

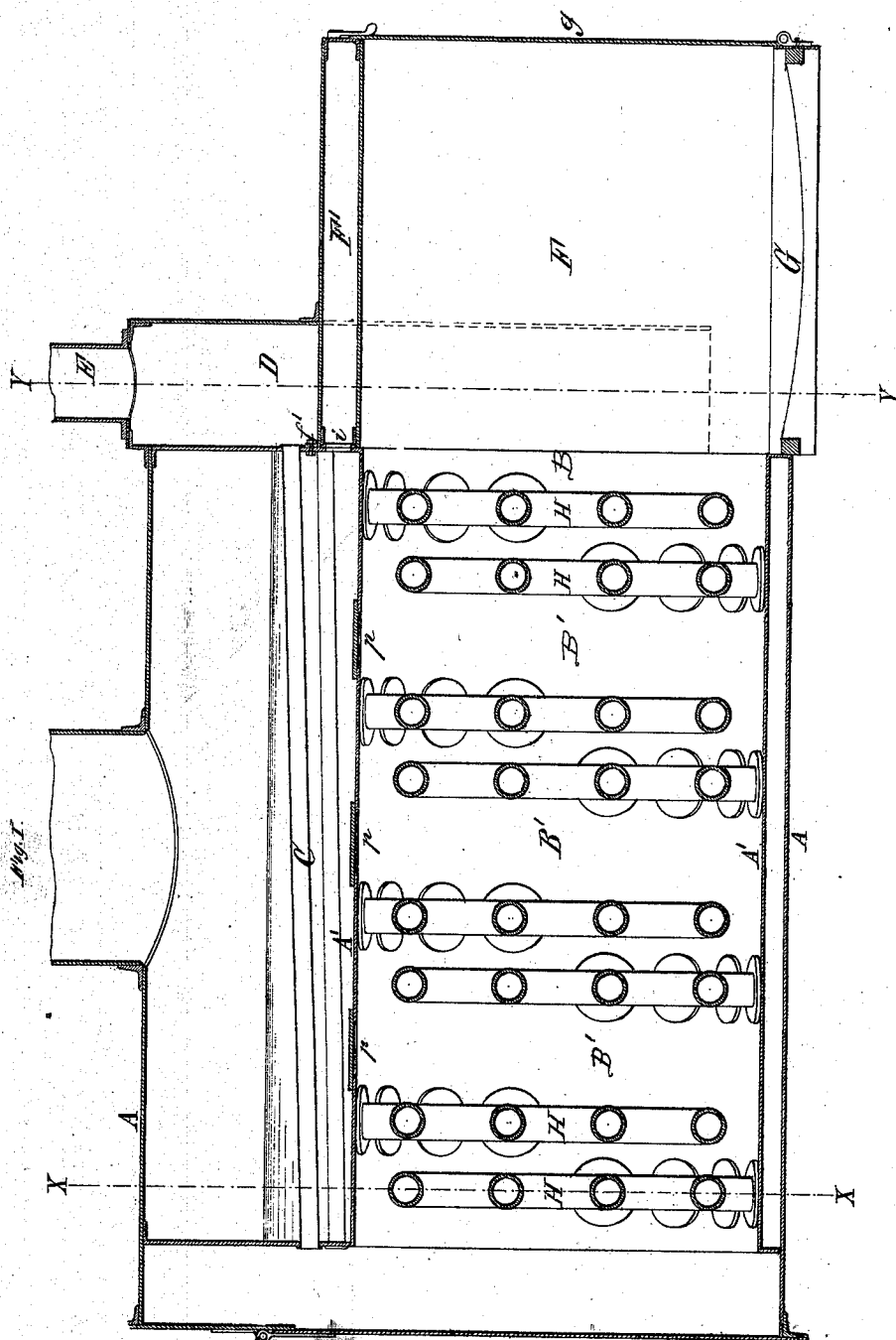
2. Sheets, Sheet 1.

E. Evans,

Steam Boiler.

No. 112,328.

Patented Mar. 7. 1871.



Edward Wilhelm
Jno. J. Conner
Witnesses

Edward Evans Inventor
by Forbush & Syatt
Attys.

