

H. S. WALKER.
 APPARATUS FOR HEATING AND COOLING LIQUIDS.
 APPLICATION FILED DEC. 18, 1911.

1,056,385.

Patented Mar. 18, 1913.

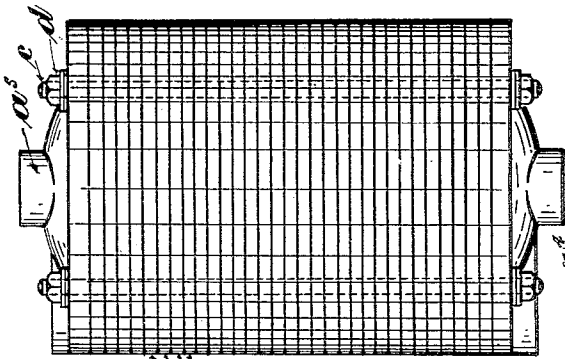


Fig. 5.

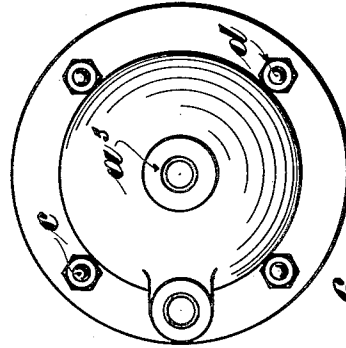


Fig. 6.

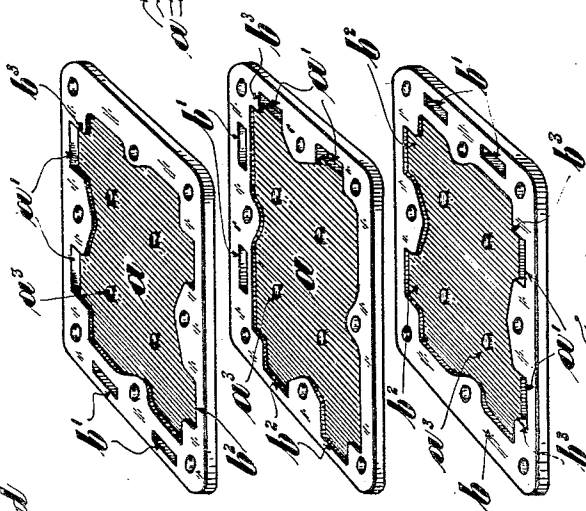


Fig. 1.

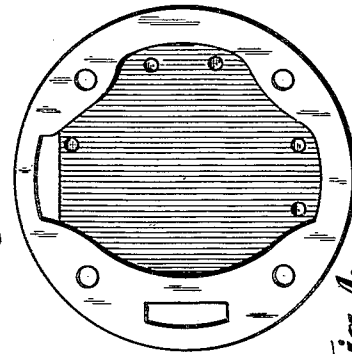


Fig. 4.

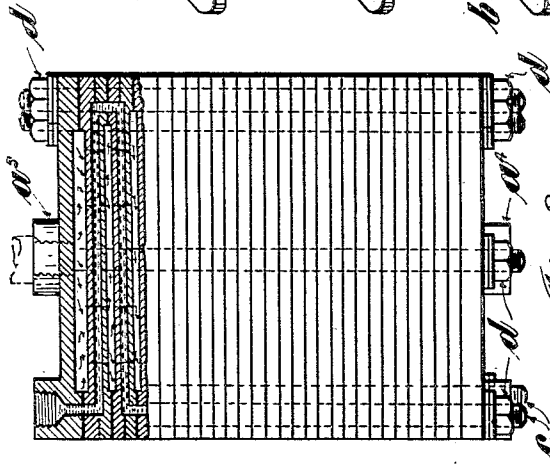


Fig. 2.

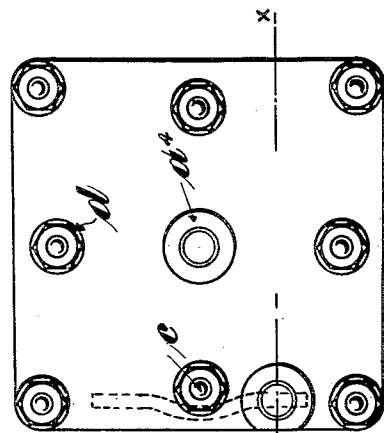


Fig. 3.

Witnesses.

John C. Sanders

Albert F. Neuman

Inventor.

Harold Snape Walker

By his Attorney, (M. M. McLean)

UNITED STATES PATENT OFFICE.

HAROLD SNAPE WALKER, OF PRESTWICH, ENGLAND, ASSIGNOR TO WALTER FRANCIS GOODRICH, OF LONDON, ENGLAND, AND DAVID WILSON, OF MANCHESTER, ENGLAND.

APPARATUS FOR HEATING AND COOLING LIQUIDS.

1,056,385.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed December 18, 1911. Serial No. 666,434.

