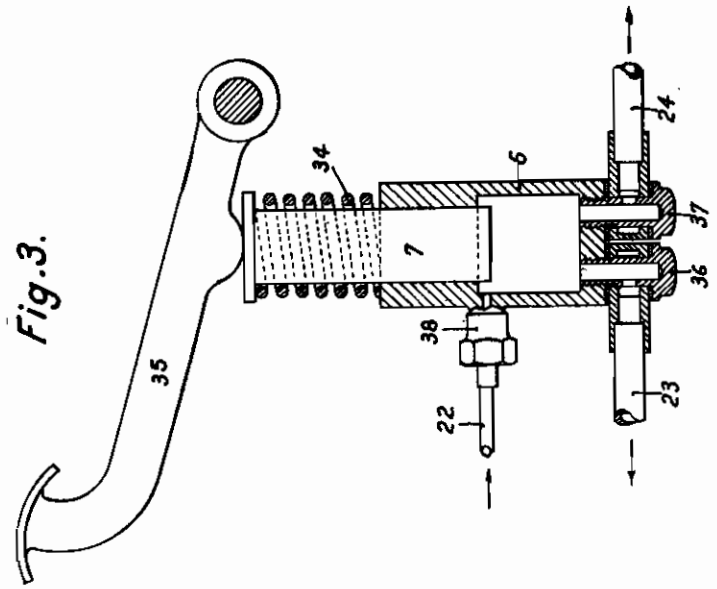
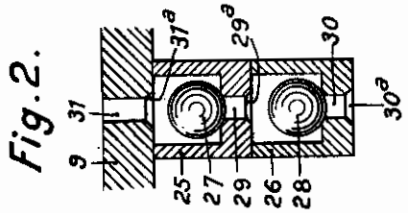
PUBLISHED
APRIL 27, 1943.
BY A. P. C.

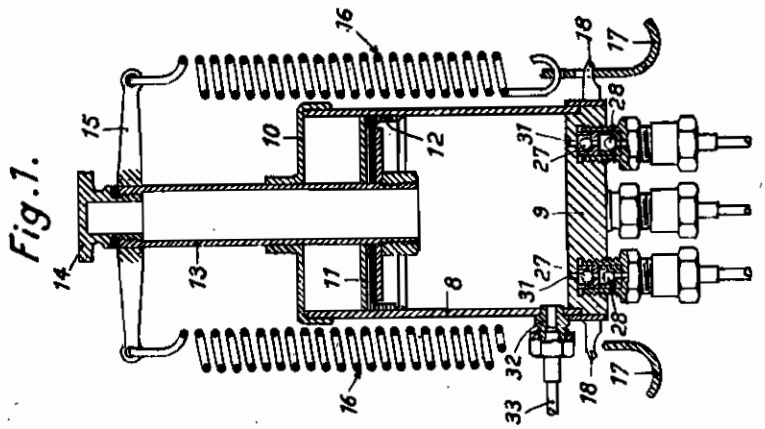
A. A. MORTON
DEVICE FOR THE SUPPLY OF HYDRAULIC CONTROL APPARATUS FOR MOTOR VEHICLES
Filed June 5, 1941

Serial No.
396,779

3 Sheets-Sheet 1







Inventor,
A. A. Morton

By: Glascock Downing & Seebold
Attys.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

