G. G. LOBDELL.

Steam-Boilers.

No. 144,778. Patented Nov. 18, 1873.

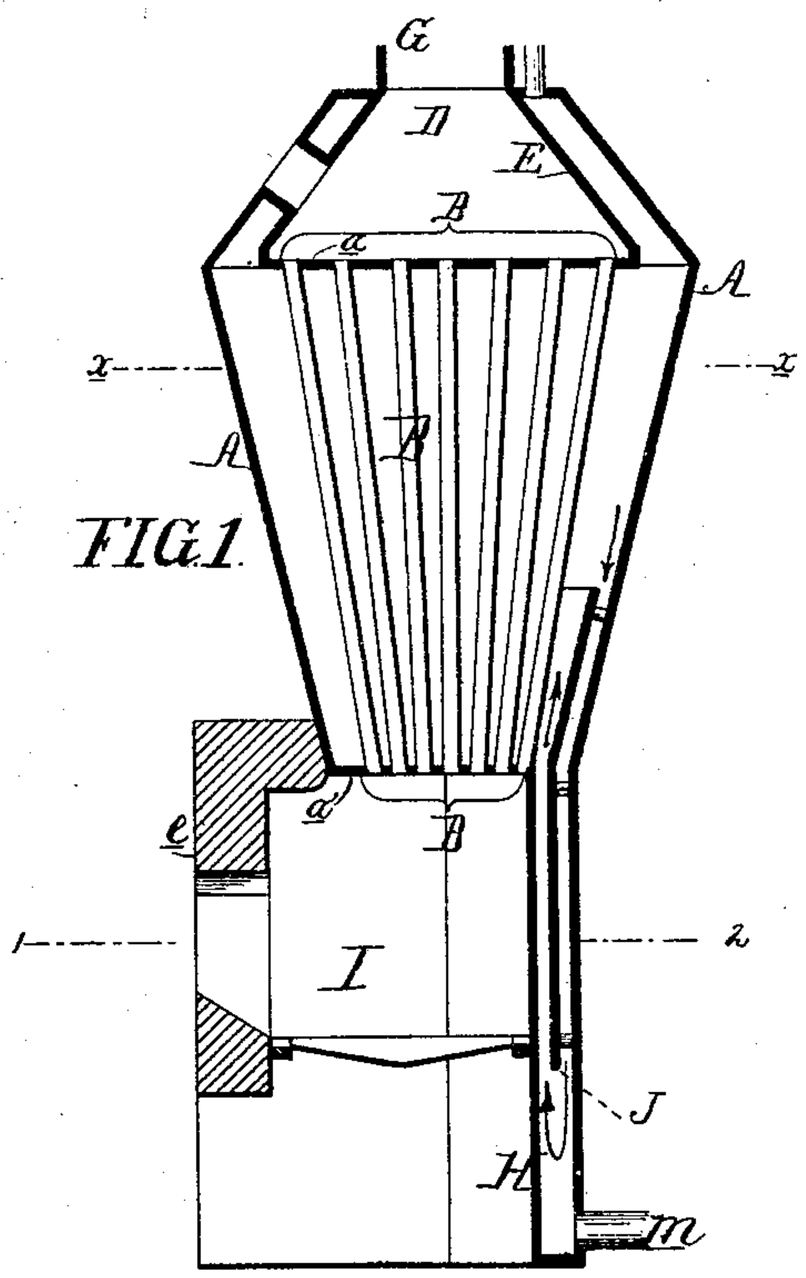

FIG. 1.

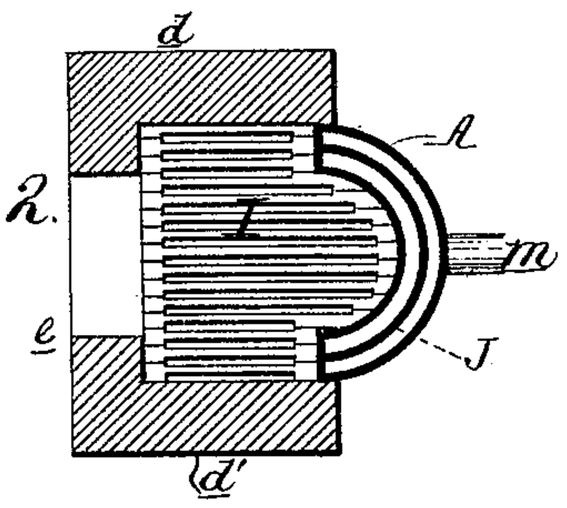

FIG. 2.

