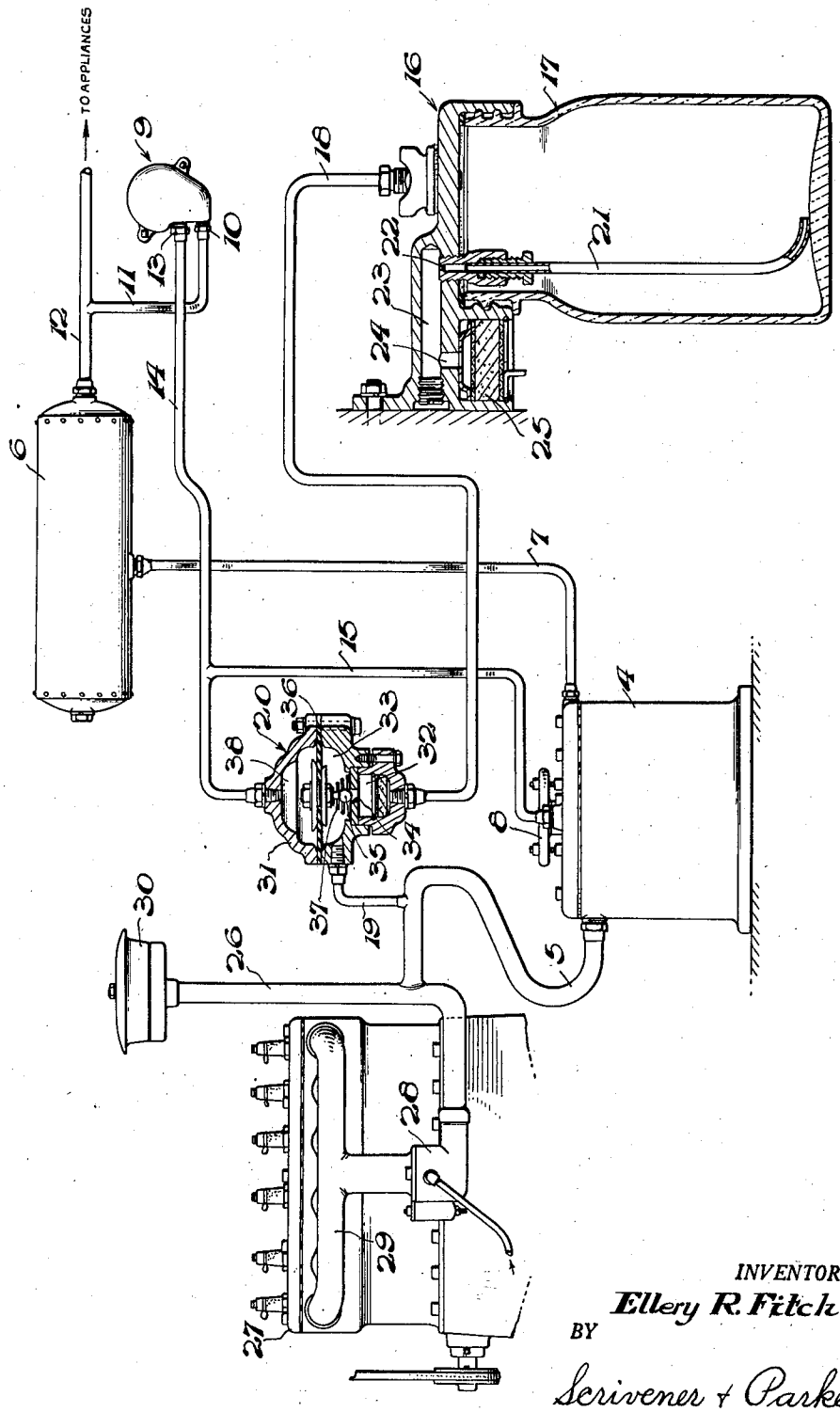
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CONTROL MECHANISM

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CONTROL MECHANISM

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1

This invention relates to fluid pressure control mechanism, and more particularly to mechanism of the above type for controlling the supply of anti-freeze medium to a fluid pressure system in order to prevent freezing of the fluid in the system.

Devices for supplying an anti-freeze medium such as alcohol to a fluid pressure supply system, and particularly to a compressed air supply system, have previously been in common use, but in many cases have been so constituted as to insure a supply of anti-freeze fluid to the compressor at all times when the latter is operating, and it is one of the objects of the present invention to provide control means for preventing the supply of anti-freeze liquid to a fluid pressure supply system except under certain conditions of operation.

In some cases, it has been customary to provide means for feeding the anti-freeze medium to the intake manifold of the compressor, and since many of these compressors are provided with means for unloading the compressor when the pressure in the supply reservoir reaches a predetermined value, it is a further object of the invention to provide means for cutting off the supply of anti-freeze medium when the compressor is unloaded.

