Nov. 17, 1964 B. H. PICKARD 3,157,773

ENGINE BLOCK HEATER ASSEMBLY

Filed March 11, 1963

FIG. 1

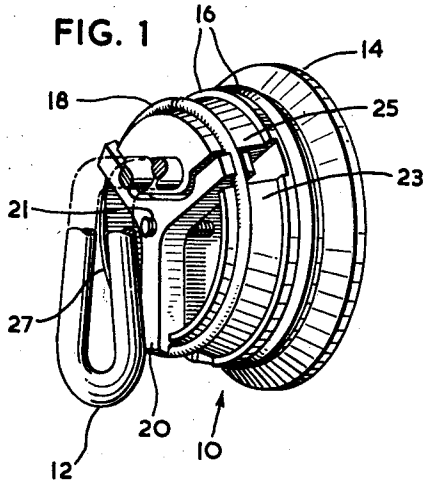


FIG. 2

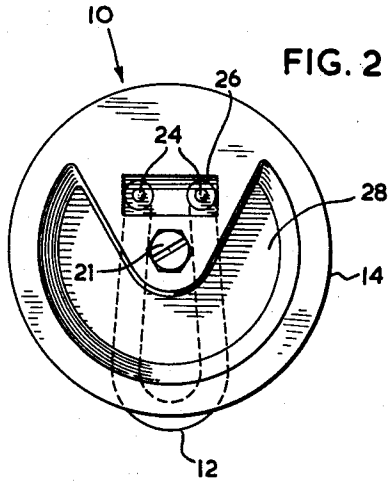


FIG. 3

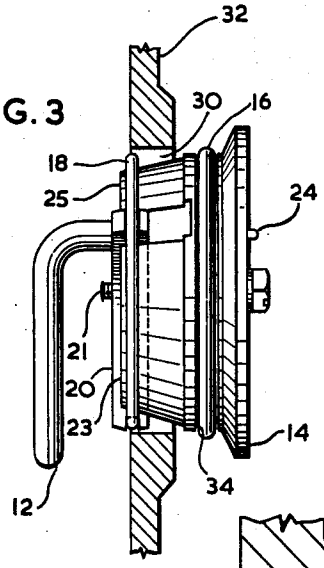


FIG. 4

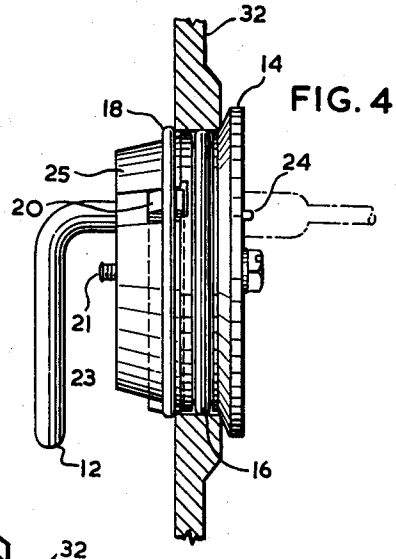
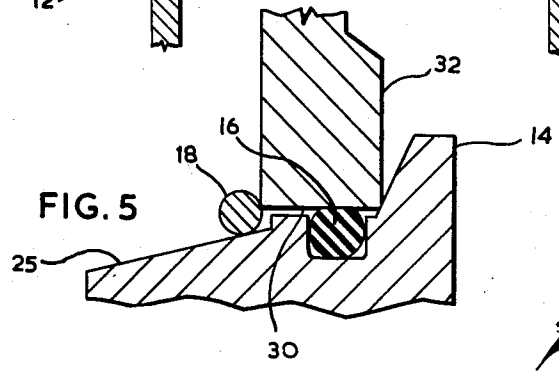


FIG. 5



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ENGINE BLOCK HEATER ASSEMBLY

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This invention relates to engine block heaters of the type which are normally mounted in frost plug openings in engine block walls. More specifically, the invention relates to a block heater of this type having an improved mechanism for locking the heater in a frost plug opening.

The type of block heater with which the present invention is concerned comprises a plug body which is mountable in a frost plug opening and carries an electrical heating element which extends into the body of the cooling liquid when the heater assembly is in position. Electrical terminals are connected to the heating element and protrude outwardly of the plug body on the outside of the engine block wall. It is usual to provide some means whereby a fluid seal between the plug body and the engine block wall can be effected as to prevent loss of cooling fluid.

