

(No Model.)

R. KENNEDY.
ELECTRICAL WATER HEATER.

No. 479,814.

Patented Aug. 2, 1892.

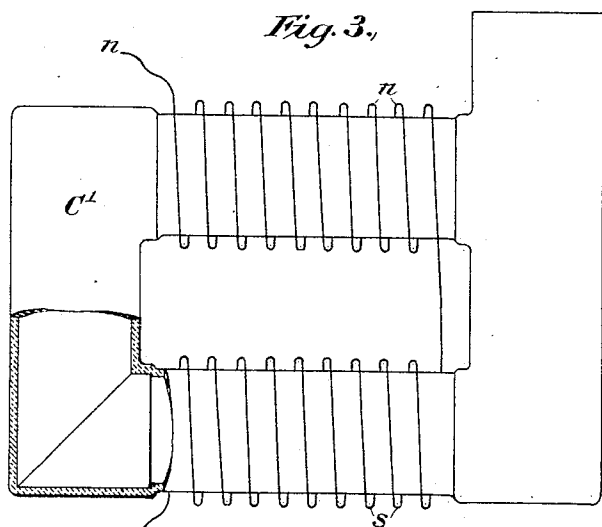
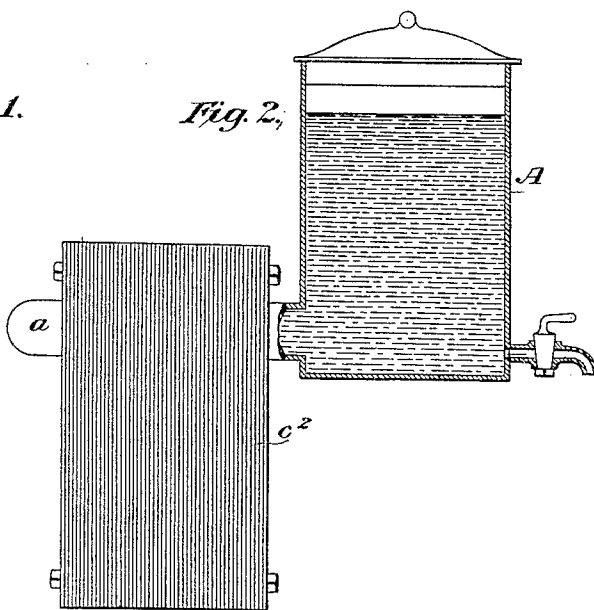
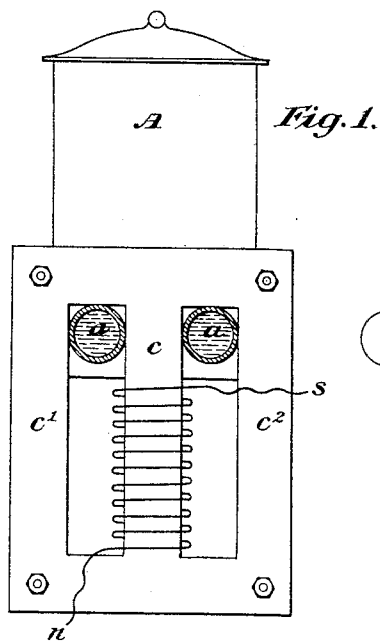
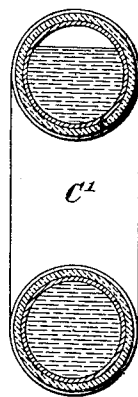


Fig. 4,



Witnesses
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UNITED STATES PATENT OFFICE.

RANKIN KENNEDY, OF KILMARNOCK, SCOTLAND.

ELECTRICAL WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 479,814, dated August 2, 1892.

Application filed April 1, 1891. Serial No. 338,436. (No model.)

To all whom it may concern:

Be it known that I, RANKIN KENNEDY, a subject of the Queen of Great Britain, and a resident of Kilmarnock, Scotland, have invented a certain new and useful Improvement in Apparatus for Heating by Electricity and Magnetism, of which the following is a specification.

It is well known that if an alternating or pulsatory electric current be made to pass through a helix surrounding an iron core induced currents are caused to circulate within the mass of iron by which the latter becomes heated. The object of my invention is to utilize the heat thus generated. In some of the apparatus and methods hitherto employed for this purpose electricity has been derived from an external source and conveyed therefrom directly into the body to be heated.

My invention relates to that class of apparatus in which the electricity which is to be converted into heat is induced by the action of magnetism, which magnetism is generated by alternating or pulsatory electric currents from a generator of any suitable character.

My present invention relates more particularly to apparatus for heating liquids; and to this end it is so constructed that the chambers, tubes, or other like receptacles for containing the liquid to be heated are inclosed wholly or in part by an iron core, and such receptacles have walls of material which is a good conductor both of electricity and of heat. Heat is generated within these walls by secondary currents, which are induced therein by primary currents, preferably alternating in their character and derived from any suitable or convenient source of energy.

In the accompanying drawings, Figure 1 is an elevation, and Fig. 2 a section, of a containing-vessel, within which is placed the liquid to be heated and having a tube, preferably of copper, communicating therewith, in the walls of which the heat energy is developed. Figs. 3 and 4 show in elevation and cross-section, respectively, another form of heater made of wrought-iron tubes.

Referring to the drawings, A, Figs. 1 and 2, is a receptacle, preferably of copper, for con-

taining the main body of the liquid which is to be heated.

a a is a U-shaped tube projecting horizontally from a point near the bottom of the vessel A and communicating freely therewith at both ends.

C is the core of the electro-magnet, composed of a mass of thin iron plates secured together in any suitable manner. Each of these plates is of the form best seen in Fig. 1, consisting of a central limb *c* and two exterior limbs *c'* and *c''*, these being united at each of their ends by a transverse portion of equal width. Around the middle limb *c* the wire *n s* is wound in a helix in the usual manner. When a pulsating, or preferably an alternating, current is made to traverse the wire *n s*, secondary currents are generated within the walls of the tube *a a*. This tube in fact constitutes the secondary of an alternating transformer, and the secondary currents generated within its walls are transformed into heat which is imparted to the water or other liquid in the vessel.

In Figs. 3 and 4, C' is an endless tube of wrought-iron put together by couplings in the form of a rectangle. This tube therefore constitutes a closed magnetic circuit upon which the helix *n s* is wound. In this construction the secondary currents are generated within the walls of the iron tube itself, which constitutes the core of the electro-magnet, and develop heat therein, which is imparted to the liquid contents of the tube.

A non-conducting layer of asbestos or other heat-insulator may with advantage be placed between the helix and the tube.

I claim as my invention—

1. In apparatus for heating by electricity, the combination of a magnetizing-coil and a source of alternating or pulsatory electric currents with an iron core and one or more chambers, tubes, or other receptacles for containing liquid to be heated inclosed wholly or in part by said core and having walls of conducting material, within which secondary currents are induced and caused to generate heat, substantially as set forth.

2. The combination of an endless tubular

core with a magnetizing-coil and a source of
alternating or pulsatory electric currents.

3. In apparatus for heating by electricity,
the combination of a magnetizing-coil and
5 a source of alternating or pulsatory electric
currents with an endless iron core surround-
ing or inclosing a receptacle for containing a
liquid to be heated.

In testimony whereof I have hereunto sub-
scribed my name this 19th day of February, A. 19
D. 1891.

RANKIN KENNEDY.

Witnesses:

DAVID CARRUTHERS,
JOHN STEWART.