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(54) **HYDRAULIC FLUID ARRANGEMENT FOR A VEHICLE, ESPECIALLY AN INDUSTRIAL VEHICLE**

HYDRAULIKFLÜSSIGKEITSANORDNUNG FÜR EIN FAHRZEUG, INSBESONDERE EIN
INDUSTRIELLES NUTZFAHRZEUG

AGENCEMENT DE FLUIDE HYDRAULIQUE POUR UN VEHICULE, NOTAMMENT UN VEHICULE
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10, 31 October 1996 (1996-10-31) -& JP 08 166028
A (MITSUBISHI AUTOMOB ENG CO LTD;
MITSUBISHI MOTORS CORP), 25 June 1996
(1996-06-25)**

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Description

Technical field

[0001] The present invention relates to a hydraulic fluid arrangement for a vehicle, especially for an industrial vehicle.

Technical background

[0002] Conventionally, a vehicle, especially an industrial vehicle, may be equipped with one or more hydraulic circuits which can power one or more hydraulic motors.

[0003] A typical hydraulic circuit usually includes a hydraulic tank where the hydraulic fluid is stored. Figure 1 illustrates a hydraulic tank 101 according to the prior art.

[0004] The hydraulic tank, which can be made of plastic material, is connected to the hydraulic circuit by an outlet port 102 and inlet port 103. The hydraulic tank also includes, in its upper part, a filler port 104 through which the hydraulic fluid can be poured. The hydraulic tank is partially filled with the hydraulic fluid and the level of hydraulic fluid can be visually controlled thanks to a control window 105.

[0005] This type of hydraulic tank is widely spread but from many standpoints is not entirely satisfactory.

[0006] For a satisfactory operation of any hydraulic circuit it is important that the hydraulic tank is easily accessible for a routine maintenance whereby the level of the hydraulic fluid is checked and, if necessary, a refilling of hydraulic fluid can be easily carried out.

[0007] It is also important that the hydraulic fluid which returns to the tank from the hydraulic circuit is filtered before entering the hydraulic tank. The hydraulic fluid may be contaminated with iron fillings generated by the operation of the pumps or valves of the hydraulic circuit.

[0008] One of the problems is that the space dedicated to accommodate the hydraulic tank can be severely limited. In other words, a vehicle has a complex structure which includes a large number of components (engine, cooling system, suspension system, transmission system, hydraulic system etc.) which are very tightly arranged so as to minimize the overall size of the vehicle. The consequence is that the shape and the location of the hydraulic tank have to be adapted to the vehicle structure.

[0009] In many cases the hydraulic tank can be very difficult to reach, making the control of the hydraulic fluid level and the refilling operation very awkward and, in some examples such as the hydraulic tank illustrated on figure 1, the inlet port 103 cannot be fitted with a filtration means due to a lack of space.

[0010] From a different point of view, a traditional hydraulic fluid tank can be an expensive part. A hydraulic fluid tank such as the one depicted on Figure 1 can be made of moulded plastic material which includes several metal inserts. It should also be noted that a hydraulic fluid tank has a specific shape for a specific vehicle. This

means that for any new vehicle, a new hydraulic fluid tank has to be designed as well as all the industrial equipment required to produce this new hydraulic fluid tank.

[0011] It therefore appears that there is room for improvement in the field of hydraulic fluid tank design.

[0012] A hydraulic fluid arrangement according to the preamble of claim 1 is known from US-A-3 991 568.

Summary of the invention

[0013] One object of the invention is to propose a hydraulic fluid arrangement which improves the accessibility to the maintenance functions.

[0014] The invention provides a hydraulic fluid arrangement as defined in claim 1.

[0015] In effect, the invention offers a hydraulic fluid arrangement which is separated into:

- i. a hydraulic fluid primary tank whose only function is to store a hydraulic fluid and, as such, can be of any shape and can be located in any suitable place in the vehicle, and
- ii. a satellite secondary assembly which concentrates all the functions whereby an access is needed and as such has to be placed in the vehicle in a place offering any easy access. The use of a satellite secondary assembly also makes it possible to integrate a filtering means in the hydraulic arrangement, whereas a unitary hydraulic tank, in most cases, would not be able to accept as this would not fit within the allocated space.

