

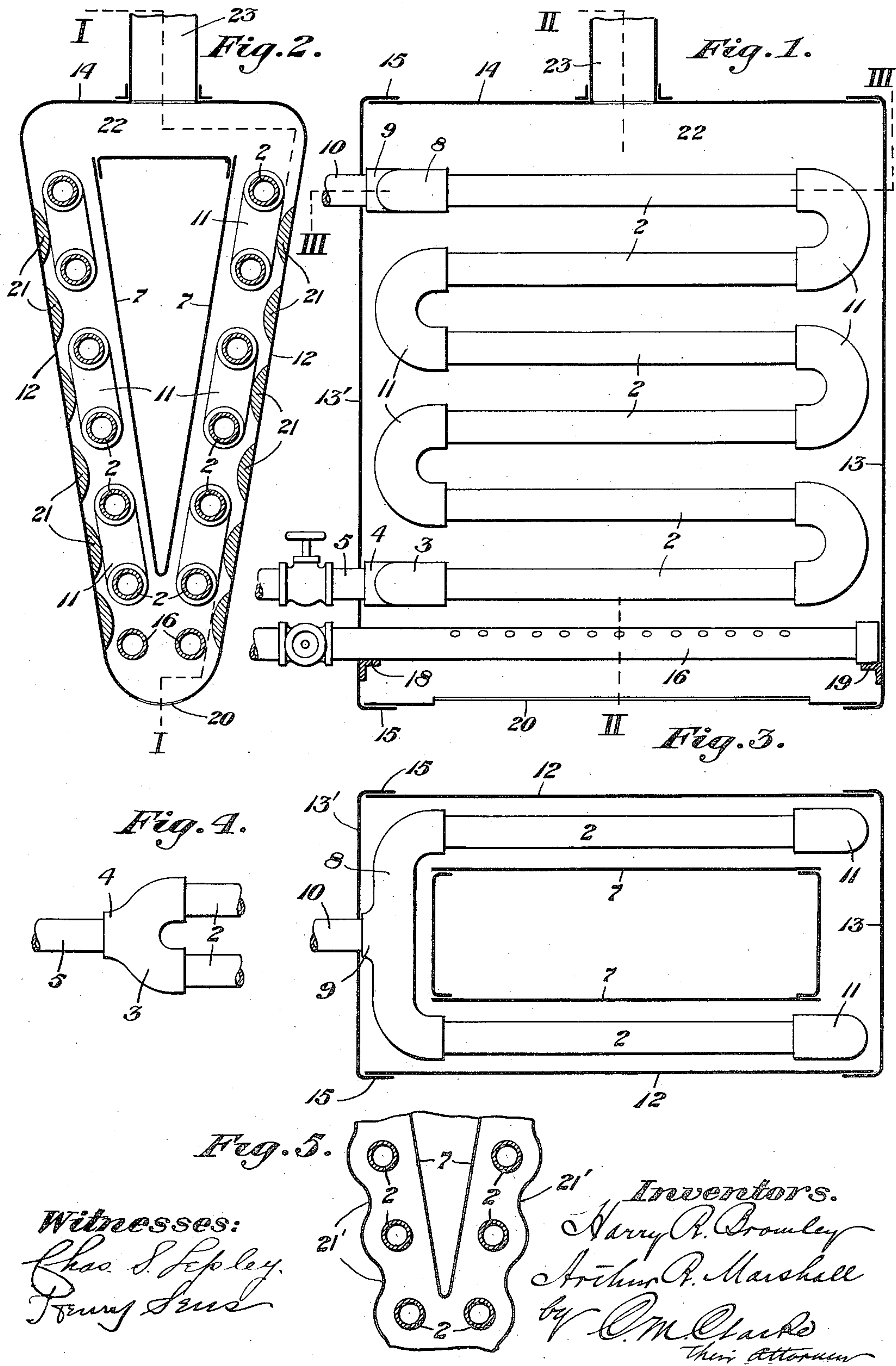
H. R. BROMLEY & A. R. MARSHALL.

