March 2, 1926. 1,575,580

E. C. JOHNSTONE

HEATER FOR LIQUID CIRCULATING SYSTEMS

Filed May 26, 1925

Fig. 1.

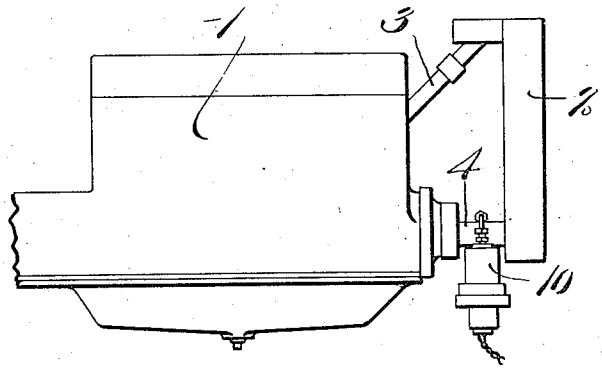


Fig. 2.

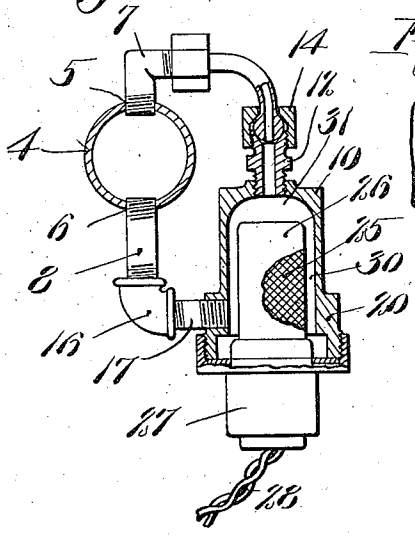


Fig. 3.

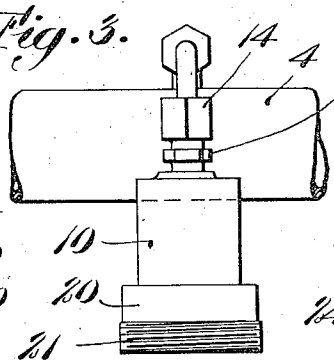


Fig. 4.

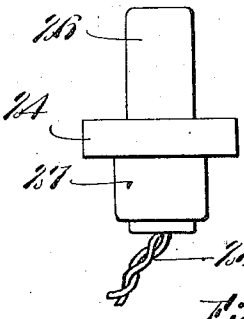


Fig. 5.

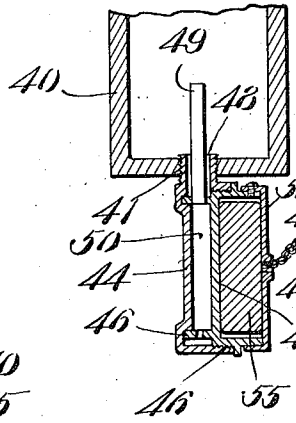


Fig. 6

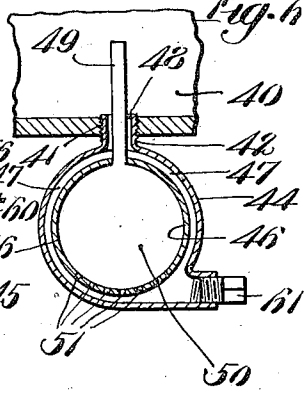
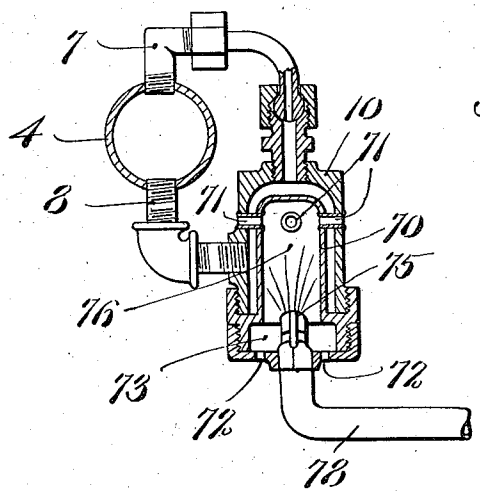


Fig. 7.



