

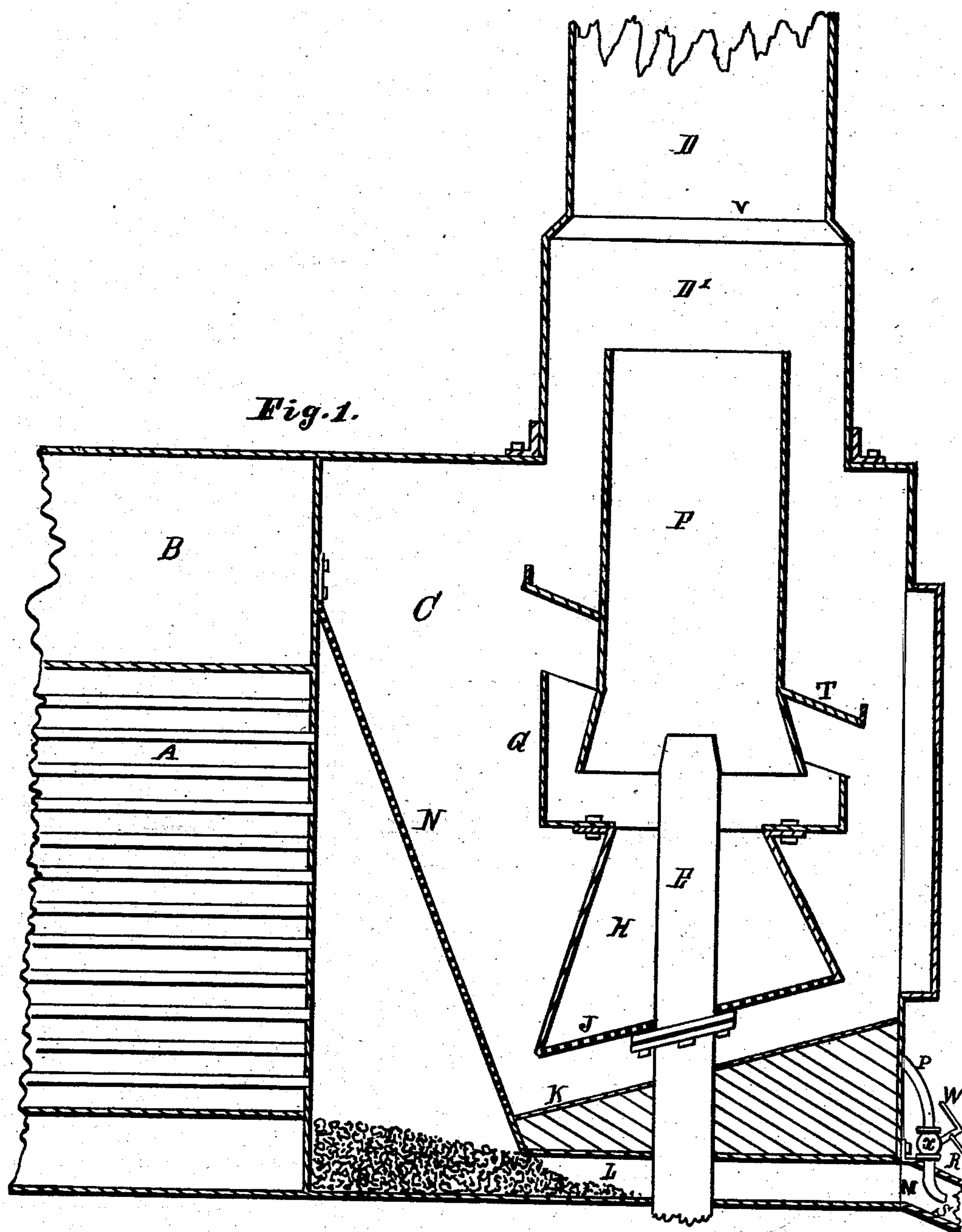
(No Model.)

3 Sheets—Sheet 1.

J. D. BROWN.

Exhaust Mechanism and Spark Arrester.
No. 238,084.

Patented Feb. 22, 1881.



