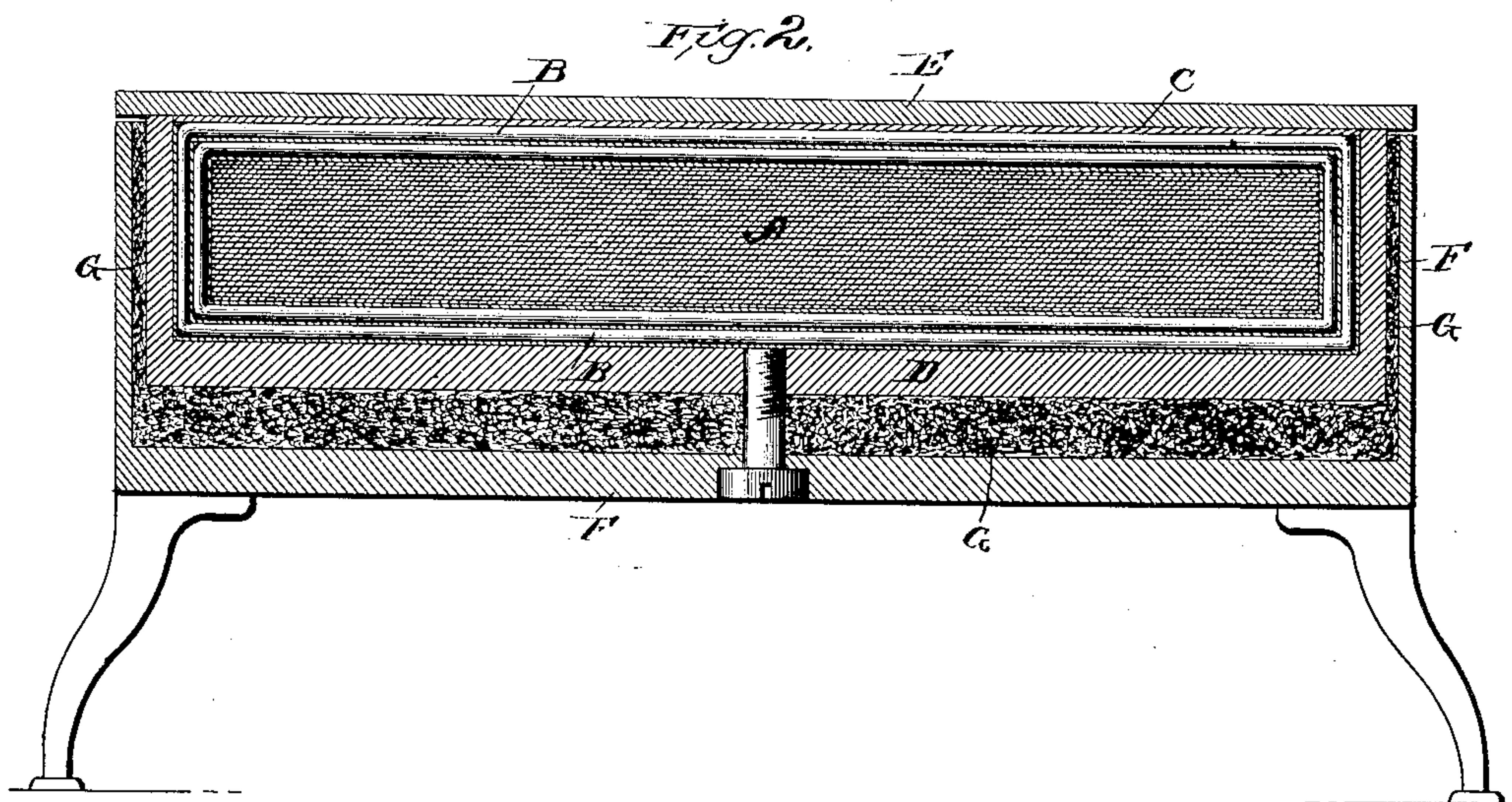
