D. Flynn,

Steam Boiler.

No. 109,195. Patented Nov. 15. 1870.

Fig. 1.

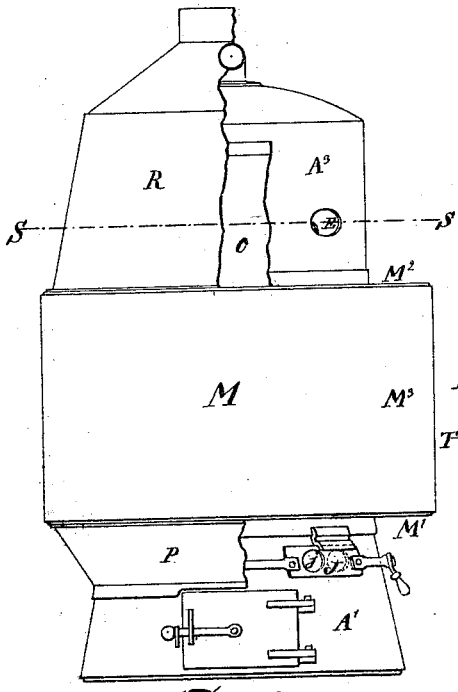


Fig. 2.

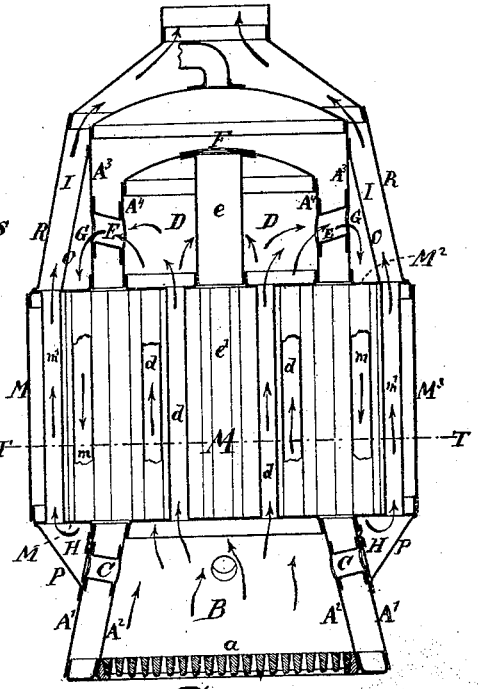


Fig. 3.

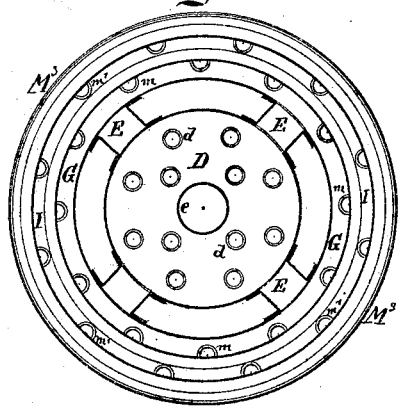
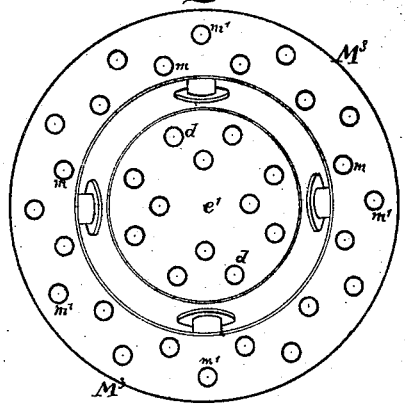


Fig. 4.



Witnesses.

A. Hoermann.

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UNITED STATES PATENT OFFICE

DANIEL FLYNN, OF FALL RIVER, MASSACHUSETTS.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **109,195**, dated November 15, 1870.

To all whom it may concern:

Be it known that I, DANIEL FLYNN, of Fall River, in the county of Bristol and State of Massachusetts, have invented new and useful Improvements in Steam-Boilers; and I do hereby delare that the following is a full and exact description thereof.

My invention relates, mainly, to an enlargement near the middle height of the boiler, and to the arrangement of flues and chambers relatively thereto.

I will proceed to describe what I consider the best means of carrying out my invention.

The accompanying drawing forms a part of this specification.

Figure 1 is a side elevation of the entire boiler, with a portion of the slight casing which incloses certain portions broken away to show the strong boiler-shell proper. Fig. 2 is a central vertical section through the entire boiler. Fig. 3 is a horizontal section on the line S S in Fig. 1. Fig. 4 is a horizontal section on the line T T in Fig. 2.

Similar letters of reference indicate like parts in all the figures.

My boiler is of the general style known as "upright tubular," but with provisions for returns and for mixing the gases and utilizing all the heat, and also for giving a large water-surface or separating-surface for the ultimate disengaging of the steam without carrying up water into the steam-pipes. Its chief peculiarity lies, as before remarked, in the enlargement or belt around the waist or middle height of the boiler, which is inclosed within and forms a portion of the boiler-shell, and in its relation to the provisions for returning the gases, and to the several other parts, contributes to produce a boiler remarkably efficient, free from weak or dangerous characteristics, and giving a liberal grate-surface and liberal disengaging-surface, and withal very compact, durable, and easily accessible for repairs when such are required.