The block heaters available heretofore have been provided with some means for locking the heater in its mounted position within the engine block wall. For one reason or the other, these prior locking devices have not been completely adequate. The prior devices are too expensive, ineffective in achieving a good locking action or difficult to take out of engagement whereby the heater can be taken out and replaced with a new heater or the usual frost plug, as is desired.

It is, therefore, an object of this invention to provide an improved engine block heater.

It is a more specific object of the invention to provide an engine block heater having an improved locking means for retaining the heater in its mounted position in an engine block wall.

It is a still further object of the invention to provide an engine block heater having a locking mechanism which is of simpler construction than those hitherto available, and which is less expensive to manufacture, more effective in achieving the desired locking action, and easier to release when it is desired to remove the block heater from its mounted position.

These and other objects of the invention are achieved by forming the locking mechanism in accord with the invention as the combination of an expansible ring carried by the block heater, with means for expanding the ring following the insertion of the block heater within a frost plug opening. By expanding the ring to a size which exceeds the diameter of the opening, the heater is effectively locked in place.

The invention will be more thoroughly understood from the following description of a preferred embodiment thereof as read in conjunction with the accompanying drawings.

In the drawings,

FIGURE 1 is a perspective view of a block heater in accord with the invention showing the heating element thereof broken away.

FIGURE 2 is an end view of the heater shown in FIGURE 1 as is seen from the outside of the engine block wall so that the heating element is shown in broken lines.

FIGURE 3 is a side view of the heater shown in FIGURES 1 and 2, in the process of being inserted in a frost plug opening in an engine block wall.

FIGURE 4 is a view similar to FIGURE 3 but showing the heater in its final locked position within the frost plug opening, and

FIGURE 5 is an enlarged cross-sectional view of one side of the mounted heater specifically illustrating the

manner in which the heater is sealed and locked in the frost plug opening.

Referring to FIGURE 1, the block heater in accord with this invention essentially consists of a plug body 10, which carries a heating element 12, an outer flange 14, an O-ring seal 16, an expansible ring element 18, and means for expanding the ring consisting of a spider element 20, an actuating screw 21, and a ring carrying means consisting of three expander elements 23, 25 and 27, which are provided with sloped outer surfaces.

The plug body is preferably cast of brass or bronze, although any metal or reasonably strong plastic could be suitable. The heating element 12 is a standard type element, as is common in this type of heater and is connected to an outside source of electrical power through the prong type terminals 24. These are contained within the recess 26 in the outside of the plug body.

In the illustrated block heater, the outer face of the plug body is also provided with a fairly large recess 28 which is merely provided for the purpose of reducing the overall weight of the unit, primarily in the interests of saving costs.

When the heater is inserted in the frost plug opening 30, in an engine block wall 32, a fluid tight seal between the periphery of the hole 30 and the plug body is effected by the O-ring 16. The latter is held in an annular groove 34 in the plug body and is so dimensioned that it will be secured tightly between the plug body and the periphery of hole 30. As the frost plug openings of certain types of engines are provided with an annular shoulder, the plug body in accord with this invention can be adapted to effect a seal against this shoulder rather than against the periphery of the opening. This can be done by providing a shoulder on the plug body adjacent the flanges 14. The latter shoulder can thus be grooved to carry an O-ring, which will be squeezed between the flange and the shoulder of the plug opening.

The locking mechanism which forms the invention comprises the ring 18, the spider element 20, the actuating screw 21, and the ring carrying means consisting of the three expander elements 23, 25 and 27, which are provided with sloped outer surfaces. The illustrated expander elements take the form of arc-shaped wall-like elements, with the element 25 being considerably thicker than the other two elements and serving to hold the heater element 12.

The sloped outer surfaces of the elements 23, 25 and 27 are outwardly divergent from the inner end of the plug body to the outer end. Accordingly, as the ring 18 is caused to move towards the plug body, it expands in size from a diameter less than the size of the frost plug opening 30 to a diameter which exceeds the size of opening 30. In this regard, it will be noted that, where this specification refers to the diameter of ring 18, the outer diameter is meant.

