

(No Model.)

2 Sheets—Sheet 1.

E. S. HILDEBRANDT.
STEAM MUFFLER.

No. 422,213.

Patented Feb. 25, 1890.

Fig. 1.

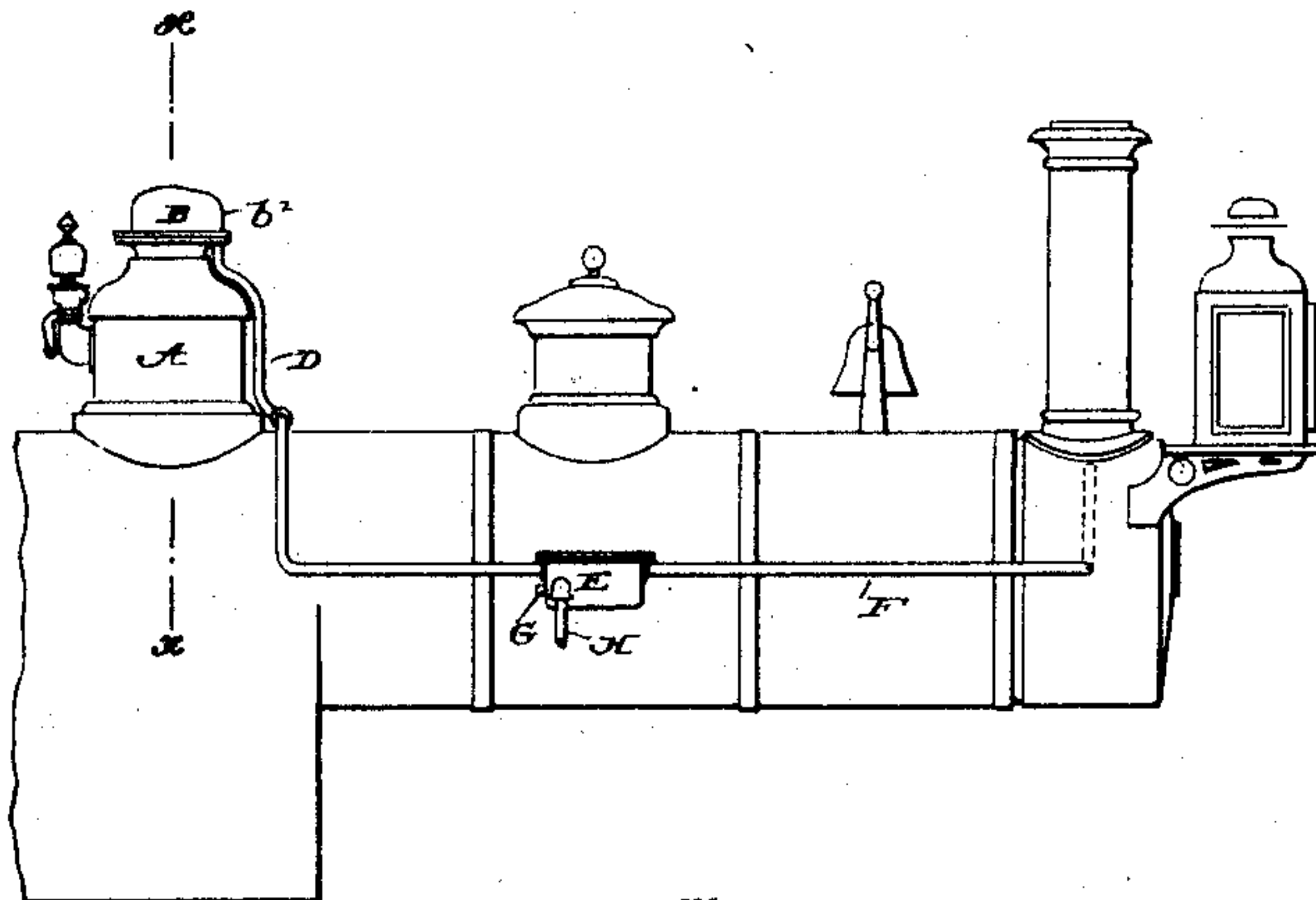
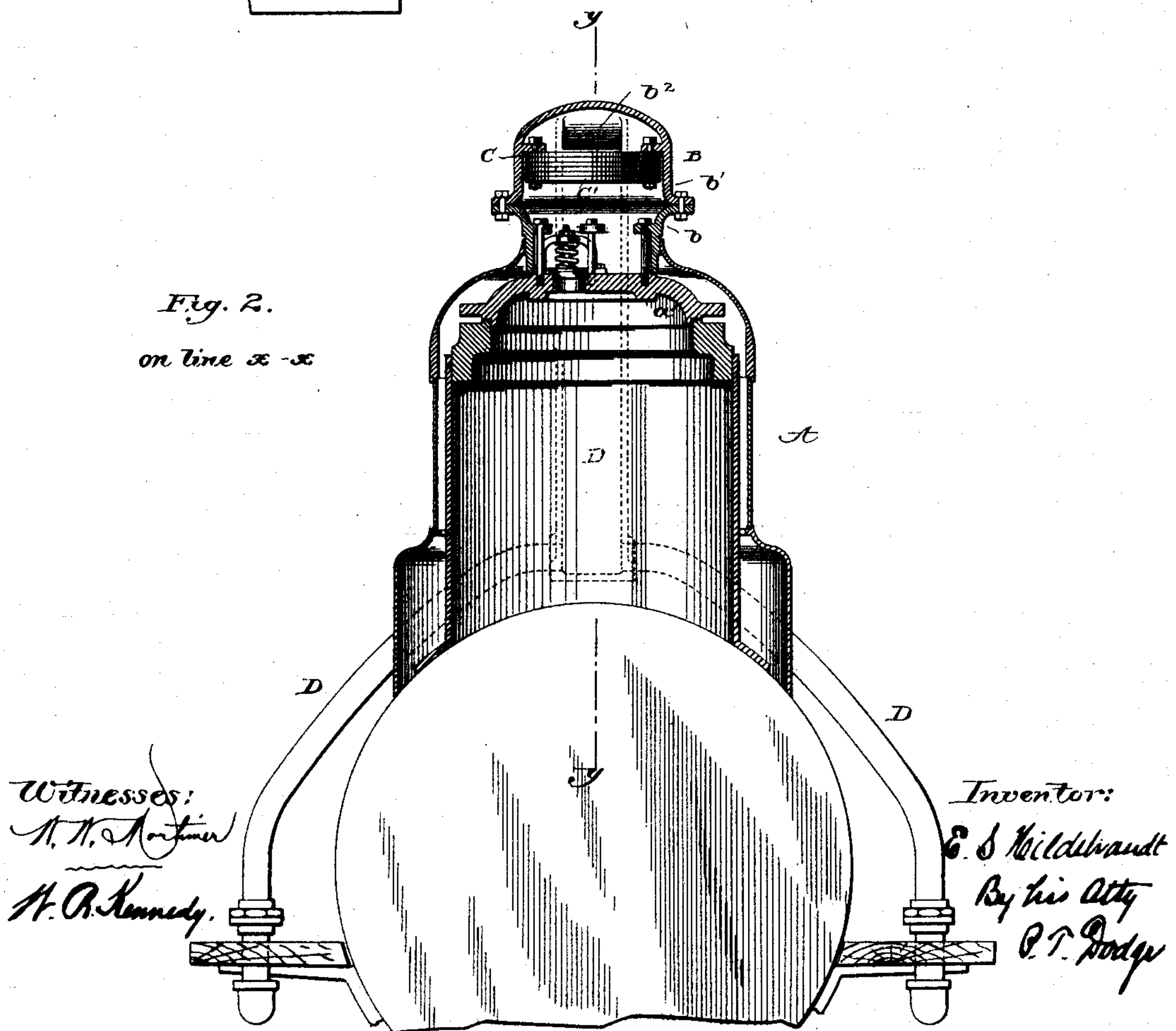


