W. L. BLACKWELL.

WATER HEATER.

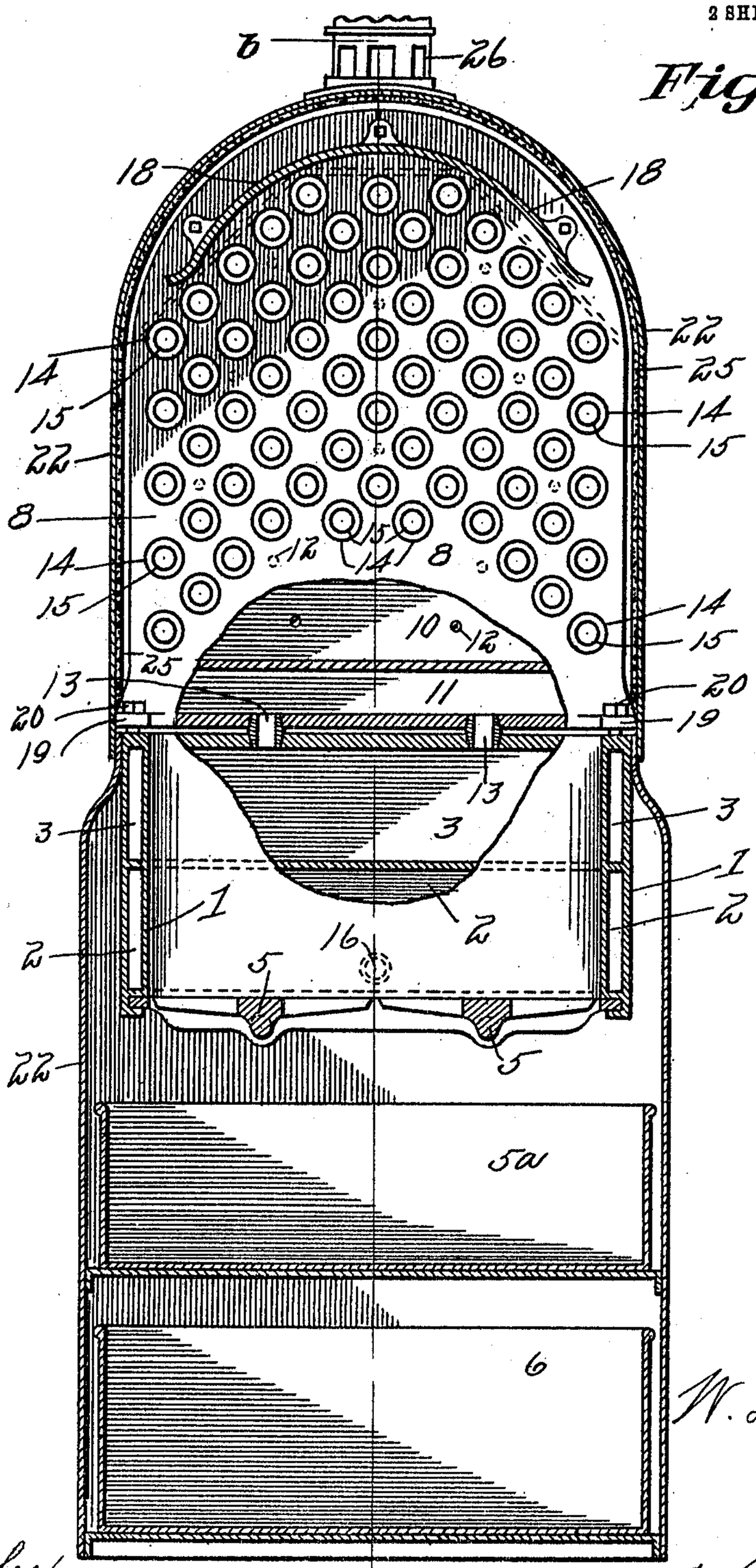
APPLICATION FILED APR. 21, 1909.

945,214.

Patented Jan. 4, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

M. Sibler.

C. M. Theobald.

Inventor,

W. L. Blackwell

By

6

R. J. McCarty

his

Attorney

W. L. BLACKWELL.

WATER HEATER.

APPLICATION FILED APR. 21, 1909.

945,214.

Patented Jan. 4, 1910.

2 SHEETS—SHEET 2.

Fig. 2.