Witnesses

William F. Brandt.
Edwin S. Bullis

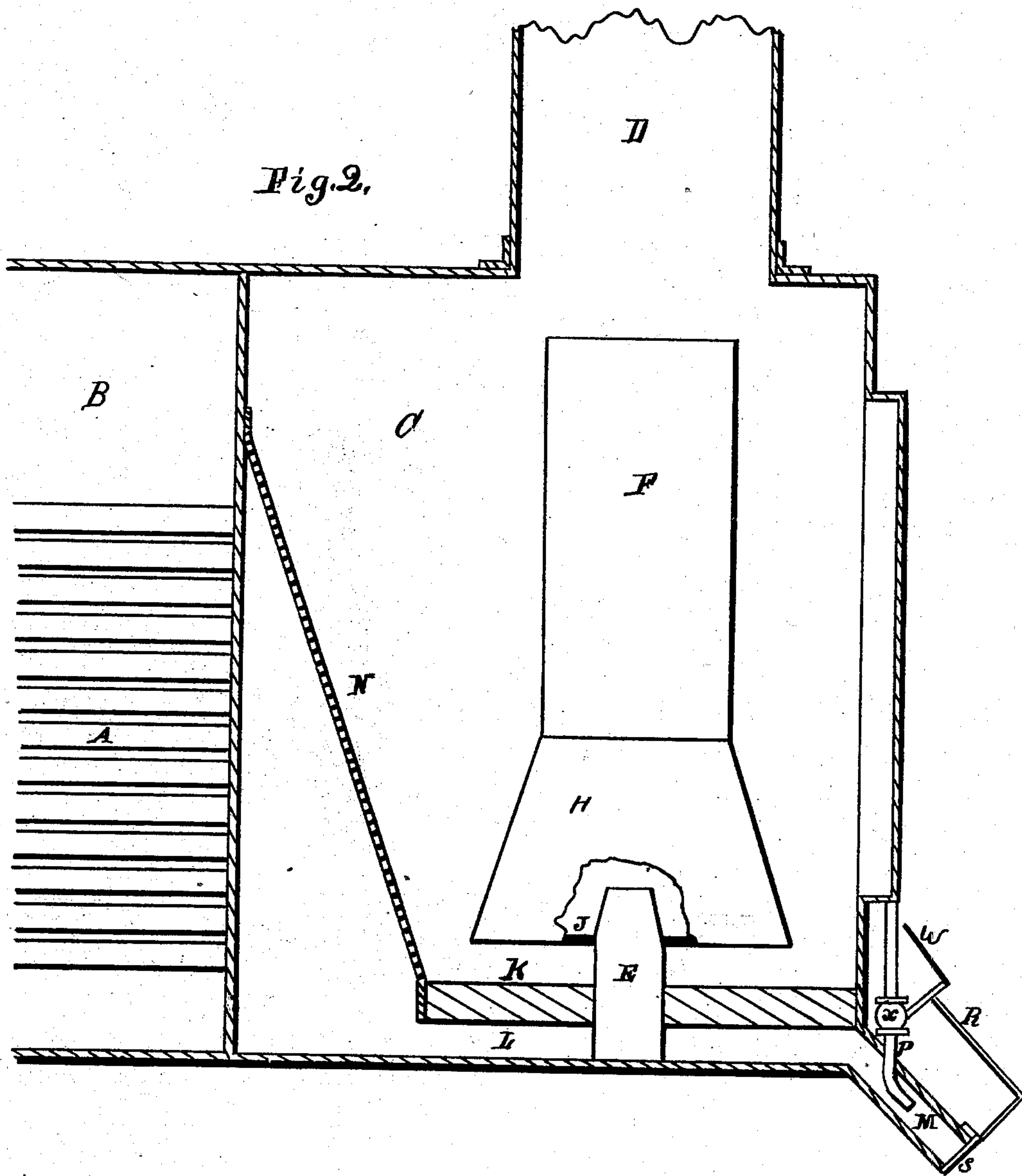
Inventor

John Dunwell Brown

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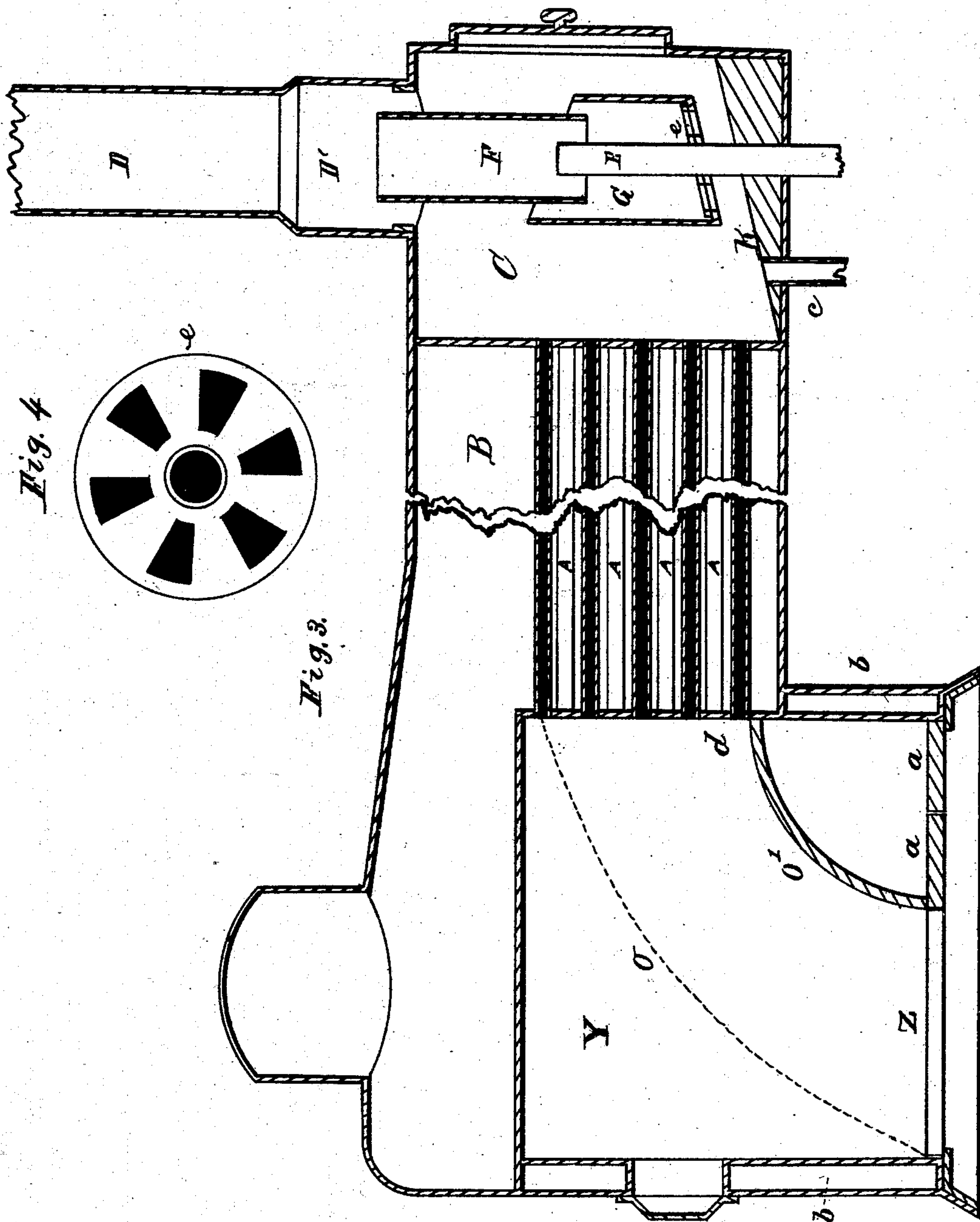
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UNITED STATES PATENT OFFICE.

JOHN D. BROWN, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, PETER J. VANDERBILT, AND MATTHEW L. HARNEY, OF SAME PLACE.

EXHAUST MECHANISM AND SPARK ARRESTER.