Fig. 2.
on line x-x



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Fig. 3
on line y-y

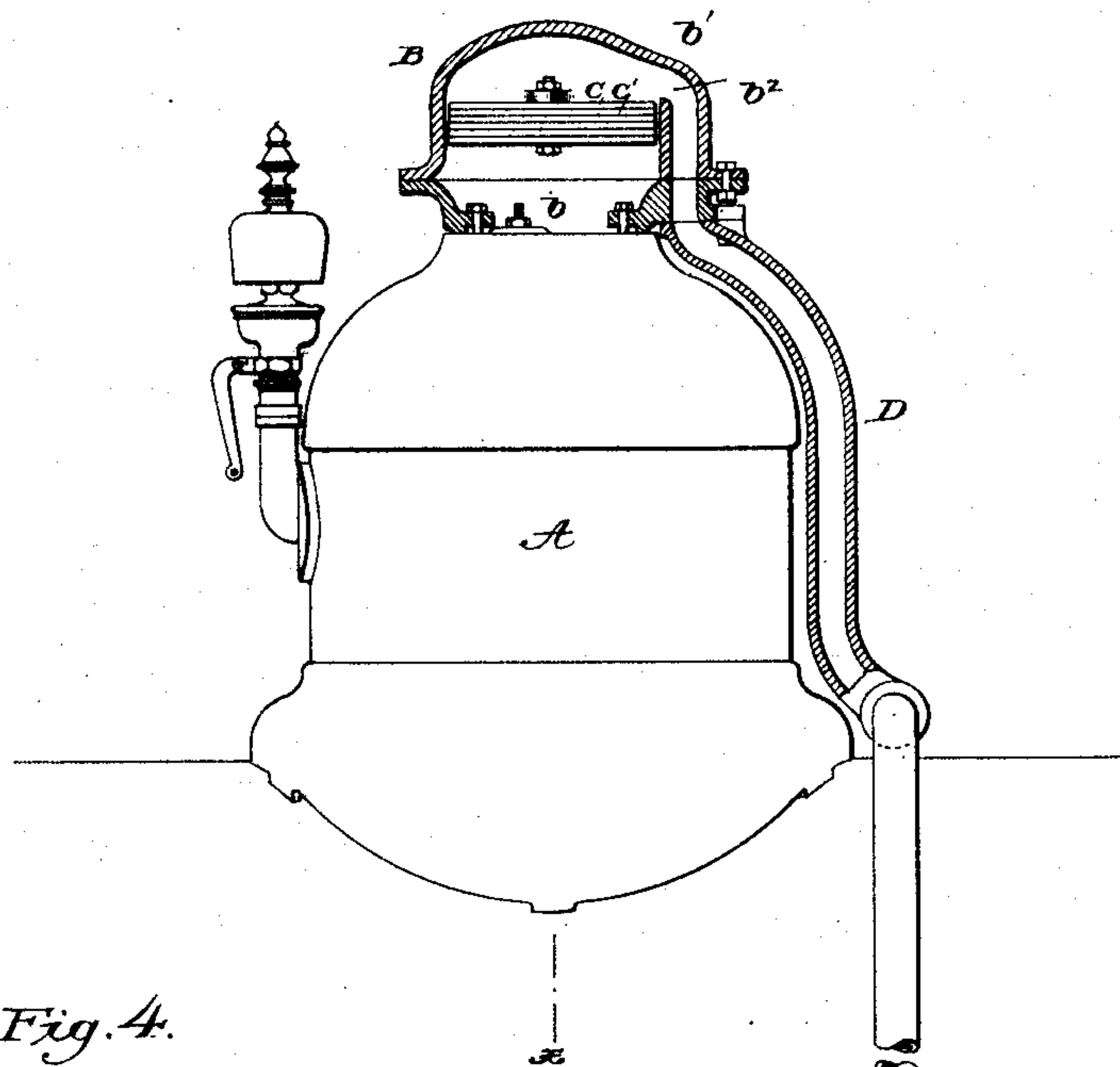


Fig. 4.

