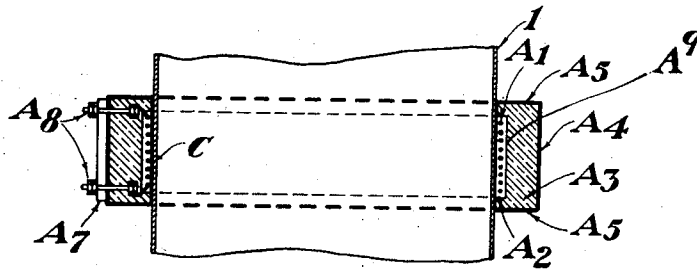
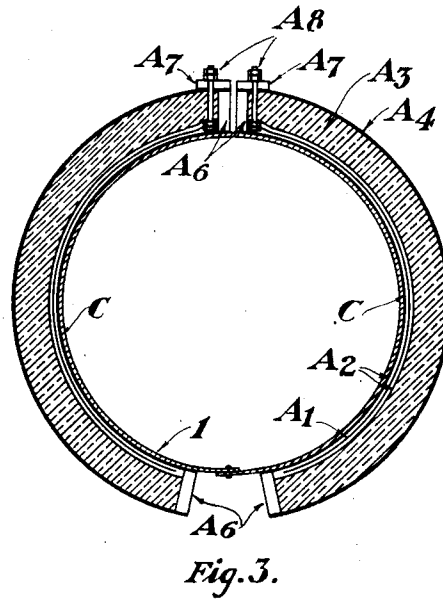
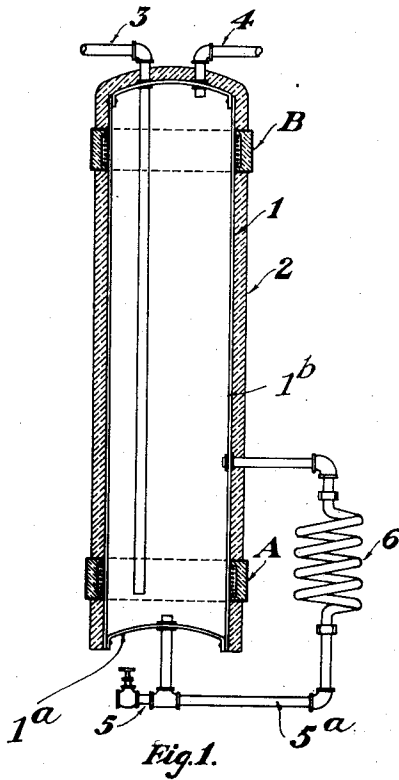


F. G. CLARK, P. ACKERMAN & C. E. CANSFIELD.
ELECTRIC HEATER ELEMENT.
APPLICATION FILED JULY 5, 1917.

1,269,052.

Patented June 11, 1918.



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UNITED STATES PATENT OFFICE.

FARLEY GRANGER CLARK, PAUL ACKERMAN, AND CHARLES ERNEST CANSFIELD, OF TORONTO, ONTARIO, CANADA, ASSIGNORS TO THE TORONTO POWER COMPANY LIMITED, OF TORONTO, ONTARIO, CANADA, A CORPORATION OF ONTARIO.

ELECTRIC-HEATER ELEMENT.

1,269,052.

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Application filed July 5, 1917. Serial No. 178,621.

To all whom it may concern:

Be it known that we, FARLEY GRANGER CLARK, a citizen of the United States of America, PAUL ACKERMAN, a citizen of Switzerland, and CHARLES ERNEST CANSFIELD, a subject of the King of Great Britain, all residing at the city of Toronto, in the county of York and Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Electric-Heater Elements; and we hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to an electric heater element consisting essentially of an electrical resistant molded in a heat-conducting bed of cement or other plastic material of high dielectric strength and comparatively high conductivity, which will uniformly diffuse, by conduction, the heat of the resistant to the surface to be heated, the resistant and heat-conducting bed of cement being covered with non-inflammable heat insulation, preferably protected by a frame of appropriate mechanical strength.

The electric heater element may be employed for the heating of various devices, and in some cases, such as tanks, reservoirs and the like, it will take an annular form or be arranged as a belt to encompass the device to be heated, and in other cases, it will take other forms, the shape and dimensions of which will depend on the purpose for which it is employed.

To explain one of its uses, we have shown and described it in connection with a tank or range boiler for domestic purposes:—

Figure 1 of the drawings, being a sectional elevation of a tank equipped with two electric heater elements;

Fig. 2, being a vertical cross-section through one of the electric heater elements on a larger scale than Fig. 1; and,

Fig. 3, being a horizontal section of a preferred form of heater element.

The tank 1, preferably covered with heat insulation 2, is connected with the water-

circulating system of the building in which it is installed, by an inlet pipe 3 and an outlet pipe 4. Extending into the bottom 1^a and side 1^b of the tank 1, is a by-pass pipe 5^a, provided with a drain-cock 5, and inserted in the by-pass pipe 5^a, is a water heater 6, which may be considered as diagrammatic of one of the usual types of gas water heaters or furnace coils, now in use, this by-pass pipe and water heater representing an existing installation.

A and B represent two electric heater elements located one near the bottom and the other near the top of the tank, to indicate the uses of which the invention is capable to obtain certain circulating effects. For instance, the heater element A, placed near the bottom of the tank, will heat the whole of the tank content uniformly, while the heater element B, placed near the upper end of the tank, may be employed to assist the heater element A in meeting the demands on the tank content, or it may be employed to quickly heat the top part of the tank content only.

