A. A. OLSON.

BOILER ATTACHMENT.

APPLICATION FILED DEC. 9, 1914.

1,166,539.

Patented Jan. 4, 1916.

2 SHEETS—SHEET 1.

Fig. 1

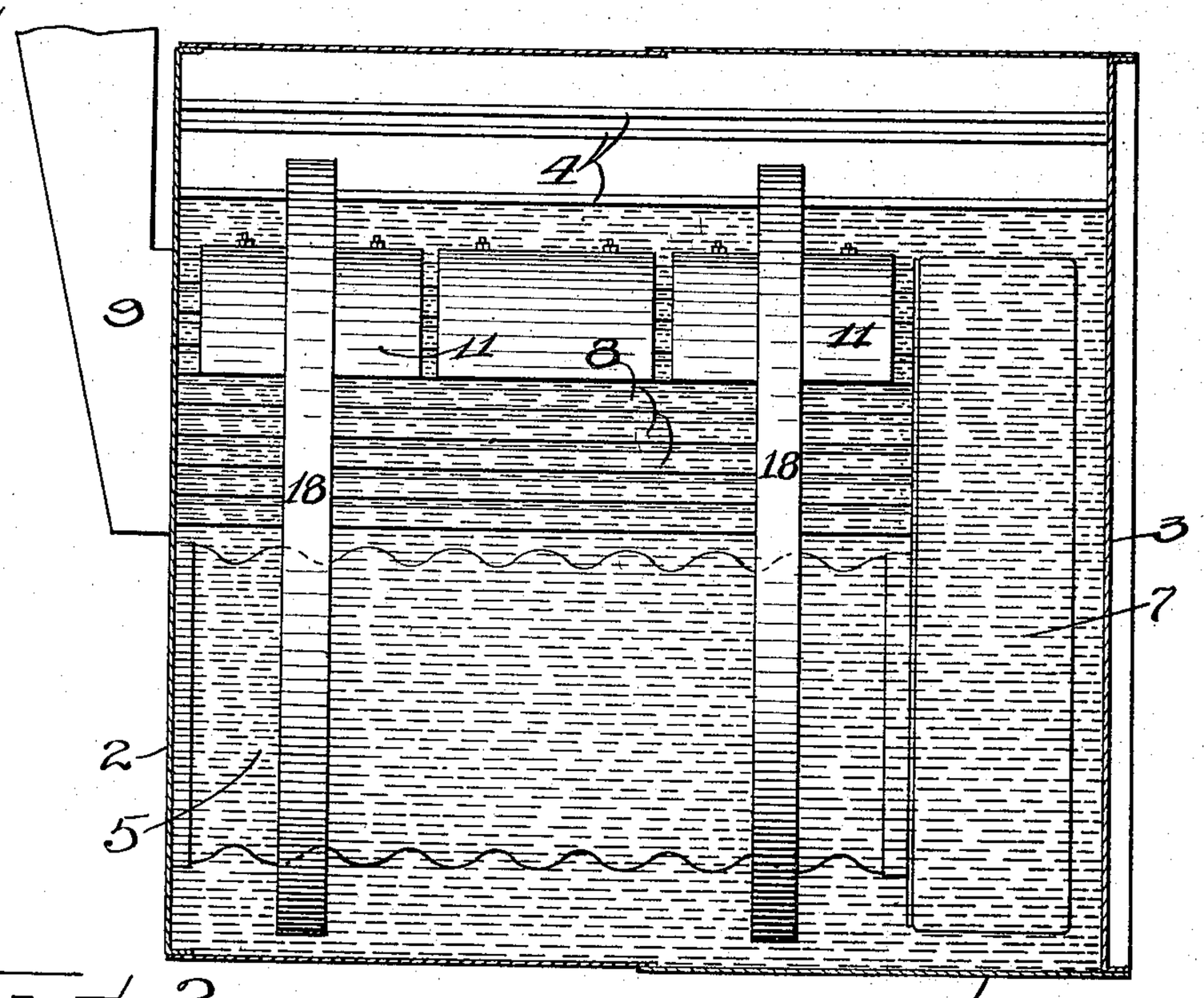
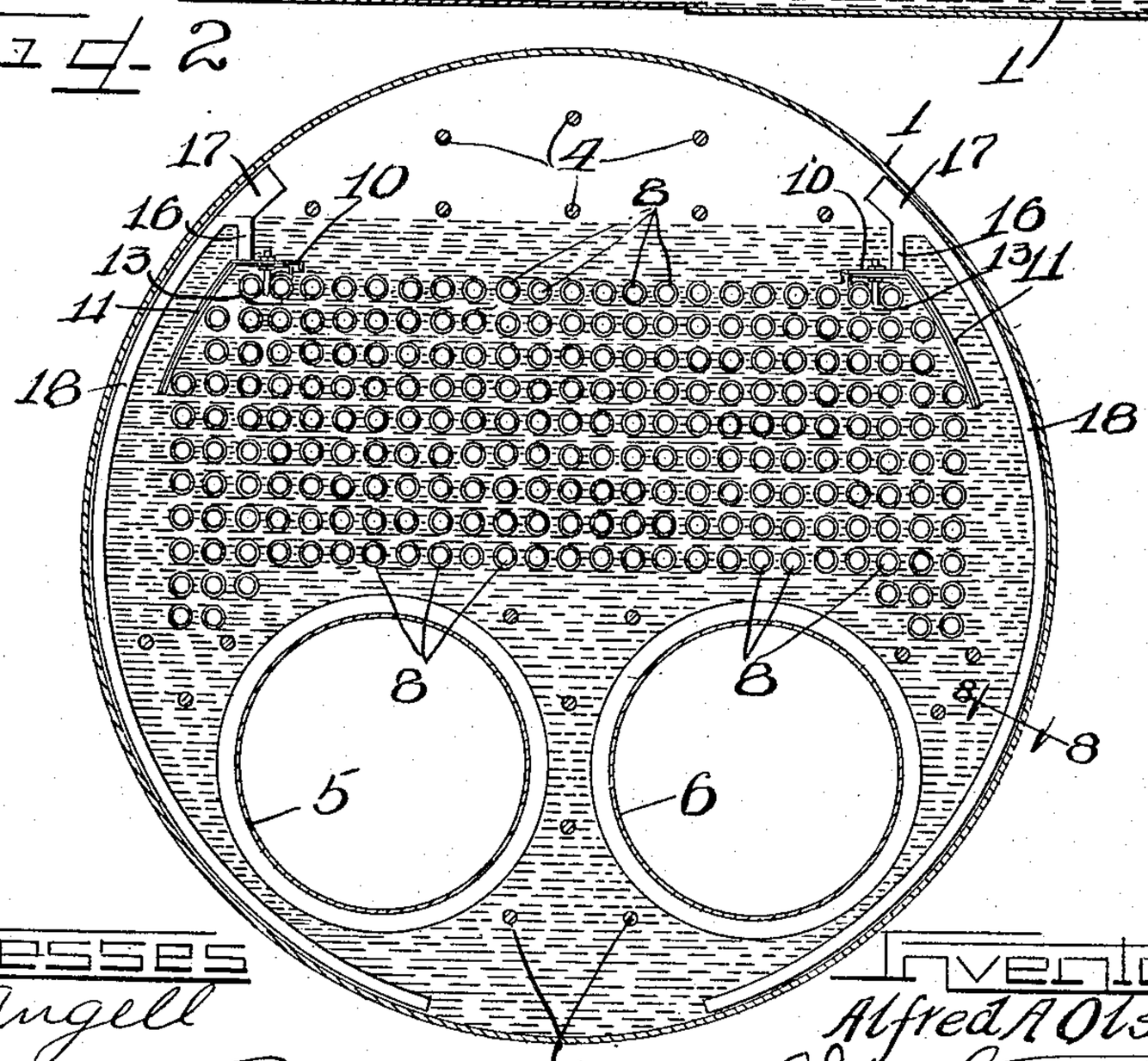


