G. SHARPNACK & T. J. NASH.

ELECTRIC HEATER (ELECTROLYTIC TYPE).

APPLICATION FILED MAR. 27, 1916.

1,205,571.

Patented Nov. 21, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

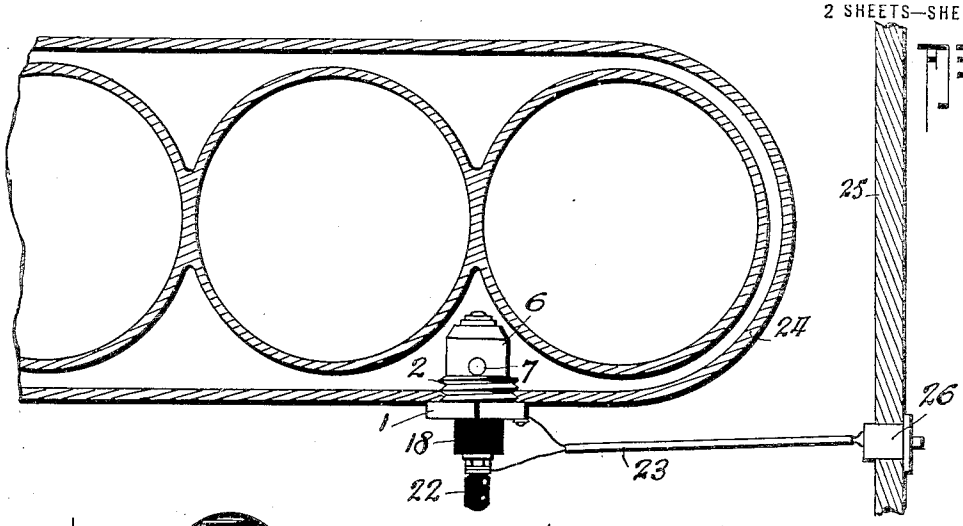



Fig. 2.

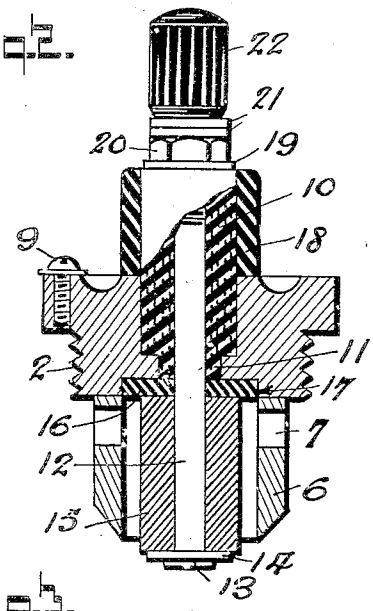



Fig. 4.

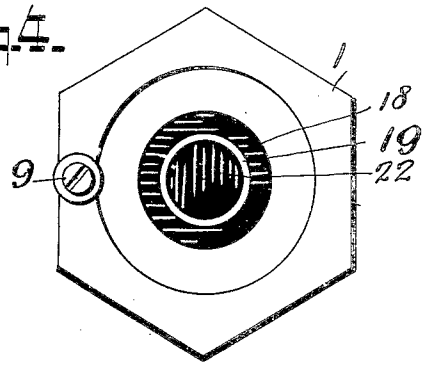



Fig. 5.

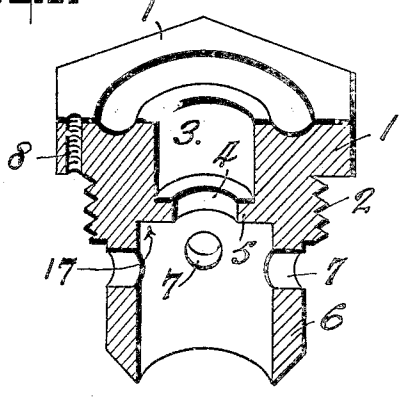
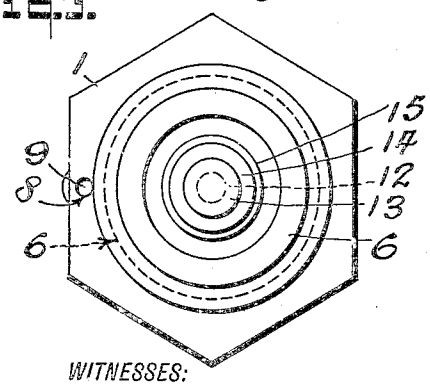



Fig. 3.




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ELECTRIC HEATER (ELECTROLYTIC TYPE).

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2 SHEETS—SHEET 2.

Fig. 6.