[0016] A further advantage of the invention is that the satellite secondary assembly can be implemented on several types of vehicle in connection with a hydraulic fluid primary tank which is specific to a type of vehicle. The invention makes it possible to standardize the component - satellite secondary assembly - of the arrangement which carries most of the technical functions and as such is expensive to manufacture while only the least expensive component - hydraulic fluid primary tank - has to be adapted to the specification of a vehicle.

[0017] In a preferred embodiment of the invention, the second place, where the satellite secondary assembly is located, is remote from the first place where the hydraulic fluid primary tank is located. A significant advantage of the invention is that it makes it possible to locate the hydraulic fluid primary tank in a first place which offers the necessary space but not the necessary accessibility and to locate the satellite secondary assembly in a second place remote from the first place which offers a satisfactory access to the functions carried by the satellite secondary assembly.

[0018] In an embodiment of the invention, the satellite tank can comprise a cup which comprises the at least one inlet port capable of being connected to a hydraulic circuit and the outlet port capable of being connected to the hydraulic fluid primary tank, and a body fitted upon

the cup, which includes the filler port and a hydraulic fluid level visibility window. Thereby, the main maintenance functions are carried on a satellite secondary assembly which can be placed in a suitable location in terms of accessibility.

[0019] Advantageously, the filtering element can be interposed between the cup and the body.

[0020] According to the invention, the inlet port and the filler port are located upstream the filtering element and the outlet port is located downstream the filtering element so that the hydraulic fluid coming from the inlet port and from the filler port undergoes filtration before going into the hydraulic fluid primary tank.

[0021] Preferably, the body can comprise an anti drip rib which surrounds the filler port. This useful feature can be easily integrated in the satellite secondary assembly.

[0022] It can be envisaged that the hydraulic fluid primary tank is made of plastic material.

[0023] These and other advantages will become apparent upon reading the following description in view of the drawing attached hereto representing, as a non-limiting example, an embodiment of a hydraulic fluid arrangement according to the invention.

Brief description of the drawing

[0024] The following detailed description of embodiments of the invention is better understood when read in conjunction with the appended drawings being understood, however, that the invention is not limited to the specific embodiments disclosed. In the drawings,

- Figure 1 shows a hydraulic fluid tank according to the prior art,
- Figure 2 shows a hydraulic fluid arrangement according to the invention,
- Figure 3 shows a satellite secondary assembly which is part of the hydraulic fluid arrangement according to the invention,
- Figure 4 is an exploded view of the satellite secondary assembly.

Description of the invention

[0025] As this appears on figure 2, the hydraulic fluid arrangement 1 according to the invention is essentially comprised of two components namely a hydraulic fluid primary tank 2 and a satellite secondary assembly 3.

[0026] As represented on figure 2, the satellite secondary assembly 3 is adjacent to the hydraulic fluid primary tank 2 but as this will be apparent from the description the satellite secondary assembly 3 can be located in a remote place with regards to the hydraulic fluid primary tank 2.

[0027] Starting the description with the hydraulic fluid primary tank 2, this sub component is essentially a tank which can suitably be made of plastic material. The hydraulic fluid primary tank 2 can be given any suitable

shape which may help to fit the same in the vehicle. The shape of the hydraulic fluid primary tank 2 as depicted on figure 2 is therefore purely indicative. The hydraulic fluid primary tank 2 carries a very limited number of functions; in actual terms, it only includes on its lowest point an outlet port 5 which can provide a connection with a hydraulic circuit of, for example, an industrial vehicle. This hydraulic circuit is not illustrated. The hydraulic fluid primary tank 2 can be equipped with fastening means such as for example a hole 6 for receiving a bolt to make fixation onto the same on the vehicle.

[0028] The other sub component of the hydraulic fluid arrangement 1 is a satellite secondary assembly 3 which is more specifically shown on figures 3 and 4. In the illustrated embodiment, the satellite secondary assembly 3 is comprised of a cup 8 upon which is fitted a tubular body 9. An annular seal 10 is suitably interposed between the cup 8 and the body 9. As shown on figure 4, several bolts 11 secure the body 9 onto the cup 8.

[0029] It can also be mentioned that the cup 8 comprises at least one inlet port 12 and a central outlet port 13.

[0030] In the illustrated embodiment of the invention, only one inlet ports 12 is active and is fitted with a connection socket 21 whereas this other inlet ports 12 are each closed with a plug 14.

