

W. F. Beecher,

Smoke Stack.

No. 97,473.

Patented Dec. 7. 1869.

Fig. 1.

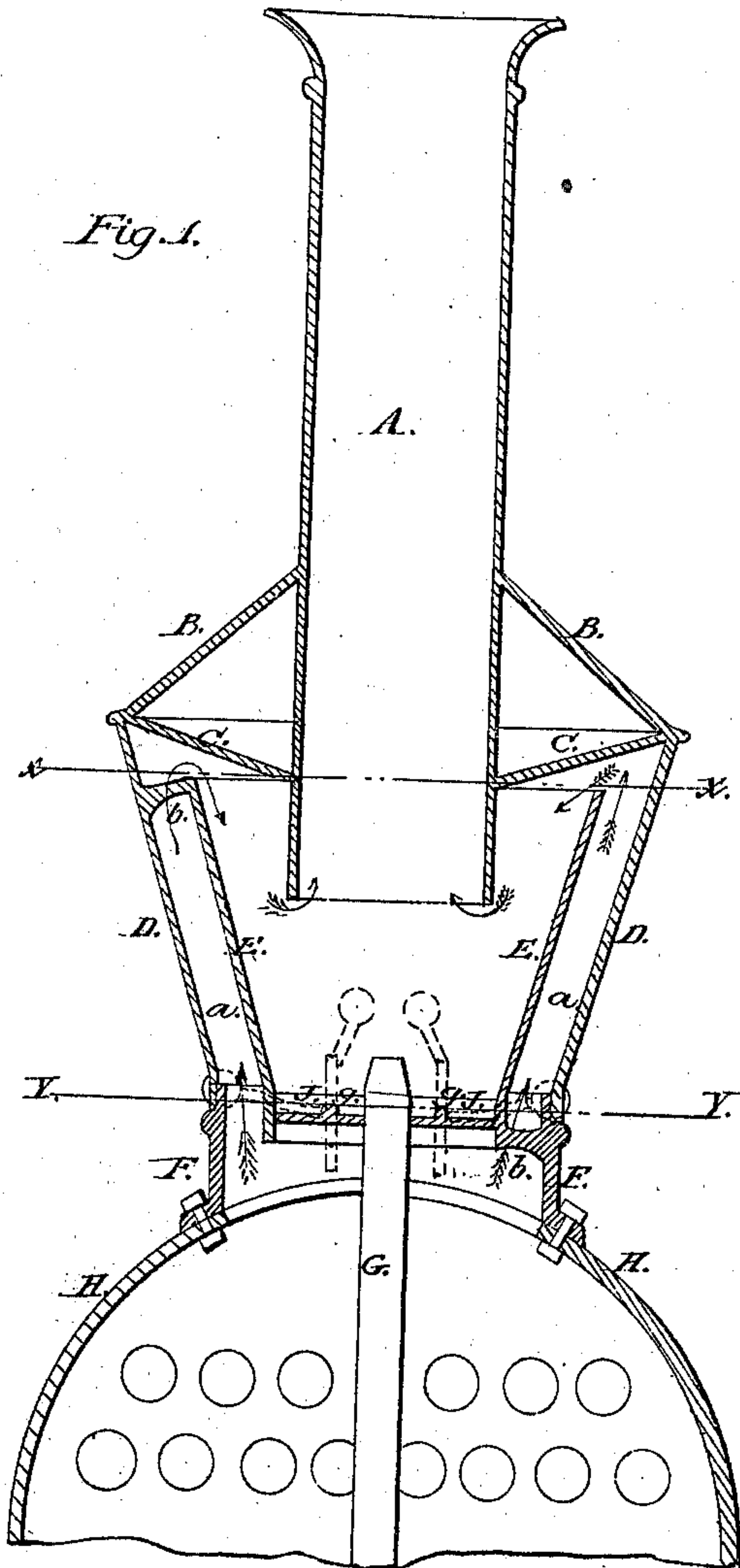


Fig. 2.