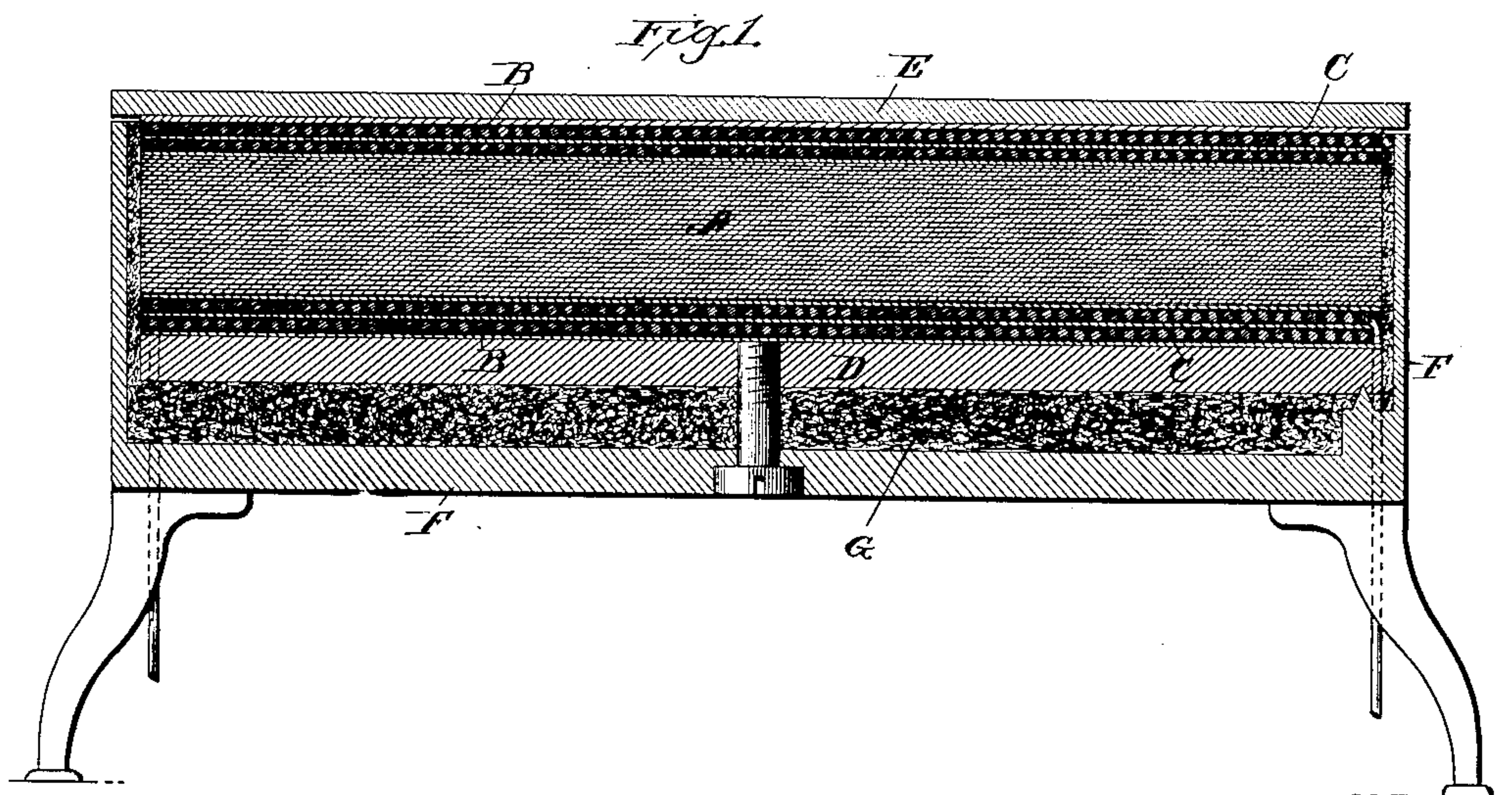


