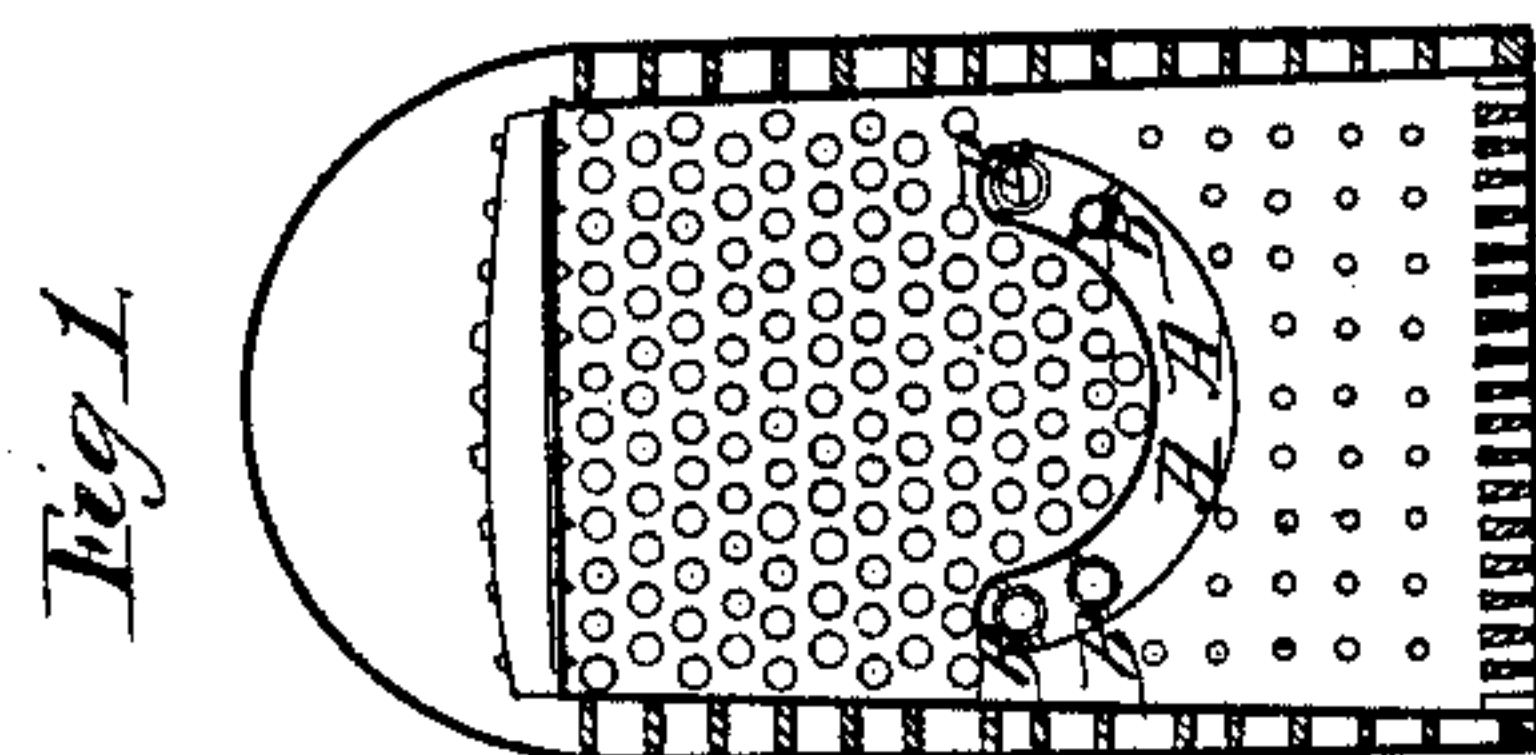
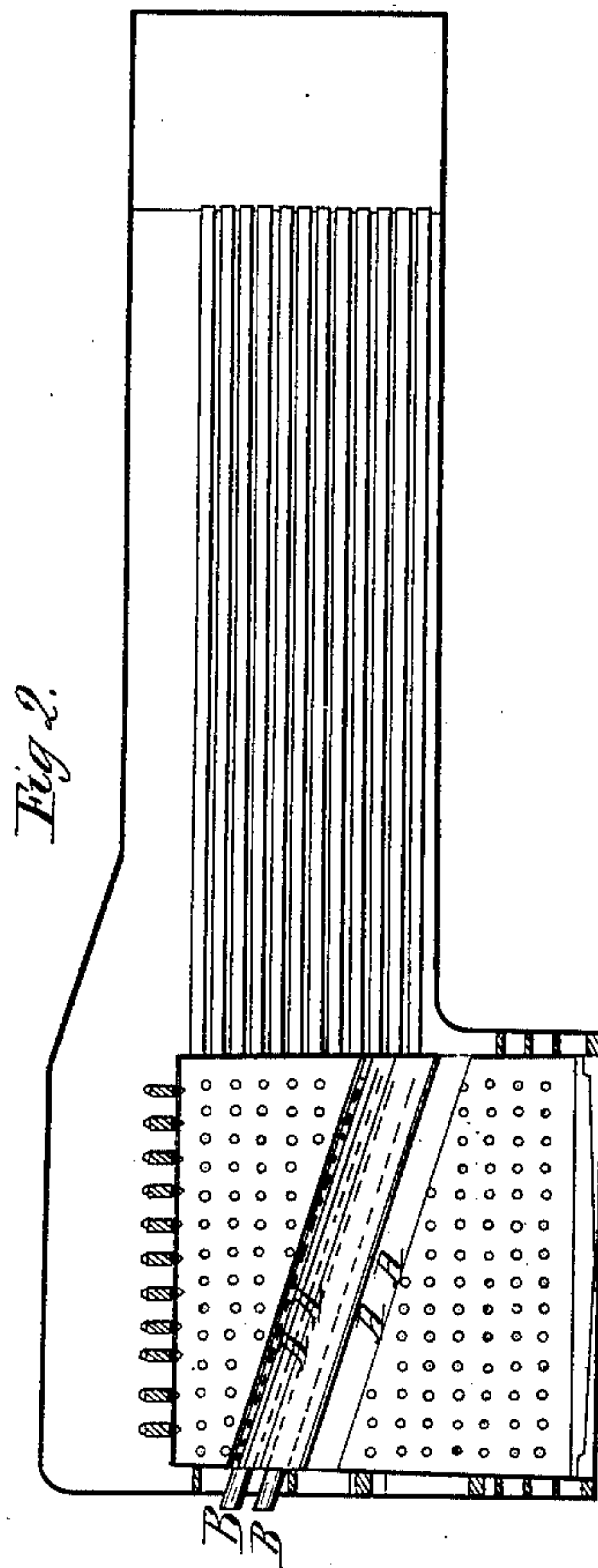


