Oct. 11, 1927. 1,645,277

F. J. CID

ELECTRIC WATER HEATER

Filed Feb. 25, 1926 3 Sheets-Sheet 1

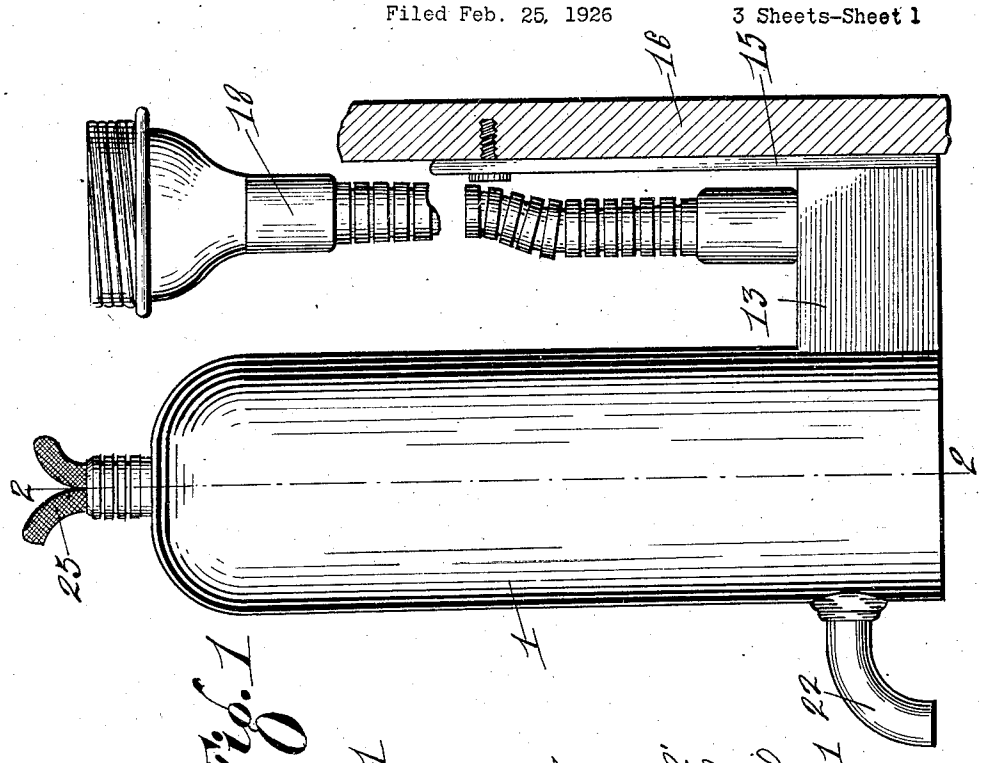


Fig. 1

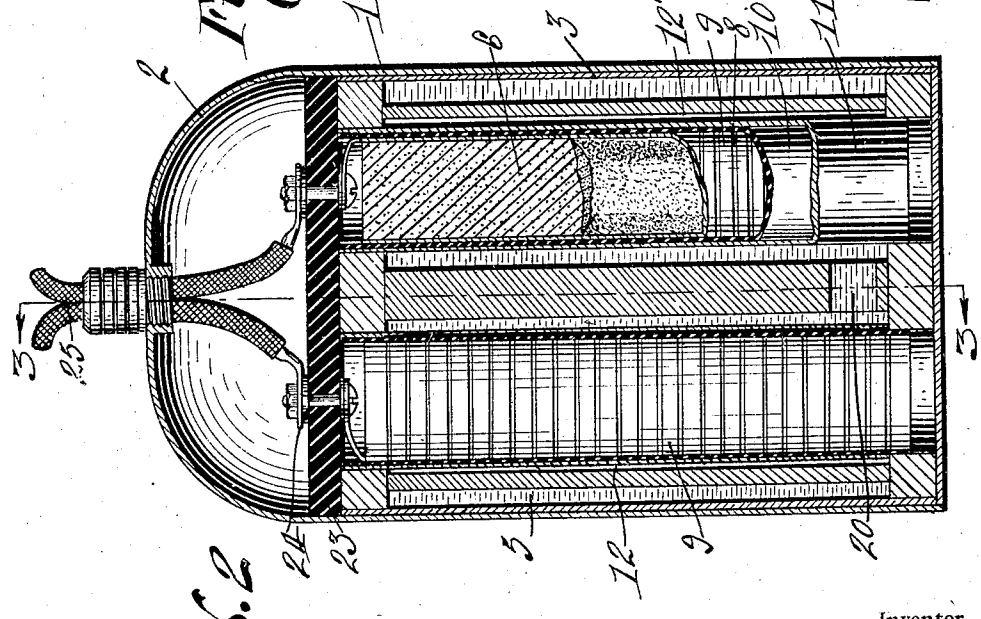


