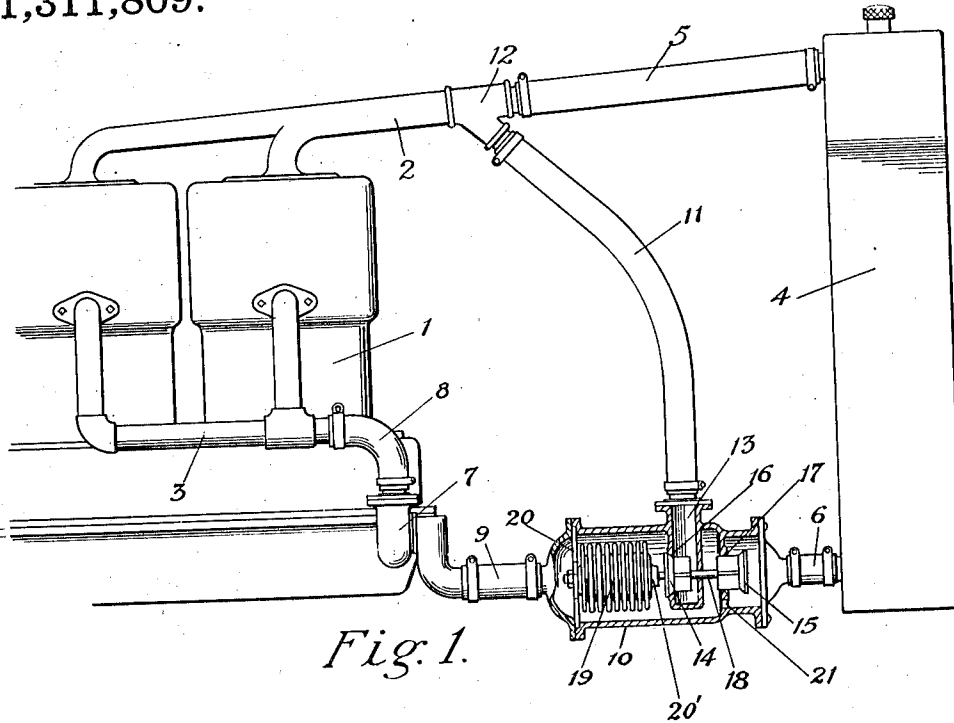
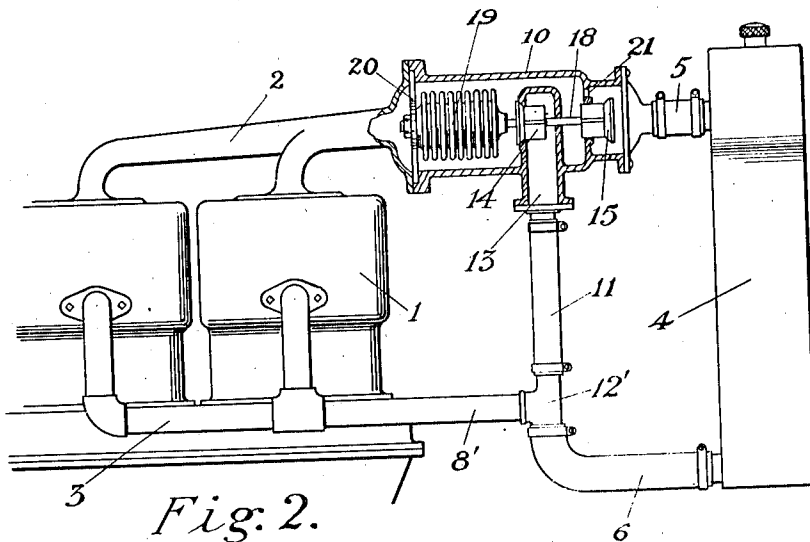


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 COOLING SYSTEM FOR INTERNAL COMBUSTION ENGINES.
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COOLING SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JEAN V. GIESLER, a citizen of the United States of America, and a resident of Knoxville, Tennessee, have invented a new and useful Improvement in Cooling Systems for Internal-Combustion Engines, which invention is fully set forth in the following specification.

This invention relates to a cooling system for internal combustion engines, and to one particularly adapted for the cooling of such engines when used in automobiles.

An object of this invention is to provide a system of the type referred to with means that shall lessen the likelihood of the radiator freezing in cold weather. A further object of the invention is to provide a cooling system comprising a radiator, a by-pass therearound, and means for regulating the flow of the cooling medium through the radiator and by-pass, with means whereby a circulation may be maintained through the radiator at all times. Further objects relate to the provision of a system of the type above characterized which is simple in construction, inexpensive to manufacture and install and efficient in operation.