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UNITED STATES PATENT OFFICE.

EDWARD C. JOHNSTONE, OF SPARTANBURG, SOUTH CAROLINA.

HEATER FOR LIQUID-CIRCULATING SYSTEMS.

Application filed May 26, 1925. Serial No. 33,012.

To all whom it may concern:

Be it known that I, EDWARD C. JOHNSTONE, a subject of the King of Great Britain, and resident of Spartanburg, in the county of Spartanburg and State of South Carolina, have invented an Improvement in Heaters for Liquid-Circulating Systems, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings representing like parts.

My present invention is an improved and novel heating appliance, particularly intended for application to and for use with liquid circulating systems, such as for example as the water jacket and radiator of a liquid cooled automobile engine.

While my invention is primarily intended as a heating attachment for use in maintaining the liquid cooling system of a gasoline engine warm to prevent freezing, permitting the storing of the automobile in a non-heated garage, yet the invention broadly considered is applicable to other uses, and may be employed for heating radiators or the like. An important feature of my present invention consists in the provision of means which will permit a relatively small quantity or amount of the liquid medium to be heated, into a heating chamber or receptacle, whereby an economical and relatively small and inexpensive supply of heat can be given, which will create sufficient and immediate temperature in the small quantity of liquid admitted to the heating chamber, so as to produce a circulation in the system and through the application of a relatively slight heat supply. Thus, where I contemplate the use of an electric heating unit, it is of great importance to conserve the expense and energy of an electric heater, the expense of such a heating agent being necessarily of great importance in the commercial success or very general use of any system of this kind. A further object of the present invention is to provide a heating appliance which can be attached to existing automobile engines at practically any convenient or desired point, in the water jacket, at the radiator, or along the connecting conduits. Furthermore, in one form of my invention I may quickly fix the heating appliance at a single point with provision for both inlet and outlet through a single opening in the water jacket, radiator or other portion, substitute the same for the drain cock of the liquid cooling system if desired.

A further important object of my present invention is to provide a completely self-contained heater attachment, capable of being attached adjacent to but outside of any portion of the system to which it is desired to attach the heater, thus rendering it at all times convenient for use, inspection, application, repair, renewal or removing if desired.

In carrying out my invention I prefer to utilize an electric heating unit, it now being substantially universally customary to have electric light in garages, and I contemplate attaching the current carrying wires from the usual electric lighting system in the garage by any suitable connector, which may be fitted on the dash board of the car if desired, and thus connect the same to the heater appliance. However, I may also utilize gas as a heating element, and the invention in its broader aspects is comprehensive of both forms of heat supply. In carrying out the invention in the several modifications illustrated herein, I utilize the principle of attaching a self-contained heater, closely adjacent to while external of the liquid cooling system, providing in each instance a relatively small film of liquid to be circulated in heat receiving relation to a compact, economical source of heat supply, thus quickly heating the relatively small film of liquid, initiating a circulation thereby, and conserving the expense involved by employing a relatively small amount of the heating element. This film of liquid being relatively thin the total volume of liquid within the chamber is small as compared to the heating surface in contact therewith, with the result that such volume of liquid is practically instantaneously heated, thus causing the initiation of an extremely rapid flow of heated liquid through the entire system.

The importance of maintaining the automobile engine, oil and adjacent portions in a warm temperature, particularly during cold weather in winter and in non-heated garages, has long been appreciated, and while I am aware of numerous attempts having been made to properly solve this problem, I am not aware that any of such attempts have been successful commercially nor have they been based on the principle which I have evolved in carrying out the present invention.

Further features of the invention, novel combinations of parts and advantages will be hereinafter more fully pointed out and claimed.