The heater elements A and B may be placed at positions intermediate those shown in the drawings, to meet local requirements, or a heater element or heater elements may be installed between the heater elements A and B, and the current may be selectively switched through any or all of these elements to meet the variable demands on the tank content. The heater elements A and B, shown in Fig. 1, and the heater element shown in Figs. 2 and 3, consist of an electrical resistant A', in this instance taking the form of resistance wire embedded in cement or other plastic material A² of high dielectric strength and comparatively high heat conductivity, covered with non-inflammable heat insulation A³ to reduce the heat radiation losses, the resistant being provided with terminals A⁴ to which the circuit conductors may be connected, these terminals being mounted on terminal boards A⁷.

A frame, consisting of a mechanically-

strong peripheral wall A⁴ and side-boards A⁵ of asbestos or other relatively strong non-inflammable insulating material, may be employed to hold the non-inflammable heat insulating material together when necessary.

Each heater element may be applied to the tank or reservoir:—(a) by covering the tank at the place of installation with a layer of heat-conducting cement or other like material A², then wrapping the resistant A' around this layer and covering it with another layer of the same cement or plastic material, and then covering the whole with non-inflammable heat insulation A³; or (b) the heater element may be manufactured in a self-contained form, as shown in Fig. 3, to be clamped as a complete unit on the tank, in which case its inside surface will approximate the shape of the tank surface, and the voids between the tank surface and the heater element will be filled with heat-conducting material C, similar to that in which the resistant is embedded. In both constructions, the heater elements may be applied without disturbing the existing connections.

A preferred form of a self-contained heater element suitable for application to standard domestic hot water tanks, is shown in Figs. 2 and 3, as comprising two segments, each consisting of a semi-circular wall A⁴, corresponding side plates A⁵, and end plates A⁶, constituting a frame filled with molded non-inflammable heat-insulating material A³, the inside curvature of the frame approximating that of the tank surface, and the inside surface of the molded heat insulation having a recess A⁹ in which is placed the resistant A' and heat-conducting bed of cement or plastic material A², each semi-circular element having electric terminals A⁸ mounted on terminal boards A⁷.

These heater elements may be used on any type of tank or reservoir, or other device, and may be applied to any part of the surface thereof where the desired heating effect is required, and may be of such shape and dimensions as not only to fit the tank surface, but also to produce the most efficient heating effect.

In some installations, the electric heater elements may be used in conjunction with the water heater 6, being applied, in such cases, direct to the tank, without disturbing the existing connections. In other cases, they may be used without the water heater 6, the by-pass pipe 5^a in that case being dispensed with, as the necessary water and heat circulation may be maintained internally of the tank by the electric heater elements, which, as in the previous case, are

applied direct to the tank without disturbing the existing connections.

While we have explained one particular use of our invention, we do not desire to limit ourselves to that use, nor to any structural details.

Having thus fully described the nature of our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. An electric heater element comprising a frame consisting of a mechanically-strong peripheral wall and side pieces of non-inflammable insulating material, a non-inflammable insulation contained within the frame, a heat-conducting bed of plastic material of high dielectric strength and comparatively high heat conductivity molded in the inner surface of the heat-insulating material, and an electrical resistant embedded in the heat-conducting bed.

2. An electric heater element consisting of a self-contained unit comprising an electrical resistant, a heat conducting bed of plastic material of high dielectric strength and comparatively high heat conductivity for the resistant, a covering of non-inflammable heat insulation for the resistant and heat-conducting bed, and heat-conducting material filling the voids between the heat-conducting bed and the surface to which the electric heater element is applied.

3. An electric heater element consisting of a self-contained unit comprising two segments, each segment consisting of molded non-inflammable heat insulation, a heat conducting bed of high dielectric strength and comparatively high heat conductivity inserted in the inner surface of the non-inflammable heat insulation, an electrical resistant contained in the heat-conducting bed, terminals for the resistant, and heat-conducting material filling the voids between the heat-conducting bed and the surface to which the electric heater element is applied.

4. An electric heater element consisting of a self-contained unit for a tank having its interior surface to fit the exterior surface of the tank at the place of installation, the heater element consisting of molded non-inflammable heat insulation, a heat-conducting bed of high dielectric strength and comparatively high heat conductivity inserted in the inner surface of the non-inflammable heat insulation, an electrical resistant contained in the heat-conducting bed, terminals for the resistant, and heat-conducting material filling the voids between the heat-conducting bed and the surface to which the electric heater element is applied.

5. An electric heater element consisting of a self-contained unit, comprising a frame

consisting of a mechanically-strong peripheral wall and side pieces of non-inflammable insulating material, a non-inflammable insulation contained within the frame, a
5 heat-conducting bed of plastic material of high dielectric strength and comparatively high heat conductivity molded in the inner surface of the heat-insulating material, an electrical resistant embedded in the heat-con-
10 ducting bed, and heat-conducting material

filling the voids between the heat-conducting bed and the surface to which the electric heater element is applied.

Toronto, June 14th, 1917.

FARLEY GRANGER CLARK.

PAUL ACKERMAN.

CHARLES ERNEST CANSFIELD.

Signed in the presence of—

CHAS. H. RICHES,

WM. VOLKMANN.