A. P. NICHOLS.

ELECTRICAL WATER HEATER.

APPLICATION FILED JUNE 24, 1911.

1,056,205.

Patented Mar. 18, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

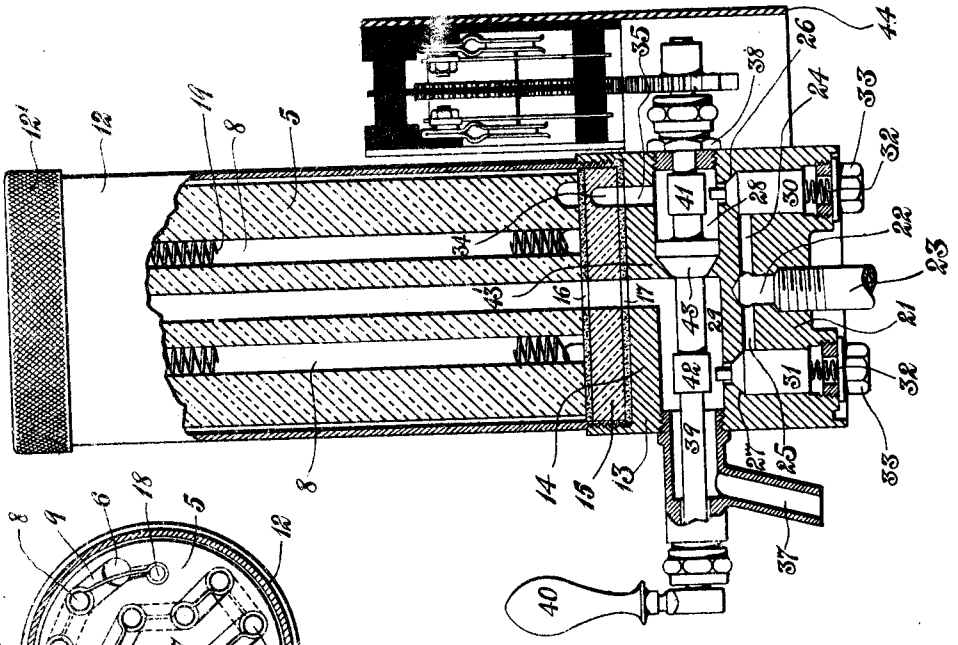


Fig. 5.

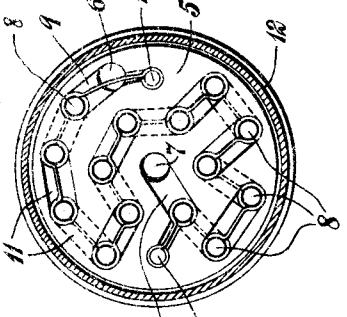
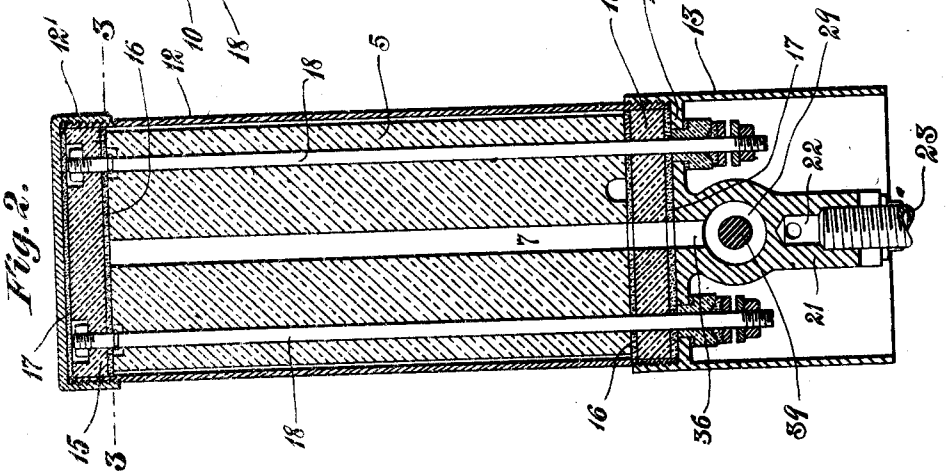


Fig. 2.



