R. S. Harris,

Steam-Boiler Fire-Tube.

No. 39,289. Patented July 21, 1863.

Fig. 2.

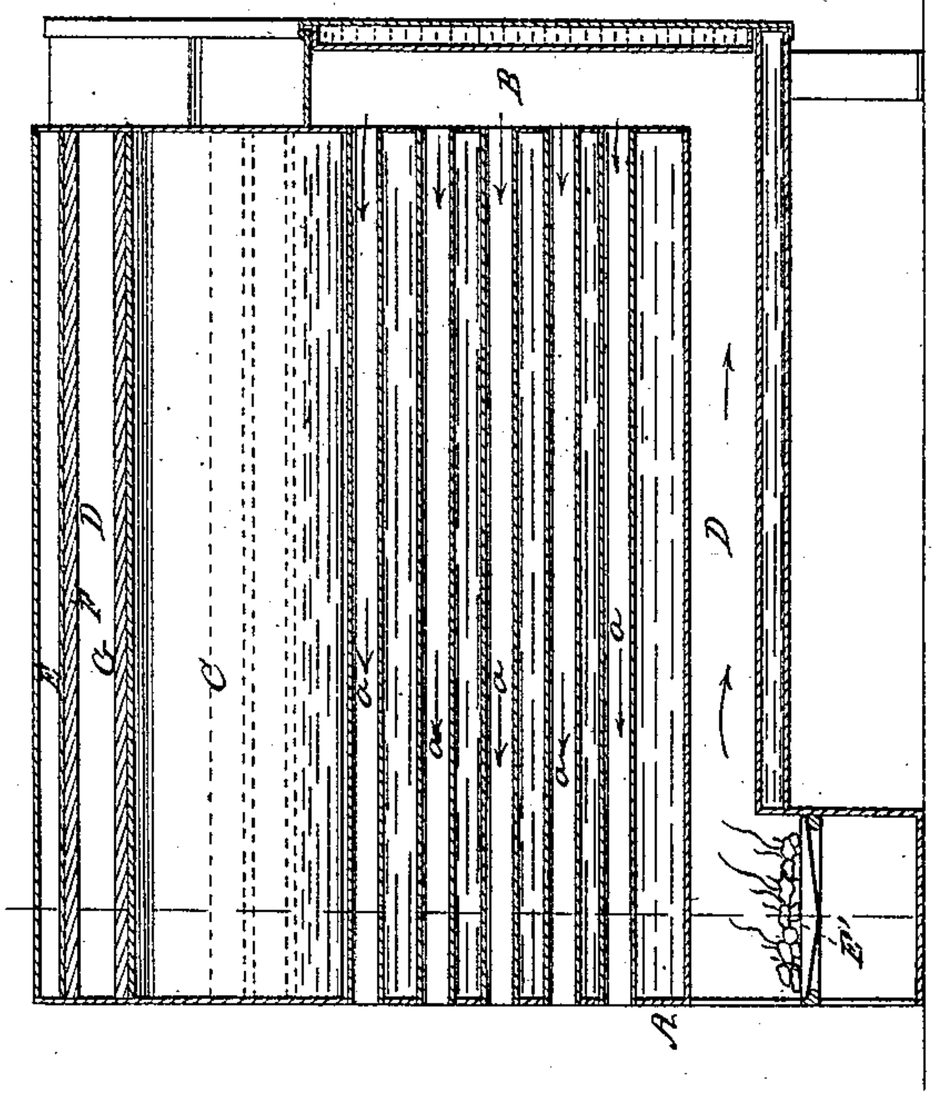
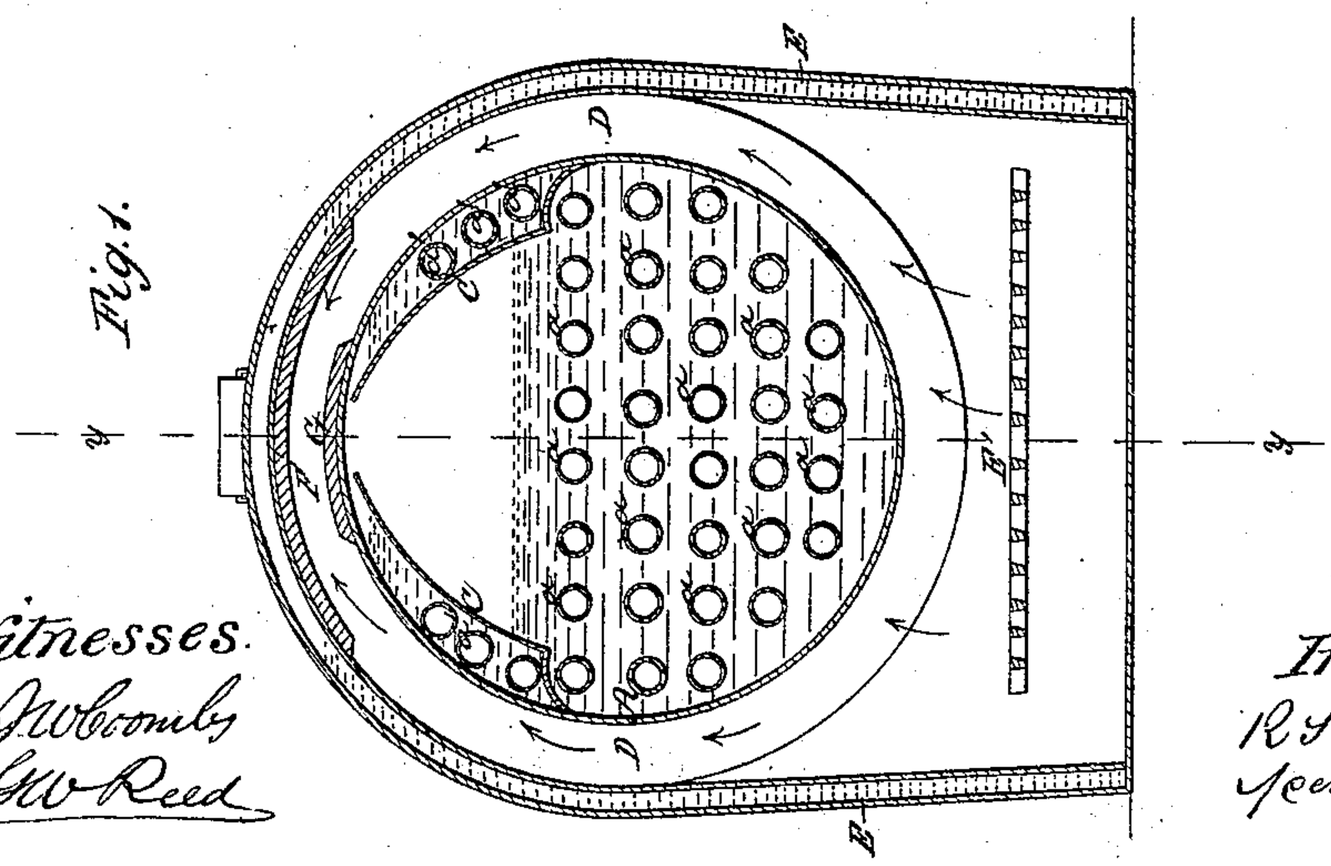