Fig. 2

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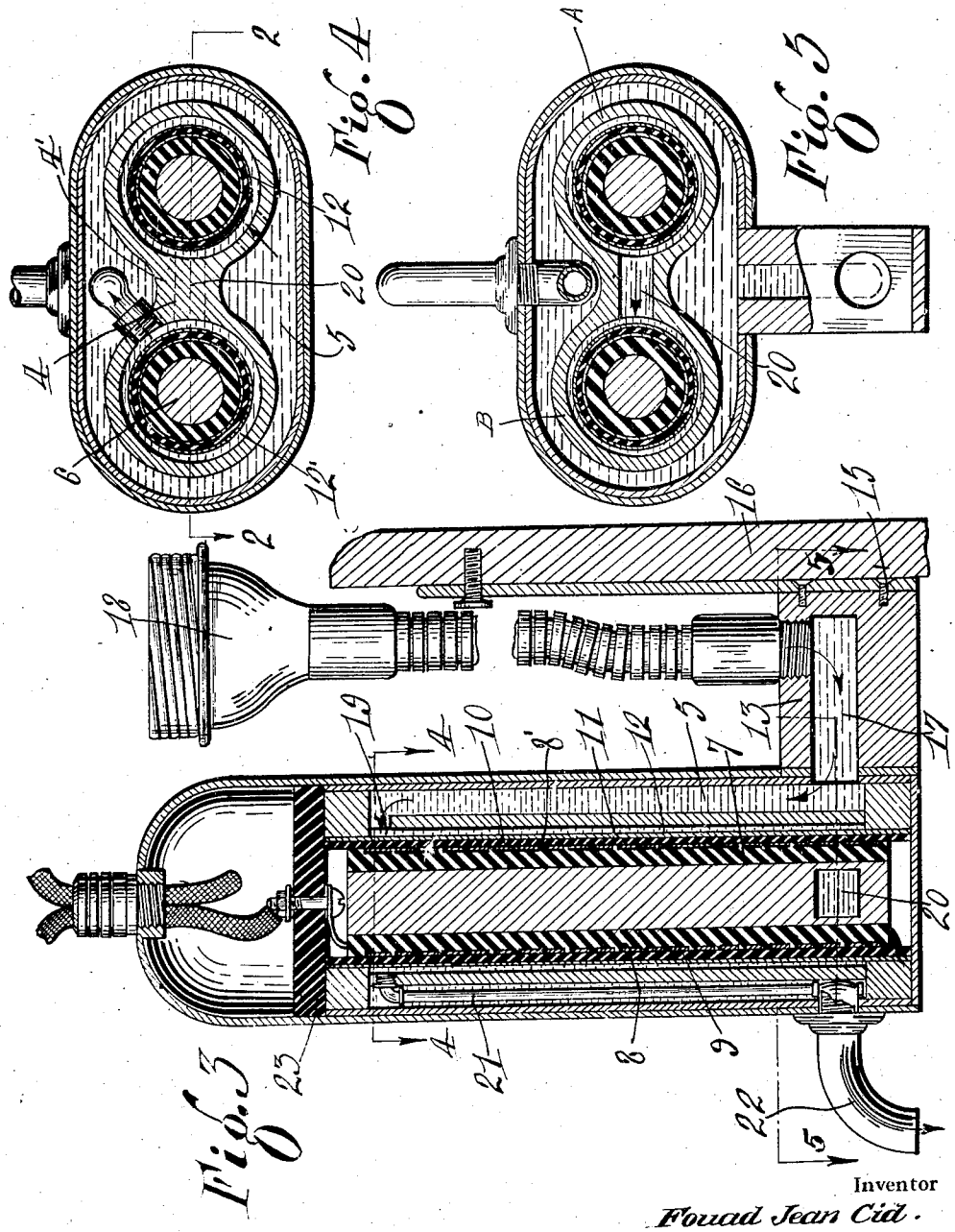
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ELECTRIC WATER HEATER