HEATER.

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933,879.

Patented Sept. 14, 1909.



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UNITED STATES PATENT OFFICE.

HARRY R. BROMLEY AND ARTHUR RAYMOND MARSHALL, OF PITTSBURG,
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HEATER.

933,879.

Specification of Letters Patent. Patented Sept. 14, 1909.

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To all whom it may concern:

Be it known that we, HARRY R. BROMLEY and ARTHUR RAYMOND MARSHALL, citizens of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Heaters, of which the following is a specification, reference being had therein to the accompanying drawing.

Our invention consists in improvements in heaters for hot water heating systems or any similar construction for the purpose of heating the fluid passing through heating coils.

It has for its object to provide a simple compact construction of high efficiency for utilizing the full amount of the gas or other heating fuel employed; exposing the circulating coil to the heating effect within a casing and in combination with an inner deflecting element adapted to cause circulation of the gases in intimate contact with the coil pipes; means whereby the device may be readily installed and the casing removed; and to various other features of construction and improvement as shall be more fully hereinafter described.

Referring to the drawings: Figure 1 represents a vertical sectional longitudinal view indicated by the line I. I. of Fig. 2. Fig. 2 is a transverse sectional view indicated by the line II. II. of Fig. 1. Fig. 3 is a horizontal sectional view indicated by the line III. III. of Fig. 1. Fig. 4 illustrates in plan, a fragment of the lower tubes, their coupling inlet connection, and water supply pipe. Fig. 5 is a sectional detail view showing a modified construction of casing.

In apparatus for heating water, for which the present invention is particularly adapted, it is desirable to pass the water through the circulating coil in intimate contact with the products of the fuel in combustion, to so construct the coil that it may be cheaply manufactured, parts may be readily renewed or inspected, and whereby it may be constructed of commercial sections and connections readily available.

In carrying out our invention we have so constructed the coils that they are composed of sections 2 of straight pipe or tubing ar-

ranged in two series or banks diverging upwardly and outwardly toward the top, the tubes 2 at each side being substantially parallel and on the same horizontal level with each other. The tubes 2 of the lower pair are connected by a U coupling 3 having a central inlet connection 4, into which is screwed the common supply pipe 5, preferably provided with a controlling valve as shown. If desired any other form of coupling may be designed to provide the twin outlet openings and the single inlet opening, which does not necessarily have to be located midway of the outlet openings as shown, and as will be readily understood.

The series of tubes 2 are flaringly arranged in banks at each side of a central wedge shaped deflector which may conveniently be made of sheet or cast metal having outer walls 7, 7, arranged at any desired angle, and substantially parallel with the diverging banks of tubes 2, terminating in a lower edge as shown and extending upwardly substantially co-extensive with the height of the said banks at each side. The upper tubes 2 are connected at either side of the apparatus, but preferably at the same side as the lower pair, by a coupling 8 similar to coupling 3 having twin connections for the incoming water and a common outlet connection 9 for the common delivery pipe 10 which may if desired be also provided with a controlling valve, although one valve is ordinarily sufficient. As shown, the series of tubes 2 are connected at their ends by U couplings 11, and as thus arranged at each side the diverging banks or series may be extended to any desired height and when connected for inlet and outlet, will provide circulation through both sides of the water to be heated.

12 represents an outer surrounding shell of sheet or cast metal or other suitable material composed of ends 13 and 13', the upwardly diverging sides corresponding generally to the slope of the banks of tubes and embodying a covering top 14, and a base; the top being relatively wider than the base depending on the angularity and height. The casing as thus constructed is preferably separable and the sides and end 13 are for

such purpose made in one piece having a slip joint connection 15 with end 13', or connected with it in any suitable manner to provide for separation by withdrawing said sides and end.