A. A. MORTON
DEVICE FOR THE SUPPLY OF HYDRAULIC CONTROL APPARATUS FOR MOTOR VEHICLES
Filed June 5, 1941

Serial No.
396,779

3 Sheets-Sheet 2

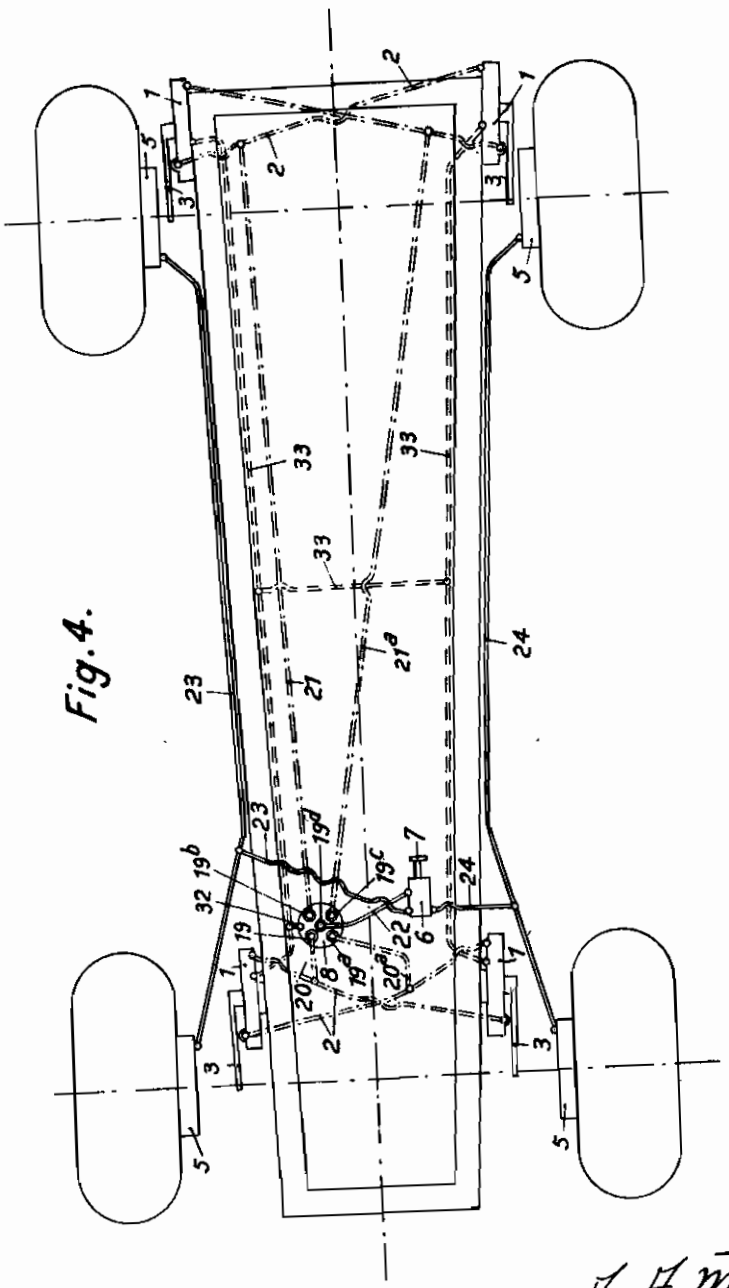


Fig. 4.

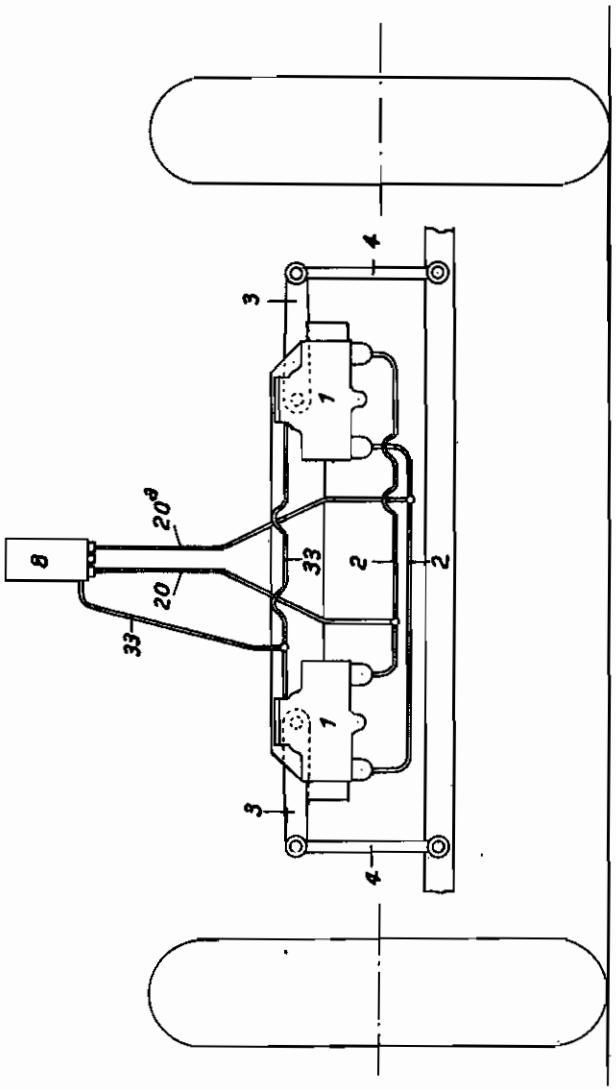
Inventor,
A. A. Morton
by: Glascock Downing & Seabold
Attys.