[0031] At its upper end, the tubular body 9 is provided with a filler port 15 which can be closed by a threaded plug 16. A seal (see figure 4) may be suitably interposed between the filler port 15 and the threaded plug 16.

[0032] The tubular body 9 is, furthermore, provided with a hole 17 in which is inserted a transparent window 18. The level of hydraulic fluid can be controlled through this window 18.

[0033] Importantly, the satellite secondary assembly 3 can also include a filtering element 19 which is interposed between on, one side, the at least one inlet port 12 and the filler port 15 and, on the other side, the outlet port 13.

[0034] As this appears from the above description, the satellite secondary assembly 3 concentrates a certain number of technical functions such as the inlet connection with the hydraulic circuit, the window 18 to control the hydraulic fluid level and the filtering element 19.

[0035] Going back to figure 2, the satellite secondary assembly 3 appears to be hydraulically connected to the hydraulic fluid primary tank 2. In the embodiment depicted on figure 2, the satellite secondary assembly 3 is directly adjacent to the hydraulic fluid primary tank 2; the outlet port 13 of satellite secondary assembly 3 is directly engaged in an opening provided in the hydraulic fluid primary tank 2.

[0036] In operation, the hydraulic fluid which is generally a type of oil, enters the hydraulic fluid arrangement 1 through the inlet port 12; the hydraulic fluid passes through the filtering element 19 and then returns to the hydraulic fluid primary tank 2.

[0037] Importantly, the satellite secondary assembly 3 can be adjacent to the hydraulic fluid primary tank 2, in the case where there is enough space to accommodate

the entire hydraulic fluid arrangement 1 but, and this is the most advantageous implementation of the hydraulic fluid arrangement 1, the satellite secondary assembly 3 can be implemented in the vehicle in a place remote from the place where the hydraulic fluid primary tank 2 is implemented. The only requirement regarding the location of the satellite secondary assembly 3 is that the control window 18 of the satellite secondary assembly 3 must be positioned at the level of the hydraulic fluid in the hydraulic fluid primary tank 2. Failing to correctly position the satellite secondary assembly 3 would result in incorrectly controlling the quantity of hydraulic fluid in the hydraulic fluid primary tank 2 as the satellite secondary assembly 3 and the hydraulic fluid primary tank 2 are connected according to the principle of communicating vessels.

[0038] The present invention is believed to substantially improve the accessibility to at least the hydraulic maintenance functions by concentrating at least these functions on an assembly 3 which is smaller than a hydraulic fluid primary tank 2 and therefore can be placed in a location offering an easy access whereas the hydraulic fluid primary tank 2 can be in any location which offers the required accommodation space but not the required accessibility.

[0039] Apart from improving the accessibility, the invention also has a substantial impact from an economic point of view. As the hydraulic fluid storing function allotted to the hydraulic fluid primary tank 2 and the other technical functions allotted to the satellite secondary assembly 3 are separated, the invention makes it possible to define a standard satellite secondary assembly 3 which is then implemented on several types of vehicle, each of them being equipped with a standard satellite secondary assembly 3 and a specific hydraulic fluid primary tank 2. The functions which are the most costly to manufacture are included in the satellite secondary assembly 3 while the hydraulic fluid primary tank 2 is kept very simple.

[0040] Another aspect of the invention which should be mentioned, is that as the satellite secondary assembly 3 can be freely positioned, it is possible to easily adjust the required quantity of hydraulic fluid in the hydraulic fluid primary tank 2 by adjusting the vertical position of the satellite secondary assembly 3. Moving the satellite secondary assembly 3 upwards relative to the hydraulic fluid primary tank 2 means that the control window 18 moves upwards and, consequently, more hydraulic fluid is required in the hydraulic fluid primary tank 2; alternatively, moving the satellite secondary assembly 3 downwards relative to the hydraulic fluid primary tank 2 means that the control window 18 moves downwards and consequently less hydraulic fluid is required in the hydraulic fluid primary tank 2. This proves to be very advantageous when a new vehicle is launched and when it appears that more (or less) hydraulic fluid is needed for a satisfactory operation of hydraulic circuit. Unlike a conventional hydraulic fluid tank where the control window 18 is part of

the tank and therefore, by construction, is set to read a single level, the hydraulic fluid arrangement 1 according to the invention offers the possibility to move along a vertical axis the position of the satellite secondary assembly 3 and therefore to adjust the level of the hydraulic fluid level in the hydraulic fluid primary tank 2.