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ELECTRIC WATER HEATER

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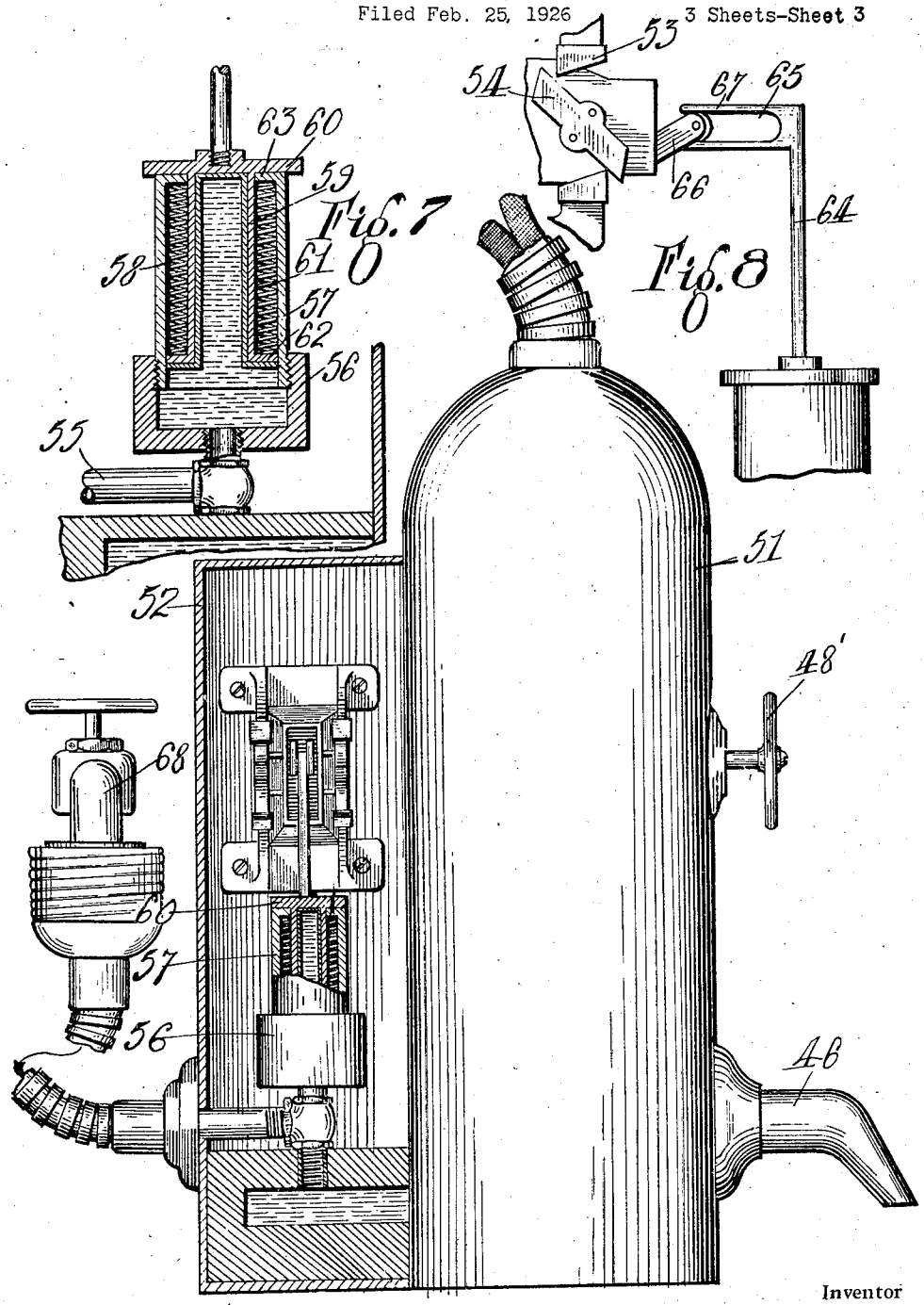


Fig. 7

Fig. 8

Fig. 6.

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UNITED STATES PATENT OFFICE.

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ELECTRIC WATER HEATER.

Application filed February 25, 1926. Serial No. 90,651.

The present invention pertains to novel improvements in electric heaters, and the principal object is the provision of a device of this character constructed of a small number of simple and inexpensive parts and also efficient and reliable in operation.

The device consists essentially of a metallic casing having one or more water spaces formed therein. When two chambers are used, the water which is received from a suitable supply is caused to flow into the upper end of one of the spaces, then to the lower end of the remaining space, and finally through an outlet pipe leading from the upper end of the latter space to the lower part of the casing.

Each chamber preferably contains a carbon rod around which is wound a spiral resistance element embodied in a jacket of lava. This rod has been found in practice to become red hot during operation of the device and so maintain it at a constant uniform temperature.

