Sept. 8, 1925. 1,553,026

A. BROWN

ELECTRIC HEATING UNIT OR ELEMENT

Filed July 25, 1922

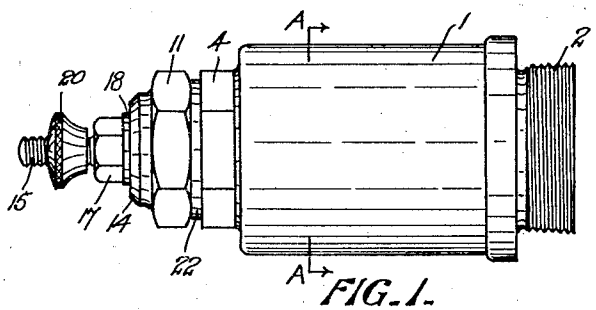


FIG. 1.

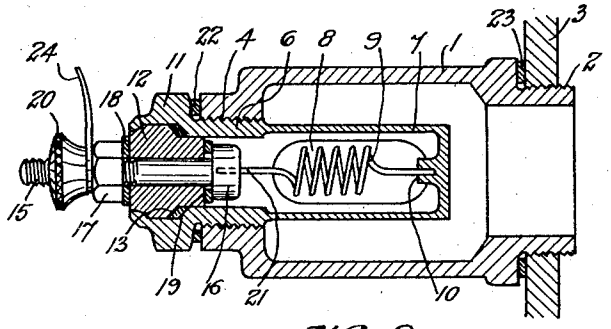


FIG. 2.

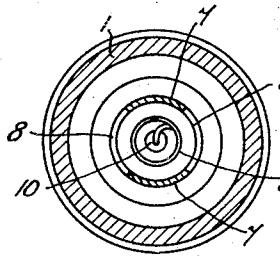


FIG. 3.

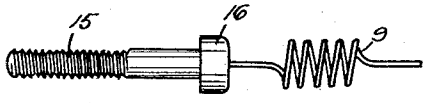


FIG. 4.

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UNITED STATES PATENT OFFICE.

ALFRED BROWN, OF GORE, OTAGO, NEW ZEALAND.

ELECTRIC HEATING UNIT OR ELEMENT.

Application filed July 25, 1923. Serial No. 577,415.

To all whom it may concern:

Be it known that ALFRED BROWN, of Carter's Garage, Gore, Otago, New Zealand, citizen of the British Empire, has invented certain new and useful Improvements in and Relating to Electric Heating Units or Elements, of which the following is a specification.

This invention relates to means for maintaining the working temperature of internal combustion engines and in particular the internal combustion engines of motor vehicles and the like and to electric heating devices or units for use in connection therewith and for other suitable purposes. As is well known when an internal combustion engine becomes cold through non-working for a period of time, the engine is difficult to start and this is particularly the case when the weather is very cold and the engine is left cold throughout the night or for any lengthy period of time. Furthermore the engine may be damaged in a severe frost and an object of the invention is to warm the engine sufficiently to prevent frost affecting it.

It will be seen therefore that one of the objects of this invention is to provide means securable to the radiator or the water jacket of an internal combustion engine whereby the above mentioned difficulty in starting the engine in cold weather is overcome by heating the water in the radiator or jacket of the engine to a suitable and convenient temperature, usually about 75 or 80 degrees Fahrenheit so that the engine being warm may be easily started.

This object of the invention is carried into effect by the provision of a specially designed electric heating unit or device which is adapted to be secured to the water jacket or radiator of the engine whereby when the current is turned on the water is heated to the required temperature.

In the preferred embodiment of the invention this specially designed electric heating device or unit is attached in a novel manner to the water jacket or radiator of the engine preferably in a horizontal position and low down and the radiator or water jacket is cut away to allow the water to enter the shell of the device around the heating element and then back again to the water jacket. This arrangement is found to materially assist the circulation of the water.

In the low voltage type the wire heat element is in direct contact with the water, and this enables the length of the wire to be considerably shortened without loss of efficiency. The method of mounting the element is also novel and no cement or support is required other than at the two extremities. This permits of a more uniform heating of the element and overcomes the difficulty in this respect which occurs in the ordinary type at present in use. A further advantage of having the element immersed entirely in the water is that no heat of any consequence can escape, nor can the element become white hot or fuse or scale easily. Furthermore by reason of its construction the device can withstand a greater variation in voltage than the usual type. It will be obvious that owing to its simple construction the heating element may be replaced inexpensively and is easily accessible for repair. By reason of the small space the device occupies when not used with the outer shell two separate heat units may be secured close together on one vessel the first heat unit being capable of maintaining the water for instance at a temperature of 212 degrees Fahrenheit. By simply carrying wires to the second unit, the temperature could be maintained at 106 degrees Fahrenheit or any reasonable modification thus halving the current cost. Again any reasonable regulation of current and consequently heat may be obtained by suitable regulation of the step down transformer, which as is hereinafter explained may be used in conjunction with the device.

Referring now to the preferred embodiment of the invention disclosed in the accompanying drawings in which Figure 1 is a side elevation of the device, Figure 2 is a side sectional elevation showing the device attached to the water jacket of an engine in a horizontal position, Figure 3 is a cross sectional elevation through lines A—A see Figure 1 showing the sides of the heating unit tube cut away, Figure 4 is an elevation of the terminal post with the heating unit attached.

