J. BAIRD,

Steam-Boilers.

No. 199,139. Patented Jan. 15, 1878.

Fig. 1.

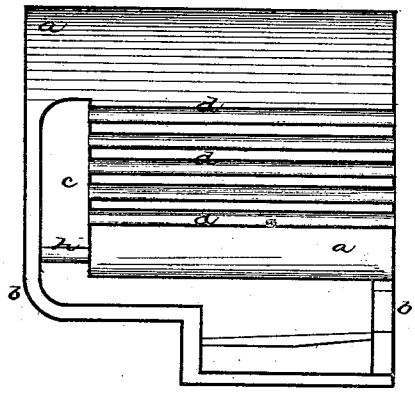

Fig. 2.

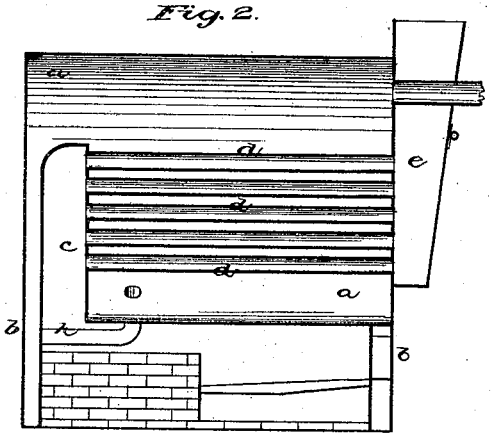

Fig. 3.

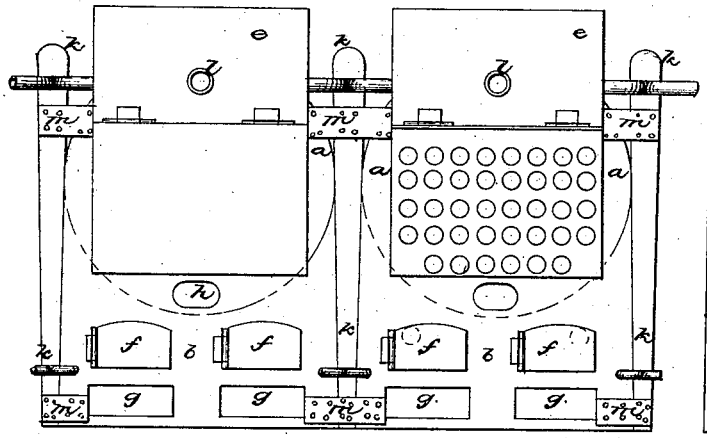

Fig. 4.

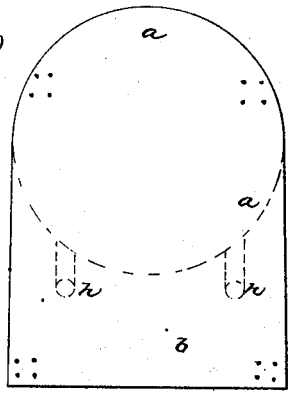

Fig. 5.

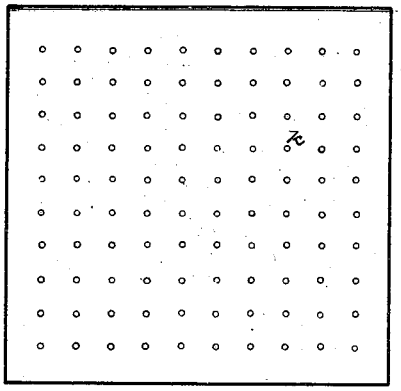

Fig. 6.

Attest:

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JOHN BAIRD, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **199,139**, dated January 15, 1878; application filed January 4, 1877.

To all whom it may concern:

Be it known that I, JOHN BAIRD, mechanical engineer, of the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Boilers; and that the following, taken in connection with the drawings, is a full, clear, and exact description thereof.

In the drawings, Figures 1 and 2 are longitudinal vertical sections through modifications of a part of my boiler. Fig. 3 is a front elevation of the whole thereof. Fig. 4 is a rear elevation of Fig. 2. Fig. 5 is a longitudinal vertical section through one of the supplementary water spaces or sections. Fig. 6 is a transverse vertical section through the same.

These boilers are intended chiefly for use in steam-vessels, either for inland navigation or sea-going, but may be used advantageously in connection with stationary engines.

At the present day the use of high steam is general. It is therefore necessary to have a boiler which will bear a high pressure, and expedient that this boiler should bear such pressure with the aid of as little staying or bracing as possible.

When boilers are used in the holds of steamships it is also desirable that they should be constructed in sections, so that they may be taken out of the hold and replaced therein, when necessary, through the ordinary hatchways, thereby obviating the necessity of removing and replacing the deck and deck-beams, which usually exists when boilers of the ordinary type are employed.