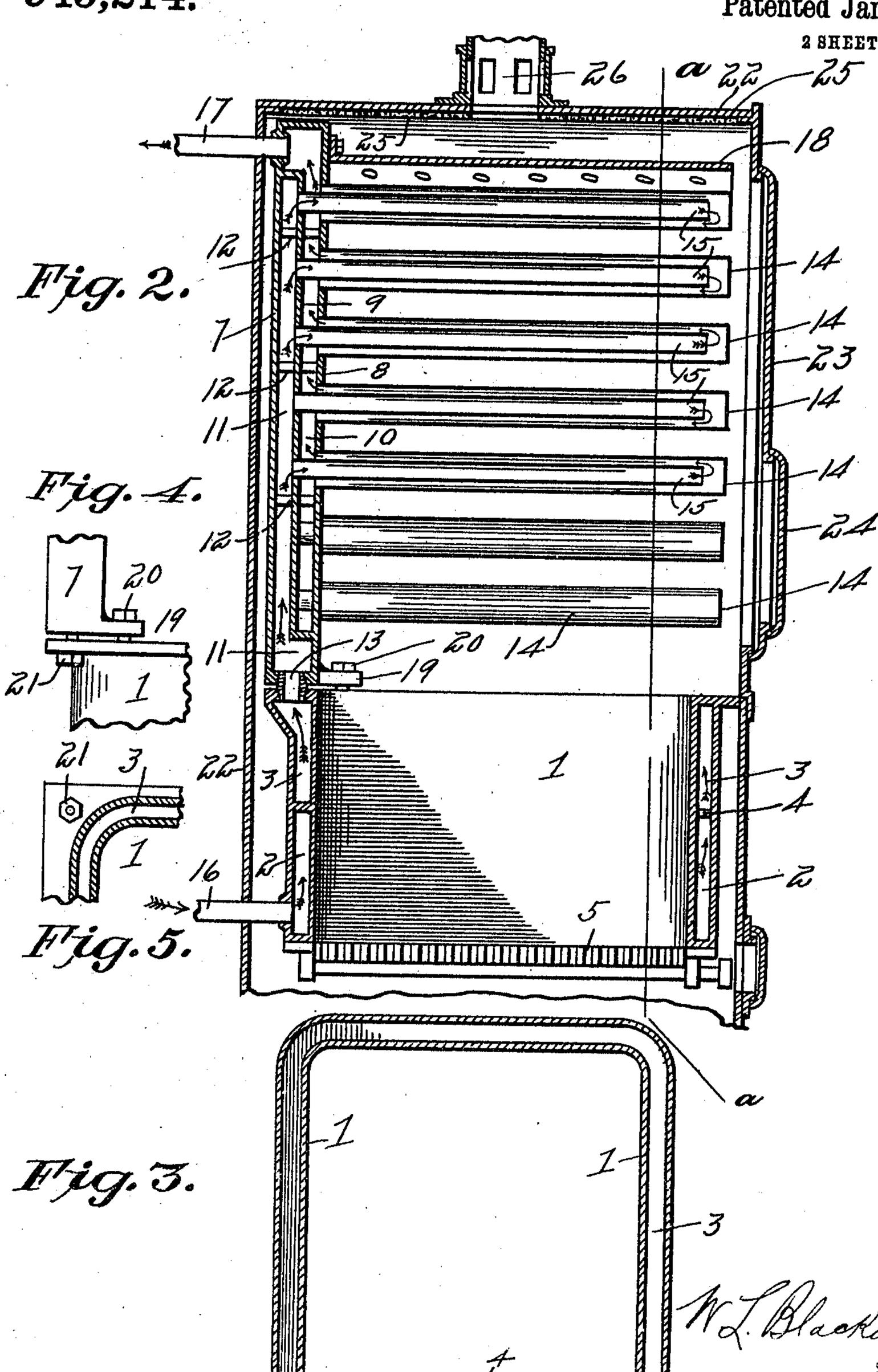


Fig. 4.

Fig. 5.

Fig. 3.

Witnesses

M. Sibler

C. M. Thorhald.

W. L. Blackwell.

Inventor

By R. J. McCarty

His Attorney

UNITED STATES PATENT OFFICE.

WILLIAM L. BLACKWELL, OF DAYTON, OHIO, ASSIGNOR TO THE COOPER HEATER CO., OF DAYTON, OHIO.

WATER-HEATER.

945,214. Specification of Letters Patent. Patented Jan. 4, 1910.

Application filed April 21, 1909. Serial No. 491,228.

To all whom it may concern:

Be it known that I, WILLIAM L. BLACKWELL, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Water-Heaters; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in water-heaters of the type utilized for heating residences, street cars, and elsewhere. With slight modification the heater may be adapted for the use of steam.

