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VACUUM BRAKE APPARATUS

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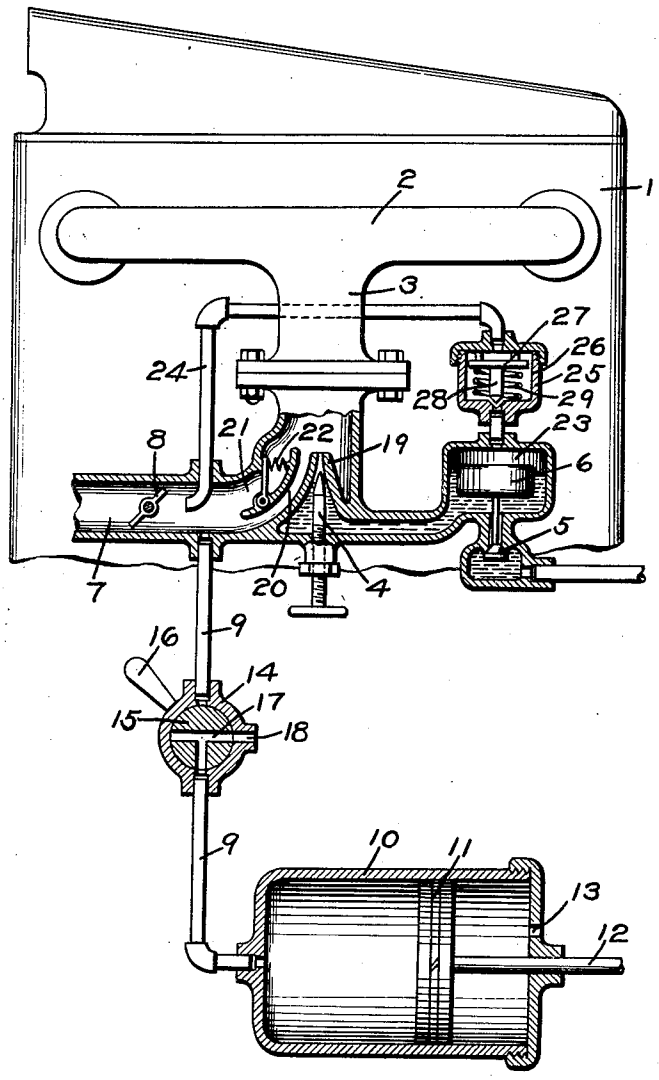

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UNITED STATES PATENT OFFICE

CLYDE C. FARMER, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF WILMERDING, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

VACUUM BRAKE APPARATUS

Application filed February 15, 1928. Serial No. 254,416.

This invention relates to brakes, and more particularly to a motor vehicle brake adapted to be operated by the reduced pressure created in the intake manifold of an internal combustion engine.

It has heretofore been proposed to operate a brake on a motor vehicle by means of the reduced pressure created in the intake manifold of an internal combustion engine, in which the brake connection is made between the usual engine throttle and the intake manifold.

With the above arrangement, ordinarily the throttle will be in its idling position, supplying a minimum flow of the motor fuel and air mixture, when the brakes are to be applied.

In applying the brakes, air from the brake cylinder flows to the intake manifold and if the engine throttle is in or nearly in its idling position, then the additional air admitted to the manifold from the brake cylinder will make the mixture of fuel and air so lean that the engine is liable to stall.

The principal object of my invention is to provide a brake apparatus which utilizes the vacuum created in the manifold for operating the brake without tending to cause the engine to stall when the brakes are applied.

In order to accomplish this result, I effect the desired reduction in fluid pressure in the brake cylinder by connecting the brake cylinder with the air intake passage to the usual carburetor and I provide a throttle valve in the air intake passage for controlling the acceleration of the engine, dispensing with the usual throttle valve between the carburetor and the intake manifold of the engine.

In the accompanying drawing, the single figure is a diagrammatic view, partly in section of a motor vehicle brake apparatus embodying my invention.