The assembly for causing the ring 18 to move from the inner end towards the outer end of the plug body consists of the spider element 20 and the screw 21. The latter is engaged in a threaded opening in the center of spider 20, so that the rotation of the screw causes the spider to move in either direction, depending upon the sense of rotation of the screw. In this regard, it will also be noted that it is preferable to upset the end of the screw so as to prevent the spider 20 from moving off the end of the screw completely. Spider 20 can also be formed of brass or similar metal, while the ring 18 is formed of spring steel.

The ring 18 is held in grooves in the outer ends of the arms of the spider 20, and is free to move in these grooves as to permit expansion of the ring as the spider is drawn towards the outer end of the plug body. The necessary inward and outward movement of the arms of

the spider **20** takes place in the channelways spacing the ends of the expander elements **23**, **25** and **27**. It will be appreciated, of course, that it is not absolutely essential to have three arms on spider **20**, as two or four or more would accomplish the same object, although in the case of a two-armed spider, some difficulty may be encountered in maintaining the ring **18** in proper alignment.

FIGURES 3 and 4 illustrate two steps in the process of installing the block heater in accord with the invention in a frost plug opening. FIGURE 3 shows the insertion of the plug body in the opening **30**, and it will be noted that ring **18** is held by spider **20** at the inner end of the plug body, as to reduce the diameter of the ring to a valve which is less than the diameter of the opening.

FIGURE 4 shows the final position of the heater and it will be noted that spider **20** and ring **18** have been drawn towards the outer end of the plug body as to expand the ring to a diameter which exceeds the diameter of the opening, thereby solidly locking the heater in place.

FIGURE 5 is an enlarged cross-sectional view of the position of the heater shown in FIGURE 4, and illustrates in greater detail both the final position of ring **18** and the manner in which the O-ring **16** effects the fluid-tight seal between the plug body and the periphery of hole **30**.

When it is desired to remove the heater from the engine block wall, screw **21** is rotated in the opposite direction as to retract spider **20** and the ring **18** from the forwardmost position shown in FIGURE 4, whereby the ring reverts to its original diameter as to permit withdrawal of the heater from the wall opening.

What I claim as my invention is:

1. An engine block heater adapted to be mounted within a frost plug opening in an engine block wall, said heater comprising a plug body of which a part thereof is shaped and sized to fit snugly in said opening, stop means carried by said body to prevent said plug body from passing completely through said opening, sealing means carried by said plug body to effect a fluid-tight seal between said plug body and said engine block wall, an electrical heating element carried by the plug body at the opposite end from said stop means whereby said heating element is positioned within the engine block when said block body is mounted in said opening, terminal means electrically connected with said heating element and accessible from the outside of said engine block whereby electrical connection with an outside source of electrical power can be effected, and locking means carried by said plug body for releasably locking said heater within said opening, said locking means comprising an expansible ring having a diameter in its unexpanded condition which is less than the diameter of said opening,

ring carrying means carried by said plug body and extending inwardly of said opening, said ring being slidably mounted on said ring carrying means with the axis of said ring being co-extensive with the axis of said plug body, said ring carrying means having outer surfaces which are outwardly divergent towards said plug body, and means carried by said plug body and operable from outside said engine block wall for moving said ring towards said plug body along said divergent surfaces, said divergent surfaces being dimensioned to cause said ring to expand a sufficient degree to prevent withdrawal of the plug body from said opening.

2. A block heater as claimed in claim 1, in which said means operable from the outside of the engine block for moving said expansible ring includes a spider element having at least two arms extending outwardly from a central hub, with said arms being held against rotation by said ring carrying means, a threaded hole through said central hub, a screw threadedly engaged in said threaded hole and protruding completely through said plug body to the outside thereof, said expansible ring being engaged by the outer ends of said arms whereby turning of said screw advances said spider element towards the outer end of the plug body.

3. A block heater as claimed in claim 2, in which the outer ends of said arms carry slots which face outwardly, said expansible ring being received in said slots so that rotation of said screw in either direction advances or retracts said spider element towards or away from said plug body and carries said expansible ring in both directions whereby said block heater can be released from, as well as locked in, its position in said opening.

4. A block heater as claimed in claim 3, in which said spider element carries three arms, said ring carrying means comprising three arc-shaped wall-like elements, defining an annular wall which is slotted at three spaced points providing passageway for the axial travel of said three spider arms.

5. A block heater as claimed in claim 4, in which said sealing means comprises an O-ring received within an annular groove in the outside surface of said plug body.

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