Stated briefly, the invention comprises a cooling system for internal combustion engines comprising a radiator, a by-pass therearound, valve mechanism for regulating the flow of the cooling medium through the radiator and by-pass, and means whereby a circulation may be maintained through the radiator at all times, such means preferably comprising a by-pass around the valve mechanism regulating flow of the cooling medium through the radiator and constituting a small passage between the usual jacket or jackets of the engine and such radiator.

The invention is capable of receiving a variety of mechanical expressions, two of which, for purposes of illustration, have been shown on the accompanying drawing. But it is to be expressly understood that such embodiments of the invention have been selected for purposes of illustration only, and are not to be construed as a definition of the limits of the invention, reference being had to the appended claims for that purpose.

Referring to the drawing, wherein the same reference characters designate corresponding parts in the several figures.

Figure 1 is an elevation of a cooling system for an internal combustion engine,

partly in section, illustrating an embodiment of the invention in a system employing a pump for maintaining circulation of the cooling medium;

Fig. 2 is an elevation, partly in section, of a system embodying the invention and employing the tremosiphon principle for maintaining circulation of the cooling medium.

Referring in detail to Fig. 1, 1 represents any usual or preferred form of internal combustion engine, such as is commonly used in automobiles. The cylinder or cylinders of the engine are provided, as is usual, with a jacket or jackets through which it is designed a cooling medium shall circulate for maintaining the cylinder or cylinders at the proper temperature for the most efficient operation of the engine. 2 represents the outlet manifold for the cooling medium and 3 the inlet manifold for conducting such medium to said jacket or jackets. 4 represents any suitable form of radiator, 5 a conduit connecting manifold 2 with the radiator, and 6 the outlet conduit of the radiator. 7 is any conventional form of circulating pump, shown as delivering the circulating medium to the manifold 3 through conduit 8 and receiving the circulating medium from conduit 9. 10 is a valve housing communicating in the form shown at its opposite ends with the conduits 6 and 9. 11 is a by-pass connected at one end with the branch of the circuit comprising manifold 2 and conduit 5, as by a Y-coupling 12, and communicating at its other end with the aforesaid valve housing 10, as by a passage 13 leading laterally thereinto.

Within the aforesaid valve housing 10 is valve mechanism for regulating the flow of cooling medium through the radiator 4 and by-pass 11. While such valve mechanism may take a variety of forms, it is shown as comprising valve members 14 and 15 adapted to control ports 16 and 17 with which the by-pass 11 and the radiator outlet 6 respectively communicate. While these valves have been shown as seating valves, it is to be expressly understood that they may be of any suitable construction. Valve members 14 and 15 are also shown as rigidly connected by a stem 18 whereby they move in unison.

Means are preferably provided for controlling the position of said valve members, such means, in the form shown, comprising

a thermostat positioned in the path of and subjected to the influence of the cooling medium as it flows through the system. While any suitable form of thermostat may be employed, the illustrated embodiment comprises a corrugated expansible and collapsible vessel 19 positioned within the valve housing in any suitable way, as by a bracket 20 secured to one end of the vessel 19 and holding such end stationary. The opposite movable end wall 20' of the vessel 19 is connected with the aforesaid valve members 14 and 15. The expansible and collapsible vessel 19 is desirably made to possess an inherent elasticity as by constructing the same of a resilient metal, and this vessel may be charged with a thermosensitive volatile fluid at a pressure below that to which the vessel is normally exteriorly subjected, whereby it is normally collapsed against the elasticity inherent therein.

In order to prevent the cooling medium freezing in the radiator when valve 15 is entirely closed and the circulation is being maintained solely through the jacket or jackets of the engine and the by-pass 11, means is provided whereby a circulation is maintained through the radiator at all times. To this end a by-pass is provided in any suitable way around the valve 15, such by-pass constituting a small passage of communication between the radiator and the engine jacket or jackets. While this by-pass may be provided in a variety of ways, the construction shown comprises an aperture 21 in the partition constituting the seat for the valve 15.

Referring to Fig. 2, the invention is illustrated as embodied in a system employing a thermo-siphon principle for maintaining a circulation of the cooling medium through the radiator and engine jacket or jackets. In the form here shown, the valve housing 10 is positioned in the upper branch of the system between the manifold 2 and the conduit 5 constituting the inlet to the radiator 4, the outlet 6 of the radiator communicating with the conduit 8' leading to the manifold 3 through a T-coupling 12' with which also communicates the by-pass 11 leading from the aforesaid housing 10. The construction of valve mechanism and thermosensitive means for controlling the same is shown as the same as employed in the embodiment illustrated in Fig. 1. As in the first described embodiment, circulation of the cooling medium through the radiator is maintained at all times, even though valve 15 be entirely closed, by the provision of the aperture 21 in the partition constituting the valve seat of said valve 15.

