J. L. ANDERSON.

UNIVERSAL ELECTRIC INDUCTION HEATING ELEMENT.

APPLICATION FILED OCT. 30, 1911.

1,023,791.

Patented Apr. 23, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

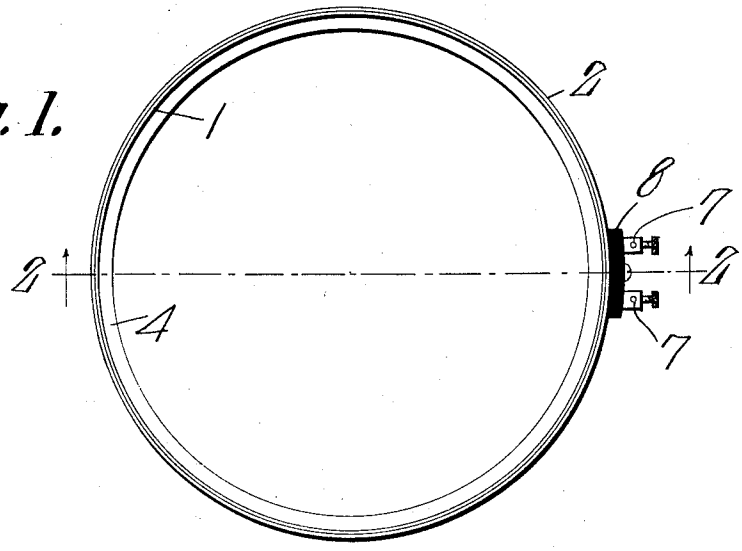
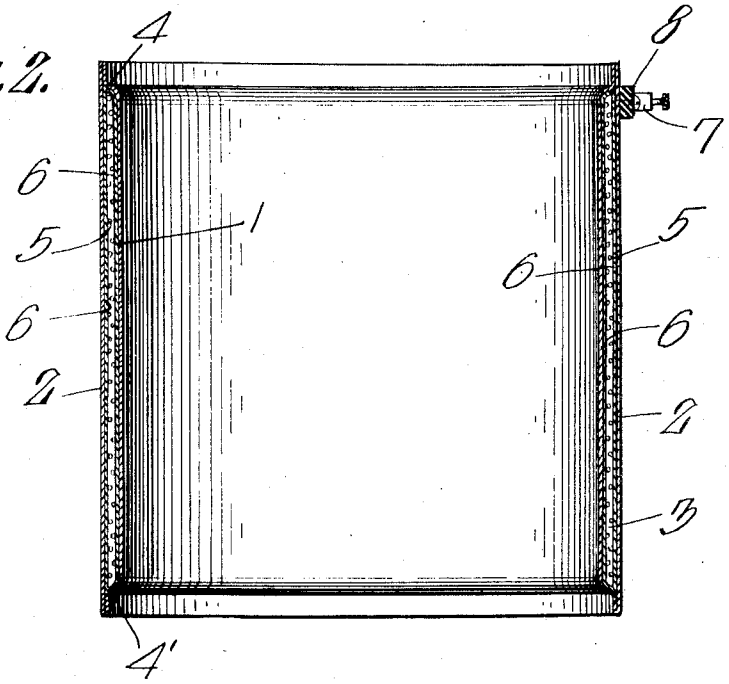


Fig. 2.



Witnesses

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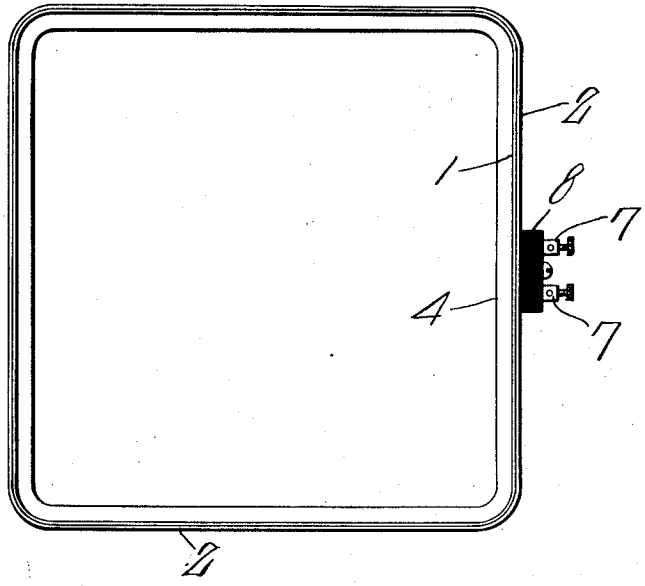
3 SHEETS—SHEET 2.