Witnesses:

L. L. Markel

L. O. Greenough

Inventor:

Andrew P. Nichols

By his Attorneys,

Bakewell & Anderson

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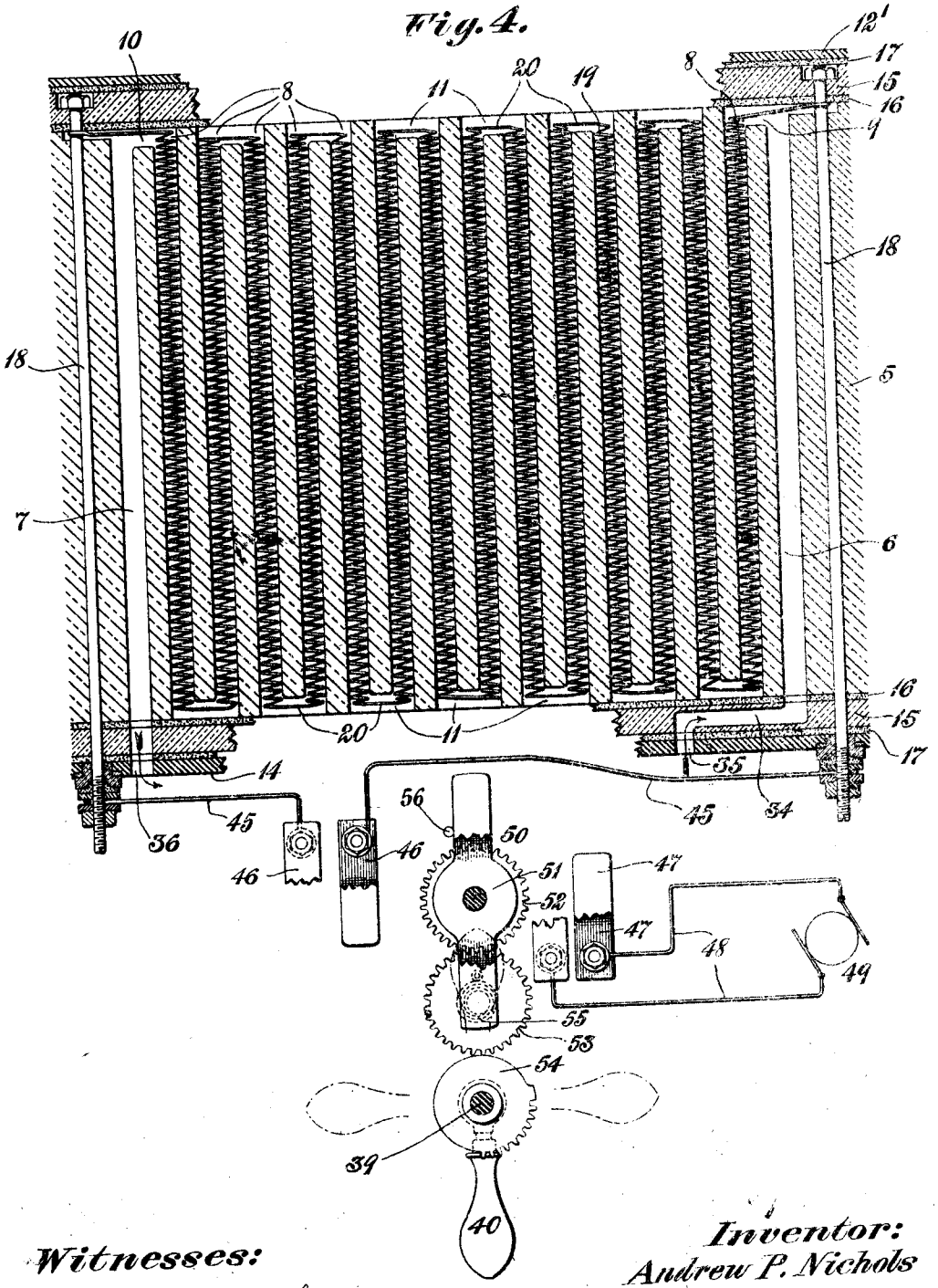
2 SHEETS—SHEET 2.

Fig. 4.



