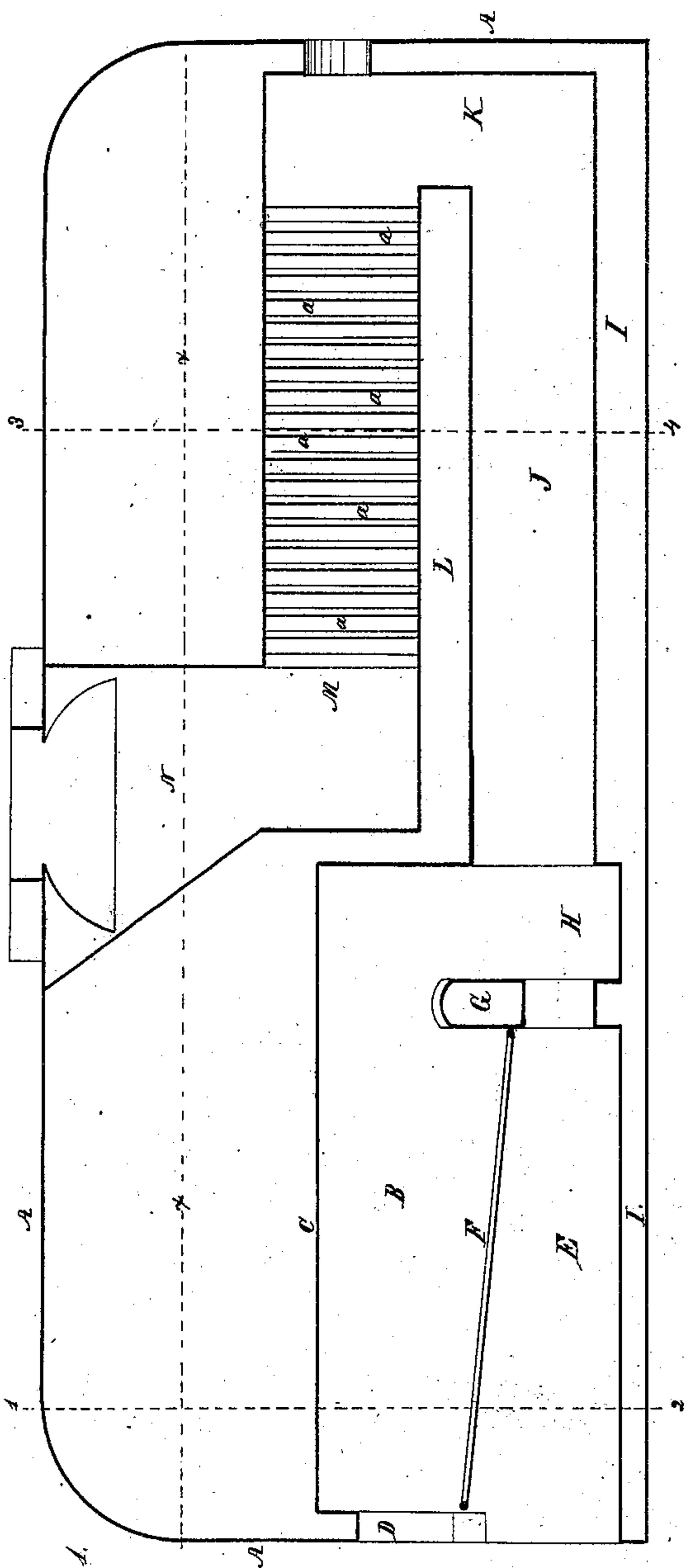


*B. H. Bartol,*  
*Steam-Boiler Fire-Box.*

*N<sup>o</sup> 34,556.*