Yet another object of the invention is to provide, in connection with mechanism of the above type, means controlled by variations of pressure in the fluid pressure supply system for controlling the flow of anti-freeze medium to the fluid pressure system in accordance with variations of pressure in that system.

It has also been proposed to connect the inlet manifold of the compressor with the air supply pipe leading to the carburetor of an internal combustion engine which may serve to drive the compressor, and since the suction in the supply pipe tends to draw anti-freeze medium into the supply pipe and thence into the engine when the compressor is unloaded, means are provided in the present invention for disconnecting the anti-freeze supply device from the inlet manifold of the compressor whenever the compressor is unloaded.

These and other objects and novel features of the invention will appear more fully hereinafter from the following detailed description, when taken in connection with the accompanying drawing illustrating one embodiment of the invention. It is to be expressly understood, however, that the drawing is employed for purposes of illustration only, and is not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

2

In the drawing, wherein one embodiment of the invention is illustrated, a fluid compressor 4, such as an air compressor, is provided having an inlet manifold 5, and adapted to supply fluid pressure to a supply reservoir 6 through a discharge connection 7. The compressor is provided with an unloading mechanism 8 of well known design, this unloading mechanism being adapted on the application of fluid pressure thereto from the reservoir, to unload the compressor and temporarily prevent the pumping of fluid pressure to the reservoir by the compressor. In order that the unloader mechanism may be properly controlled, the unloader is adapted to be connected with the reservoir by means of a governor 9, of well known design, having an exhaust port, not shown, a supply connection 10 connected with the reservoir through a conduit 11 and a conduit 12, and an outlet connection 13 connected with the unloader through a conduit 14 and a conduit 15. As will be well understood by those skilled in the art, the governor 9 is so constructed as to normally prevent communication between the connections 10 and 13, and to permit communication between the outlet connection 13 and atmosphere through the exhaust port, not shown. When the pressure in the reservoir and in the conduit 12 and 11 increases above a predetermined value, the governor is effective to prevent communication between the outlet connection 13 and atmosphere, and to establish communication between the inlet and outlet connections 10 and 13, thus permitting fluid pressure to be supplied from the reservoir to the unloading mechanism 8 through the conduit 12, conduit 13, governor 9, and conduit 14 and 15, whereupon the unloader mechanism 8 is operated to unload the compressor in order to prevent the latter from supplying fluid pressure to the reservoir, it being further understood that in the unloaded condition, no fluid is drawn into the compressor through the inlet manifold 5. As the pressure decreases by a predetermined amount in the reservoir, the governor again operates to disestablish communication between the connections 10 and 13 and to establish communication between connection 13 and atmosphere, whereupon fluid pressure is exhausted from the unloader mechanism 8 through conduit 15 and 14 and the governor 9, and the compressor is again loaded and conditioned to supply fluid pressure to the reservoir.

A commonly used form of device 16 for supplying anti-freeze medium to the compressor is in-

dicated on the drawing, and includes a container 17 adapted to hold an anti-freeze medium such as alcohol, the upper end of this container being connected with the inlet manifold of the compressor by means of a conduit 18 and a conduit 19 connected with a manifold, the conduit 18 and 19 being normally connected by means of a valve mechanism 20, to be more fully described hereinafter. The device 16 is also provided with an air tube 21, having its lower end open and positioned near the bottom of the container 17 below the surface of the alcohol, the upper end of the pipe being connected with atmosphere through a restricted port 22, a passage 23, a passage 24, and a filter element 25 having its lower end open to atmosphere. When the compressor is started, a vacuum is established in the inlet manifold 5 of the compressor, and since this vacuum is transmitted to the container 17 through the conduit 19, the valve mechanism 20 and the conduit 18, the pressure in the container is lower than that of the atmosphere, and air is drawn into the container through the tube 21. As this air passes upward through the alcohol, or other anti-freeze fluid, the latter is vaporized and this vapor is carried over into the inlet manifold of the compressor through the connections heretofore described. Since the fluid or air for the compressor, as the case may be, is drawn into the intake manifold and pumped into the reservoir, the vapor from the device 16 is also carried into the reservoir through the same channels, and is effective to prevent freezing of the fluid in the reservoir due to the presence of water or water vapor therein, the alcohol or other fluid combining with the water in order to form a nonfreezing liquid.