PUBLISHED
APRIL 27, 1943.
BY A. P. C.

A. A. MORTON
DEVICE FOR THE SUPPLY OF HYDRAULIC CONTROL APPARATUS FOR MOTOR VEHICLES
Filed June 5, 1941

Serial No.
396,779
3 Sheets-Sheet 3

Fig. 5.



Inventor,
A. A. Morton

By: Glascock Downing & Seebold
Attys.

Published Apr. 27, 1943 Serial No. 396,779

ALIEN PROPERTY CUSTODIAN

DEVICE FOR THE SUPPLY OF HYDRAULIC CONTROL APPARATUS FOR MOTOR VEHICLES

André Adolphe Morton, Paris, France; vested in the Alien Property Custodian

Application filed June 5, 1941

The present invention concerns a device for the supply of the various hydraulic control apparatus fitted to certain motor vehicles, and especially of the dampers and stabilisers of the oscillations impressed to said vehicles by road bumps, and of the hydraulic control for the brakes.

The device according to the present invention is designed in a manner to compensate the expansions and contractions of the liquid under the effect of changes of temperature, to remedy the loss of liquid by leakage or use of the latter, and to ensure constant filling of the apparatus and regular operation of the latter.

The device presents the following main features:

The supply of the various hydraulic control apparatus is ensured by a low pressure tank constituted by a cylinder containing oil and in which moves a piston fixed to one end of a hollow rod forming a filling tube for said tank and closed at its other end by a removable plug; the piston being subjected to the action of springs which may be removed for filling the tank.

The supply tank is provided with a bottom carrying boxes provided with balls arranged in a manner to ensure hermetic closing of said tank from the outside towards the inside while permitting a certain leakage from inside to outside, said balls resting on their seat, with adjustable leakage, when the vehicle is at rest and the apparatus supplied by the tank are idle, and being applied against their hermetic seat by the shock experienced by the liquid during operation of said apparatus and travel of the vehicle.

The master cylinder provided for the hydraulic control of the brakes is connected to one of the ball boxes of the supply tank through a high pressure pipe connected to said box and to a suction aperture provided in the wall of the master cylinder and not closed by the piston movable in said cylinder.

High pressure pipings connect each of the crossed pipes of the damper-stabilisers to as many ball boxes arranged at the base of the supply tank.

A low pressure piping collects all leakage from the various apparatus supplied by the tank and returns this liquid to said tank.

For the purpose of illustration, the device according to the invention is described below with reference to the joined drawing as applied to the supply of hydraulic dampers and stabilisers of a motor vehicle and of the hydraulic control device for the brakes of said vehicle.

In the joined drawing:

Figure 1 shows in vertical section along the axis the oil tank supplying the various hydraulic controls of a motor vehicle.

Figure 2 is a detailed view showing in section along the axis one of the valve boxes of said supply tank.

