

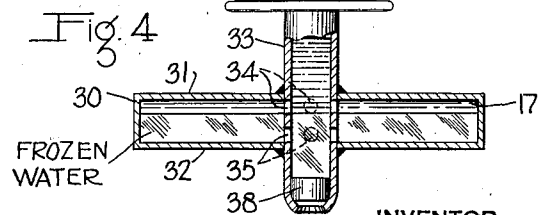
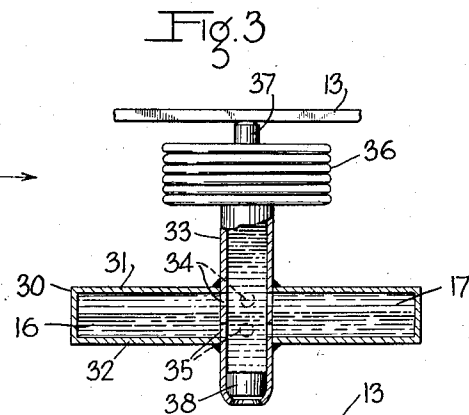
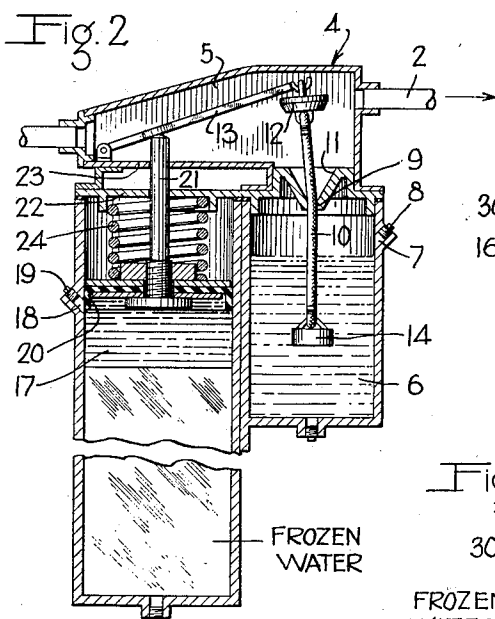
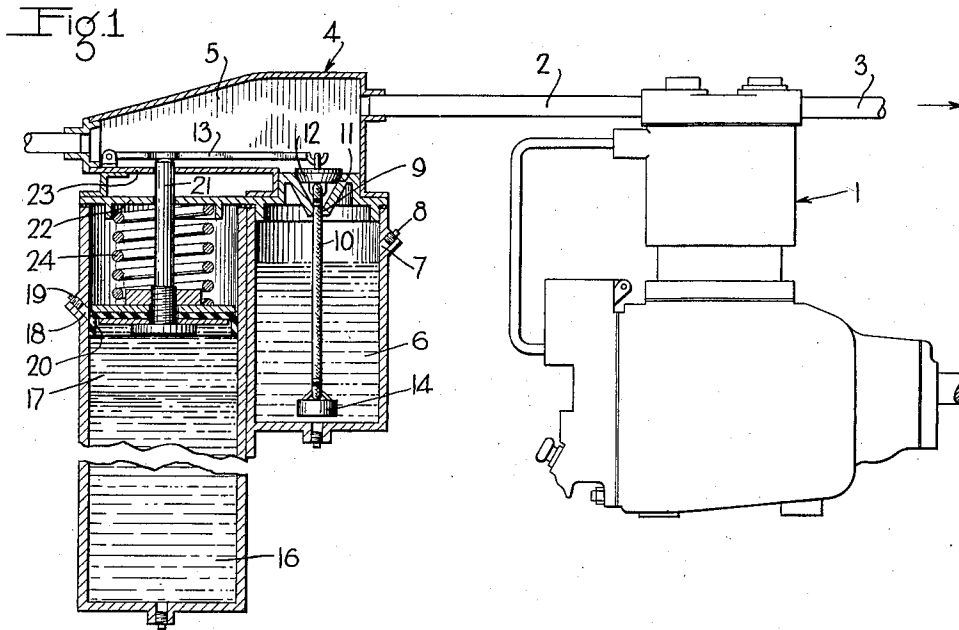
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ANTIFREEZING DEVICE

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ANTIFREEZING DEVICE

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This invention relates to air conducting systems and more particularly to apparatus for introducing an anti-freeze medium into air to be used in such a system or into the air as it flows through the system.