When the engine is started, the cooling medium is at substantially the same temperature as the surrounding air. The temperature of the medium being comparatively

low, the collapsible and expansible vessel 19 is contracted, valve 14 is wide open, and valve 15 entirely closed. Circulation of the cooling medium is now maintained through the engine jackets and by-pass 11. When the temperature of this medium tends to rise above a degree proper for the most efficient operation of the engine, the vessel 19 begins to expand, proportionately closing the valve 14 and opening valve 15, thereby deflecting part of the circulation through radiator 4. Continued expansion of the vessel 19 continues to close valve 14 and open valve 15, until the former is entirely closed and the latter entirely open, when the entire circulation is by way of the radiator 4. Thereby the thermosensitive means automatically regulates the flow of the cooling medium through the radiator or by-pass, or both, in accordance with the needs of the system as determined by the temperature of such medium.

When the valve 14 is wide open and valve 15 entirely closed, if no provision were made otherwise, the cooling medium would stand in the radiator 4 without circulation, and in very cold weather would freeze therein. By the provision of the by-pass or passage 21, however, a small amount of the cooling medium will flow therethrough to maintain a slight circulation through the radiator. Not only is a fluid in motion less likely to freeze than one that is still, but the medium flowing through the radiator owing to the provision of the by-pass or passage 21, whether the circulation be due to the use of a pump or to convectional currents set up when different portions of a body of fluid are at different temperatures, comes to said radiator from the engine jacket or jackets in heated condition and tends to raise the temperature of the cooling medium in said radiator. Thereby freezing of such medium in the radiator is prevented.

When the thermostat is charged with a thermosensitive fluid at a pressure below that of the surrounding medium as heretofore described, in case the vessel 19 leaks whereby the pressure within and without the same becomes equalized, the elasticity inherent in such vessel moves valve 15 to wide open position, admitting the maximum circulation through the radiator and thereby preventing dangerous conditions arising in the system, such as overheating of the system, as would occur if circulation was maintained solely through the by-pass without a thermostatic regulation thereof.

It is to be understood that the invention is susceptible of embodiment in other suitable forms of cooling systems for internal combustion engines without departing from the spirit of this invention, and that the valve casing in each case may be positioned in any suitable portion of the cooling sys-

tem, the illustrated embodiments showing it as applied to both the upper and the lower branches of such system. Furthermore, the provision for maintaining a circulation through the radiator may be supplied in any other suitable way without departing from the spirit of this invention. Reference is therefore to be had to the appended claims for a definition of the limits of said invention.

What is claimed is:

1. In a cooling system for internal combustion engines, the combination of a radiator, a by-pass around said radiator, valve mechanism regulating the flow of cooling medium through said radiator and by-pass, and a by-pass around the valve mechanism regulating flow of the cooling medium through said radiator whereby a circulation of cooling medium may be maintained through the radiator at all times.

2. In a cooling system for internal combustion engines, the combination of a radiator, a by-pass around said radiator, valve mechanism regulating the flow of cooling medium through said radiator and by-pass, thermosensitive means for actuating said valve mechanism, and a by-pass around the valve mechanism regulating flow of the cooling medium through said radiator whereby a circulation of cooling medium may be maintained through the radiator at all times.

3. In a cooling system for internal combustion engines, the combination of a radiator, a by-pass around said radiator, valve mechanism regulating the flow of cooling medium through said radiator and by-pass, and means whereby a circulation of cooling medium may be maintained through said radiator when the valve mechanism regulating flow of cooling medium therethrough is closed.

4. In a cooling system for internal combustion engines, the combination of a radiator, a by-pass around said radiator, valve mechanism regulating the flow of cooling

medium through said radiator and by-pass, thermo-sensitive means for actuating said valve mechanism, and means whereby a circulation of cooling medium may be maintained through said radiator when the valve mechanism regulating flow of cooling medium therethrough is closed.

5. In a cooling system for internal combustion engines, in combination with the engine jacket, a radiator, a by-pass around said radiator, valve mechanism regulating the flow of cooling medium through said radiator and by-pass, and a relatively-small always-open passage intermediate the jacket and radiator whereby a circulation of heated medium may be maintained through said radiator when the valve mechanism regulating flow of the cooling medium therethrough is closed.

6. In a cooling system for internal combustion engines, in combination with the engine jacket, a radiator, a by-pass around said radiator, valve mechanism regulating the flow of cooling medium through said radiator and by-pass, thermosensitive means for actuating said valve mechanism, and a relatively-small always-open passage intermediate the jacket and radiator whereby a circulation of heated medium may be maintained through said radiator when the valve mechanism regulating flow of the cooling medium therethrough is closed.

7. In a cooling system for internal combustion engines, in combination with the engine jacket, the radiator, the by-pass around the radiator, and means whereby the circulation of cooling medium may be maintained through the by-pass to the exclusion of the radiator, a small passage whereby a limited circulation of the heated medium from the engine jacket may be maintained through the radiator when the normal circulation is maintained only through the by-pass.

In testimony whereof I have signed this specification.

JEAN V. GIESLER.