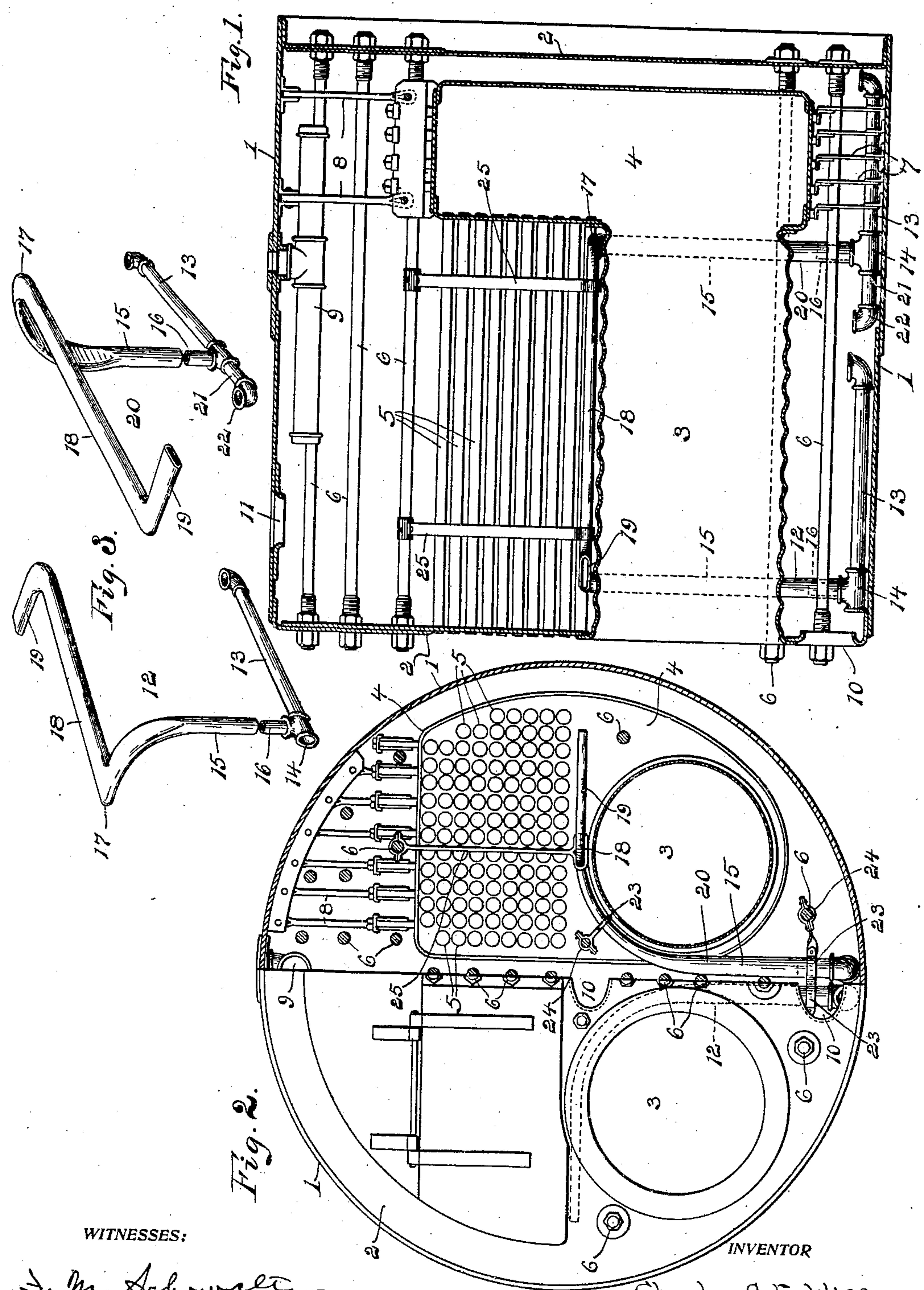


939,991.

C. C. ECKLIFF.
WATER CIRCULATOR FOR BOILERS.
APPLICATION FILED NOV. 28, 1908.

Patented Nov. 16, 1909.



WITNESSES:

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UNITED STATES PATENT OFFICE.

CHARLES C. ECKLIFF, OF GRAND HAVEN, MICHIGAN.

WATER-CIRCULATOR FOR BOILERS.

939,991.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed November 28, 1908. Serial No. 464,830.

To all whom it may concern:

Be it known that I, CHARLES C. ECKLIFF, a citizen of the United States of America, residing at Grand Haven, in the county of
5 Ottawa and State of Michigan, have invented certain new and useful Improvements in Water-Circulators for Boilers, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to improvements in water circulators for boilers and more particularly to such devices especially adapted for boilers of the Scotch Marine and similar types in which it is found that there are
15 parts of the boiler where the water does not circulate freely and rapidly thus causing an unequal distribution of heat and consequent unequal expansion of the shell resulting in breakage of stay bolts and injury to the
20 parts, rendering the boilers unsafe.

The object of this invention is to provide a cheap and efficient water circulator for such boilers which may be very readily placed in boilers already in use without any
25 change whatever in the boiler or in any way affecting its operation or efficiency.

A further object is to provide a device which is automatic in its operation and is adapted to be detachably supported wholly
30 within the water space where it cannot be tampered with by inexperienced persons.

It is also an object of the invention to provide certain other new and useful features all as hereinafter more fully described, reference being had to the accompanying
35 drawing, in which:—

Figure 1 is a longitudinal vertical section of a boiler of the Scotch Marine type, in which is shown a water circulating device
40 embodying the invention; Fig. 2 is a view of the same partly in end elevation and partly in section; and Fig. 3 is a detail showing the several parts of the device detached and in perspective.