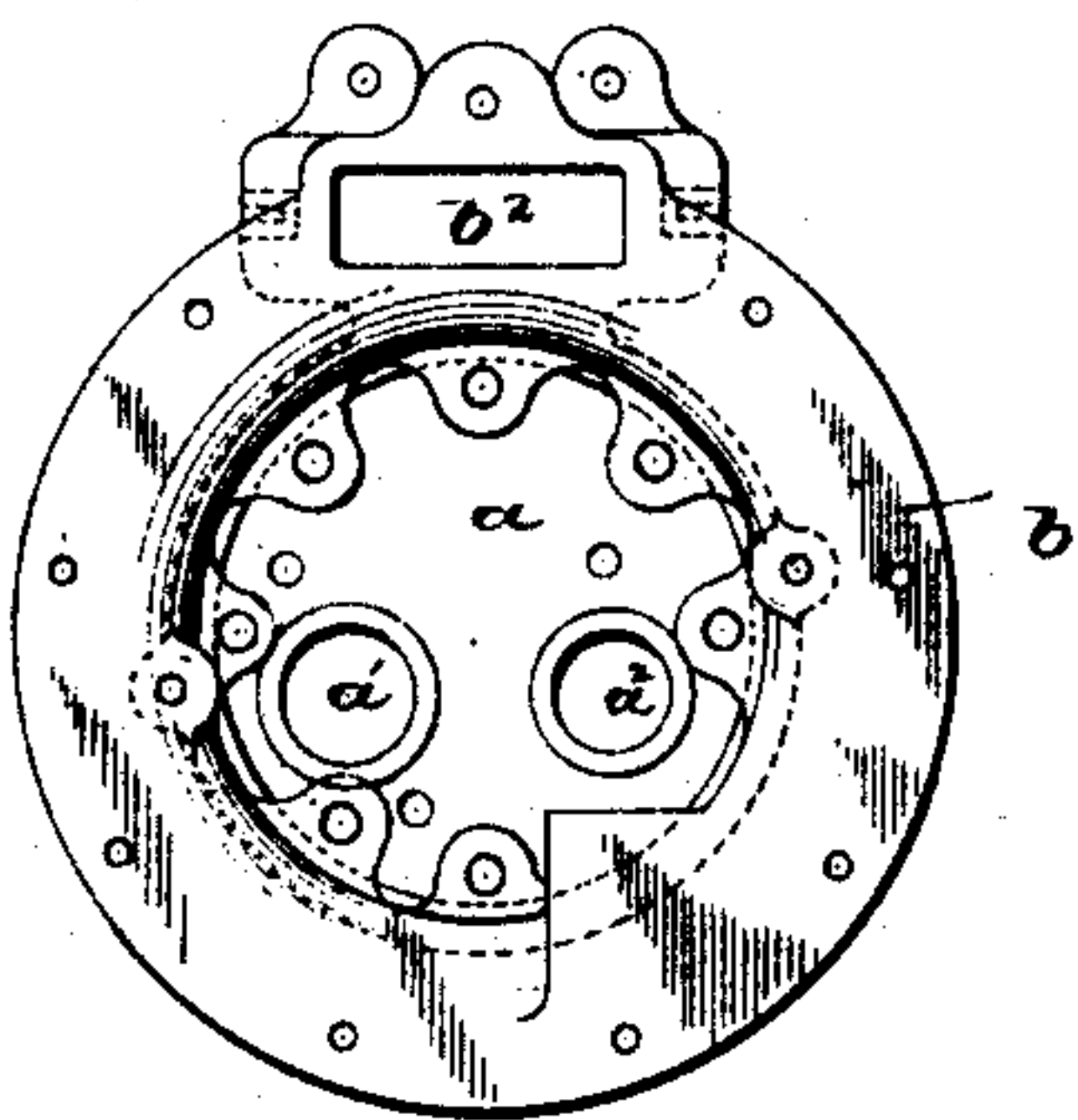


Fig. 5.

