

(No Model.)

R. MUNROE & R. MUNROE, Jr.
WATER TUBE BOILER.

No. 478,756.

Patented July 12, 1892.

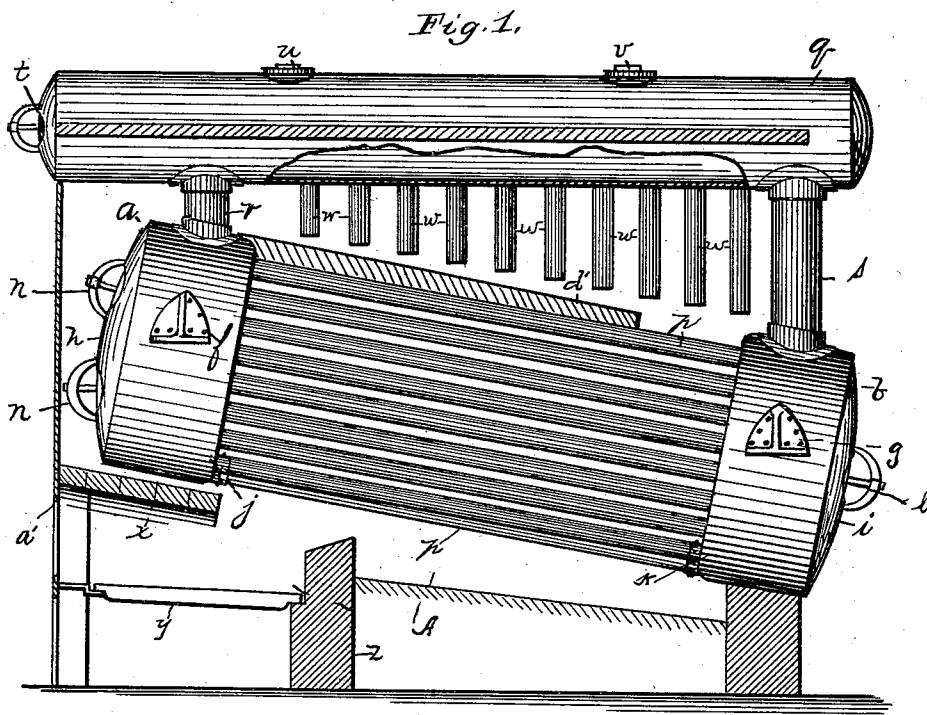


Fig. 2.

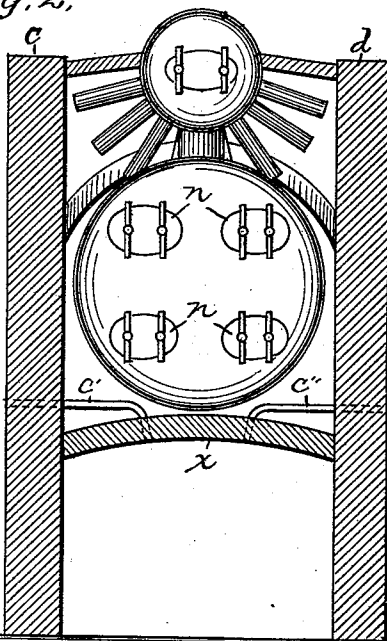


Fig. 3.

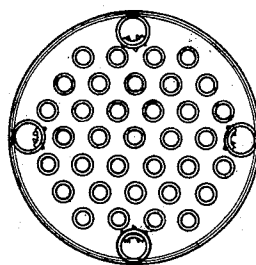
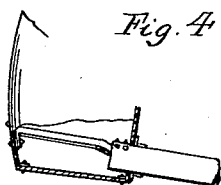


Fig. 4.



Witnesses:

H. E. Harrison.
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UNITED STATES PATENT OFFICE.

ROBERT MUNROE AND ROBERT MUNROE, JR., OF ALLEGHENY,
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WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 478,756, dated July 12, 1892.

Application filed March 21, 1892. Serial No. 425,659. (No model.)

To all whom it may concern:

Be it known that we, ROBERT MUNROE and ROBERT MUNROE, JR., citizens of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Water-Tube Boilers; and we do hereby 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 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, in which—

Figure 1 indicates a side elevation, partly in section, of our improved combination water-tube boiler. Fig. 2 is a front elevation, partly in section, of the same. Fig. 3 is an elevation of one of the tube-sheets. Fig. 4 is a portion of one of the tube-cylinders broken away to show manner of attaching tube therein.

