F. B. Blanchard,

Steam-Boiler Superheater.

No. 32,613. Patented June 25, 1861.

Fig. 1.

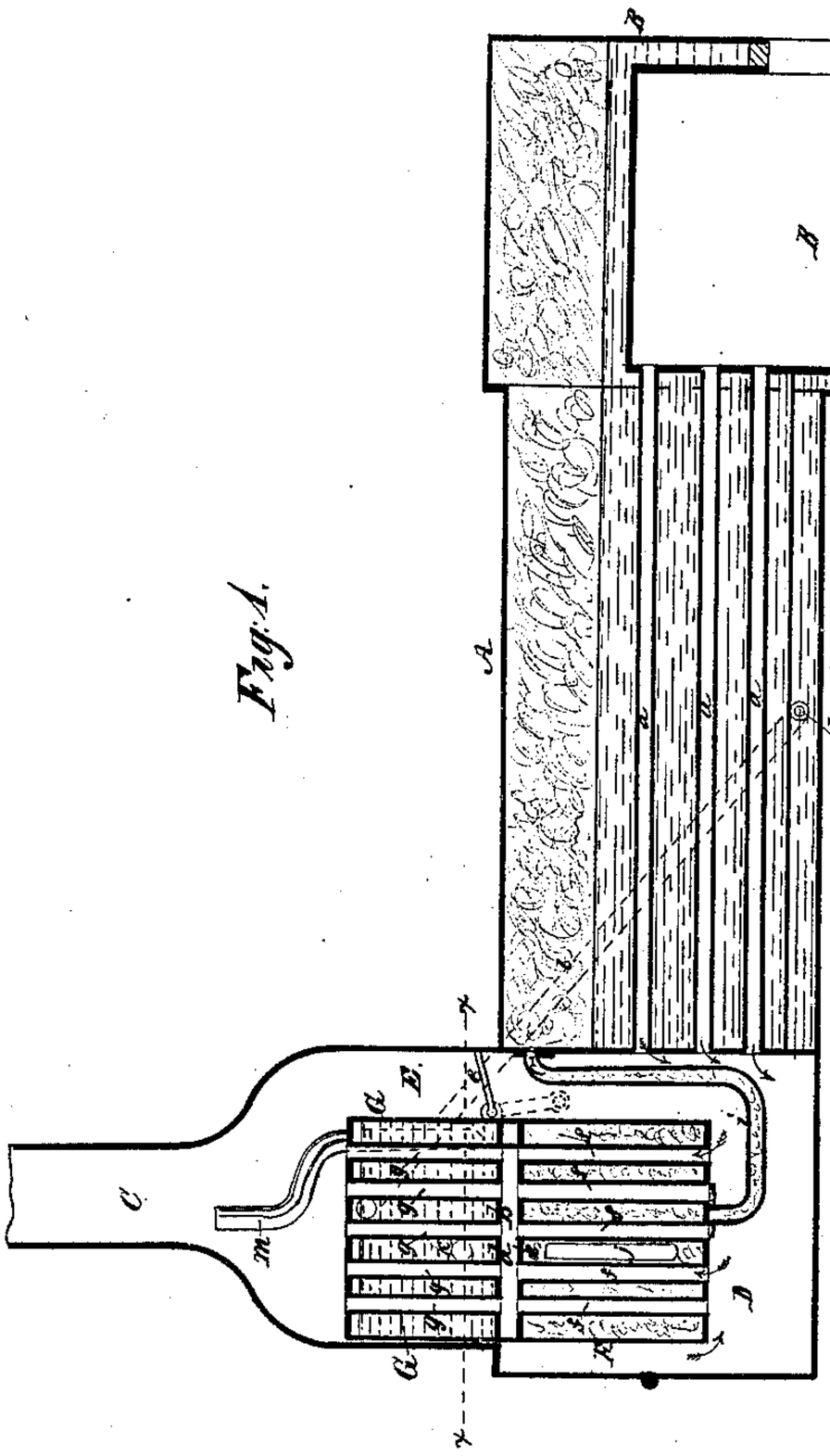


Fig. 3.