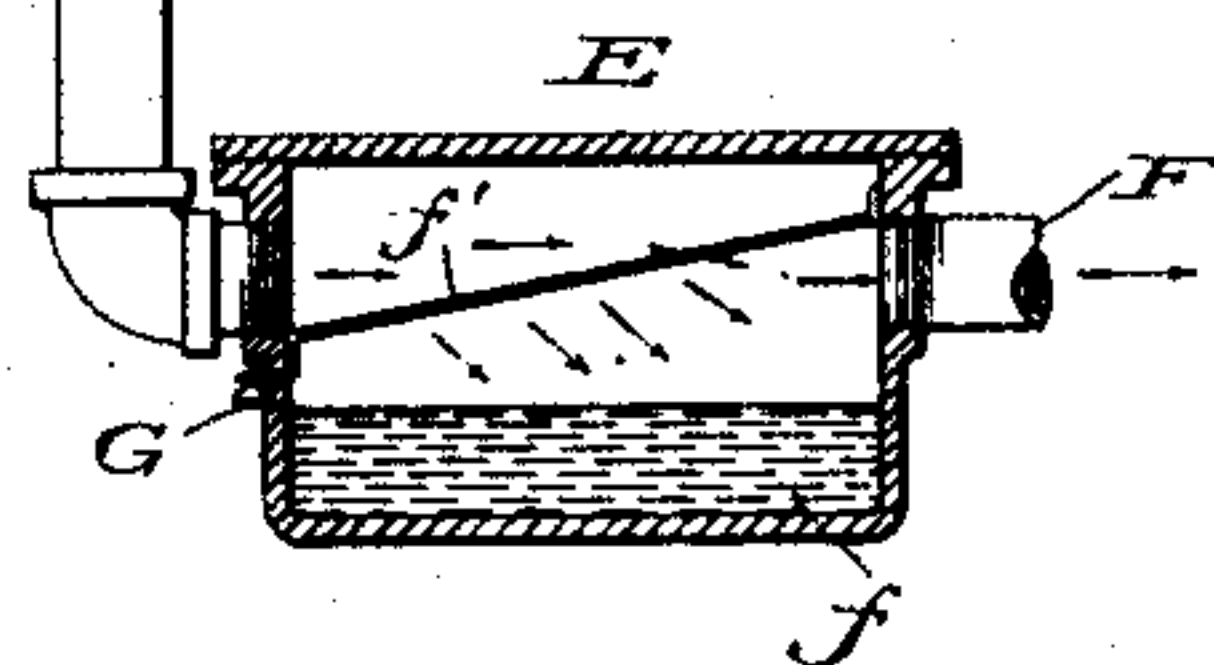
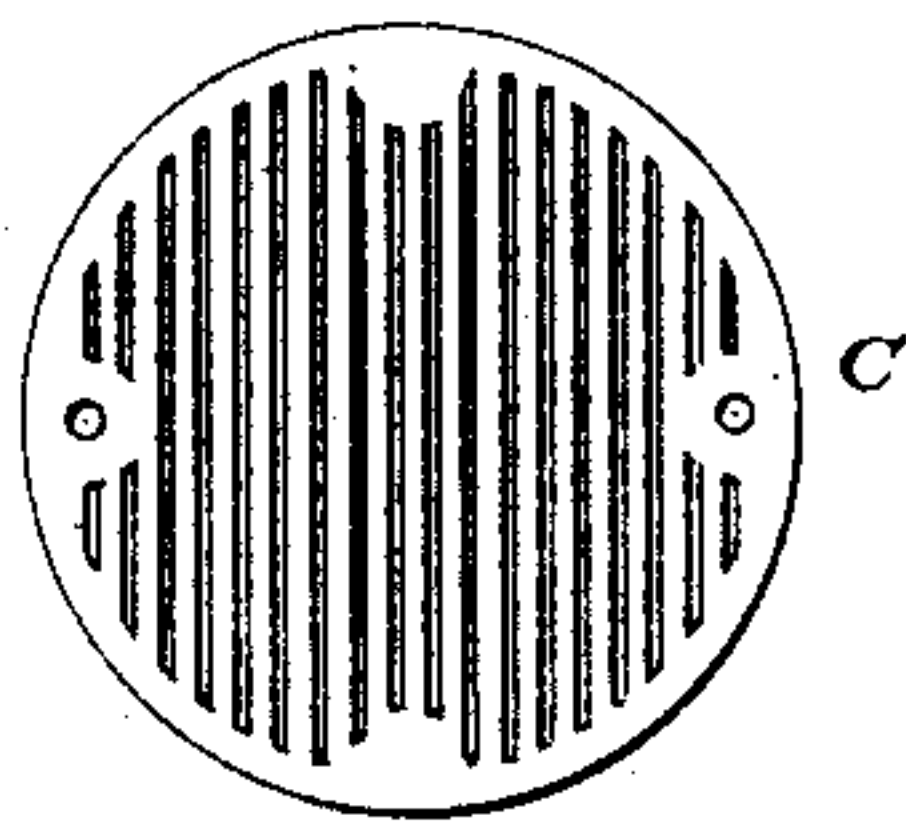
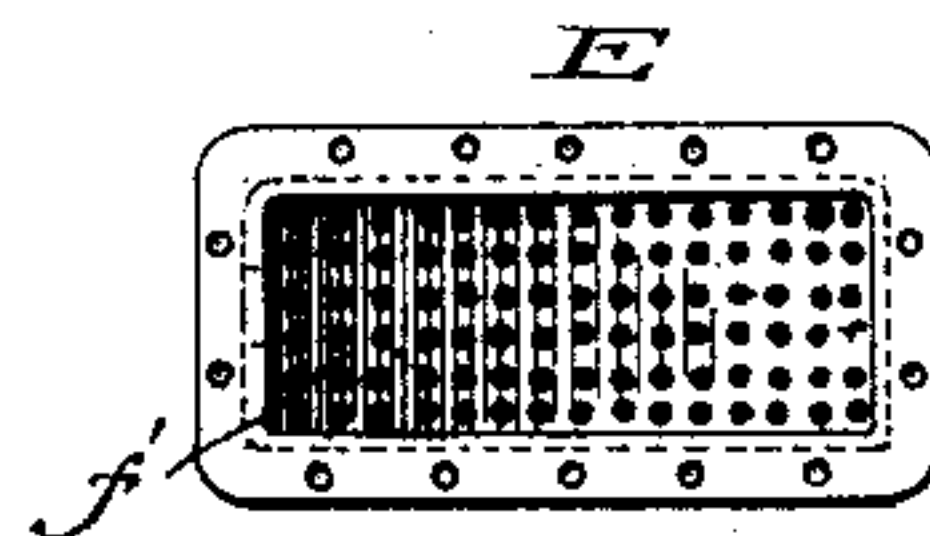