There are two essential heating devices or units disclosed one of which is particularly adaptable in a garage and may be heated from the ordinary battery of a motor car of sufficient voltage or current may be used from the ordinary electric light socket or the like provided any usual form

of step down transformer is used to reduce the current down to a voltage sufficiently low to ensure that there will be no short circuiting as the ni-chrome wire in this type is in direct contact with the water thereby adding to its efficiency. This type is hereinafter referred to as the low voltage type.

In a modification there is provided a high voltage device adapted for utilization direct from the main service supply of electric current, and this type is hereinafter referred to as the high voltage type.

The low voltage device preferably consists of an outer cylindrical metal casing 1 having at its base a screwed end 2 adapted to screw into the water jacket or radiator 3 of an internal combustion engine, preferably in a horizontal position (as shown in Figures 1 and 2). The side of the water jacket or radiator 3 is cut to correspond with the opening in the casing 1 to enable the water to flow into the metal casing 1 and around the heating element 9. The opposite end 4 of the casing 1 is preferably hexagonal in shape to permit of a spanner being used thereon for tightening and loosening purposes and is provided with a tapped hole 4 into which is screwed a suitable metal heating unit tube 6 one end 7 of which extends into the interior of the casing 1 the opposite sides 8 being cut away (see Figures 2 and 3) to allow the free passage of water past a preferably ni-chrome wire heating element 9 of suitable resistance which is inserted into and brazed or otherwise suitably secured to a boss 10 on the end of the extension piece 7. The opposite end or head 11 of the tube 6 is externally preferably hexagonal in shape, and is internally shaped to receive a preferably porcelain insulator 12 which is provided with a copper or other suitable packing washer 13 to form a watertight joint between the heating element tube 6 and the insulator 12. The outer part 14 of the head 11 is spun over the cone of the insulator 12 when the insulator 12 is in position, thereby locking it securely. A terminal post 15 on the inner end of which is a head 16 passes through the insulator 12 and is secured thereto with a lock nut 17 copper packing washers 18 and 19 being provided at the outer and inner ends respectively of the insulator 12. The insulator 12 may be made of black fibre in which case the copper packing washers (13, 18, and 19) are rendered unnecessary. A terminal nut 20 is provided to secure the coil 24 conveying the current, to the terminal post 15. The end 21 of the ni-chrome filament 9 is inserted into and brazed to the inner end of the head 16. Suitable washers (22 and 23) are provided at opposite ends of the casing 1 to make watertight joints.

In operation the current passes by the single wire and earth return system through wire 24 to the terminal post 15 to the ni-chrome wire filament 9 thence to the boss 10 of the heating unit tube 6 and through the body 1 of the metal water-jacket 3 of the engine. The device is preferably placed low down on the radiator or water-jacket of the engine in a horizontal position the water to be heated passes into the interior of the casing 1, and comes into contact with the filament 9 thus setting up a circulation of the water which is heated in passing round the filament 9. This low voltage type is preferably for use when the voltage of the current is between 12 and 24.

I claim:—

1. An electrical heating device of the class described, comprising an outer casing having a threaded opening at its outer end and also having its inner end provided with an opening and arranged for attachment to a water container, an electrical heating unit tube extending into the outer casing and engaged in the said threaded opening at the outer end thereof and provided at its outer end with a head, an insulation fitted in said head and extending into the bore of said tube, a terminal post extending through said insulation, and a heating element in said tube, attached to the outer end thereof, and also to said post, the said tube having an opening to admit water from said outer casing to direct contact with said heating element.

2. A low voltage electrical heating device for raising the temperature of internal combustion engines of the kind described for the purposes set forth comprising an outer casing, having at its base a screwed end adapted to screw into a suitable orifice in the water jacket or radiator of the engine, means for securing in said casing a metal heating unit tube having the lower portion thereof extending downwardly in the casing said lower portion having its sides cut away to allow free access of water to a ni-chrome wire element secured within said heating unit tube at one end to the bottom thereof the other end being secured to the head of a terminal post, means for insulating said terminal post from the surrounding upper end of said metal heating unit tube and means for securing said terminal post insulating means and metal heating tube firmly in position and means for securing electrical supply coil in contact with said terminal post.

3. A low voltage electrical heating device for raising the temperature of internal combustion engines of the kind described for the purposes set forth comprising an outer casing having at its base a screwed end adapted to screw into a suitable orifice in the water jacket or radiator of an engine, said metal casing having its other end hexagonal in

shape and having at its upper end a tapped hole adapted to receive the lower portion of a metal heating unit tube which extends downwardly in the said casing, said lower end having its sides cut away to allow free access of water therewithin, the upper end of said inner tube being hexagonal in shape and internally adapted to receive an insulator provided with a washer, to form water-tight connection between said insulator and inner tube said insulator being adapted to receive a terminal post extending therethrough and having at its bottom end a head adapted to receive the top portion of a nichrome wire element located within and secured to the bottom of the said metal heating tube means for securing the said terminal post and said insulator and metal heating tube firmly in position and means for securing the current coil in contact with said terminal post.

In testimony whereof I affix my signature.

ALFRED BROWN.