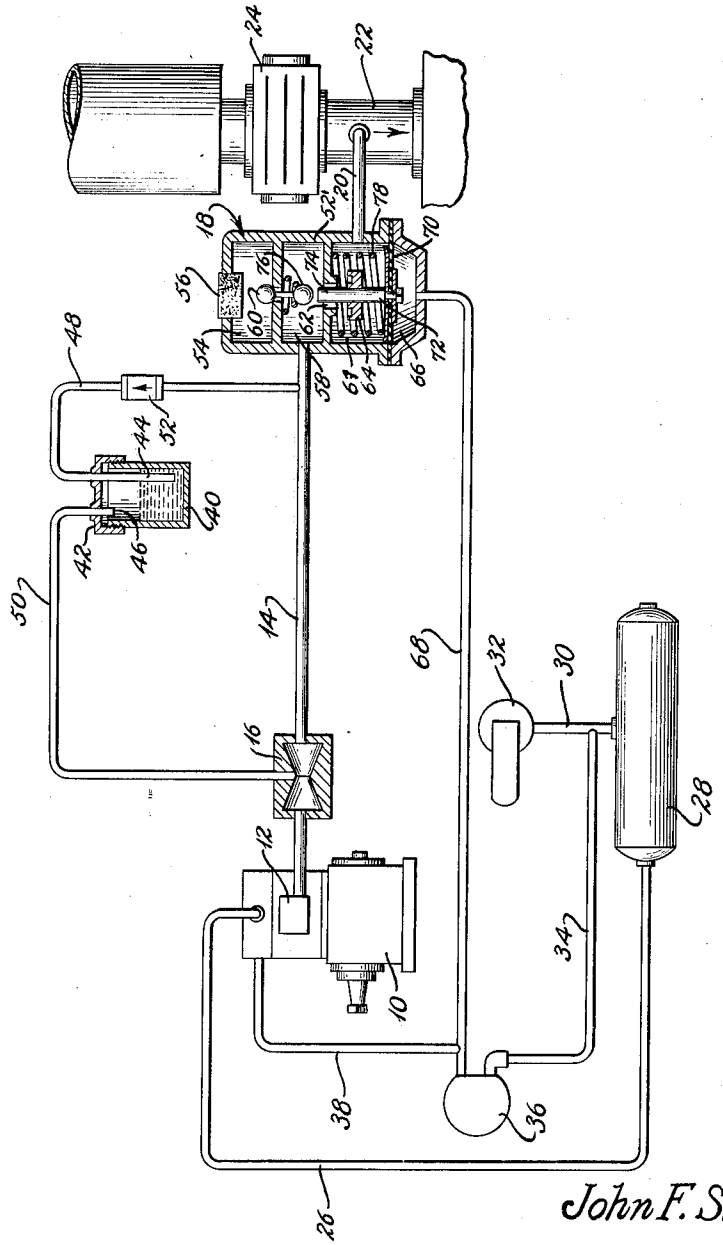
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FLUID PRESSURE SYSTEM

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INVENTOR

John F. Shumaker

BY Scrivener and Parker

ATTORNEYS

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FLUID PRESSURE SYSTEM

John F. Shumaker, Elyria, Ohio, assignor to Bendix-Westinghouse Automotive Air Brake Company, Elyria, Ohio, a corporation of Delaware

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This invention relates to a fluid pressure system and more particularly to a means for injecting antifreeze vapors into an air pressure system which employs a compressor having a supercharged inlet.

Air brake systems employing a compressor having an inlet connected to an engine supercharger or blower cannot use a direct connection between an antifreeze supply reservoir and the compressor inlet because the elevated pressure in the inlet line would blow the antifreeze medium out the conneventional atmospheric vent in the antifreeze reservoir.

A principal object of the present invention, therefore, is to provide an antifreeze injecting system that can be used with a compressor having a supercharged inlet.

Another object of the invention is the provision of means for supplying antifreeze from a reservoir to the supercharged inlet of a compressor which system includes means for subjecting the antifreeze in said reservoir to substantially full supercharge pressure while the outlet connection of said reservoir with said supercharged inlet is subjected to less-than-full supercharge pressure.

Another object of the invention is the provision of an antifreeze supply system of the foregoing nature which operates to supply antifreeze only at such times as the compressor is loaded.

Other objects and their attendant advantages will become apparent as the following detailed description is read in conjunction with the accompanying single FIGURE illustrating diagrammatically the application of the present invention to an automotive air pressure brake system.