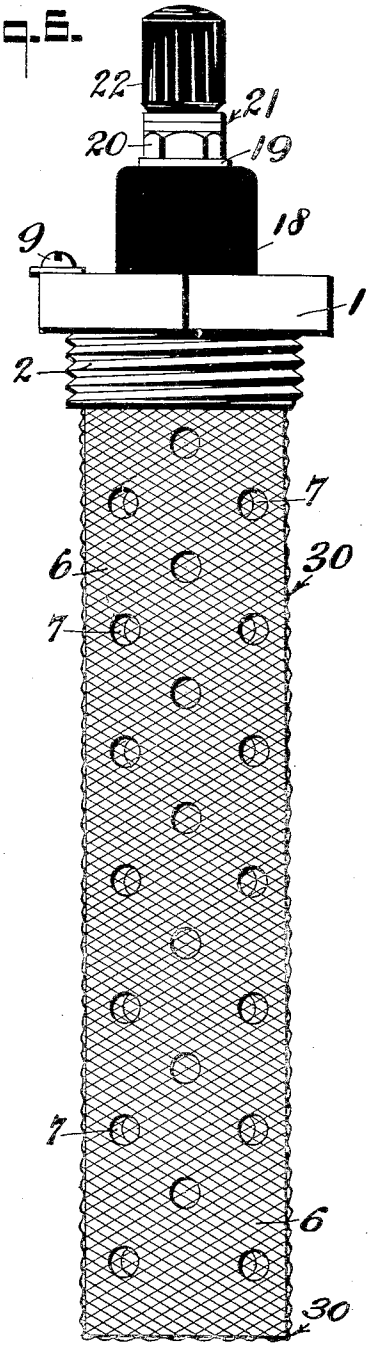
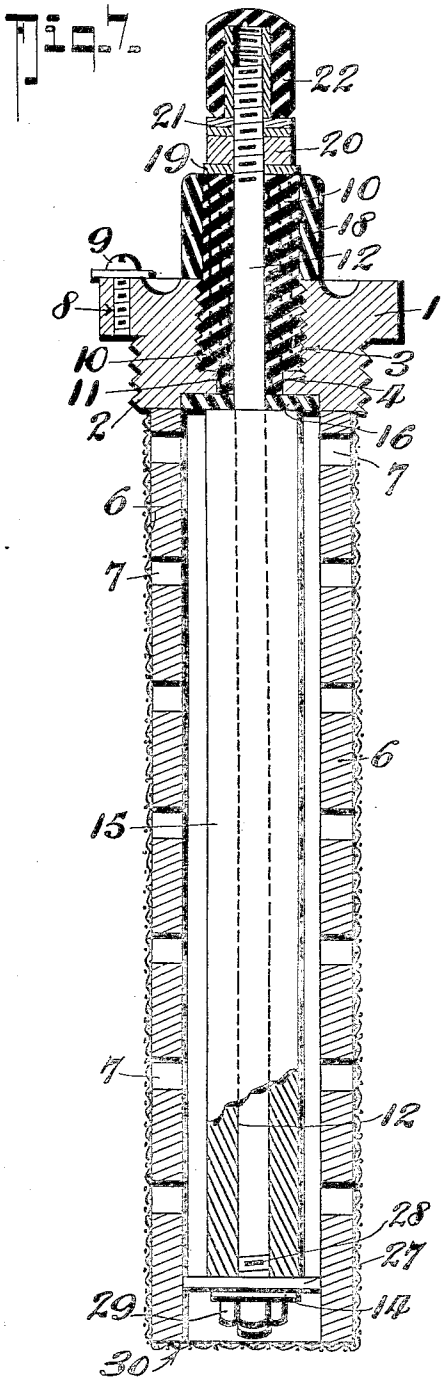



Fig. 7.




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# UNITED STATES PATENT OFFICE.

GEORGE SHARPNACK AND THOMAS J. NASH, OF LINCOLN, NEBRASKA, ASSIGNORS OF ONE-HALF TO GEORGE P. ELMEN, ONE-FOURTH TO STEPHEN O. SALISBURY, AND ONE-FOURTH TO ADOLPHUS R. TALBOT, ALL OF LINCOLN, NEBRASKA.

## ELECTRIC HEATER, (ELECTROLYTIC TYPE.)

1,205,571. Specification of Letters Patent. Patented Nov. 21, 1916.

Application filed March 27, 1916. Serial No. 87,071.

*To all whom it may concern:*

Be it known that we, GEORGE SHARPNACK and THOMAS J. NASH, residing at Lincoln, in the county of Lancaster and State of Nebraska, have invented certain new and useful Improvements in Electric Heaters, (Electrolytic Type,) of which the following is a specification.

