Jan. 9, 1923. 1,441,610

W. B. TOPP.
ELECTRIC HEATING AND COOKING.
FILED JAN. 16, 1922. 2 SHEETS-SHEET 1

FIG. 1

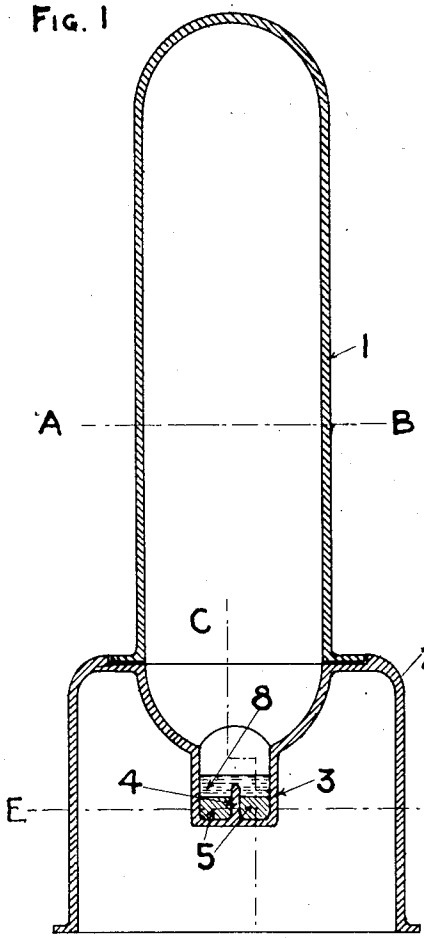


FIG. 6

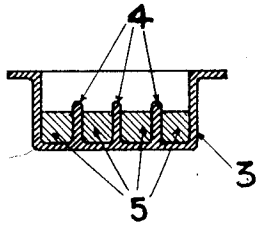


FIG. 2

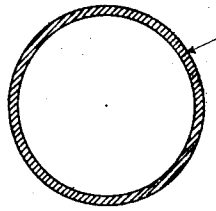


FIG. 3

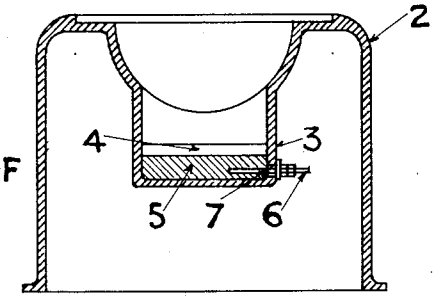
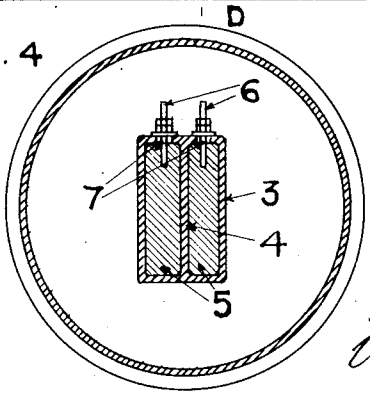