Witnesses:

L. L. Markel

S. C. Greenough

Inventor:

Andrew P. Nichols

By his Attorneys

Sutherland & Anderson

UNITED STATES PATENT OFFICE.

ANDREW P. NICHOLS, OF SEATTLE, WASHINGTON.

ELECTRICAL WATER-HEATER.

1,056,205. Specification of Letters Patent. Patented Mar. 18, 1913.

Application filed June 24, 1911. Serial No. 635,174.

To all whom it may concern:

Be it known that I, ANDREW P. NICHOLS, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Electrical Water-Heaters, of which the following is a specification.

This invention relates to electrical water heaters, the object of the invention being to provide a compact appliance of this character by which water can be quickly and effectively heated.

In the drawings accompanying and forming part of the present specification I show in detail one convenient form of embodiment of the invention which to enable those skilled in the art to practice said invention will be set forth fully in the following description, while the novelty of the invention will be included in the claims succeeding said description. From this observation it will be apparent that I do not restrict myself to such showing; I may depart therefrom in several respects within the scope of my invention covered in said claims.

Referring to said drawings, Figure 1 is a sectional side elevation of an electrical water heater including my invention. Fig. 2 is a transverse sectional view of said heater. Fig. 3 is a horizontal section on the line 3—3 of Fig. 2, and, Fig. 4 is a sectional diagrammatic view.

Like characters refer to like parts throughout the several figures of the drawings.

The device preferably embodies in its construction a member having means for the passage of water, and while this member may vary radically as to material and shape, it is preferably made from some suitable non-conducting or insulating material such as porcelain. A member such as satisfactorily answers my requirements, is that denoted in a general way by 5, being shown as cylindrical. While the non-conducting member 5 may be disposed in any suitable way it is generally set vertically, and it is shown as having two ducts 6 and 7 extending longitudinally thereof, the duct 6 constituting what might be considered an inlet duct, while the duct 7 presents an outlet duct. In addition to these ducts the member 5 has other ducts 8 of which there may be any suitable number. There is practically no difference in construction between the ducts 6, 7 and 8. In the present case and as will hereinafter appear, however, the ducts 8 are adapted to receive bends or coils of a resistance member, while such coils do not fit in said ducts 6 and 7. The duct 6 is connected with the first or adjacent duct 8 by a channel or groove 9 located in the top of the non-conducting member 5, while the final duct 8 is connected with the adjacent duct 7 by a groove 10 also formed in the top of said body. The ends of the remaining ducts 8 are connected by grooves all denoted by 11 disposed in alternation in the top and bottom of said member 5, and by reason of this construction a tortuous or serpentine course is provided for the water to be heated, the water, as will hereinafter appear, initially entering the member 5 at the lower end of the duct 6 and leaving said member 5 at the lower end of the duct 7. The ducts 6 and 7 and 8 are preferably in parallelism and with their connecting channels present a tortuous passage of which said ducts present branches. Said ducts, as will be seen, are located at different distances from the axis of the member 5.

Surrounding the member 5 is a casing 12 which is generally, although not necessarily, made of metal, the casing extending above the upper end of the porcelain member 5 and having as a matter of convenience the removable screw cap 12′. The lower end of said casing 12 extends below the porcelain member 5 and has a removable shell 13 threaded thereto provided interiorly thereof with a flange or partition 14. Fitted within the casing 12 are the plates each denoted by 15 and which are usually, although not essentially, made of disks of some insulating material as porcelain. Between the two plates 15 and the porcelain member 5 I may interpose packings 16 while similar packings 17 may be located between the upper plate 15 and the cap 12′ and between the lower plate 15 and the flange 14. The two plates 15, the flange 14 and the porcelain body 5 are preferably tied or rigidly con-

nected together, and for this purpose the tie rods or bolts 18 may be utilized, the bolts extending through registering openings in the several parts. In addition to the tying function, the bolts also serve as binding posts as will hereinafter appear.

