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No. 716,048.

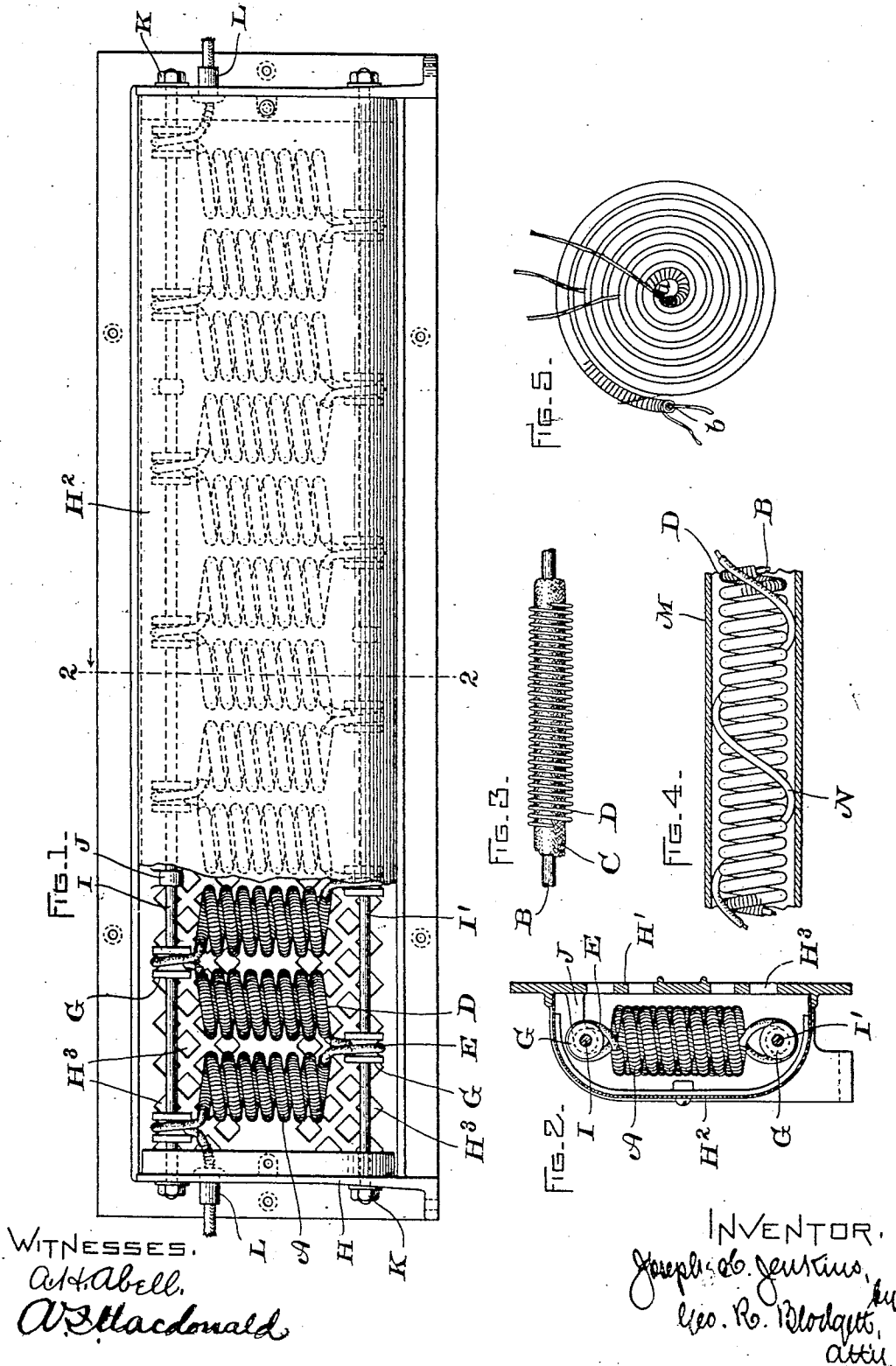
J. H. JENKINS.

ELECTRIC HEATER.

(Application filed Apr. 24, 1897.)

(No Model.)

Patented Dec. 16, 1902..



UNITED STATES PATENT OFFICE.

JOSEPH H. JENKINS, OF SCHENECTADY, NEW YORK, ASSIGNOR TO THE
GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC HEATER.

SPECIFICATION forming part of Letters Patent No. 716,048, dated December 16, 1902.

Application filed April 24, 1897. Serial No. 633,711. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. JENKINS, a citizen of the United States, residing at Schenectady, county of Schenectady, and State of New York, have invented certain new and useful Improvements in Electric Heaters, of which the following is a specification.

The present invention relates to electric heaters, and has for its object to provide a support for the resistance-coils of which the heater is made that is sufficiently flexible to be formed into any desirable shape and sufficiently rigid to maintain that shape when so formed.

In carrying out my invention I preferably employ a core formed of insulated wire and wind upon it the resistance-wire, after which the core is formed into an open helix.

By employing a core of the character above described I am enabled to dispense with the large central core over which the wire is usually wound, thereby increasing the radiating-surface of the coil and at the same time forming a structure so arranged that cool air may enter at the bottom and be heated on its upward passage both through the center of the helix and on the outside.

In the accompanying drawings, attached to and made a part of this specification, Figure 1 is a rear elevation, partially in section, of a heater embodying my invention. Fig. 2 is a sectional view taken on the line 2 2 of Fig. 1. Fig. 3 is an enlarged detail view showing the construction of the core of the resistance-coils. Figs. 4 and 5 are modifications.

