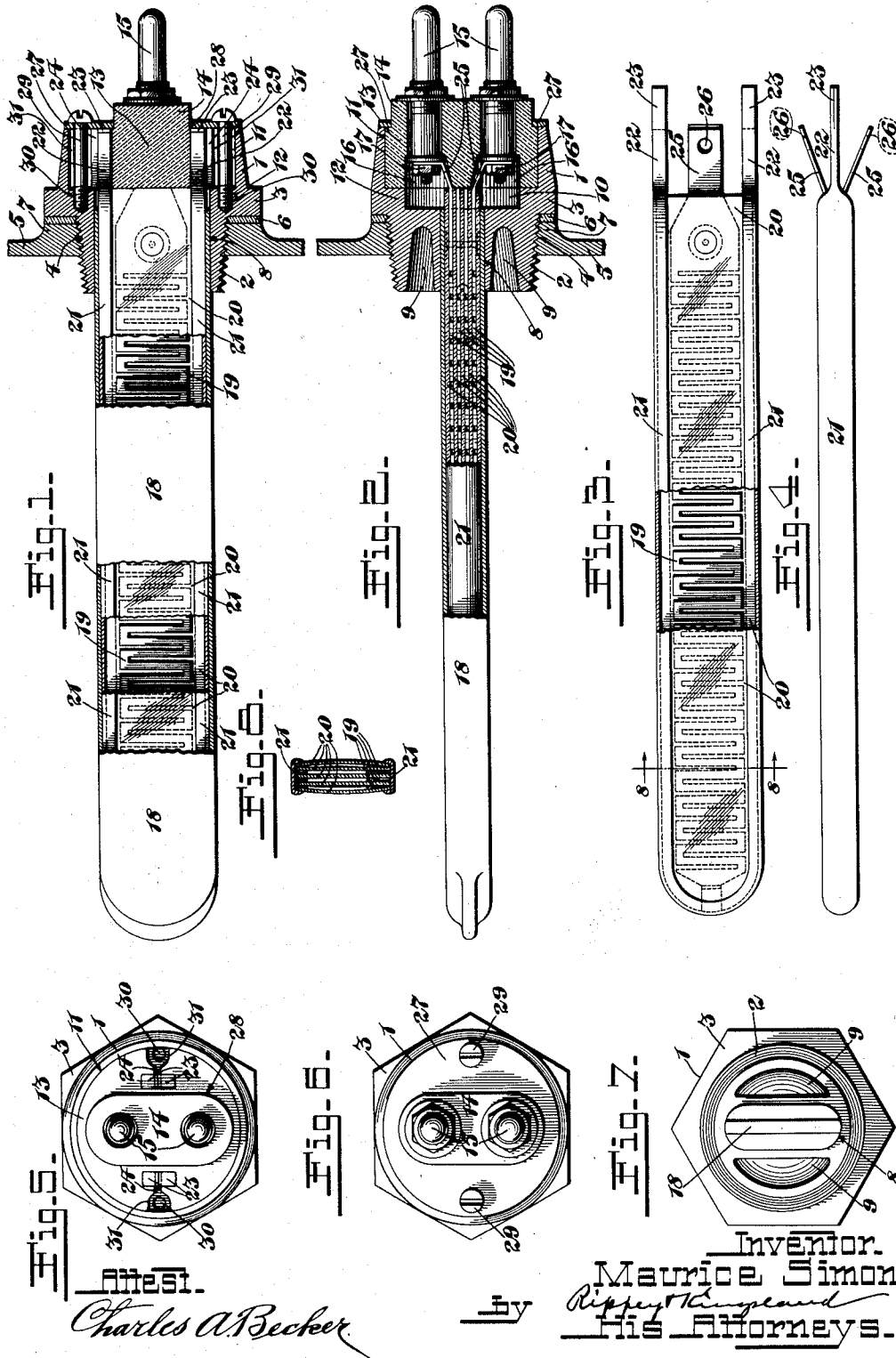


M. SIMON.
ELECTRIC FLUID HEATER.
APPLICATION FILED JULY 14, 1917.

1,282,476.

