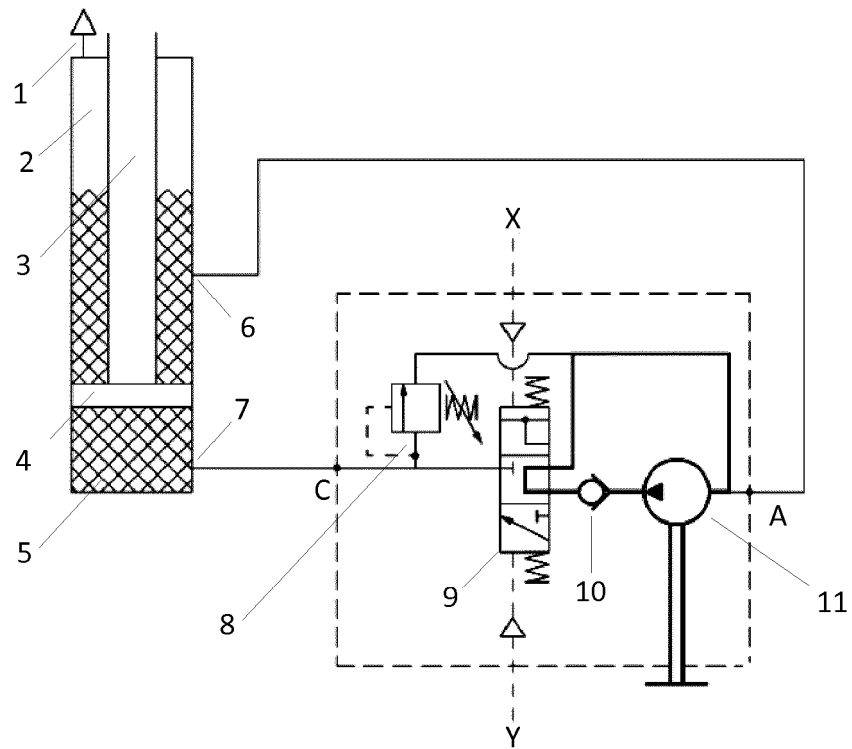


Fig. 1

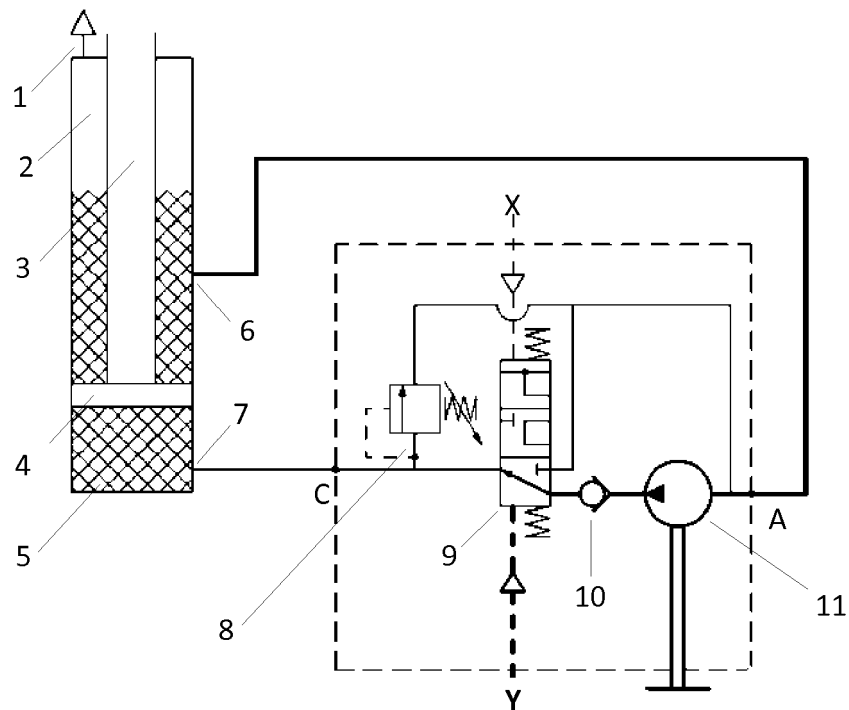


Fig. 2

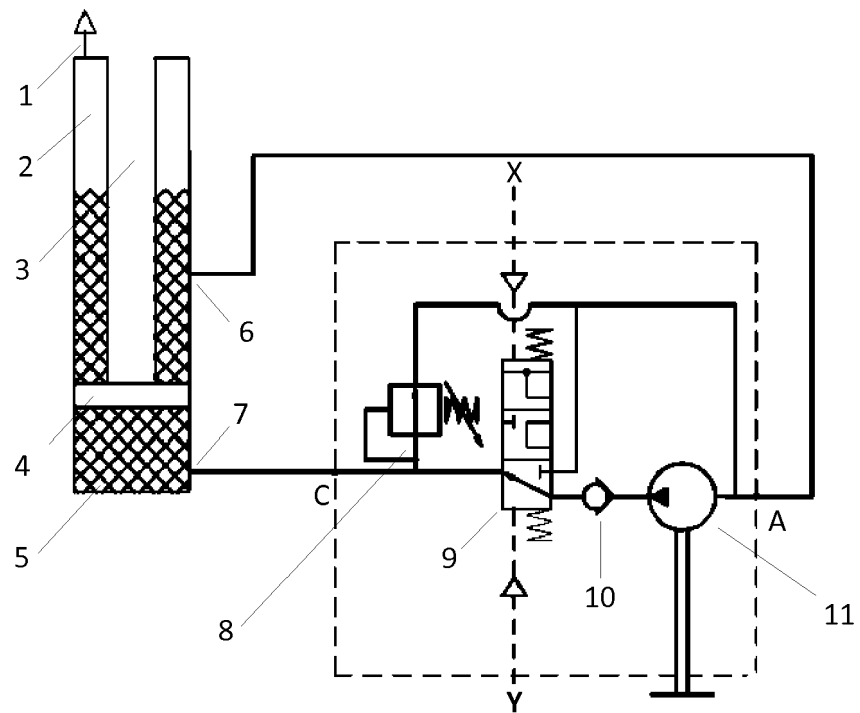


Fig. 3

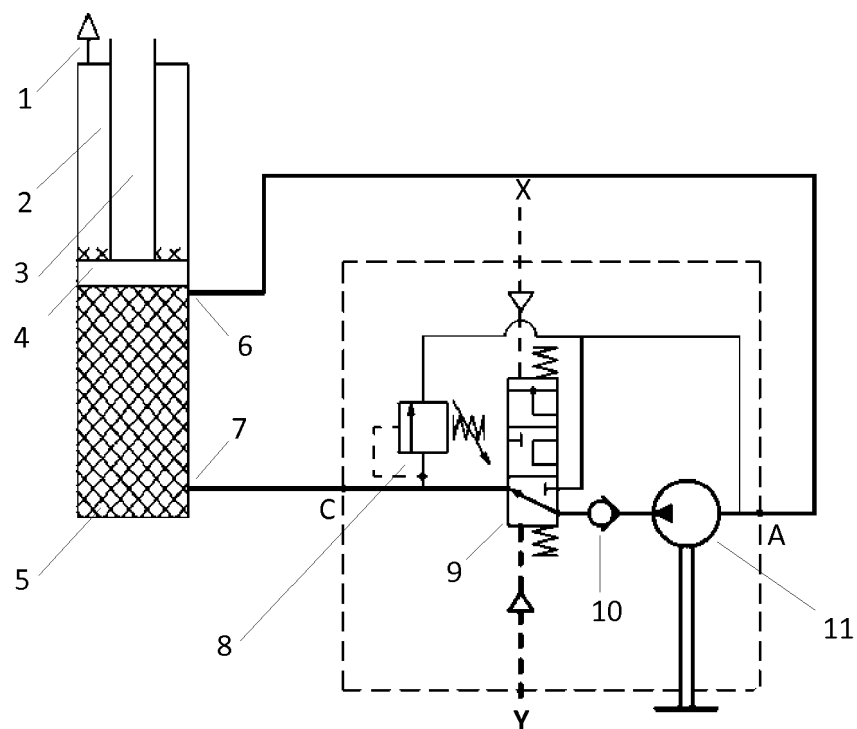


Fig. 4

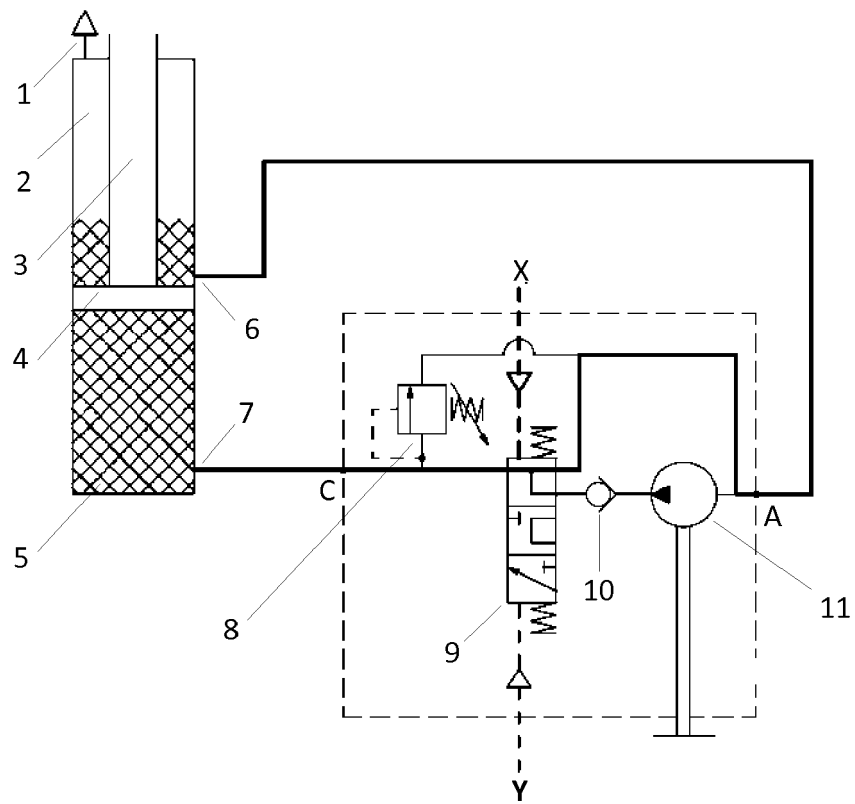


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 17 18 4133

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 December 2017	Examiner Díaz Antuña, Elena
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