



## UNITED STATES PATENT OFFICE

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## INDICATOR FOR COOLING SYSTEMS OF AUTOMOBILES

Application filed July 16, 1926. Serial No. 122,783.

This invention relates to an indicator device for the cooling systems of automobiles or otherwise where water cooled motors are employed.

5 An object of the invention is to provide a device for indicating the extent to which said water or other cooling fluid is immune from freezing.

10 A more specific object is to provide an indicator device which may be incorporated as a part of the cooling system and which will visually indicate the specific gravity of said fluid.

15 A further detailed object is to provide an indicator arranged permanently in the cooling system and containing a hydrometer visible at all times.

20 A further specific object is to provide means whereby if desired an artificial water level may be provided and maintained at a convenient point for the proper functioning of the hydrometer.

25 Other objects and aims of the invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts and applications of principles constituting the invention; and the scope of protection contemplated will be indicated in the appended claims.

30 In the accompanying drawing which is to be taken as a part of this specification, and in which we have shown merely a preferred form of embodiment of the invention:—

35 Fig. 1 is a side elevational view, partly in vertical section, of an indicator device constructed in accordance with this invention, and

40 Fig. 2 is a similar view illustrating a modification in which the exterior vent tube is employed instead of the valve device shown in Fig. 1, and the device being illustrated in association with the cooling system of an automobile engine.

45 Referring to the drawing for describing in detail the structures therein shown, the reference character G indicates the upper portion of the radiator of the cooling system of an ordinary automobile engine. Between the

radiator and the engine proper, not illustrated, extends the usual flexible connecting pipe consisting in this instance of two spaced pieces of flexible tubing as 17 and 18, and a short metallic tube 16 interposed between the pieces 17 and 18. 55

The tube 16 is shaped to constitute a base member of the present indicator device.

The section 17 of flexible tubing is shown as being connected to the inlet 3 of the radiator G. 60

A transparent, preferably glass, tube 15 rests in seat 4 provided in the pipe 16. The upper end of said tube being closed as at 19 and the lower end being open and in communication with the interior of the pipe 16 through a passage-way 7 provided through the wall of the pipe within the seat 4 so that the water or other cooling fluid in the system is free to move into the transparent tube. 65 70

The tube 15 may be sealed into the seat 4 in any suitable manner but for convenience is here shown as being held by cement or other appropriate material as 8.

75 A small passage-way 28 is formed through the side wall of the tube 15 at a point spaced downwardly from the top closure 19 being arranged at a level approximately that desired for an artificial level as 25 of fluid within the tube. 80

A suitable valve is provided in the passage-way 28. This valve may take any desired form suitable to permit egress of air and to shut off egress of liquid when the liquid has raised to the desired level. It may be either manually operable or automatically operable. 85 In the present instance it is shown as being automatically operable. It consists of a hollow extension 26 contained in a float ball 27, the extension 26 being in communication with the interior of the indicator tube through the passage-way 28 and having an upwardly opening vent aperture 29 controlled by the ball 27. 90

95 During the time while the fluid is rising in the indicator tube the air from within said tube will exhaust freely through the openings 28 and 29. When the fluid reaches the desired level it will close the opening 29 and a slight additional rise within the extension 26 will 100

float the ball 27 and thereby close the opening 29 so as to prevent overflow of the fluid while the main level in the cooling system is further raised.

5 The shutting off of the passage-way 28 by the fluid will stop the egress of air from within the tube 15. This will prevent the continued rising of the fluid within the tube 15 and thus establish an artificial fluid level as 25  
10 within the tube.

A hydrometer H is freely movable within the tube 15, said hydrometer being preferably, though not necessarily, provided with graduations as 14, readable at the artificial  
15 level 25.

The hydrometer H may indicate the relative proportions of the non-freezing ingredient to the whole quantity of cooling fluid. In replenishing the supply of non-freezing ingredient it has been heretofore difficult, if  
20 not impossible, to maintain a uniform quality of mixture. Due to evaporation, etc., the proportion of the non-freezing ingredient to the whole quantity of cooling fluid may be materially changed in the system and the addition  
25 of a new supply may contain a wholly inadequate proportion of the non-freezing ingredient, or a wholly too strong proportion, according to how good a guesser the operator  
30 may be.

By the present invention however the strength of the cooling fluid in the system will be always readable at a glance and the strength of the replenishing supply may be  
35 regulated accordingly. In fact the graduations upon the hydrometer may readily be marked to indicate by figures or otherwise the exact strength required for the replenishing supply, for instance at a given height the hydrometer may call for one ounce of non-freezing  
40 ingredient to each quart of water added, at another height it may call for two ounces of the non-freezing ingredient, and so on.

The closure 19 for the upper end of the tube  
45 may consist of a removable screw plug or cap, whereby the hydrometer may be removed or inserted upon occasion.