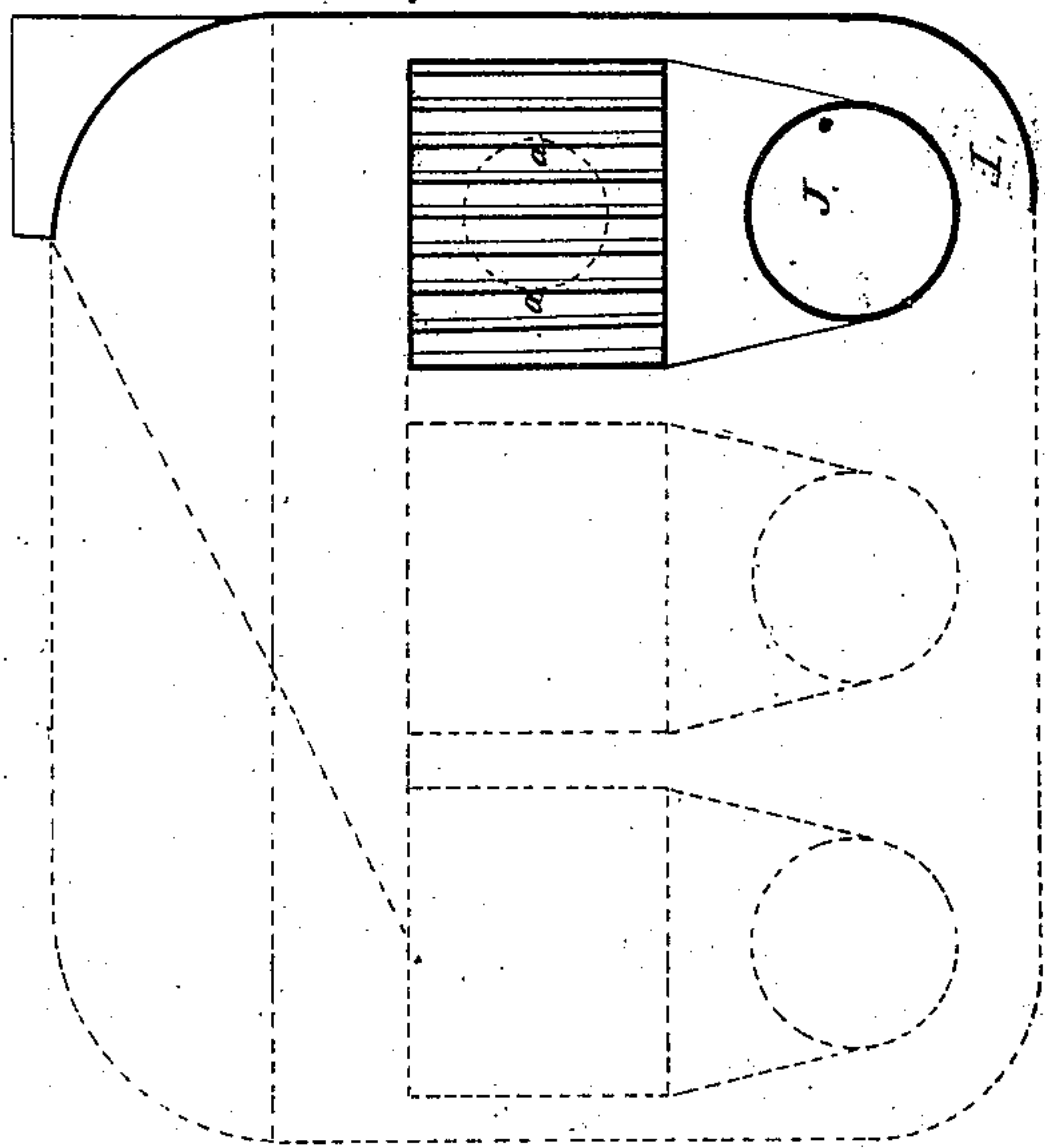
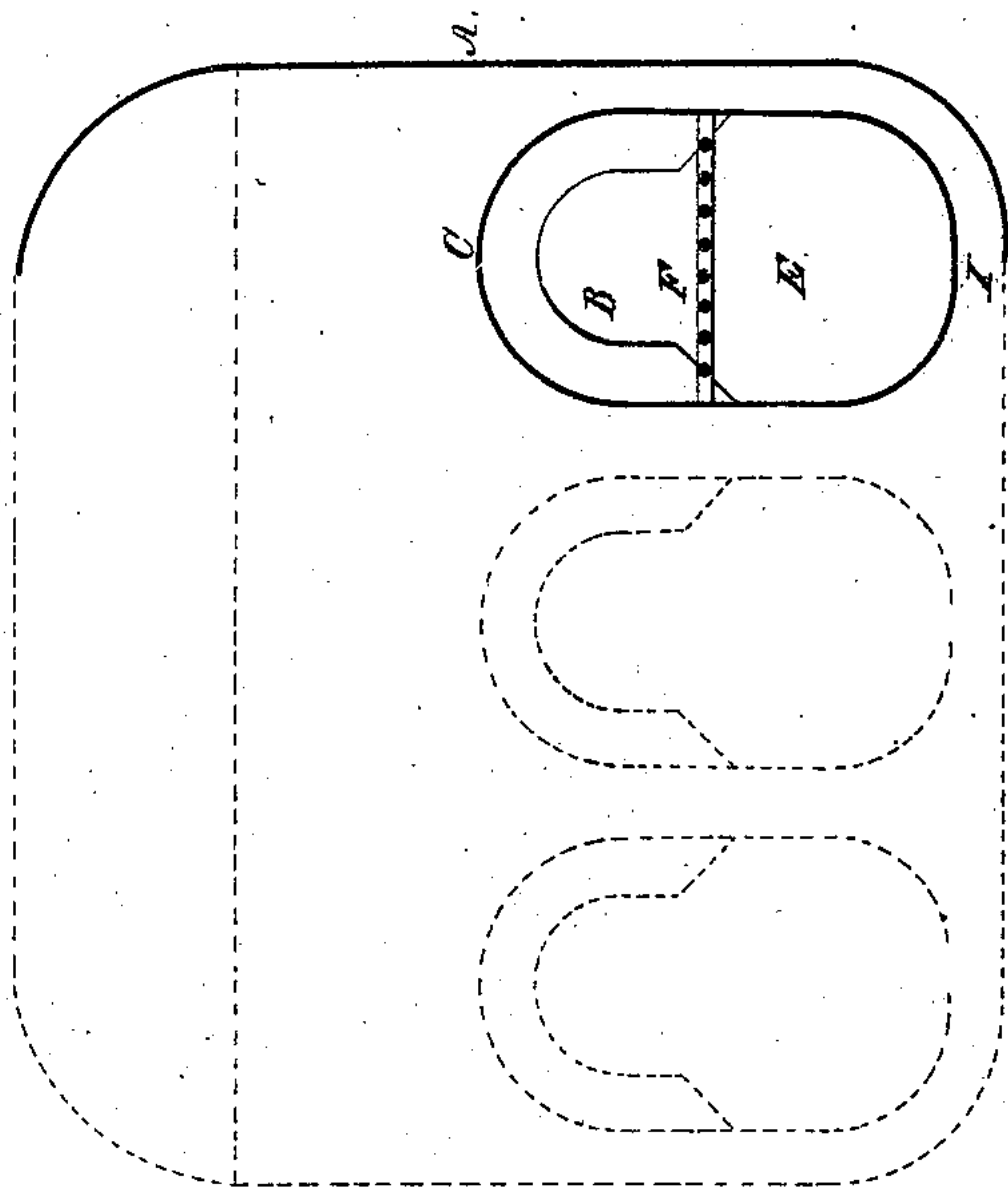
*Patented Mar. 4, 1862.*



