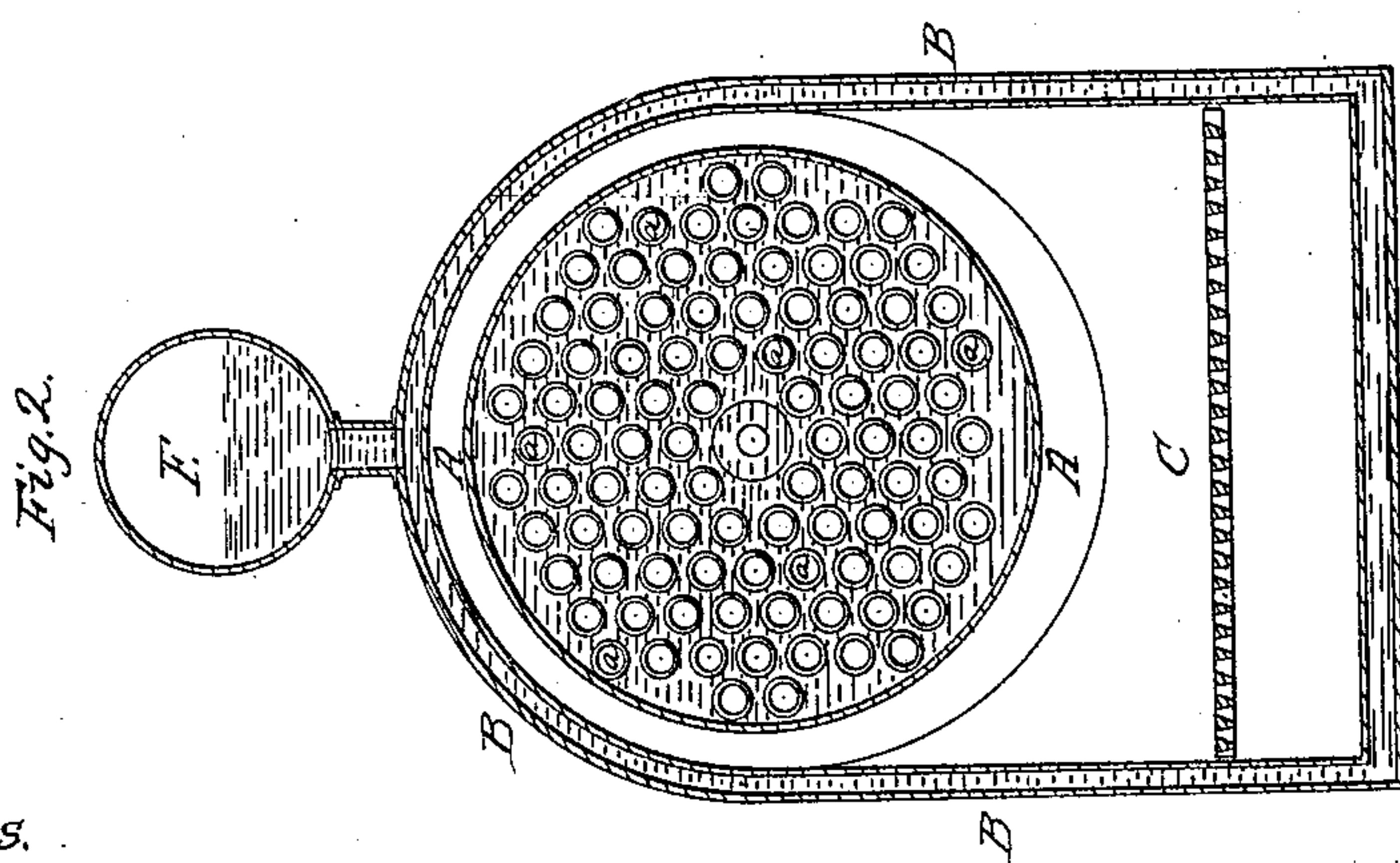
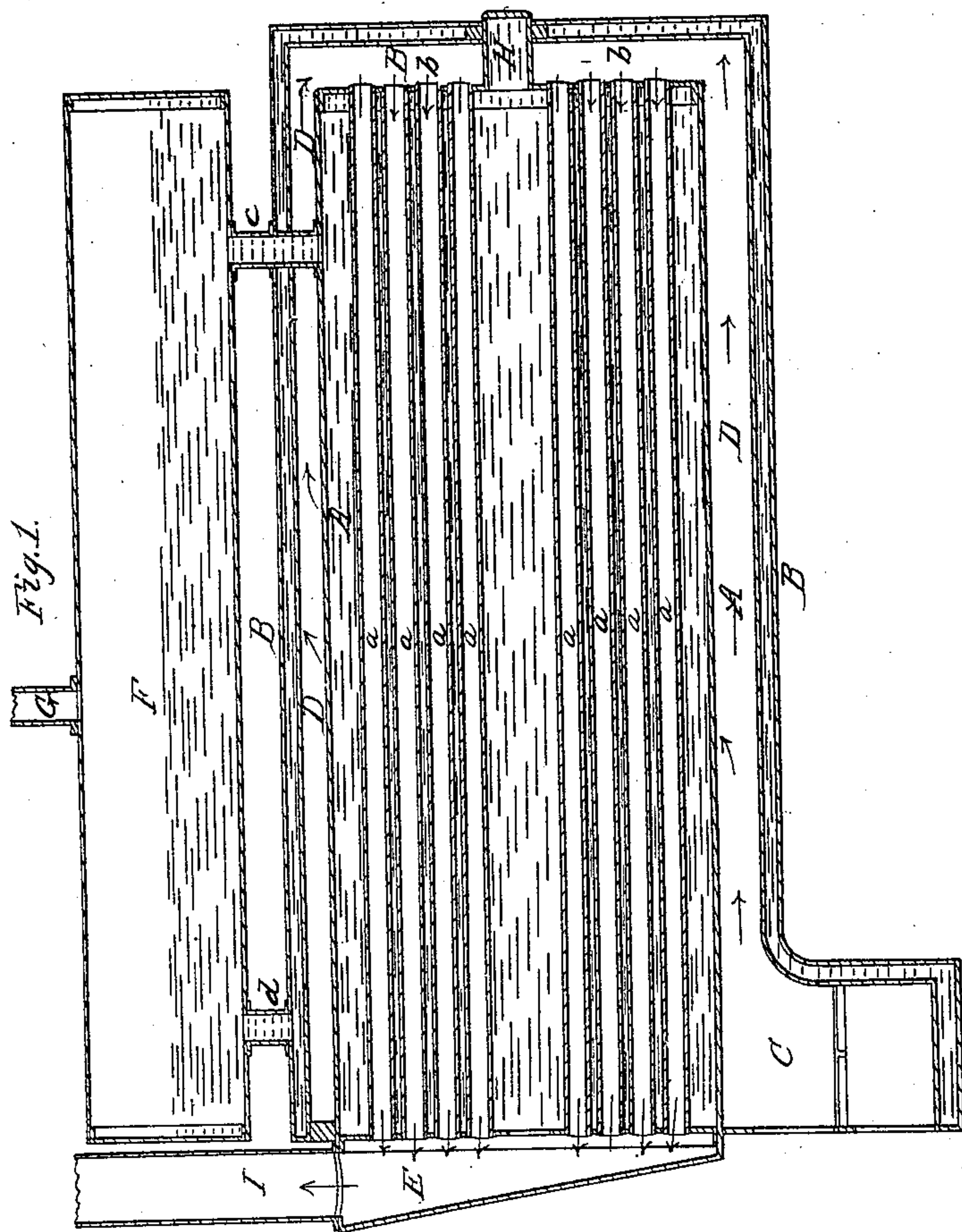