Fig. 3.



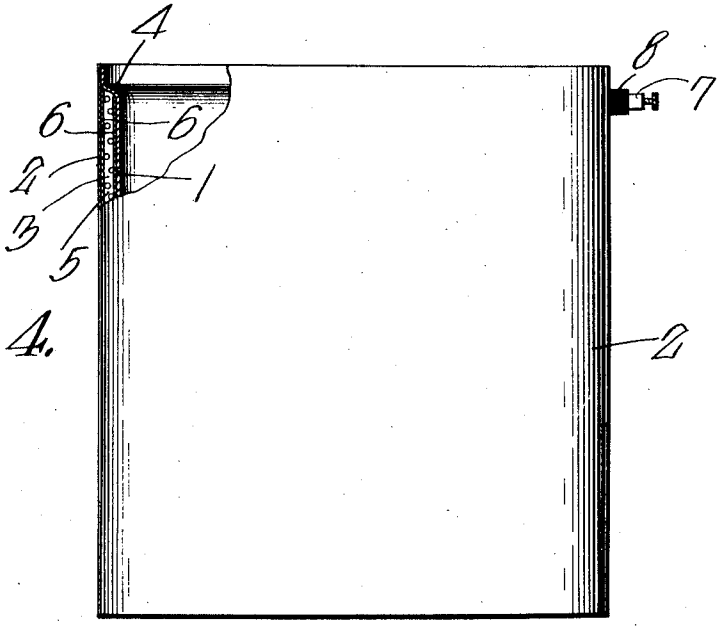


Fig. 4.

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3 SHEETS—SHEET 3.

Fig. 5.

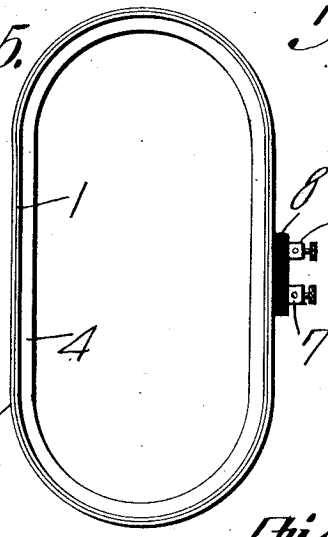


Fig. 7.

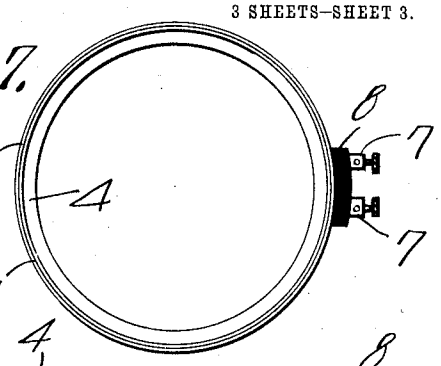


Fig. 6.

