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DEVICE FOR MAINTAINING CONSTANT PRESSURE IN CONDUITS OR RESERVOIRS FILLED WITH LIQUIDS OR GASES
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Fig. 1

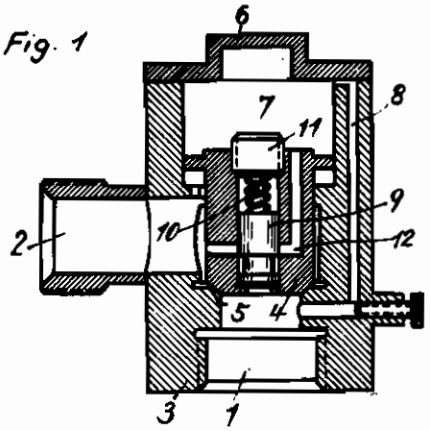


Fig. 2

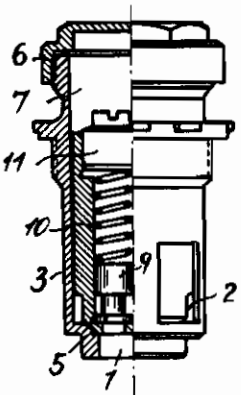


Fig. 3

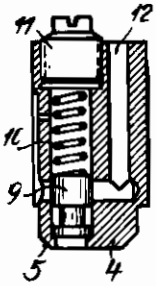


Fig. 4

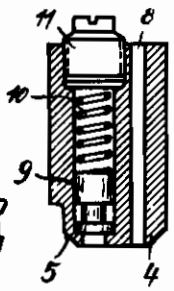
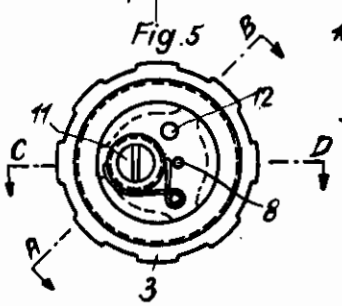


Fig. 5



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ALIEN PROPERTY CUSTODIAN

DEVICE FOR MAINTAINING CONSTANT PRESSURE IN CONDUITS OR RESERVOIRS FILLED WITH LIQUIDS OR GASES

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The invention relates to a device for keeping constant a predetermined pressure in conduits or reservoirs filled with liquids or gases.

Very frequently the demand will raise to maintain liquid or gas pressure in a system of conduits or the like at a predetermined constant amount. In lubricating internal combustion engines, e. g., which is generally operated by means of an oil pump supplying oil under considerable pressure and in an excessive quantity from a storage reservoir of the engine or from a separated tank to the single oiling points, either the whole quantity delivered is pressed through the oiling points or, as frequently usual, will in part be returned through a relief valve directly to the reservoir. This relief valve will in most cases be designed as a spring-loaded valve, the initial spring tension of which may be adjusted to a certain amount. This relief valve is to keep up, with all the working conditions of the engine, a predetermined oil pressure, respectively, to preserve the system of conduits from excessive pressures. It is generally usual to apply, particularly in lubricating systems provided with oil coolers, relief valves so as to preserve the relatively delicate oil cooler from too high pressures as caused, e. g., with the engine still being cold by the viscous oil, and to obtain a constant oil pressure before the cooler, as the pressure drop on the side of the oil is essential for the cooling capacity of the cooler.

However, the springloaded relief valves generally applied up to this time show the disadvantage that oil pressure cannot be maintained constant at a predetermined adjusted amount, but that the pressure effectively resulting in the system of conduits depends upon the quantity of discharge overflowing for a given moment through the relief valve. Yet, the overflowing quantity itself very often changes during operation and is dependent on the existing number of revolutions of the engine and the viscosity of the lubricating oil. The mentioned disadvantageous dependence of the pressure on the overflowing quantity results from the characteristic of the spring with which the valve is loaded and the force of which increases when being compressed more and more.

It is the object of the present invention to eliminate those shortcomings subsistent in the known relief valves and to realize a device which though allowing a simple and clear structure guarantees the maintaining of a predetermined adjusted pressure in the system of conduits.

