Feb. 17, 1948. E. P. BARTLETT ET AL 2,436,281

PROCESS FOR COOLING INTERNAL-COMBUSTION ENGINES

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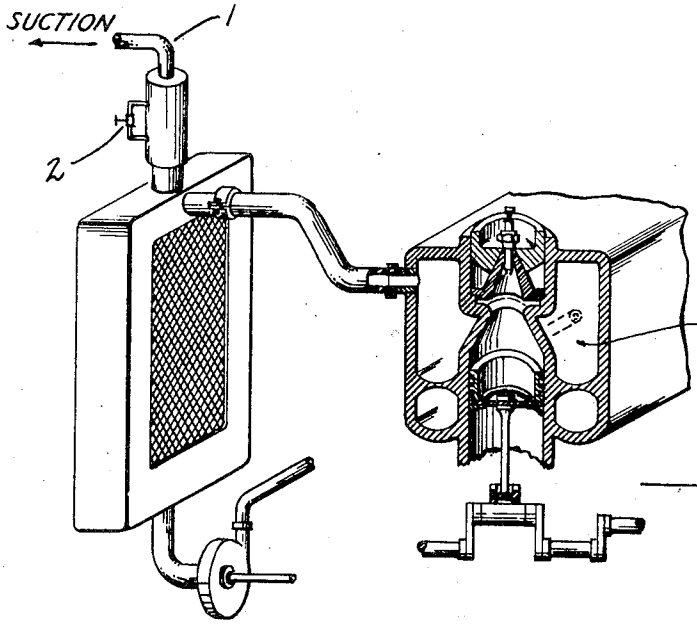

Fig. 2

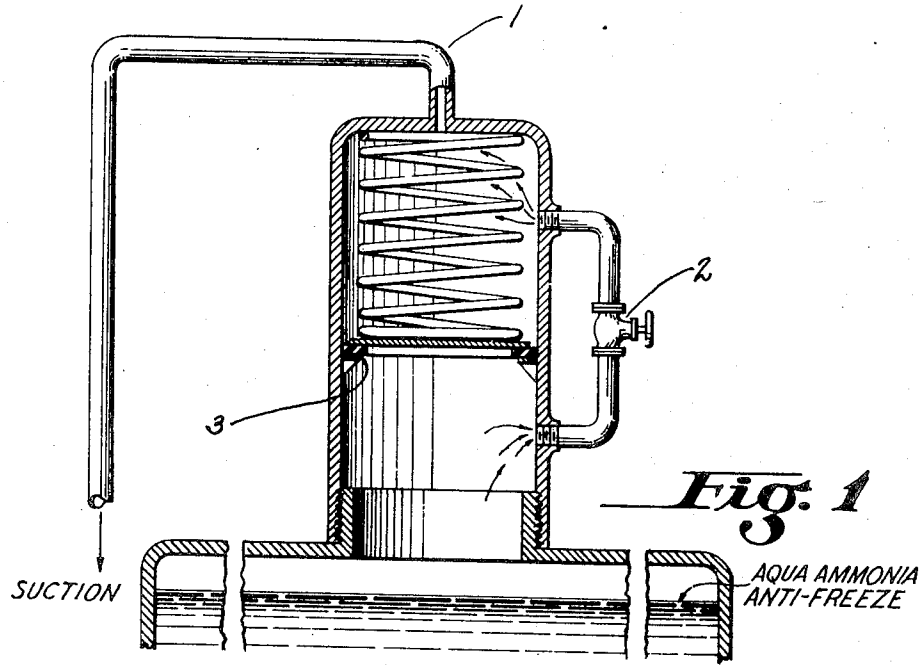

Fig. 1

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PROCESS FOR COOLING INTERNAL-COMBUSTION ENGINES

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3 Claims. (Cl. 122—170)

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This invention relates to improvements in processes for cooling internal combustion engines, and particularly to improvements in processes employing antifree compositions in the cooling systems of internal combustion engines.