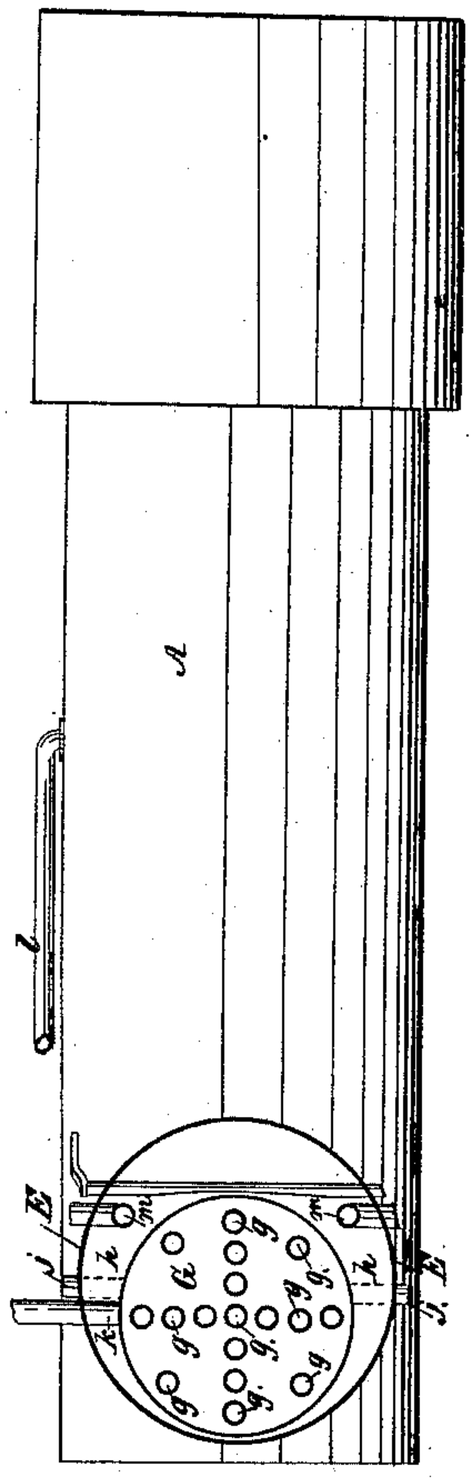
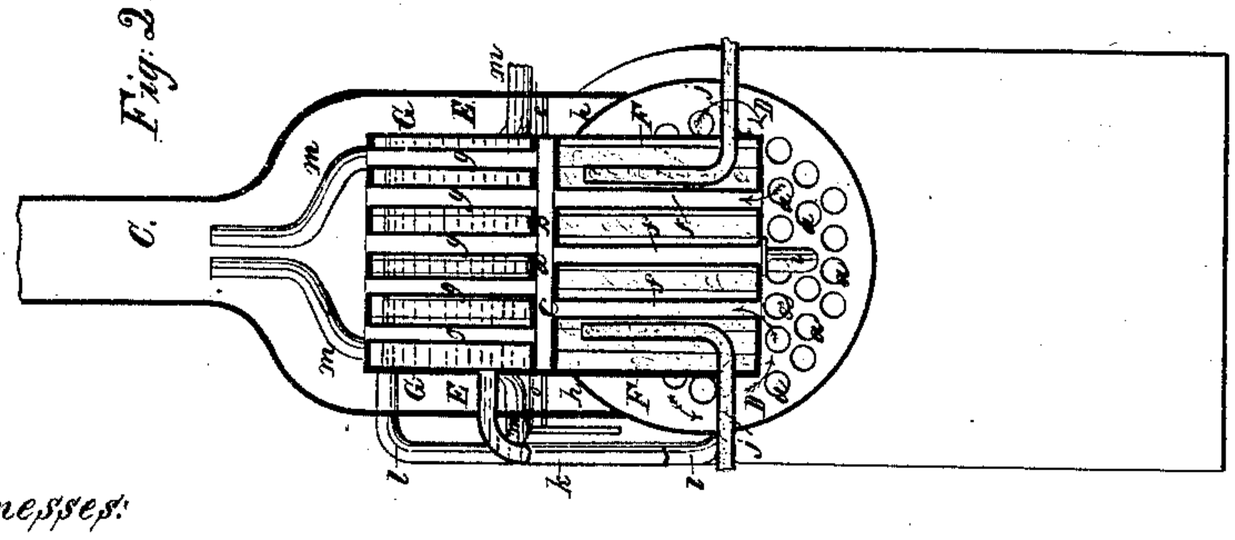


Fig. 2.



Witnesses:

C. M. Thompson

J. W. Coombs

Inventor:

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UNITED STATES PATENT OFFICE.

