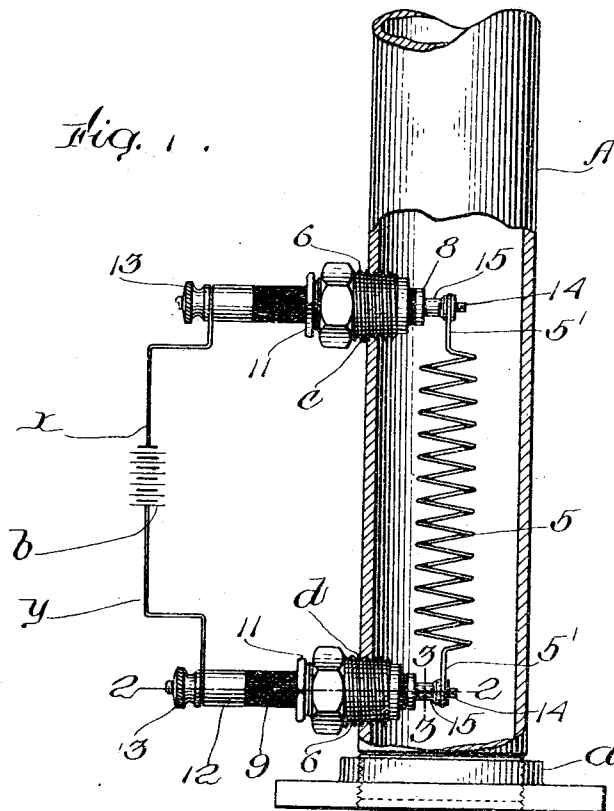
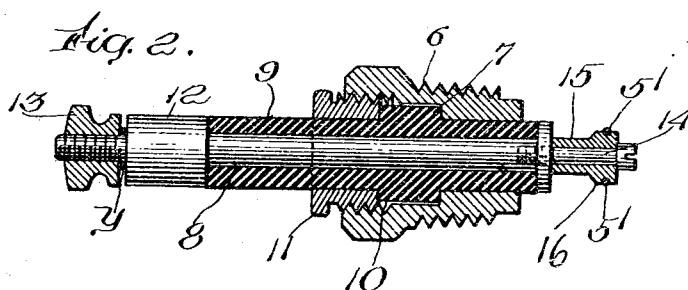
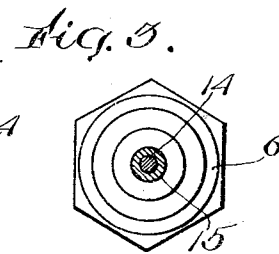


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ELECTRIC HEATER.
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ELECTRIC HEATER.

1,093,237.

Specification of Letters Patent. Patented Apr. 14, 1914.

Application filed March 19, 1913. Serial No. 755,304.

To all whom it may concern:

Be it known that I, GEORGE A. ARNOLD, of Middletown, in the county of Middlesex and State of Connecticut, have invented a certain new and useful Electric Heater, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

This invention has reference to improvements in electric heaters or plug heaters, so called, for the intake pipes of combustion engines.

One object of the invention is to so construct an electric heating device of this nature that its heating or resistance element may be readily applied, within a pipe, to the terminals of both arms of an electric circuit without distorting said heating element.

Another object of the invention is to provide an electric heating device for the intake pipe of an engine so that the heating or resistance element shall be included in the main electric circuit as distinguished from such an element forming part of a grounded circuit.

Another object of the invention is to improve the plugs or supports for the electric heating element.

Other objects of the invention will appear from the following description:

The invention consists in the novel heating element and in the means for sustaining said element in the intake pipe.

The invention also consists in such other novel features of construction and combination of parts as shall hereinafter be more fully described and pointed out in the claims.

Figure 1, represents a view of portions of an engine intake pipe partially shown in section to illustrate the improved electric heating device applied to said pipe. Fig. 2, represents a sectional view taken on line 2—2 of Fig. 1. Fig. 3, represents a similar view taken on line 3—3 of Fig. 1.

Similar characters of reference designate corresponding parts throughout.