This invention relates to certain new and useful improvements in electric heaters of the electrolytic type, such as is shown, for instance, in the patent granted to Thomas J. Nash, March 23, 1915, No. 1,132,604, the said invention being a modification of the heater therein shown and described, adapting the same especially for use in connection with internal combustion engines to maintain the temperature of the circulating water in the water jacket above the freezing point.

The present invention particularly has for its object to provide such a device of a simple and effective construction, in which the parts are compactly arranged and which can be manufactured at a minimum expense.

In the generic nature, the invention comprises a plug adapted to be tapped into the water reservoir from which plug one of the electrodes projects inwardly, the electrode being tubular in form and provided with water passages, the other electrodes being located within the fixed electrode, but spaced from and insulated from the same, and from the plug by an insulating medium, one portion at least of which is compressible to form a packing around the stem of the second electrode, which stem projects through the plug to the outside of the same and is designed to serve as a circuit terminal to which one of the current feed wires may be secured.

In its more detail nature, the invention includes those novel features of construction, combination and arrangement of parts, all of which will be first fully described, then be specifically pointed out in the appended claims and illustrated in the accompanying drawings, in which:—

Figure 1 is a horizontal section of a portion of an internal combustion engine, illustrating the application of the invention thereto. Fig. 2 is an enlarged vertical central longitudinal section, (parts being broken away and other parts being shown in elevation) of the device, *per se*. Fig. 3 is an inverted plan view of the same. Fig. 4 is a top plan view of the device. Fig. 5 is a sectional perspective view of the plug and electrode member. Fig. 6 is a side elevation of the modification of the invention designed especially for use for heating water in boilers and radiators. Fig. 7 is a central vertical longitudinal section of the form shown in Fig. 6.

In the drawing, in which like numerals of reference indicate like parts in all of the figures, 1 represents the flange or nut portion of the plug from which the threaded projection 2 extends, the threaded projection 2 being designed to be tapped into the wall of the water jacket of the engine. The plug is bored at 4 and counterbored at 3 to leave a flange 5 for a purpose presently understood, and below the flange 5 a tubular electrode 6 is projected. This electrode may be integral with the plug or made separately therefrom and secured to the plug by soldering, brazing or other well-known means, so as to provide a good electric engagement. The electrode 6 is tubular in nature and has its lower end open and near its upper end is provided with water circulating passages 7. The flange 1 of the plug is bored and tapped at 8 to receive a terminal screw 9 to which one of the circuit terminals 23 from the switch 26 and the source of current supply (not shown), is connected, as will be readily understood by those skilled in the art.

10 designates a compressible tubular body made of rubber and fabric in the well-known "hose pipe" form, which is designed to fit into the counterbore 3 and has a reduced portion 11 to fit in the bore 4. Surrounding the upper end of the resilient packing 10, which projects above the plug flange 1, is a hard rubber ring 18, the ring 18 being tightly held in place when the packing 10 is compressed by taking up on the nut 20 that engages the washer 19 on the bolt 12. The bolt 12 projects through the packing 10 and at its other end has a head 13 against which a washer 14 is seated to hold the inner electrode 15 in place, the inner electrode being preferably constructed of carbon and insulated from the plug by a disk 16 of slate or other suitable material which is set into the recess.

The upper end of the bolt or rod 12 is provided to receive the nut 20, and washers 21 and a thumb nut 22 is provided for clamping the other terminal wire into electrical engagement with the rod, it being understood that the thumb nut 22 is preferably formed of hard rubber or other insulating substance, the provision of the hard rubber parts 18 and 22 allows the plug to be handled without danger of burning the fingers and also provides effective insulation.

The engine is indicated by the reference character 24 and 25 is the dash of the motor vehicle on which the switch 26 is mounted when the invention is employed in connection with an automobile engine. It should be understood that the invention is not only adapted for internal combustion engines of the motor vehicle type but may be used as well on stationary engines or at any other place where it may be needed for the purpose of raising the temperature of the water.

In Figs. 6 and 7 is shown a modification of the invention especially designed for use in heating water in boilers, radiators or other fluid reservoirs, it being understood that the invention is intended for use where ever it is desired to heat water in a boiler, radiator, reservoir, or other container, and the length of the electrodes may be varied to suit the requirements of the particular situation.

If desired, instead of providing the bolt 12 with an integral head 13, as shown in Fig. 2, the outer end of the bolt may be threaded at 28 and provided with a nut 29 to engage the washer 14 and a disk 27 may be provided to close off the end of the outer electrode 6 to prevent access of foreign matters should the heater be pushed into the same while inserting it into a boiler.

In order that scale and other foreign substances may not enter the apertures 7 and short-circuit the electrodes, we prefer to inclose the outer electrode in a screen shell 30 of such mesh as will prevent the entrance of the scale, etc., into the space between the electrodes 6 and 15.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the complete construction, operation and advantages of our invention will be readily understood by those skilled in the art.