For the purpose of heating the water in its passage through the porcelain member 5 I prefer to provide a resistance device such as that denoted in a general way by 19. The two outermost coils or bends of this resistance device 19 are located in the first and last of the ducts 8, it being remembered that the ducts 6 and 7 preferably do not contain such whorls. As will be understood the ducts 6 and 7 do not contain coils of the resistance member 19, but the ducts 8 do. Naturally the ducts 6 and 7 when the valves 30 and 31 are closed are free of water. The ducts 8, however, contain a constant supply of water acting practically in this respect as traps. The water, therefore, constantly covers the resistance device 19, and owing to this condition said resistance device is prevented from being burned out when the current is turned on. The whorls of the resistance coil are connected by transverse portions 20 which lie in the respective connecting grooves 11, to which reference has already been made. The terminals of the resistance coil 19 are as shown in Fig. 4 connected with the upper ends of the binding posts or tie rods 18. The flange 14 is provided with the pendent valve body 21, the two parts generally being integral, and this pendent body or casing 21 has an opening 22 in which the water supply pipe 23 is tapped. Leading oppositely from the opening 22 are channels 24 and 25 which are connected by ports 26 and 27 with the chambers 28 and 29 formed in the pendent body 21 all as best indicated in Fig. 1. Conforming to the ports 26 and 27 are valves 30 and 31 which are of plug and tapered type and which, therefore, do not need to be further specifically described. The two valves 30 and 31 are normally held in their closed position by springs each designated by 32 and bearing respectively against nuts 33 tapped into the lower part of the pendent body 21. The two valves 30 and 31 in the present case are opened by being thrust downward, and the means for opening the said valves will be hereinafter described. It will be evident that when the tapered portion of the valve 30 is moved below the channel 24, water can flow from said channel by way of the port 26, into the chamber 28, and the same statement applies with respect to the valve 31 and chamber 29. The amount of water to be delivered can be gaged by the degree of movement of the two valves which are alternately opened. In the lower plate 15 is a channel 34, the outer or lower end of which is in register with a port 35 extending through the flange 14 and lowermost packing 17, while the outer or upper end of said channel 34 is connected with the lower end of the duct 6 already described. The lower end of the duct 7 is connected by a port 36 with the chamber 29. When the valve 30 is opened, water will flow from the channel 24 to the chamber 28 by way of the port 26 passing through the port 35 into the channel 34 from thence into the duct 6. Such water will then traverse the communicating ducts 8 and channels 11 and leaving the last duct 8 will flow into the duct 7 by way of the groove 10 passing from the lower end of said duct 7 into the chamber 29 by way of the port 36 and out the faucet 37 for consumption. It will be assumed at this time that current is traversing the coils of the resistance member 19, and owing to this condition the water as it flows through the ducts 8 will be heated by said coils. On opening the valve 31, water from the channel 25 can flow directly into the chamber 29 and from the latter through the faucet 37, and in this latter case the water is not brought into contact with the whorls of the resistance device 19 and is therefore not heated.

Supported by the faucet 37 and also by a plug 38 threaded into the rear part of the pendent body 21 is a spindle or stem 39, and to this stem or spindle as will hereinafter appear, is connected switch-operating mechanism for closing and opening an electric circuit. This stem is also provided with an operating handle or lever 40 by which the same can be conveniently operated. In addition to this it also has cams 41 and 42, the cam 41 being adapted to open the valve 30 while the cam 42 is adapted to open the valve 31. To prevent water passing from the chamber 28 directly into the chamber 29 without taking the circuitous course to which I have already referred, the stem 39 may be provided with a tapered valve 43 constantly held against a seat in the partition or wall 43' separating the chambers 28 and 29. The chamber 29 is in constant and uninterrupted communication at all times with the discharge duct 7 and as the latter is in direct communication with the atmosphere explosions are impossible.

As will be inferred from what has already been stated, the device in practice involves a switch, and as the switch and its adjuncts, do not constitute a part of the present invention, they are not illustrated and described in detail. They are, however, partially shown and will be briefly described.

