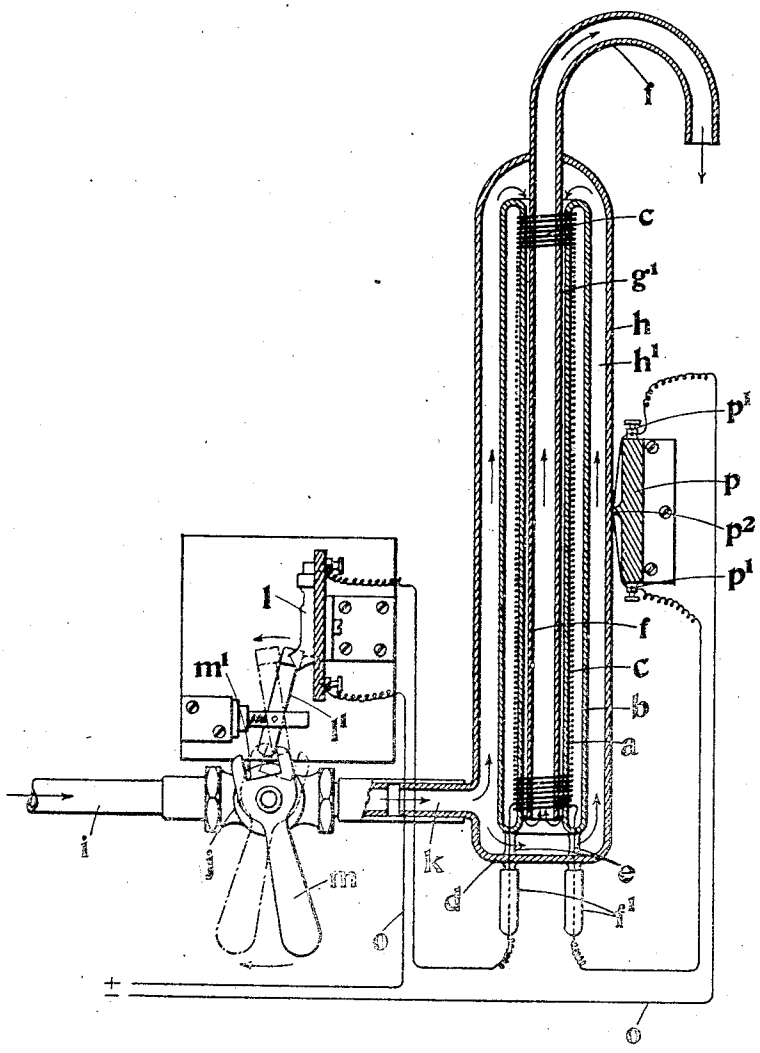
J. R. QUAIN.

ELECTRIC WATER HEATER OR GEYSER.

APPLICATION FILED JULY 11, 1914.

1,174,443. Patented Mar. 7, 1916.



Witnesses—

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UNITED STATES PATENT OFFICE.

JOHN ROBERT QUAIN, OF LONDON, ENGLAND.

ELECTRIC WATER-HEATER OR GEYSER.

1,174,443. Specification of Letters Patent. Patented Mar. 7, 1916.

Application filed July 11, 1914. Serial No. 850,469.

To all whom it may concern:

Be it known that I, JOHN ROBERT QUAIN, a subject of the King of Great Britain and Ireland, residing at 17 Victoria street, London, S. W., England, have invented certain new and useful Improvements Relating to Electric Water-Heaters or Geysers, of which the following is a specification.

This invention relates to electric water heaters or geysers and has for its object to provide such a heater with the resistance completely inclosed and supported within a casing of silica.

The invention has also for its object to provide a connected water tap and switch, by means of which the water may be first admitted before the current is passed through the heater, the tap having also an independent movement by means of which, after the switch has been closed, the supply of water may be partially cut off with a view to regulate the passage of water through the heater and thus the degree to which the water may be heated.

The invention has furthermore for its object to provide a fuse, which is adapted to be burned out on an excessive rise of temperature in the heater due to an excessive current passing through, or to other causes.

The invention comprises the construction which is hereinafter described.

The invention is illustrated in the accompanying drawing, which represents diagrammatically a heater provided according to the invention.