Figure 3 shows, also in section, the pump body or master cylinder for the hydraulic control of the brakes.

Figure 4 is a plan view showing schematically a motor vehicle frame fitted with hydraulic dampers and stabilisers and with hydraulically controlled brakes and provided with the device according to the invention for automatic supply of the dampers and master cylinder controlling the brakes.

Figure 5 is a front view of the same frame, showing diagrammatically the supply tank according to the invention and the pipings connecting this tank to two damping and stabilising devices fitted to the front wheels of said vehicle.

Referring to Figures 4 and 5 of the drawing, it will be seen that the motor vehicle, shown diagrammatically, is fitted with two pairs of hydraulic devices 1, similar to one another and located: those of one pair, in front, and those of the other pair at the rear of said vehicle. These devices, of similar construction with those described in the patent application filed by the same applicant the same day as the present application, are hydraulically connected to one another, in each pair, by two crossed pipes, 2, 2_1 and constitute the hydraulic damper and stabiliser object of the above mentioned patent application.

Each of these devices is constituted by a casing 1 forming an oil reserve tank in its central part and comprising two inner cylinders in which are arranged pistons, one of which is connected, over a lever arm 3 and a connecting rod 4, to the front axle, for one of the pairs of said devices, and to the rear axle, for the other pair.

These various casings 1, the corresponding cylinders and the tubes 2 are completely filled with oil.

In Figure 4 it is seen that the vehicle is fitted with brakes 5 controlled hydraulically by means of a pump or master cylinder 6 filled with oil and the piston 7 of which is actuated by the driver's foot in the known manner.

The device according to the present invention is adapted for supplying hydraulically the dampers and stabilisers 1 and the pump 7 controlling the brakes, and is designed so as to compensate

the expansions and contractions of the liquid due to temperature changes, and to permit further to collect the liquid leakages which may be quite considerable in the dampers and stabilisers of this type, due to their continuous operation.

This device may, of course, be applied for the supply of any hydraulically controlled apparatus fitted on a motor vehicle. It consists in principle in a central tank **8** under a certain pressure head with respect to the apparatus supplied, and connected to the latter through suitable pipings and ball valves compensating the expansions and contractions of the liquid contained in said tank and in the various apparatus connected to the latter.

The said pressure head of the liquid contained in tank **8** may be obtained simply by gravity, as shown schematically in figure 5, or, preferably, by a mechanical means subjecting the liquid to a low pressure, as in the embodiment of figure 1.

In this figure it will be seen that the tank arranged in this manner and placed under the engine hood, consists in a cylinder **8** provided at its base with a bottom **9** and at its upper part with a lid **10**. Inside cylinder **8** is slidably arranged a piston **11** provided with a leather cup stuffing **12** or the like and fixed to the lower end of a tubular rod **13** guided in the lid **10** and in the upper end of which is fitted a threaded plug **14** closing the pump body constituted by tank **8** and permitting an easy filling of said tank when the plug has been unscrewed.

The tubular rod **13** of piston **11** carries, on the other hand, fixed to its end, a rigid bracket **15** to both ends of which are fixed two coil springs **16** provided, at their lower ends, with suitable fixing members **17** for tensioning said springs and hooking them under tension to two hooks **18** integral with the bottom **8** of the pump or supply tank body **8**.

These springs **16**, thus held under tension, permit to exert, through the means of piston **11**, a slight pressure on the liquid contained in cylinder **8** between said piston and bottom **9** of said cylinder, and introduced into the latter after unhooking the spring links **16**, unscrewing plug **14** and lifting piston **11** inside the cylinder. After effected filling, plug **14** is screwed back and springs **16** tensioned by hooking the members **16** as shown in figure 1.

The bottom **9** of the tank or supply pump carries ball boxes arranged in a number corresponding to that of the hydraulic control devices which have to be supplied by said tank **8**.

In the example shown, there are five ball boxes, refered to in figure 4 as **19**, **19***a*, **19***b*, **19**c and **19***d*.