The invention is fully disclosed in the following description and in the accompanying drawings in which:

Figure 1 is an elevation of a device constructed according to the invention;

Figure 2 is a vertical section on the line 2—2 of Figure 1;

Figure 3 is a vertical section at right angles to Figure 2 and on the line 3—3 of Figure 2;

Figure 4 is a transverse horizontal section on the line 4—4 of Figure 3;

Figure 5 is a similar section on the line 5—5 of Figure 3;

Figure 6 is an elevation of a modified form, partly in section;

Figure 7 is a detail section of the switch actuating device employed in Figure 6; and

Figure 8 is a detail elevation of the switch device.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

The apparatus illustrated in Figures 1 to 5 inclusive comprises an outer casing 1 of substantially oval shape surmounted by a dome 2. The vertical wall of the casing is provided with a heat insulating lining 3 to prevent the escape of heat through the casing.

Within the casing is mounted a core 4 having the form of two cylinders connected by a comparatively small bridge. The core is spaced all around from the inner surface of the lining 3 and thereby forms a water chamber 5 surrounding the entire core. The two cylinders comprised in the core contain separate units of the heating apparatus and are designated as A and B. Since both units are of identical construction except for details which are fully pointed out below, a description of one such unit will suffice.

Each unit has a cylindrical longitudinal opening drilled or cast therein, and this opening contains a carbon rod 6 of such size as to form an annular space with the inner wall of the unit. The rod is surrounded by a jacket 7 of lava, and in the latter is cut a spiral groove 8 which receives a spirally wound resistance element 9. The resistance elements in the two units are connected in series, preferably by forming both windings of a single continuous ribbon. The resistance element is surrounded by a mica insulating sleeve 10 which engages the ribs 8′ constituting the walls of the groove 8. Finally, the sleeve is surrounded by a metal tube 11, and the sleeves of the two units form annular water spaces 12 and 12′ with the inner walls of the cylindrical openings in which they are placed.

To the lower end of the casing 1 is secured a block 13 which carries a bracket 15 by means of which the entire device may be supported on a wall 16 or the like. In the block 13 is cut a water passage 17 which communicates with the water space 5. A pipe 18 leading from a source of water supply is connected to the passage 17 as clearly illustrated in Figure 1.

The upper end of the core 4 is formed with a water admission duct 19 in the wall of unit A so that the water chamber 5 is brought into communication with the annular water space 12. The bridge 4′ of the core 4 has a duct 20 formed in its base to establish communication between the water spaces 12 and 12′ at their lower ends. The space 12′ is connected at its upper end to an outlet pipe 21 which passes through the chamber 5 and communicates with an outlet cock 22 threaded into the casing as clearly shown in Figure 3.

Over the units A and B and at the base of the dome 2 is mounted a cover plate 23

of insulating material as clearly illustrated in Figures 2 and 3. The ends of the resistance elements 9 are connected to binding posts 24 passed through the plate 23. A pair of conductors 25 leading from a source of electrical energy are connected to the binding posts, whereby a circuit is completed for the supply of current to the resistance element. In the operation of the device as thus far described, the water entering the lower end of the chamber 5 through the passage 17 is forced to rise until it flows through the duct 19 into the annular water space 12 of unit A. On reaching the bottom of this space, the water flows through the duct 20 and to the bottom of the annular water space 12′ of unit B. The water rises to the top of the latter space and then down through the pipe 21 to the outlet cock 22. In its passage down the space 12 and up the space 12′, the water is heated by its contact with the metal sleeves 11 which in turn are heated by the resistance elements 9.

In the embodiment illustrated in Figure 6, the casing 51 also has an extension 52 in which the switch device is mounted. The switch mechanism consists however in this case of an apparatus controlled by the pressure of the entering water. The conductors leading to the ends of the resistance elements are provided with spaced contacts 53. To the water inlet pipe 55 is connected a cup 56 into which is threaded a cylinder 57 open at both ends. The cylinder contains a hollow piston 58 adapted to receive water from the cup 56. The cylinder is surrounded by a sleeve 59 carrying at its other end a cap 60 which lies over the top of the cylinder 57. In the annular space formed by the cylinder and sleeve are mounted a plurality of springs 61 which engage a flange 62 at the lower end of the sleeve and a flange 63 at the upper end of the cylinder. To the cap 60 is attached an upright rod 64 having a fork 65 extending perpendicularly therefrom. An arm 66 is connected to the switch blades and carries a pulley 67 which is slidable within the fork 65. The admission pipe 55 is controllable by a valve 68 inserted therein at an exterior point as shown in Figure 8. When this valve is opened, water is admitted to the cup 56, and the piston 58 is raised by water pressure. This movement is transmitted to the blades 54 through the mechanism 64—67, and the circuit through the conductors is completed. When the water within the apparatus has been heated to the desired temperature, the valve handle 48′ is turned to admit a flow of water through the nozzle 46.