45 In the drawings 1 represents the cylindrical shell of the boiler and 2—2 the heads closing the ends thereof.

3—3 are the tubular fire chambers opening through the front head and at the rear
50 ends of which are the combustion chambers 4, and 5 are the tubular flues above the fire chambers opening into the upper ends of the combustion chambers at one end and through the front head at their opposite
55 ends, all constructed and arranged in the ordinary and well known manner. The usual

stay bolts 6 are provided to strengthen the boiler where necessary, 7 and 8 are supports and hangers for the combustion chamber, and 9 is the usual skimmer supported in
60 the upper part of the boiler. The ordinary manholes 10 and 11 are provided in the front head and top of the boiler so that access may be had to its interior.

This invention consists in providing tubes
65 or piping so constructed and arranged that they may be inserted through the manholes into the interior of the boiler and detachably secured therein to take in water from the lower portion of the boiler, heat it and
70 discharge it into the upper part thereof, said circulator 12 consisting of a horizontal tube or pipe 13 adapted to lie upon and extend longitudinally of the bottom of the boiler, a tee 14 secured to one end thereof
75 and a vertically extending pipe 15 which is detachably attached to the tee at its lower end by a nipple 16 in the tee adapted to fit within the lower end of said pipe 15. Said pipe preferably extends upward alongside
80 the fire chamber or furnace near one end thereof and is bent to the arc of said furnace, then formed with a short bend at 17 and extended longitudinally along and close to the upper side of the furnace in a
85 straight run 18 to near the opposite end thereof where it is again bent forming the laterally extending end 19 open toward the side of the boiler. This tube or pipe 15 is preferably flattened where it lies close to
90 the furnace so as to present a greater heating surface thereto and the end of the horizontal pipe 13 is preferably provided with an elbow turned to open upward, said elbow and the tee 14 being open to permit the wa-
95 ter to freely enter the pipe and pass up the pipe 15.

Preferably, the pipe 13 extends rearwardly to about the center of the boiler and a second circulator 20 is provided for the rear
100 half of said boiler. Said circulator 20 is substantially the same as the other except that its vertical pipe 15 extends upward alongside the fire chamber adjacent to the combustion chamber and is bent and ex-
105 tended forwardly along the upper side of the fire chamber and then laterally adjacent to the front boiler head, toward the side of the boiler. Its tee 14 is also provided with a short forwardly extending pipe 21 having
110 an elbow 22 on its forward end. Where there are two fire chambers in the boiler, as

shown in the drawings, the circulators are preferably so formed and arranged that one will extend upward between the chamber near the front boiler head and then rearwardly along one of the said chambers, and the other circulator will extend upwardly between said chambers adjacent to the combustion chamber then forwardly along the top of the other fire chamber to near the boiler head, then laterally toward the adjacent side of the boiler.

These circulators may be readily placed in a boiler which is in use or a finished boiler, as they may be easily inserted through the manholes and the pipe 15 slipped over the nipple 16 to connect the same. When in place the pipes are detachably secured in place in any suitable manner as by clips 23 on the pipe and stays 24 secured to the adjacent stay bolts. To support the pipe 15 in proper relation to the furnace, hangers 25 may be secured to the stay rods in the upper part of the boiler.

The water in the lowest part of the boiler where the horizontal pipes 13 are located is coolest and the water in each side of the boiler or the space into which the upper ends of the pipe 15 open is comparatively cool. The middle portion of the pipes 15 lie close to the top or hottest part of the furnace and the water contained in that portion of said pipes is very rapidly heated and thus causes a circulation through the pipes, drawing in the cool water through the pipes 13 and discharging it in a very hot condition laterally into the cool water spaces at each side of the boiler, thus inducing a complete circulation which will heat all parts of the boiler alike and prevent unequal expansion.

What I claim as my invention is:—

1. A boiler, a fire chamber extending into said boiler, a pipe opening at one end into the lower part of the boiler and extending upward therein over the fire chamber and thence longitudinally of the fire chamber

and laterally thereof, said pipe lying close to the top of the fire chamber and being flattened to present an increased heating surface to the heat from the fire chamber, and means for detachably and removably supporting said pipe within the boiler.

2. A boiler, a fire chamber in the boiler, a pipe extending longitudinally within the lower part of the boiler and open at its ends, a pipe extending vertically upward from the horizontal pipe and over the fire chamber, and a nipple on the horizontal pipe projecting into the lower end of the vertical pipe to detachably connect said pipes.

3. A boiler, a fire chamber extending into said boiler, horizontally extending pipes in the lower part of said boiler having open ends, vertically extending pipes detachably connected to said horizontal pipes at their lower ends and extending upward therefrom, one near the forward end of said fire chamber and the other near the rear end thereof and said vertical pipes being extended over and longitudinally of said fire chamber in opposite directions and thence each extended laterally from said chamber in opposite directions toward the sides of the boiler.

4. A boiler, a cylindrical fire chamber extending into said boiler, pipes opening at their lower ends into the lower part of the boiler and extending upward therein, one near each end of the fire chamber and bent to the arc of said chamber to extend over the same, thence extended longitudinally of said chamber and laterally at its upper end, said pipes being flattened throughout their portions which lie adjacent to the fire chamber, and means for detachably supporting said pipes within the boiler.

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

CHARLES C. ECKLIFF.

Witnesses:

WM. L. PHILLIPS,
SAML. THURSTON.