B. L. Griffith,
Steam-Boiler Furnace.
N^o 18,897. *Patented Dec. 22, 1857.*



Witnesses,
Thomas Evans
Owen Garrison

Inventor,
B. L. Griffith

UNITED STATES PATENT OFFICE.

B. L. GRIFFITH, OF HAZELTON, PENNSYLVANIA.

ARRANGEMENT OF AIR-TUBES IN FIRE-BOXES OF STEAM-BOILERS.

Specification of Letters Patent No. 18,897, dated December 22, 1857.

To all whom it may concern:

Be it known that I, BENJAMIN L. GRIFFITH, of Hazelton, in the county of Luzerne and State of Pennsylvania, have invented a new and Improved Mode of Arranging the Air-Tubes in the Fire-Boxes of Steam-Boilers; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon, Figure 1 of said drawings being a vertical longitudinal section of the improved fire box; Fig. 2 a vertical cross section of the same, and the same letters are used to indicate like parts in both drawings.

The nature of my invention consists in an improved method of admitting atmospheric air into the gas or combustion chamber of steam boilers.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation, referring for this purpose to the aforesaid drawings.

I construct my boiler in the usual form of those having an interior furnace and generally known and recognized as the locomotive boiler and place a water table in the furnace chamber thereof, which water table is of convex or rounding form on its lower side and concave or hollowed on its upper side, as at A A, Fig. 2, and is placed in the chamber in an inclined position, as shown at A A, Fig. 1, low enough at the tube sheet end to have all the tubes above the table and high enough to permit at the other end a free circulation of the water and an easy passage for the steam through the table. There must also be sufficient space left between the two lateral edges of the table and the sides of the fire box, the areas of which conjointly should be less than that of the aggregate area of all the tubes. The water table thus divides the fire chamber into two parts, the furnace being in the lower one, in its usual position, and the upper one being a chamber for the combustion of the gases. But to accomplish this object properly requires the presence of atmospheric air and that too in controllable quantities. This I accomplish by means of the air tubes, B, B, B, B, Fig. 2, and B, B, Fig. 1; these

tubes are placed within the water table and are closed at the inner or lower ends but are open at the outer or upper ends where the size of the opening is regulated as required by sliding dampers or other suitable means. These tubes communicate with the interior of the fire box by means of small hollow stay bolts by which also they are held in position. The atmospheric air is thus distributed or mixed with the gases through numerous small jets which are found to work advantageously in practice.

This improvement in steam boilers possesses several important advantages: First, the lower side of the water table serves as a crown to the furnace and by its proximity to the glowing fuel, transmits a greater amount of caloric to the water than it could do if it were at a greater distance or at the usual distance from it. Second, the rounding form of the sub-crown or lower side of the water table deflects the flame and heat against the sides of the fire box, thus greatly increasing their steam generative power as compared with the common fire box, for in them the draft is directly through the body of the chamber from the surface of the fuel to the tubes of the boiler, thus requiring inconveniently long tubes to absorb the heat economically from the gases passing through them. Thirdly, the upper side of the water table being hollow or concave, the flame and heat are reverberated into this cavity by the action of the upper crown and the draft of the lower tubes. Fourthly, a comparatively thorough combustion of the gases. Fifthly, increase of surface with an increased action of the heat upon the whole interior surface of the fire box.

Having thus described the nature, construction and mode of operation of my improvements in the furnace chambers of steam boilers—what I claim therein as my invention and desire to secure by Letters Patent, is—

The placing of air tubes within the water tables or series of water tubes, substantially as described.

B. L. GRIFFITH. [L. s.]

Witnesses:

THOMAS EVANS,
OWEN GORMAN.