It has been found desirable to connect the inlet manifold 5 of the compressor with an inlet pipe 26 which serves to supply air to the carburetion system of an internal combustion engine 27, which may also be the engine which drives the compressor, although this is not essential for the purpose of the present invention. The engine 27 is provided with a carburetor 28 of conventional type, connected respectively with the inlet pipe 26 and an inlet manifold 29 on the engine. An air cleaner 30, likewise of conventional type, is provided at the upper end of the inlet pipe 26, and thus serves to filter not only the air supplied to the carburetion system of the engine, but also the air supplied to the inlet manifold of the compressor. When the engine and compressor are both operating, and the compressor is loaded in such a manner as to pump air or fluid into the reservoir 6, a vacuum is established in the inlet pipe 26, and also in the inlet manifold 5, and the flow of air through the inlet manifold 5 is at all times from the inlet pipe 26 to the compressor rather than in the reverse direction, and consequently any alcohol drawn into the inlet manifold of the compressor from the device 16 is carried into the compressor rather than into the intake system of the engine. When the compressor is unloaded, due to the operation of the governor 9 and the unloading mechanism 8, no air is drawn into the compressor to the inlet manifold 5, and due to the vacuum in the engine inlet pipe 26, alcohol tends to be drawn into the engine through the carburetor system unless means are provided to prevent this undesirable action.

To this end, the control valve mechanism 20 includes a casing 31 having an inlet chamber 32 connected with the vaporizer device 16 by means of the conduit 18, and an outlet chamber 33 which is connected to the inlet manifold of the compressor by means of the conduit 19, communication between the chambers 32 and 33 being normally permitted by means of a port 34 which serves to connect the two chambers. A valve 35 is suitably carried by a flexible diaphragm 36 clamped in the casing 31 as shown, and this valve is normally maintained in spaced relation with the upper end of the port 34 by means of a spring 37 interposed between the casing and the lower portion of the diaphragm. Since the chamber 33 below the diaphragm is subjected at all times to the vacuum in the compressor inlet manifold 5, it will be understood that this vacuum acts on the diaphragm to close the valve 35, and that the spring 37 is therefore so tensioned as to normally maintain the valve in open position regardless of the degree of vacuum to which the chamber 33 is subjected. A control chamber 38 is formed between the diaphragm and the upper portion of the casing, and this chamber is connected to the conduit 14. Thus when the governor 9 operates, as heretofore described, to supply fluid pressure to the unloader mechanism 8 when the pressure in the reservoir 6 exceeds a predetermined value, it will be understood that the governor also acts to supply fluid pressure to the control chamber 38 through conduit 14, whereupon the resulting pressure on the diaphragm is sufficient to overcome the tension of the spring 37 and to move the valve 35 to closed position in order to prevent the flow of alcohol or other anti-freeze medium from the device 16 to the inlet manifold of the compressor and into the engine. When the governor again operates to relieve the pressure from the unloader mechanism 8 in order to load the compressor, fluid pressure will be released from the control chamber 38 of the control valve mechanism 20, and the valve 35 will again be moved to open position by the action of the spring 37 in order to permit the flow of alcohol vapor from the vaporizer 16 to the inlet manifold of the compressor.

There has thus been provided by the present invention, in connection with a fluid compressor, and particularly in connection with a fluid compressor receiving its fluid supply or air supply from the inlet system of an internal combustion engine, means controlled by variations of pressure in the fluid pressure supply reservoir for preventing the flow of alcohol vapor from the vaporizer to the compressor and to the engine whenever the compressor is unloaded. Although the invention is illustrated in connection with a vaporizer of the vacuum operated type, and in connection with a compressor of the type having its inlet manifold connected with the induction system of an internal combustion system, it is to be understood that the invention is not limited to the arrangement shown, but is also effective in connection with any device adapted to supply anti-freeze medium to a fluid pressure supply system. By way of example, the device 16 may be adapted to feed an anti-freeze liquid to the fluid pressure system by gravity or by any other suitable means, without in any way interferring with the effectiveness of the valve mechanism 20 in interrupting the supply of anti-freeze medium during periods when the compressor is unloaded.

While one embodiment of the invention has been shown and described herein with considerable particularity, it is to be understood that the invention is not limited thereto, but is capable of

a variety of expressions, as will now be readily apparent to those skilled in the art. Reference will, therefore, be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. The combination in a fluid pressure supply system of the type having a reservoir, an air compressor having a discharge port connected to the reservoir, an inlet port connected to a source of air having a pressure below atmospheric pressure, and means responsive to variations of pressure in the reservoir for unloading the compressor when the pressure therein exceeds a predetermined value, of means operated by the vacuum in the inlet port for supplying an anti-freeze fluid thereto and to the air compressed by the compressor including a fluid container and a connection between said container and inlet port, and means controlled by the operation of said pressure responsive means for preventing the flow of anti-freeze fluid through the last named connection to the compressor when the compressor is unloaded.

