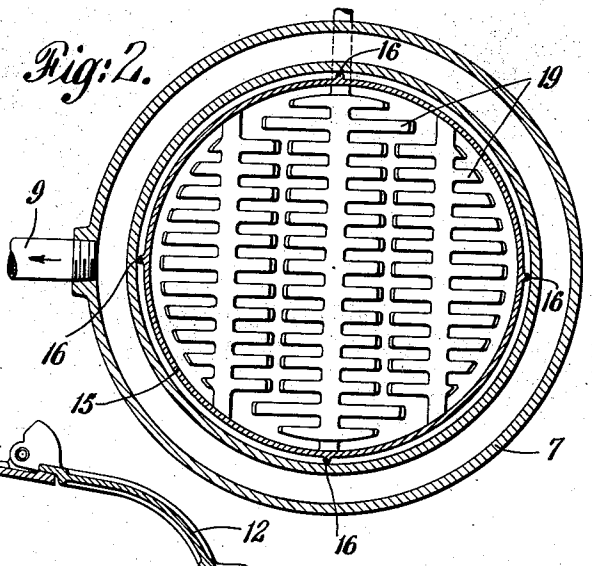
Aug. 6, 1940. H. R. HAGEN 2,210,854

HEATING APPARATUS

Filed April 8, 1938

Fig: 2.



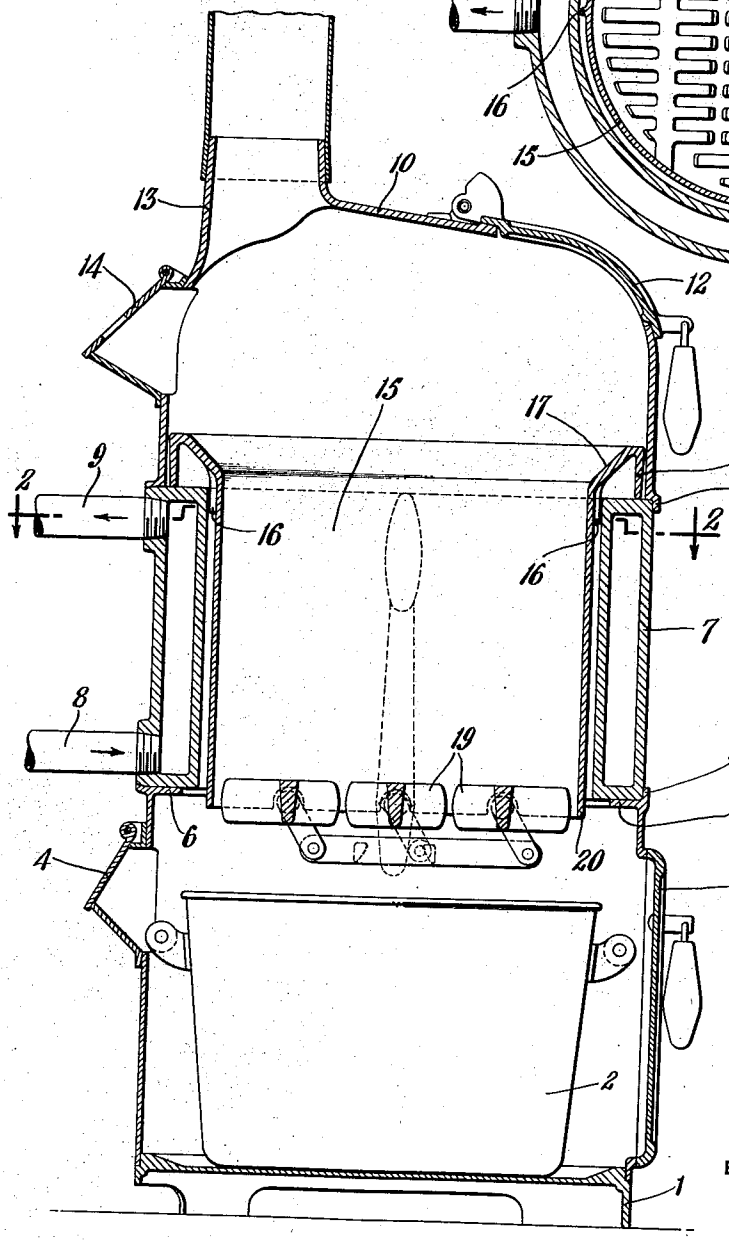


Fig: 1.