[0041] Of course, the invention is not restricted to the embodiment that has just been described by way of a non-limiting example, but on the contrary it encompasses all embodiments thereof.

Claims

1. A hydraulic fluid arrangement (1) for a hydraulic circuit of a vehicle, especially an industrial vehicle, having a hydraulic fluid primary tank (2) located in a first place of the vehicle capable of storing a hydraulic fluid, wherein the hydraulic fluid arrangement (1) further comprises a satellite secondary assembly (3) connected to the hydraulic fluid primary tank (2), located in a second place of the vehicle, said satellite secondary assembly (3) including at least:
 - hydraulic fluid filling means including a filler port (15),
 - inlet connection means including at least one inlet port (12) capable of being connected to a hydraulic circuit,
 - an outlet port (13) capable of being connected to the hydraulic fluid primary tank (2) and
 - hydraulic fluid filtering means including a filtering element (19),
 characterized in that the inlet port (12) and the filler port (15) are located upstream the filtering element (19) and the outlet port (13) is located downstream the filtering element (19).
2. The hydraulic fluid arrangement (1) according to claim 1, characterized in that the second place, where the satellite secondary assembly (3) is located, is remote from the first place, where the hydraulic fluid primary tank (2) is located.
3. The hydraulic fluid arrangement (1) according to one of claims 1 to 2, characterized in that the satellite secondary assembly (3) includes a cup (8), which comprises the at least one inlet port (12) and the outlet port (13), and a body (9) fitted upon the cup (8), which includes the filler port (15).
4. The hydraulic fluid arrangement (1) according to claim 3, characterized in that the filtering element (19) is interposed between the cup (8) and the body (9).
5. The hydraulic fluid arrangement (1) according to one

of claims 1 to 4, **characterized in that** said satellite secondary assembly (3) further includes hydraulic fluid level controlling means (18).

6. The hydraulic fluid arrangement (1) according to claim 5, **characterized in that** said hydraulic fluid level controlling means include a hydraulic fluid level controlling window (18).
7. The hydraulic fluid arrangement (1) according to claim 6, **characterized in that** the satellite secondary assembly (3) includes a body (9) which includes the hydraulic fluid level controlling window (18).
8. The hydraulic fluid arrangement (1) according to one of claims 1 to 7, **characterized in that** the satellite secondary assembly (3) comprises an anti drip rib which surrounds the filler port (15).
9. The hydraulic fluid arrangement (1) according to one of claims 1 to 8, **characterized in that** the hydraulic fluid primary tank (2) is made of plastic material.

Patentansprüche

1. Hydraulikfluidanordnung (1) für einen Hydraulikkreis eines Fahrzeugs, insbesondere eines Industriefahrzeugs, die einen an einer ersten Stelle des Fahrzeugs angeordneten primären Hydraulikfluidtank (2) aufweist, der ein Hydraulikfluid speichern kann, wobei die Hydraulikfluidanordnung (1) außerdem eine mit dem primären Hydraulikfluidtank (2) verbundene sekundäre Nebenanordnung (3) umfasst, die an einer zweiten Stelle des Fahrzeugs angeordnet ist, wobei die sekundäre Nebenanordnung (3) wenigstens

- eine Hydraulikfluidfülleinrichtung mit einer Füllöffnung (15),
- eine Einlassverbindungseinrichtung, die wenigstens eine Einlassöffnung (12) umfasst, die mit einem Hydraulikkreis verbunden werden kann,
- eine Auslassöffnung (13), die mit dem primären Hydraulikfluidtank (2) verbunden werden kann, und
- eine Hydraulikfluidfiltereinrichtung umfasst, die wenigstens ein Filterelement (19) aufweist,

dadurch gekennzeichnet, dass die Einlassöffnung (12) und die Füllöffnung (15) stromaufwärts des Filterelements (19) angeordnet sind und die Auslassöffnung (13) stromabwärts des Filterelements (19) angeordnet ist.

2. Hydraulikfluidanordnung (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die zweite Stelle, an

der die sekundäre Nebenanordnung (3) angeordnet ist, von der ersten Stelle entfernt ist, an der der primäre Hydraulikfluidtank (2) angeordnet ist.

