(No Model.)

J. F. McLAUGHLIN.

ELECTRIC HEATER.

No. 432,205. Patented July 15, 1890.

Fig. 1

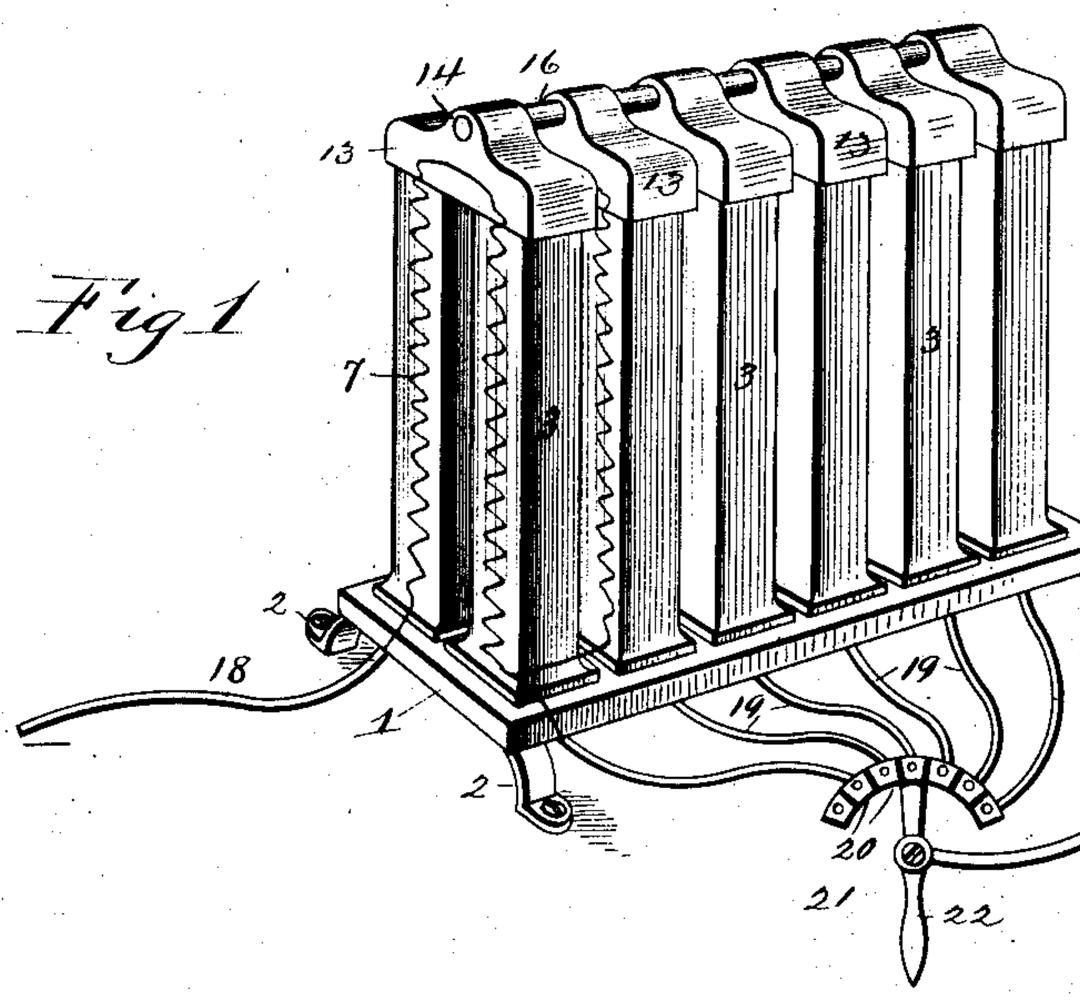


Fig. 1a.