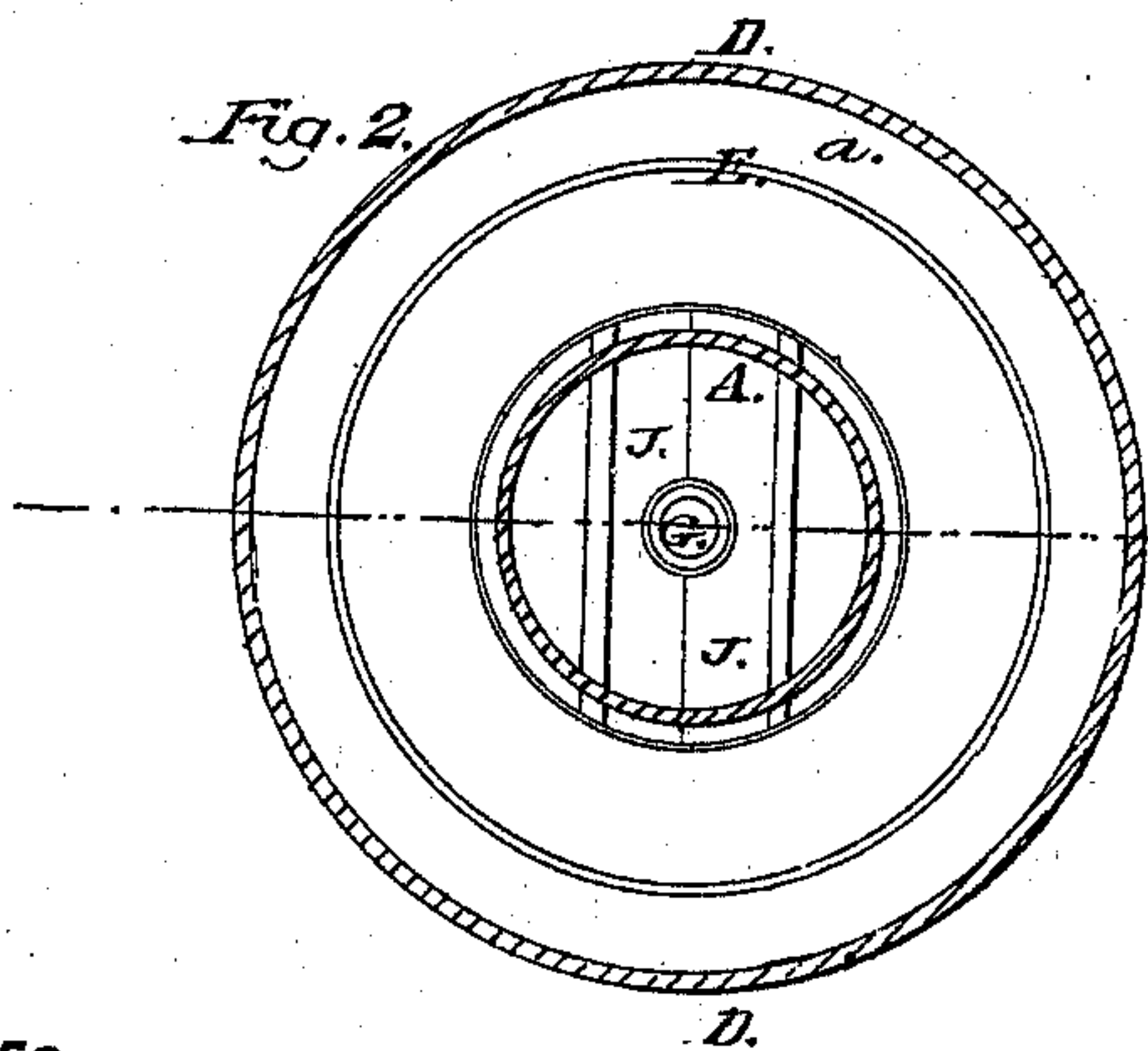