The drawing represents the most complete and perfect form of the invention.

The grate is marked *a*, the exterior shell of the lower portion, A^1, the corresponding interior shell, A^2, the interior of the upper portion, A^3, and the interior shell, somewhat corresponding thereto, A^4.

M^1 M^2 M^3 is the enlargement referred to around the middle of the boiler. It is connected to the parts A^1 and A^3 by horizontal or nearly horizontal sheets M^1 M^2, which are traversed by vertical or nearly vertical tubes *m*, as represented. These tubes utilize the remaining heat in the gaseous products of combustion.

The gases, after having imparted a portion of their heat, in the ordinary manner, in the other portion of the boiler, are retained by a conical casing, O, which incloses a space, G, above the enlargement, and are compelled to descend through the tubes *m*. On emerging at the base of the enlargement they are received in an annular chamber, H, within a conical casing, P, and rise therefrom through other tubes, *m'*, to the thin chamber or space I, within an exterior casing, R, around the upper portion, and conducted to the chimney at the apex.

I will, for convenience, designate by the single letter M the entire enlargement of the boiler around the waist. This includes the annular tube-sheets M^1 M^2, the exterior cylindrical portion M^3, and the entire contents included between the outer sheet, M^3, and an imaginary continuation downward of the upper portion, A^3.

It will be observed that the grate *a* is of larger area than could be afforded if the lower portion of the boiler were cylindrical. The lower portion is conical, thus producing a conical furnace, which is not in itself new, but is highly conducive to the success of the boiler, in connection with the other features.

From the furnace B the gases rise through tubes *d* into a mixing-chamber, D, thence flow radially outward through passages E into the space G, before described, inclosed within the casing O. Here they dive through the tubes *m*, and reascend through the tubes *m'*, to be retained a moment around the upper portion of the boiler, where they contribute to dry the steam by the moderate heat remaining without endangering a possibility of overheating the metal at that point.

Some of the advantages of my invention may be secured by using all the tubes in the enlargement for the descent of the gases therein, in which case there may be but one series, *m*, and

the products of combustion may be allowed to ascend within a thin casing (not represented) on the exterior of the enlargement.

So far I have said nothing of the provisions for a central column of water, and for a central connection through the mixing-chamber. The tubes *d* are omitted in the center, thus leaving a column of water, *e'*, in the center, which is made continuous through the mixing-chamber by means of a large pipe, *e*. There is a strong tendency for the steam to rise through this column and descend at the sides. I prevent this current from becoming too violent, so as to throw up water into the steam-pipe, by covering the top of the pipe *e* with a perforated plate, F.

I provide for shortening the route of the gaseous products of combustion, when required, in kindling fires or at other times, by means of a movable conical ring, J, with apertures *j*, mounted, as represented, within the lower smoke-chamber, H, and controlling the passage of the gases directly from the furnace into such chamber through the short pipes or passages C, provided at the sides of the furnace. Under ordinary conditions this ring is turned so as to close the passages and compel the gases to follow the circuitous route indicated by the arrows; but, when necessary, I can open the passages C by moving the ring J, and allow a large proportion of the gases to flow directly into the chamber H, and thence upward to the chimney.

It will be observed that my enlargement M is easily accessible on its upper side by removing the slight casing O, and on its lower side by removing the slight casing P. It is thus a part of the main boiler in every sense, with tubes for heating effect, while its peculiar arrangement induces but a very slight increase in the cost of the boiler or in the space occupied thereby.

The casing O has the hot gases on both sides of it, yet never at a very high temperature. After seven months' use it retains its form as perfectly as when new.

I claim—

1. The enlargement M in the waist or middle height of an upright tubular boiler, in combination with means, E, for conducting the hot products of combustion outward beyond the shell of the boiler above such enlargement, and with means, *m m'*, for utilizing the heat remaining, substantially as herein set forth.

2. In combination with the enlargement M and tubes *m* around the middle height of the boiler, the movable ring J *j*, controlling passages C, for the more direct flow of the products of combustion thereto when required, as set forth.

3. The perforated plate F, the central tube, *e*, and the space *e'* for the water-column below, arranged as shown relatively to each other and to the mixing-chamber D, for the purposes set forth.

4. The general arrangement of the entire boiler, having a large grate and conical furnace, vertical flues or tubes for the rise of the gases from the furnace, a mixing-chamber receiving the gases from such tubes, radial passages E, discharging the gases from such mixing-chamber, upper annular space, G, imprisoning the gases after such radial discharge, the enlargement M, with the descending tubes *m* therein, lower annular chamber, H, receiving the gases and turning them again upward, provisions, *m'*, for the conveyance of the gaseous products upward to the chimney, and enveloping the upper portion of the boiler, and the apertures C and controlling means, J, for affording a more direct draft when desired, all constructed, combined, and arranged for joint operation, to form the boiler, substantially as herein set forth.

5. The casings O and P, arranged as shown relatively to the enlargement M and to the boiler-shell, above and below, and to the passages for the gaseous products of combustion, for the purposes herein set forth.

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

DANIEL FLYNN.

Witnesses:

CHAS. A. BENNETT,

S. H. BARNARD.