While specific embodiments of the invention have been illustrated and described, it is to be understood that various alterations in the details of construction may be made without departing from the spirit of the invention as indicated by the appended claims.

Having thus fully described the invention, what I claim as new and desire to protect by Letters Patent is:

1. An electric heater comprising a casing, a core contained in the casing and having a pair of water spaces formed therein, refractory tubes disposed in said spaces, resistance elements wound around said tubes fluid inlet means extending to one of said spaces, fluid outlet means extending from the remaining space, said core being formed with a duct connecting the two water spaces.

2. An electric heater comprising a casing, a core contained in the casing having a pair of water spaces formed therein, resistance elements disposed in said spaces, water inlet means communicating with the end of one of said water spaces, water outlet means extending from the end of the remaining water space, said core being formed with a duct connecting the two water spaces at their ends.

3. An electric heater comprising a casing, a core contained in the casing and having a pair of water spaces formed therein, refractory tubes disposed in said spaces, resistance elements wound around said tubes, insulating sleeves separating the resistance elements from the water spaces, fluid inlet means extending to one of said spaces, fluid outlet means extending from the remaining space, said core being formed with a duct connecting the two water spaces.

4. An electric heater comprising a casing, a pair of resistance elements mounted within said casing and each comprising a refractory tube, a resistance conductor wound on said tube, an insulating cover surrounding said resistance conductor and a metallic tubular protecting casing surrounding said insulating cover and closed at its opposite ends against the ingress of liquid, and a pair of water jackets surrounding each of said resistance elements and in spaced relation thereto, one of said jackets having a water inlet at one end thereof, the other of said jackets having a water outlet at the corresponding end and the opposite ends of both of said jackets being in liquid communication with one another.

5. An electric heater comprising a resistance element including a cylindrical support of refractory material, a resistance conductor wound upon said support, an insulating covering surrounding and enclosing said resistance conductor and a tubular protective jacket surrounding said resistance element and closed at both ends against the ingress of liquid, a water jacket surrounding said protector and in spaced relation thereto and having an inlet for the water at one end thereof and an outlet therefor at the other end thereof and a second water jacket surrounding said first mentioned water jacket and in spaced relation thereto.

6. An electric heater comprising a resistance element, a tubular insulating covering surrounding said resistance element, a tubular protective casing surrounding said insulating tube and closed at both ends against liquid ingress, a water jacket surrounding said protective casing and spaced apart therefrom and having a water inlet at one end and a water outlet at the other end and a second water jacket surrounding said first mentioned water jacket in spaced relation thereto and having an inlet and an outlet therein, said outlet of the second mentioned jacket communicating with the outlet of said first mentioned jacket.

7. An electric heater comprising a resistance unit, a tubular insulating covering surrounding said resistance unit, a tubular protective casing surrounding said cover and closed at each end against ingress of liquid, a water jacket surrounding said protective casing and in spaced relation thereto, an inlet at one end of said water jacket and an outlet at the other end of said jacket, a second water jacket surrounding said first mentioned water jacket and in spaced relation thereto having an inlet at an end opposite the inlet of said first mentioned water jacket and having an outlet communicating with the outlet of said first mentioned water jacket.

8. An electric heater comprising a pair of resistance elements, a tubular insulating covering surrounding each of said elements, a second tubular enclosing casing surrounding said insulating covering and closed at each end against the ingress of water, a water jacket surrounding each of said protective casings and in spaced relation thereto, one of said water jackets having an inlet at one end and the other having an outlet at the corresponding end and said jackets communicating with one another at the opposite ends and a water jacket surrounding both of said first mentioned water jackets and having an inlet at one end and an outlet communicating with the outlet in the water jacket.

9. An electric water heater comprising a pair of heating units each including a tubular support of refractory material, a resistance conductor wound upon said support, a tubular insulating casing surrounding said conductor and a tubular protective casing surrounding said insulating casing and closed at both ends against the ingress of liquid, a water jacket surrounding each of said heating units and in spaced relation to said protective casings, said water jackets communicating with one another and a second water jacket surrounding at least a part of both of said first mentioned jackets and communicating therewith.

In witness whereof I have hereunto set my hand.

FOUAD JEAN CID.