F. J. RANDALL.

WATER HEATER.

APPLICATION FILED APR. 12, 1909.

947,521. Patented Jan. 25, 1910.

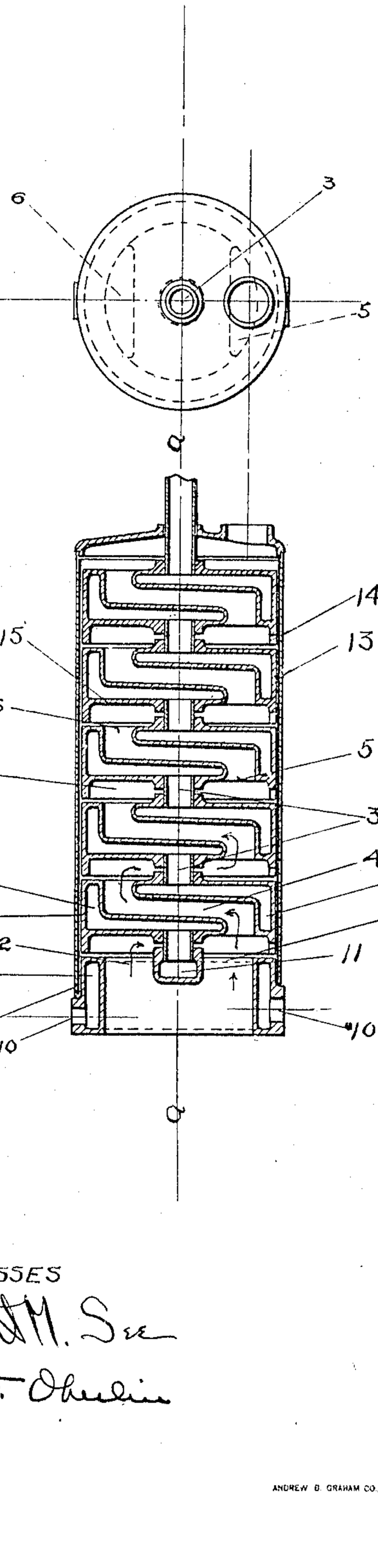

FIG-2.

FIG-1.

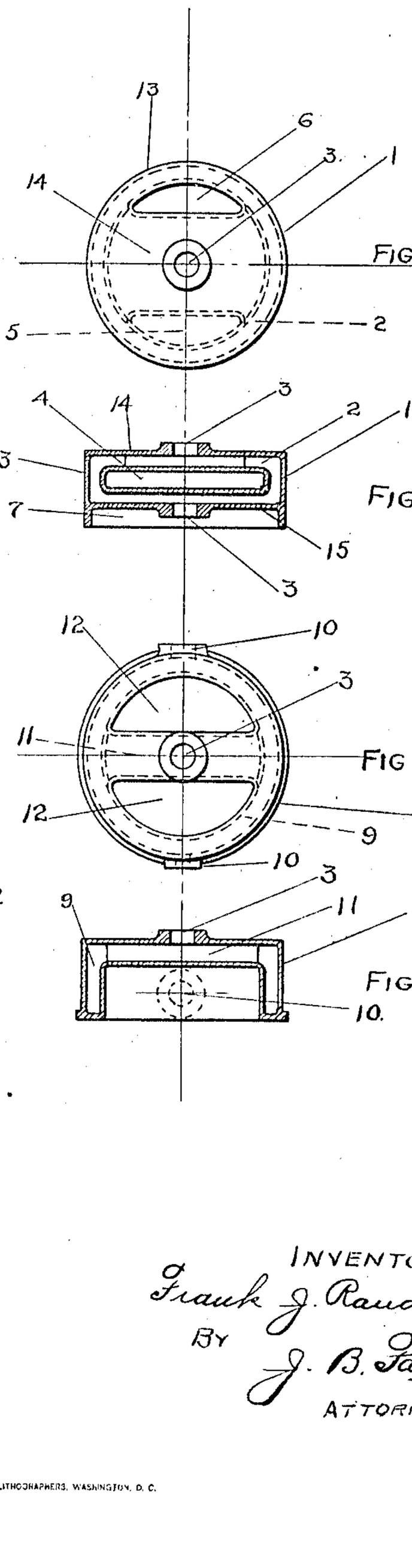

FIG-6.

FIG-5.

FIG-4.

FIG-3.

WITNESSES

Robt. M. Sze

Jno. F. Oberlin

INVENTOR

Frank J. Randall

BY

J. B. Fay

ATTORNEY.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRANK J. RANDALL, OF CLEVELAND, OHIO.

WATER-HEATER.

947,521. Specification of Letters Patent. Patented Jan. 25, 1910.