In carrying the invention into effect I provide the resistance element of a tubular form, of silica, that is to say, of a central tube *a*, around which is wound the resistance *c*, advantageously a metallic filament, such as molybdenum, or nickel chrome, and I surround the tube *a* with a tube *b* of greater diameter. I advantageously fuse the edges of the respective silica tubes *a* and *b* together so as thus to form a space completely inclosed for the resistance, wherein a vacuum or inert gas may be maintained, current being led to the filament through integrally fixed silica tubes *e*, which are provided with seals of lead or mercury and are fitted with metal caps f^1, which may be adapted to be fitted within corresponding sockets or to be otherwise connected in a suitable fitting.

The heater element *a b* thus constituted is closed at the bottom by an integral base of silica *d* and it is completely inclosed by means of a casing *h* which is advantageously also made of silica, the casing *h* being so disposed as to leave a uniform annular space h^1 surrounding the element.

An outlet pipe *f* is advantageously provided which protrudes within the central hole in the element to a distance short of the base *d*, the outlet tube *f* being so positioned as to leave a narrow and uniform annular space g^1 between its outer surface and the bore of the element. The outlet tube *f* is advantageously fused to the upper part of the casing *h* and the element may be secured in a fixed position within the casing *h* by fusing the tubes *e* within the lower wall of the casing *h* in the manner indicated. The upper extremity of the outlet tube *f* is so shaped as to direct the stream of water downwardly.

In operation it will be understood that the water to be heated enters from the service pipe *i* through the tap *j* and through the inlet tube *k* into the lower part of the casing *h*. The water passes upwardly through the casing *h* and then passes downwardly through the annular space g^1 between the outlet tube *f* and the inner bore of the heating element, and thence passes upwardly through the outlet tube *f* and is discharged. By such means the heating element *a b* is completely surrounded by the water to be heated, and the water flows on the exterior as well as in the interior of the element. Furthermore the disposition of the outlet tube *f* within the element *a b* permits of a thin film of water passing in contact with the inner wall or support *a* of the element and the water may in thus passing through in a thin film be effectively heated to any desired degree according to the rate at which the water passes through the apparatus.

I provide in connection with the water tap *j* a switch *l*. For this purpose I provide the handle *m* of the water tap *j* with a slot m^1 at its extremity to engage the end of the switch arm or lever l^1. By such means the electric circuit *o*, through which current is passed through the resistance *c* of the heating element *a b*, is maintained closed in all positions of the handle *m* in which the flow of water is permitted, while on the flow being completely cut off the circuit is at once broken. It will, however, be understood that the connection between the handle *m* and the switch arm or lever l^1 is such that

the handle has an independent movement by which after the switch has been closed the supply of water may be partially cut off with a view to regulate the rate of passage of water through the apparatus and thus the degree to which the water may be heated.

I mount in the electric circuit o of the heater a fuse p disposed in position on the side of the casing h. The fuse wire is suitably carried by contact screws p^1, p^1 and is so supported in a central position at p^2 that a part of the fuse wire touches the casing h. The fuse is advantageously completely inclosed so that access can be obtained thereto for the renewal of the fuse wire.

It will be understood that such a heater may be disposed vertically and that the flow of water may thus take place upwardly so that under the normal conditions the apparatus is filled with water. Should the temperature of the heating element be raised to an excessive degree, the wire is fused so that thus the passage of current through the apparatus is discontinued. By such means the possibility of accidents or inconvenience in the use of the apparatus through excessive heating is avoided.

It will be understood that any number of heating elements may be provided and of any suitable form and that the resistance wire may be arranged thereon in any convenient way. The space through which the water flows may thus have any suitable section or shape, for example, the section may be oblong or may be of circular or other shape.

What I claim as my invention and desire to secure by Letters Patent is:—

An electric liquid or water heater, comprising a resistance element of tubular form having a central bore and having an annular space within the element within which the resistance lies free of air, the central bore being closed at one end, a casing in which the said resistance element is mounted to leave between the casing and the said element an intervening annular space surrounding it, an inlet pipe for the admission into the said annular space of the liquid to be heated, and an outlet pipe extending inwardly into the central hole in the said element to a position near the closed end thereof, substantially as described.

In testimony whereof I have hereunto signed my name to this specification in the presence of two subscribing witnesses.

JOHN ROBERT QUAIN.

Witnesses:
ROBERT OWEN HUGHES,
O. J. WORTH.