SPECIFICATION forming part of Letters Patent No. 238,084, dated February 22, 1881.

Application filed December 11, 1880. (No model.)

To all whom it may concern:

Be it known that I, JOHN DUNWELL BROWN, a citizen of the United States, residing in the city, county, and State of New York, have invented a certain new and useful improvement in means for equalizing, regulating, and improving the draft of locomotive and stationary boilers, and for disposing and removing the sparks and cinders which may be drawn through the flues; and I hereby declare the following specification to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to construct and use the same.

My invention relates to improved means for equalizing, regulating, and improving the draft of locomotive and stationary boilers and for disposing and removing the sparks and cinders which may be drawn through the flues, the object thereof being, first, to accomplish a saving of fuel by so regulating the draft that it will draw in an equalized manner throughout all the flues, and consequently in the same manner over and through the entire surface of coals on the grate; second, to provide a simple means for removing sparks and cinders drawn through the flues without allowing them to pass out at the stack or to remain long enough in the smoke-box to affect the draft or to burn the metal.

Figure 1 is a vertical longitudinal broken section of a horizontal tubular boiler. Figs. 2 and 3 are modifications of the same. Fig. 4 is a view of a register for regulating the draft.

Like letters designate corresponding parts in all the figures.

In the drawings above mentioned, A represents the flues of the boiler; B, the steam and water space; C, the smoke-box; D D', the stack; E, the exhaust-pipe leading from the cylinder; F, a "lift" or "petticoat" pipe (so called) placed over the nozzle of the pipe E. This pipe E terminates at a point at any suitable distance within the lift-pipe F. This pipe F sits partially within a drum or pipe, G, which is partially closed at the bottom, and immediately below and attached to or connected with the same is placed a suction-pipe, H. This suction-pipe H is made of a suitable diameter at its base in order to draw upon a large space,

and if very large and entirely open at the bottom would draw within it so great a quantity of the products of combustion as to prevent the equalization of draft in other parts. It is therefore provided with a plate, J, fastened to the bottom thereof, which plate is provided with perforations or openings in various portions thereof to allow the entrance of a sufficient quantity of the products of combustion, and at the same time to draw upon such a sufficient area below as to affect or draw in the gases lying against the sides of the smoke-box and in front of the side flues of the boiler, the said openings or perforations being left open, or they may be covered by a register, e, similar to the one shown in Fig. 4.

In the front end of the smoke-box, extending across to either side thereof and a few inches below the suction-pipe H, is placed a floor or hearth, K, which may be made of any suitable material and of any desired thickness. This floor extends from the front end of smoke-box toward the flue-sheet a little beyond the suction-pipe H, while underneath said floor K there is left a cavity, L, connecting with a pipe, M, outside of the smoke-box.

Attached to the floor K, or in front of same, and connected with either side of the smoke-box or to the flue-sheet, is placed a netting, N, which is intended to arrest any sparks or cinders that may be drawn through the tubes and allow them to fall and be deposited at the mouth of the cavity L. From this point they may be removed by means of the steam-jet pipe P, terminating within the discharge-pipe M in the lower part of the front end of the smoke-box, or they may be removed at any suitable point along the base of said passage L either by hand or blast.

Within the pipe M is placed a blower-pipe, P, connecting with the steam-chamber of the boiler, the cock X of which is connected, by the rod R, to a gate or door, S, on or within any part of the pipe M.

Attached to and surrounding the lift-pipe F, a short distance above the bottom thereof, is a partition-plate or shield, T, which is intended to divide the draft which passes into the drum G from that which passes upward into the stack, the exterior base of the drum G having

a similar effect in partitioning the draft which passes into the suction-pipe H from that which passes into the top of the drum G.