FIG. 4



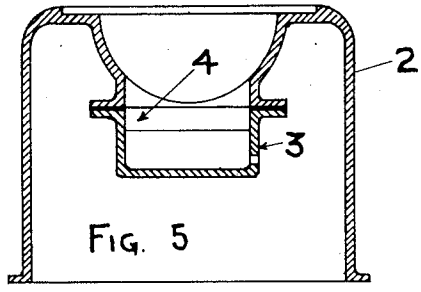


FIG. 5

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FIG. 7

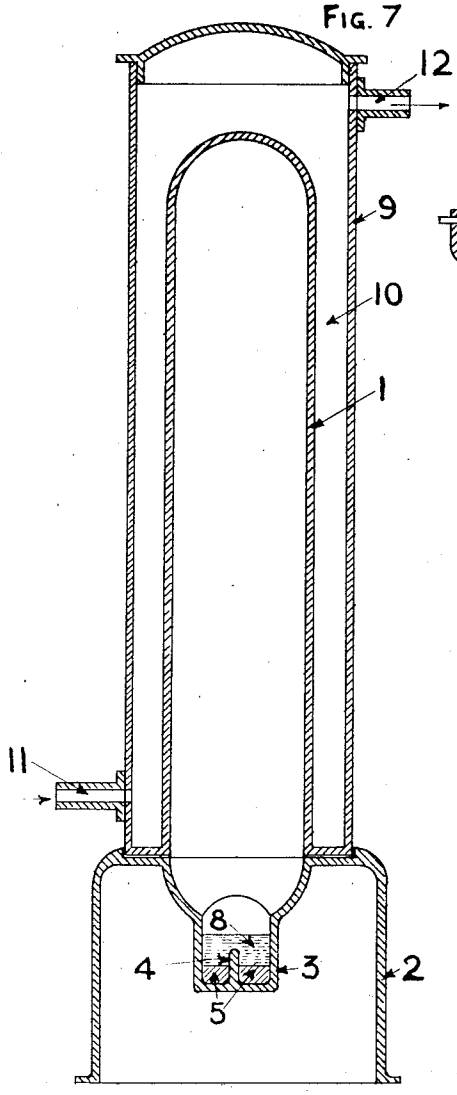


FIG. 8

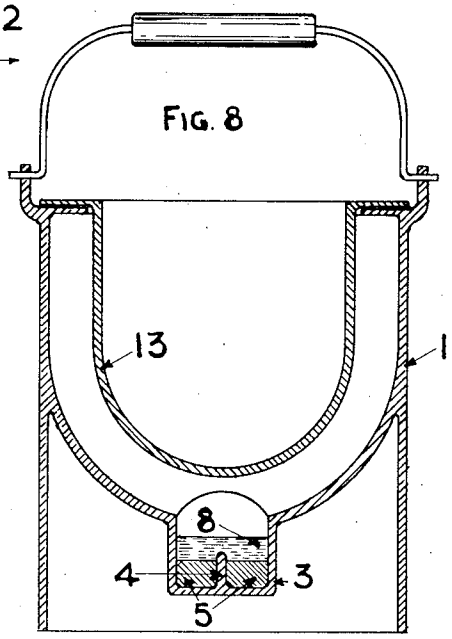
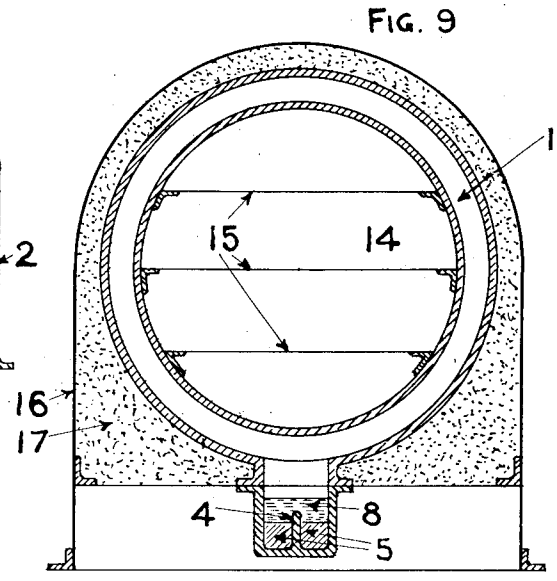


FIG. 9



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Patented Jan. 9, 1923. 1,441,610

UNITED STATES PATENT OFFICE.

WILLIAM BLANCHARD TOPP, OF MELBOURNE, VICTORIA, AUSTRALIA.

ELECTRIC HEATING AND COOKING.

Application filed January 16, 1922. Serial No. 529,413.

To all whom it may concern:

Be it known that I, WILLIAM BLANCHARD TOPP, subject of the King of Great Britain, residing at Melbourne, Victoria, Australia, have invented certain new and useful Improvements in Electric Heating and Cooking, of which the following is a specification.

This invention relates to heating apparatus utilizing alternating current, and has for its object to provide apparatus which is simple to construct, which is free from the resistance wires common to the usual types of heating apparatus, and which possesses the feature of automatically and materially decreasing the current consumed with the increase in temperature of the medium to which the apparatus is supplying heat.

According to the invention steam, or vapour, is generated by the passage of an alternating current of electricity between electrodes immersed in or in contact with a vaporizable conductive body such as water rendered conductive as hereinafter explained contained within a suitable receptacle, and on generation passes to a main closed heating chamber connected to or forming part of the electrode receptacle. The walls of this chamber abstract heat from the steam, or vapour, and impart it to the surrounding medium and the resulting condensate formed within the said chamber gravitates to the electrodes and effects a further generation of steam, or vapour. Thus during the emission of heat from the walls of the apparatus there is being effected within the apparatus a continuous generation of steam, or vapour, and a continuous condensation thereof.

While steam is the vapour normally used for conveying the heat to the walls of the closed heating chamber, vaporizable conductive bodies other than water may be used in special cases. Thus, for example, higher temperatures may be obtained without excessive pressure by the use of mercury. The vaporizable conductive body may in some cases be a mixture of substances and, obviously, must be selected according to the applicability of its known properties. Thus any substance or mixture, which would be materially decomposed in the apparatus would either be quite unsuitable or would introduce unnecessary complexity into the apparatus. Further the corrosive effect of the vapours and condensates on the apparatus must be considered as well as the temperature attainable. In the following description, for the sake of simplicity, water and steam are alone referred to.

The automatic feature referred to above depends upon the fact that while the apparatus is working the water level within the electrode receptacle will vary with the rate of condensation within the main heating chamber, the rate of condensation depending upon the temperature of the medium surrounding the chamber walls, it being evident that as this temperature rises the condensation within the chamber will be retarded and consequently the level of the water in the electrode receptacle will drop. As the volume of water in the electrode receptacle determines the amount of current passing between the electrodes any diminution in this volume will therefore effect a corresponding diminution in the amount of current consumed.