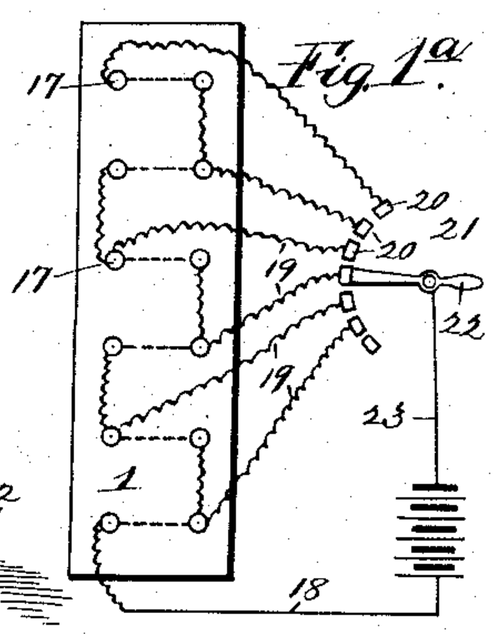


Fig. 2

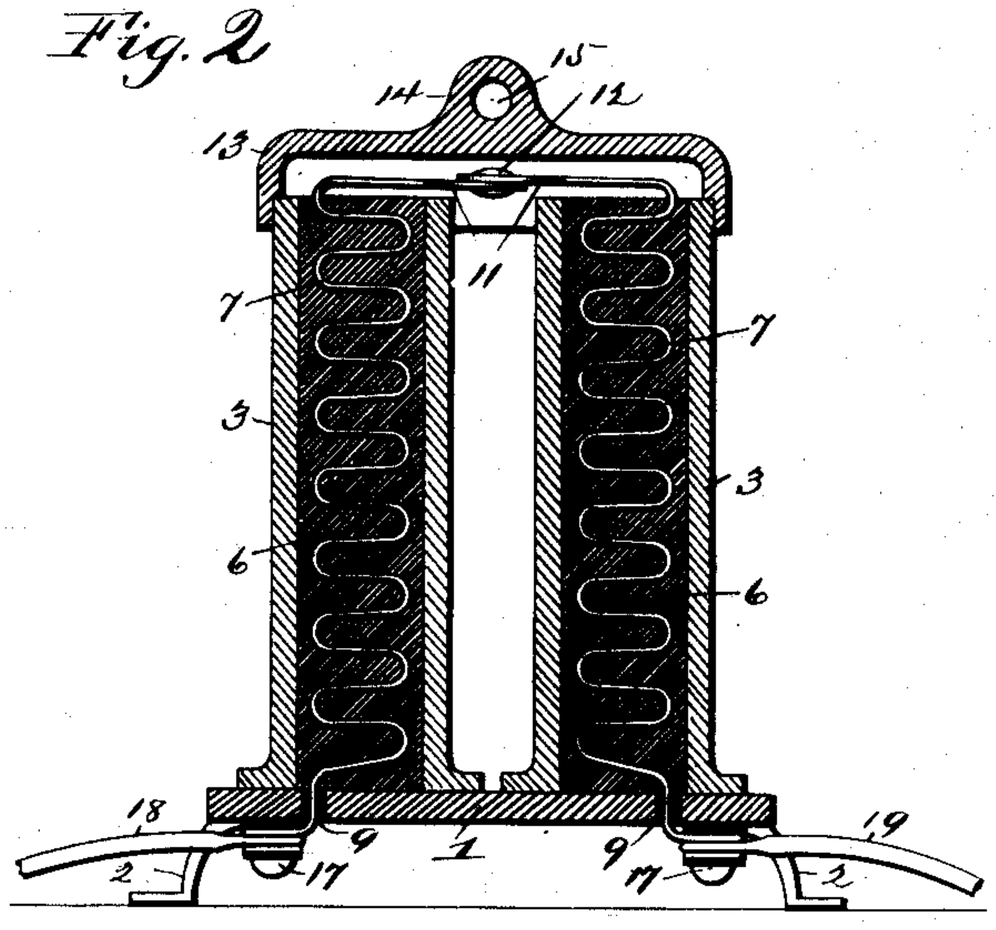


Fig. 3

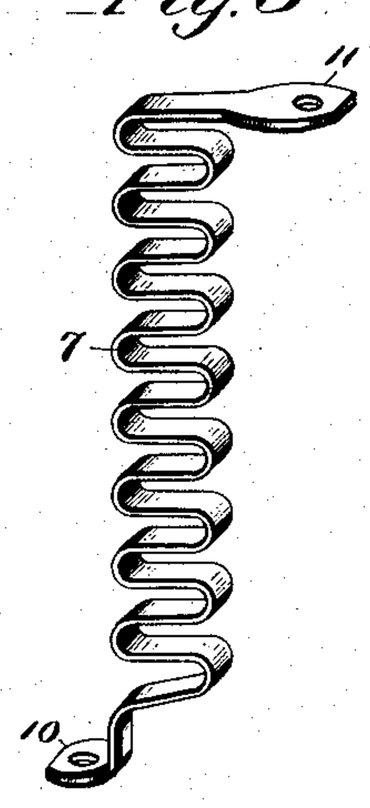


Fig. 4

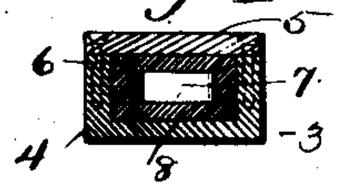
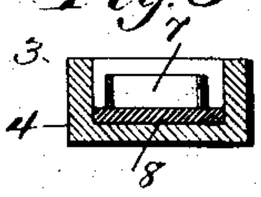


Fig. 5



Wittnesses:
Percy C. Bowen
F. F. Chapman

Inventor,
James F. McLaughlin,
By Joseph Lyon,
Attorney.

UNITED STATES PATENT OFFICE.

JAMES F. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC HEATER.

SPECIFICATION forming part of Letters Patent No. 432,205, dated July 15, 1890.

Application filed February 1, 1890. Serial No. 338,862. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McLAUGHLIN, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric Heaters, of which the following is a specification.

My invention has reference to electric heaters specially adapted for use in places where the presence of combustibles is objectionable for various reasons; and its object is to furnish an effective heater of that kind that will not be destroyed by the application of abnormally great volumes of currents and will form a steady and convenient source of heat, which may be regulated with ease and comfort.

The embodiment of my invention is shown in the accompanying drawings, although I am not confined to the identical details illustrated.

Figure 1 is a perspective view of a radiator constructed in accordance with my invention, and showing a switch by means of which any desired number of sections of the radiator may be included in the circuit. Fig. 1ª is a diagram illustrating the connections between the switch and radiator sections. Fig. 2 is a vertical central section through one of the radiator-sections, and Figs. 3, 4, and 5 are detail views illustrating the construction of parts of the radiator-sections.