Fig. 6.



Witnesses:

W. H. Mortimer
H. A. Kennedy

Inventor:

E. S. Hildebrandt
By his Atty.
Phil. T. Dodge

UNITED STATES PATENT OFFICE.

EDWIN S. HILDEBRANDT, OF BALTIMORE, MARYLAND, ASSIGNOR OF TWO-THIRDS TO WILLIAM M. CLEMENTS, OF SUMMIT POINT, WEST VIRGINIA, AND FRANKLIN M. HILDEBRANDT, OF BALTIMORE, MARYLAND.

STEAM-MUFFLER.

SPECIFICATION forming part of Letters Patent No. 422,213, dated February 25, 1890.

Application filed June 19, 1889. Serial No. 314,789. (No model.)

To all whom it may concern:

Be it known that I, EDWIN S. HILDEBRANDT, of the city of Baltimore and State of Maryland, have invented certain Improvements in Steam-Mufflers, of which the following is a specification.

The object of my invention is to prevent the disagreeable sounds which are produced by steam escaping from the safety or blow-off valves of locomotive and other high-pressure boilers, and particularly locomotive-boilers, and this without producing a back-pressure or giving rise to other objectionable conditions.

In carrying my invention into effect I propose to surround the valve or valves with a closed chamber of suitable size to permit a considerable expansion of steam as it escapes. In this chamber I propose to use one or more metallic baffle-plates of slotted or other appropriate form, these plates serving the three-fold purpose of checking the velocity of the steam, of subdividing the steam, and of effecting a greater or less condensation. From the expansion-chamber the steam is delivered through one or more conductors into a condenser, whence the remaining power, if any, is discharged, preferably into the smoke-box or into the base of the smoke-stack. The condenser is preferably in the form of a box having a steam-inlet at the top, a perforated plate through which the steam descends, and a body of water in the bottom in such position that jets of steam flowing through the plate impinge upon the surface of the water.

The details may be variously modified, as will be apparent to the skilled mechanic after reading this specification; but I have represented in the drawings a construction which I prefer and which is now in successful use.

As the boiler and its attachments may all be of ordinary construction and form no part of my invention, I have confined my drawings to such parts as are necessary to an understanding of the improvement.

In the accompanying drawings, Figure 1 is a side elevation of the forward portion of a locomotive-boiler having my improvement

applied thereto. Fig. 2 is a transverse vertical section on the line $x x$ of Figs. 1 and 3. Fig. 3 is a longitudinal vertical section on the line $y y$ of Fig. 2. Fig. 4 is a top plan view of the top plate of the steam-dome with the valve-seats therein. Fig. 5 is a plan view of one of the baffle-plates. Fig. 6 is a plan view of the condenser with the top plate removed to expose the internal construction.