The heater is composed of a number of counterpart coils A, each coil being provided with a flexible core consisting of a wire B, covered with a body of non-combustible insulating material C. This wire forms a core which is sufficiently flexible to permit the coil to be formed into any desirable shape, yet is rigid enough to maintain its shape and to support the resistance-wire. It is desirable to make the insulation for the core out of some tough fibrous material, so that it will not split when the core is bent, thereby grounding the coils through the metal core.

I am aware that heretofore electric heaters have been proposed in which a resistance-wire has been wound helically upon bars or

tubes which support the wire, but are not flexible, so that the shape of the finished heater is the same as that given the core before the resistance-wire is applied, and also that resistance-wires have been wound upon asbestos cord which are flexible; but in the last-named heater the resistance-wire is passed around the supports and in reality supports the core rather than the reverse.

The principal point of difference in my heater is that I employ a core (preferably of metal for strength and an insulated cover) which is flexible and yet will support the resistance-wire and will when bent into a given shape maintain such shape permanently. Hence I can wind the resistance-wire on the core when straight and then bend the whole into a helical form, which is at once a cheap and convenient mode of manufacture and a compact and desirable form of completed heater.

In constructing the coils the wire B may be made of sufficient length to form the core for all of the coils in a single heater or a number of such heaters. This is desirable on account of dispensing with joints between parts and also to permit of a simple form of suspension. The resistance-wire D is wound over the core B throughout its length, as shown in Fig. 3, an insulating-space being left between the turns. The wire D may or may not be insulated. After a sufficient length of core B has been wound with resistance-wire the core is wound over a suitable mandrel, so that it forms an open helix similar to a helical spring. By this arrangement the resistance-wire D forms a double helix, one around the core B, the other around the mandrel as a center. The mandrel is then removed and the turns arranged in parallel groups by bending them, as shown in Fig. 1. At the time the groups are formed an eye E is made between them by bending one of the turns at right angles to the vertical center line of the coils. At this point the resistance-wire D is pressed back, so that the core is uncovered at this point and passes around the supporting-insulators G, Figs. 1 and 2. By this arrangement all tension and abrasion of the resistance-wire is prevented. Mounted in the eye E between each of the groups of coils is a non-combus-

tible insulator G, having a circular groove on its outer periphery, in which the core forming the eye rests. The coils are mounted in an inclosing case H, having a cast-metal front 5 H', provided with openings H², and a closed sheet-metal back H². The inclosing case is designed to be secured by screws in any suitable manner either in the wall of a building or under the seats of a vehicle. Extending 10 laterally through the case are rods I I', situated, respectively, above and below the resistance-coils. These rods support the insulators G and are mounted in lugs J and secured at their outer ends by nuts K. The 15 ends of the wire D are insulated from the inclosing casing by bushings L.

It is immaterial whether the wire which forms the core is included in circuit or not; but I have found that in certain instances it 20 is better not to do so.

It will be seen that the arrangement is such that currents of air can readily enter through the openings H² in the lower part of the casting H' and pass upward through the resistance-coils and that the wire of which the coils 25 are composed presents an extended radiating-surface, so that the full benefit is derived from the current which passes through the heater.

By forming the core of flexible material and 30 making it continuous I am enabled to form the coils into any desired shape and to simplify the construction of their support.

In Fig. 4 is shown a slight modification in which a flexible insulated core B is wound 35 with resistance-wire and the whole formed into a helix and inserted into a tube M, the resistance-wire being insulated from the tube by insulated wire N, which may or may not form a part of the core B.

In Fig. 5 is shown a further modification, in which the coil is made in the form of a flat spiral. This is particularly useful where it is desired to make a very thin heater. In this case the core B is included as a part of 45 the circuit, one connection being made to the outer end b, the other to the inner end a; but it is clear that such connection is not limited to the spiral coil. If desirable, a number of connections can be made with intermediate 50 points, either on this coil or those above described, for the purpose of varying the amount of wire in circuit, and these connections can consequently be controlled by suitable switches in any well-known manner, so 55 that any combination of coils can be included in circuit at any given time.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. An electric heater comprising a flexible core bent into a series of alternate helical 60 coils and bends or loops, a resistance-wire helically wound about the respective helical coils of said core, and means for supporting said core at the respective bends or loops thereof. 65

2. An electric heater comprising a single flexible insulated core in the form of a series of alternate bends or loops and helical coils, a resistance-wire wound upon the helical coils of said core, and means for supporting 70 said core at the respective bends or loops thereof.

3. The combination with a core of flexible material which is sufficiently rigid to retain the shape into which it is bent, of a plurality 75 of resistance-coils wound helically on separate successive portions of the core, said core being also coiled, and the free portions of the core between the resistance-coils being adapted to engage the parts which support the 80 structure.

4. In an electric heater, the combination of a plurality of counterpart coils placed side by side in parallel relations, a common flexible core for the coils, eyes formed in the core 85 between the several coils, and means for supporting the coils at the eyes.

5. In an electric heater, the combination of a plurality of counterpart coils, each coil consisting of a number of turns of helically- 90 wound resistance-wire, a common core for the coils wound in the form of open helices, eyes formed in the core between the coils, rods extending through the eyes, and insulators between the eyes and the rods. 95

6. The combination with a core of flexible material, which is sufficiently rigid to retain the shape into which it is bent, of a plurality of resistance-coils wound helically on separate successive portions of the core, said core 100 being wound so that each part wound with resistance-wire will form a helical coil, whereby the resistance-coils are made double helices, the free portions of the core between the helical coils being adapted to support the 105 structure.

In witness whereof I have hereunto set my hand this 22d day of April, 1897.

JOSEPH H. JENKINS.

Witnesses:

E. W. CADY,

A. F. MACDONALD.