Feb. 17, 1925. 1,526,843

M. D. DOMINGUEZ

ELECTRIC HEATING ELEMENT

Filed Nov. 22, 1923 2 Sheets-Sheet 1

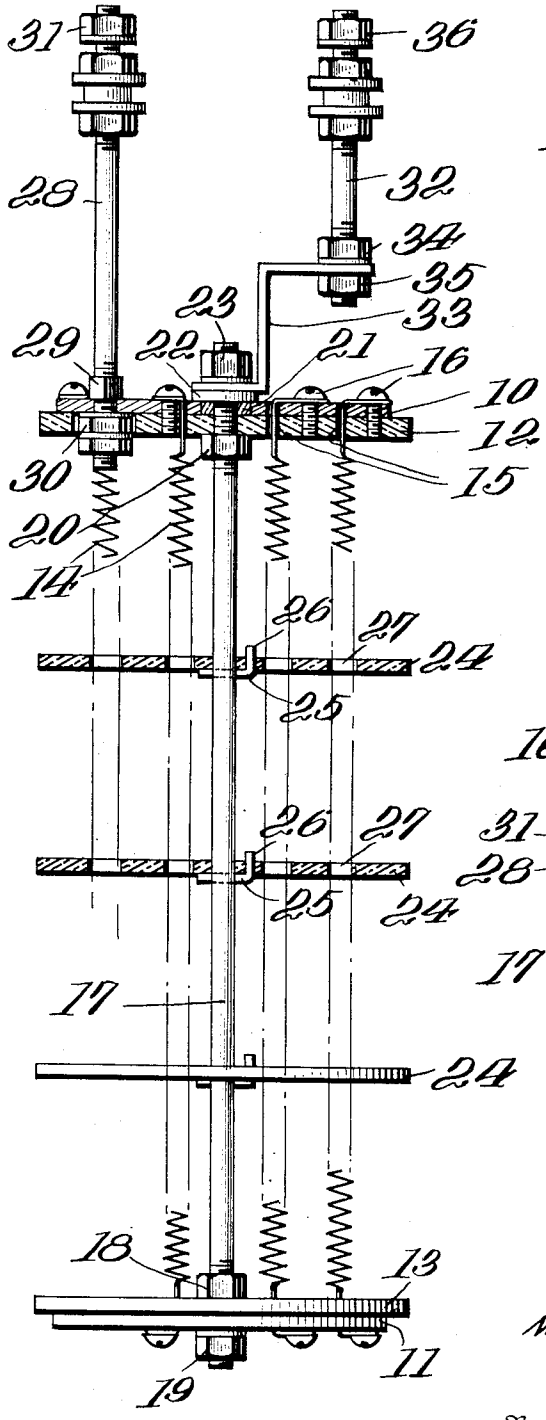


FIG. 1.

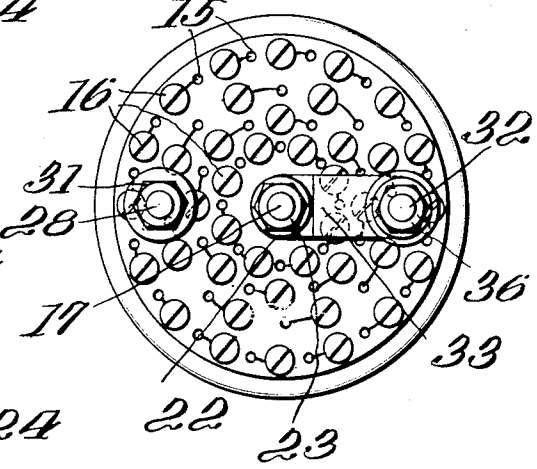


FIG. 2.

Inventor
MANUEL D. DOMINGUEZ.

By Browne & Phelps
Attorneys

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FIG. 3.