3. Hydraulikfluidanordnung (1) nach einem der Ansprüche 1 bis 2, **dadurch gekennzeichnet, dass** die sekundäre Nebenanordnung (3) wenigstens einen Napf (8) aufweist, der die wenigstens eine Einlassöffnung (12) und die Auslassöffnung (13) umfasst, und ein Gehäuse (9) auf den Napf (8) aufgesetzt ist, das wenigstens die Füllöffnung (15) aufweist.
4. Hydraulikfluidanordnung (1) nach Anspruch 3, **dadurch gekennzeichnet, dass** das Filterelement (19) zwischen dem Napf (8) und dem Gehäuse (9) angeordnet ist.
5. Hydraulikfluidanordnung (1) nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die sekundäre Nebenanordnung (3) außerdem eine Einrichtung (18) zur Kontrolle des Hydraulikfluidpegels aufweist.
6. Hydraulikfluidanordnung (1) nach Anspruch 5, **dadurch gekennzeichnet, dass** die Einrichtung zur Kontrolle des Hydraulikfluidpegels ein Fenster (18) zur Kontrolle des Hydraulikfluidpegels aufweist.
7. Hydraulikfluidanordnung (1) nach Anspruch 6, **dadurch gekennzeichnet, dass** die sekundäre Nebenanordnung (3) ein Gehäuse (9) aufweist, das das Fenster (18) zur Kontrolle des Hydraulikfluidpegels umfasst.
8. Hydraulikfluidanordnung (1) nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** die sekundäre Nebenanordnung (3) eine Antitropfrippe umfasst, die die Füllöffnung (15) umgibt.
9. Hydraulikfluidanordnung (1) nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** der primäre Hydraulikfluidtank (2) aus Kunststoffmaterial hergestellt ist.

Revendications

1. Dispositif à fluide hydraulique (1) pour un circuit hydraulique d'un véhicule, notamment d'un véhicule industriel, comprenant un réservoir principal de fluide hydraulique (2) situé à un premier emplacement du véhicule et apte à stocker un fluide hydraulique, le dispositif à fluide hydraulique (1) comprenant en outre un ensemble secondaire satellite (3) raccordé au réservoir principal de fluide hydraulique (2), situé à un deuxième emplacement du véhicule, ledit ensemble secondaire satellite (3) comprenant au moins :

- un moyen d'introduction de fluide hydraulique comprenant un orifice d'introduction (15),
- un moyen de raccord d'entrée comprenant au moins un orifice d'entrée (12) pouvant être raccordé à un circuit hydraulique,
- un orifice de sortie (13) pouvant être raccordé au réservoir principal de fluide hydraulique (2) et
- un moyen de filtration de fluide hydraulique comprenant un élément de filtration (19),

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caractérisé en ce que l'orifice d'entrée (12) et l'orifice d'introduction (15) sont situés en amont de l'élément de filtration (19) et l'orifice de sortie (13) est situé en aval de l'élément de filtration (19).

