E. E. GOLD.

ELECTRIC HEATER.

APPLICATION FILED MAY 9, 1913.

1,147,388. Patented July 20, 1915.

Fig. 1.

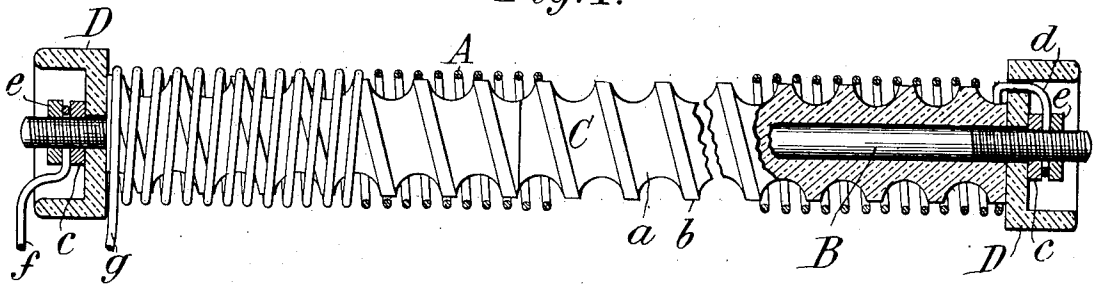


Fig. 3.

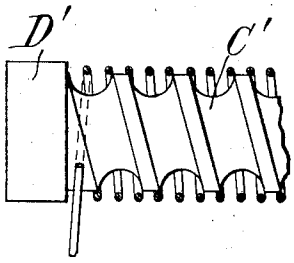


Fig. 2.

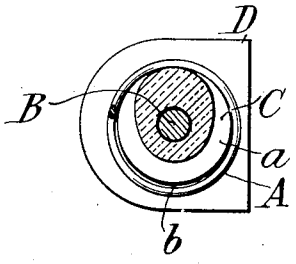


Fig. 4.

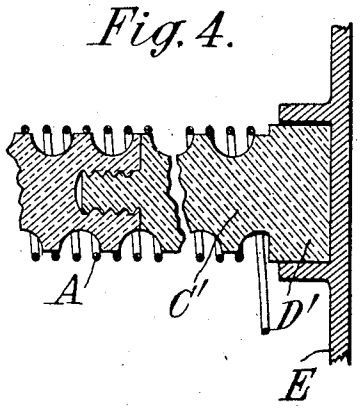


Fig. 5.

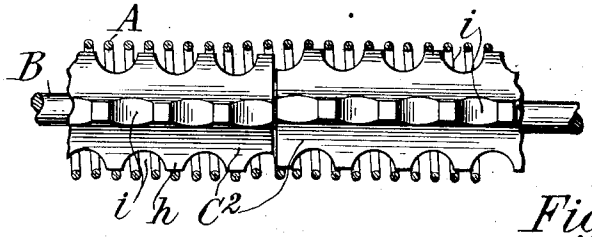


Fig. 6.

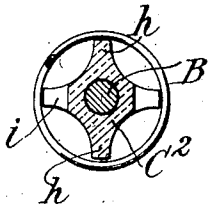


Fig. 8.

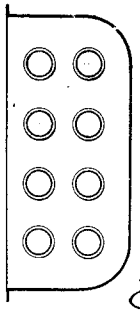
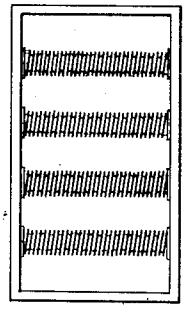


Fig. 7.



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UNITED STATES PATENT OFFICE.

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ELECTRIC HEATER.

1,147,388. Specification of Letters Patent. Patented July 20, 1915.

Application filed May 9, 1913. Serial No. 766,519.

To all whom it may concern:

Be it known that I, EDWARD E. GOLD, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Electric Heaters, of which the following is a specification.

This invention relates to electric heaters of that type in which an open coil or helix of resistant wire is mounted on a support which extends within it, the axis of the coil being permissibly and preferably straight. Heretofore heaters of this type have commonly been made with a supporting rod of iron heavily enameled in order to insulate it, the rod being sometimes straight but more commonly sinuous, and the coil being forced upon it so as to slightly distort the coil and thereby hold it with sufficient firmness to avoid rattling. A disadvantage of such use of an enameled rod is that the enamel coating is sometimes imperfect so that short circuits occasionally occur.

According to the present invention the support for the resistant coil is afforded by a body of porcelain or analogous resistant insulating material. This insulating support is best made tubular and slipped over a rod, the porcelain being preferably in sections and clamped firmly on the rod. The outer surface of the porcelain is varied in such manner as to allow free circulation of air within and against the resistant wire of the heating coil. Preferably its surface is made with a spiral groove constituting a steep screw-thread, so that its outer portion alone makes contact with the resistant wire.