Fig. 2



Witnesses

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2 SHEETS—SHEET 2.

Fig. 5

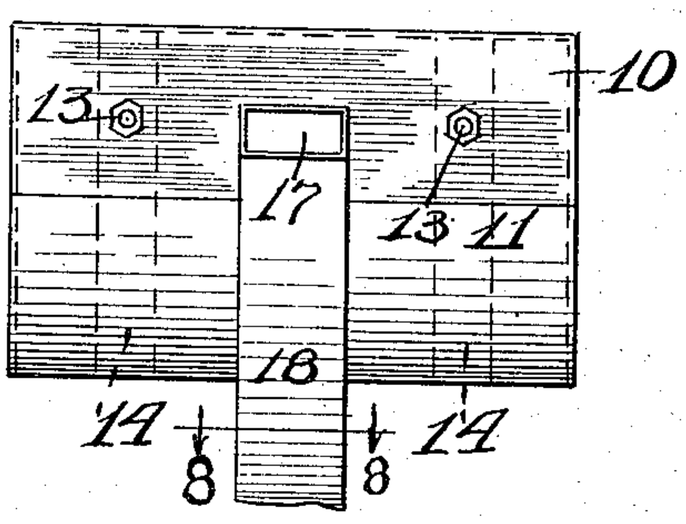


Fig. 6

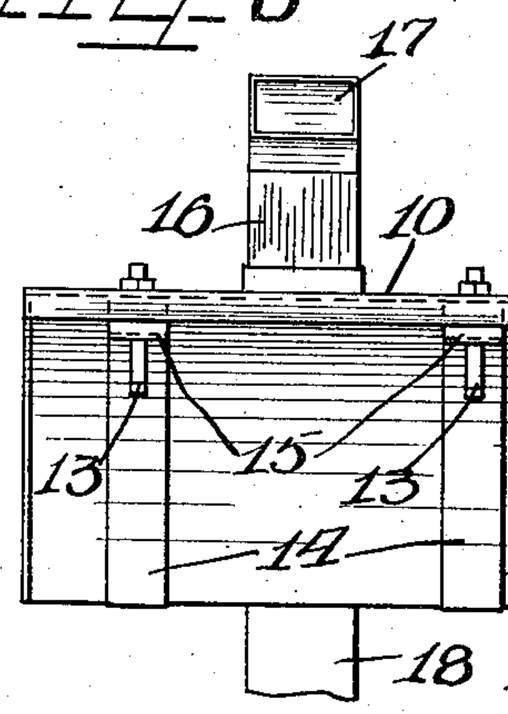


Fig. 7

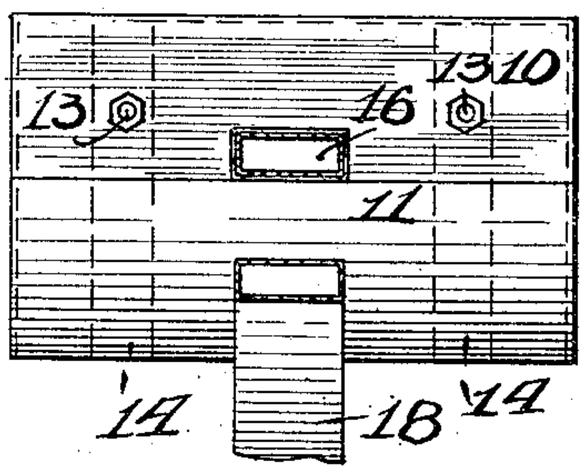


Fig. 3

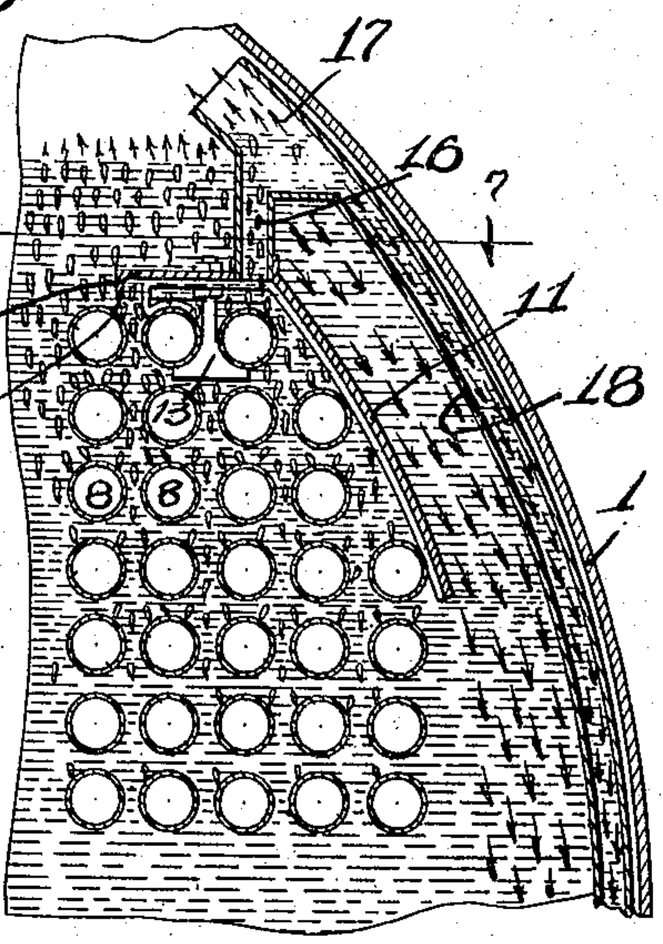


Fig. 4

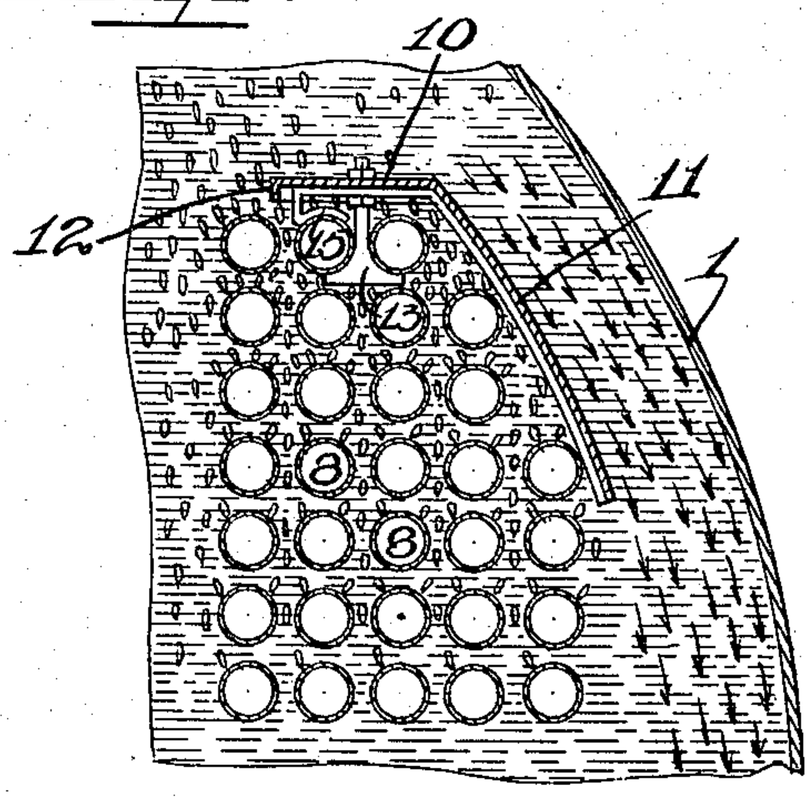
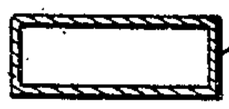


Fig. 8



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UNITED STATES PATENT OFFICE.

ALFRED A. OLSON, OF RIVERSIDE, ILLINOIS.

BOILER ATTACHMENT.

1,166,539. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed December 9, 1914. Serial No. 876,195.

To all whom it may concern:

Be it known that I, ALFRED A. OLSON, a citizen of the United States, and a resident of the town of Riverside, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Boiler Attachments; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

Recent experiments have shown that the efficiency of a boiler may be greatly increased by producing a rapid circulation of the water within the boiler, thereby abstracting a greater quantity of heat from the tubes, either in a fire tube or water tube boiler, as the case may be.

This invention relates to an attachment adapted to be associated more particularly with a Scotch marine type of boiler, although of course well adapted for use in other types of boilers, the attachment causing a circulation of water to be set up therewithin around the tubes due to a thermo-siphon effect.