*R. S. Harris,*

*Steam-Boiler Fire-Box.*

*N<sup>o</sup> 40,929.*

*Patented Dec. 15, 1863.*



*Witnesses.*

*J. W. Coombs  
Geo. W. Reed*

*Inventors.*

*R. S. Harris  
per Munn & Co.  
Attorneys*

# UNITED STATES PATENT OFFICE.

R. S. HARRIS, OF DUBUQUE, IOWA.

## IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 40,929, dated December 15, 1863.

*To all whom it may concern:*

Be it known that I, R. S. HARRIS, of Dubuque, in the county of Dubuque and State of Iowa, 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 boiler constructed according to my invention. Fig. 2 is a transverse vertical section of the same.

Similar letters of reference indicate corresponding parts in both figures.

This invention consists in a novel arrangement of tubes, flues, and water-jacket, in connection with the cylindrical body or main portion of the boiler and with an upper water and steam drum, whereby I obtain a boiler which is very safe, durable, and economical of fuel.

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 or main body of the boiler, of horizontal cylindrical form, and filled from top to bottom as closely as desirable with horizontal tubes *a a*, which extend right through it.

B is the water-jacket, having the furnace C arranged in the front part of it below the shell A, and surrounding the shell in rear of the fire-box in such manner as to form an annular flue, D, from the furnace to the rear end of the shell. A sufficient space, *b*, is left between the rear end of the shell A and the rear end of the jacket for the gaseous products of combustion to pass from the annular flue D into the tubes *a a*. At the front end of the boiler a breeching, E, covers the ends of the shell and tubes, and brings all the tubes into communication with the chimney I.

F is the drum, the lower part of which is to contain water and the upper part steam, arranged above the shell and water-jacket in

the position commonly occupied by the steam-drum and connected with the shell at *c* and with the water-jacket at *d*.

G is the steam-pipe.

H is a man-hole for reaching the interior of the shell, extending right across the space *b*, and through the water-jacket and having the lid outside of the jacket.

The flame and gaseous products of combustion from the furnace circulate along and entirely around the shell A, over its top as well as along its sides and under its bottom, thence through the space *b* and flues *a a*, to the breeching E and chimney, and, as the water is so divided by the flues as to bring every portion of it except that in the drum F into intimate contact with the heating-surface, the heat is utilized in a very high degree and the generation of steam is effected with a very small consumption of fuel. By allowing the water to enter the drum and so allowing the whole of the shell and jacket to be filled with water, the necessity for the brick-work in the upper part of the annular flue described in my Letters Patent of July 21, 1863, is obviated, and I am enabled to use the whole outer surface of the shell A and the whole inner surface of the jacket B as heating-surface without any danger of injuring any part of the boiler by overheating.

The water is gaged in the drum F.

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

The boiler composed of the shell A, filled to the top with tubes *a a*, the water-jacket B, the annular flue D, extending uninterruptedly round the shell and the drum F, containing both steam and water and communicating with the shell and the jacket, which are both filled with water, the whole combined substantially as herein set forth.

R. S. HARRIS.

Witnesses:

E. LANGWORTHY,  
A. W. FLEMING.