

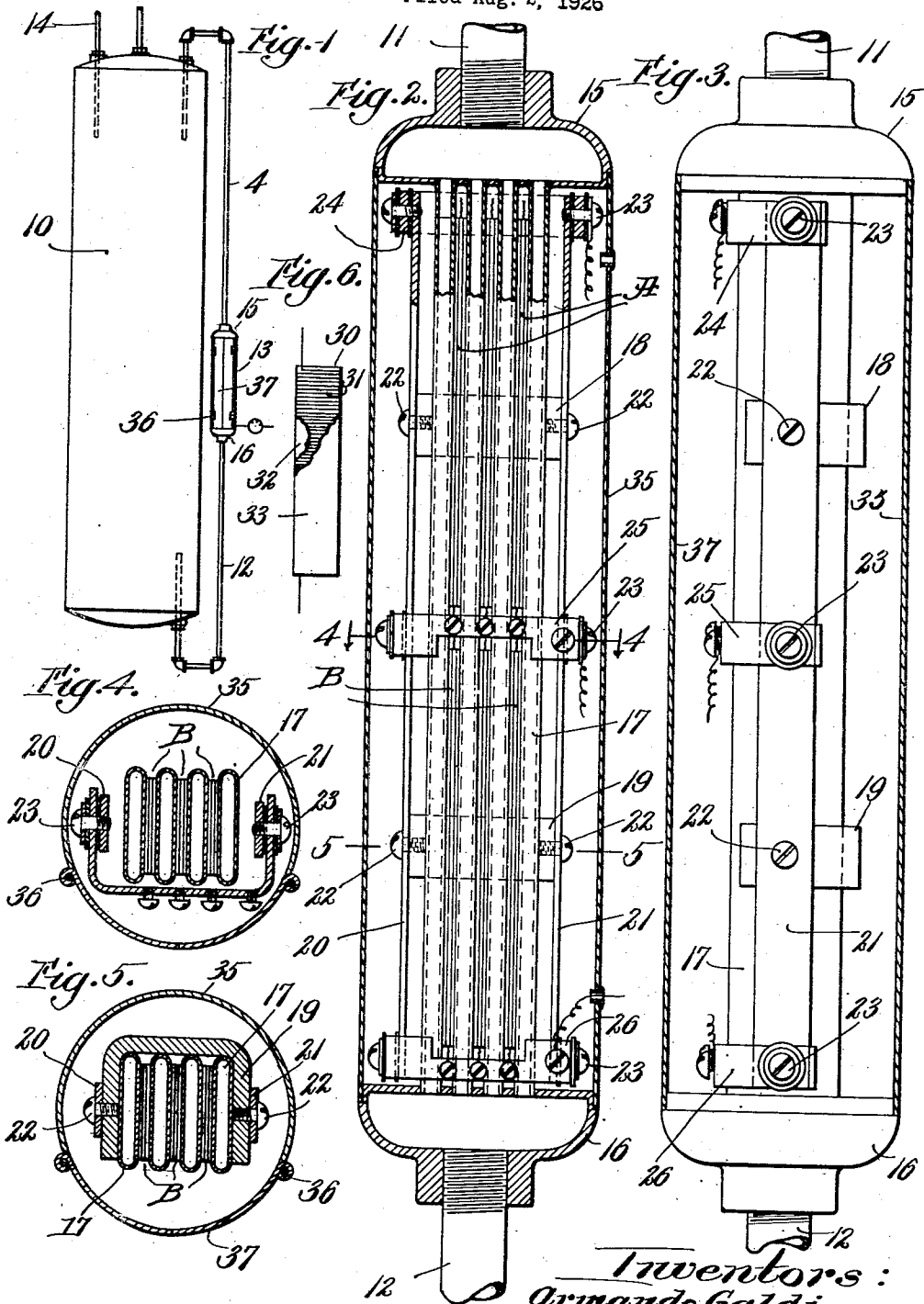
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WATER HEATER

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UNITED STATES PATENT OFFICE.

