April 10, 1928. 1,665,941

A. E. M. VAN DER MEERSCH

ELECTRIC HEATER

Filed Dec. 8 1926

Fig.1.

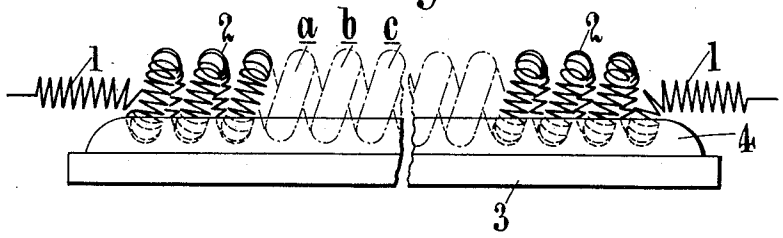


Fig.2.

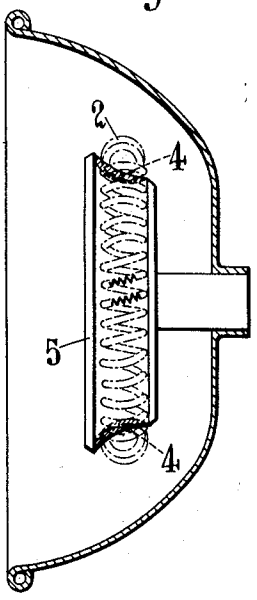
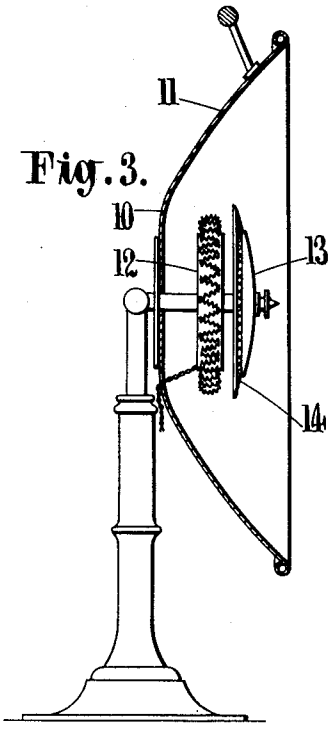


Fig.3.



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UNITED STATES PATENT OFFICE.

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ELECTRIC HEATER.

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In connection with hot wire electrical heaters it is already known to coil the wire into spiral shape. Regarding this coil as a flexible unit, it is also known to coil said unit into larger helices in order to increase the amount of heat radiated by positioning the various elements of the hot wire more closely together.

In practice the spiral coils of the coiled wire unit have been wound round a tile or former of heat-insulating material. This suffers from the disadvantage of having hot wire on the reverse side of the tile where it may not always be needed, and considerable radiation efficiency is lost owing to the proximity of the tile to the hot wire.

The present invention has for its object an improved manner of mounting a hot wire heating element coiled helically in two steps as above described so that the larger helices project from the insulating support with open cores, the coiled wire being attached to the support at suitably spaced points to give the necessary rigidity. A heating element so formed is particularly advantageous for use in a radiator in conjunction with a reflector, as the greater portion of the wire reaches a higher temperature under a given wattage, and the radiation of its heat is considerably improved as it is freely exposed to the air.

Preferably, the wire so formed is adapted to be held and mounted in a heating unit by having its coils embedded for a comparatively small portion of their length in an electrically-insulating cement. The coils of the flexible unit, for example, may be constructed round a former of circular or elongated cross-section, the former being thereafter removed. The unit whilst held to the coiled shape is then impressed or embedded on a base which may comprise an asbestos plate, fire brick, or other heat resisting brick, coated with a layer of electrically-insulating cement. The lower portions of some or all the coils of the flexible unit are embedded in the cement while soft and held in place until the cement has set, whereupon the unit will be held fixedly in place with the original coils of wire and the larger coils of the flexible unit placed substantially closely together and separated only by air. Obviously instead of helices, the spirally coiled wire may be shaped to festoons, undulations or in any zigzag manner adapted to leave the major portion of the wire freely projecting into the air from the insulating support. The supporting points are arranged sufficiently close together to provide the necessary rigidity and it is usually simpler in manufacture to make the larger coils of equal size and embed a small portion of each in the cement.

The invention is illustrated in the accompanying drawing in which

Fig. 1 represents a plain heating element, and Figs. 2 and 3 a domestic heater.

Turning now to Fig. 1, the wire is first coiled into a spiral as indicated at the end portions 1, the spiral formation being then itself coiled into an annular spiral or helix as indicated at 2. The wire so formed is mounted on a slab or base 3 by embedding a small length of the lower portion of the coils in a layer of electrically-insulating cement 4 attached to the base. The wire is embedded in the cement whilst the latter is soft and held in place until it has set, whereupon the wire will be rigidly held and the element will be ready for use.

The element formed as above may then be mounted within a heater, toaster or kettle or merely set up under a hot plate or grid for boiling liquids thereon.

Figure 2 illustrates a modification in which the wire 2 is mounted as a ring about the edge of a circular disc 5 to which it is attached by a layer of cement 4 as in the previous example, the coils 2 projecting from the edge of the disc as the coils project from the plate 3 in Fig. 1. Fig. 3 shows the complete device to a smaller scale than Fig. 2. The reflector 10 is formed to a surface of revolution of which the generatrix of the annular edge 11 is a parabola, the wire being arranged to lie across the surface of revolution traced by the axis of the parabola. The disk 12 bearing the heating wire is coaxial with the reflector and is guarded by a protector 13 bearing a small annular grill 14 the major part of the surface of the reflector being uncovered.

Obviously, the invention is not limited to the rectilinear or annular shape of the coiled flexible unit as this may be arranged in parallel lengths e. g. in a heater, in a flat spiral e. g. in an iron, or in zig-zag manner or according to any other arrangement as found suitable.

In addition to the greater radiating effi-

ciency obtained by this construction, further advantages appear in that the coils may with safety be placed closer together than hitherto since in the preferred form each of the separate coils such as *a*, *b*, *c* of Fig. 1 is separately held and is thus maintained more rigidly and less subject to vibration under shocks or the alternations of the electric current.

In carrying out the invention I find a suitable cement can be constructed of fireclay mixed with soluble silicate and then baked.

I claim:—

1. An electric heating element comprising a wire initially coiled into spiral form with such spiral length of wire further coiled into spiral form of greater diameter, and a cement base in which the coiled wire is partly embedded to freely expose the greater portion of the wire including the cores of the second spiral formation to the air.

2. An electric heating element comprising a wire initially coiled into minor spiral form and such spirally formed wire thereafter coiled into major spiral form, and a cement backing in which the wire is embedded to an extent to freely expose to the air the open cores of the major spiral form to thereby present a large proportion of the wire for free radiation.

In testimony whereof I affix my signature.

ANDRÉ EMMANUEL MARIE VAN DER MEERSCH.