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(54) **Hydraulic control**

(57) The present invention privilege order described herein intends to solve the still ongoing technical problems, by proposing a hydraulic directional control. The hydraulic directional control proposed herein provides, besides the already existing items, one pilot pressure sequence valve, one pressure vent valve with gauged vent for flux control, and one externally piloted stop valve.

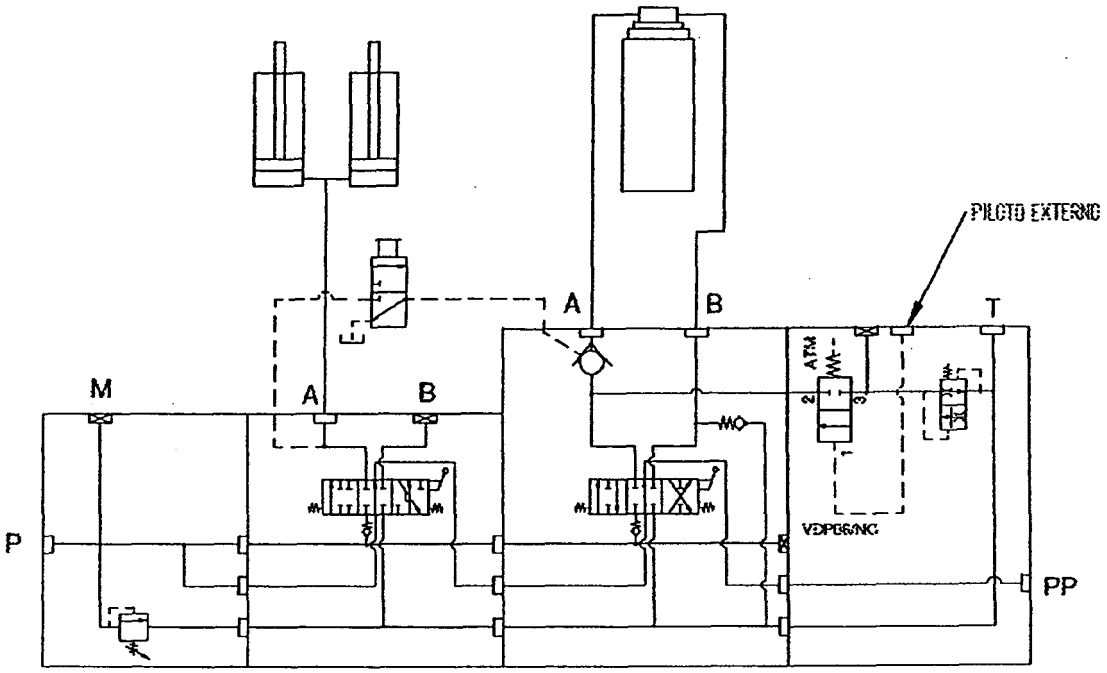

Figure 9

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Description

[0001] The request hereon is about privilege of invention of a hydraulic control used in trucks and refuse compactor.

[0002] The refuse collectors and compactors in use in the market show a few problems related to the ability to compact refuse, that is, problems in getting a higher density of refuse per cubic meter of container 12 during the collection operation. Since the means of transmission of force and power used to drive the compacting mechanism is fit within the collection vehicle, a hydraulic system uses the increase of hydraulic pressure in the main work to get a greater hydraulic power and, as a result of it, a greater force in compacting the refuse. As a mechanic resistance limits the container, the truck structure may be damaged in case high forces overcome such resistance. It also occurs that both the uneven distribution of the residue cargo in the container 12 and the application conditions, together with the characteristics of the hydraulic products, such-as a telescopic cylinder and the cylinder control directional valve, cause the driver some discomfort. Still, due to this lack of homogeneity, the residue is irregularly compacted and accumulated in a few points of the container, thus making the cargo to be unevenly distributed and causing problems in both the front and rear axles of the vehicle.

[0003] Another technical problem found is that, being the operator able to handle parts of the equipment not specifically destined to compact the residue, he can concentrate a bigger volume of residue inside the container, causing it to look inflated, what is popularly known as "rubber nipple" effect. The problem is that the inflation of the container on top of not helping compacting the residue, it damages the whole structure of the truck,/collector and also the road due to its weight.

[0004] Collector operators and residue compactors have been trying to solve these problems by increasing the cargo capacity above the limit specified by the truck manufacturer, operators working with the truck inflated, that is, with the container at the limit of its cargo capacity and ready for being unloaded both in terms of volume and weigh, above the cargo capacity allowed for the equipment/vehicle and the road.

[0005] As there is no control on the distribution of cargo in the container 12 the operator concentrates the load of collected residue mainly in the rear axle, thus causing discomfort to the driver, insecurity while driving the vehicle, besides compromising the service life and maintenance of the road. The operator tries to solve this problem by causing the "rubber nipple" effect, which takes place as the operator drives the directional valve and releases the flow of hydraulic oil for the telescopic cylinder to open while keeping the lid kit closed. Such drive and action compromise the service life of the equipment as well as the operator safety, as mechanical parts, not designed to compact residue, are used for this purpose.

[0006] To solve this problem, patent request P10006713-0 proposes a directional control with a pressure sequence valve and a pressure compensation valve, to allow the pressure induced in the telescopic hydraulic cylinder by the action of the compacting work to be constant and independent in the course the different stages/areas of the telescopic cylinder. This pressure varies according to the force of compacting and the area of the telescopic cylinder in operation. As a result, a homogeneous compacting of the residue is obtained. However, the "rubber effect" can still occur this way.

[0007] The hydraulic system, already known in the state of the art, includes:

- Hydraulic pump;
- Hydraulic fluid tank;
- Hydraulic actuating cylinders; and
- Telescopic hydraulic cylinder.