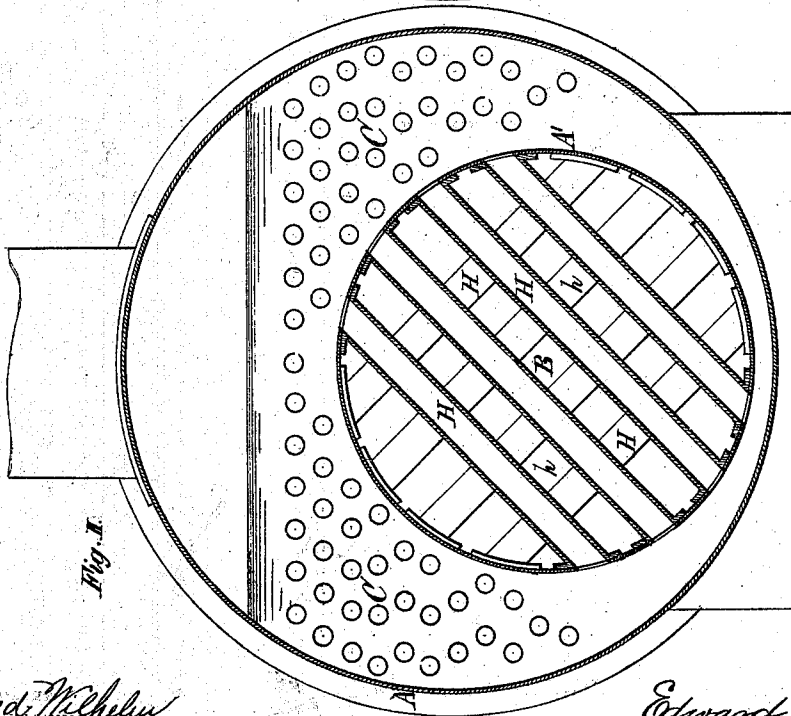
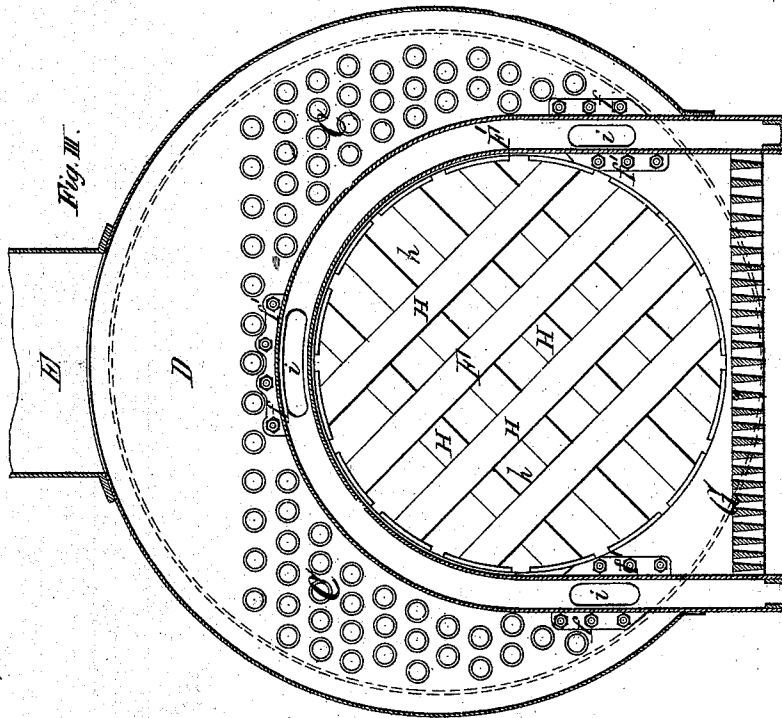
F. Evans,

2, Sheet, 3rd. 2

Steam Boiler.

No. 112,328.

Patented Mar. 7. 1871.



Edward Michelson
John J. Bonner } *Witnesses*

Edward Evans, Inventor.
by Forbes & Hyatt
Attys.

United States Patent Office.

EDWARD EVANS, OF NORTH TONAWANDA, NEW YORK.

Letters Patent No. 112,328, dated March 7, 1871.

IMPROVEMENT IN STEAM-BOILERS.

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

I, EDWARD EVANS, of North Tonawanda, in the county of Niagara and State of New York, have invented certain Improvements in Steam-Boilers, of which the following is a specification.

The invention consists—

First, in the construction and arrangement of the furnace and the surrounding water-jacket with the smoke-chamber, and in front of the boiler proper, and, preferably, so connecting it to the latter that it can be detached therefrom without disturbing any of the main parts of the boiler.