My boiler is composed of at least three sections, so constructed that these three will make up one boiler, and that, by the use of additional sections, a battery of boilers, which will furnish any desired quantity of steam, may be constructed. Moreover, each larger section is composed chiefly of a continuous cylindrical shell, which needs no bracing except that for the heads thereof, at such places as these heads are not braced by the tubes.

The main or larger section of the boiler consists, in fact, of a cylindrical shell, having water-legs attached to the lower portions of the ends thereof, and without any water-legs depending from the sides of the shell. The supplemental or smaller sections of the boiler are thin boxes of iron or steel, having, by preference, the form of truncated wedges, the sides of which may be braced together by ordinary screw-bolts or socket-bolts, in the way that the water-legs of locomotive-boilers are braced. These latter sections are constructed entirely independent of the former or larger sections; and when the sections are put together, as hereinafter described, connections between the steam and water spaces of the several sections are made by proper pipes.

In the drawings, the cylindrical shell of the larger section is shown at *a a*, with two flat water-legs, as at *b b*, depending therefrom, and secured thereto in such way as such water-legs are usually secured to cylindrical shells. Each of these shells contains a back connection, *c*, and tubes *d d*, and may also contain a forward connection leading to the chimney, or may have the forward connection bolted on outside of the shell, as shown at *e*, Figs. 2 and 3, which is the construction of front connection that I prefer. These front water-legs are provided with openings *f f*, through which coal may be fed to the grate-bars, and, if the legs descend below the grate-bars, with other apertures, *g g*, for admitting the air below the grate-bars.

In order to insure circulation, I intend, sometimes, to connect the rear water-leg with that part of the shell which is below the rear end of the tube by pipes *h h*, but do not consider these pipes as absolutely necessary. When these larger sections are to be used on land or in iron steamships I prefer to make the hearth below the grate-bars, the bridge-wall, and the bottom of the back connection of brick, as shown in Fig. 2; but when the boilers are to be used in wooden vessels I prefer to bend the rear water-leg forward under the back connection to form a bottom to the back connection, thence downward to form a bridge-wall, and, finally, forward to form the bottom of the hearth, until it connects with the bottom of the front water-leg, all as represented in Fig. 1.

The secondary or smaller sections which make up the boiler are represented at *k k*, Figs. 3, 5, and 6, and, as before stated, are boxes of sheet metal, properly stayed, and, by preference, shaped like truncated wedges, with

their larger ends uppermost, so that the steam formed in them may rise freely to the upper part of these supplementary sections. These supplementary sections rise above the usual water-level in the large sections, in order that the water may be at the same level in both, and that there may exist a practical steam-space in the supplementary sections. It is obvious that the larger sections (those first described) could not of themselves alone be used as steam-boilers, because the fire-boxes would be open at the sides, and the same would be the case with the back connections. When it is desired, therefore, to construct a boiler of these sections, two supplementary sections are placed one on each side of a main or larger section, as shown in Fig. 3, thus completing the fire-box and back connection; and if the boiler then should be of too small size, a second large section and a third supplementary section may be added thereto, as shown in Fig. 3, and so on in succession until a battery or series of boilers competent to produce the required supply of steam is obtained. All the larger sections may communicate through their front connections with a common chimney or smoke-pipes, and, through proper apertures and pipes, as at *l l*, Fig. 3, with a common steam-pipe, and the several sections must be fastened to each other in some proper manner. I prefer to bolt pieces of boiler-iron *m m*, Fig. 3, to the ends of the shells and the front and rear of the water-legs of the large sections, and to bolt these same pieces to the front and rear ends of the secondary sections, thus uniting all the sections of a series firmly together, and in such manner that any section can be removed by unbolting these pieces of heavy boiler-iron and disconnecting the steam and water connections. The upper part of each of the smaller sections must be connected with either the main steam-pipe or with the steam-space of the adjoining larger section, or both the adjoining larger sections, if desired; and the lower part of each smaller section must also be connected with the adjoining leg or legs of the larger sections, or else directly connected with the feed-pipe. I prefer not to use the latter plan, as it would probably necessitate the use of water-gages or gage-cocks on the supplementary sections; and it is my opinion that these may be dispensed with, and means for ascertaining the height of the water be applied to the larger sections only when the water-legs of the latter are connected with the lower part or water-spaces of the supplementary sections. The joints between the larger and the supplementary sections may be made perfectly tight, if desired, by fire-lute or any of the ordinary cements used in soft-patching boilers.

I do not deem it necessary to describe any special way of connecting the steam and water spaces of the sections with each other, or with a common steam-pipe or with feed-pipes, as various modes of making such connections are well known to engineers.

A careful consideration of this description and the drawings will, I think, show that my boiler is strong, compact, and easy to be put in position or removed for repairs, while at the same time it is comparatively cheap and free from expensive bracing.

I claim as of my own invention—

The compound boiler composed of a larger section, having a shell and water-legs, and supplementary sections extending above the water-level in the larger sections, each constructed and applied together substantially in the manner specified.

JOHN BAIRD.

Witnesses:
HENRY B. RENWICK,
JAMES A. RENWICK.