In winter, when the atmospheric temperature is below freezing, moisture carried by air into the system will be deposited on the wall or walls of fluid storage reservoirs, fluid conducting pipes and passages, valve mechanisms and the like and will there freeze. This is of course objectionable in that the ice formed on the walls may in some cases seriously reduce the flow areas of pipes and passages and the volume of control or storage reservoirs and may also render the valve mechanisms employed in the systems either sluggish in their operation or inoperative. In railway fluid pressure brake systems such a condition is especially objectionable since it may so affect the desired braking characteristics of the system as to render the operation of a railway vehicle or train dangerous.

An object of the present invention is to provide means automatically operative in accordance with variations in atmospheric temperature for either supplying a volatile anti-freeze medium, such as alcohol, to air flowing into or through a fluid conducting system or cutting off such supply.

Another object of the invention is to provide means automatically operative in accordance with variations in atmospheric temperature for regulating the supply of volatile anti-freeze medium to a fluid conducting system.

According to the invention these objects are attained by means of an apparatus which may be placed in any desired location in a fluid conducting system and which is operative in response to freezing temperatures to expose an alcohol laden wick or the like to air flowing through the system and which, at temperatures above freezing, will maintain the wick out of the path of flow of the air in the system and at the same time maintain the alcohol storage chamber sealed out of communication with the air stream.

Another feature of the invention resides in the arrangement whereby the alcohol carrying wick, as it is moved in accordance with changes in temperature, is automatically cleaned of any dirt which may have collected thereon during the time it has been exposed to the air stream.

Other objects and advantages will appear in the following more detailed description of the invention.

In the accompanying drawing, Fig. 1 is a di-

agrammatic view of a portion of a fluid pressure system embodying the invention for introducing alcohol into the system, a portion of the apparatus being shown in section, the several parts of the anti-freeze apparatus being shown in their ineffective position; Fig. 2 is a sectional view showing the apparatus in position to introduce alcohol to the fluid pressure system; Fig. 3 is a detailed view partly in section of another form of thermostat for controlling the apparatus, the thermostat being in the condition it will assume under temperatures above freezing; and Fig. 4 is a view similar to Fig. 3 but illustrating the thermostat in the condition it will assume under temperatures below freezing.

The equipment shown in the accompanying drawing includes a compressor 1, which may be of any desired type having an inlet conduit 2 and a discharge conduit 3, which latter conduit may be connected to the usual air storage reservoir, not shown. The equipment also comprises an anti-freeze device 4 which, in the present embodiment of the invention, is directly associated with the compressor inlet conduit 2.

It will here be understood that the invention is not limited to the association of the anti-freeze device with the compressor inlet conduit since it is apparent that the device may be interposed or located at any other point in the system.

The anti-freeze device 4 as shown in Figs. 1 and 2 may comprise a casing in which there is formed a fluid conducting conduit or chamber 5 which is open to one end of the atmosphere and which is open at the other end to the compressor inlet conduit 2.

The casing of the anti-freeze device is so constructed as to define an alcohol storage chamber 6 which is supplied with alcohol by way of a filling passage 7 normally closed by means of a plug 8 having screw threaded connection with the casing. The upper end of this chamber is provided with an opening 9 for the accommodation of a flexible member which, as shown, may be in the form wick 10 made of porous material. This wick is contained in the chamber 6 and, as will be later described, is movable vertically upwardly and downwardly through the opening 9. Above the opening 9 an annular valve seat 11 is provided in the casing on which a valve 12, contained in chamber 5, is adapted to seat to cut off communication from the chamber 6 to the fluid conduit 5, thereby preventing unintentional introduction of alcohol vapor to the fluid flowing through the conduit 5. Also contained in the conduit 5 is an arm 13 which has one of its ends

operatively connected to the valve 12, and which has its other end hinged to the casing in such a manner as to permit it to rock in a vertical plane.

Secured to the lower end of the wick 10 and contained in chamber 6 is a weight 14 which, at all times, maintains the wick taut.