Referring to the drawings, illustrating preferred embodiments of the invention,

Fig. 1 is a diagrammatic view of a portion of an automobile engine and circulating system;

Fig. 2 is an enlarged view, partly in cross section, of my novel and improved heater attachment, utilizing an electric heating unit;

Fig. 3 is a side view of the same, with the heater detached;

Fig. 4 is a view of a typical electric heater;

Figs. 5 and 6 illustrate in side and right angled elevations a modified form of heater appliance wherein but a single opening into the circulating system is required for both the outflow and intake; and

Fig. 7 is a view, partly in cross-section of a further modification illustrating the use of a gas heater.

Referring to the drawings, 1 designates generally an automobile engine with the usual water jacket. 2 shows a radiator and the conduits 3 and 4 connect the radiator and water jacket to the engine 1 in the usual manner. While I can attach my heating appliance to any desired part of the liquid cooling system, yet one of the conduits 3 or 4 affords a convenient means to which my heating appliance can readily be affixed. As shown in Figs. 2 and 3, I tap recesses 5 and 6 in the top and bottom respectively of the conduit 4, fitting therein pipes 7 and 8, which in turn are led to the heating chamber 10. A suitable union comprising the pipe 12 and connecting nut 14 on the top, and elbow 16 and nipple 17 at the lower portion, are provided to attach to the heating chamber 10. Preferably the connecting pipes and chamber 10 are of brass, copper or other suitable noncorrosive and heat retaining metal. The heating chamber 10 is preferably formed with an enlarged flange substantially as illustrated at 20, being externally threaded to receive at 21 a correspondingly threaded cap 24 carrying integral therewith the heating member 25, which is adapted to extend into the chamber 10, being covered by a metal coating 26 and having the current receiving socket portion 27 to which the current conducting wires 28 are led. The heating member 25 and the covering 26 are of appropriate diameter and size to cooperate with the interior of the heating chamber 10 and form a relatively small and annular space therearound, as shown at 30, whereby the liquid from the interior of the conduit 4 will flow through the pipes 7 and 8 and fill the annular chamber 30 and the portion 31, thus giving a thin film of liquid around the heating element. The current carrying wires 28 can be led to any suitable point where a connector of usual type can be supplied from the source of current supply, and if desired the connecting socket therefor can be positioned on the dash board of the vehicle for the convenience of the driver in affixing or detaching the same. With electric current supplied through the wires 28, the heating element will quickly raise the temperature of the liquid in the heating chamber 10, or if the liquid system is already at a heated temperature, such for example after the engine has been run or in use, it will maintain the liquid in sufficient temperature to prevent freezing and preserve the oiling system and other parts of the engine in good working condition. My heater attachment readily initiates a circulation by drawing the relatively colder water through the opening 6 in the pipe 4 into the heater and thence allowing same to be heated and expanded in the upper portion 31 of the heating chamber and it is then forced outwardly through the pipe 7 and into the opening 5 during the heating and expansion of the liquid in the chamber 10. Thus the continual heating and circulation of the liquid is maintained and with an economical source of heat supply, the relatively thin film of liquid in the recess 30 and the relatively large heating surface 26 giving great efficiency in the heat exchange from the heating unit to the liquid.

In the modifications illustrated in Figs. 5 and 6, which I have termed a "contra-flow" heater, I am enabled to produce both the flow into the heater and the reflow of the heated liquid from the heater through the same recess in the cooling system. This affords a more compact self-contained heating unit than the form illustrated in Figs. 1 to 4, and furthermore enables the entire attachment to be made through a single tapped recess in the cooling system, or may be substituted for the drain cock in the bottom of the cooling system, radiator or other position. Thus, as shown in Figs. 5 and 6, 40 designates the lower portion of the cooling system, which may be the radiator or the like, wherein the usual drain cock is fitted through a tapped recess at 41, by removal of the drain cock and the substitution of my heater, the "contra-flow" heating effect is produced. This comprises a threaded tap 42 attached to a recessed member 44 to which is fitted the heater-containing member 45 by the threaded connection at 46. This member 45 also has an extending flange 46 fitting within and dividing the recess of the member 44 into a relatively small or thin annular passage 47, which opens directly through the neck 48 into the opening in the liquid cooling system. This flange 46 is perforated at the upper end to receive the outlet pipe 49, through which the heated

liquid will flow backwardly and into the cooling system from the heating chamber 40, liquid being admitted through the annular passage 47 by means of a plurality of holes 51, 51, into the heating chamber 50, which latter is in direct heat receiving position to the heater 55. This heater is held in position by a removable cover or plate 56 through which the current conducting wires are led.

