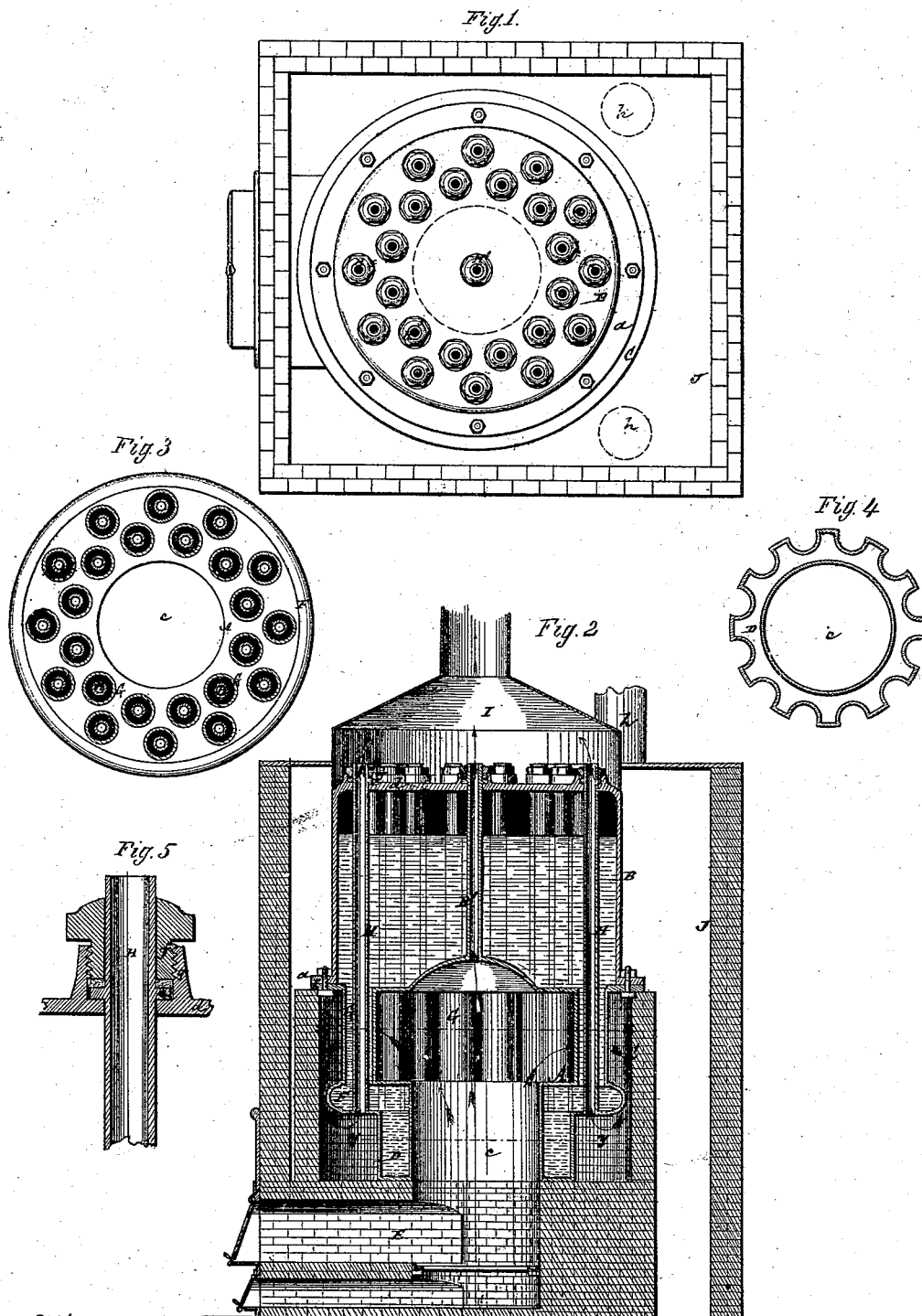


J. L. FRISBIE.
STEAM BOILER.

No. 111,191.

Patented Jan. 24, 1871.



Witnesses
Fred. Hoyer
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JOHN L. FRISBIE, OF BROOKLYN N. Y., ASSIGNOR TO MARSHALL T DAVIDSON, OF SAME PLACE.

Letters Patent No. 111,191, dated January 24, 1871.

IMPROVEMENT IN STEAM-BOILERS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that I, JOHN L. FRISBIE, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Steam-Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a plan view of a steam-boiler constructed according to my improvement, with the smoke-box removed;

Figure 2, a central vertical section of said boiler;

Figure 3, a horizontal section, taken as denoted by the line *x x*, in fig. 2; and

Figure 4, a further horizontal section through the line *y y*.