16 represents a burner of any suitable type, which may consist of one or more perforated tubes located beneath the lower layer of tubes 2 and suitably connected with or forming part of a gas supply pipe 17 preferably extending through end wall 13'. The burner may be supported within the casing by suitable brackets 18, 19, while the lower portion of the casing is provided with one or more air inlet openings 20 to facilitate combustion.

For the purpose of deflecting the products of combustion inwardly toward each successive pipe 2 and for causing a complete circulation around the pipes and intimate contact therewith, the inner faces of the side walls of casing 12 are preferably provided with inwardly extending longitudinal ridges or abutments 21 of asbestos or other suitable material, or the sides of the casing may be longitudinally corrugated as indicated at 21' in Fig. 5. By this construction it will be seen that the gases of combustion passing upwardly from the burner will be constantly deflected inwardly by such abutments toward pipes 2, while the inner sloping walls 7 will also constantly tend to deflect the gases outwardly toward the pipes, so that as the gases circulate upwardly through the space between the outer walls of the casing and the inner deflecting walls 7, they will act upon each coil successively, finally emerging into the upper space 22 of the casing and be carried off through a suitable outlet pipe 23. As thus constructed and arranged it will be seen that the heat of the fuel will heat the water within the lower coils, causing upward circulation and successive heating in the upper coils, whereby with a minimum of fuel, the highest possible degree of heat may be secured, utilizing the heat units practically to exhaustion. This is due to the arrangement of the circulating tubes and the inner and outer deflecting walls.

The advantages of the invention will be readily appreciated by all those familiar with the class of water heaters. It is economical of installation and operation, may be used for domestic heating at low fuel cost, is not readily liable to get out of order, may be used with any suitable fuel supply, and is composed of parts which are readily available and can be easily and quickly repaired.

The invention may be utilized in different sizes or amplified in various features and details by the skilled mechanic, but all such

changes are to be considered as within the scope of the following claims:

What we claim is:—

1. A heater having an upwardly and outwardly diverging connected series of straight circulating pipes, straight inner and outer walls conforming to the plane of the pipes, and means for circulating fuel in combustion around said pipes within said walls, substantially as set forth.

2. A heater having an upwardly and outwardly diverging connected series of flaringly arranged straight circulating pipes, straight inner and outer walls conforming to the flaringly plane of the pipes, and means for circulating fuel in combustion around said pipes within said walls, substantially as set forth.

3. A heater comprising a plurality of divergently arranged series of straight circulating pipes having common inlet and outlet openings, straight interior and exterior walls conforming to the slope of said series of circulating pipes, and means for introducing fuel in combustion between said walls and in contact with said pipes, substantially as set forth.

4. A heater comprising a plurality of divergently arranged series of straight circulating pipes having common inlet and outlet openings, straight interior and exterior walls conforming to the slope of said series of circulating pipes, said outer walls having inner longitudinal deflecting abutments, and means for introducing fuel in combustion between said walls and in contact with said pipes, substantially as set forth.

5. In a heater, the combination of an inner straight wedge-shaped deflector, series of straight circulating pipes arranged in banks at each side thereof and having common inlet and outlet connections, a surrounding rectangular casing divergently arranged at each side of said pipes, a heater below said tubes, and means for carrying off the products of combustion, substantially as set forth.

6. In a heater, the combination of an inner straight wedge-shaped deflector, series of straight circulating pipes arranged in banks at each side thereof and having common inlet and outlet connections, a surrounding rectangular casing divergently arranged at each side of said tubes having a longitudinally corrugated deflecting surface, a heater below said pipes, and means for carrying off the products of combustion, substantially as set forth.

7. In a heater, the combination of an outer rectangular casing having upwardly and outwardly diverging walls and a fixed and a removable end and longitudinal deflecting abutments, an inner rectangular wedge-shaped deflector conforming to the

planes of the outer walls with an intervening space, series of straight circulating pipes having inlet and outlet connections and arranged at each side of said deflector and vertically between said abutments, a heater below said pipes, and means for carrying off the products of combustion, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

HARRY E. BROMLEY.

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Witnesses:

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