[0008] The request on privilege of invention described hereon aims at solving the problems present in the state of the art, thus proposing a hydraulic directional control.

[0009] The hydraulic directional control proposed hereon provides, besides the already existing items, a piloted pressure sequence valve, a pressure compensation valve with a calibrated vent to control the flow and a externally piloted retention valve.

[0010] This invention will be better understood with the help of the figures attached to the descriptive report hereon, where:

Figure 1 represents a lateral view of a refuse collector truck 1 where one can notice the location of the hydraulic control 2;

Figure 2 represents a perspective view of the hydraulic control 2;

Figure 3 represents a perspective view of another angle of the hydraulic control 2;

Figure 4 represents a cross sectional view of the hydraulic control 2 indicating the externally and/or internally piloted pressure sequence valve 21;

Figure 5 represents a cross sectional view of the hydraulic control 2, where one can notice the location of the pressure compensating valve with calibrated hole to control the flow 22;

Figure 6 represents a cross sectional view of the piloted retention valve 20, known as anti-rubber nipple valve", where all its components can be observed;

Figure 7 represents a lateral sectional view of the hydraulic control 2, where one can notice the position of the piloted retention valve 20;

Figure 8 represents a lateral sectional view of the hydraulic control 2, where one can notice when the piloted retention valve 20 is not used, being replaced by a lid set 24.

Figure 9 is a representation of the hydraulic system 3 where one can notice the location of the piloted retention valve 20, known as "anti-rubber nipple" and

the location of the externally piloted pressure sequence valve 21.

Figure 10 is a representation of the hydraulic system 3, where one can notice the location of the piloted retention valve 20, known as anti-rubber nipple and the location of the internally piloted pressure sequence valve 21.

In some applications the use of the piloted retention valve, known as "anti-rubber nipple", will be unnecessary.

Figure 11 is a representation of the hydraulic system 3, where one can notice the location of the lid set 24 and the location of the externally piloted pressure of the regulation valve 21 (hydraulic circuit)

Figure 12 is a representation of the hydraulic system 3, where one can notice the location of the lid set 24 and the internally piloted pressure of the regulatory valve 21.

[0011] The piloted retention valve 20 comprises the body of a valve 23, a buffer 24 a connection for the pilot line 25, a piston 26, a limiter 27, a plunger 28 and a spring 29. The piston 26 is kept against a center place in the body of the valve 23 through the action of a spring 29. Its function is to allow the free flow of fluid in one direction and keep it from going the opposite way. Note that an increase of pressure on the piston 26 in the non-allowed direction of the flow tends to push the piston 26 against the center place, thus enhancing the blocking.

[0012] With the use of two valves, an externally and/or internally piloted pressure sequence valve 21 and a pressure compensation valve with calibrated hole to control the flow 22 we managed to get an increase of cargo (greater residue density per cubic meter) at the work main low pressure. Both valves are part of the hydraulic pressure control induced in the telescope. The externally and/or internally piloted pressure sequence valve 21 is responsible, at being piloted by the hydraulic pressure of the hydraulic cylinders 11 of the compactor, for liberating just the pressure induced in the telescopic cylinder to the pressure compensating valve with calibrated hole to control the flow 22, responsible for keeping the resulting pressure stable and controlling it so as to allow a minimum reduction of induced pressure and consecutively a small retreat of the stage of the telescopic cylinder in operation. The volume of the container is increased when the retreat of the stage of the telescopic cylinder in operation is released 12, that is, a greater volume is created within the container 12 so that more residue may be compacted. This pressure compensating valve 22 with calibrated hole keeps the induced hydraulic pressure of the telescopic cylinder under control. This induced pressure is obtained according to the areas of the stages of the telescopic cylinder in operation, as a result of the force of compacting applied. A constant and homogeneous compacting is obtained in each stage of the telescopic cylinder from the operation of this valve. We conclude that, contrary to the current concept that it does not keep the induced pressure controlled through the compensation of the pressure but rather liberates it back to the tank, one has, by using this pressure compensating valve 22 with calibrated hole, a better control on the compacting, for the course of retreat of the telescopic cylinder is minimum, thus significantly increasing the density of the collected residue per cubic meter of container 12. This implies that the compacting force may be adjusted to keep and assure that the cargo of compacted residue is compatible with the equipment/vehicle 1 and consequently with the road being used.

[0013] Keeping the compensation of the induced pressure in the telescopic cylinder under control may also directly control the retreat of the telescopic cylinder. This also greatly favors the compacting and distribution of the compacted residue and provides greater security and driving conditions to the vehicle 1. All this makes it possible the adequacy of the main hydraulic pressure, which may be reduced the high performance of compacting, By redefining the compacting forces to lower values we managed to reduce them on the structure of the container 12 to values perfectly acceptable for the operation of the equipment in both the technical and security aspects. The characteristics of this hydraulic control complies to the design specifications of the vehicle/equipment 1, as well as the better distribution of the compacted cargo between the front and rear axles of the vehicle 1.

[0014] The piloted retention optional valve 20, provides the effect called "anti-rubber nipple". The piloted retention valve 20, will allow the passage of hydraulic oil only to the telescopic cylinder and consequently the opening of this telescopic cylinder so that the compacted residue may be ejected through the ejecting system 14, outside the container 12 if the lid set 13 of the compactor is open. This is because the hydraulic pressure induced by the hydraulic cylinder 11 that opens the lid set 13 is what generates the piloting hydraulic pressure liberating the hydraulic flow to open the telescopic cylinder. For this to take place, a directional hydraulic valve in the hydraulic line between the cylinder that lifts the lid set 13 and the pilot line of the piloted retention valve 20 is needed. The lid set must drive this directional valve mechanically and/or electrically 13. When this lid set 13 is closed the pilot line of the piloted retention valve 20 must be connected to the hydraulic oil tank.