Figure 5 is a view on a larger scale, showing the mode of securing the smoke-tubes in the crown-sheet of the boiler.

Similar letters of reference indicate corresponding parts.

My invention relates to vertical tubular boilers mainly designed for domestic use, but which also are applicable as a power-boiler for driving machinery, and has for its object economy of fuel, together with a rapid steam-producing capacity, and being wholly or mainly of cast-iron, cheapness of construction, combined with safety, durability, and security against leakage and collapse.

In the construction and arrangement of its parts, said boiler embraces a lower central fire-chamber, surrounded or formed by an annular water-leg, preferably having a fluted exterior and mounted by an annular overhanging water-chamber, from which project vertical water-tubes, arranged in concentric rows and connecting at their upper ends with the main body of the boiler, also through which and the annular water-chamber, at their base, the smoke-tubes pass.

Said vertical water-tubes, annular base-chamber, and lower water-leg, are all arranged within a heating-space or chamber, to which the products of combustion pass from the central fire-chamber by escape between the concentric rows of vertical tubes, from thence down and around the annular water-chamber at their base, and up through the smoke-tubes to the smoke-box.

The smoke-tubes are secured on or to the crown-sheet of the boiler by forming said tubes with a flange on them at a little distance from their tops, which flange is made to lie against the outer surface of the crown-sheet, and is borne down thereon by a gland fitting over the upper projecting end of the tube, and screwing into a surrounding socketed projection on the crown-sheet. This forms a simple and secure mode of attachment, both against internal pressure and external pressure or collapse.

Referring to the accompanying drawing, the boiler as there represented, and which is made wholly or mainly of cast-iron, tubes and all, though wrought-metal smoke-tubes may be inserted, if preferred, is composed of two prominent or leading parts, namely, a lower portion, A, and upper portion, B, which latter, that forms the body of the boiler, is secured by a lower flange, *a*, and bolts to an upper flange, *b*, on the lower portion A.

This last-mentioned flange *b* is formed by an extension of the top plate of the lower portion A, which plate constitutes the bottom of the body B or crown-sheet of the fire-chamber, and which plate, at its flange-portion, rests on and incloses at its top a heat-retaining and circulating-chamber, C, of brick-work, that is, made of or lined with fire-clay, said chamber encompassing the whole of the lower portion A of the boiler.

This portion A rests, by means of a bottom annular water-leg, D, on the bottom of said chamber, the fire or products of combustion passing from the fire-place E up through the interior *c* of said water-leg that thus also forms a fire-chamber.

Cast on the upper portion of this water-leg is an annular overhanging water-chamber, F, of lesser exterior diameter than the interior of the chamber C, so as to allow of the products of combustion passing it.

G G are vertical water-tubes, arranged in concentric rows, with fire-spaces in between them, and connecting the annular water-chamber F with the body B of the boiler.

H H are smoke-tubes, passing up through the chamber F, within and up the water-tubes G G, and through the body B of the boiler to the smoke-box I.

If desired, there also may be a central smoke-tube, H', connecting in a direct manner the smoke-box I with a dome-shaped space formed by the crown-sheet of the fire-chamber.

In the operation of the boiler, which should be provided with suitable inlets and outlets for feeding it and drawing or blowing off therefrom, the heated gases and products of combustion first pass from the fire-place E up through the interior of the water-leg D; from thence around and between the water-tubes G to the heat-retaining chamber C; down said chamber around the annular water-chamber or water-tube base F; around the exterior of the water-leg D, which is fluted or corrugated, as shown in fig. 4, to give it additional strength and heating surface; and from thence up through the smoke-tubes G to the smoke-box I. This combination and arrangement of parts are both efficient and economical.

I furthermore propose to secure the smoke-tubes H in or to the crown-sheet *d* of the boiler by forming each of said tubes with a flange, *e*, near its upper

end, which flange lies on the outside surface of said sheet, and is borne down thereon by a gland, *f*, arranged to fit over the projecting upper end of the tube, and to screw into a socket, *g*, cast on the plate *d*, within which socket the flange *e* of the tube lies. This mode of attachment provides against injury or accident, either by internal or external pressure.

When the boiler is used for domestic purposes it may be arranged within an exterior chamber, *J*, of brick-work, from which chamber pipes *h h* may be led to convey heated air, as derived by radiation from the boiler and its setting, to upper apartments or elsewhere.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination and arrangement of the water-leg *D*, the annular water-chamber *F*, the water-tubes *G*, the heating-chamber *C*, the smoke-tubes *H*, and the body *B*, substantially as specified.

2. The smoke-tubes *H*, secured as described to the crown-sheet of the boiler by means of flanges *e*, in combination with the glands *f* and sockets *g* on said sheet, and into which the glands are made to screw, essentially as shown and described.

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Witnesses:

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