Referring to the drawings, there is shown a radiator having a base-plate 1, mounted upon legs 2, and carrying several pairs of hollow open-ended metallic posts 3, secured to it. As shown, each of these posts 3 is rectangular in cross-section, and consists of a shell composed of two pieces 4 5, the first constituting three sides of the post and the other the remaining side or cover. Each of these posts is filled with an insulating refractory material 6, preferably composed of equal parts of fire-clay, asbestus, and plaster-of-paris, thoroughly mixed and reduced to a paste by the addition of water, after which it is poured into the post in the manner hereinafter described and allowed to set or harden. Centrally through this mass of insulating material extends a conductor 7, of German silver or other material offering great resistance to the passage of an electric current, and in the present instance this conductor 7 is constructed of a flat strip of metal bent to and fro upon itself into a sinuous or serpentine form, as clearly shown in Figs. 2 and 3, and the ends 10 and 11 of the conductor are thickened, as shown at 7′, and have eyes formed in them.

Before placing the conductor 7 within the post 3 a layer 8 of the compound before described is spread within the portion 4 of the post 3 when the latter is in a horizontal position, and then before this layer has completely set or hardened the conductor is placed on it and pressed slightly into the soft material, so that when the post is placed upright, after the layer 8 has hardened, the conductor will be maintained in an upright position. The post is then placed on the base 1, with the lower end 10 of the conductor 7 extending through an insulating-bushing 9, seated in a perforation in the said base 1. The insulating compound 6 is then introduced through the upper end of the post until the interior thereof is completely filled, and the conductor 7, except at the thickened ends, which extend beyond the post, is entirely surrounded by the insulating material, and after which the latter is allowed to set or harden. These posts 3 are arranged on the base 1 in pairs, as clearly shown in Figs. 1 and 2, with the upper ends 11 of the conductors 7 connected by a rivet 12, as clearly shown in Fig. 2.