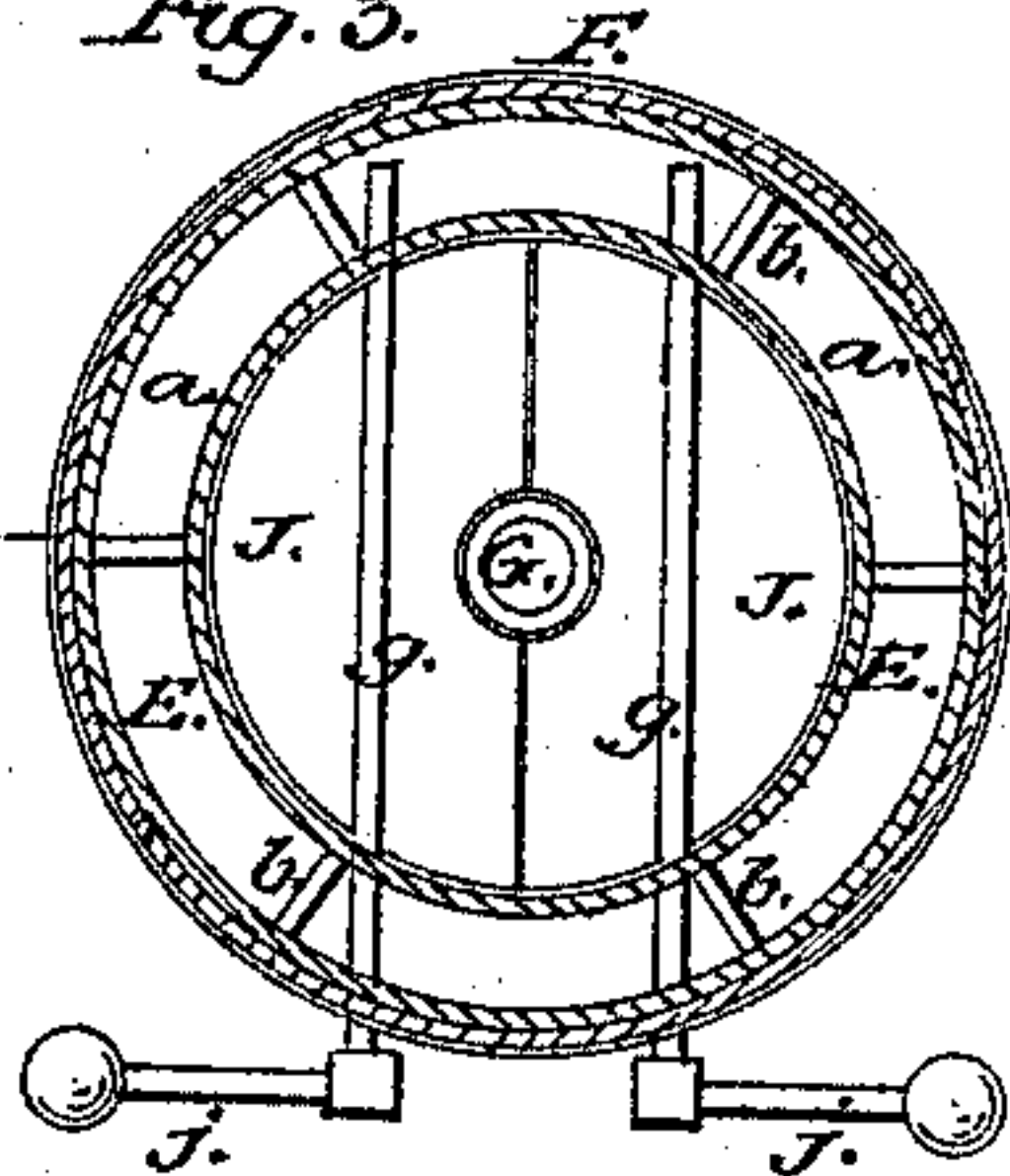