[0015] It must be evident to those familiar to the technique that the invention hereon can be set up on many other specific ways without been separated from the spirit or scope of the invention. One must understand that the invention may be specially set up in the ways described hereinbefore.

[0016] Therefore, the examples and set ups hereon must be considered illustrations rather than restrictions and this invention should not be limited to the details provided in this document, but rather modified within the scope and equivalence of the related claims.

Claims

1. Hydraulic control **characterized in that** it comprises a pilot pressure sequence valve; a pressure vent valve with gauged vent for flux control; and an externally piloted stop valve.

2. Hydraulic control according to claim 1, **characterized by** the external and/or internal use of the pilot operated pressure control valve (21) and the pressure vent valve with gauged vent for flux control (22) that increase the load.

3. Hydraulic control according to claims 1 and 2, **characterized by** the valves control of induced hydraulic pressure in the telescopic cylinder.

4. Hydraulic control according to claim 1, **characterized by** the external and/or internal use of the pilot operated pressure control valve (21) liberate the recoiling of the telescopic cylinder stages.

5. Hydraulic control according to claim 4, **characterized by** the external and/or internal use of the pilot operated pressure control valve (21) when liberating the recoiling of the telescopic cylinder, that increase the volume in the container (12).

6. Hydraulic control according to claim 1, **characterized by** pressure vent valve (22) with gauged vent, that keeps the hydraulic pressure controlled and variable in function of the area of the telescopic cylinder stages.

7. Hydraulic control according to claim 1, **characterized by** the valves that keep compacting forces constant regardless the areas of the telescopic cylinder stages.

8. Hydraulic control **characterized by** residues that are homogenously compacted throughout the entire container (12) and the compacting force that is set to keep and assure that the compacted residue load is compatible with the equipment/vehicle (1) and consequently with transportation road being used.

9. Hydraulic control according to claim 1, **characterized by** the pilot stop valve (20), that promotes the so-called "anti-pacifier" effect.

10. Hydraulic control according to claim 9, **characterized by** the pilot stop valve (20), that only allows the passage of hydraulic oil into the telescopic cylinder and consequently the open of that telescopic cylinder through the ejecting system (14), outward the container (12), if the compactor cover (13) assembly is open.