*Fig. 1.*

*Fig. 2.*

*Fig. 3.*



*Witnesses,*

*Charles E. Foster*

*Charles H. Brown*

*Inventor,*

*Henry Brown*

*Atty. for B. H. Bartol*

# UNITED STATES PATENT OFFICE.

B. H. BARTOL, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 34,556, dated March 4, 1862.

*To all whom it may concern:*

Be it known that I, B. H. BARTOL, of Philadelphia, Pennsylvania, have invented an Improvement in Boilers for Marine Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention consists of a furnace diving-flue, one or more horizontal flues, and a return-flue with vertical tubes, the whole being arranged within an exterior shell or casing, in the manner described hereinafter, so that the boiler may be reduced in height and used on gun-boats of light draft without being exposed to an enemy's shot.

In order to enable others skilled in the art to make my invention, I will now proceed to describe the manner of constructing the same.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is a vertical section of my improved steam-boiler for marine engines; Fig. 2, a transverse vertical section of part of the boiler on the line 1 2, Fig. 1; and Fig. 3, a transverse section on the line 3 4, Fig. 1.

Similar letters refer to similar parts throughout the several views.

A is the exterior casing or shell of the boiler; B, the furnace; C, the arched top of the same; D, an opening, to one edge of which is hinged the usual door; E, the ash-pit; G, the bridge; F, the grate-bars; H, the diving-flue at the rear of the bridge, and I the lower water-space continued throughout the entire length of the boiler.

One or more round or oval flues, J, form a communication between the diving-flue H and smoke-chamber K, which communicates with the return-flue M, the latter being separated from the lower flue, J, by the water-space L and communicating through the flue N with the chimney.

Within the return-flue M are arranged a series of vertical tubes, *a*, which form a communication between the water-space L and the

space above the return-flue, the level of the water being represented by the line *x*.

Boilers with return-flues situated directly above the fire-box and containing a series of vertical or nearly vertical tubes have been in common use, a boiler of this description having been invented by Lord Dundonald and described in vol. 53, page 466, of the London Mechanics' Magazine for 1850, and subsequently reproduced by D. B. Martin, to whom Letters Patent of the United States were granted November 28, 1854. Although boilers of this class have been adopted to a considerable extent in the larger class of vessels of the United States Navy, for the reason that they occupy comparatively small space as regards length and width in the hold of a vessel, they are not well adapted to war-vessels of light draft, as the arrangement of the tubular flues directly above the furnace involves the necessity of making the boiler so high that the upper portion is prominently exposed to the shots of an enemy.

By arranging the tubular flue M at the rear of and nearly as low down as the furnace the boiler is so far reduced in height as to be contained in the hold of a vessel of light draft and free from exposure to the effects of an enemy's shots, thus rendering it especially applicable to light gun-boats, in which the area occupied by the boiler is of little importance compared with the reduced height, which insures the desired protection.

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

The furnace B, diving-flue H, one or more horizontal flues, J, and the return-flue M, with its vertical tubes, the whole being arranged within the casing A, as for the purpose herein set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

B. H. BARTOL.

Witnesses:

HENRY HOWSON,  
CHARLES E. FOSTER.