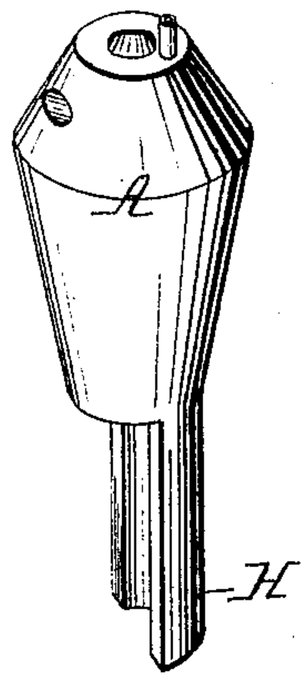

FIG. 3.

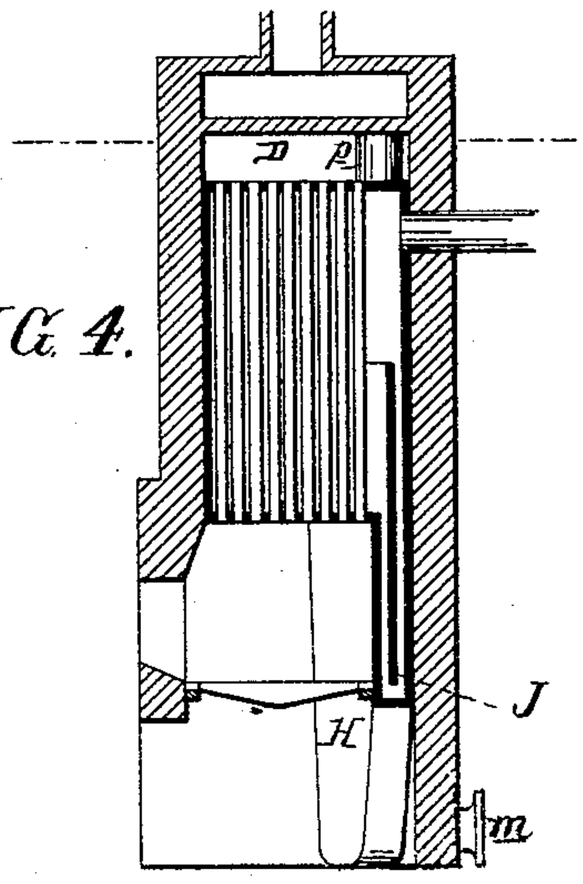

FIG. 4.

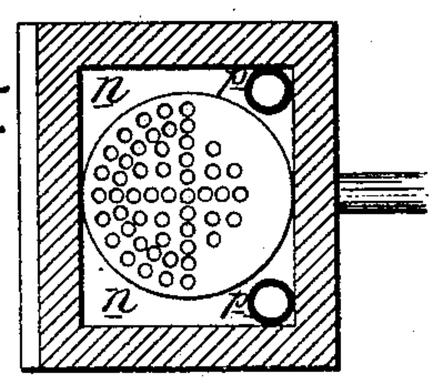

FIG. 5.

Witnesses, John K. Rupertus.
Thomas McIlvain

Geo. G. Lobdell
by his Attys.
Howson and Sons

UNITED STATES PATENT OFFICE.

GEORGE G. LOBDELL, OF WILMINGTON, DELAWARE.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **144,778**, dated November 18, 1873; application filed September 30, 1873.

To all whom it may concern:

Be it known that I, GEORGE G. LOBDELL, of Wilmington, Delaware, have invented certain Improvements in Steam-Boilers, of which the following is a specification:

The object of my invention is the construction of a steam-boiler which shall bear a high pressure, absorb or utilize as much as possible all the heat produced by the burning of the fuel, insure a more effective consumption of smoke, and a consequent reduction in the quantity of fuel required, maintain the interior of the boiler, more particularly the lower tube-sheet, free from sediment, superheat the steam to a degree necessary for economy, and prevent the priming of vertical boilers having small tubes. I attain these objects by constructing a vertical boiler in the manner illustrated in the accompanying drawing, in which—

Figure 1 represents a vertical section of the boiler as arranged for use on a steamboat; and Fig. 2, a sectional plan on the line 1 2, Fig. 1.