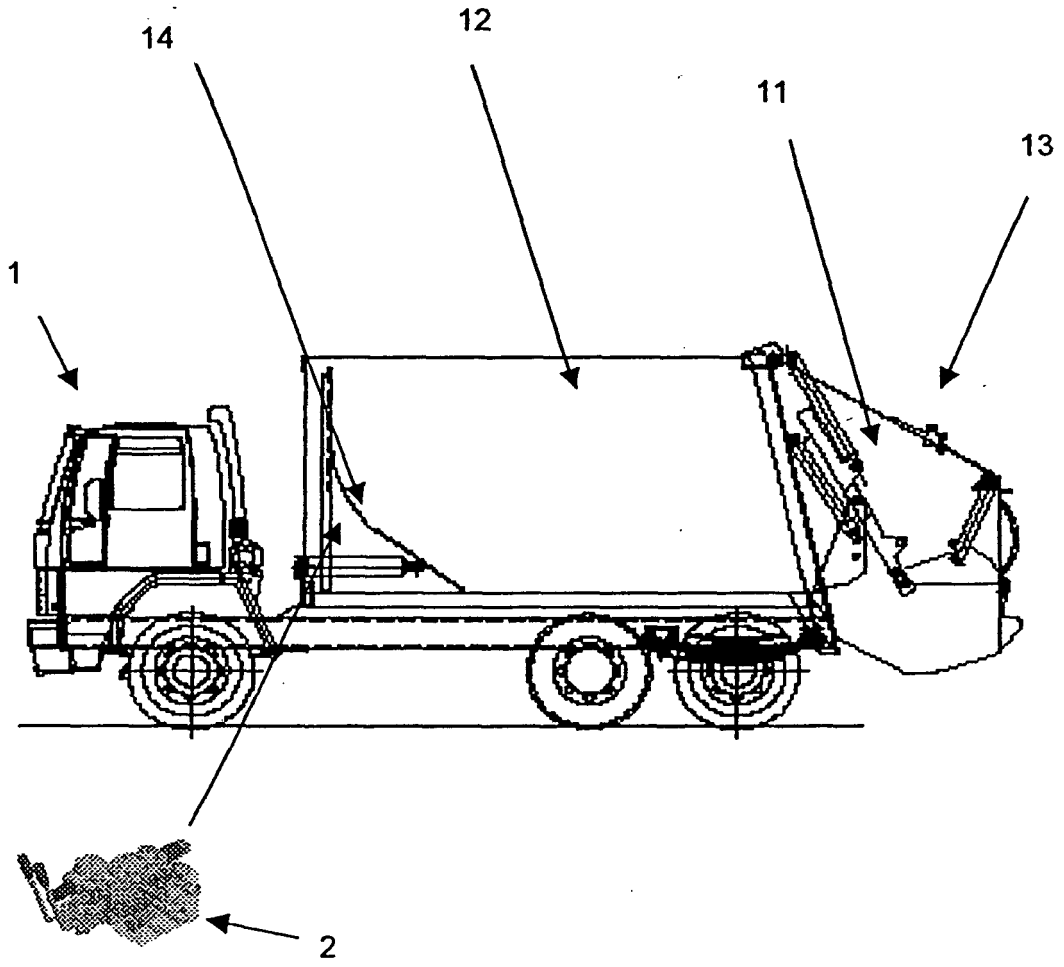

Figure 1

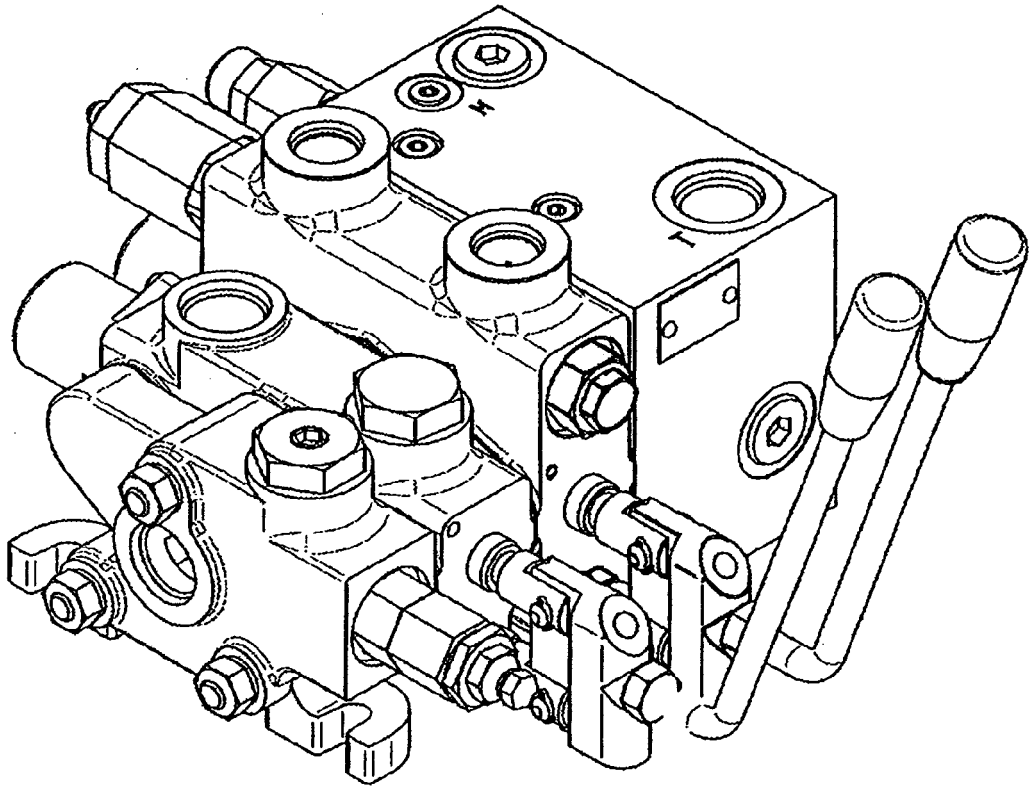

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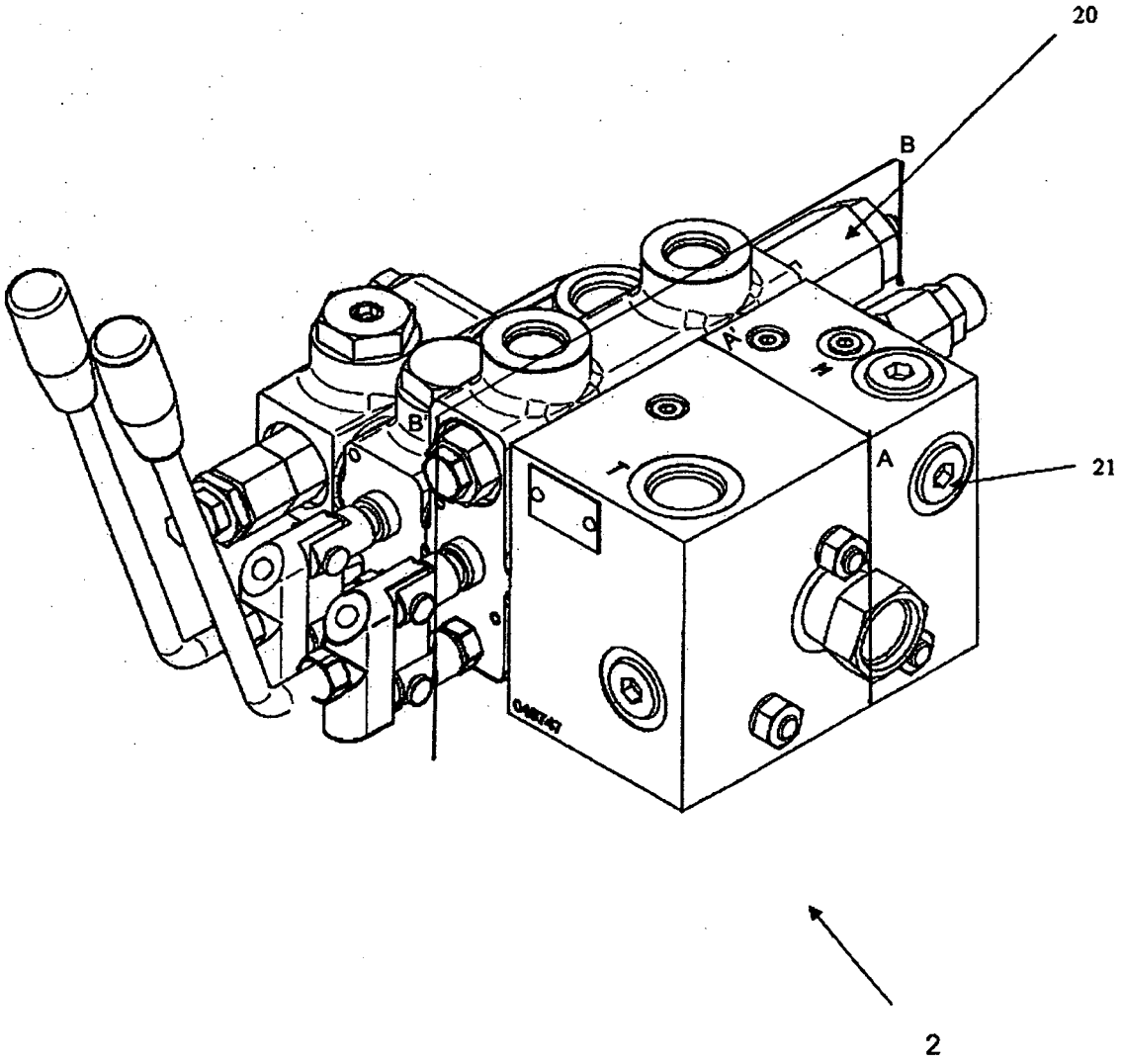
Figure 2