Referring to the drawings, A represents the steam-dome on the top of a steam-boiler, as usual. The top of the dome is formed by a plate a , having therein the throats a' and a'' to receive the safety-valves, of which there are usually two, one with an ordinary spring-valve and the other with a so-called "pop-valve." There may be one or more valves, as preferred, and they may be of any form and construction desired, my invention having no relation thereto. On the top of the dome I provide the chamber B, which completely incloses or surrounds the valve in order to receive the steam escaping therethrough. This chamber, which may be constructed in any suitable manner, I make of large size in relation to the valve-seats, in order that the steam may expand to a very considerable degree therein. In the form shown the chamber consists of the lower part b , bolted on top of the dome, and the top part b' , flanged and bolted to flanges on the lower member. In the upper part of the chamber I mount baffle-plates C C', two or more in number. I prefer to form each plate with a series of parallel vertical slots therethrough, as shown in Fig. 5, and to arrange them horizontally with the slots lying across each other. As regards the baffle, the only essential requirement is that it shall present an extensive surface and compel the steam to pursue an indirect course therethrough, in order that the flow may be checked or retarded, and it is to be understood that any construction or arrangement of metal or other materials which answers this purpose is to be considered in my combination as the equivalent of the slotted plates. At a point above the baffle-plates the chamber is provided with an outlet-passage b^2 , leading downward on the outside and en-

tering through a pipe D, with the condenser E located in any convenient position, preferably, as shown, at one side of the boiler.

From the condenser a pipe F extends to the smoke-stack or smoke-box, as shown in Fig. 1. The condenser, as shown, consists of a rectangular cast-metal box adapted to contain a body of water *f*, and provided above the water-level with a perforated, preferably inclined, plate *f'*. The steam entering through the pipe D is subdivided by the perforated plate and the resulting jets are directed downward upon the surface of the water, the effect being to condense the whole or practically the whole of the steam. The remaining vapor, if any, will have but slight pressure, but will escape through the pipe F to the smoke-box, whence it will be delivered with the exhaust to the stack.

An overflow-pipe G serves to maintain the water-level in the condenser, but permits the surplus water to escape. A pipe H, leading to a pump or other source of water-supply, enables the condensing-water to be renewed from time to time, as may be required, in order to maintain it at a suitable temperature.

The operation is as follows: The high-pressure steam escaping through the safety-valve expands within the chamber B, its velocity and the pressure being greatly diminished. This diminution in pressure is effected in part by the action of the baffle-plates, and is due in part to the expansion. The plates also act to condense a portion, the water of condensation escaping through a pipe I or other suitable outlet. The expanded low-pressure steam escaping from the top of the expansion-chamber E passes into the top of the condenser, where the remaining condensation is effected.

If desired, there may be duplicate condensers located at opposite sides of the dome and connected, as above described, with the expansion-chamber and the stack.

While it is preferred to employ a condenser,

great advantages are found to attend the use of the expansion-chamber, or the expansion-chamber and the baffle-plates therein, in the absence of a condenser.

Having thus described my invention, what I claim is—

1. In combination with a safety or similar steam-discharging valve, a closed expansion-chamber inclosing the same, a discharge-pipe leading from said chamber, and baffle-plates located in the chamber between the valve and said discharge-pipe.

2. In combination with a steam-discharge valve, an expansion-chamber inclosing the same, a baffle-plate in said chamber, and a condenser connected with said chamber, whereby the steam is first expanded and reduced in velocity and thereafter introduced into the condenser.

3. In combination with a steam-discharging valve, a chamber inclosing the same, a baffle-plate in said chamber, a condensing-chamber connected with the expansion-chamber and having a body of condensing-water in its base, and a perforated plate located in said condensing-chamber to divide the body of steam before it reaches the water.

4. In combination with a steam-discharging valve, an expansion-chamber inclosing the same, a baffle-plate located in said chamber, a pipe leading from said chamber, a condensing-chamber into which said pipe delivers and in which there is a body of water, a perforated plate located between the steam-inlet and the water, and a pipe leading from a point between the water-level and said plate to the smoke-stack.

In testimony whereof I hereunto set my hand, this 22d day of May, 1889, in the presence of two attesting witnesses.

EDWIN S. HILDEBRANDT.

Witnesses:

F. M. HILDEBRANDT,
W. R. KENNEDY.