Second, in the arrangement, with the direct flue of a steam-boiler, of transverse pipes, arranged in rows across the same, with a man-space between each two rows, and man-holes in the top of the inner shell, through which access is had to said spaces for repairing or replacing the water-pipes.

In the accompanying drawing—

Figure I is a sectional elevation of a boiler provided with my improvements.

Figure II is a cross-section in line *x x*, Fig. I.

Figure III is a cross-section in line *y y*, Fig. I.

Like letters designate like parts in each of the figures.

A is the outside shell of a cylindrical boiler;

A' is an inner shell, forming a direct flue, B, from the furnace to the opposite end of the boiler;

C C are small return-flues, arranged in the water-space around and above the shell A';

D is the smoke-chamber; and

E, the chimney.

All of these parts are constructed in the ordinary manner.

F is the furnace, provided with a water-jacket, F'; and

G, the fire-grate.

The former is constructed independent of the boiler proper, and projects in front thereof, as represented.

Its upper portion is semi-cylindrical, and forms, when the jacket is attached to the boiler, an extension of the flue B, while the sides are plane and extend downward below the bottom of the flue B, so as to receive the furnace-grate G.

The open end of the water-jacket F', opposite the boiler, is closed by a suitable door, g.

The furnace and jacket are, preferably, attached to the end of the boiler by means of flanges *f* and bolts *f'*, so as to be easily attached or removed.

Communications are formed between the jacket F' and water-space of the boiler by openings *i i*, as clearly shown in Fig. III.

The jacket may also be connected to the boiler by water-pipes running from the ends of the former

to the tube-sheet of the boiler, or in any other suitable manner.

As will be seen from Figs. I and II, the smoke-chamber, into which lead the return-flues C, is arranged as a saddle inclosing the rear portion of the furnace or water-jacket thereof, and subjects that portion of the outer shell surrounded thereby to the heat of the said smoke-chamber, utilizing the same, and increasing the heating-surface of the boiler, the base of the smoke-chimney being partly attached to the boiler and partly to the outer shell of the water-jacket.

The object of this water-jacket is to receive the heat which, in the old manner of arranging such boilers, is absorbed by the brick-work of the furnace, thereby adding a considerable amount of very effective heating-surface to the boiler.

As it is easily detached from the boiler, repairs of the same can be made with great facility without disturbing the parts of the boiler proper, as is necessarily the case when the furnace is arranged in the usual manner.

H H represent the inclined water-pipes arranged crosswise of the inner shell or direct-flue B. They are arranged side by side, in rows, lying in vertical planes across the flue, the pipes of one row or series being inclined in one direction, at an angle of about forty-five degrees from the horizon, while the pipes of the next succeeding row are inclined in an opposite direction at the same angle, so as to cross the plane of the other at right angles, or nearly so, after the manner of lattice-work, and as clearly represented.

The pipes of each alternate row or series being arranged in the same relative manner, square spaces or flues *h*, extending the whole length of the boiler, will be formed between the pipes, for the unimpeded passage of the products of combustion.

Between each two rows or sets of pipes a space, B', Fig. I, is left of sufficient width to allow a man to work therein in repairing, cleaning, or replacing the pipes, as the same may become necessary.

Access to these spaces is had through man-holes, *p*, formed in the top of the inner shell A, the interior of the main shell being reached in the usual way.

The arrangement of these inclined water-pipes adds a great amount of very effective heating-surface to boilers without increasing the size or necessitating a change in their general construction, while the inclination of the pipes insures a free circulation of the water throughout the boiler.

The arrangement of the furnace in front of the boiler proper enables the feed-water in a cold state to

be admitted into the water-jacket, in which it becomes properly heated before it enters the main boiler, thereby dispensing with the use of a separate heater. This permits a direct escape of the exhaust into the open air, while the admission of cold water into the water-jacket keeps the latter comparatively cool, thereby protecting in a corresponding degree the inner shell thereof from the action of the heat of the furnace.

What I claim is—

1. The furnace F and water-jacket F', arranged

with the smoke-chamber D, and in front of the main boiler or boiler proper, as hereinbefore set forth.

2. The arrangement, with the direct-flue B and man-holes p, of the transverse water-pipes H H, with a space, B', left between each two rows of pipes, as hereinbefore shown and described.

EDWARD EVANS.

Witnesses:

EDWARD WILHELM,
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