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BRAKING ARRANGEMENT COMPRISING AN HYDRAULIC DECELERATOR

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Fig. 2

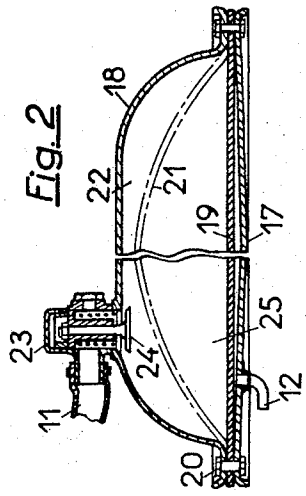


Fig. 1

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BRAKING ARRANGEMENT COMPRISING AN HYDRAULIC DECELERATOR

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ABSTRACT OF THE DISCLOSURE

A braking hydraulic decelerator in which the decelerator is simultaneously supplied directly from the cooling system of the vehicle and directly from an auxiliary supply reservoir.

The invention relates to a new method of using hydraulic decelerators.

It is known that hydraulic decelerators cannot suffice to ensure the braking of automobile vehicles in the sense in which the word "braking" is generally used, and denotes the possibility of stopping the vehicle if not instantaneously, at least in a minimum of time acceptable for a given speed. Also hydraulic arrangements are considered as capable only of ensuring a limited deceleration before being completed by the use of a mechanical brake, if it is desired to come to a stop—or capable of preventing accelerations. Whence comes their name of "decelerators."

The inadequacy of decelerators in the conditions demanded practically for an arrangement capable of being regarded as a brake has, for one of its principal causes, the time necessary for filling up the decelerator which, when proceeding normally, should be empty of liquid in order not to absorb the shaft power unnecessarily.

The arrangements comprising an hydraulic decelerator, the heat exchanger of which is formed by the radiator of the vehicle, includes lengths of pipe relatively long with as small a diameter that it is possible, in practice, to give to them.

The arrangements with an independent heat exchanger are more costly, they offer the advantage of not bringing about a lowering of the level in the radiator of the engine of the vehicle during the functioning of the decelerator, but it is often difficult to accommodate such exchangers in the immediate vicinity of the decelerator and from the point of view of the time of the filling they cannot offer a considerable advantage and, in any case, one sufficient to be able to attain the desirable order of magnitude.

A lower filling time can be obtained with arrangements with an independent heat exchanger, the liquid charge of which is normally contained in a cylinder from which it is driven by means of compressed air in order to fill the decelerator, but the arrangements used have somewhat slow response times, and as the present inventor has recognized, can be, in themselves, the object of considerable improvement on this point.

A first object of the invention is to preserve the advantages which the radiator of the vehicle offers as a heat exchanger.

These advantages include a greater volume of liquid in circulation and greater surface of radiation.

While avoiding the major disadvantages of one part of this radiator includes a lowering of the level and its remoteness, it also alleviates the disadvantages of an independent heat exchanger.

With these objects in view concomitant use is made of the said radiator and of a filling cylinder, and this without making use of an independent heat exchanger.

A second object of the invention is to reduce the time of filling of the decelerator and correlatively the emptying time.

With this object in view the invention makes use of simultaneous filling, starting from the filling cylinder and starting from the mass of water circulating in the general cooling system of the engine of the vehicle—more particularly and additionally, supplying the decelerator starting from the jacket of the engine cylinders in such a way as to reduce the length of the piping and to take advantage, of the excess pressure at this point created by the circulating pump, if any.

The third object of the invention is to obtain a supplementary improvement for a given time of functioning, by augmenting the speed of evacuation and of return of the liquid.

With this object in view the invention provides for the replacement of the classic cylinder by an extremely flat diaphragm receiver, a receiver the form of which is designed in order that the emptying may be total, that is to say, the form of which approaches as nearly as possible the form which the diaphragm tends to take when it is subjected to the action of compressed air.