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WATER HEATER.

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This invention relates to means for heating water, and more particularly to means for electrically heating water for domestic purposes.

5 It is an object of the invention to produce a neat appearing compact heating device at moderate cost which is attachable to existing boilers or water containers.

10 It is a further object of the invention to produce an electrical heating device with a plurality of heating units which are arranged to closely contact with water containers but which are removable therefrom for the purpose of repair or the substitution
15 of new units for old or burned out units.

Another object of the invention is to so arrange the heating units with respect to the heater in general, that in the event that replacement of units is necessary they may
20 be quickly replaced by a person of average intelligence or mechanical or electrical skill without employing the services of a plumber as the arrangement is such that it is not necessary to dismantle the heater or to shut
25 off the water supply during the replacement of the units.

It is an object of the invention to so arrange the heating units with respect to the water tubes or containers as to present to
30 the containers the maximum of heat transmitting surface consistent with the construction thereof, to thereby gain in heating efficiency and to prolong the life of the heating elements or units by rapid conduction of the
35 heat to the tubes.

A still further object of the invention is to produce a heater of the above class having a plurality of heating units therein of such
40 arrangement that the absence of one or more units or the inability thereof to function need not prevent the heater in general from performing at least a part of its function even though the time required to heat a given
45 quantity of water may be somewhat longer according to the unit or number of units absent or inoperative.

Other objects of the invention will be fully understood from a description of the drawing and the claims hereinafter given.

50 Of the drawing.

Figure 1 represents a view of a domestic boiler having the invention applied thereto.

Figure 2 is an enlarged view of the heating device partially broken away and partially
55 in section.

Figure 3 is a side view of the heater shown in Figure 2 the casing being shown in section for clearness.

Figure 4 is a section on the line 4—4 Figure 2.

Figure 5 is a section on the line 5—5 Figure 2.

Figure 6 is a side elevation in reduced scale of one of the heating elements or units a portion being broken away.

Like characters represent like parts throughout the several figures of the drawing.

Referring to the drawing.

The drawing herewith illustrates the invention in one of the many forms in which it may be used, and for the purpose of explanation it is shown herein as applied to a boiler such as is commonly used in households for heating water for domestic purposes.

It will be understood however that it is not the intention to limit the invention to the precise construction and arrangement shown as changes might be made therein without departing from its spirit and scope.

In the present instance the invention is applied to a well known house boiler or tank 10 which is or may be provided with the usual supply and draft pipes and which has the circulation pipes 11 and 12 coupled together by the heater 13 so that the water passing through the heater will be drawn from the bottom of the boiler and discharged into the top thereof to be drawn upon as wanted through the pipe 14.

The heater proper comprises an upper and a lower manifold or hollow head 15 and 16, respectively, whose interior chambers are connected by a row of parallel flat tubes 17, the number, size and length of which depending upon the capacity required of the heater.

The tubes 17 are arranged in spaced relation so as to enable the insertion of heating units between them as will be presently explained.

Partially surrounding the tubes 17 and frictionally held thereto are the clips 18 and 19 to which are secured the longitudinal bars 20 and 21 by means of the screws 22.

Secured to the bars 20 and 21 by the screws 23, and insulated therefrom, are the yoke members 24, 25 and 26 which serve to receive the screws or other means by which the

wires leading from the heating units are secured to the yokes.

It is preferred to arrange the heating units in two or more banks or series A and B and for the sake of explanation two banks are shown herein so that each unit of the upper series has one end of its wire secured to the yoke 24 and the other end secured to the yoke 25, while each unit of the lower series has one end of its wire secured to the yoke 25 and the other end secured to the yoke 26.

It will also be understood that one bank or series may be of greater or less resistance than the other by which arrangement three heats may be obtained by the use of a well known switch S indicated in Figure 1 of the drawing, arranged to cut in either the high or the low resistance unit or both together to get the maximum heat or capacity.

The said units are of simple structure being composed of a central slab of suitable insulating material 30 preferably mica, which is wound with a resistance wire or ribbon 31, and two slabs of insulating material 32 and 33 arranged one each side of the central slab, the said slabs being secured together in any suitable manner.

