

(No Model.)

A. E. APPLEYARD.
ELECTRICAL HEATER.

No. 483,758.

Patented Oct. 4, 1892.

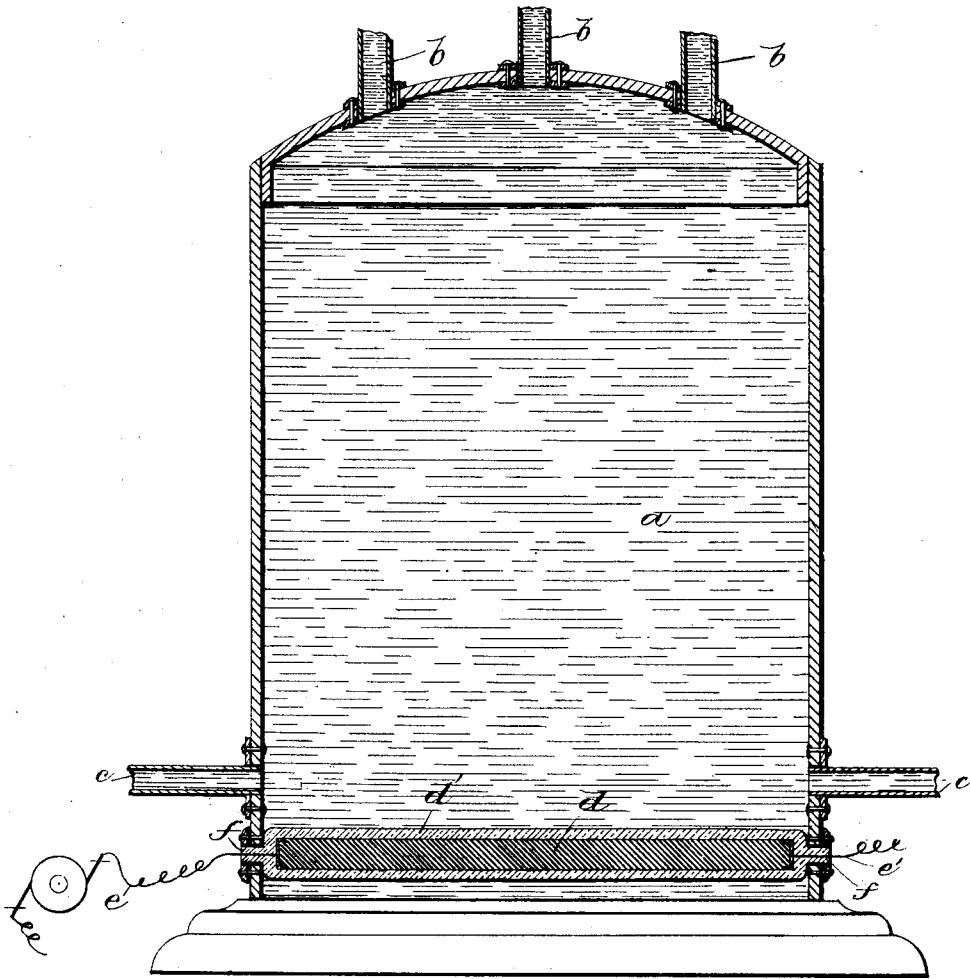


Fig. 1.



Fig. 2.

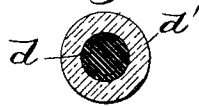


Fig. 3.

Witnesses:

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By

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UNITED STATES PATENT OFFICE.

ARTHUR E. APLEYARD, OF BOSTON, MASSACHUSETTS.

ELECTRICAL HEATER.

SPECIFICATION forming part of Letters Patent No. 483,758, dated October 4, 1892.

Application filed September 14, 1891. Serial No. 406,697. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR E. APLEYARD, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Electrical Heating Apparatus, of which the following is a specification.