Fastened in some suitable manner to the rear part of the shell 13 is a casing 44 which contains the switch mechanism and certain

other electrical connections. From the lower ends of the rods 18 the wires 45 extend being connected within the casing 14 to terminals 46 generally made in the form of clips, and which coöperate with clips 47 also located in said casing 44 and which are wired or otherwise connected by wiring denoted in a general way by 48 with a suitable source of electrical current which may be a dynamo 49. The switch which coöperates with the two sets of contacts 46 and 47 is denoted in a general way by 50, being of the double armed construction and being rigidly fastened to the shaft 51 mounted in the casing 44. Said shaft also rigidly carries a spur gear 52 in mesh with a practically similar spur gear 53 and coöperative with a mutilated pinion or segment 54, fastened to the stem 39. The shaft of the lower gear 53 is surrounded by a coiled spring 55, the function of which is always positively to move the switch 50 to its circuit-breaking position at which time it bears against a stop 56 in the casing 44 as indicated in Fig. 4. As intimated the resistance circuit is shown broken in Fig. 4, the handle or lever 40 at this time being in its downward position, both valves 30 and 31 being closed. To secure a flow of cold water, the handle 40 is swung up to the dotted line position to the left in Fig. 4, and on this motion the teeth of the mutilated pinion or segment 54 will not be brought into mesh with the spur gear 53. The valve 31, however, will be opened by the cam 42 so as to obtain a supply of cold water. The parts are so proportioned that the said handle or lever 40 can be moved to its upper vertical position without bringing the teeth of the mutilated pinion or segment 54 into mesh with those of the spur gear 53, and I might add that when said handle is in said upper position, the active part of the cam 42 will have passed out of engagement with the valve 31 whereby the latter will be closed. To obtain a supply of hot water the handle 40 will be swung over to the dotted line position to the right in Fig. 4 and during this action the teeth of the mutilated pinion or segment 54 will be brought into mesh with the spur gear 53 thereby turning said spur gear 53, the latter consequently turning the spur gear 52 so as to cause the branches or arms of the switch 50 to bridge the two sets of contacts 46 and 47, and thereby cause the current to traverse the whorls of the resistance member 19 and hence heat the water, it being understood that when the switch is thrown to its circuit closing position, the cam 41 will open the valve 30. To cut off the supply of hot water, the lever or handle 41 will be returned to either of the other described positions and during the reverse motion of said lever, the switch 50 by the described gearing, is returned to its circuit opening position. In case there should be any drag from any cause, the spring 55 will positively move said switch to its ineffective or circuit breaking position.

What I claim is:

1. An electrical water heater comprising a member having ducts, and channels connecting said ducts to collectively present a tortuous water passage, one part of the passage being normally free of water and another part normally containing water, and a resistance device having parts fitted in the normal water containing part of said passage.

2. An electrical water heater comprising a member having a tortuous water passage, one part of which is normally free of water, and another part of which is normally supplied with water, and a resistance device, parts of which are disposed in the normal water containing part of the passage, the other part of said passage being free of the resistance device.

3. An electrical water heater comprising a member having ducts and channels connecting said ducts and presenting collectively a tortuous water passage, one of the ducts constituting a supply duct, and the other an outlet duct, and a resistance device having coils fitted in the ducts between the supply and outlet ducts, said supply and outlet ducts being free of said coils.

4. An electrical water heater comprising a member having a tortuous water passage, plates operatively associated with said member, tie rods for tying together the plates and member and constituting binding posts, and a resistance device in said tortuous passage electrically connected with said rods.

5. An electrical water heater comprising a plurality of members, tie rods connecting said members together and constituting binding posts, one of the members having a tortuous water passage, and a resistance device disposed in the passage and electrically connected with said rods.

6. An electrical water heater comprising an integral, non-conducting body having a series of longitudinally extending ducts and also having transverse channels connecting the ends of said ducts to present a tortuous passage, and a resistance device having coils and connecting portions, the coils being located in said ducts and the connecting portions being disposed in said channels.

7. An electrical water heater comprising an integral, non-conducting body having a series of longitudinally extending ducts and also having transverse channels connecting said ducts to present collectively a tortuous water passage, a resistance device having coils, and connecting portions, the coils being disposed in said ducts and the connecting

portions in said channels, disks at the ends of said body, one of the disks having supply and discharge ports in communication with two of the ducts, and tie rods uniting said body and disks, the terminals of the resistance device being electrically connected with said tie rods.

In testimony whereof I affix my signature in presence of two witnesses.

ANDREW P. NICHOLS.

Witnesses:
F. E. ANDERSON,
HEATH SUTHERLAND.