Patented Oct. 22, 1918.



Attest.
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by

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UNITED STATES PATENT OFFICE.

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ELECTRIC FLUID-HEATER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, MAURICE SIMON, a citizen of the United States, residing at the city of St. Louis and State of Missouri, have invented a new and useful Electric Fluid-Heater, of which the following is a specification.

This invention relates to improvements in electric fluid heaters, and consists in the novel construction, arrangement and combination of parts hereinafter disclosed.

An object of the invention is to produce a simple, compact and efficient heating unit that is primarily adapted to be inserted in and to be supported by the wall of a hot water storage tank of the usual type for heating the water in the tank.

Another object of the invention is to provide a heating unit of the type mentioned, designed so that it may be economically manufactured and easily repaired.

Other advantages inhere in the structure of the invention that will be readily apprehended from the following disclosure thereof taken in connection with the accompanying drawings, and in which—

Figure 1 is a view partially in section and partially in side elevation of the heating unit of the present invention.

Fig. 2 is a view partially in section and partially in top plan of the construction of the invention.

Fig. 3 is a view partially in section of the resistance element removed from the case.

Fig. 4 is a top plan view of the resistance element removed from the case.

Fig. 5 is an end view of the heating unit with the end plate removed.

Fig. 6 is an end view of the heating unit.

Fig. 7 is a view illustrating the opposite end of the unit to that illustrated in Fig. 6, and

Fig. 8 is a cross section through the heating element taken on the line 8—8 of Fig. 3.

In the embodiment of the invention illustrated the heating unit is shown as consisting of a socket member 1, which member has a tapered threaded portion 2. The body of the socket member is extended outwardly adjacent to the inner end of the threaded portion 2, thereby forming a flange or shoulder 3. This construction permits the socket to be threaded into an opening 4 through the wall of the tank 5. The threaded portion is

made of standard size thread and is of a diameter standard with the ordinary opening in a hot water storage tank of the usual type, so that it is only necessary to remove the usual plug and to insert the socket within the tank. In order to seal the opening a gasket 6 may be provided, which gasket is interposed between the face of the shoulder 3 and the face of the boss 7, surrounding the threaded opening in the tank.

There is an opening 8 through the central part of the socket member which is oblong in form and which extends inwardly from the face of the threaded portion to approximately the center of the socket body. In this opening the case of the heating element is mounted. In the inner face of the socket body, at either side of the opening 8, recesses 9 are formed. The recesses 9 extend inwardly substantially the depth of the opening 8. These recesses are provided so that the fluid from the tank may pass into the socket body, serving to cool the body to prevent overheating from that part of the heating element that extends into the socket.

The outer face of the socket body is deeply recessed, there being a circular recess 10 near the center of the socket body and a recess 11 of larger diameter extending from the outer face of the socket member to the edge of the recess 10, thereby providing a shoulder 12. Within the recess 11 is inserted an insulated base block 13. The base block 13 has on its outer face an oblong extension 14. Terminal binding posts 15 are mounted in the block 13 extending outwardly through the projection 14, the inner ends of said terminal binding posts being within recesses 16 formed in the inner face of the block. The outer ends of the terminal binding posts project from the face of the projection 14 and are adapted to receive a slip socket of a flexible electrical conducting cord. The ends of the resistance element are connected with the respective terminal binding posts by binding nuts 17 which seat within the recesses 16.

The heating element comprises a case 18 which in practice may be readily made by flattening brass or copper tubing and pressing one end thereof together and brazing it to form a sealed flattened case. The open end of the case 18 is mounted within the oblong opening 8 in the socket member. The resistance element proper comprises a con-

tinuous stretch of slotted metallic ribbon 19 which is arranged in a double fold as illustrated particularly in Fig. 2.