In the accompanying drawing,—Figure 1 is an elevation of the resistant coil and its support, being partly broken or dissected away to better show the construction. Fig. 2 is a transverse section. Fig. 3 is a fragmentary elevation showing a modification, of which Fig. 4 is a section. Figs. 5 and 6 are a fragmentary elevation and cross-section of a modification. Figs. 7 and 8 are a front elevation and transverse section of a form of heater.

According to the drawing A designates the coil of resistant wire, B the supporting rod, and C the intervening tubular insulating support. The coil A is wound as a straight helix of resistant wire of the usual construction and proportions. The rod B is of any suitable size and material (preferably steel) to give the required support, and is best screw-threaded at its opposite ends. The tubular insulation C is made up of sections, of suitable length, of porcelain or other form of earthenware or other analogous refractory insulating material. It is best made with a deep spiral groove *a*, which permits the air to circulate within the heating coil. The latter is thus supported upon the outer perimeter *b* of the porcelain, and as the spiral is preferably somewhat steep, and as it also is preferably of a pitch opposite to that of the heating coil, the points of contact are relatively few, so that the heating coil is almost uninterruptedly exposed to convection by the currents of air flowing against it.

The sections of porcelain insulation are firmly held in place on the rod by screwing clamping nuts upon its threaded ends. These nuts are shown at *c c*. It is preferable to interpose heads D D which serve the purpose set forth in United States Patent No. 1,040,043, of October 1, 1912, that is, they serve for locating the coil in its casing and permit its ready removal therefrom independently of the other heating coils of a multiple coil heater. The porcelain insulating support having spiral faces provided by my present invention is to be distinguished from that used in the type of heater shown in said Patent No. 1,040,043, wherein the resistant coil is itself coiled around the porcelain support, and lies in the groove thereof; with that construction, if the resistant coil were to break or burn through at any point, its elasticity would cause it to uncoil and press outward against the casing of the heater, so that it would be liable to short circuit. With my construction, on the contrary, the porcelain support passes inside the heating coil and the latter is straight so that even if the coil were to break, it could not escape, and short circuiting would be impossible. My improved construction is equally free from the disadvantages of the enameled rod type of heater support in that accidental contact cannot occur between the resistant coil and the internal supporting rod.

A further feature of the present invention is the utilization of the supporting rod B as a return conductor by connecting one

end *d* of the wire to this rod by a suitable binding nut *e*, and by a similar nut *e'* at the opposite end connecting a circuit lead *f*, whereby both the terminals *f* and *g* are brought to the same end of the coil. This would not be feasible with enameled rod supports because any chipping of the enamel would cause a short circuit. It is often desirable to make both terminal connections at the same end of the heating coil, and this is now possible without any special or expensive construction.

The construction may be somewhat modified without departing from the invention. An example is shown in Figs. 3 and 4, which show the insulating section C' made solid or imperforate so as to require no central rod. This construction is suitable where the coil to be supported is short, so that a single porcelain section (or two or more sections screwed together or otherwise united at their ends) may afford sufficient strength. The exterior of the porcelain support may be the same as that shown in Fig. 1 or any modification thereof. In such case the ends of the section may be enlarged to form heads D' D', which take the place of the heads D D in Fig. 1. Such heads will fit into slots or recesses formed in the supporting casing E, as shown at the right in Fig. 4.

The external shape of the insulating supports or sections C or C' may be modified, an example being shown in Figs. 5 and 6, where insulating sections C^2 are shown of porcelain, which is grooved longitudinally to leave a series of longitudinal ribs *h* which alone make contact with the wire of the coil and which, in addition, may be notched as shown at *i*. Thus the wire of the coil makes only intermittent contact with the salient portions of the ribs. The sections C' may be strung concentrically upon the supporting rod, or, as shown, they may be made slightly eccentric so that successive sections may be alternated by throwing the eccentricity to opposite sides, as indicated, whereby the wire coil may be distorted slightly from a straight line and thereby be put under such stress as to hold it firmly and prevent rattling.

The coils and supports may be variously assembled in a heater. An example is shown in Figs. 7 and 8, wherein a vertical series of coils is provided (four being shown), and also when desired the coils may be in horizontal series, as shown in Fig. 8, in any desired number (two being shown). The casing will be of any construction adapted to permit the requisite circulation of the air to be heated.

I claim as my invention:—

1. An electric heater comprising a coil of resistant wire and a support of earthenware extended continuously within said coil, having its exterior surface channeled to afford free circulation of air within the coil, and making intermittent supporting contact with the coil, said insulating support having heads at opposite ends beyond the coil and a casing having sockets receiving said heads.

2. An electric heater comprising a coil of resistant wire, a tubular support of resistant insulating material extended within said coil and having its exterior surface spirally grooved of opposite pitch to said coil, and a rod extended within said support.

3. An electric heater comprising a straight coil of resistant wire, a rod extended axially within said coil, and intervening tubular insulating sections within said coil fastened on said rod, and making intermittent contact with said coil.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD E. GOLD.

Witnesses:
HENRY M. FINK,
FRED WHITE.