Our invention relates to combination water-tube steam-boilers; and our object is to produce a boiler simple in construction, efficient in operation, and economic and ready in generating steam, and in which any of the series of tubes therein can be speedily and cheaply removed and new tubes substituted, and we believe we accomplish this by the device, which consists of a series of tubes suitably nested in heads, the front head having four or more independent manholes, a steam-drum located above and connected at the front and rear with said water chambers, respectively, and having series of downwardly-projecting tubes and other features of construction hereinafter more specifically described, reference being had to the accompanying drawings, forming part hereof, in which like letters indicate like parts wherever they occur.

Referring to said drawings, *a* and *b* are respectively front and rear tube-cylinders, supported above the furnace *A* and within the walls *c* and *d* of the same by the lugs *f* and *g*, secured upon the sides of said cylinders. Said cylinders *a* and *b* consist, respectively, of the front walls or heads *h* and *i* and the tube-sheets *j* and *k*, forming the rear walls thereof. Said head *i* is provided with one manhole *l*,

located in the center of the same and adapted to be closed in any suitable manner, and the front head with four independent manholes *n n n n*, whereby easy access may be had to the series of tubes *p p p p*, connecting said tube-cylinders, said tubes being expanded or otherwise suitably secured in the series of orifices in said tube-sheets, formed therein in series parallel in every direction, excepting vertically, thus enabling easy and thorough inspection thereof for the purpose of locating leaks, &c., the lower, upper, and extreme side tubes being of greater diameter than the rest, the ends thereof projecting a slight distance into said tube-cylinders and secured therein by rivets, as shown in Fig. 4, the ends of said tubes being also provided with flat straps secured thereto and to the inner surfaces of said heads, as shown in said figures, for the purpose of thoroughly bracing the same.

q is a steam-drum located above and connected with said tube-cylinders at the front and rear ends, respectively, by the necks *r* and *s*, respectively, said neck *s* being of somewhat less diameter, but of much greater length than said neck *r*, whereby said steam-drum is maintained in a horizontal position and complete circulation of water secured. Said drum is provided with the manhole *t* and suitable connections *u* and *v* upon the upper side of the same, also with a series of downwardly-projecting tubes *w w w w*, which increase in length toward the rear of said drum, as shown in Fig. 1.

x is a wall across the furnace *A* above the grate-bars *y*, which are supported in the bridge-wall *z* and the fire-front *a'* of the furnace, respectively, said wall terminating slightly at the rear end of the tube-cylinder *a*, and is provided with orifices *b' b''* for the reception of pipes *c'* and *c''*, which extend from the exterior of said furnace for the admission of air thereto. *d'* is an arch above said tubes, extending from the front of the same and terminating a slight distance from the rear thereof, whereby the flame and products of combustion are conducted and enabled to act upon the tubes, drum, and its series of downwardly-projecting tubes, the tile *m*, which extends from side to side of said furnace and its en-

tire length, serving to confine the flame or heat in the chamber above the tubes before passing out of the chimney.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a water-tube boiler, the combination of the front and rear tube-cylinders, the former having four or more and the latter one man-
 10 hole located therein and adapted to be closed in any suitable manner, tube-sheets forming the rear walls of said cylinders and provided with series of orifices parallel in every direction, except vertically, and a series of tubes
 15 suitably secured in said orifices and connecting said tube-cylinders, and a steam-drum connected with said water-chambers and having a series of downwardly-projecting tubes, substantially as and for the purpose herein
 20 set forth.

2. In a water-tube boiler, the combination of the front and rear tube-cylinders, the former having four or more and the latter one man-
 hole located therein and adapted to be closed
 25 in any suitable manner, tube-sheets forming the rear walls of said cylinder and provided with series of orifices parallel in every direction, except vertically, and a series of tubes

suitably secured in said orifices and connecting said heads, the upper, lower, and extreme
 30 side tubes being of greater diameter than the rest and projecting into said heads and suitably secured therein, and a steam-drum connected with said water-chambers and having
 35 a series of downwardly-projecting tubes, substantially as and for the purpose herein set forth.

3. A boiler-setting consisting of the furnace A, provided with an arch *x*, extending from side to side, the frame above the grate-bars, a
 40 bridge-wall *z*, an arch *d'* above said tubes, terminating a slight distance from the rear ends thereof, and a tile extending from side to side of said furnace its entire length, in combination with the air-admission pipes *c'* and *c''*,
 45 substantially as and for the purpose herein described.

In testimony that we claim the foregoing we hereunto affix our signatures this 8th day of March, A. D. 1892.

ROBERT MUNROE. [L. S.]
 R. MUNROE, JR. [L. S.]

In presence of—
 R. W. MILLER,
 O. E. SHIELDS.