(No Model.)

C. E. CARPENTER.
ELECTRIC HEATER.

No. 477,628.

Patented June 21, 1892.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES E. CARPENTER, OF MINNEAPOLIS, MINNESOTA.

ELECTRIC HEATER.

SPECIFICATION forming part of Letters Patent No. 477,628, dated June 21, 1892.

Application filed November 29, 1890. Serial No. 373,018. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. CARPENTER, a citizen of the United States, and a resident of Minneapolis, county of Hennepin, and State of Minnesota, have invented certain new and useful Improvements in Electro-Heating Apparatus, of which the following is a specification.

This invention relates to improvements in electro-heating apparatus, and has for its prime object to utilize a portion of the secondary circuit or element of a transformer, converter, or induction-coil as the heated resistance for evolving heat upon the passage of a current of electricity of varying intensity through the primary circuit of the apparatus.

Other objects are to have such a heated resistance subserve the further purpose of the heated surface-plate for the uses of the apparatus and to provide certain novel details of construction in carrying out my invention, all as illustrated in the accompanying drawings, in which—

Figure 1 represents a central longitudinal section through an electro-heating apparatus embodying my invention, and Fig. 2 a transverse central section of the same.

Similar letters of reference indicate the several parts of the same drawings.

Referring by letter to the accompanying drawings, A indicates a laminated-iron core, preferably consisting of thin layers or sheets of soft iron with or without insulation of some suitable character therebetween; or this core may consist of soft iron, a bundle of iron wires, or any other construction which will subserve the intended purpose. Around this core is wound any desirable number of convolutions and layers of wire B, composed of some good electrical conducting material of convenient size, which are insulated from one another, as in the winding of electro-magnets, by embedding in some insulating material or in any other suitable manner, such as by layers of asbestos interposed between the layers, with the convolutions separated from one another, as illustrated in the drawings.

Thus far we have the core and primary circuit or element of a converter or transformer similar in structure to the converter ordinarily used in converting alternating currents of electricity from a high voltage and little

quantity to a low voltage and considerable quantity for electric-lighting purposes. The secondary circuit or element of this converter, instead of being a winding of coarser wire, as ordinarily constructed, consists of a shell composed of the two parts D and E, the former surrounding the core upon three sides, but not at the ends, while the latter covers the remaining side. The portion D should be of some good electrical conducting substance—such as copper—and the side E should consist of a metal—such as iron—which offers a much higher resistance to the flow of current than the other portion D, and thus it will be seen that the secondary circuit or element is composed of two different substances or metals joined together or continuous, one of which is a good conductor of electricity, and will therefore not be heated to any considerable degree by the passage of the secondary current there-through induced upon the passage of a current of electricity through the primary element, while the other, being a poor conductor of electricity, will offer sufficient resistance to the passage of the current therethrough to generate a high degree of heat. This latter portion or the heated resistance I prefer should subserve the further purpose of the heated surface-plate for the uses of the apparatus, although an additional heated surface might be employed to be heated by conduction or radiation therefrom, as I do not confine myself to any particular material in the construction of this secondary element.

When an interrupted, pulsating, or alternating current or a current of varying intensity flows through the primary circuit, the core will be magnetized with varying intensity, as a result of which secondary currents are induced in the secondary element D E, and since the portion E of this secondary element offers resistance to the flow of current the energy transformed into the secondary element will be evolved in the form of heat at the place where the heat is required. In practice it is preferable that the core and the shell inclosing the same, excepting the heated resistance or surface-plate thereof, should be contained within some suitable casing—such as the part F—which is out of the metallic contact with the shell, so as not to form a part of the secondary element, and is prevented from being

heated by means of a layer or layers or a packing of some non-heat-conducting substance, such as asbestos or mineral wool, for while the energy evolved in the form of heat is principally confined to the plate E still the portion D of the shell, being also a good conductor of heat and in contact with the plate E, will become heated by conduction from the plate, and but for the heat-insulation intervening between the casing and shell much energy would be dissipated into the atmosphere, and hence lost.

It is understood that this apparatus, while illustrated in the drawings in the form of a stove or heater, may be made in numerous forms of devices not necessary to herein describe or illustrate, and in which, also, the heat can be largely confined to the surface-plate.

In conclusion I may state that the essential feature of this invention is the secondary element composed of two parts of different conductivity, not meaning, however, that they shall be two separate and distinct parts of different or of even the same material, for the same result might be accomplished by having the secondary element formed entirely of a single piece and of the same material but of different thicknesses in cross-section at different parts, so that the two parts will have different conductivities or capabilities of conducting current.

Having described my invention, what I

claim, and desire to secure by Letters Patent, is—

1. In an electro-heating apparatus, the combination, with the iron core and the primary coil wound thereon, the convolutions of said coil being insulated from the core and from each other, of the shell surrounding said coil, composed of the parts D and E, constituting the secondary element, substantially as described.

2. In an electro-heating apparatus, the combination, with the iron core and the primary coil wound thereon, the convolutions of which coil are insulated from said core and from each other, of the secondary element composed of the shell D E, surrounding said coil, the part E of which constitutes the heated surface-plate, substantially as described.

3. In an electro-heating apparatus, the combination, with the iron core and the primary coil wound thereon, the convolutions of which are insulated from said core and from each other, of the secondary element composed of the parts D and E, surrounding said coil, the part E constituting the heated surface-plate, a casing inclosing the part D and the ends of the coil, and a non-heat-conducting material interposed between said casing and the parts inclosed thereby, substantially as described.

CHARLES E. CARPENTER.

Witnesses:

ROBT. T. LANG,
M. F. SCOFIELD.