To enable the invention to be more completely understood I will now describe, with the aid of the accompanying diagrammatic drawings, some of the more typical forms of the invention. In these drawings,—

Fig. 1 is a vertical section of a form of radiator.

Fig. 2 is a section on the line A—A of Fig. 1.

Fig. 3 is a section on the line C—D in Fig. 1, the water not being shown in this section.

Fig. 4 is a section on the line E—F in Fig. 1.

Fig. 5 is a similar section to Fig. 3 showing a detachable form of electrode receptacle, the electrodes and terminals being omitted.

Fig. 6 shows another form of electrode receptacle.

Fig. 7 is a vertical section of a water heater.

Fig. 8 is a vertical section of a glue pot or like device.

Fig. 9 is a vertical section of a form of stove.

Referring to Fig. 1, a vertical main heating chamber 1 constructed of metal and of circular section, as shown in Fig. 2, is suitably attached to a metal base 2 which has formed integrally therewith an electrode receptacle 3. Positioned within this receptacle and on either side of a dividing partition 4 are the electrodes 5, 5 which are pro-

vided with terminals 6, 6 which lead out through insulating bushings 7, 7 in one wall of the receptacle 3 and are connected to a source of alternating current.

A conductive body of water 8 lies above the electrodes 5, 5 and reaches to a level somewhat above the top of the dividing partition 4 this level depending upon the size of the chamber, the area of the electrodes 5, 5 and the temperature the apparatus has to attain.

The interior of the chamber 1, the electrode receptacle 3, including the dividing partition 4, and the interior of the base 2 above the receptacle 3 are lined with a vitreous enamel or other suitable insulating heat resistant and non-hygroscopic material.

The electrodes may be constructed of any not easily corrodible metal, or conductive material, such as carbon, graphite, copper, lead, lead oxides, iron or iron oxides.

As is well known the body of water 8 may be given the necessary conductivity by the addition of either sulphuric acid or washing soda, although some other acids, or salts, might be used equally well for this purpose. The proportion of acid, or salt, will depend on the conductivity required, which will be determined by the electrical input for which the apparatus is designed.

In Fig. 5 the electrode receptacle 3 is not formed integrally with the base 2 but may be detachably fixed thereto by means of screws or bolts.

In the form shown in Fig. 6 the receptacle 3 is provided with a plurality of electrodes 5 and dividing partitions 4 and these electrodes may be connected up either in series or in parallel.

In any of the above forms of electrode receptacle instead of the metal thereof being coated with a layer of vitreous enamel, or like material, the electrodes may be positioned within a porcelain or like container, this container being cemented, or suitably secured within the receptacle. Alternatively, the whole receptacle may be formed of porcelain or other suitable heat resistant, insulating and non-hygroscopic material.

In Fig. 7 is shown a form of water heater in which the electrodes 5, electrode receptacle 3, base 2 and heating chamber 1 are similar to the radiator illustrated in Fig. 1. An outer wall 9 is arranged concentrically with the chamber 1 and with the wall of this latter chamber forms an annular space 10 for the water which has its inlet at 11 and outlet at 12.

Fig. 8 illustrates a form of apparatus suitable for heating glue or other liquids, and in this construction the steam heating chamber 1 is in the form of an annular jacket surrounding the inner vessel 13 containing the liquid to be heated.

In Fig. 9 is illustrated a form of cooking stove in which the heating chamber 1, in the form of an annular jacket, surrounds an inner cooking chamber 14 having shelves 15. An outer casing 16 surrounds the chamber 1 and a suitable heat insulating material 17 is interposed between the two.

In cases where a temperature above 100° C. is desired, as for cooking, this may be attained by generating the steam under pressure by suitable proportioning of the capacity of the closed heating chamber, the volume of water and the electrical input.

It is to be understood that the invention is not confined to the typical forms of construction described and illustrated but may be varied while keeping within the scope of the claim and, while the preferred forms of construction and materials are described it will be obvious that these are to some extent dependent on variable industrial considerations such as cost and supply of materials.

I claim:—

Electric heating apparatus for use with alternating current comprising a closed chamber, an electrode receptacle positioned in the lower end of said chamber, insulating partitioning means in and dividing said receptacle into electrode compartments, electrodes positioned within the said compartments and having their upper surfaces below the upper edges of the insulating partitioning means, a vaporizable electrically conductive liquid body in contact with the electrodes and reaching to a level above that of the upper edges of the insulating partitioning means, and terminals connected to the electrodes and adapted to be connected to a source of alternating current supply.

Dated the 7th day of December, 1921.

In testimony whereof I affix my signature.

W. B. TOPP.

In the presence of—
H. G. DAVIES,
M. COURY.