The casing is also provided with a chamber 15 which is partially filled with water 16 and partially with oil 17 or any other liquid which will float on top of the water. The water and oil are supplied to the chamber through a filling passage 18 which is normally closed by means of a plug 19 having screw threaded connection with the casing. Resting on the oil in the chamber 15 is a vertically movable abutment 20 having a stem 21 which extends upwardly through vertical aligned guide openings in a cover 22 of the chamber 15 and a wall 23 of the chamber 5, the end of the stem operatively engaging the arm 13 at a point located intermediate the ends of the arm.

Interposed between and operatively engaging the abutment 20 and the cover 22 is a spring 24 which acts at all times to maintain the abutment in contact with the upper surface of the oil.

It will be understood from the following description that the casing, water 16, oil 17, piston 20, piston rod 21 and spring 24 constitute a thermostat which will function to control the operation of the arm 13 and thereby the wick 10.

In operation, when the atmospheric temperature falls below freezing, the water in chamber 15 freezes and expands forcing the oil 17 and thereby the piston 20 and piston stem 21 upwardly, compressing spring 24. The stem 21, since it is in operative engagement with the arm 13 will rock the arm upwardly about its pivot to unseat the valve 12 and to, at the same time, expose a portion of the alcohol saturated wick to the air flowing through the chamber 5 to the conduit 2 leading to the compressor 1. The alcohol vapor given off by the wick will be carried by the air through the compressor to all parts of the system. The wick in its raised position will for a portion of its length be immersed in the alcohol, so that the portion exposed to the air in chamber 5 will be continuously replenished with alcohol by capillary attraction.

When the temperature rises above freezing the ice melts and contracts, thus permitting the oil 17 to move downwardly. When this occurs the spring 24 acts to move the piston and thereby the piston stem 21 downwardly with the oil. As the stem is thus moved the arm 13 rocks downwardly permitting the valve 12 to seat on the valve seat 11 and cut off communication from the chamber 6 to the chamber 5.

As the wick is moved upwardly and downwardly by the arm 13 the edge of the opening 9 agitates the fabric of the wick and thereby loosens any dirt which may have collected thereon thus preventing the caking of dirt on the wick which would impair its alcohol carrying capacity.

The form of thermostat illustrated in Figs. 3 and 4 for actuating arm 13 comprises a hermetically sealed hollow casing which is completely filled with water 16 and oil 17.

The casing of this thermostat comprises a non-expandible chamber portion 30 which may be secured in any suitable fixed support (not shown) against movement.

Extending through vertically aligned openings in the top and bottom walls 31 and 32, respectively, of the chamber portion of the casing, is

a vertically disposed tube 33 which is soldered or welded to the walls 31 and 32, the solder or welding material filling any spaces which may exist at the juncture of the tube and walls, thus rendering the casing leak proof. This casing is provided with openings 34 which establishes communication from the interior of the chamber portion 30 to the interior of the tube and are located close to the inner surface of the top wall 31 of the portion. Like openings 35 are also provided in the tube but are located close to the inner surface of the bottom wall 32 of the portion 30.

The upper end of the tube has secured thereto the lower end of a Sylphon diaphragm 36, which diaphragm constitutes a flexible part of the casing. Secured to the upper end of the diaphragm is a plunger 37 which is adapted to operatively engage the wick controlling arm 13.

The lower end of the tube is initially open to permit the filling of the chamber portion 30, tube 33 and Sylphon diaphragm 36 with the oil and water 16 and 17, respectively. After the casing is completely filled a plug 38 is inserted in the lower end of the tube and is soldered, welded or otherwise secured to the tube to render the tube leakproof.

When the casing is filled and secured in place for controlling the operation of the arm 13, the oil and water will stratify as shown in Fig. 3 and the water level will be substantially mid-way between the upper and lower walls 31 and 32 respectively of the portion 30. It will here be noted that the oil in the chamber portion 30 is in communication with the oil in the tube by way of the openings 34 and that the water in the chamber portion is in communication with the water in the tube through the openings 35.

In operation, when the water 16 freezes it expands and displaces the oil 17 upwardly into the Sylphon diaphragm causing the diaphragm to expand upwardly as shown in Fig. 4 to rock the arm 13 upwardly about its pivot, thereby unseating the valve 12 and pulling the alcohol laden wick 10 upwardly into the chamber 5. When the ice in the casing melts the oil will be permitted to move downwardly and as a result the diaphragm will contract and thereby permit the arm 13, valve 12 and wick 10 to assume the position in which they are shown in Fig. 1.