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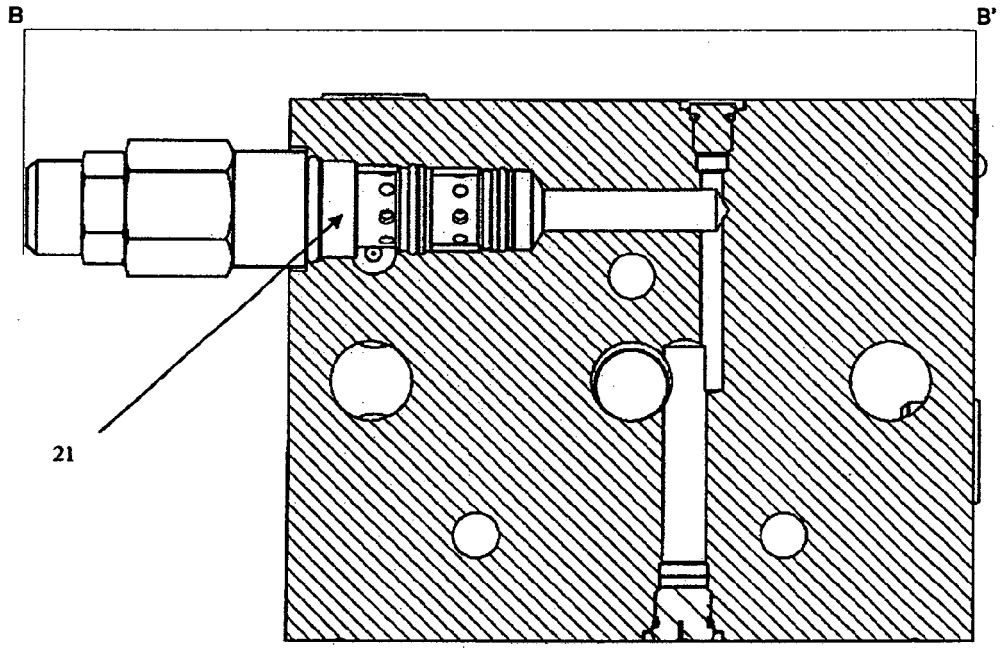

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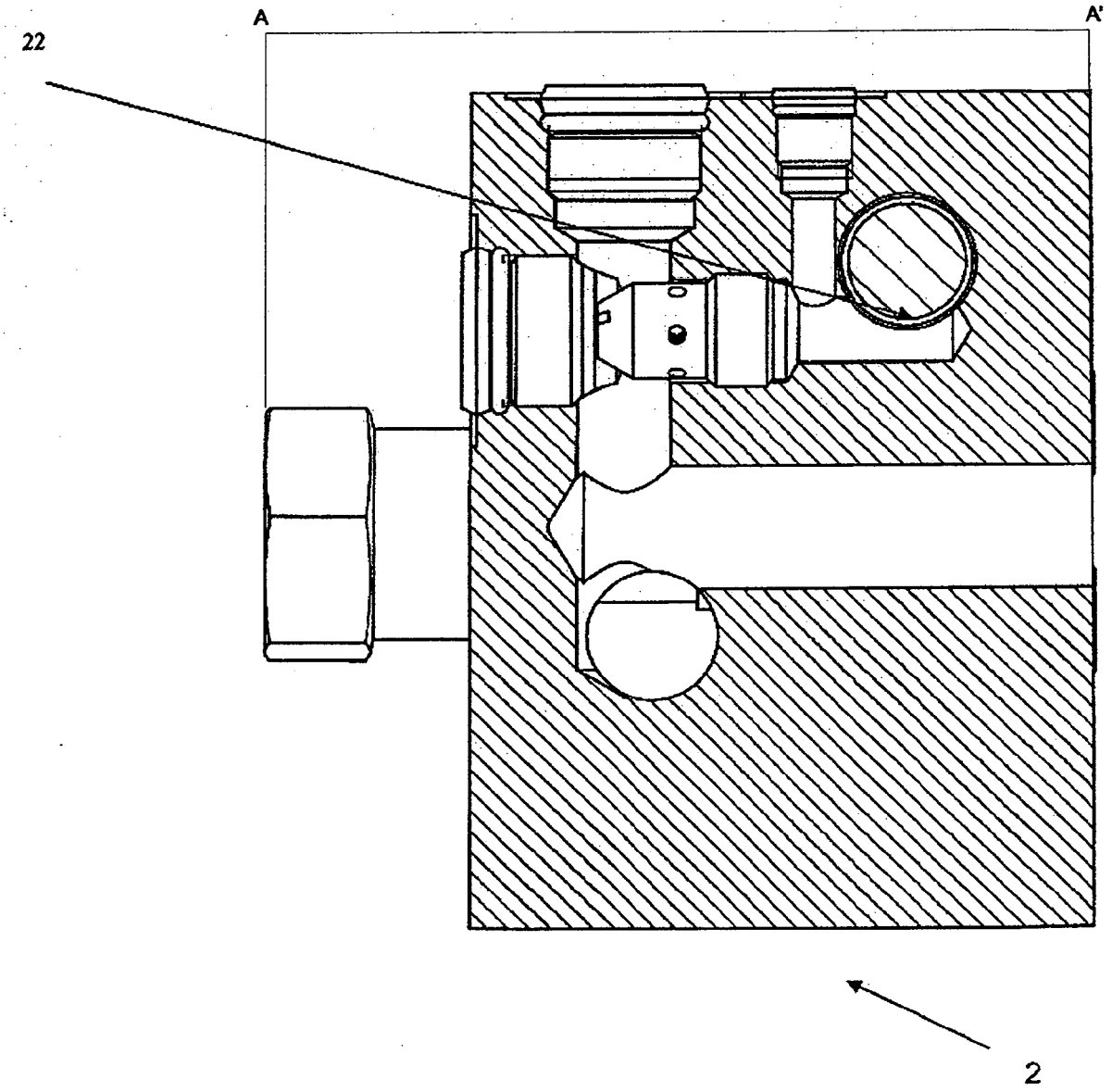