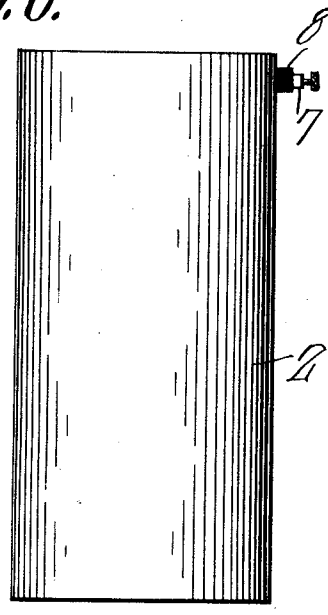
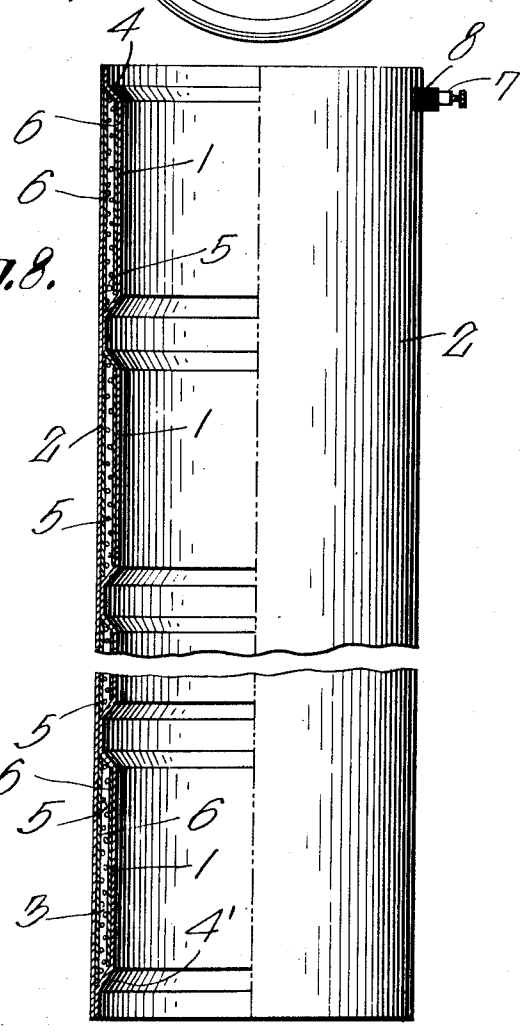


Fig. 8.



Witnesses.

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UNITED STATES PATENT OFFICE.

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UNIVERSAL ELECTRIC INDUCTION HEATING ELEMENT.

1,023,791. Specification of Letters Patent. Patented Apr. 23, 1912.

Application filed October 30, 1911. Serial No. 657,574.

To all whom it may concern:

Be it known that I, JOHN L. ANDERSON, a citizen of the United States, residing at Ogden, in the county of Weber and State of Utah, have invented a new and useful Universal Electric Induction Heating Element, of which the following is a specification.

The present invention relates to an improved universal electric induction heating element or unit, the primary object of the invention being the provision of a heating element or unit which is essentially a transformer, the magnetic circuit of which also constitutes the secondary circuit of the heating element or unit.

A further object of the invention is the provision of an electric induction heating element or unit, designed for use in all classes of heating appliances, as for heaters, cook stoves, fireless cookers, and sad irons.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of coustruction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings:—Figure 1 is a top plan view of an element to be used as a fireless cooker. Fig. 2 is a vertical section taken on line 2—2 of Fig. 1. Fig. 3 is a top plan view of an element to be used with an oven. Fig. 4 is a side elevation thereof, with a portion is section to show the interior structure. Figs. 5 and 6 are views of the element when used for car heater radiators and the like. Figs. 7 and 8 are forms taken by the element as applied to water heaters.

Referring to the drawings, and more particularly to the structure shown in Figs. 1 through 8, wherein the element takes on different forms, but is essentially identical, the numerals 1 and 2, respectively, indicate the inner shell and the outer shell, which are concentric cylinders made of wrought iron. The inner shell 1, is rolled or flared outwardly at its ends 4 and 4′, so that the outside diameter of the ends is equal to the inside diameter of the outside shell 2 and is hazed or welded thereto. This construction provides the annular space 3 between the shells and the hermetically inclosed ends 4 and 4′, so that the primary or inducing winding or coil 5 is retained waterproof, the fireproof insulator 6, being placed between the shell 1 and said winding 5. This primary winding is wound circumferentially about the outside of the shell 1, and the outer shell 2, is slipped over this, thus entirely hermetically inclosing the winding 5. The terminals of the primary winding 5 are brought out to the posts 7, which are carried by the porcelain terminal block 8.