Hitherto it has been customary to employ as internal combustion engine coolants aqueous solutions of monohydric or polyhydric alcohols together with various corrosion inhibitors, antioxidants and the like. In certain instances, non-alcoholic freezing-point depressants, such as calcium chloride, magnesium chloride, or sodium lactate have been used, but these materials generally have been somewhat corrosive.

An object of the present invention is to provide an improved method for cooling internal combustion engines. Another object is to prevent corrosion in the cooling systems of internal combustion engines by the use of a non-alcoholic, yet non-corrosive, freezing-point depressant.

With the foregoing objects in view, this invention comprises the method of cooling internal combustion engines by means of a sealed cooling system containing aqueous ammonia, preferable in the absence of air or oxygen. Thus, the present invention contemplates a cooling system containing a hermetically sealed-in cooling liquid comprising aqueous ammonia. This is illustrated in the accompanying diagrammatic drawing which shows an engine cooling system containing ammonia, means for expelling air by applying suction to the outlet tube 1 while the shut-off valve 2 is open, and means for hermetically sealing the system, viz. the shut-off valve 2, and the sealing device 3.

In the practice of this invention it is preferable that the cooling system, before sealing, be de-aerated so that the vapor above the antifreeze liquid consists largely or almost exclusively of water and ammonia. By keeping the system free of air, corrosion of copper and other oxidizable metals is prevented or greatly diminished. The preferred concentration of ammonia in the antifreeze liquid is about 5% to 30% by weight, although adequate protection against freezing is obtained at 10% to 20% concentration.

In a specific illustration, an automobile engine water jacket is charged with a 20% solution of ammonia in water, and a suction is applied, thus expelling the air from the free space.

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The system is then sealed, and operation of the engine is started. When the temperature of the coolant reaches 180° F. the gauge pressure on the system is 29 pounds per square inch. At a temperature of 230° F., the gauge pressure is 79 pounds per square inch. The mixture in the system, in this illustration, has a freezing point of —40° F.

Figure 1 illustrates an engine cooling system containing aqueous ammonia, and provides a cross-sectional view of a means 1 for withdrawing air from the system. In normal operation of the engine the valve 2 and the sealing device 3 remains closed, i. e. the system is completely sealed. Figure 2 also illustrates an engine cooling system containing aqueous ammonia, with the air withdrawing means 1 and the valve 2 suitably positioned. After the suction has been applied, as illustrated in Figures 1 and 2, the valve 2 is closed, and the aqueous ammonia circulates through the engine in the de-aerated sealed cooling system.

The advantages of the present invention reside not only in the excellent physical properties of the antifreeze composition, but also in its chemical inertness towards most metals, and in its low cost. The sealing of the cooling system not only prevents excessive loss of the constituents of the antifreeze composition, but also eliminates the influx of air into the system, thus protecting the metals against corrosion.

While it is desirable, for best results, that air be excluded from the sealed cooling system, this is not always necessary. Thus, the exclusion of air is less important when the metals with which the antifreeze mixture comes in contact are non-cupreous, such as steel or aluminum.

We claim:

1. A method for preventing corrosion in the cooling systems of internal combustion engines which comprises cooling the said engines by means of a medium consisting of an aqueous medium containing from 10% to 20% by weight of ammonia as a freezing point depressant in a de-aerated, hermetically-sealed cooling system.

2. A method for preventing corrosion in the cooling systems of internal combustion engines which comprises cooling the said engines by means of an aqueous solution containing about

5% to 30% by weight of ammonia, in a deaerated, hermetically sealed system.

3. In a process for preventing corrosion in the cooling system of an internal combustion engine, the steps which comprise introducing into the said cooling system an aqueous solution containing 10% to 20% by weight of ammonia, expelling the air from the said cooling system, and sealing the system to avoid excessive loss of the constituents of the said solution.

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Certificate of Correction

Patent No. 2,436,281. February 17, 1948.

EDWARD P. BARTLETT ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Column 1, line 4, for "antifree" read *antifreeze*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of April, A. D. 1948.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.