M. S. PARNELL-SMITH.

ELECTRICAL HEATING DEVICE.

APPLICATION FILED OCT. 11, 1920.

1,409,019. Patented Mar. 7, 1922.

Fig. 1.

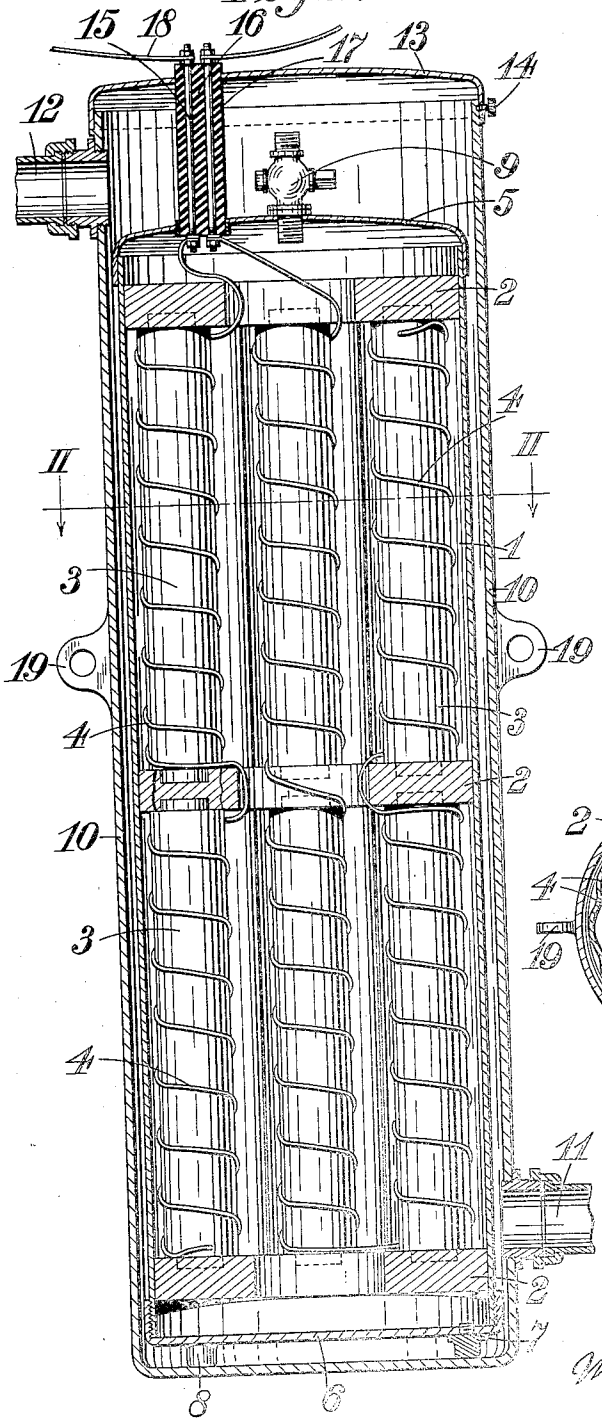
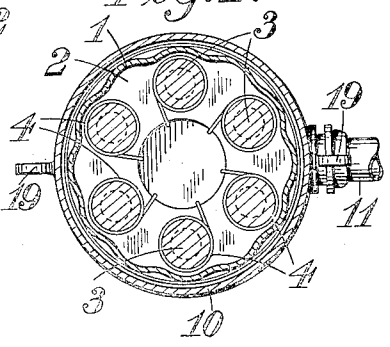


Fig. 2.



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by his attorneys

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ELECTRICAL HEATING DEVICE.

1,409,019. Specification of Letters Patent. Patented Mar. 7, 1922.

Application filed October 11, 1920. Serial No. 416,077.

To all whom it may concern:

Be it known that I, MICHAEL SIMEON PARNELL-SMITH, a subject of the King of England, residing at London, England, have invented certain new and useful Improvements in Electrical Heating Devices, of which the following is a specification.

This invention is for improvements in or relating to electrical heating devices and has for its object to provide a device in which the efficiency shall be considerably greater than in those hitherto employed.