The structure illustrated in Fig. 2 is similar to that shown in Fig. 1, except that it suggests that instead of the valve 27 an exterior  
50 vent tube 20 may be employed through which air may exhaust to permit the fluid in the transparent tube 15 to rise to a desired level. This vent tube may be connected with a small  
55 nozzle-like protuberance 21 provided upon the side of the tube 15, said extension being hollow and in communication with the interior of the tube 15 at a desired point spaced downwardly from the upper end of the tube  
60 15. The vent tube 20 may conveniently consist of a short piece of rubber tubing and it may be extended upwardly above the indicator device and have its upper end as 22 conveniently attached to the tie rod 23 or other  
65 part of the automobile structure as by means

of a bond or clamp device as 24, the simple requirement involved being that the end 22 should be sufficiently elevated to stand above the level as 25 of fluid in the system, thus to prevent over-flow of fluid through the vent  
70 tube.

In operation, when fluid is initially introduced into the system, the fluid will rise, through the opening 7 of the base tube, and move upwardly toward the top of the indicator tube 15 meanwhile driving air outwardly from said tube through the passage-way 28. The rise of the fluid in the tube 15 will continue until it shuts off access of air to the passage-way 28. An artificial level 25 will thus  
75 80 be established for the reading of the hydrometer.

In the structure Fig. 1 the fluid will continue to flow through the passage-way 28 until the ball 27 is floated to close the vent 29.  
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In the structure Fig. 2 the fluid will continue to rise in the vent tube 20, the level of the fluid in this tube being thereafter at all times the same as the level 25 of fluid in the system.  
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As many changes could be made in this construction without departing from the scope of the invention as defined in the following claims, it is intended that all matter contained in the above description or shown in the accompanying drawing, shall be interpreted as illustrative only and not in a limiting sense.  
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Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:—  
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1. The combination with the water cooling system of an engine, of a transparent indicator tube comprised in said system at least partly below the water level in the system and arranged to receive water from the system therinto, the tube having an air vent opening therefrom, a device arranged to be moved by the water for controlling said vent opening to thereby automatically establish  
105 110 an artificial water level in said tube below the level in the system, and a hydrometer device readable at said artificial level.

2. The combination with the water cooling system of an engine, of a transparent indicator tube comprised in said system, said tube being open at its lower end and closed at its upper end, the lower end being in communication with the water cooling system to admit water into the tube, an air vent opening into the tube at a point spaced downwardly from the upper end of the tube arranged thereby to limit the rise of water in the tube and to thereby provide an artificial water level in the tube, a hydrometer device  
115 120 125 readable at said artificial level, and a valve operable by the water to close the air vent.

3. The combination with the water cooling system of an engine, of a transparent indicator tube arranged in said system, said  
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transparent tube being closed at its upper end and having its lower end open and arranged to permit water of the system to rise in the tube, said transparent tube having a vent opening formed through the side wall thereof spaced downwardly from its upper end, and a float valve arranged in said opening constructed to permit egress of air and prevent egress of water.

5 vent opening formed through the side wall thereof spaced downwardly from its upper end, and a float valve arranged in said opening constructed to permit egress of air and prevent egress of water.

10 4. The combination with the water cooling system of an engine, of a transparent indicator tube closed at its upper end and having its lower end open and arranged to permit water of the system to rise in the tube, said transparent tube having a vent opening therefrom spaced downwardly from its upper end, and a float valve to control said opening constructed to permit egress of air and to prevent egress of water.

20 5. The combination with a liquid container, of means automatically operable to establish an artificial liquid level below the level of the liquid within the container said means including a valve member arranged to be floated by the liquid, and a hydrometer device readable at said artificial level.

6. The combination with a liquid container, of means to establish an artificial liquid level below the level of the liquid within the container, said means comprising a hollow tubular member closed at its upper end and having means at its lower end communicating with the container and adapted to permit liquid from the container to flow into the tubular member, the tubular member having an air vent opening communicating with its interior at a point spaced downwardly from the upper closed end of the tubular member and having its outer end open to the atmosphere so that rise of the level of the liquid within the tubular member will prevent the displacing of air outwardly through said vent opening when the liquid rises above the vent opening, a hydrometer device within the tubular member, and the tubular member being constructed to provide vision of the hydrometer device for reading at the liquid level.

7. The combination with a liquid container, of means to establish an artificial liquid level below the level of the liquid within the container, said means comprising a hollow tubular member closed at its upper end and having means at its lower end communicating with the container and adapted to permit liquid from the container to flow into the tubular member, the tubular member having a vent opening spaced downwardly from the upper closed end of the tubular member for the purpose of allowing air to escape and means connected with said tubular member and co-operating therewith to cause the liquid within said tubular member to seal said vent opening when the level of the liquid within the tubular member rises above said

vent opening, a hydrometer device within the tubular member, and the tubular member being constructed to provide vision of the hydrometer device.

In testimony whereof we affix our signatures.

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