Having thus, by means of the two means indicated above, improved in a considerable way the time of filling of the decelerator, it is recognized that it is possible to use the decelerator not only in a way that is to some extent incidental and subjective, the driver operating the decelerator by an independent control every time that he thinks it necessary to do so, but by using systematically the hydraulic deceleration as the first phase of any braking operation, the second phase of which is then mechanical. Hence, one alleviates the disadvantage which hydraulic decelerators have shown hitherto in comparison with electric decelerators.

With this object in view the invention divides into two parts the course of the control member of the mechanical brake, that is to say, in practice the course of the usual brake pedal. The first part of the course brings about the progressive actuation of the decelerator, the second part the progressive actuation of the mechanical brake, understanding by the mechanical brake, a brake of which the friction member is mechanical; even if the transmission is hydraulic or pneumatic.

The arrangement according to the invention thus makes possible the avoidance of the use and therefore of the wear of the lining of the mechanical brakes whenever it is only a matter of obtaining a temporary deceleration without coming to a stop, which is at present the case in the majority of the braking occurrences for buses or lorries of urban service, the presence of a source of compressed air on which is already in general use.

As will be shown hereafter this improvement does not exclude the possibility of putting the decelerator into a state of permanent operation, for example in the course of a long descent.

Although intended for use by buses and lorries the invention will also find application in other fields, for example that of the engines of hoisting machines, in particular those which comprise an internal combustion engine and more particularly still those in which the engine is controlled by compressed air as is often the case in the mining industry.

The invention will now be described with reference to the accompanying drawings which show an embodiment of the invention but in no restrictive sense, wherein:

FIGURE 1 represents schematically the mounting of the arrangement according to the invention of a commercial vehicle.

FIGURE 2 shows in diametrical section the reservoir according to the invention.

In FIGURE 1 is shown by means of 1 the hydraulic decelerator in its entirety—a decelerator of which a great number of types exist which have been either proposed or carried out, for example, that which was described in English Patent 842,145 due to the present inventor.

The supply of the decelerator is taken at 2 from the jacket of the engine 3.

The decelerator discharges during its functioning into the radiator 4 of the vehicle by means of the output pipe 5 while 6 is the discharge piping.

On the supply piping 7 is the usual valve 8 which is normally controlled in the actual installation by a manual control and which, according to the present invention, is controlled by the brake pedal 9 by means of the compressed air servomotor 29.

In the immediate vicinity of the decelerator 1 is the filling reservoir 10 a detailed description of which will be given later.

This filling reservoir communicates by a large diameter piping 11 with the decelerator, this piping being connected to the said decelerator by a T-tube 12 on the other branch of which is branched the discharge piping 6.

The piping 13 is the compressed air piping starting from the reservoir of the vehicle—a reservoir which has not been shown.

The piping 13 arrives at the distributor valve 14 which permits of connecting the piping 13 with the piping 15 which itself is connected to the reservoir 10. In a second position the distributor valve 14 closes the supply of compressed air by the piping 13 and connects the piping 15 to the atmosphere via the purge 16.

As may be seen in the figure, the compressed air servomotor is simply a small piston jack, the compressed air acting on one face of the piston against the action of the spring which bears on the opposite face of the piston.

Although this has not been shown in the drawing it will be easily understood that it is possible to establish a by-pass piping which permits of short-circuiting the valve 8, this by-pass tubing in its turn comprising a by-pass valve which may be controlled manually by a remote control starting from the cabin of the vehicle.

Turning now to FIGURE 2, it is seen that the reservoir 10 is formed in the following way:

It shows in the first place an extremely flat form composed of a base 17 which, seen from outside, presents a very slightly convex form and a dished part 18, the two parts 17 and 18 gripping by means of flanges a diaphragm 19 the general form of which is circular.

The gripping of the diaphragm between the two flanges is here represented as carried out by a series of bolts such as 20, but of course one can use for this gripping the various means which are already known for diaphragm devices of this kind.

At 21 is shown, by broken lines, the position of the diaphragm when it is partially stretched by the action of compressed air which arrives through the pipe 15.

It will be easily understood that if the diaphragm continues to stretch it will come to be closely applied over the whole of the dished part 18.