Fig. 3.



WITNESSES:

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W. F. BEECHER, OF MORRISTOWN, NEW YORK.

Letters Patent No. 97,473, dated December 7, 1869; antedated November 24, 1869.

IMPROVEMENT IN STEAM-GENERATOR SMOKE-STACKS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, W. F. BEECHER, of Morristown, in the county of St. Lawrence, and State of New York, have invented a new and improved Smoke-Stack; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a diametrical section through my improved smoke-pipe or stack applied on one end of a steam-generator.

Figure 2 is a section taken through the stack, in the horizontal plane indicated by line $x x$ in fig. 1, looking downward.

Figure 3 is a horizontal section through the stack, taken in the plane $Y Y$, fig. 1, looking downward.

This invention relates to certain novel improvements on smoke-stacks for portable and stationary boilers and for marine boilers, which improvements are designed for preventing the escape of sparks from a stack without the use of wire gauze; also, for concentrating and retaining a large amount of heat in the smoke-box; and, also, for causing the arrested sparks, cinders, and soot to fall freely into the smoke-box beneath the stack.

Provision is also made for regulating the draught, and for obtaining either a direct or an indirect draught at pleasure, as will be hereinafter explained.

To enable others skilled in the art to understand my invention, I will describe its construction and operation.

In the accompanying drawings, I have represented my improved stack arranged upon a locomotive-boiler; but it will be seen from the following description that the stack is applicable to steam-generators of various descriptions.

A represents the discharge-pipe, which is secured, at a point above its lower end, to a crown, B, made of the form of the frustum of a cone, and flaring downwardly.

The circumferential edge of this crown rests upon and is secured to the upper end of an upwardly-flaring annular wall, D, which is secured, at its lower contracted end or neck, to an annular saddle, F, which is bolted to the shell H over the smoke-box at the end of the boiler.

The three parts, A, B, and D, constitute the outer walls of the stack or chimney, and are made of boiler-metal in the usual well-known manner.

At the base of the cone B is an annular diaphragm, C, which inclines downwardly toward pipe A from its point of connection with the upper end of the outer wall D, and is united to this pipe A at a point above the lower end thereof, as shown in fig. 1.

By this arrangement, there is formed around the

lower end of pipe A, and beneath the diaphragm C, a space for the reverberation of the sparks and gases, which are deflected downwardly, but arrested for a time in said chamber or space before entering the lower end of pipe A.

Within the outer wall D is an inverted funnel-shaped wall, E, which is held in place by supports $b b$, and constructed of such diameter, relatively to the outer shell, as to leave an annular upwardly-flaring space, a , between it on this outer shell.

The upper end of the inner shell extends above the lower end of the pipe A, and the inner end extends nearly to the base of the saddle F, and terminates in a cylindrical portion enclosing two valves or dampers.

The space a is open at top and bottom for the free ascent of the products of combustion through it when the dampers at the base of the inner wall E are shut.

The exhaust-steam pipe G rises from the smoke-box, and its discharge-end enters the space enclosed by the wall E, terminating at a point just above the dampers above referred to.

This pipe G coincides with the centre of the pipe A, and directs the exhaust steam upwardly through this pipe A.

The dampers J are two semicircular plates, fitted in a suitable manner within the cylindrical base of the inner wall E, and hung by means of rods $g g$, so as to vibrate freely.

The ends of these rods extend outside of the outer shell of the stack, and have loaded arms, $j j$, applied at right angles to them, for holding the dampers open or shut.

The semicircular notches made in the straight edges of the dampers, allow them to shut around pipe G.

I have now described the construction of my improved spark-arresting and heat-retaining stack, adapted for locomotive-boilers.

For marine boilers, the shell D and wall E may be made of two cylinders, terminating in conical ends.

When the dampers J J are open, the smoke will pass directly off through the inner wall E and pipe A, assisted by every pulsation of exhaust steam through pipe G.

When the dampers are both shut, the products will take the course indicated by the arrows in fig. 1.

The products pass up through the space a and impinge against the diaphragm C, which is so arranged as to retard them long enough to deprive them of a large amount of heat, which will be retained within the stack.

The products then descend to the lower end of the discharge-pipe A, and rise through this pipe, where they are subjected to the action of exhaust steam issuing from pipe G.

The extinguished particles fall partly through the

passage *a* and partly upon the dampers J, and are discharged below into the smoke-box; consequently the ventilating-passages cannot become clogged with cinders or soot.

By having the exhaust-pipe carried above the damper, and leaving no obstruction to the ascent of the exhaust steam above this pipe, I insure sufficient draught when the dampers are shut, by expelling the air from pipe A, and thus creating a partial vacuum back to the fire-box.

This arrangement also causes a powerful draught through the grate, and produces lively combustion.

Having described my invention,

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

1. The arrangement of the walls D E and pipe A, in combination with space *a* and an exhaust-pipe, G, which extends above the plane of said dampers, substantially as described.

2. In combination with such arrangement, the diaphragm C, located over space *a*, and arranged above the lower end of pipe A, substantially as described.

3. The crown-plate B and diaphragm C, arranged above the lower end of pipe A, and above space *a* and inner wall E, substantially as described.

W. F. BEECHER.

Witnesses:

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