FRANCIS B. BLANCHARD, OF BROOKLYN, NEW YORK.

IMPROVED STEAM-BOILER.

Specification forming part of Letters Patent No. **32,613**, dated June 25, 1861.

To all whom it may concern:

Be it known that I, FRANCIS B. BLANCHARD, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central longitudinal vertical section of a locomotive-boiler with my invention applied. Fig. 2 is a transverse vertical section through the smoke-box, superheating-chamber, and feed-water heater. Fig. 3 is a horizontal section of the boiler in the plane indicated by the line *x x* in Fig. 1.

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

This invention consists in a certain novel arrangement of a superheating-vessel and feed-water-heating vessel in combination with each other and within the smoke-box and chimney-base at the rear end of a horizontal multitubular boiler, whereby the heat of the escaping gases of combustion is utilized and the draft through the upper and lower tubes or flues of the boiler is rendered uniform, or nearly so.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the shell of the boiler; B, the fire-box; *a a*, the tubes, and D the smoke-box, all constructed as in an ordinary locomotive-boiler, except that the smoke-box is of greater depth from back to front.

C is the chimney, having its lower part or base, E, of cylindrical form and of the full or nearly the full diameter of the smoke-box upon which it is placed.

F is the superheating-vessel, and G the feed-water-heating vessel, both of upright cylindrical form of similar diameter, and each containing a number of upright tubes, through which the gases of combustion from the boiler pass on their way into the chimney. The vessel G is arranged above the vessel F, and their sides are connected in such a manner as to form a shallow chamber, *b*, between the upper tube-sheet, *c*, of F and the lower tube-sheet, *d*, of G, and the two vessels so connected are fitted into an opening in the top of the smoke-box in such manner that, except while a damper, *e*, is open, none of the gases can pass from the smoke-box to the chimney without passing first through the tubes *f f* of the vessel F, then through the chamber *b*, and afterward through the tubes *g g* of the vessel G. The portion *h h* of the top of the smoke-box—that is, within the chimney-base and surrounding the vessels F G—constitutes a partition between the smoke-box and chimney, and the damper *e* is fitted to an opening provided in this partition between the backs of the vessels F and G, and the front tube-sheet, *h*, of the boiler, and is only opened when a direct draft to the chimney is desired—as, for instance, when the fire is first lighted, or when the locomotive is stopping for any considerable time. I prefer to arrange the vessels F and G at such elevations that F is wholly or almost wholly within the smoke-box and extends to within a short distance from the bottom thereof, and that G is wholly or almost wholly within the chimney-base.

i is a pipe for conveying steam from the boiler to the superheating-vessel F, connecting with the latter at or near the bottom.

j j are pipes leading from the superheating-vessel F to the steam-chests of the engines, communicating with the said vessel F at the top.

k is the pipe leading from the feed-pump to the vessel G, and *l* is the pipe leading from the said vessel to the boiler.

m m are the exhaust-pipes from the engine, entering the chimney above the vessel G.

When, after the fire has been well lighted in the furnace, the damper *e* is closed, the gases escaping from the tubes *a a* into the smoke-box pass first around the sides and under the bottom of the vessel F, then upward through its tubes *f f* into the chamber *b*, from whence they pass through the tubes *g g* of the vessel G. The sides, the upper and lower tube-sheets, and the tubes of the vessel F all constitute heating-surfaces for the superheating of the steam, which circulates through and between the tubes.

The lower and upper tube-sheets and the tubes of the vessel G constitute the heating-

surfaces for the heating of the feed-water, which circulates through the said vessel. The extensive heating-surface presented by the heater F and its tubes obtain from the gases all of their heat which is available for superheating, and a large proportion of the remaining heat of the said gases is imparted to the water in the heater G. The arrangement of the superheater within the smoke-box in such manner that its tubes, constituting the only means of communication between the smoke-box and chimney, will cause a downward draft from the upper tubes, *a a*, of the boiler, as indicated by arrows in Fig. 1, equalizes the draft through the several tubes *a a* by checking the natural draft through the upper ones.

What I claim as my invention, and desire to secure by Letters Patent, is—

The arrangement of the upright tubular superheating-vessel F, upright tubular feed-water-heating vessel G, and interposed chamber, *b*, in combination with each other and with the otherwise separated smoke-box D and chimney-base E, substantially as herein specified.

F. B. BLANCHARD.

Witnesses:
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