What we claim is:

1. A heater comprising a plug having a threaded portion, an electrode projecting from said threaded portion, said plug having a bore provided with a recess, a second electrode, a rod clamping said second electrode to said plug, means for insulating said second electrode from said plug, a compressible insulating packing in said recess and a nut device on said rod and engaging said packing for compressing the same.

2. A heater comprising a plug having a threaded portion, an electrode projecting from said threaded portion, said plug having a bore provided with a recess, a second electrode, a rod clamping said second electrode to said plug, means for insulating said second electrode from said plug, a compressible insulating packing in said recess and a nut device on said rod and engaging said packing for compressing the same, and means for securing electric terminal wires to the rod, and plug and an insulating collar carried by said packing and plug, substantially as shown and described.

3. A heater of the class described comprising a plug having a threaded portion and a nut portion, said plug having a recess in one face and a bore through the same, a disk of insulating material held in said recess, an inner electrode, a rod on which said inner electrode is carried, said rod projecting through said insulating disk and through said plug bore, a compressible tubular packing member around said rod in said bore, and means for securing said rod and packing in place, and a tubular electrode projecting from said plug around said inner electrode and spaced from the same, said tubular electrode having water circulating passages.

4. A heater of the class described comprising a plug having a threaded portion and a nut portion, said plug having a recess in one face and a bore through the same, a disk of insulating material held in said recess, an inner electrode, a rod on which said inner electrode is carried, said rod projecting through said insulating disk and through said plug bore, a compressible tubular packing member surrounding said rod in said bore, and means for securing said rod and packing in place, a tubular electrode projecting from said plug around said inner electrode and spaced from the same, said tubular electrode having water circulating passages, said compressible packing projecting beyond the face of the nut portion of said plug and a hard rubber ring encircling said projecting portion in said packing, substantially as shown and described.

5. A water heater comprising a plug, said plug having a bore provided with a recess, a tubular electrode attached to said plug and projecting therefrom, an inner electrode disposed within said tubular electrode, an insulating disk in said plug recess, a rod passing through said inner electrode, said disk and said plug bore for sustaining said inner electrode, means for electrically insulating said rod and for effecting a water-tight closure between said rod and said plug.

6. A water heater comprising a plug, said

plug having a bore provided with a recess, a tubular electrode attached to said plug and projecting therefrom, an inner electrode disposed within said tubular electrode, an insulating disk in said recess, a rod passing through said inner electrode, said disk, and said plug bore for sustaining said inner electrode, means for electrically insulating said rod and for effecting a water-tight closure between said rod and said plug, said last named means comprising a compressible insulating packing located within said plug bore, means coöperative with said rod for applying compression strains to said packing for the purposes stated.

7. A water heater comprising a plug, said plug having a bore provided with a recess, a tubular electrode attached to said plug and projecting therefrom, an inner electrode disposed within said tubular electrode, an insulating disk in said plug recess, a rod passing through said inner electrode, said disk, and said plug bore for sustaining said inner electrode, means for electrically insulating said rod and for effecting a water-tight closure between said rod and said plug, said tubular electrode being perforated, the outer end of said tubular electrode being open, a disk of insulating material on said rod fitted within said tubular electrode to form an end closure for the same, said tubular electrode extending beyond the end of said rod.

8. A water heater comprising a plug, said plug having a bore provided with a recess, a tubular electrode attached to said plug and projecting therefrom, an inner electrode disposed within said tubular electrode, an insulating disk in said recess, a rod passing through said inner electrode, said disk, and said plug bore for sustaining said inner electrode, means for electrically insulating said rod and for effecting a water-tight closure between said rod and said plug, said last named means comprising a compressible insulating packing located within said plug bore means coöperative with said rod for applying compression strains to said packing for the purpose stated, said tubular electrode being perforated, the outer end of said tubular electrode being open, a disk of insulating material on said rod fitted within said tubular electrode to form an end closure for the same, said tubular electrode extending beyond the end of said rod.

9. A water heater comprising a plug, said plug having a bore provided with a recess, a tubular electrode attached to said plug and projecting therefrom, an inner electrode disposed within said tubular electrode, an insulating disk in said plug recess, a rod passing through said inner electrode, said disk, and said plug bore for sustaining said inner electrode, means for electrically insulating said rod and for effecting a water-tight closure between said rod and said plug, said tubular electrode being perforated, the outer end of said tubular electrode being open, a disk of insulating material on said rod fitted within said tubular electrode to form an end closure for the same, said tubular electrode extending beyond the end of said rod, and a screen fabric member fitted onto said outer electrode to inclose the same, said screen fabric extending across the open end of said tubular electrode, substantially as shown and described.

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