The operation of the draft is as follows:

5 The engine being at rest, the natural draft is passing from the flues upward within and around the pipes in the smoke-box into the stack. The first exhaust of steam from the pipe E into the pipe F cuts off that upward
10 current below the partition-plate T, drawing it downward through the drum G into the pipe F. Simultaneously, also, the products of combustion at the bottom of the flues are drawn inward through the perforations or openings in
15 the plate J and through the suction-pipe H, when, following the exhaust-steam from the pipe E, it passes through the lift-pipe F and is discharged into the base of the stack or drum D'. The exhaust-steam, in passing into the
20 upper pipe, D, draws after it the whole contents of the drum D', and if made of sufficient length will draw the products of combustion from the sides and top of smoke-box as far down as the partition-plate T. The natural draft being thus broken up and destroyed by an almost simultaneous discharge, and a partial vacuum having been produced at the bottom, center, top, and sides of the smoke-box, the products of combustion from the furnace
30 at once pass through the flues in an equalized manner, whereby each flue discharges into the smoke-box C an almost equal quantity of said products of combustion and at about the same moment of time, when the operation of the exhaust is again repeated, and so on until the engine or engines have come to a stop. This equalized draft throughout the entire smoke-box causes the current to reach over within the furnace Y, (shown in
40 modification, Fig. 3, in the shape of the curved lines O O',) to a space quite remote from the flue-sheet d, yet not quite touching the water-leg b, as shown in said modification, Fig. 3, in consequence of which the grate Z, in front of the flue-sheet d, may be closed off to a considerable extent by cast-iron plates a a or their equivalent, and the air-space between the grate-bars need not exceed one and one-half time the sectional area of the flues.

50 The method above described of disposing of sparks and cinders is not only applicable to the means above described, where the same is made to draw upon the top, center, and sides of the smoke-box, but is also applicable to any other means provided for producing a partial vacuum within the smoke-box.

In the modification, Fig. 2, C represents a smoke-box, with the ordinary lift-pipe F placed over the nozzle E, K representing the floor or
60 hearth; L, the cavity below; N, the netting attached to the sides of smoke-box and to the hearth K; and M, the blower or exhaust pipe for removing the cinders, as shown in Fig. 1. The cavity L, while useful as a channel for
65 the removal of cinders, has also a beneficial effect upon the draft, the gases within same,

when the pipe M is closed, acting as a cushion, which modifies the force or energy of the draft from the lower flues as it passes into the lift or suction pipe. For that reason the cinders
70 should not be allowed to accumulate to any great extent before being blown out, which may be done at any time when the steam is shut off from the cylinders by simply opening the blower-pipe P.

75 For the purpose of cleaning the smoke-box of sparks and cinders by the use of the cavity L and blow-pipe P, it is not absolutely necessary, although it is preferable, that the cinders should be collected in any particular spot. They may be made to fall generally all over the smoke-box, the action of the blow-pipe, as constructed and arranged with cavity L and pipe M, being sufficiently strong to thoroughly cleanse the smoke-box of cinders from
85 any portion thereof.

The flare of the lift-pipe F is a modification of the suction-pipe H, (shown in Fig. 1,) J representing the plate attached to or connected with the lower portion thereof, with a sufficient opening therein or around the sides of
90 same for the admission of the necessary amount of draft.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The herein-described device for regulating the draft in the furnace and flues of locomotive and stationary boilers, consisting of the drum G, lift-pipe F, suction-pipe H, and exhaust-pipe E, arranged substantially as
100 shown, for the purpose of dividing the draft within the smoke-box into three currents, whereby the draft is equalized throughout the flues and over the surface of the furnace.

2. The herein-described device for regulating and improving the draft of locomotive and stationary boilers, consisting of the drum G, exhaust-pipe E, lift-pipe F, suction-pipe H, and plate K, all arranged substantially as
110 shown, for the purposes specified.

3. The herein-described device for regulating and improving the draft of locomotive and stationary boilers, consisting of the lift-pipe F, provided with an annular shield, T, for assisting in diverting a portion of the draft downward into drum G, in combination with said drum G, suction-pipe H, and exhaust-pipe E.

4. The herein-described device for arresting, collecting, and discharging sparks or cinders, which consists of the netting N, terminating on plate K, for the purpose of deflecting said sparks or cinders downward to the bottom of the smoke-box, and the passage or cavity L,
125 formed by said plate K, in combination with jet-pipe P and pipe M, for exhausting and conducting the cinders from said passage L.

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Witnesses:

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