The drawing illustrates a portion of an air brake system including a compressor 10 having an inlet 12 connected by a pipe 14, containing a venturi 16 adjacent the inlet 12, with a valve 18 which in turn is connected by a pipe 20 to the main inlet conduit 22 of an engine supercharger 24. The compressor 10 is connected by an outlet line 26 to a reservoir 28 which is connected by a conduit 30 with a conventional brake valve 32. Connected to the conduit 30 is a branch line 34 leading to a conventional fluid pressure governor 36 which admits or exhausts pressure to or from a line 38 leading to a conventional compressor unloader mechanism (not shown). It will be apparent to those skilled in the art that the governor responds to a predetermined high pressure in the reservoir to admit reservoir pressure to the unloader mechanism which acts to unseat the compressor inlet check valve so that no further pressure is pumped by the compressor until such time as the reservoir pressure falls to a predetermined low value at which time the governor 36 acts to close the connection between the reservoir and the unloader and simultaneously exhausts to atmosphere the line 38 leading to the unloader so that the compressor can again pump pressure to the reservoir.

In accordance with the invention, means are provided for injecting antifreeze vapors into the inlet of the compressor only at such times as the compressor is loaded. The antifreeze is contained in a receptacle 40 provided with a closed sealed top 42 through which extend the lower ends 44, 46 of respective pipes 48, 50 with the end 44 of pipe 48 extending below the surface of the antifreeze and the end 46 of pipe 50 terminating above the surface of the antifreeze. The pipe 48 is connected through a check valve 52 to the supercharge line 14 and the pipe 50 is connected to the throat of the venturi 16 as shown. It

will be understood that when supercharged air pressure flows through pipe 14, a portion is bypassed through line 48 and check valve 52 to flow into receptacle 40 through pipe end 44 where the supercharged air pressure bubbles upwardly through the antifreeze causing the latter to vaporize and collect in the space above the antifreeze so that as the supercharge pressure flows out through the pipe 50 to venturi 16 entrained antifreeze vapors are injected into the main stream of supercharge pressure flowing through the pipe 14 to the compressor inlet. It will be apparent and in accordance with the invention, feed back of supercharge pressure through pipe 50 to receptacle 40 is prevented by the formation of less pressure at the throat of the venturi than exists upstream of the venturi where the pipe 48 connects with supercharge pipe 14.

In order that antifreeze will not be continually depleted during periods when the compressor is unloaded, the present invention provides automatic cutoff means for closing off the supply of supercharge pressure to the compressor inlet when the compressor is unloaded. The cutoff means comprises the valve 18 which consists of a casing 52′ divided into four chambers as follows: An exhaust chamber 54 which is connected to atmosphere through a filter port 56; an outlet chamber 58 which is connected to exhaust chamber 54 through a spring-loaded normally closed check valve 60 and is also connected to the supercharge line 14; an inlet chamber 61 which is connected to the main supercharge conduit 22 through pipe 20 and is also connected to the outlet chamber 58 through a port 62 controlled by a spring-loaded normally open valve 64; and a pressure chamber 66 which is connected by a pipe 68 with the unloader line 38 and is separated from the inlet chamber 61 by a diaphragm 70 which has centrally connected thereto a plunger 72 carrying the aforementioned valve 64. The upper end 74 of plunger 72 projects through the port 62 in registry with valve 60 and is adapted to engage the lower end 76 of valve 60 so that the latter is unseated when the valve 64 is moved against the force of a return spring 78 to close port 62 upon the admission of fluid pressure to chamber 66.

In operation, assuming a condition such that the various components of the system occupy the positions shown in the drawing, when the engine is started the engine supercharger and the compressor are likewise started so that supercharged pressure flows through conduit 22 where a portion is bypassed through pipe 20, valve 18, pipe 14 and venturi 16 to the inlet 12 of the compressor. Simultaneously, a portion of the supercharge pressure in line 14 is tapped off through line 48 to flow into the antifreeze reservoir to throw antifreeze vapors into suspension in the reservoir as described above and also to create a pressure in the reservoir 40 which is substantially equal to the full supercharge pressure in the main conduit 22. However, the pressure existing at the throat of the venturi 16 is less than main conduit supercharge pressure because of venturi action and also because of friction losses which occur as the pressurized fluid travels the length of conduit 14. Therefore pressurized fluid with entrained antifreeze in reservoir 40 must flow outwardly through the line 50 into the venturi throat whence the antifreeze travels into the compressor inlet and from there into the entire system.

