(No Model.)

A. C. WALWORTH & C. W. NASON.

STEAM BOILER.

No. 439,261. Patented Oct. 28, 1890.

Fig. 1.

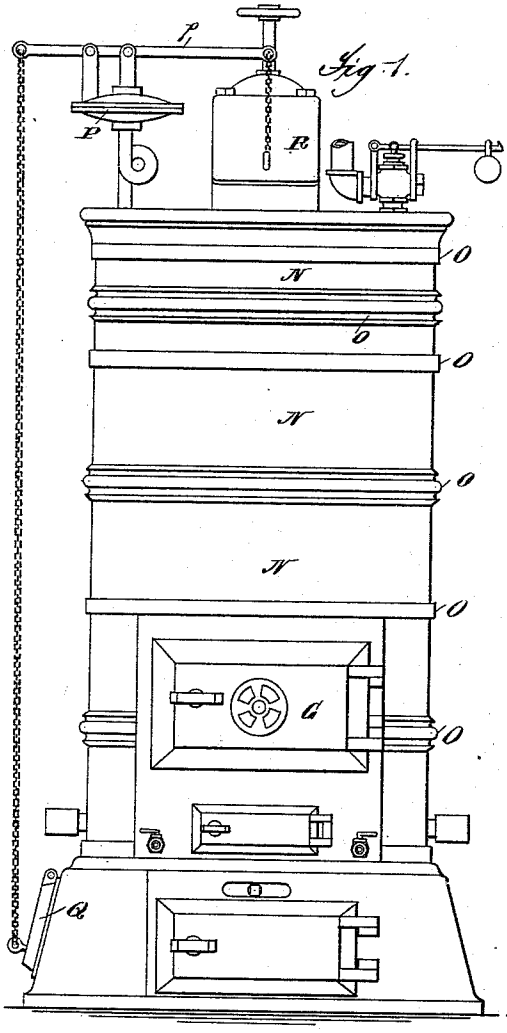


Fig. 2.

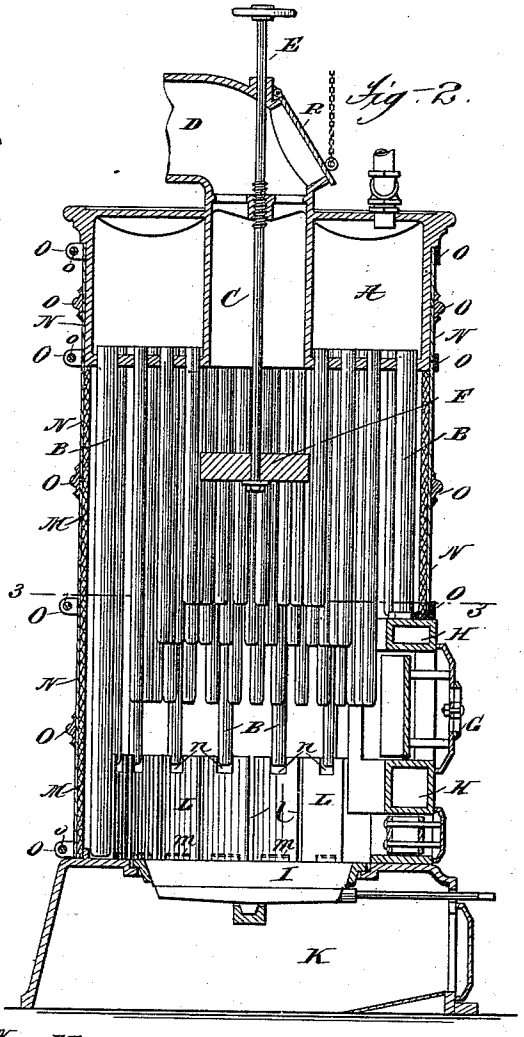


Fig. 4.

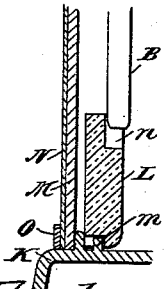
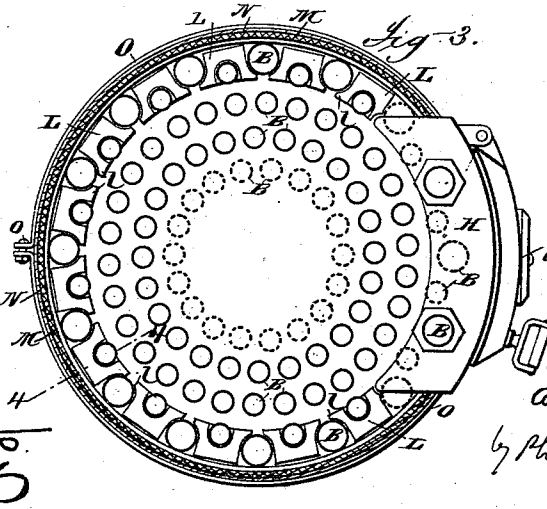


Fig. 3.



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UNITED STATES PATENT OFFICE.

ARTHUR C. WALWORTH, OF NEWTON, MASSACHUSETTS, AND CARLETON W. NASON, OF NEW YORK, N. Y.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 439,261, dated October 28, 1890.

Application filed November 22, 1889. Serial No. 331,213. (No model.)