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To all whom it may concern:

Be it known that I, FRANK J. RANDALL, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Water-Heaters, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to water-heaters, and has for its object the improvement of the circulation of the water around the flues which carry the heated gases. This I have obtained by such a relative arrangement of the water chambers and the flues as will cause a much more constant and thorough circulation of the water around the flues than has heretofore been obtainable in heaters of this general type.

The principle of my invention is to cause a flow of the water from one chamber to another through a series of alined openings connecting the chambers, but to produce a high degree of circulation by so placing the flues within the chambers as to interrupt the direct flow through the openings.

The heater is composed of sections which may be joined in any usual manner.

The accompanying drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting but one of various mechanical forms in which the principle of the invention may be used.

In said drawing:—Figure 1 is a vertical cross-section of a heater embodying my invention; Fig. 2 is a plan of the top thereof; Fig. 3 is a cross-section of the heating section, taken on the line *a*—*a*— in Fig. 1; Fig. 4 is a plan of said heating section; Fig. 5 is a cross-section of one of the series of similar sections taken on the line *a*—*a*— in Fig. 1; Fig. 6 is a plan view of the section shown in Fig. 5.

1 represents one of the series of similar sections which are combined in the heater, any suitable number of which sections may be so combined. As here shown each section consists of a vertical shell 13, and horizontal plates 14 and 15, which constitute respectively the upper and lower faces of the section. Within the section is placed the flue 4 through which pass the heated gases. As shown, the flue extends from the opening 5 on the lower face 15 of the section, to an opening 6 on the upper face 14, the two openings 5 and 6, being diametrically opposite. The portion of the section surrounding the flue forms the water chamber 2. The water chambers of the successive sections are connected by a series of alined openings 3, in which are placed nipples in the usual way. This series of openings is shown as centrally disposed with relation to the walls of the sections, but their position may be varied so long as the flues extend between them in such way as to obstruct the direct flow through the openings. On the under side of the section is a circular recess 7, with the opening 5 into the flue of the same section. At a point diametrically opposite the opening 5, is the opening 6 on the upper face of the next lower section, through which the flue of said section opens into the recess 7.

The series of similar sections is combined with a heating section 8, the whole being surrounded by a suitable casing. The section 8 consists of a hollow wall 9, into which water supply pipes lead through one or more openings 10. Communication between the wall 9 and the opening into the water chamber of the lowest of the series of sections is had through a transversely disposed connection 11, while communication between the interior of the heating section and the flue system of the series of sections is had through openings 12, on either side of such connection 11, into the recess 7 on the under side of the lowest of the series of sections. Any convenient means for heating the flues may be placed within or under the heating section 8.

From this description it is obvious that the water after being heated within the wall 9, will flow through the connection 11, and upward through the openings 3 and the water chambers 2. But the flues 4 will act as baffles across the direct path of flow through the openings 3, and cause a constant and thorough circulation of the water about the heated flues, with a consequent gain in the heat imparted to the water but a relatively small amount of fuel consumption.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, pro-

vided the means stated by any one of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a water heater, the combination of a series of superimposed sections, each section comprising a water chamber, communication between the several water chambers being had by a series of alined openings, and an inclined flue within the water chamber extending transversely between the alined openings therein from an opening on the lower face of the section diagonally to an opening on the upper face, the flues of the several sections being disposed substantially parallel; and means for connecting the several flues.

2. In a water heater, the combination of a series of superimposed sections, each section comprising a water chamber, communication between the several water chambers being had by a series of alined centrally disposed openings, and an inclined flue within the water chamber extending transversely between the alined openings therein from an opening on the lower face of the section diagonally to an opening on the upper face, the flues of the several sections being disposed substantially parallel; and means for connecting the several flues.

3. In a water-heater the combination of a series of superimposed sections, each section comprising a water chamber, communication between the several water chambers being had by a series of alined centrally disposed openings, an inclined flue within the water chamber extending transversely between the alined openings therein from an opening on the lower face of the section diagonally to an opening on the upper face, the flues of the several sections being disposed substantially parallel, and a recess on the under side of the section into which open the adjoining flues.

4. In a water heater, the combination of a series of superimposed sections, each section comprising a water chamber, communication between the several water chambers being had by a series of alined centrally disposed openings, an inclined flue within the water chamber extending transversely between the alined openings therein from an opening on the lower face of the section diagonally to an opening on the upper face, the flues of the several sections being disposed substantially parallel, and a recess on the under side of the section into which open the adjoining flues; and a heating section, comprising a hollow wall having a water inlet opening and a connection between such wall and the centrally disposed opening of the adjoining water chamber.

Signed by me this 10th day of April, 1909.

FRANK J. RANDALL.

Attested by—

ROBERT M. SEE,

JNO. F. OBERLIN.