The resistance wire or ribbon 31 of each unit is arranged to extend therefrom so that its ends may be connected to the proper yokes.

These units are of such a width depth and length as to permit them to be inserted in the space between the tubes 17 and to fit snugly therein with their side slabs in close contact with the tubes so that the greatest possible heat transmitting surface may be presented to the tubes.

It will be understood that it is preferred that the heating units shall be held in place frictionally so that they may be easily removed one at a time without the use of instruments or tools other than a screw driver with which to loosen the screws securing the ends of the resistance wire to the yokes.

Surrounding the tubes 17 is the casing 35 a portion of which may be permanently attached to the heads 15 and 16 and having the front portion hinged at 36 to form a door 37 as a means of access to the interior thereof when it becomes necessary to repair or replace the heating units. As will be clear the casing 35—37 constitutes a cylindrical jacket, closed at its ends by the manifolds 15 and 16, said jacket serving with the manifolds to inclose the tubes and heating units so as to confine the air immediately surrounding the latter and thereby prevent the heat from the units being dissipated through being carried off by air circulation.

It is not known that a water heater has ever been used wherein water conduits, containers or tubes were permanently interposed between the ends of a circulation pipe, and wherein the heating units were in con-

tact with the tubes and in such manner as to be easily removed therefrom, and replaced, without disturbing the water system.

In view of the above it is the intention to broadly claim a permanently arranged heater having provision for the reception of separable heating units which may be inserted into operative position or removed therefrom, the arrangement of the heater proper and the units therefor being such that the necessity for disturbing or dismantling the heater or the water containing portion thereof to remove the units is obviated.

Having described the invention we claim:

1. A heater of the character described comprising a pair of hollow one-piece end manifolds, one having an inlet adapted to be connected with a supply pipe and the other having an outlet adapted to be connected with a delivery pipe; a plurality of tubes directly connected at their ends with said manifolds and connecting the interiors of the latter and electric heating units arranged between said tubes.

2. A heater of the character described comprising end manifolds, one of which is provided with an inlet adapted to be connected with a supply pipe and the other with an outlet adapted to be connected with a delivery pipe; a plurality of tubes connecting the interiors of said manifolds; a plurality of electric heating units disposed between said tubes; tube-holding and confining clips embracing and supported by said tubes; binding post supporting members carried by but insulated from said clips, and a sheet metal jacket co-operating with the end manifolds to inclose the tubes, heating units, clips and binding post supports.

3. A heater of the character described comprising a pair of hollow one-piece end manifolds one having an inlet adapted to be connected with a supply pipe and the other having an outlet adapted to be connected with a delivery pipe; a plurality of tubes directly connected at their ends with said manifolds and connecting the interiors of the latter; electric heating units arranged between said tubes, and a sheet metal tubular jacket surrounding and inclosing said tubes telescopically engaged at its opposite ends with said manifolds by which latter it is positively supported in position against displacement, said jacket being circular in cross-section and including a segmental body portion that measures more than 180 degrees and less than 360 degrees circumferentially so that it holds itself in position upon said manifolds and including a normally closed door segment movably connected with said body portion.

4. A heater of the character described constructed in accordance with claim 3 and

wherein the movable door section is hingedly connected with one side of said segmental body portion.

5 5. A heater of the character described comprising a pair of hollow one-piece end manifolds, one having an inlet adapted to be connected with a supply pipe and the other having an outlet adapted to be connected with a delivery pipe; a plurality of
10 tubes directly and permanently connected at their ends with said manifolds and connecting the interiors of the latter; electric heating units arranged between said tubes and

a cylindrical sheet metal housing jacket completely inclosing said tubes and heating 15 units, said jacket being separably connected with and normally supported against displacement by said end manifold but with provision for removal without disturbing the normal condition of the other parts of 20 the heater.

Signed by us at Boston, Massachusetts,
this 22nd day of July, 1926.

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