In the operation of this form of my invention I am enabled to secure an influx of relatively cool liquid and an outflow of heated liquid through the same passage, effecting the influx through the neck 48 and annular passage 47, through the holes 51 into the heating chamber 50 and thus also securing the advantages of a relatively thin film of water in direct heat receiving contact to the heater. As my contra-flow type of heater may be used to take the place of the drain pipe or cock, I apply a removable plug 61 to the bottom portion of the recessed member 44, which may also serve to drain out the liquid at any time desired.

In Fig. 7 is illustrated a heater similar to that described in Figs. 1 to 4 inclusive, but employing a flame, such as a gas jet, as the heating element. In this form, the heating chamber 10 is substantially identical in construction and operation with that already described for use with the electric heater, but where a flame is used, I fit in to the heating chamber a partition 70 and provide a plurality of outlets 71, 71, for the products of combustion and air inlets 72, 72, together with a circular air mixing chamber 73, thus allowing the gas jet or flame 75 to burn within the interior 76 of the partition and with a constant supply of oxygen and outlet therefrom. Any suitable conduit 78 to conduct the gas or other heating element can be led from any desired source of supply, and if requisite the entire apparatus could be covered by one or more screens (not shown) as a protective feature, after the principle of the Davy lamp.

The advantages of my invention, wherein a complete attachable heater appliance or unit arranged in compact, simple and efficient form, and capable of attachment to existing types of engines or cooling systems, will be readily appreciated. The entire apparatus is positioned externally of the conduits, pipes, water jacket and the like, thereby eliminating the danger and difficulty of stopping the flow or circulation when heaters have been positioned directly in such conduits and pipes. Furthermore by having the heating appliance thus positioned externally the interior diameter and capacity of the circulating liquid is preserved, and an effective and positive flow is produced from a point in the circulating system to and through the heating unit where the greatest efficiency obtainable is secured through the small film of liquid in contact with a large heated surface. The arrangement is so compact as to be applicable to any desired point or position, and in the form shown in Figs. 5 and 6, can indeed be substituted for the drain cock, thus eliminating the tapping of any additional openings in the circulating system.

While I have described the invention as applicable to and primarily intended for, use with an automobile engine to maintain the same warm and in operative condition, particularly in non-heated garages, yet it will be appreciated that my heating appliance and the principle thereof may be utilized advantageously in other manner, such for example as in affording a heating element to heat a radiator in a room, for commercial heating and the like, and I wish to claim the same thus comprehensively.

My invention is further described and defined in the form of claims as follows:

1. A heater for liquid circulating systems, comprising a heating chamber, means permitting the flow of liquid into and out of said heating chamber, and a removable electric heating element located within said heating chamber, said heating element having such proportions relative to the heating chamber that the liquid capacity of such chamber is small when compared to the heating surface of the heating element, whereby the liquid within the chamber is quickly heated to a relatively high degree and propelled from the chamber through the circulating system.

2. A heater for liquid circulating systems, comprising a heating chamber, means permitting the flow of liquid into and out of said heating chamber, and a removable electric heating element located within said heating chamber, said heating element having such proportions relatively to the heating chamber that the liquid capacity of such chamber is small when compared to the heating surface of the heating element, whereby the liquid within the chamber is quickly heated to a relatively high degree, thereby instantly initiating a rapid positive flow of the liquid through the circulating system.

In testimony whereof, I have signed my name to this specification.

EDWARD C. JOHNSTONE.