As shown in figure 4, the first two boxes **19**, **19***a* are connected by pipes **20**, **20***a* to two crossed tubes **2**, **2** connecting the front dampers and stabilisers, the two boxes **19***b*, **19**c are also connected by two other pipes **21** and **21***a* to the two crossed pipes connecting the two rear dampers-stabilisers, while the box **19***d* is connected, by a tube **22**, to the master cylinder **6** controlling hydraulically the fore and aft brakes connected to one another and to said master cylinder **6** by the tubes **23** and **24**.

The various pipes above, issuing from the ball boxes **19** to **19***d*, have a smaller inner diameter for resisting to the pressures exerted in the various hydraulically controlled apparatus, and which, in the damper-stabilisers, may attain several hundred kgs/sq cm. For increasing the safety, the balls enclosed in the several boxes **19** to **19***d* are arranged two, three or more in cascade.

Refering to figure 2, illustrating in detail and at a larger scale any one of the various ball boxes carried by the bottom **9** of the supply tank **8**, it will be seen that each of the said boxes consists in two superposed cups **25** and **26** in which are respectively located and vertically movable two balls **27**, **28** which, during the rest periods of the vehicle and when the brakes are not in operation, normally rest respectively on two seats with a suitably arranged leakage formed by the upper aperture of two channels **29** and **30** going through the centre of the bottom of each of the two cups **25** and **26** and ending, at the base of the latter, by conical apertures shown in figure 2 respectively in **29***a* and **30***a*.

In the axis of the upper cup **25** of each ball box ends, on the other hand, by a conical port **31***a* a channel **31** passing through the bottom **9** of tank **8**.

Tank **8** carries, on the other hand, at a certain height, a nipple **32** permitting, by means of small diameter pipes **33**, to connect said tank, as shown in figure 4, to the various hydraulically controlled apparatus and to recuperate the liquid leaked from the various apparatus.

Refering to figure 3 showing in detail the master cylinder **6** for the hydraulic control of the brakes, it is seen that the plunger piston **7** sliding in said cylinder may be or not provided with a stuffing and is reset by spring **34** against the pedal **35** actuated by the driver for the operation of the brakes **5**. The cylinder is provided, at its bottom, with nipples **36**, **37** to which are respectively connected the two pipes **23** and **24** connecting said cylinder to the brakes as shown and described with reference to figure 4.

Another nipple **38**, arranged so as not to be closed by the plunger piston **7**, connects over a resisting pipe **22** cylinder **6** to the ball box **19***d* as described with reference to figure 4.

It is thus seen that the balls **27** and **28**, rest, when the vehicle is at rest and the brakes not in operation, upon the respective seats with prepared leakage of the ball boxes, thus connecting the supply tank **8** with the hydraulic control apparatus of said vehicle and permitting to compensate the contractions and expansions of the liquid due to changes of temperature. Besides, the communication between said tank **8** and the various apparatus over the connections **33** permits to supply the liquid lost by leakage or use, as explained above.

The compensating balls or valves are pushed against their respective hermetic seats **31***a* and **29***a* and thus brought into closing position when the damper-stabiliser and/or the brakes are in operation, i.e. when due to the oscillations impressed to the axles during the travel of the vehicle, or to operation of the brakes by piston **7**, the liquid enclosed in these hydraulic control apparatus and in the high pressure pipes connecting them to tank **8** is suddenly displaced towards said tank by the movable parts of the apparatus and exerts on the compensating balls or valves a shock bringing said balls into contact respectively with their hermetic seats in order to prevent at this moment the flow of liquid into the tank and to permit the free operation of the hydraulic control apparatus.

The constructive arrangements described above are, of course, given only by way of example, the forms, substances and dimensions of the elements constituting the supply tank and the master cylinder **6** controlling the brakes, and the details of embodiment may be varied without at all departing from the invention.

ANDRÉ ADOLPHE MORTON.