To all whom it may concern:

Be it known that I, HAROLD SNAPE WALKER, a subject of the King of Great Britain and Ireland, and resident of Prestwich, Manchester, England, have invented certain new and useful Improvements in Apparatus for Heating and Cooling Liquids, of which the following is a specification.

This invention refers to and consists of an improved construction of apparatus for transferring heat, chiefly for use in producing a continuous supply of boiling water, or for affording a continuous cooling effect upon any liquid or fluid passed through it.

According to the invention, the improved apparatus consists of a series of units in the form of plates which at their edges are thickened in order that when placed one against another they will produce shallow chambers between them. In two adjacent sides of the plates are slots or ports and in the opposite sides are recesses by which when the plates are assembled the chambers 25 are connected and caused to produce two separate series of zig-zag channels or sinuous passages through the apparatus, one for the passage of the liquid to be heated or cooled and the other for the heating or cooling medium. The several plates are threaded upon rods and are held by nuts screwing on to the ends of the rods. The endmost plates are formed with pipe connections.

Upon the accompanying sheet of drawings, Figure 1 illustrates three of the units separately. Fig. 2 illustrates an elevation, partly sectional, of an apparatus built up from the improved form of units, and Fig. 3 illustrates a plan of Fig. 2. Fig. 4 illustrates in plan a circular form of the unit. Figs. 5 and 6 illustrate, in elevation and plan respectively an apparatus built from the circular units.

Each unit comprises a plate *a* formed integral with a frame, or with thickened edges *b* producing a recess or hollow on each side of the unit. In each unit and parallel with and near to two adjacent edges of said unit are slots or ports *a'*, *b'* respectively. The ports *a'* open into the hollow on the upper side of the unit, the metal of the thickened part on that side of the ports farthest from

the outer edge of the unit being cut away so as to form recesses *b*³. Diametrically opposite the recesses *b*³ there are formed recesses *b*². The under-side of each unit is formed to the same outline but with the ports *b'* opening into the hollow on such side and the metal surrounding the ports *a'* intact.

In assembling the units a series of chambers is formed, while to put the chambers into alternate communication and produce the desired alternate passages therethrough, each unit is set a quarter of a turn in advance of the next preceding unit. Thus, as will be seen from Fig. 1, the heating or cooling medium flowing, say in an upward direction through the ports *b'* of the lowermost unit will pass through the ports *a'* of the next unit above and, by reason of the recesses *b*³ flow across the upper surface of the plate *a* toward the recesses *b*², where it will then pass through the slots *b'* of the third unit to the next succeeding chamber but one above. In similar manner the heating or cooling medium flowing, say, downwardly will by reason of the recesses *b*³ flow from the upper surface of the highermost unit through the ports *a'* and ports *b'* in the central unit to the recesses *b*² of the lowermost unit where it will meet with the plate *a* and pass across the surface thereof to recesses *b*³ and ports *a'* to the next succeeding chamber but one below. In this manner an alternate flow is provided.

The plates *a* of the units are preferably formed with studs or projections *a*³ to prevent buckling and the several units are secured together by rods *c* and nuts *d*, the two endmost units being, as shown in Fig. 3, adapted to receive the necessary pipe connections, while between each unit will be a packing similar in shape and size to the frame part of the unit.

Figs. 5 and 6 show how the apparatus may be of circular shape. In use as a heater the water to be heated flows in by the connection *a*⁴ and rises through alternate chambers to the top of the apparatus, while the steam enters at the connection *a*⁵ and passes down through every other chamber.

Obviously, the improved apparatus may be used for a variety of purposes, including the heating of boiler feed water, or bath

water, and it may also be used for heating or cooling air or gases, as well as liquids or vapors.

From the foregoing it will be seen that a very simple form of heating or cooling apparatus is provided with a minimum of parts, and further that the plates being facsimiles of each other are interchangeable and allow of the apparatus being readily built up to any length.

What I claim is:—

1. Apparatus for heating and cooling liquids and for like purposes, comprising a series of plates with thickened edges producing shallow depressions on the opposite faces of each plate, and each plate at one part of its edge having slots or ports, and at other and opposite parts having recesses, and said plates also having bolt holes passing completely through the thickened edge, the several plates being facsimiles of each other and when placed side by side producing two separate series of tortuous passages, end plates for the apparatus each with a shallow recess on one face only and having inlet and outlet orifices, and also having bolt

holes, and bolts and nuts for clamping all the plates tightly one against another, as set forth.

2. In heating and cooling apparatus, metal plates each having a thickened edge producing a shallow depression on each face of the plate, and such thickened edge having slots or ports and bolt holes, and upon its inner edge having recesses at points diametrically opposite the slots, as set forth.

3. In heating and cooling apparatus, metal plates each having a thickened edge producing a shallow depression on each face of the plate, and such thickened edge having slots or ports and bolt holes, and upon its inner edge having recesses at points diametrically opposite the slots and each of said plates also having a series of short projections upon its surfaces equal in length to the depths of the depressions, as set forth.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

HAROLD SNAPE WALKER.

Witnesses:

F. C. PENNINGTON,
FRED. J. MEREDITH.