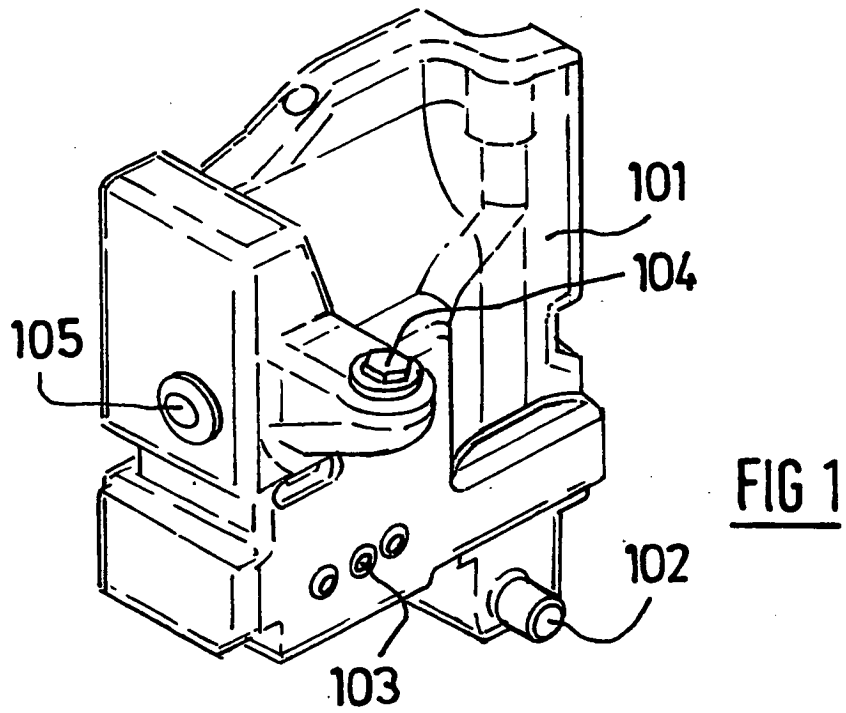
10

15

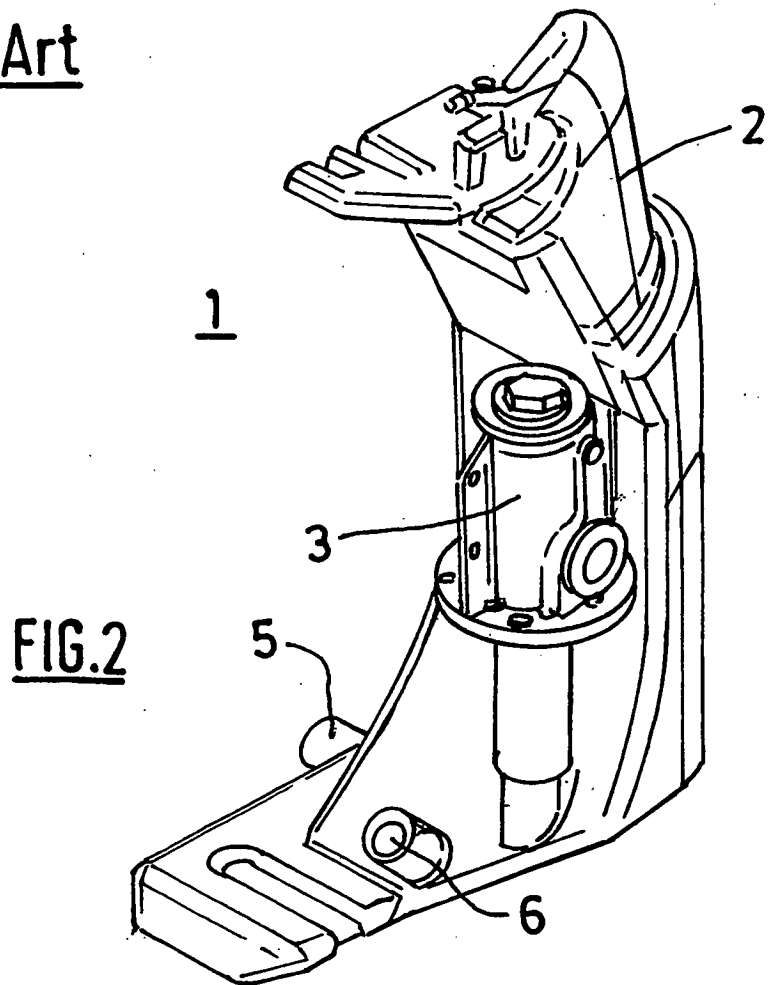
2. Dispositif à fluide hydraulique (1) selon la revendication 1, **caractérisé en ce que** le deuxième emplacement, où est situé l'ensemble secondaire satellite (3), se trouve à distance du premier emplacement, où est situé le réservoir principal de fluide hydraulique (2). 20
3. Dispositif à fluide hydraulique (1) selon l'une des revendications 1 et 2, **caractérisé en ce que** l'ensemble secondaire satellite (3) comprend une coupelle (8), qui comprend l'au moins un orifice d'entrée (12) et l'orifice de sortie (13), et un corps (9) monté sur la coupelle (8), qui comprend l'orifice d'introduction (15). 25
4. Dispositif à fluide hydraulique (1) selon la revendication 3, **caractérisé en ce que** l'élément de filtration (19) est intercalé entre la coupelle (8) et le corps (9). 30
5. Dispositif à fluide hydraulique (1) selon l'une des revendications 1 à 4, **caractérisé en ce que** ledit ensemble secondaire satellite (3) comprend en outre un moyen de contrôle de niveau de fluide hydraulique (18). 35
6. Dispositif à fluide hydraulique (1) selon la revendication 5, **caractérisé en ce que** ledit moyen de contrôle de niveau de fluide hydraulique comprend une fenêtre de contrôle de niveau de fluide hydraulique (18). 40
7. Dispositif à fluide hydraulique (1) selon la revendication 6, **caractérisé en ce que** l'ensemble secondaire satellite (3) comprend un corps (9) qui comprend la fenêtre de contrôle de niveau de fluide hydraulique (18). 45
8. Dispositif à fluide hydraulique (1) selon l'une des revendications 1 à 7, **caractérisé en ce que** l'ensemble secondaire satellite (3) comprend une nervure anti-gouttes entourant l'orifice d'introduction (15). 50

