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W. O. TWOMBLY

1,930,830

WATER HEATER

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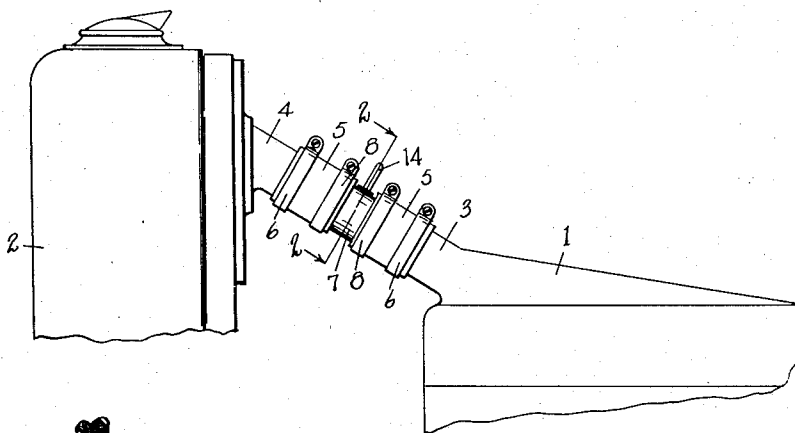


Fig. 1

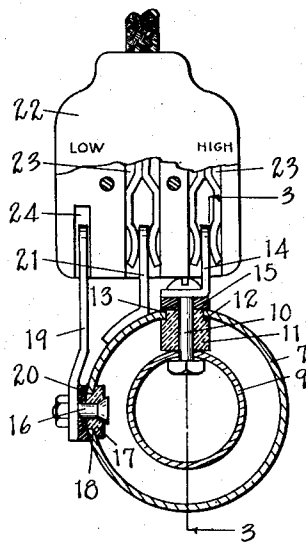


Fig. 2

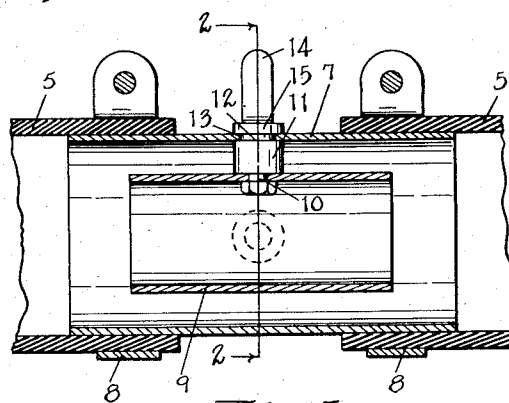


Fig. 3

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WATER HEATER

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9 Claims. (Cl. 219—40)

The main objects of this invention are:

First, to provide a water heater which is well adapted for use in the water cooling systems of motor vehicles which is highly efficient; that is, which may be employed to heat the water or system to insure easy starting or to provide a moderate temperature to prevent freezing.

Second, to provide a water heating apparatus by means of which the above results may be secured without the use of rheostats or other controls.

Third, to provide a water heating apparatus which may be inserted in the conduits connecting the water jacket of the motor to the radiator and one which does not materially restrict the circulation.

Objects relating to details and economies of my invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a fragmentary view of a water circulating system of an internal combustion engine consisting of the engine and radiator having my improved water heater installed therein.

Fig. 2 is a fragmentary view partially in section on line 2—2 of Figs. 1 and 3.

Fig. 3 is a fragmentary view mainly in longitudinal section on line 3—3 of Fig. 2.

Referring to the accompanying drawing, 1 represents an internal combustion engine and 2 the radiator of the engine cooling system. The engine water jacket is provided with a nipple 3 while the radiator has a nipple 4.

5, 5 represent sections of rubber hose secured upon the nipples 3 and 4 by means of clips 6.

My improved heater comprises an outer tubular electrode 7 adapted as a coupling member, the hose sections 5 being sleeved upon the ends of this outer electrode and clamped thereon by means of the hose clamps 8.

The hose clamps 8 are insulated from the electrode by means of the hose sections. The outer electrode thus becomes a part of the conduit.

The inner electrode 9 is preferably tubular and is disposed concentrically within the outer electrode, being supported therefrom by means of the bolt 10. This bolt 10 is insulated from the outer electrode by means of the block 11 of insulating material which also serves as a spacing block, the block being shouldered at 12 to engage a hole 13 in the outer electrode.