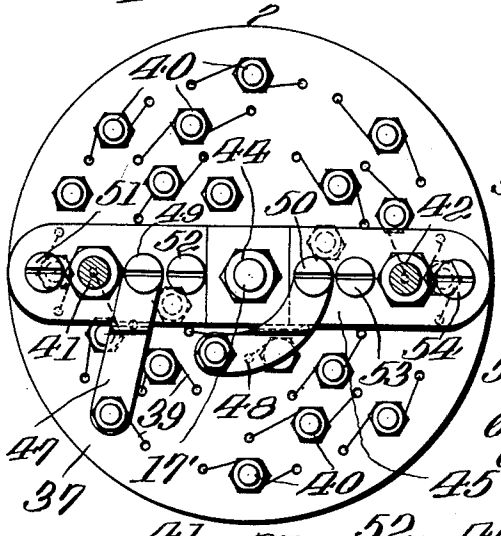


FIG. 5.

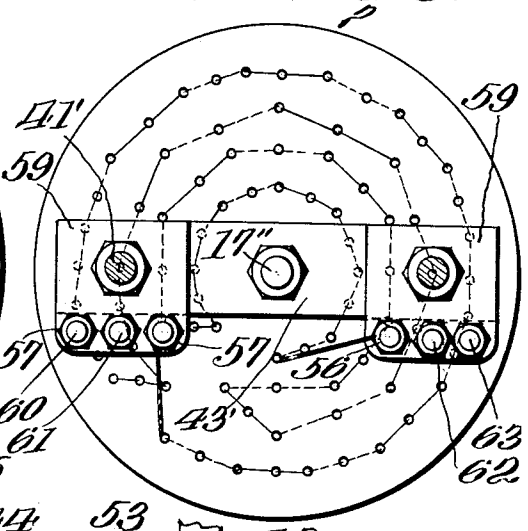


FIG. 4.

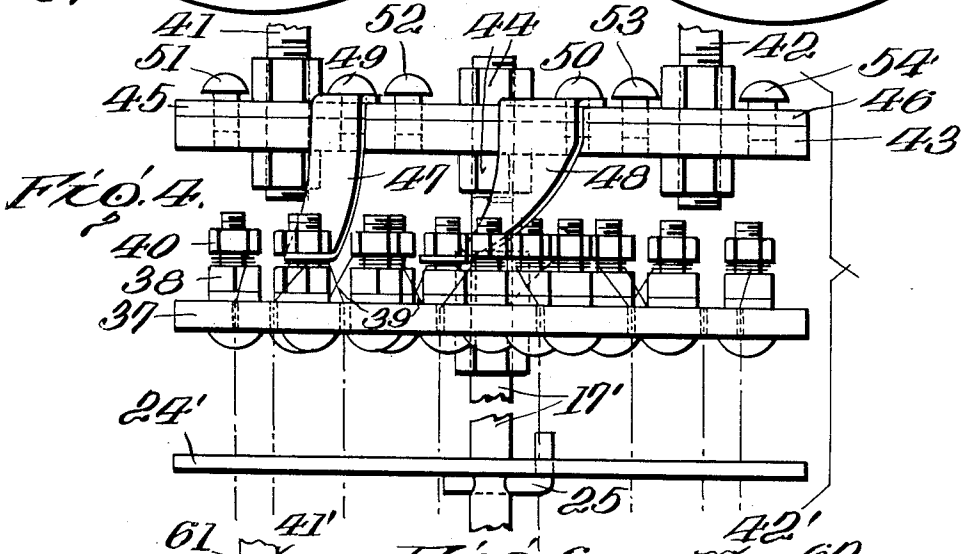
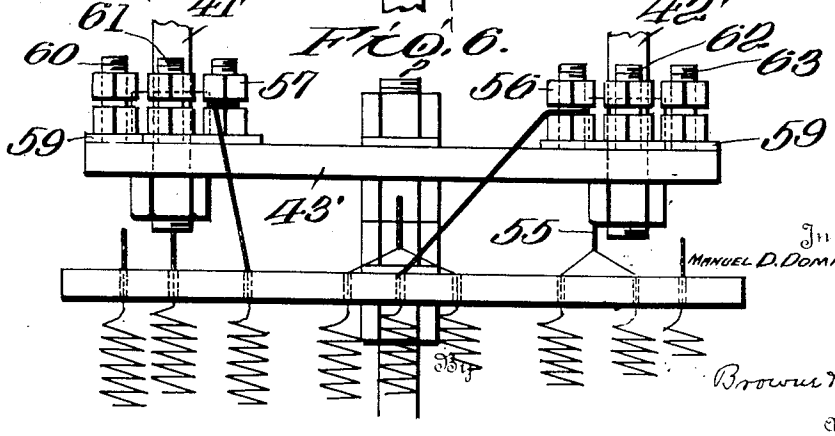


