(No Model.)

J. BUTLER.

SMOKE PURIFIER AND CONSUMER.

No. 494,522. Patented Mar. 28, 1893.

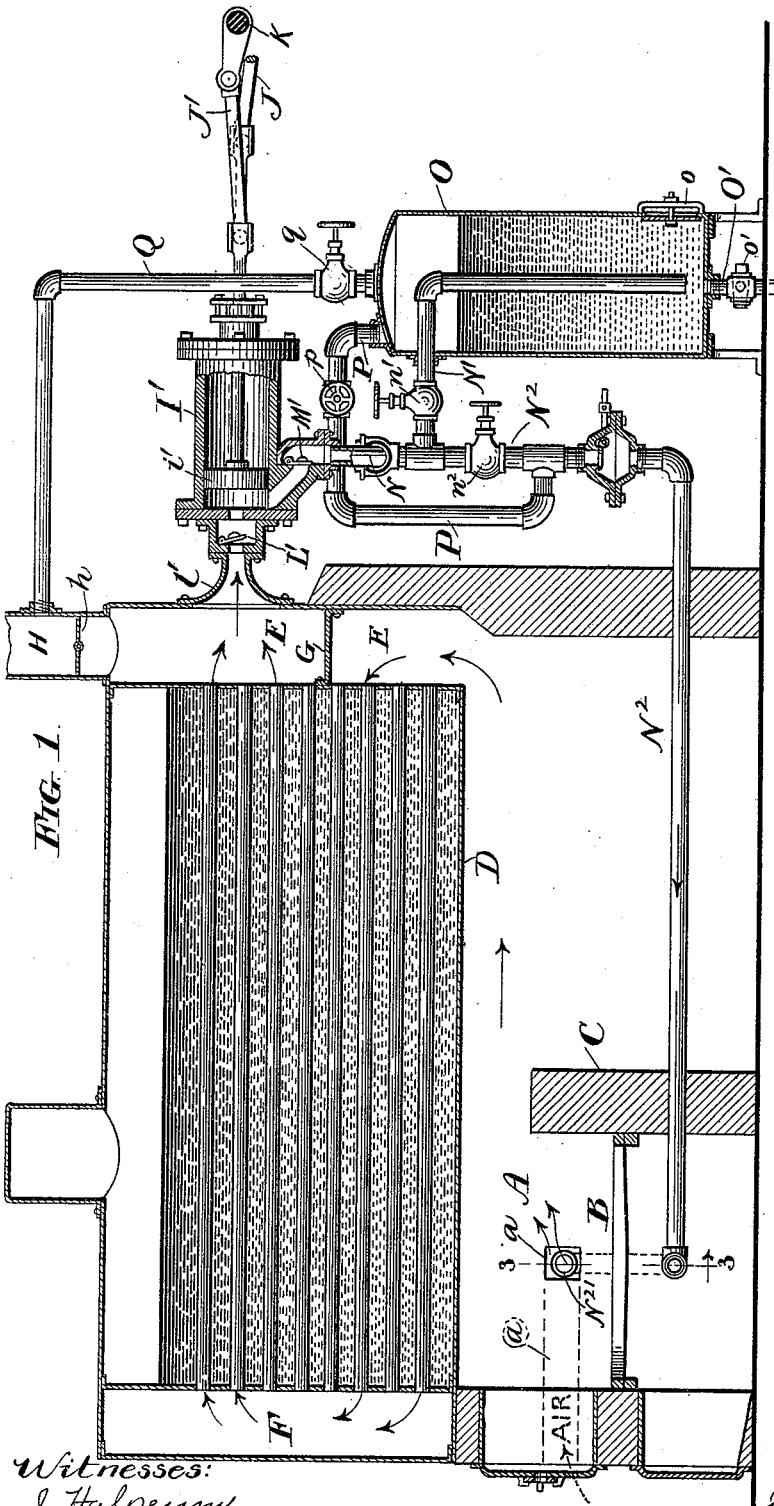

FIG. 1.

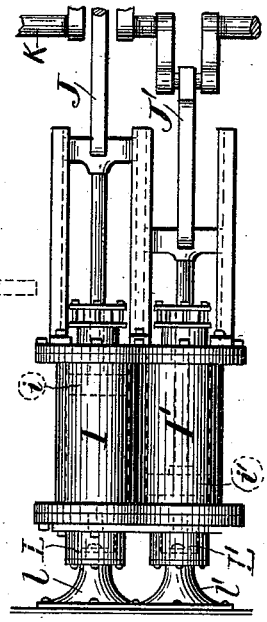

FIG. 2.