When the pressure in the reservoir has reached a predetermined high value the pressure in pipe 34 trips governor 36 so that reservoir pressure flows through pipe 38 to the compressor unloader to unload the compressor. Simultaneously, reservoir pressure flows through pipe 68 to the diaphragm chamber 66 of valve 18 causing diaphragm 70 to move upwardly so that valve 64 closes port 62 and stem 74 of plunger 72 engages the lower portion 76 of check valve 60 to unseat the latter and connect outlet chamber 68 with exhaust chamber 54. With valve 64 closed and check valve 60 open, it will be apparent

that supercharge pressure is disconnected from pipe 14 and the latter is connected to atmosphere through chamber 58, valve 60, chamber 54 and filter port 56. With line 14 connected to atmosphere and the compressor inlet valve retained unseated by the unloader mechanism, the air in line 14 may surge slightly between the atmospheric filter port 56 and the compressor inlet. Inasmuch as some of the surging air will pass from venturi 16 through line 50 to the antifreeze reservoir, the check valve 52 prevents antifreeze being carried with the surge in a reverse direction through the line 48.

When the reservoir pressure has fallen to a predetermined low value, the governor 36 again trips and disconnects the reservoir from lines 38, 68 and connects these to atmosphere to exhaust pressure from the unloader and disphragm chamber 66 of valve 18 to restore the system to the condition shown in the drawings so that antifreeze is again injected into the inlet of the compressor.

From the foregoing description it will be apparent that the present invention provides an effective system for injecting antifreeze vapors into the supercharged inlet of a compressor through the provision of pressure reducing means such as a venturi connected to the outlet of the antifreeze supply reservoir downstream from a direct connection between the supercharge line and said reservoir, the arrangement insuring one-way flow through the reservoir and positive injection of antifreeze into the compressor irrespective of the degree of supercharge pressure. In addition the present invention insures conservation of antifreeze by supplying antifreeze only at such times as the compressor is loaded. It will be apparent to those skilled in the art that the invention is susceptible of various modifications and changes without, however, departing from the scope and spirit of the appended claims.

What is claimed is:

1. In a fluid pressure system which includes a compressor having an inlet, and an outlet connected to a fluid pressure reservoir, a source of air having a pressure greater than atmospheric pressure, first conduit means connecting said source to the inlet of said compressor, means for injecting antifreeze fluid into the inlet of said compressor comprising a reservoir of antifreeze fluid, said last named reservoir being sealed against the entrance of air at atmospheric pressure, second conduit means connected at one end to said first conduit means adjacent said source and having its opposite end extending into said antifreeze reservoir and terminating below the surface of the antifreeze fluid therein, a venturi in said first conduit means adjacent the inlet of said compressor, and third conduit means connected at one end to the throat of said venturi and having its opposite end extending into said antifreeze reservoir and terminating above the surface of the antifreeze fluid therein, a compressor unloader, a fluid connection between said fluid pressure reservoir and said unloader, a fluid pressure governor in said connection for loading and unloading the compressor in response to predetermined high and low pressures in said fluid pressure reservoir, a normally open valve in said first conduit means positioned between said source and the connection between said second conduit means for controlling the flow of air from said source to the inlet of said compressor and to said antifreeze reservoir, and fluid pressure responsive means operatively connected to said governor for moving said valve to closed position when said governor operates to unload said compressor.

2. A fluid pressure system as set forth in claim 1 which includes in addition, a one-way check valve in said second conduit means permitting flow of air only from the first conduit means to said antifreeze reservoir.

3. In a fluid pressure system which includes a compressor having an inlet, an outlet connected to a fluid pressure reservoir, and means controlled by the pressure in the reservoir for unloading the compressor when said pressure exceeds a predetermined value, a source of air having a pressure greater than atmospheric pressure, a conduit connecting said source to the inlet of said compressor, means for injecting antifreeze fluid into the inlet of said compressor comprising a reservoir of antifreeze fluid, said last named reservoir being sealed against the entrance of air at atmospheric pressure and having an inlet and an outlet, means for connecting the inlet of said antifreeze reservoir to said conduit so as to subject the antifreeze fluid in said reservoir to substantially the full air pressure at said source, pressure reducing means in said conduit adjacent the compressor inlet providing a region of pressure less than that of said source, means connecting the outlet of said antifreeze reservoir to said region, normally open valve means in said conduit positioned upstream with respect to said connecting means for controlling the flow of air from said source to the compressor inlet and to the inlet of said antifreeze reservoir, and fluid pressure responsive means for moving said valve of closed position to interrupt communication between said source and said conduit when the compressor is unloaded.

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