INVENTOR
HILMAR R. HAGEN
BY E. C. Sanborn
ATTORNEY

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HEATING APPARATUS

Hilmar R. Hagen, Pottsville, Pa., assignor to The Philadelphia & Reading Coal & Iron Company, Reading, Pa., a corporation of Pennsylvania

Application April 8, 1938, Serial No. 200,831

6 Claims. (Cl. 122—30)

This invention relates to a fluid-heating apparatus and has particular reference to a water heater in which the heat is transferred from a bed of burning solid fuel to the water principally by radiation.

This application is a continuation in part of my co-pending application Serial No. 193,838, filed March 4, 1938, now Patent No. 2,151,512, issued Mar. 21, 1939.

An important feature of the present invention is the simple construction which it provides in a very efficient hot water heater obtaining its heat principally by radiation from the fuel. Unlike the more elaborate apparatus disclosed in the application referred to above, there is no flow of auxiliary air between the firepot and the water heating chamber. The omission of this feature results in a simplified construction which nevertheless acts as a radiation heater even though no provision is made for the flow of air between the fire pot and the water heating chamber to the stack.

Another feature is the removable fire pot spaced away from the chamber in which the water is heated and supported at its upper end from this chamber, the upper portion of the fire pot being adapted to facilitate the passage of fuel from a hopper to the combustion space in the fire pot. The lower edge of the fire pot encircles the grate and lies between it and the lower edge of the water heating chamber and as the fire pot is slightly longer than this chamber, the burning fuel does not contact it.

Further advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawing in which

Fig. 1 is a vertical sectional view through a heater containing a preferred embodiment of the invention, and

Fig. 2 is a horizontal sectional view taken along the line 2—2 of Fig. 1.

Referring to the drawing, the numeral 1 indicates a base resting on the floor and being sufficiently large to accommodate an ash bucket 2 adapted to contain at least several days deposit of ashes. This base is provided with an ash door 3 through which the ash bucket 2 may be removed easily, and as a damper 4 which, for convenience, is placed in the rear of the base.

The upper edge of the base may be, and preferably is, provided with a circular flange 5 around its periphery, surrounding a flat annular ring 6. The water heating chamber, or jacket, 7 rests on the ring 6 and is held against displacement thereon by the upstanding flange 5. This jacket, which is preferably annular, comprises inner and outer spaced walls as illustrated, between which the water to be heated is contained. The upper and lower surfaces of the jacket are preferably flat as shown, the upper surface supporting the fire pot as hereinafter described. The water to be heated is supplied to the jacket through the inlet pipe 8 and the heated water withdrawn through the outlet pipe 9.

The water jacket may be constructed of iron as usual, or where desired to avoid corrosion and discolored water, it may be made of a suitable non-corrosive or non-ferrous metal. To cite a specific example of the moderate size of water jacket which may be employed in this type of heater, it may be only 10 inches high, 16½ inches outside diameter, with a 1 inch space between its inner and outer walls. This relatively small size enables it to be constructed economically of the more expensive non-corrosive materials. And the application of the radiation heating principle as hereinafter described obviates the necessity of having the fire in direct contact with the non-ferrous surface which would be undesirable.

The coal hopper 10 may be supported on the top surface of the water jacket as shown, being provided with an annular flange 11 which encircles the upper outside edge of the water jacket. This hopper is provided with a fuel charging door 12, a stack connection 13 and a check damper 14, also preferably located at the rear of the stove.

It has been found that the construction described is sufficiently stable for ordinary purposes and readily permits the removal of parts for inspection and repair. However, if it be desired to make the apparatus more gas tight, or for other reasons, furnace cement, or other suitable plastic material may be used between the various joints.

The fire pot 15 is located inside of the water jacket as shown and comprises a substantially cylindrical portion preferably slightly longer than the water jacket and spaced a short distance away from the jacket on all sides by means of the spacing members 16 near its upper end and distributed around its periphery as more clearly shown in Fig. 2. The upper portion of the fire pot is provided with an outwardly diverging surface, indicated at 17, overlying the flat, top surface of the water jacket, and extending substantially to the hopper wall. This arrangement facilitates the feeding of coal, or other solid fuel, from the hopper to the combustion space in the

fire pot. Outside of the flared portion 17, there is a depending flange 18, the lower edge of which rests on the top surface of the water jacket to support the fire pot therefrom. As will be readily appreciated, the fire pot may be easily removed after the hopper 12 has been taken off.

