(No Model.)

W. L. BURTON.

ELECTRIC HEATER.

No. 357,572. Patented Feb. 15, 1887.

Fig. 1.

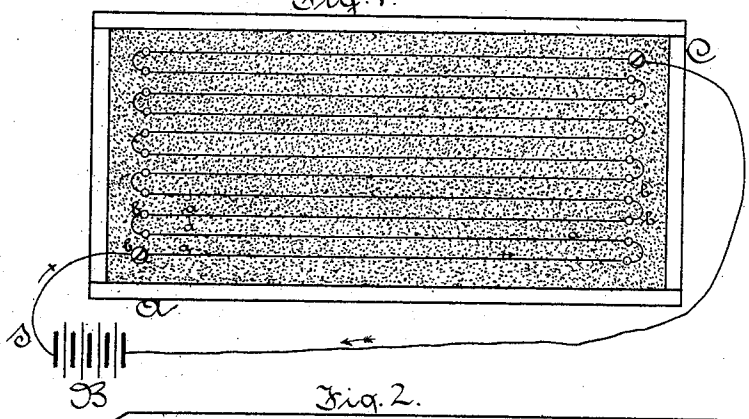


Fig. 2.

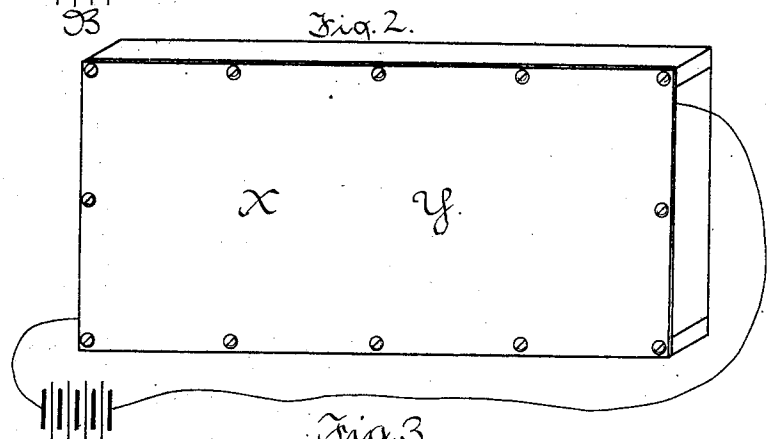
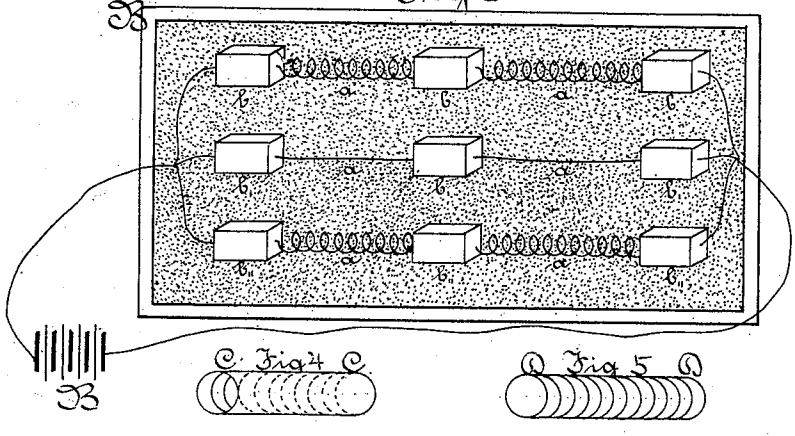


Fig. 3.



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UNITED STATES PATENT OFFICE.

W. LEIGH BURTON, OF RICHMOND, VIRGINIA.

ELECTRIC HEATER.

SPECIFICATION forming part of Letters Patent No. 357,572, dated February 15, 1887.

Application filed April 23, 1886. Serial No. 199,880. (No model.)

To all whom it may concern:

Be it known that I, W. LEIGH BURTON, a citizen of the United States, residing in the city of Richmond, in the State of Virginia, have invented certain new and useful Improvements in Electric Heaters, of which the following is a description in such full, clear, concise, and exact terms as to enable any one skilled in the art or science to which my invention belongs or with which it is most nearly connected to make and use the same, reference being had to accompanying drawings, making part of this specification, and to the letters and figures of reference marked thereon.

In an application for Letters Patent of even date herewith I have described an improvement on Letters Patent of the United States, No. 88,006, granted to me March 23, 1869. My present invention relates to improvements in electric heaters, which may be used either in connection with the devices and combinations of devices described in said Letters Patent and application above referred to or independently of them.

In United States Letters Patent No. 88,006 I have described an electric heater in which heat-reservoirs, suitably placed in electrical connection with sections of platinum wire or other suitable refractory material raised to a high temperature by the passage of an electrical current, serve to carry off the heat therefrom with sufficient rapidity to prevent the temperature of the wires being raised sufficiently high to melt and destroy them.