It is an object of this invention to construct a baffle device for connection in a boiler to isolate the water in the neighborhood of the hot tubes from the otherwise quiescent water near the cooler shell of the boiler, so that a thermo-siphon circulation is established, the water adjacent the shell flowing to the bottom of the boiler, and then rising around and between the heated tubes.

It is also an important object of this invention to construct a device which provides for the trapping of a certain amount of the water in the neighborhood of the hot tubes of the boiler, permitting the same to rise through a pipe into a confined space, thereby producing a head upon a column of water in a downwardly directed pipe provided for the purpose, so that a flow is set up from said confined space to the bottom of the boiler, and the circulation of the water in the boiler thus increased.

It is also an important object of this invention to construct a device attachable on the fire tubes of a marine boiler which acts to confine a portion of the hot water surrounding the outermost tubes, permitting the water to rise through a small passage into a confined space where, due to the upward flow of the steaming water, producing a head of water, and a pipe connected with said confined space and leading downwardly to the lower portion of the boiler acting to convey the water, due to the head thereon, to the bottom of the boiler, thus increasing the general circulation of water.

It is furthermore an important object of this invention to construct baffle plates for attachment upon the fire tubes of a boiler extending downwardly over certain of the tubes to separate the water around the tubes from that adjacent the shell of the boiler, so that a thermo-siphon circulation is set up, the cool water near the outer shell of the boiler flowing downwardly to the bottom thereof, and then upwardly between the hot tubes.

It is finally an object of this invention to construct a simple and easily attached device for connection in a marine type of boiler to cause an automatic increase in the circulation of the water therein, thereby increasing the steaming efficiency of the boiler.

The invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

In the drawings: Figure 1 is a central vertical longitudinal section taken through a conventional form of Scotch marine boiler, showing devices embodying the principles of my invention connected therein. Fig. 2 is a tranverse vertical section therethrough. Fig. 3 is a detail sectional view taken at one side and transversely of the boiler, showing one form of my device in section connected therein. Fig. 4 is a similar view illustrating another form of my invention connected into the boiler. Fig. 5 is a top plan view of a detached device. Fig. 6 is a front view thereof. Fig. 7 is a sectional view thereof taken on line 7—7 of Fig. 3. Fig. 8 is a section on line 8—8 of Fig. 5.

As shown in the drawings: The outer cylindrical shell of the boiler is indicated by the reference numeral 1, and the respective front and rear heads 2 and 3, thereof, are riveted to the shell and connected one to another by means of stay bolts 4.

The two furnaces are indicated by the reference numerals 5 and 6, respectively, and consist of corrugated cylinders extending longitudinally within the shell 1, communicating at their front ends through the boiler head 2, and at their rear into a com-

bustion chamber 7. A plurality of horizontal fire tubes 8, communicate with said combustion chamber 7, and also through the front head 2, of the boiler, the products of combustion from the furnaces flowing through said combustion chamber and thence through said tubes and leaving the boiler through a connection 9, to the stack.

My invention consists of a flat plate 10, having a downwardly curved portion 11, integral therewith, with a lip 12, formed around the upper and side edges of said plate. Said plate is positioned over the outermost rows of tubes on each side of the boiler, as clearly shown in Fig. 2, and is clamped securely upon certain of the upper rows of tubes although spaced therefrom, by means of T-bolts 13, which engage beneath the tubes and are held adjustably in place by a nut. In order to hold said baffle plate spaced from the boiler tubes at all points therearound, a plurality of straps 14, are provided, which may or may not, as desired, be attached directly upon the baffle plate, but which, at their upper ends, are provided with a curved inwardly turned portion 15, which bears upon one of the tubes of the boiler. Said T-bolts 13, extend through apertures provided in said straps 14, so that, together with the baffle plate, said straps are clamped tightly downwardly upon the tubes by said T-bolts.

In the form of device shown in Fig. 3, an opening is provided in the plate 10, near the point of junction with the integral portion 11, thereof, and communicating therethrough is a rectangular shaped pipe 16, which, at its upper end, opens into a compartment 17, the upper end of the compartment opening into the steam space of the boiler. A long curved pipe section 18, is constructed integral therewith, communicating into said compartment and leading downwardly along the shell of the boiler to the bottom thereof, as clearly shown in Figs. 1 and 2.