The grates 19 of the rocking-dumping type are preferably located at approximately the lower level of the water jacket. While flat grates have been illustrated for convenience, it will be understood that various other types of grates may be employed if desired.

The lower edge of the fire pot encircles the grates as indicated at 20, being spaced a sufficient distance away to permit the discharge of ashes therebetween, and preferably terminates slightly below the lower end of the water jacket as shown.

It will be understood that there is an air space between the fire pot and the water jacket throughout their respective lengths and that the contacts between them are exceedingly slight, comprising only the spacing members 16 and the edge of the flange 18. Accordingly the transfer of heat from the fuel in the fire pot to the water jacket must be made by radiation across the intervening air space, to the substantial exclusion of other modes of heat transfer.

The primary air damper 4 and the check damper 14 may, if desired, be interconnected, and if desired, may also be controlled by temperature regulators as disclosed in my co-pending application Serial No. 193,838, filed March 4, 1938, now Patent No. 2,151,512 issued March 21, 1939.

It will be understood that the invention herein described is not limited to the details of form and arrangements of parts set forth, for various changes may be made without departing from the spirit and scope of the present invention.

I claim:

1. In fluid-heating apparatus, a double-walled container in which the fluid is to be heated, said container being in the form of an imperforate annulus, an imperforate fire pot positioned within the container and substantially co-extensive therewith but having its side walls separated slightly therefrom to provide a chamber therebetween which is open only at the bottom, said fire pot provided at its upper end with means for supporting it from the top of the container and in spaced relation thereto, said imperforate annulus and imperforate fire pot being closed together at the top so that heat is transferred from the fire pot to the chamber substantially exclusively by radiation and gas flow is confined substantially entirely to the interior of the fire pot.

2. Fluid-heating apparatus comprising a base, a hopper and an intermediate member supported on the base and supporting the hopper, said member having spaced inner and outer walls between which the fluid is heated and a substantially imperforate fire pot supported from the upper portion of said member and lying within the same for the full length thereof but spaced away from said inner wall at all points whereby the contents of said member will be heated substantially exclusively by radiation from said fire pot, the support for said hopper being immediately adjacent the support for said fire pot at the upper portion of said member.

3. A water heater comprising a heating chamber having concentric upright inner and outer walls connected to provide a substantially flat upper surface between them, a fuel hopper supported on said surface, a removable fire pot located within said chamber and having its side walls slightly spaced from said inner wall, an enlarged portion at the upper end of said fire pot provided with a depending flange resting upon said surface, said enlarged portion having sloping sides between said flange and the main portion of the fire pot and extending over said flat upper surface.

4. Heating apparatus comprising a fluid-containing jacket having concentric inner and outer walls, a removable fire pot positioned within said jacket, projections on the upper portion of said fire pot abutting against the upper end of the inner walls of the jacket to maintain said fire pot in substantially uniform spaced relation thereto whereby heat is transferred from said fire pot to said jacket principally by radiation, said fire pot having a peripheral flange above said projections, said flange extending outwardly and terminating in a downwardly extending portion arranged to rest freely on said jacket.

5. Fluid-heating apparatus comprising a base, a hopper and an intermediate member supported on the base and supporting the hopper, said member having spaced inner and outer walls between which the fluid is heated and a fire pot supported from the upper portion of said member and lying within the same for the full length thereof but spaced away from said inner wall at all points whereby the contents of said member will be heated substantially exclusively by radiation from said fire pot, a grate positioned at the lower level of said member, the lower end of the fire pot lying between the grate and said member and being slightly lower than said member.

6. Heating apparatus for fluids comprising an annular fluid-heating chamber having spaced inner and outer walls between which the fluid to be heated is carried, the upper ends of said inner and outer walls being connected by a wall having a substantially flat upper surface, a fuel hopper supported on said surface, and a fire pot within said chamber, said fire pot being spaced away from said inner wall at a substantially uniform distance and having an outwardly extending flange projecting over and resting directly on said flat upper surface.

HILMAR R. HAGEN.