This invention has for its object to enable electricity to be economically and effectively used as a heating agent; and it consists in the construction and combination of parts, as hereinafter described and claimed.

In the accompanying drawings, forming a part of the specification, Figure 1 represents a vertical section of an electrical heating apparatus embodying my invention. Fig. 2 represents a sectional view of the resistance and its insulator and end supports on a larger scale than in Fig. 1. Fig. 3 represents a section on line 3 3 of Fig. 2.

The same letters of reference designate the same parts throughout the several views.

In the drawings, *a* represents a water-receptacle, which may be of cast-iron or other suitable material, and may be connected by flow-pipes *b b* and return-pipes *c c* with radiators of ordinary or suitable construction, said reservoir-pipes and radiators being relatively arranged as in hot-water-heating systems now in common use, the heated water passing from the receptacle *a* to the radiators through the flow-pipes *b* and returning from the radiators to the receptacle through the return-pipes *c*.

d represents an electrical resistance, which is located in the receptacle *a*, so that when the apparatus is in use the resistance will be surrounded by the water. Said resistance is preferably a bar of graphite or other form of carbon, and it is connected at its ends with conducting-wires *e e'*, which constitute parts of an electric circuit including the resistance and a suitable source of electricity. The construction and arrangement being such that when an electric current is passed through the resistance, the latter will be highly heated and will immediately heat the surrounding water, which will thereupon be caused to circulate through the system and radiate heat from the radiating-surfaces. I prefer to cover the resistance *d* with an insulator or coating *d'* of any material which is a sufficient non-conductor of electricity and a sufficient con-

ductor of heat. I prefer a vitreous material, such as mineral enamel of the kind used in ornamenting jewelry, the same being formed into a tube or sheath and having a watertight connection with the resistance.

To afford a suitable connection of the wires *e e'* with the resistance and avoid risk of melting the wires at their ends where so connected, I preferably fit a plate *d²* (which may be cup-shaped, as shown, or plane) to each end of the resistance and connect the wires with these plates. The insulating material *d'* entirely envelops the resistance and the end plates and extends through sockets in the sides of the water-receptacle, as at *f*, and thus envelops the ends of the wires *e e'* and insulates them, also, from the walls of the receptacle. I have found that by electrically heating a resistance in the presence of water I am enabled to effectively and economically circulate and distribute the heat developed by the resistance.

My invention is not limited to use with water-circulating systems such as that as herein described, but may be used for heating water for cooking and other purposes.

I do not confine myself to a carbon resistance nor to the described means for supporting the resistance.

The receptacle may be made of a material which is a non-conductor of electricity, such as porcelain, in which case special insulators for the resistance will not be required.

I am aware that it has been proposed to line a metallic tube with insulating material—such as a silicate of an alkali in a pasty condition—and allow it to dry therein and then fill the interior space with broken pieces of resistance material, and I do not claim such construction. By my invention I avoid the necessity of a metallic inclosing tube and leave the exterior of the homogeneous insulating-covering exposed to the water or other medium to be heated.

Having now described my invention, I claim—

1. A resistance of graphite or other suitable form of carbon, having wires connected to its ends, and an externally-exposed homogeneous waterproof insulating-covering inclosing the sides and ends thereof, substantially as described.

2. The combination, with the carbon d , of
the plates d^2 at the ends thereof, wires $e e'$,
connected with said plates, and an externally-
exposed homogeneous waterproof insulating
5 material inclosing the said carbon and plates
and a portion of the wires, substantially as
described.

3. An electric heater composed of a solid
and rigid resistance-rod having an externally-
10 exposed coating of waterproof vitreous ma-

terial, said coating entirely inclosing the rod,
substantially as described.

In testimony whereof I have signed my
name to this specification, in the presence of
two subscribing witnesses, this 29th day of 15
August, A. D. 1891.

ARTHUR E. APPLEYARD.

Witnesses:

C. F. BROWN,

ARTHUR W. CROSSLEY.