The object of the invention is to provide a water heater which may be utilized as a heating medium in places where space is limited, such for example, as a vestibule of a street car, and which, regardless of the limited amount of space available, will generate a maximum amount of heat.

A further object of the invention is to provide for the thorough circulation of water and to subject the water tubes to a maximum amount of heat, all of which will be hereinafter more fully described in connection with the accompanying drawings, of which—

Figure 1 is a longitudinal, vertical, sectional elevation on the line *a*—*a* of Fig. 2. Fig. 2, is a sectional view on the line *b b* of Fig. 1. Fig. 3 is a cross section through the fire box at a point above the lower annular water leg. Fig. 4, is a detail view of one of the corners formed between the fire box and the upper cast iron jacket. Fig. 5, is a similar detail looking upwardly on Fig. 4.

In a detail description of the invention, similar reference characters indicate corresponding parts.

The fire box 1 is surrounded by two annular water legs 2 and 3 which communicate at the front of the heater through a port 4. The usual grate 5 is located at the bottom of the fire box and other necessary appliances of well-known utility, such as the ash pit, etc., are necessary features of the heater. For example, in Fig. 1, an ash pan 5^a is shown supported below the fire box, and below the ash pan a coal receptacle 6 may be placed for convenience. These however, are mere details comprising well-known parts which do not enter into a description of the invention.

Mounted above and supported upon the fire box is an inner cast iron casing 7 having a rigid water back consisting of the outer wall of said casing and inner tube sheets 8 and 9 which provide two parallel water legs 10 and 11. The tube sheets are united to the outer wall 7 by means of cast iron stay-bolts 12 which are cast integrally therewith. The outer water leg 11 communicates with the upper annular water leg 3 of the fire box through nipples 13 which are tapered at both ends and constitute a rigid joint between the fire box and the upper portion of the heater. A series of outer circulating tubes 14 having their front ends closed, are attached to the inner tube sheet 8 in a semi-circular arrangement as shown in Fig. 1, and communicate with the inner water leg 10. Another series of inner circulating tubes 15 are telescoped in said outer tubes with their ends open and with suitable space between them and the interior of the outer tubes to permit of a free circulation of water. The said inner series of tubes are connected with the intermediate tube plate 9 and communicate with the outer water leg 11, receiving the water therefrom and discharging it to the outer tube, whence it is discharged to the inner water leg 10. Water to be heated and circulated through the system, is introduced to the lower annular water leg 2 surrounding the fire box, through an induction pipe 16 which leads to the source of water supply. The water circulates around the fire pot and into the outer vertical water leg 11 and thence into the inner series of tubes 15, outer series of tubes 14, inner water leg 10 and out through the outlet pipe 17 which provides a communication with said inner water leg. A perforated baffle plate 18 incloses the body of water tubes at the top of the heater, the same being mounted upon the water back. The shape of said baffle plate conforms to the semi-circular arrangement of the tubes, and the object thereof, is to throw the heat or products of combustion rising around the tubes back onto said tubes in order that the heat may be utilized upon the tubes to the fullest extent. It will be understood that there is a suitable number of slip nipples 13 forming communications between the annu-

lar water leg 3 of the fire box and the outer vertical water leg 11.

In Fig. 4, one of the corner joints between the water back and the fire box is shown to consist of an apertured lug 19 extending laterally from the water back with a bolt 20 passing therethrough and engaging the marginal flange of the fire box. Also a bolt 21 passing through said marginal flange of the fire box and engaging the lower side of the water back. An outer casing 22 lined with asbestos 25 incloses the heater, and a door 23 in the front of said casing enables access to be had to the circulating tubes. A door 24 is provided in the main door through which to feed the fire box with the necessary fuel. An outlet 26 is provided at the top of the casing to allow the products of cumbustion to escape.

Having described my invention, I claim:

In a water heater, the combination with a casing, a back united to said casing and providing two upright non-communicating water legs, and two series of circulating tubes providing communication between said water legs, of a fire box formed of an integral casting and having upper and lower water legs extending there-around between which there is a communication enabling the water to circulate from the lower to the upper water leg, and a series of nipples providing communication between the water leg around the upper portion of the fire box and the outer water leg in the back of the heater, as herein shown and described.

In testimony whereof I affix my signature, in presence of two witnesses.

WILLIAM L. BLACKWELL.

Witnesses:
R. J. McCarty,
Matthew Siebler.