Fig. 1.



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UNITED STATES PATENT OFFICE.

R. S. HARRIS, OF GALENA, ILLINOIS.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **39,289**, dated July 21, 1863.

To all whom it may concern:

Be it known that I, R. S. HARRIS, of Galena, in the county of Jo Daviess and State of Illinois, 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 a part of this specification, in which—

Figure 1 represents a transverse vertical section of my invention, taken in the plane indicated by the line *x x*, Fig. 2. Fig. 2 is a longitudinal vertical section of the same, the line *y y*, Fig. 1, indicating the plane of section.

Similar letters of reference in both views indicate corresponding parts.

This invention consists of two segmental reservoirs, with or without heating-tubes attached to the sides of the steam-space of a flue or tubular boiler and extending throughout its whole length, in combination with an annular flue surrounding the shell of the boiler and surrounded by a water-jacket in such a manner that the smoke and sparks are perfectly consumed while passing from the furnace in front to the smoke-box in the rear of the boiler, and at the same time the fire in passing through said annular flue acts on the water in the boiler and in the segmental reservoirs on the inside and on the water contained in the water-jacket on the outside, and the heat emanating from the fuel is used with the best possible advantage.

The invention consists, further, in a narrow strip of brick-work on the top of the shell between the open ends of the segmental reservoirs, in combination with a cast-iron plate on the interior of the water-jacket and under its highest part, in such a manner that the steam-spaces of the boiler and of the water-jacket are fully protected against the direct action of the fire.

To enable those skilled in the art to make and use my invention, I will proceed to describe it.

A represents the shell of a steam-boiler, made in the form of a cylinder and provided with a number of heating tubes or flues, *a*. These tubes occupy the water-space of the boiler, and they are intended to conduct the products of combustion from the rear end or smoke-box, B, to the front end of the boiler and to the chimney. The steam-space of the boiler is furnished with two segmental reservoirs, C, which extend throughout the entire length of the boiler, being produced by fastening suitable boiler-plate to the sides of the steam-space, as clearly shown in Fig. 1 of the drawings. These reservoirs are open on the top, and they are intended to be filled with water. Tubes *a'* may be arranged in them, similar to the tubes *a* in the boiler. The boiler A is surrounded by an annular flue, D, which communicates in front with the fire-place E', and in the rear with the smoke-box B, as clearly shown in Fig. 2 of the drawings. The heat which emanates from the fire is diffused throughout the annular flue, and in this flue the sparks and smoke rising from the fire are consumed. The fuel is thus used to the best possible advantage and the boiler is enveloped in a continuous sheet of fire. The reservoirs C protect the boiler-plate on the upper part or steam-chamber of the boiler against injury from coming in direct contact with the fire, and the superheating of the flue is prevented. From the rear end or smoke-box of the boiler the heat is returned through the tubes *a* to the chimney, as clearly indicated by the arrows in Fig. 2. The annular flue D is surrounded by a water-jacket, E, which is filled with water nearly full. The heat of the flue D strikes the inside of the water-jacket and heats the water contained in the same. That portion of the jacket E which is not filled with water is protected by a cast-iron plate, F, and the top of the shell A, between the segmental reservoirs C, is protected by brick-work G, to prevent the fire from coming anywhere in direct contact with the steam chamber of the shell A or of the jacket E. By the arrangement of the annular flue and water-jacket the heat emanating from the fire is applied to the best possible advantage, the fuel is fully consumed, and steam is generated with the greatest possible economy. At the same time the boiler-plate is protected by the segmental reservoirs C, cast-iron plate F, and brick-work G, so that the steam-chamber is not allowed to come anywhere in direct contact with the fire.

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

1. The annular flue D and water-jacket E, in combination with a tubular or flue boiler, A, constructed and operating as and for the purpose herein shown and described.

2. The segmental reservoirs C, cast-iron plate F, and brick-work G, in combination with the annular flue D, boiler A, and water-jacket E, all constructed and operating in the manner and for the purpose substantially as specified.

R. S. HARRIS.

Witnesses:
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