To all whom it may concern:

Be it known that we, ARTHUR C. WALWORTH and CARLETON W. NASON, citizens of the United States, residing, respectively, at Newton, Middlesex county, State of Massachusetts, and in the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Boilers, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to that class of boilers known as "drop-tube" boilers, in which the water-tubes depend from the steam-drum and are closed at their lower ends, it being the object of the invention to provide a boiler of this class which shall be more perfect in its construction and economical in its operation than those heretofore in use.

To that end the invention consists in various details in construction and combinations of parts, which can only be fully understood by an illustration and a detailed description of a boiler embodying said improvements. All further preliminary description will therefore be omitted and a detailed description of the improvements given, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of a boiler of the class referred to, embodying the present invention. Fig. 2 is a vertical sectional elevation of the same. Fig. 3 is a horizontal section taken on the line 3 of Fig. 2. Fig. 4 is a sectional detail taken on the line 4 of Fig. 3.

Referring to said drawings, it is to be understood that as to its general construction and organization the boiler is substantially the same as those heretofore in use and constituting the general class of drop-tube boilers.

Located at the top of the boiler is the steam chamber or drum A, the bottom of which is perforated to receive the ends of the vertical tubes B, which are suspended from the bottom of the drum. The tubes B are arranged in concentric rows, the outer row of tubes being of larger diameter than the others, and the tubes decrease in length from the outer to the inner row, so as to form a dome-shaped space at the bottom of the boiler, which constitutes the fire-box or furnace. The tubes B are closed at their lower ends and open at their upper ends, as is common in this class of boilers, the tubes being provided with the usual longitudinal diaphragms to insure circulation. Passing upward through the center of the steam-drum, and communicating at its lower end with the furnace portion of the boiler inside the inner row of tubes, is a flue C, which communicates at the top of the boiler with the chimney D. Passing downward through the flue C is a threaded rod E, which carries at its lower end a horizontal baffle-plate F, which is located within and substantially fills the space inside the inner row of tubes. This baffle-plate operates to deflect the flame and hot gases arising from the fuel in the furnace laterally, and cause them to pass between and circulate among the depending tubes instead of passing directly upward into the flue C. This plate is adjustable by means of the threaded rod E, so that it can be located at different distances from the lower end of the flue, and thus vary the point at which the flame and hot gases from the furnace are deflected among the tubes as the different working conditions of the boiler may require.

The furnace is provided upon one side with the usual door G for the introduction of fuel, and this door is surrounded by a water-circulating passage H, which communicates with the steam-drum and is kept supplied with water by means of one or more of the outer row of tubes B, with which it communicates, as best shown in Fig. 3. The boiler is provided with the usual grate I, beneath which is a space K, forming the ashpit.

In order to protect from the extreme heat of the furnace the lower ends of the outer row of tubes, which extend downward to a point on a level with the grate, they are protected by suitably-formed pieces of fire-brick L, which fit in between the tubes and are provided upon their inner faces with flanges *l*, which project so as to partially but not wholly cover the inner sides of the tubes and protect them from the heat of the furnace. For the purpose of maintaining these brick in position, the bottom of the furnace is provided with an annular flange *m*, (see Fig. 4,) which

fits into recesses in the lower ends of the brick, while the upper ends of the brick are provided with recesses *n*, (see also Fig. 4,) into which project the lower ends of the next row of tubes, thus preventing the brick from moving inward from their proper position. In order to remove any one or more of the brick, it is only necessary to raise it until it is clear of the flange *m*, and then move its lower end inward until it is free from the tube which holds its upper end in place.

The boiler-casing which surrounds the tubes is preferably made of sheet metal provided with an asbestus lining M; but a casing of any other suitable construction may be used. In many cases it may be desirable to brick in the furnace and boiler, and such a construction, common with boilers of this general class, we intend to cover by the general term "casing." The sheet-metal casing, preferably, is made up of horizontal rings or sections N, the abutting edges of which are covered by bands O, which are provided with bolts *o*, by which they are clamped together around the sections of the casing so as to hold them in place. By loosening the bolts *o* the bands can be slipped up or down, and thus permit the removal of any one or more of the sections N, to gain access to the asbestus or to the interior of the boiler, if desired.

The boiler, as herein shown, is provided with an ordinary diaphragm-regulator P, the lever of which is connected to the draft-door Q of the ashpit, and also with a draft-door R, located in the side of the chimney D. The operation of this regulator is the same as usual. When the pressure in the boiler falls back to the normal point, the regulator will operate its lever to close the door R and open the door Q, thus admitting a draft to the furnace.

What we claim is—

1. The combination, in a drop-tube boiler, of the vertical water-tubes decreasing in length from the circumference toward the center of the boiler, and the blocks of fire-brick arranged around the circumference of the fire-box to protect the lower ends of the longest tubes, substantially as described.

2. The combination, in a drop-tube boiler, of the vertical water-tubes surrounding the fire-box, and the blocks of fire-brick arranged to fit in between the tubes and having flanges *l* to overlap and partially cover and protect the tubes, and also arranged to fit in behind and be held in place by the shorter tubes, substantially as described.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

ARTHUR C. WALWORTH.
CARLETON W. NASON.

Witnesses as to signature of Arthur C. Walworth:

APPLETON W. SMITH,
CHAS. F. FLETT.

Witnesses as to signature of Carleton W. Nason:

SAMUEL A. NASON,
CHAS. E. CORYELL.