The two cylindrical shells 1 and 2 form a closed magnetic circuit, which links with the primary winding 5, the magnetism flowing axially through the shells. The area of this magnetic path is large as is clearly evident, and consequently a strong alternating field is set up, when an alternating electromotive force is impressed on the primary winding. This alternating field, in turn, induces currents of large value, but low voltage, in the shells 1 and 2, their direction being circumferentially around said shells. Each shell 1 and 2, carries approximately one half of the total secondary current. These shells 1 and 2 can be considered, as constituting a single short-circuited turn of the secondary circuit. The current in this secondary circuit is limited in value only by the induced voltage and the electrical resistance of the shells. It will thus be seen that it is only a matter of properly proportioning the magnetic and electric circuits to secure a device of the desired wattage or capacity.

As shown in Figs. 7 and 8, a plurality of shells 1 and a single shell 2, is employed, this cellular or sectional construction being essentially, only a feature of design, and not of principle. It has been discovered that magnetic leakage plays an important part, unless the magnetic circuit is made relatively short. Where a heating element in the form shown in Figs. 7 and 8, is desired, it has been found that all leakage difficulties are overcome by cutting up the magnetic circuit in a number of short circuits by means employing the series or plurality of shells 1 and the windings 5, as shown instead of a single shell 1, as shown in Figs. 1 through 6.

It is deemed only necessary to show the four shapes, illustrated in Figs. 1 through 8, but it is to be understood that various other shapes may be designed for similar or different purposes, and still be within the scope of this invention.

It will be evident that the heating surface of the device is large and entirely exposed; and consequently no high temperature and no oxidation or other detrimental effects result. If properly constructed, the life of this form of heater should be very great, as it cannot "burn out", as in the ordinary high resistance heating elements. In this device, the heat is generated in the surface of the heater, thus making it a quick and highly efficient heating element. Electrically speaking, the construction of this device is ideal, as practically all of its material is active material.

From the foregoing description taken in connection with the drawings, it is evident that the herein described and shown heating element is in reality a transformer, *per se*, constructed in various shapes to provide a heating unit, the current flowing thereto and the magnetic current generated therein, being varied to secure radiation of heat from said element in varying degrees, that is a minimum heat to a maximum heat may be obtained for the various purposes.

What is claimed, is:—

1. An electric induction heating element having two nested members hermetically sealed at their respective ends and providing a coil retaining chamber therebetween, and a coil disposed in said chamber, and forming with the members a transformer.

2. An electric induction heating element, having two nested metallic members hermetically sealed at their respective ends and forming a compartment therebetween, both of said members constituting the closed magnetic circuit of a transformer, and a primary winding disposed within the compartment between the nested members and linked with the magnetic circuit of said members.

3. An electric induction heating element having two nested members hermetically sealed at their respective ends and providing a compartment therebetween, a primary winding mounted within the compartment, and terminal posts connected to said winding exteriorly of one of said nested members, whereby the two members constitute a closed magnetic circuit linking with the primary winding to cause magnetism to flow axially through the members.

4. An electric induction heating element, having two nested members composed of magnetic metal and hermetically sealed at their respective ends to provide a coil receiving compartment, a primary coil disposed within said compartment with a fire proof insulation interposed between the coil and the adjacent portions of the nested members, and terminal posts carried by one of said members and connected to the coil, whereby an alternating field produces current in the respective members circumferentially thereof.

5. An electric induction heating element, having two nested members composed of magnetic metal and hermetically sealed at their respective ends to provide a coil receiving compartment, a primary coil disposed in said compartment with a fire proof insulation interposed between the coil and the adjacent portions of the nested members, whereby the nested members form a closed magnetic circuit linked with the said coil to cause magnetism to flow axially through the said nested members.

6. An electric induction heating element, having two nested shells composed of magnetic metal and hermetically sealed at their respective ends to provide a coil receiving compartment, a primary coil disposed in said compartment with a fire proof insulation interposed between the coil and the adjacent portions of the nested shells, and terminal posts carried by one of said members and connected to the coil, whereby the nested shells form a closed magnetic circuit linked with the coil to cause magnetism to flow axially through the said nested shells.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN L. ANDERSON.

Witnesses:
C. V. ZINN,
P. E. THOMAS.