2. The combination in a fluid pressure supply system of the type having a reservoir, an air compressor having a discharge port connected to the reservoir, an inlet port connected to a source of air having a pressure below atmospheric pressure, and means responsive to variations of pressure in the reservoir for unloading the compressor when the pressure therein exceeds a predetermined value, of means operated by the vacuum in the inlet port of the compressor for supplying an anti-freeze fluid thereto and to the air compressed by the compressor including a fluid container and a connection between said container and inlet port, and means for preventing the flow of anti-freeze fluid through said connection to the compressor when the compressor is unloaded including a normally open valve associated with said connection and means controlled by the operation of said pressure responsive means for closing said valve.

3. The combination in a fluid pressure supply system of the type having a reservoir, an air compressor having a discharge port connected to the reservoir, an inlet port connected to a source of air having a pressure below atmospheric pressure, and means responsive to variations of pressure in the reservoir for unloading the compressor when the pressure therein exceeds a predetermined value, of means for normally supplying an anti-freeze fluid to said inlet port and to the air compressed by the compressor including a fluid container connected thereto, and means controlled by the operation of said pressure responsive means for preventing the flow of anti-freeze fluid from the container to the inlet port when the compressor is unloaded.

4. The combination in a fluid pressure supply system of the type having a reservoir, an air compressor having a discharge port connected to the reservoir, an inlet port connected to a source of air having a pressure below atmospheric pressure, an unloader, and means responsive to variations of pressure in the reservoir for supplying air pressure from the reservoir to the unloader to operate the latter to unload the compressor when the pressure in the reservoir exceeds a predetermined value, of means for supplying an anti-freeze fluid to the inlet port and to the air compressed by the compressor including a fluid container having a connection with the inlet port, a valve in said connection, and means responsive to the pressure supplied to said unloader for closing said valve when the compressor is unloaded.

5. The combination in a fluid pressure supply system of the type having a reservoir, an air compressor having a discharge port connected to the reservoir, an inlet port connected to a source of air having a pressure below atmospheric pressure, an unloader, and means responsive to variations of pressure in the reservoir for supplying air pressure from the reservoir to the unloader to operate the latter to unload the compressor when the pressure in the reservoir exceeds a predetermined value, of means for supplying an anti-freeze fluid to the inlet port and to the air compressed by the compressor including a fluid container having a connection with the inlet port, a valve in said connection, resilient means for normally maintaining said valve in open position, and means including an element responsive to the pressure supplied to the unloader for closing said valve when the compressor is unloaded.

6. Mechanism for supplying an anti-freeze fluid to a fluid pressure supply system of the type including a reservoir, a compressor having a discharge port connected to the reservoir, an inlet port, and means controlled by the pressure in the reservoir for unloading the compressor when said pressure exceeds a predetermined value, said mechanism including a fluid container of anti-freeze fluid having a connection with the inlet port of the compressor for mixing anti-freeze fluid with the fluid compressed by the compressor, and means controlled by the operation of the first named means for preventing the flow of anti-freeze fluid from said container to said inlet port through said connection when the compressor is unloaded.

7. Mechanism for supplying an anti-freeze fluid to a fluid pressure supply system of the type provided with a reservoir and a compressor having a connection with atmosphere, a connection with the reservoir, and means controlled by the pressure in the reservoir for unloading the compressor when said pressure exceeds a predetermined value, said mechanism including a container for anti-freeze fluid, means for connecting said container with one of said compressor connections to mix the anti-freeze fluid with the fluid compressed by the compressor, and means controlled by the operation of the first named means for preventing the flow of anti-freeze fluid through said connecting means when the compressor is unloaded.

8. In combination with an internal combustion engine inlet manifold having an atmospheric connection associated therewith, a reservoir, an air compressor having a discharge port connected with the reservoir, an inlet port connected with said atmospheric connection, compressor unloading mechanism having an actuator, means responsive to variations of pressure in the reservoir for supplying compressed air from the reservoir to said actuator for operating said unloader to unload the compressor when the pressure in the reservoir exceeds a predetermined value, means for supplying an anti-freeze fluid to the inlet port to be mixed with the air compressed by the compressor including a fluid container having a connection with said inlet port, and means for controlling the flow of anti-freeze fluid through said last named connection including a normally open valve in said connection, a pressure responsive member for moving said valve to closed position, and means for supplying compressed air from the first named means to said pressure responsive

member when compressed air is supplied by the operation of said first named means to the unloader actuator, whereby said valve is closed when the compressor is unloaded.

9. Mechanism for supplying an anti-freeze fluid to a fluid pressure supply system of the type provided with a reservoir and a compressor having an inlet connection and an outlet connection connected with the reservoir, and control means for the compressor operative to prevent the compressor from supplying fluid pressure to the reservoir, said mechanism including a container for anti-freeze fluid, means for connecting said container with one of said compressor connections to mix the anti-freeze fluid with the fluid compressed by the compressor, and means controlled by the operation of said control means for preventing the flow of anti-freeze fluid through said connecting means when said control means is operative to prevent the compressor from supplying fluid to the reservoir.

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