According to the present invention a unit, for use as an electrical heating device, comprises an element, such for example as a resistance wire, which is to be heated by the passage through it of an electric current and is enclosed in a gas-charged chamber, such for example as a chamber charged with inert gas such as nitrogen or argon.

Preferably the chamber is formed of a heat-conducting material such as copper or brass, and in one form of the invention the chamber is combined with a jacket. In the space between the jacket and the chamber a fluid to be heated may be passed, preferably in the form of a thin film.

The presence of an inert gas in a container enclosing an electric filament is known in the manufacture of electric incandescent lamps, but the present invention does not include lighting elements.

One preferred form of the invention will now be described by way of example only with the aid of the accompanying drawings in which—

Figure 1 is a central section through the heating-unit; and

Figure 2 on a smaller scale is a section on the line II—II of Figure 1.

Like reference numerals indicate like parts in the drawings.

A hollow metal cylinder 1, for example of copper or brass, is preferably corrugated as shown more particularly in Figure 2 with the corrugations running parallel with the direction of its length. Within and near each end, and also centrally within the cylinder 1, are rings 2 of fireclay, procelain or some other insulating and refractory material.

Rods 3 of similar material are engaged at their ends, which are reduced as shown, within recesses in the rings 2 and are held firmly therein. A resistance wire 4 of material such as is commonly used for electric heaters, for example nickel-chromium, or other high-resistance wire, is wound in series round the several rods 3, this wire being indicated diagrammatically in the drawing.

The ends of the cylinder 1 may be left uncorrugated and are closed by caps 5 and 6 respectively. The cap 6 may be conveniently screwed on to the end of the cylinder 1 and is formed with an orifice normally closed by a screw-plug 7. The plug 7, when in position, constitutes one of three equidistantly-spaced feet, the other two, indicated at 8, being formed by casting or otherwise on the outer surface of the cap 6. In the cap 5 there is a gas-cock 9 for the admission of gas to the cylinder 1. The cap 5 may be secured in any convenient manner, for example by welding to the cylinder, and when the parts are assembled with the plug 7 inserted in position and the cock 9 closed the cylinder is substantially gas-tight.

The cylinder 1 is conveniently contained within a cylindrical chamber or jacket 10, the walls of which are spaced a small distance from the walls of the cylinder 1 so that fluid admitted to the jacket through the inlet-pipe 11 will flow as a comparatively thin film through the jacket over the surface of the tube 1 to the outlet-pipe 12. The latter is disposed above the cap 5 so that the liquid will cover the cap before passing to the outlet.

The upper end of the cylinder 10 is closed by a cap 13 held in position by set-screws 14. An orifice in the cap 13 permits of the insertion of a double-poled terminal of which the two conducting portions 15 and 16 are insulated from one another by the insulating cylinder 17. The two extremities of the wire 4 are connected to the members 15 and 16 respectively and the latter, outside the cap 13, are connected with electric supply mains 18.

The cylinder 10 may be formed with lugs 19 by which the apparatus as a whole may be secured to a support by means of screws or the like.

The cylinder 1 comprises a substantially airtight chamber enclosing the resistance-wire and this chamber is charged with an inert gas such as nitrogen or argon or other gas which will have no appreciable chemical action either on the resistance-wire or the material of the chamber enclosing it in either

a heated or cold condition. In order to charge the cylinder 1, gas is admitted under pressure through the cock 9 with the plug 7 removed. The gas passes out through the orifice opened by the removal of the plug and sweeps the contained air before it. This operation may be repeated several times until the air has been completely or substantially completely replaced by the gas so that, for example not more than about 1% of air remains in the chamber. The plug 7 is then replaced and the cock 9 closed which seals the cylinder in a substantially gas-tight manner. Alternatively the filling of the cylinder 1 may be assisted by evacuating it before the admission of the gas.

With the construction illustrated, water or other liquid to be heated may be passed through the space between the jacket 10 and the cylinder 1 by means of the pipes 11 and 12, the liquid flowing in a comparatively thin film over the surface of the corrugated cylinder 1, thereby becoming heated during its passage through the jacketed space and issuing from an outlet-pipe as hot water, the temperature depending inter alia, as is usual in such apparatus, upon the rate of flow and the thickness of the film of water and the temperature to which the heating-element is raised.