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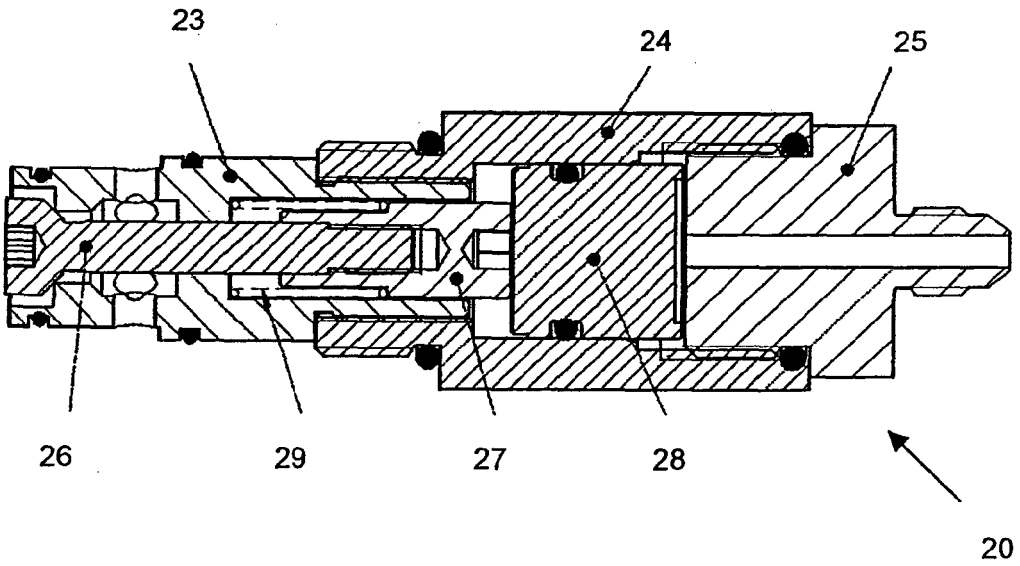

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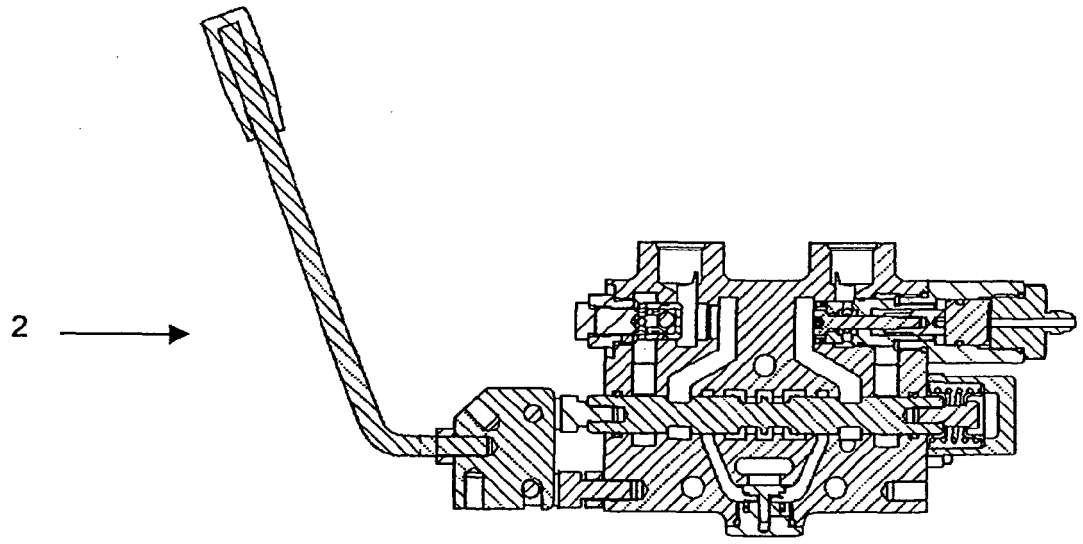