The outer casing or shell A of the boiler is, in Figs. 1, 2, and 3, made of the tapering form represented, so as to accommodate the peculiar arrangement of tubes B, the latter diverging from the lower tube-plate *a'* to the upper tube-plate *a*—a plan which I, in some cases, adopt, for a purpose explained hereafter. D is the smoke-chamber contained within the tapering casing E, which connects the upper tube-plate *a* with the chimney G, the shell of the boiler also extending to the chimney, and assuming a form corresponding with that of the internal casing E. The water is maintained at about the level indicated by the line *x x*, so that the upper portion of the tubes and the casing of the smoke-chamber D is surrounded by steam, which is consequently maintained, by intimate contact with these hot surfaces, in the desired superheated condition.

The perspective view, Fig. 3, illustrates the external shape of the boiler as it appears when removed from its setting. The lower portion of the boiler, below the bottom tube-sheet, is cut away in front to the extent of about half its diameter, thus leaving a semi-cylindrical leg, H, within which a circulation of water is maintained, in a manner rendered apparent hereafter. In front of the lower portion of the boiler thus cut away are built the opposite side walls *d* and *d'* and front wall *e* of the fire-place I, as best observed in the sectional plan, Fig. 2, the fire-place being furnished with the usual grate-bars, fire-door, and ash-pit.

I have found by practical tests that a more effectual consumption of smoke can be brought about in a fire-place bounded by brick-walls than one surrounded by the iron of the boiler. This I attribute to the fact that the walls of the fire-place, when the boiler is in full operation, are always maintained at a red heat, and consequently act as smoke-consumers. In the boiler which I have in operation at my works, and which is constructed in accordance with the plan described, I use as a fuel a mixture of two parts of coarse bituminous coal with four parts of the screenings of anthracite coal—a cheap mixture, which I have been unable to use advantageously for raising steam in other boilers, but which is so effectually consumed in the fire-place of my improved boiler, that the portion of the leg exposed to the fire as well as the brick walls are always clean, while the smoke escaping from the chimney is scarcely perceptible.

As the leg H forms the back of the fire-place, it is essential that a continuous circulation of water should be maintained therein down to a point below the grate-bars. This circulation I secure by means of the plate J, which extends upward into the body of the boiler to a point below the water-line, and downward to a point below the surface of the grate-bars. This plate must necessarily induce a circulation down and up the leg in the direction of the arrows, and this circulation must prevent all deposit of sediment on the top of the lower tube-sheet, for all sediment is carried down the leg with the water, and is left in the leg below the lower edge of the plate J, and can be withdrawn from time to time through blow-off pipes *m*. This is an important feature of my invention, as one of the most serious objections to vertical tubular boilers is the accumulation of sediment on the top of the lower tube-plate, and the consequent rapid destruction of the said plate and of the lower ends of the tubes.

Another defect of vertical tubular boilers is their tendency to prime—a tendency attributable to the crowding of parallel tubes together in the steam-space. I obviate this difficulty by

so arranging the tubes that, while they are in the usual close proximity to each other at the lower tube-sheet, they diverge from this point upward, so that when they pass through the steam-space of the boiler they are at such a distance apart from each other that the surface of the water remains in a comparatively quiescent state, which cannot be maintained in the presence of a crowded group of heated tubes.

It will be understood that the exposed exterior of the boiler should be clothed with non-conducting material, as in ordinary marine boilers.

Fig. 4 is a vertical section of my improved boiler as I arrange it for use in connection with stationary engines, the body of the boiler being in this case cylindrical, and the whole being inclosed within a square casing of brick-work, so that products of combustion, after passing from the tubes into the smoke-chamber D, will dive into the spaces *n n* between the brick-work and shell of the boiler, and then pass upward through pipes *p p*, which project downward into the said spaces *n n*, and communicate with the chimney, the shell of the boiler being thus subjected to the action of the products of combustion prior to the escape of the same.

It should be understood that the boiler, Fig. 3, with tapering body and diverging tubes may be used for stationary purposes, the brick-work being arranged to suit the form of the body. The boiler, Fig. 3, however, is more especially applicable to steamboats when the opportunity of using large steam-drums, which can be employed in stationary boilers, is not afforded.

I claim as my invention—

1. A vertical tubular boiler having below the lower tube-sheet a continuation or leg, forming the rear, or part of the rear, of a fire-place, the sides and front of which are composed of brick-work, all substantially as and for the purpose herein set forth.

2. A vertical tubular boiler having tubes which diverge from the lower to the upper tube-plate, as set forth.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

GEO. G. LOBDELL.

Witnesses:

H. HOWSON,

HARRY SMITH.