In the mechanism according to the invention there is provided between the space in which pressure is to be kept constant and the return conduit leading, e. g., to the storage reservoir a main valve preferably designed as a sliding piston and on both sides of which pressure means is admitted and the surfaces of admittance of which are of different sizes. The pressure chamber arranged on the side of the larger surface of admittance communicates through a port with the proper pressure reservoir. There is further provided, according to the invention, a particular auxiliary valve which, preferably, is likewise designed as a sliding piston and on one side of which liquid or gas from the pressure tank is admitted whilst the other side of which is exposed to a predetermined adjustable pressure, e. g. to that of a spring, said auxiliary valve controlling a conduit which leads from the pressure chamber situated on the side of the larger face of admittance of the main valve to the return conduit.

By means of the device according to the invention, as tests proved, exact maintenance of a predetermined adjusted pressure in the conduit or the pressure tank is, at all events, obtained and that independently on the quantity which passes at a given moment and the viscosity of the applied liquid.

In the annexed drawing examples of construction of the device have been represented according to the invention.

Fig. 1 shows a section through a form of embodiment of the device according to the invention.

Figs. 2, 3, 4 and 5 show a further form of embodiment of the device according to the invention, Fig. 2 representing in a fragmentary section a side view of it, and Fig. 5 a top view with its closing cap being removed.

Figs. 3 and 4 represent sections according to lines A—B respectively C—D of Fig. 5.

In all figures corresponding parts designated by the same reference characters.

In the following, the manner of action of a device according to the invention will, by means of Fig. 1, be described. The space in which pressure of a liquid or gas is to be kept at a predetermined constant amount is indicated by 1 and the return conduit leading, e. g., to a storage reservoir by 2. In the casing 3 there is mounted, capable of longitudinal motion, a piston 4 which forms the main valve and comprises an annular cone-shaped faying surface 5. Casing 3 is closed pressure proof by a cap 6. The pressure chamber 7 formed hereby above piston 4 communicates through a port 8 in the casing with the proper pressure reservoir 1. A further piston 9 which

forms the auxiliary valve is mounted longitudinally slidable in piston 4 and is pressed downwardly by a pressure spring 10 the initial tension of which is adjustable by screw 11. The pressure of liquid or gas existing in space 1 propagates through port 8 into pressure chamber 7: Piston 4, therefor, is acted upon on both sides by the same pressure; the surface of admittance of the piston situated on the side of the pressure chamber 7 being, however, larger than that directed towards the pressure reservoir 1, the piston will be depressed and seal by means of its annular surface 5 with a corresponding faying surface on the casing. Fluid under pressure will be admitted, likewise, to the auxiliary piston 9 from pressure reservoir 1. On exceeding, in space 1, a predetermined amount of pressure which is proportioned by the initial tension of spring 10, auxiliary piston 9 is moved upwardly opening a port 12 bored in piston 4, which port leads from pressure chamber 7 to return conduit 2. The cross-section of this port 12 is larger proportioned than that of port 8 whereof pressure drop results in pressure chamber 7 compared to pressure in space 1, which decrease of pressure will have the result of the main piston 4 moving upwardly thus causing the pressure fluid in space 1 to discharge into the return conduit. When pressure has dropped in space 1 the auxiliary valve closes under the influence of the pressure spring 10 port 12, and main piston 4 will move downwardly again and close the pressure reservoir 1 off the return conduit, respectively it will leave open a certain slot, so as to establish a state of equilibrium. In this way as just described a predetermined constant pressure is maintained in the pressure reservoir 1. To be able to mount the device according to the invention also in a reverse position it is of use to arrange between piston 4 and casing cap 6 a pressure spring the effect of which will be to press, in a state of no-pressure of the apparatus, piston 4 with its faying surface 5 on the corresponding faying surface of the valve box, thus the piston not tending to move by its won weight into the opposed extreme position. The pressure spring may be proportioned but very weak, the spring therefor being of no influence on the operation of regulation of the device.

The example of construction, shown in Figs. 2, 3, 4 and 5, of the subject of the invention has the same spirit of invention as its basis, the manner of action being the same, too, as with the device according to Fig. 1. Only the port of communication provided between pressure tank 1 and pressure chamber 7 has been displaced for simplification into piston 4, and the complete apparatus according to the invention is constructed in form of an insertion apparatus easily to be mounted.

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