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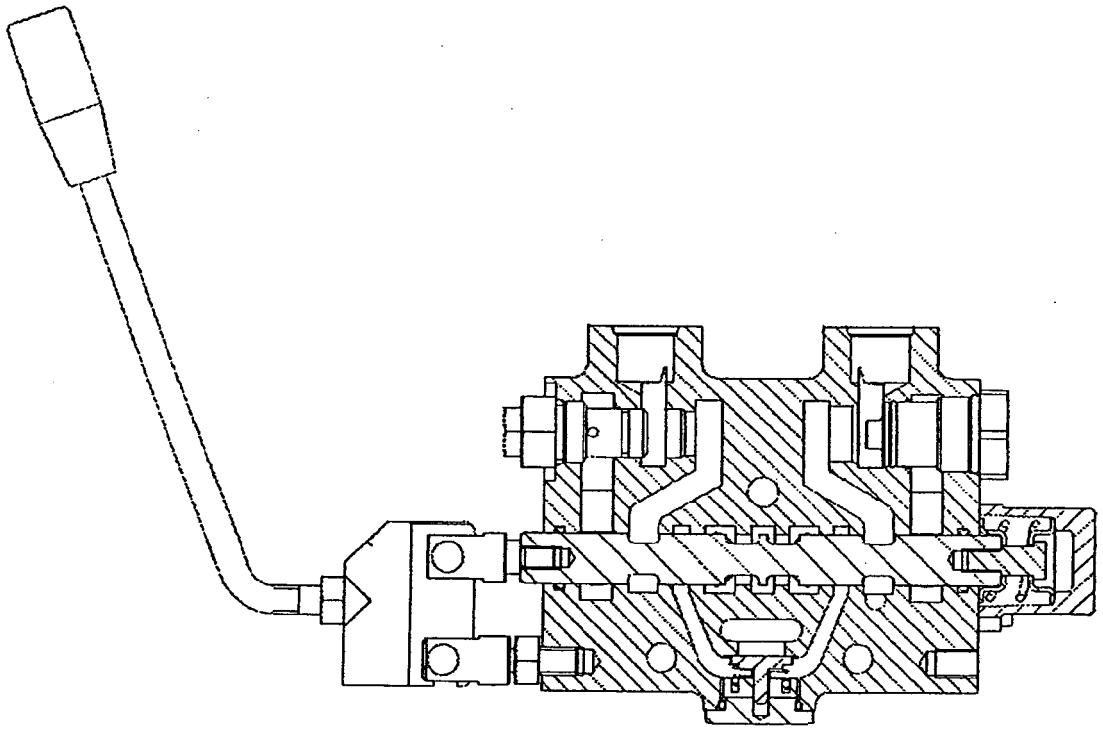

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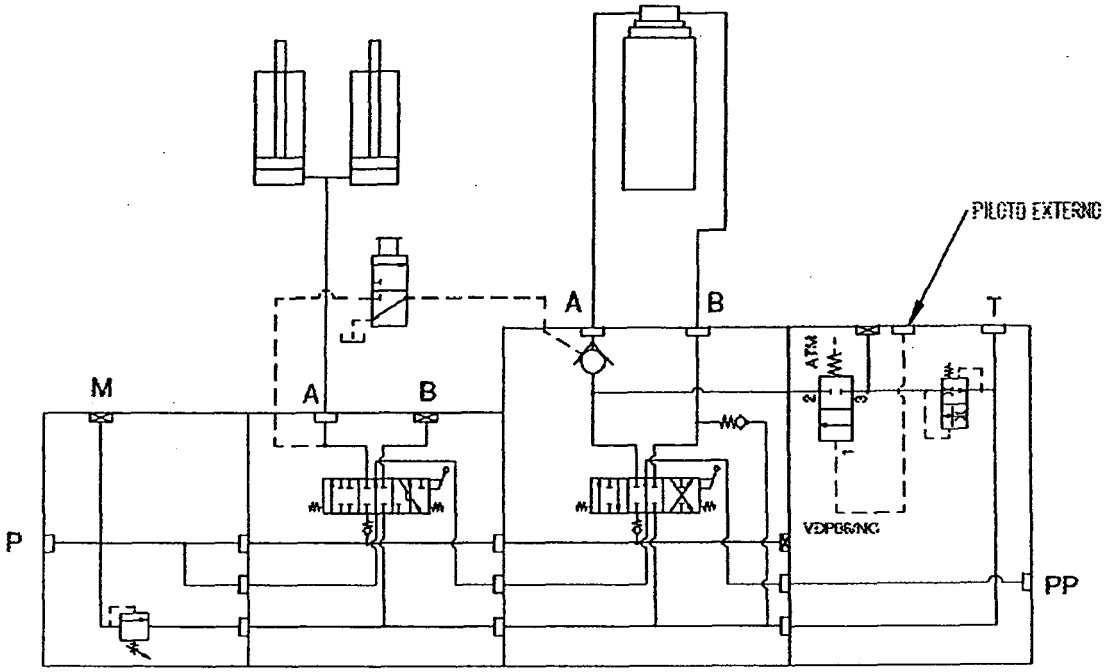