FIG. 6.



Inventor
MANUEL D. DOMINGUEZ.

Brownell & Phelps
Attorneys

Patented Feb. 17, 1925. 1,526,843

UNITED STATES PATENT OFFICE.

MANUEL D. DOMINGUEZ, OF NEW ORLEANS, LOUISIANA, ASSIGNOR OF ONE-HALF TO CHARLES A. DENIS AND ONE-HALF TO GEORGE SARPY, BOTH OF NEW ORLEANS, LOUISIANA.

ELECTRIC HEATING ELEMENT.

Application filed November 22, 1923. Serial No. 676,413.

To all whom it may concern:

Be it known that I, MANUEL D. DOMINGUEZ, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Electric Heating Elements, of which the following is a specification.

The invention relates to electric heating elements, and has as an object the provision of a heating element adapted to be placed within a coiled conduit through which liquid may be passed and heated by radiation from the resistance coils forming a part of the heating element.

A further object of the invention is the provision of a heating element which may be assembled and handled as a unit, whereby the same may be removed as a whole from its position of use and replaced by a like element when necessary. A further object of the invention is the provision of a heating element which is simple to assemble and rugged and effective in use.

Illustrative embodiments of the invention are shown in the accompanying drawing, in which—

Figure 1 is a side elevation, partly in central vertical section.

Figure 2 is a plan view.

Figure 3 is a plan view and Figure 4 is a detail side elevation of a modification.

Figure 5 is a plan view and Figure 6 is a detail side view of a further modification.

As shown in Figs. 1 and 2, the element comprises end plates 10 and 11 of conducting material, such as copper or brass, each mounted upon a plate 12 or 13 of insulating material. To provide electrical contact between the helical resistance elements 14 and the respective plates 10 and 11, the ends of the coils are shown as brought through small openings 15 in the plates through corresponding openings in the insulation plates 12 and 13, and as clamped under the heads of screws 16 seated in tapped openings in the plates 10 and 11, and if desired also penetrating into tapped openings in the plates 12 and 13.

To hold the device in assembly, and also to serve as an electrical conductor from the plate 11 to one of the terminals of the device, a rod 17 is shown as secured to plates 11 and 13, as by means of lock nuts 18, 19, being in electrical connection with the plate 11. The plate 12 is preferably seated upon a nut 20 and the rod 17 passes through the plates 10 and 12, being insulated from the plate 10 by means of a washer 21 formed of insulating material. A second washer 22 also of insulating material permits the nut 23 to clamp the plates 10 and 12 and hold the same in fixed relation to the plates 11 and 13.

To support positioning plates 24, which are formed of insulating material, and of which three are shown in the drawings, a series of hook shaped wires 25 are shown driven into holes formed in the rod 17. The plates 24 are provided with holes which are adapted to seat over the upturned portion 26 of the wires 25 to maintain the position of rotation of the plates upon the rod 17, such position being such that the openings 27 in the plates 24 for passage of the resistance elements 14 shall remain in alignment.

One terminal of the device is shown in the form of a rod 28 secured to plates 10 by means of lock nuts 29, 30, which terminal is provided with a lock nut 31 for clamping of an electrical conductor thereto. The second terminal 32 is shown as secured to a bracket 33 by means of lock nuts 34, 35 holding the same in electrical connection therewith, and as provided with a lock nut 36 for attachment of an electrical conductor. The bracket 33 is clamped against the insulating washer 22 by means of the nut 23 and is thus in electrical connection with the rod 17 and plate 11, but has no electrical connection with plate 10.