In the drawing, the reference numeral 1 indicates an internal combustion engine having an intake manifold 2. Attached to the intake pipe 3 is a carburetor having a needle valve 4 for controlling the supply of motor fuel to the intake pipe, a float valve 5 operated by the usual float 6, and an air intake pipe 7. According to my invention, the throttle valve in the intake pipe is dispensed with and a throttle valve 8 is disposed in the air intake pipe 7 and a pipe 9 is connected to the air intake pipe, between the throttle valve 8 and the carburetor.

A brake cylinder 10 is provided containing a piston 11 which is connected to a rod 12, the movement of rod 12 being adapted to effect the application and release of the brakes on the vehicle.

The chamber at the right of the piston 11 is open to the atmosphere through port 13 and the chamber at the left of the piston is connected to pipe 9.

Interposed in pipe 9 is a brake controlling valve device 14 having a valve 15 operable by a handle 16 and provided with a three way passage 17 adapted in one position of the valve to connect the brake cylinder side of pipe 9 with an atmospheric port 18 and in another position to establish communication from the brake cylinder 10 through pipe 9 to the air intake pipe 7.

The fuel spray nozzle 19 supplies motor fuel to the intake pipe 3 in proportion to the rate of flow of air through passage 20 from the air intake pipe 7 and an auxiliary air passage 21 may be provided containing an auxiliary air valve 22 for admitting additional air to the intake pipe 3 when the engine suction increases to a predetermined degree.

According to my invention, instead of having the pressure in the float chamber 23 always at atmospheric pressure, as in the usual carburetor, the pressure varies with the pressure of air in the air intake pipe 7 and for this purpose, a pipe 24 is provided which may have one end extending into the pipe 7 and bent so that the outlet of the pipe faces the flow of air through the pipe 7. The pipe 24 opens into the float chamber 23 and in order to prevent possible flow of gas to the float chamber in the event of a back fire, a check valve device may be interposed in the pipe 24, comprising a casing 25 having a chamber 26 containing a loose fitting piston 27. A valve 28 is carried by said piston and normally the valve is held unseated by the pressure of a spring 29 acting on the piston. When a back fire occurs, the sudden increase

in pressure in pipe 7 acting through pipe 24 on piston 27 acts to move the valve 28 to its seat, thus preventing the flow of gas to the float chamber and the possible ignition of the motor fuel therein.

In operation, if it is desired to apply the brakes, the handle 16 is operated to shift the valve 15 to the position in which passage 17 establishes communication from the brake cylinder 10 through pipe 9 to the air intake pipe 7. The fluid pressure in the chamber at the left of piston 11 is thus reduced by flow to the intake manifold of the engine and the brakes are applied by the movement of piston 11 to the left by the atmospheric pressure acting in the chamber at the right of the piston.

Air passing from the brake cylinder to the air intake pipe 7 flows through passage 20 with air flowing in the usual manner through the air intake pipe 7 and acts on the fuel spray nozzle 19 to induce a flow of motor fuel in proportion to the flow of air and an excessive flow of motor fuel is prevented since the pressure acting on the fuel in the float chamber 23 is maintained substantially equal to the pressure of air flowing through pipe 7, by reason of the connection of the float chamber, through pipe 24, with the air intake pipe.

Since air from the brake cylinder is not introduced into the manifold between the carburetor and the manifold, the mixture of air and motor fuel is not so weakened as to cause the engine to stall.

While one illustrative embodiment of the invention has been described in detail, it is not my intention to limit its scope to that embodiment or otherwise than by the terms of the appended claims.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The combination with the intake manifold of an internal combustion engine and a carburetor having an air intake pipe, of a throttle valve for the engine located in the air intake pipe, a pressure element operable by the reduced pressure of air in said air intake pipe and connected to the air intake pipe between said throttle valve and the carburetor, and means for controlling communication from said element to the air intake pipe.

2. The combination with the intake manifold of an internal combustion engine and a carburetor having an air intake pipe, of a throttle valve for the engine located in the air intake pipe, a brake cylinder having a piston operable by the reduced pressure of air in said air intake pipe for applying the brakes and connected to the air intake pipe between said throttle and the carburetor, and a manually operated valve for controlling communication from the brake cylinder to the air intake pipe.

In testimony whereof I have hereunto set my hand.

CLYDE C. FARMER.