As a result of long experimenting with electric heaters, I have discovered that if bare wires of brass, platinum, or other refractory material, even when of considerable length, are surrounded by or held in contact with pulverulent or finely-powdered fire-clay or other equivalent material an electrical current of considerable strength may be passed through them without raising such wires to a temperature sufficiently high to destroy them, and this even though the current be so great as to almost instantly destroy the wires if not combined with the pulverulent or powdered material aforesaid. It will be seen, therefore, that instead of providing heat-reservoirs consisting of blocks of heat-conducting material suitably placed in contact with the brass, platinum, or other refractory material, I may surround the entire surfaces of the wire by a material which, while able rapidly to carry out the heat and communicate it to the surrounding atmosphere, will not carry off a sufficiently large proportion of the current to prevent its efficient action as a heat-producer.

By the use of surrounding pulverulent material a small wire is enabled to carry a very large current without melting. The material is readily packed and remains in perfect contact with the wire throughout its entire length at all temperatures, and greatly facilitates making repairs, if such become necessary, in the conductors. It readily accommodates itself to the wire when in an expanded or contracted state, dependent on variations of temperature. A cemented material, such as plaster-of-paris, possesses none of these qualities, either electrical or mechanical. If such a material be applied to the wires when they are cold it will crack or be pushed away from the axis of the wire when the wire is heated, and when it cools again the material will be in partial contact only with its surface, and a strong current of electricity passed through the conductor suddenly will be apt to melt it; and, besides, a pulverulent material such as described is far more advantageous, owing to the electrical non-conducting character due to the entanglement of air between its particles, so that it has a higher specific electrical resistance, owing to its discontinuous nature.

The details of my invention will be understood by reference to Figures 1, 2, 3, 4, and 5. Fig. 1 shows a plan of my improved heater and its connection with the battery. Fig. 2 shows a cover for the heater, of metal or other suitable heat-conducting material. Figs. 3, 4, and 5 show details of the application of the principles of this invention to other forms of electric heaters heretofore devised by me.

In Fig. 1, a wire of brass, platinum, or other refractory material, *a a a a a a*, is suitably wrapped and reflexed around pins *b b b b b b*, of any suitable material, preferably a non-conductor of electricity. The wrapping and reflexing is effected in the manner shown in Fig. 1, so that when connected with the battery or other electric source, as shown at B, the current flowing in the direction indicated

by the arrow enters the heater at A, and, having passed through the entire length of the wire wound round the pins *b b b b b b*, passes out the heater at C, and thence back to the battery. The wire *a a a a a a*, being disposed as described or in any other suitable form, is now completely covered with dried pulverulent or powdered fire-clay or other equivalent material, as already described. In practice I prefer to construct the base of the heater wholly or partially of asbestus paper, suitably rested in a metallic form of any heat-conducting material. A metallic cover, X Y, Fig. 2, with either a plain, corrugated, fluted, or roughened surface, is provided for an external covering of the heater.

I am aware that the apparatus I have described is similar in some respects to the well-known resistance boxes or coils, where a great length of wire coiled into any shape in which it can be put into small space for rapid cooling by radiation is placed as a resistance in an electric circuit; but in all such devices, so far as I am aware, said coils are surrounded by air. Now, in my invention I surround or sustain these coils in contact with pulverulent or powdered fire-clay or other suitable material, for the purpose specified.

It is evident that the principle of my invention may be applied to the invention described in the application for United States Letters Patent for improvement in electric heaters of even date herewith, in which sections of platinum wire or other refractory material or coils thereof are connected alternately with the heat-reservoirs or blocks of good heat-conducting material. I have shown this application of my invention in Fig. 3, where the heat-reservoirs *b b′ b″* are shown as being connected in multiple series with the battery B, and either with coils of wire *a a a a* or straight pieces thereof, as *a′ a′*. The whole is then surrounded by a layer of pulverulent or powdered fire-clay or other equivalent material.

I sometimes provide an earthenware tube, C C, Fig. 4, inside of which the coiled wire is placed, and then pack the same with the pulverulent or powdered fire-clay or other similar material; or I coil the wire on the outside of a similar tube, D D, Fig. 5, and pack or apply the fire-clay around it. These tubes, besides possessing the functions hereinbefore described, afford a support to the wires and prevent their changing form under the influence of intense heat.

Instead of employing pulverized fire-clay, I may, with good results, use powdered soapstone, pumice-stone, mica, or a mixture of these or other substances having the same essential qualities may be used.

I am aware that it is not new to cover conductors in electric heaters with cemented material, such as plaster-of-paris, and that I do not, therefore, claim.

I claim as my invention, and desire to secure by Letters Patent—

1. In an electric heater, a resistance-piece covered with pulverulent or powdered fire-clay or its equivalent, substantially as described.

2. In an electric heater, a resistance-piece covered with pulverulent or powdered fire-clay and combined with heat-reservoirs, substantially as described.

3. In an electric heater, a form composed of fire-clay on or about which a resistance-piece is sustained covered with powdered or pulverulent fire-clay or similar material, said resistance-piece being in circuit with a generator of electricity, substantially as described.

4. In an electric heater, a resistance-piece in continuous contact with powdered or pulverulent fire-clay or its equivalent, substantially as described.

Signed at Richmond, in the county of Henrico and State of Virginia, this 27th day of March, A. D. 1886.

W. LEIGH BURTON.

Witnesses:
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