Each pair of posts constitutes a radiator-section, and a number of these sections are assembled on the base 1 to form a radiator, the posts being separated one from the other by an air-space, as shown in Figs. 1 and 2, and the sections also being separated one from the other by air-spaces, as clearly shown in Fig. 1. The upper ends of the posts of each section are connected by a cap or cover 13, which not only serves to connect the said upper ends of the posts, but also shields the upper exposed ends of the conductors 7. Each cap 13 is provided with a central boss 14, in which is formed an eye 15, and through these eyes extends a rod 16, serving to connect and render firm and rigid the upper ends of the radiator-sections.

The lower ends 10 of the conductors 7 are each connected to a binding-post 17, secured to but insulated from the base 1, and the several pairs of posts constituting the radiator-sections are connected in series, as will be seen from the diagram, Fig. 1ª. To one of the binding-posts 17, constituting one terminal of the radiator, is secured a main conductor 18, leading to one pole of a suitable source of current, and to alternate binding-posts 17 of the radiator-sections are secured conductors 19, leading to contact-plates 20 of a switch 21, the lever 22 of which receives a conductor 23, coming from the other pole of the source of current. The arrangement of this switch, as will be seen from Fig. 1ª, is such that when turned to make contact with one of the end contact-plates an electric current entering the switch through the conductor 23 will pass through the entire series of conductors 7 of the radiator and return to the source of current through the conductor 18, and that if the switch-lever be turned toward the other end of the series of contact-plates the radiator-sections will be successively cut out of circuit. Thus by a proper manipulation of the switch any number of radiator-sections may be used.

As will be readily understood, the electric current in passing through the conductors 7 will heat the latter to a greater or less degree, and this heat will be communicated to the surrounding compound 6, and from it to the posts 3, from whence the heat will be radiated to and raise the temperature of the surrounding air.

The insulating compound is of such a nature that the heat absorbed thereby from the conductors 7 is not readily given out, and consequently the radiator will convey heat to the surrounding atmosphere for a long time after the circuit through the conductors has been broken at the switch.

By reason of the greater conductivity of the ends of the conductors 7, owing to the fact that their cross-sections are greater than the cross-sections of the main portions of these conductors, the embedded portions may be raised to a very high temperature without unduly heating the ends. The insulating refractory compound effectually excludes the air from the embedded portion of the conductors 7, and closely fits around the same. In consequence thereof it is practicable to raise the temperature of the embedded portions of the conductors 7 to the melting-point without breaking the circuit. Great freedom of manipulation is thereby secured, since currents of such great volume as could not otherwise be employed may be used without danger of destroying the apparatus.

The refractory insulating compound hereinbefore described is peculiarly adapted to safely and closely embed the heating-conductors to protect them against the admission of air, and to maintain the continuity of these conductors when fused by the application of an uncommonly great volume of current. This compound, when once shrunk upon the heating-conductors, is not affected by the heat of these conductors, it will not warp, and will expand and contract very nearly in the same degree as the heating-conductor, if the same is made of German silver.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. An electric heater consisting, essentially, of a high-resistance conductor embedded in a mass of air-tight refractory insulating substance, consisting of a hardened compound of clay, plaster-of-paris, and asbestus, and suitable circuit-connections, substantially as described.

2. In an electric heater, the combination of a ribbon-shaped high-resistance conductor embedded in an air-tight mass of refractory insulating material, consisting of a hardened compound of clay, plaster-of-paris, and asbestus, with suitable circuit-connections, substantially as described.

3. An electric heat-radiator consisting, essentially, of a high-resistance conductor embedded in an air-tight mass of refractory insulating material, composed of a hardened mixture of clay, plaster-of-paris, and asbestus, and an inclosing radiating-shield of metal, and suitable circuit-connections, substantially as described.

4. An electric heat-radiator consisting of the combination of a series of electric heaters, each comprising a high-resistance conductor embedded in a mass of air-tight refractory insulating material, and inclosed by a radiating-shield, with enlarged coupling-terminals for the high-resistance conductor extending beyond the embedding mass of insulating material, a switch for inserting any number of heaters in the circuit, and circuit-connections, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES F. McLAUGHLIN.

Witnesses:
HERBERT P. KER,
H. F. REARDON.