Figure 9

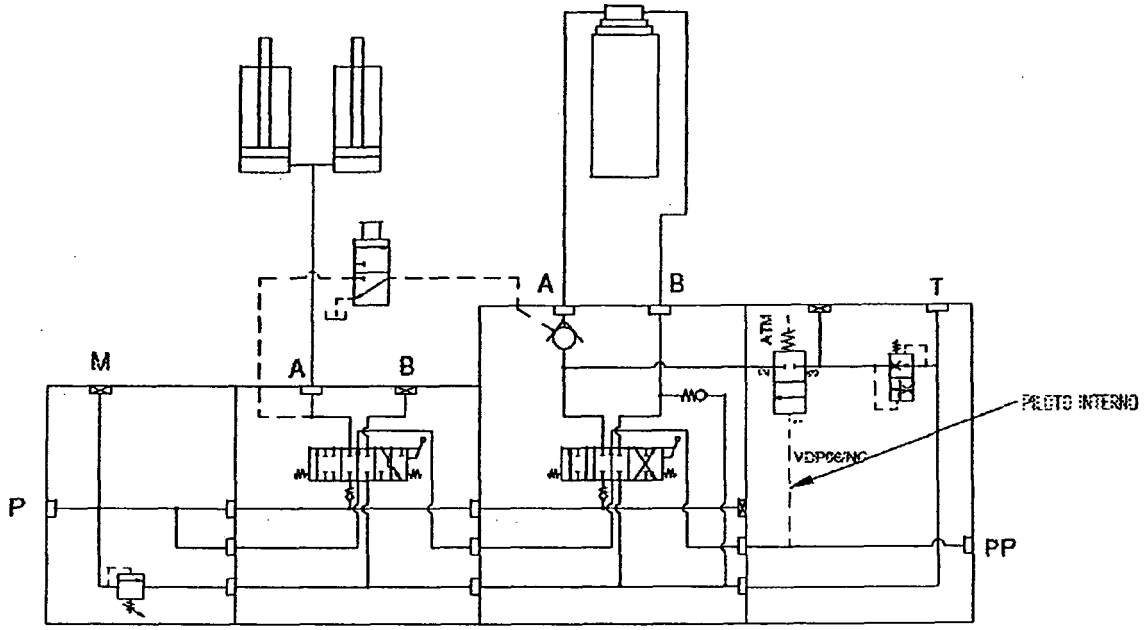

Figure 10

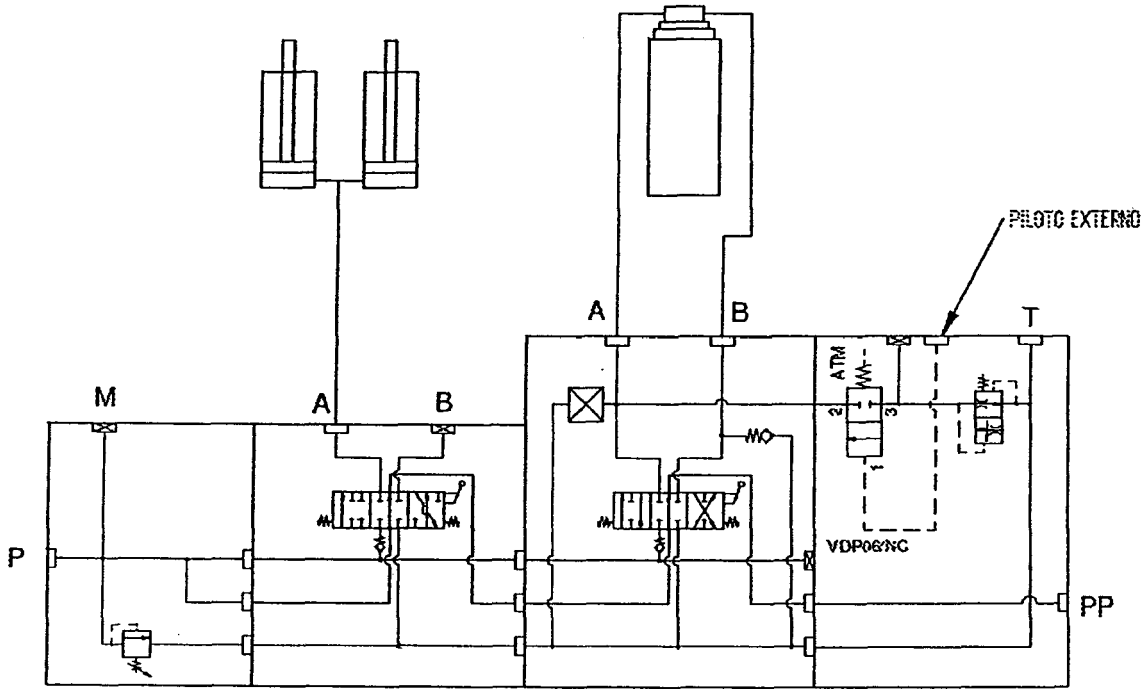

Figure 11

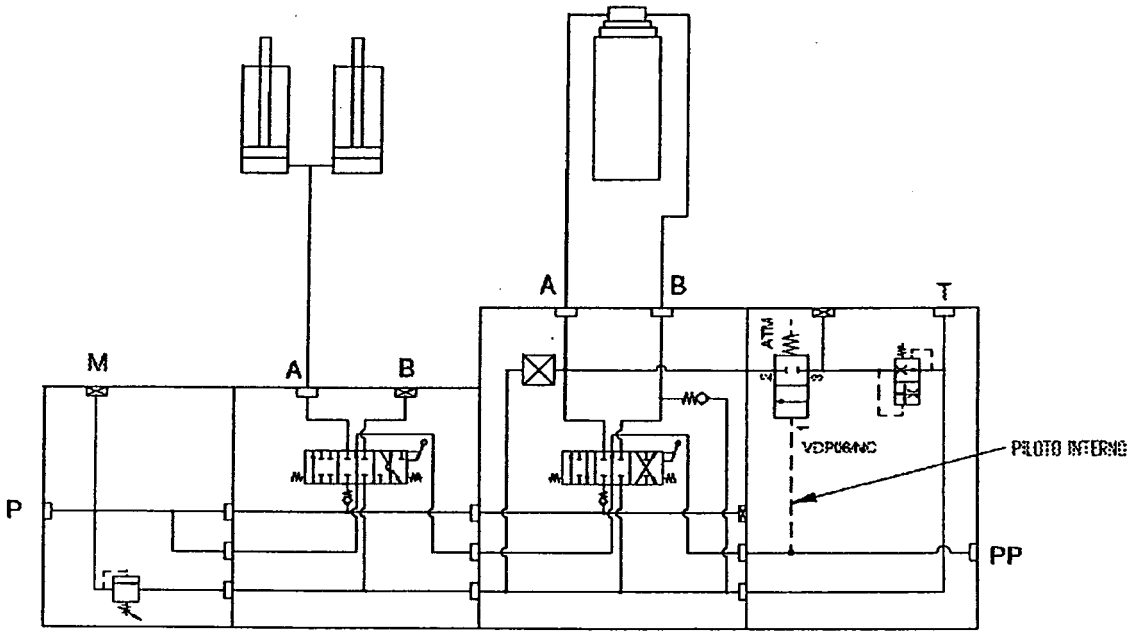

Figure 12