In the form shown in Fig. 4, however, the downwardly directed pipe 18, and communicating portions thereof which are connected through said plate 10, are omitted, and merely the baffle plate members 10—11, are used.

The operation is as follows: Where the baffle plates only are used, as shown in Fig. 4, that portion of the water around the outermost of the tubes is trapped to an extent causing the same to flow toward the center of the boiler and then upwardly, and similarly the steam disengaged from the water around said tubes must flow to one side toward the center of the boiler, in order to pass around the baffle plate. This tends to set up a circulation of the water, which is greatly assisted by the fact that the water on the outside of the baffle plate is adjacent the shell 1, of the boiler, which of course, is cooler than other parts of the boiler. Consequently the water adjacent the shell, while not cold, is at a lower temperature than that trapped around the tubes, and a thermo-siphon flow is set up in the direction of the arrows shown.

The downward flow of the water around the shell of the boiler may be greatly assisted by using that form of device shown in Fig. 3, that is, with the long curved pipes 18, leading from the upper side of the baffle plates downwardly to the bottom of the boiler. In the construction a part of the water and steam trapped beneath the baffle plate, finds its way upwardly in the pipe extension 16, into the compartment 17, where the steam is disengaged, and due to the flow thereinto of said water and steam, the water level is slightly above the normal water level in the boiler, as clearly shown in Fig. 3. This head of water, due to the fact that the pipe 18, is adjacent the shell of the boiler, therefore in a cooler position than other portions of the boiler, causes a downward flow to take place through the pipe 18, as indicated by the arrows. Furthermore a downward flow of the water surrounding said pipe 18, in the boiler, takes place, as in the construction previously described, this secondary flow also indicated by arrows. The device greatly improves the steaming efficiency of the boiler, and the poor circulation which has always existed heretofore in this type of boiler, is overcome.

It is obvious that the baffling device may be readily moved or adjusted into various positions in the boiler, and as shown in Fig. 1, both constructions described may be used simultaneously.

I am aware that various details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted otherwise than necessitated by the prior art.

I claim as my invention:

1. The combination of a Scotch marine type of boiler, of a baffle plate attached to the outermost tubes therein, causing the heated water around the tubes to flow inwardly and upwardly within the boiler, and the water adjacent the shell to flow downwardly to the bottom thereof.

2. In a device of the class described the combination with a marine boiler and its tubes, of baffle plates secured over the outermost rows of tubes, said baffle plates having a flat horizontal portion and a downwardly curved portion, acting to cause the heated water around the tubes to flow inwardly and upwardly within the boiler shell and the water adjacent the boiler shell and between the same and the baffle plates to flow down-

wardly to the bottom of the boiler, and hooked means to hold said baffle plates faced from said tubes.

3. In a device of the class described a baffle plate secured over the tubes in a boiler, of a long pipe connection communicating through said baffle plate and leading downwardly to the bottom of the boiler around and adjacent the shell thereof to cause a thermo-siphon flow of water to take place upwardly through the tubes and downwardly through said pipes to the bottom of the boiler.

4. In a device of the class described a pipe secured over the upper tubes of a boiler to extend along the shell thereof from the upper side of the boiler to near the bottom thereof, and means coacting therewith to set up a thermo-siphon flow within the boiler, the cooler water flowing downwardly through said pipe.

5. In a device of the class described the combination with a Scotch marine type of boiler, of baffle plates secured detachably over certain of the tubes therein and extending downwardly therearound, and a pipe connected through said baffle plate and extending downwardly within the boiler constraining a thermo-siphon flow to take place upwardly through the boiler and downwardly through said pipes.

6. The combination with a Scotch marine type of boiler, of baffle plates detachably secured over the tubes therein, separating compartments connected with said plates, and pipes integral with said compartments and coacting therewith to produce a thermo-siphon flow within the boiler.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

ALFRED A. OLSON.

Witnesses:
CHARLES W. HILLS, Jr.,
FRANK K. HUDSON.