The upper compartment of the reservoir designated by 22 is joined to the piping 11, itself connected to the decelerator 1, by a coupling head 23 formed by a valve, subjected to a spring and normally open, in such a way that the diaphragm covers the head of the obturator 24 at the alignment of the wall of the part 18 in order to avoid having the diaphragm penetrating the interior of the coupling head due to pressure in the lower compartment 25.

The pedal 9 controls the distributor valve 14 by means of a linkage, of which a telescopic link 26 forms part, which allows, when the distributor lever is at the end of its travel, the pedal to continue its movement against the action of the spring 27 and to actuate the usual braking arrangement (not shown).

The device operates as follows:

The pedal being in its rest position, the distributor keeps the supply of compressed air shut off while the purge is open.

The servomotor 29 is then in the position shown and keeps the valve 8 shut.

The diaphragm of the reservoir 10 is relaxed and applied to the bottom of the reservoir under the weight of the water which fills it.

By compressing the pedal over a part of its total movement the distributor closes the purge and opens the supply of compressed air, operating on the one hand on the servomotor 29, which instantaneously opens the valve 8, on the other hand on the diaphragm of the reservoir which stretches, driving out the water contained in the compartment 22 in part into the decelerator and in part into the radiator by means of the discharge tube 6.

The water thus passes from two sides into the decelerator and this can consequently have immediate effect.

To actuate the normal brake the driver continues to depress the pedal in accordance with the desired effect without modifying the action of the decelerator, from the moment at which the distributor valve 14 has arrived at the end of its travel.

The telescopic link 26 allows of the pedal being pressed to the bottom without notable additional resistance.

By releasing the pedal progressively the action of the normal brakes is reduced or even stopped and by releasing the pedal completely the decelerator in its turn ceases to act, because, the distributor returning to its purge position the servomotor 29, by the action of its return spring, closes the valve 8, thus the supply of water to the decelerator ceases and the water in the decelerator is expelled into the reservoir on the one hand by gravity, on the other hand by the suction effects of the diaphragm, the latter seeking to relax.

The air compartment 25 being likewise in communication with the atmosphere offers practically no resistance to the return of the diaphragm to its relaxed position.

What I claim is:

1. A braking arrangement comprising an hydraulic decelerator, the heat exchanger of which is constituted by the radiator of the vehicle, in which the decelerator is supplied simultaneously from the cooling system of the vehicle and from an auxiliary supply reservoir, said auxiliary supply reservoir being divided into two compartments by a diaphragm and including means for introducing fluid under pressure into the first compartment, the second compartment being connected to said decelerator.

2. An arrangement as claimed in claim 1 in which the form of the reservoir is such that one part of the diaphragm applies itself to a flat bottom when the second compartment is full of liquid and applies itself to the whole of the surface of a concave wall when the first compartment is full of fluid under pressure.

3. A braking arrangement for a vehicle having a motor and a cooling system containing coolant liquid for said motor, said cooling system including a heat exchanger comprising:

(a) said cooling system containing said coolant liquid,
(b) a decelerator,
(c) means for connecting said decelerator to said cooling system,
(d) an auxiliary supply reservoir,
(e) second means for directly connecting said reservoir and said decelerator,
(f) said decelerator being supplied simultaneously with said coolant liquid from said cooling system and from said reservoir and said coolant liquid being discharged simultaneously from said decelerator to said reservoir and to said cooling system.

4. A braking arrangement as claimed in claim 3, in which the supply of the decelerator takes place by two

distinct entrances, the first connected respectively to the said circuit and the second to the said auxiliary reservoir.

5. An arrangement as claimed in claim 4 in which the said first entrance is connected to the jacket of the engine of the vehicle.

6. An arrangement as claimed in claim 4 in which a first valve controls the said first entrance into the decelerator and a second valve controls the entrance of the fluid under pressure into the reservoir and means of control are provided for simultaneous opening of the two valves.

7. An arrangement as claimed in claim 6 in which the said means of control are actuated by the usual brake pedal only in a first part of the braking travel of the pedal while the usual means of braking the vehicle are

actuated by the said pedal only during a second part of the said travel whereby said means of control and said usual means of braking are simultaneously actuated in said second part of said travel.

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