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9. Dispositif à fluide hydraulique (1) selon l'une des revendications 1 à 8, **caractérisé en ce que** le réservoir principal de fluide hydraulique (2) est constitué de matière plastique.



Prior Art



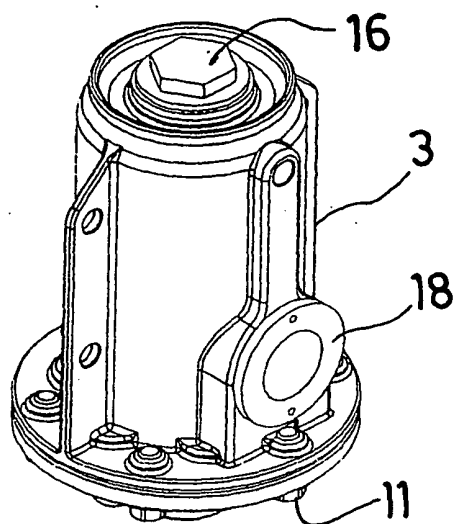


FIG. 3

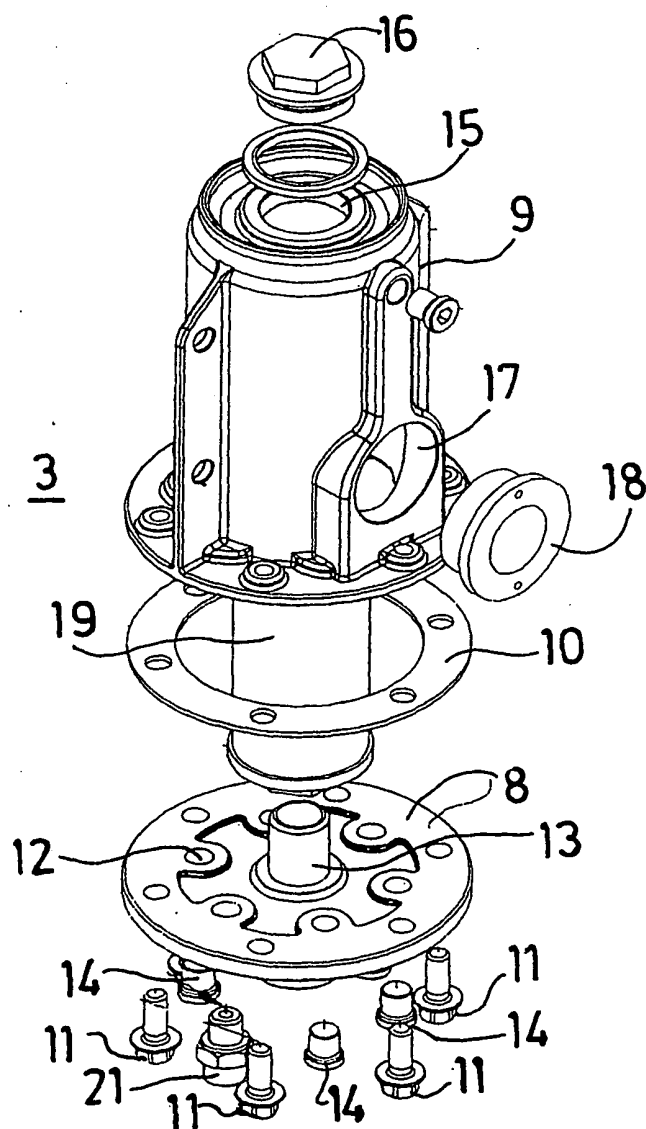


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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