As shown in the drawings in its preferred form the electric heating or electric resistance element 5 is sustained within the pipe A, which is the ordinary intake pipe of a combustion engine, by a pair of terminals both electrically insulated from the wall of said pipe and forming part of or

electrically connected with the metallic arms of the electric circuit $x-y$ which circuit also includes a battery b or other source of electric energy. In the more specific embodiment of my invention, herein shown, I employ a pair of plugs each having the tubular casing 6 screw threaded on its exterior and having an internal screw threaded socket which terminates at the shoulder 7 from which point the bore of said casing 6 to its inner end is of reduced diameter. Within the casing 6 and extending therefrom is the terminal or conductor 8 having the wall 9 of suitable electrical insulation which is provided with an enlargement 10 which is secured between the shoulder 7 of said casing and the screw threaded collar or bushing 11 which screws into the threaded socket of said casing. The outer end 12 of terminal 8 has the wire binding device 13 screwed thereon while the inner end 14 of said terminal has the sleeve 15 rotatable on said terminal and having the peripherally grooved enlargement 16. This heating device is preferably applied to the pipe A before the carbureter is attached to the end a of such pipe and in application I form through the wall of said pipe two screw threaded holes c and d which are of a size to receive the exterior screw threads of the plug casings 6. The hole d is spaced from the end a of the pipe A a suitable distance and the hole c is spaced from hole d and in alinement therewith, the distance between said holes being determined by the length of the heating element 5 and, also, by the desired distention of such element.

Element 5, in its preferred form, is a wire of iron or other resistance material wound in spiral shape, the ends having hook shaped members 5', 5'. The diameter of the coil of this member 5 is such, preferably, that it may pass through the hole c but aside from such provision the diameter of said coil is preferably large enough as compared with the inner diameter of pipe A to insure the fluid passing through said pipe coming in contact with said member 5.

One of the hook members 5' of the heating element 5 is engaged with the grooved enlargement 16 of sleeve 15 of one of the plugs and element 5 is passed endwise through the hole c of pipe A so that the free end of said element will fall toward the hole d . The casing of the plug to which said element 5 is

attached may now be screwed, partially or wholly, to a tight fit in said hole *c*. For convenience of manipulation terminal 8 of the plug for hole *d* may be removed from its casing 6 and the inner end 14 of said terminal may be inserted through said hole *d*. By now reaching into the end *a* of pipe A the free end hook 5' of element 5 may now be drawn to distend said element 5 and said end 5' may be hooked onto the grooved enlargement 16 of the sleeve 15 of said terminal. If the casing 6 of this plug, for hole *d*, has been removed, such casing is now replaced and the terminal 8 is secured in place therein by screwing in the bushing 11 and the casing of this plug is then screwed into the hole *d*. It is to be noticed that the screwing into place of the plug casings does not affect or distort the element 5 owing to the fact that the ends 14, 14 of the respective terminals 8, 8 are free to rotate in their sleeves 15, 15.

By connecting both ends of the heating element coil 5 directly with the mains of circuit *x-y* waste of current is less than where one end of the heating element is grounded through the pipe 5 and it is found that purchasers usually prefer such direct connections as simplifying the electrical circuits for testing and tracing.

As the heating element 5 is held distended its coils are open so that the vapor to be heated may pass therebetween while the holding of this element 5 under such disten-

tion permits it to readily vibrate, due to the vibration of the engine, so that its heat is more effectually radiated to the vapor passing through said pipe.

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

1. An electric heater comprising a pipe having a pair of openings spaced apart, a pair of bushings removably fitting said openings, terminals mounted in said bushings, and an electric heating element of less diameter than one of said openings carried by said terminals whereby said heating element may be introduced through one of said openings.

2. An electric heater comprising a pipe having a pair of openings spaced apart, a pair of bushings removably fitting said openings, terminals mounted in said bushings, and a spiral distensible heating coil of less diameter than one of said openings connected at its ends to said terminals whereby one of said terminals and its bushing may be removed and said coil distended to permit the disengagement thereof from its terminal to permit the removal of said coil with the other of its terminals and bushings through the other of said openings.

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Witnesses:

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