When assembled as shown and described the heating element as a whole makes up a unitary structure which may be freely handled without fear of disarrangement of parts, and in which the resistance elements are freely exposed, whereby they may radiate their heat to the turns of a fluid-containing coil in which they may be housed, as shown in my co-pending application, Serial Number 709,902 filed April 29, 1923.

In the form of the device shown in Figs. 3 and 4, the rod 17′ is provided to hold the device in assembly as a unit, while the hooks 25′ are utilized to support and align the openings in the insulating plates 24.

However, in this form of the device the rod 17′ is not utilized as an electrical conductor. The end plate 37 is an insulating plate and carries no plate of conducting material corresponding to plate 10 of Fig. 1.

To connect the resistance coils in series, there are shown binding screws 38, and the ends of the coils 39 are carried through small openings in the plate 37 and the two ends to be connected are clamped by means of the nut 40 on the binding screw. To connect the end elements of the series of resistance coils with the terminal rods 41, 42 there is shown a bar of insulating material 43 mounted upon an extension of the rod 17 by means of a pair of lock nuts 44, and plates of conducting material 45, 46 are carried one at each end of the bar 43. The binding screws to be connected with the plates 45, 46 are so connected by means of strips 47, 48 attached to the plates by means of screws 49, 50, thus placing the resistance coil at each end of the series in electrical conducting relation with the terminal rods 41, 42. These rods will be provided at their upper ends with lock nuts (not shown) corresponding to those at 31, 36 in Fig. 1.

The advantage of the forms of the device shown in Figs. 3 to 6 inclusive is that they may be made much shorter than the form of Figs. 1 and 2, by reason of the fact that the resistors may be placed in series. If it be desired to place series groups of the resistors in parallel with this form of the device the screws 51, 52, 53 and 54 may be utilized for the attachment of the individuals of the parallel groups in addition to the screws 49, 50.

In the form of the device of Figs. 5 and 6, the ends of the resistor coils which are to be placed in series are twisted together, as shown at 55, and the ends of the end coils of the series are attached to the binding screws 56, 57. This form of the device also differs from that of Figs. 3 and 4 by the form of the plates 59, 59 carried by the insulating bar 43′. In this form of the device also additional binding screws 60, 61, 62 and 63 are provided, whereby three groups of series connected resistors may be connected in parallel in conductive relation to the terminal rods 41′ and 42′. The bar 43′ in this case is mounted upon the central rod 17″, which will also carry spacing plates (not shown) corresponding to those at 24 and 24′ already described. The resistors may be placed in series throughout if the device is to be used with a current of high voltage.

Minor changes may be made in the physical embodiment of the invention without departing from its spirit.

I claim:

1. A heating element comprising a supporting and conducting rod, terminal plates mounted upon said rod, perforated plates of insulating material mounted upon said rod, means carried by the rod to hold said plates in fixed relative position of rotation, the perforations in said plates being in alignment, resistance elements in electrical connection with said terminal plates and passing through said aligned perforations, and means for connecting said terminal plates in an electrical circuit.

2. A heating element comprising, in combination, a supporting rod, terminal plates mounted upon said supporting rod, said terminal plates having tapped openings and a wire receiving perforation adjacent each opening, resistance elements having their terminals passed through said perforations, clamping screws engaging said tapped openings and clamping the ends of said resistance elements to said plates, and means to connect said plates in an electrical circuit.

3. A heating element comprising, in combination, a supporting rod, a terminal plate clamped to an end of said rod in electrical connection therewith, a second terminal plate mounted upon the remaining end of said rod and electrically insulated therefrom, an electrical terminal conductively mounted upon the end of said rod adjacent said last named plate, a second electrical terminal electrically connected to said rod, a plurality of insulating spacing plates having aligned perforations and mounted upon said supporting rod, resistance elements passing through said aligned openings and having their ends electrically connected to said plates.

MANUEL D. DOMINGUEZ.