A tap for controlling the admission of liquid to the pipe 11 preferably combines in it a switch for the circuit including the mains 18. The tap may be of the usual plug type, the operating-handle of which is extended in the form of a blade of, for example, a knife-switch so that the switch will not be closed to energize the resistance-wire 4 unless the fluid is also at the same time admitted to the jacket 10. The provision of such a combined tap and switch, however, is not essential to the present invention.

It is anticipated that large units of similar construction may be employed with boilers of larger dimensions and that, with the use of sufficiently large units, steam-boilers for the production of steam for motive power may be constructed.

The unit may be employed as an ordinary heating-unit for a room or the like without the use of the jacket 12, the outer walls of the cylinder 1 constituting a source of radiant heat.

Heating-elements enclosed in a similar manner in a gas-charged chamber or tube may be employed in electrically-heated kettles, irons and other domestic articles, the form of the gas-charged chamber and the heating-element being suited to the particular purpose to which it is to be applied.

It will be appreciated that there are many other uses to which a unit embodying the principles of the present invention may be applied without departing from the spirit of the invention and that the unit, illustrated in detail in the accompanying drawings, is only given as an example and is largely diagrammatic.

What I claim as my invention and desire to secure by Letters Patent is:—

1. An electric heating unit comprising an element to be heated by the passage through it of an electric current, and a gas-charged chamber enclosing said element, said chamber having means permitting the same to be readily charged with gas.

2. An electric heating unit comprising in combination an element which is to be heated by the passage through it of an electric current, a chamber which encloses said element and is filled with an inert gas, a substantial part of the heating surface of said chamber being of irregular form.

3. An electric heating unit comprising in combination an element which is to be heated by the passage through it of an electric current, and a gas-charged chamber which encloses said element and is formed of heat-conducting material, said chamber having a cover permitting the insertion and removal of said element.

4. An electric heating unit comprising in combination an element which is to be heated by the passage through it of an electric current and a gas-charged chamber which encloses said element, is formed of heat-conducting material and has corrugated walls.

5. An electric heating unit comprising in combination an element which is to be heated by the passage through it of an electric current, a gas-charged chamber enclosing said element, a jacket surrounding said chamber and means to pass a fluid to be heated through the space between the chamber and the jacket, said jacket having a removable closure permitting the insertion of said chamber.

6. An electric heating unit comprising in combination an element which is to be heated by the passage through it of an electric current, a gas-charged chamber enclosing said element and means to pass a fluid to be heated in a comparatively thin film of irregular depth over the outer surface of said chamber.

7. An electric heating unit comprising in combination an element which is to be heated by the passage through it of an electric current, a chamber enclosing said element which chamber is closed by means of a gas-cock near one end, and a removable plug near the opposite end.

8. An electric heating unit comprising in combination an element which is to be heated by the passage through it of an electric current, a cylindrical gas-charged chamber enclosing said element, a second cylindrical chamber having means to permit of the gas charged chamber being entered and enclosed

therein with a space between the walls of the two chambers, and conduits entering said second chamber at the bottom and top thereof to serve as inlet and outlet conduits for the passage through the space between the two chambers of a liquid to be heated.

9. An electric heating unit comprising in combination an element which is to be heated by the passage through it of an electric current, a cylindrical gas-charged chamber enclosing said element, a second cylindrical chamber within which the gas-charged chamber can be entered from one end to be enclosed therein with a space between the walls of the two chambers, conduits entering said second chamber at the bottom and top thereof to serve as inlet and outlet conduits for the passage through the space between the two chambers of a liquid to be heated, a removable cover for said second chamber, a plug sealed in the cover of the gas-charged chamber and extending through the cover of said second chamber, and terminals carried in said plug to connect electrical supply mains outside said second chamber with the element to be heated within the gas-charged chamber.

In testimony whereof I affix my signature.

MICHAEL SIMEON PARNELL-SMITH.