The bolt also serves as a binding post carrying

the terminal 14, an insulating washer 15 being arranged between the terminal and the outer electrode.

A third electrode 16 is mounted upon the outer electrode, this being in the form of a bolt having its head within the outer electrode, the bolt being insulated from the outer electrode by the block 17 shouldered to engage the hole 18 in the outer electrode. The terminal 19 is mounted on the outer end of this electrode 17, being shouldered by the washer 20 from the outer electrode.

A terminal 21 is mounted on the outer electrode between the terminals 14 and 19, the three terminals being arranged in alignment and uniformly spaced so that a pair of them may be selectively engaged by the circuit connector 22 which has sockets 23 provided with suitable contacts, as shown in Fig. 2, and a third socket 24 to receive the terminal 19 when the connector is engaged with the terminals 14 and 21. This, however, is mainly a matter of design. With the connector engaged with the terminals 14 and 21, the main electrodes 7 and 9 are rendered active, the water constituting the resistance.

A large area is presented so that the water or system is quickly heated. Where it is desired merely to prevent freezing, the connector 22 is engaged with the electrodes 19 and 21.

My improved heater is quickly installed in the cooling systems of motor vehicles now in very extensive use, has the advantage of being very substantial, at the same time does not materially impede or restrict the circulation, and is also highly efficient.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A liquid heater comprising inner and outer concentrically disposed tubular electrodes open at both ends for the free passage of liquid there-through, the outer electrode constituting a conduit coupling member, a third electrode mounted on and projecting into said outer electrode to coact therewith and insulated therefrom, a suspending bolt for the inner electrode mounted on said outer electrode and insulated therefrom and constituting an electrical connector, and plug-in terminals mounted on said bolt, said outer electrode and said third electrode respectively, and disposed in aligned uniformly spaced relation so that a connector may be selectively engaged with a pair of them.

2. A liquid heater comprising inner and outer concentrically disposed tubular electrodes open at both ends for the free passage of liquid there-

- through, the outer electrode constituting a conduit coupling member, a third electrode mounted on and projecting into said outer electrode and electrically insulated therefrom, and plug-in terminals for said electrodes disposed in aligned uniformly spaced relation so that a connector may be selectively engaged with a pair of them.
3. A liquid heater comprising inner and outer concentrically disposed tubular electrodes open at both ends for the free passage of liquid therethrough, the outer electrode constituting a conduit coupling member, a third electrode mounted on and projecting into said outer electrode and electrically insulated therefrom, and external terminals for said electrodes.
4. A liquid heater comprising inner and outer concentrically disposed tubular electrodes open at both ends for the free passage of liquid therethrough, the inner electrode being mounted upon but insulated from the outer, the outer electrode constituting a conduit, and electrical terminal connections for said electrodes mounted on the outside of said outer electrode.
5. A liquid heater comprising inner and outer concentrically disposed tubular electrodes open at both ends for the free passage of liquid therethrough, the outer electrode being adapted to receive the ends of a conduit, and external circuit connectors for said electrodes.
6. A liquid heater comprising an outer tubular electrode adapted as a conduit element, an elongated inner electrode mounted centrally and longitudinally within but electrically insulated from said outer electrode, said electrodes being open at both ends to permit free passage of liquid there-
- through and terminals for said electrodes mounted on the outside of said outer electrode, the terminal for the inner electrode being electrically insulated from said outer electrode.
7. A liquid heater comprising inner and outer concentrically disposed electrodes open at both ends for the free passage of liquid therethrough, the outer electrode constituting a conduit coupling element, the inner electrode being mounted on the outer but electrically insulated therefrom, electric circuit terminals for said electrodes, conduit sections sleeved upon the ends of said outer electrode, and hose clamps arranged upon and clamping said conduit sections upon said outer electrode and insulated therefrom by said electrodes.
8. A liquid heater comprising inner and outer concentrically disposed electrodes open at both ends for the free passage of liquid therethrough, the outer electrode constituting a conduit coupling element, the inner electrode being mounted on the outer but electrically insulated therefrom, and electric circuit terminals for said electrodes.
9. The combination with an automotive engine having a radiator and upper and lower hose connections; of an electric liquid heater comprising inner and outer concentrically disposed tubular electrodes opened at both ends for free passage of liquid therethrough, said electrodes being inserted in one of said hose connections and constituting a portion of the conduit between said engine and radiator and external circuit connections for said electrodes.

WILLARD O. TWOMBLY. 110

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65	140
70	145
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