The metallic ribbon is arranged compactly with strips of insulating material 20, preferably sheet mica, disposed between the folds of the ribbon and covering the outer face of each of the outer folds, the ribbon and the mica insulation being held in contact form by marginal metallic binding strips 21 which extend around the edges and around the inner end of the alternate layers of the metallic ribbon and of the insulating material. At the outer ends the metallic binding strip 21 is pressed together as indicated at 22, having at the extremity of the portion 22 separable leaves 23. The extremities 22 of the binding strips are insertible through slots 24 in the insulating block, and the leaves 23 are bent over at right angles so as to hold the heating element in connection with the insulating block.

At each end of the stretch of resistance ribbon are terminal strips 25 having perforations 26 therein which fit over the inner ends of the binding posts 15 and are held in place thereon by the nuts 17.

The insulating block 13 is held in place in the socket member by a top plate 27 which has an oblong opening 28 therein, fitting over the projection 14 of the insulating block. The plate 27 is removably held in place by screws 29 that thread into openings 30 formed in the socket member in the outer face of the shoulder 12, the screws 29 passing through openings 31 in the insulating block.

It will be observed from the above description that the parts may be easily assembled so that the device may be readily manufactured and so that replacement may be easily made.

I am aware that the structure may be modified in numerous particulars without departing from the spirit and scope of the invention. I do not limit myself, therefore, to the exact details shown and described, but what I claim and desire to secure by Letters Patent, is:—

1. A heating element, comprising strips of flat insulating material, resistance material disposed therebetween, means in the form of metallic binding strips for maintaining the aforesaid members in a compact relation to each other, an insulating base block, and means arranged at the ends of said metallic binding for maintaining said heating element rigidly and removably affixed to the insulating base block, said block carrying terminal members, substantially as specified.

2. An electric heating unit, comprising a socket, a case projecting therefrom, a heating element adapted to be removably inserted into said case, an insulating base block, terminal members in said base block,

and means for maintaining said heating element rigidly and removably affixed to said base block.

3. An electric heating unit, comprising a socket, a flattened case supported by said socket, a flat heating element adapted to be removably inserted into said case, and consisting of strips of mica insulating material with a resistance circuit disposed therebetween, and marginal clamping means for maintaining said heating element in a compact and hermetically sealed condition.

4. An electric heating unit, comprising a socket, a flat shell supported by said socket and closed at the end remote therefrom, a heating element adapted to be removably inserted into said shell, an insulating base block carrying terminal members adapted to be fitted into and supported by said socket, and a plate fitted to said socket for maintaining said insulating block and the heating element in position.

5. A heating unit adapted to be inserted in and supported by the walls of a tank, comprising a socket member arranged to be secured in an opening in the tank, a sealed case extending inwardly from said socket, a heating unit mounted in said case and comprising a resistance circuit composed of slotted flat sheets of resistance material, sheets of insulating material covering the surface of said resistance circuit, a marginal metallic binding strip holding said insulating material and said resistance circuit together, an insulating block adapted to be mounted in the socket, connections between said metallic binding strip and said block whereby said strip is supported by said block, and terminal members in said block connected with said resistance circuit.

6. An electric heating unit, comprising a socket adapted to be fitted into the wall of a tank and having cavities formed therein for permitting the water in the tank to come in contact with and cool the socket, a case supported by the socket and extending inwardly a considerable distance therefrom, a resistance unit comprising folds of resistance wire having insulating material therebetween with binding strips for holding the resistance wire and insulating material together, the said resistance element being insertible into said case, an insulating block insertible in and removable from said socket having terminal members for attaching an energizing circuit thereto, and connecting means for supporting the case of the resistance element in connection with said block.

7. A heating unit adapted to be inserted in and supported by the walls of a tank, comprising a socket member arranged to screw into an opening in the tank, a case, a resistance element comprising strips of flat insulating material, resistance material disposed therebetween, and means for bind-

ing the same together insertible into said case, an insulating block removably mounted in the socket, and means arranged at the end of said resistance element for connecting it with the insulating block.

5 8. An electric heating unit adapted to be supported by the walls of a tank, comprising a socket having threaded portions adapting

it to be threaded into an opening in the wall of the tank, a case projecting therefrom, 10 a heating element adapted to be removably inserted into said case, an insulating base block, terminal members in said base block, and means for connecting the heating element with the base block.

MAURICE SIMON.