While two illustrative embodiments of the invention have been described in detail, it is not my intention to limit its scope to these embodiments 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. An anti-freeze apparatus comprising an air conducting chamber adapted to form a portion of an air conductor of an air conducting system, a storage chamber for a volatile anti-freeze medium, a wick in said storage chamber adapted to be saturated with said anti-freeze medium, and means responsive to variations in atmospheric temperature for moving said wick into and out of said air conducting chamber.

2. An anti-freeze apparatus comprising an air conducting chamber adapted to form a portion of an air conductor of an air conducting system, a storage chamber for a volatile anti-freeze medium, a porous element adapted to be saturated with said anti-freeze medium, and means responsive to variations in atmospheric temperature for moving said porous element into and

out of the path of flow of air through said air conducting chamber.

3. An anti-freeze apparatus comprising an air conducting chamber adapted to form a portion of an air conductor of an air conducting system, a storage chamber for a volatile anti-freeze medium, a porous element adapted to be saturated with said anti-freeze medium, means responsive to variations in atmospheric temperature for moving said porous element into and out of the path of flow of air through said air conducting chamber, and means for scraping said porous element as it is being moved.

4. An anti-freeze apparatus comprising an air conducting chamber adapted to form a portion of an air conductor of an air conducting system, a storage chamber for a volatile anti-freeze medium, a porous element adapted to be saturated with said anti-freeze medium, means responsive to variations in atmospheric temperature for moving said porous element into and out of the path of flow of air through said air conducting chamber, and means for bending said porous element as the element is moved to free it of foreign matter which may have collected thereon.

5. An anti-freeze apparatus comprising an air conducting chamber adapted to form a portion of an air conductor of a fluid pressure system, a storage chamber for a volatile anti-freeze medium, a porous element in said chamber adapted to be saturated with said anti-freeze medium, a chamber containing water and means responsive to the expansion of the water in freezing temperatures for moving said element into said chamber and responsive to the contraction of the melting frozen water in a higher than freezing temperature for moving said element out of said chamber.

6. An anti-freeze apparatus comprising an air conducting chamber adapted to form a portion of an air conductor of a fluid pressure system, a storage chamber for a volatile anti-freeze medium, an element in said chamber adapted to carry a portion of said anti-freeze medium and being movable into and out of said air conducting chambers, and means responsive only to freezing atmospheric temperatures for moving said element into said chamber and responsive

only to higher than freezing atmospheric temperature for moving said element out of said chamber.

7. An anti-freeze apparatus comprising an air conducting chamber adapted to form a portion of an air conductor of a fluid pressure system, a storage chamber for a volatile anti-freeze medium, a porous element in said chamber adapted to absorb a portion of said anti-freeze medium, and a thermostat for moving said element into and out of said chamber.

8. An anti-freeze apparatus comprising an air conducting chamber adapted to form a portion of an air conductor of a fluid pressure system, a storage chamber for a volatile anti-freeze medium, an element in said chamber saturated with said anti-freeze medium and being movable into and out of the path of flow of air through said air conducting chamber, and means responsive only to freezing temperatures for moving said element into the path of travel of the air through said air conducting chamber.

9. An anti-freeze apparatus comprising an air conducting chamber adapted to form a portion of an air conductor of an air conducting system, a storage chamber for a volatile anti-freeze medium, a wick in said storage chamber adapted to be saturated with said anti-freeze medium, means responsive to variations in atmospheric temperature for moving said wick into and out of said air conducting chamber, and a valve movable with said wick to close said storage chamber when the wick is moved out of said air conducting chamber.

10. An anti-freeze apparatus comprising an air conducting chamber adapted to form a portion of an air conductor of an air conducting system, a storage chamber for a volatile anti-freeze medium, a porous element adapted to be saturated with said anti-freeze medium, means responsive to variations in atmospheric temperature for moving said porous element into and out of the path of flow of air through said air conducting chamber, and means movable with said porous element to close said storage chamber after the element is moved out of said air conducting chamber.

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