F. MATHEWS.

STEAM-BOILER.

No. 188,301. Patented March 13, 1877.

FIG. 1.

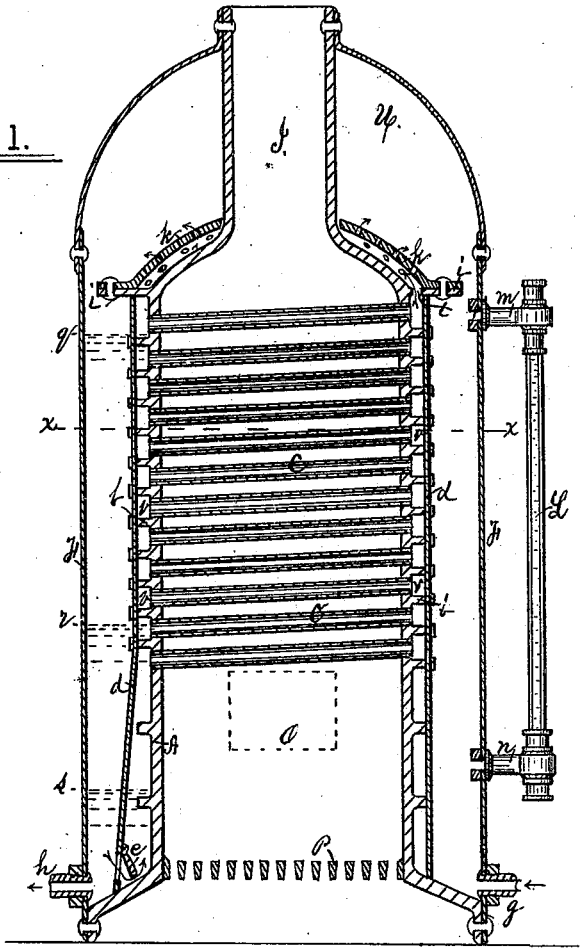
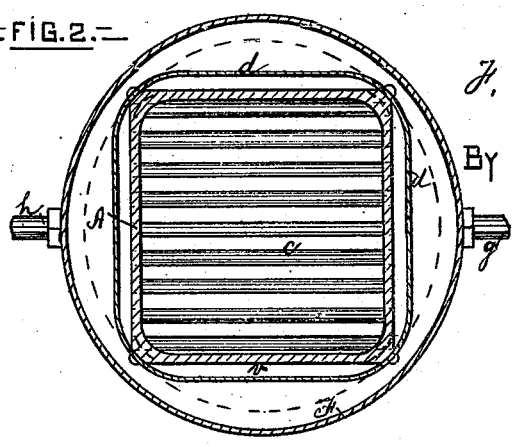


FIG. 2.



WITNESSES.

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FRANCIS MATHEWS, OF NEW ORLEANS, LOUISIANA.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **188,301**, dated March 13, 1877; application filed October 7, 1876.

To all whom it may concern:

Be it known that I, FRANCIS MATHEWS, a resident of the city of New Orleans, parish of Orleans, and State of Louisiana, have invented a certain new and useful Improvement in Steam-Boilers; and I do hereby declare the following to be a full, clear, and correct description of the same, reference being had to the annexed drawing, making a part of this specification.

The object of my invention is to produce a steam-generator that shall possess perfect immunity from dangerous explosions, and yet perform economically the functions of an ordinary steam-boiler.

The nature of my invention will be readily understood by referring to the accompanying drawing, on which—

Figure 1 represents a section of a vertical boiler constructed after my improved plan, and Fig. 2 a cross-section through the line *x x* thereof.

The novelty of my invention consists mainly in providing the outside of a cast-iron box or shell, A, with a spiral thread or flange, *b*, the recesses *v* of which are connected from one side of the box to the other with rows of inclined tubes *c*. Over the edge of the thread or flange is neatly and securely fitted a steel casing, *d*, the bottom of which is provided on one of its sides with a self-acting valve, *e*, through which water is admitted from an outer casing, F, having at the lower part of one of its sides a feed-pipe, *g*, and its opposite side a blow-off pipe, *h*.

The upper part of the fire or tube box forms a dome, from the top of which rises a chimney, I, which is secured at its top by means of rivets, as shown, to the upper portion of the outer casing.

At the spring of the dome, and around the outer side of the box A, is a flange, *i*, to which is secured a perforated plate, *k*, the object of which will presently be described.

L is a gage, which is secured to the side of the outer casing by hollow stems *m n*, for showing the height of water contained in the boiler, the furnace-door of which is shown in dotted lines at O, and the grate-bars at P.

The top or ordinary line of water is shown at *q*, and the safety-line at *r*, and the danger-line at *s*.

The operation of my invention is as follows: The boiler being filled with water to the ordinary height, *q*, and the fire lighted, the steam, as rapidly as it is generated in the tubes passes out at their upper ends into the spiral grooves *v* of the box A, to be conveyed half-way round the said box to the lower ends of the next upper tier or row of tubes, thereby imparting motion to the heated water, and causing the same to circulate through the tubes and around the box until it finally passes up through the space *t*, as shown by arrows, into the plate *k*, through the perforations of which it escapes, and is liberated from the steam; the latter passing upward into the top of the dome U, and the former, running over the surface of the perforated plate and flange thereof, by gravitation, falls to the level of the water contained in the outer casing, mixing with and increasing the temperature of the same.

From the above description it will be seen that the water is kept in constant circulation, and that my invention presents a much greater amount of heating-surface than can be obtained by boilers as heretofore constructed.

It is also evident that the same plan may be adopted for use in horizontal boilers, and that the pressure is such that no explosion can possibly occur, from the fact that the steam and water circulate on the outer side of the box-casing, as well as in the grooves thereof.

Having described my invention and its mode of operation, what I claim as new, and desire to secure by Letters Patent, is—

The improved boiler or steam-generator herein described, consisting of a rectangular fire-box, A, having inclined tubes *c*, spiral grooves *v*, and casings *d* and F, as described, and for the purpose set forth.

F. MATHEWS.

Witnesses:

R. F. FORNARIS,

F. J. ROACH.