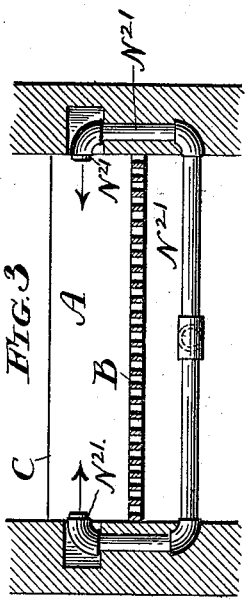

FIG. 3.

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JOHN BUTLER, OF ELLSWORTH, MINNESOTA.

SMOKE PURIFIER AND CONSUMER.

SPECIFICATION forming part of Letters Patent No. 494,522, dated March 28, 1893.

Application filed January 12, 1893. Serial No. 458,156. (No model.)

To all whom it may concern:

Be it known that I, JOHN BUTLER, a citizen of the United States, residing at Ellsworth, in the county of Nobles and State of Minnesota, have invented certain new and useful Improvements in Smoke Purifiers and Consumers, of which the following is a specification.

The subject of the present invention is an apparatus, designed to be associated with a furnace of any construction, which apparatus is adapted to exhaust the products of combustion from the furnace and dispose of them either by returning them directly to the combustion chamber, or else by forcing them beneath the surface of a body of liquid by which some of them are arrested and through which the balance rise, freed from impurities, after which they may be either allowed to escape into the atmosphere, or else returned to the combustion chamber.

The invention consists in certain features of novelty that are particularly pointed out in the claims hereinafter, and in order that it may be fully understood, I will describe it with reference to the accompanying drawings which are made a part hereof and in which—

Figure 1, is a vertical longitudinal section of a boiler and furnace of familiar construction and a sectional elevation of the improved smoke purifier and consumer in its preferred form. Fig. 2 is a plan view of the exhaust apparatus shown in Fig. 1. Fig. 3, is a vertical transverse section of the fire-box on the line 3—3.

A represents the fire-box, B the grate, C the bridge-wall, D the boiler, E and F smoke passages at the ends of the boiler, G a horizontal partition dividing the passage E into two parts, and H the smoke pipe communicating with the upper part of said passage E. All of these parts may be of any desired construction, the construction shown in the drawings being selected at random and without any intention that the invention shall be considered as limited thereto.

One of the essential features of the invention is an apparatus for creating a suction in one of the smoke passages and thereby producing a forced draft through the furnace, but I desire to have it understood that the invention is not limited to an apparatus, for this purpose, of any particular construction. On the contrary, said invention comprehends any suitable apparatus. In the drawings I have shown this apparatus as consisting of a pump having double cylinders I, I′ and reciprocable pistons, i, i', their pitmen J, J′ being connected to diametrically opposite cranks of a shaft K, whereby they are given an alternating reciprocating movement. The induction ports of the cylinders are provided with outward seating valves L, L′ and are connected with the smoke passage through pipes l, l', and the eduction ports are provided with inward seating valves M, M′, and communicate through suitable fittings with a pipe N, whose connections are described farther on.

In the forms of the invention shown by Fig. 1, two branch pipes N′ and N^2 lead off from the pipe N. The branch N′ is provided with a hand-valve n' and the branch N^2 is provided with a hand-valve n^2. In the preferred form of the invention the branch N′ enters an air-tight tank O, its end communicating with the interior of the tank near the bottom thereof. The branch N^2 extends to the fire-box where it is again branched, its two branches N^{21} terminating above the grate and on opposite sides of the fire-box, so that they discharge in opposite directions across the fire-box. The discharge end of each of these branches is located in the inner end of a flue a, the outer end of which is in open communication with the external atmosphere, as shown by dotted lines in Fig. 1.

P is a pipe having a hand-valve p and communicating at one end with the upper portion of the tank O and at the other with the branch pipe N^2, between the hand-valve n^2 and the fire-box.

Q is a pipe having a hand-valve q and communicating at one end with the upper part of the tank O and at the other end with the smoke pipe H, above the damper h.

When the exhaust apparatus is in operation, the products of combustion are exhausted from the smoke passage and forced into the pipe N. If the valve n' is closed and the valve n^2 is open, the products of combustion are forced through the branch-pipe N^2 and discharged into the fire-box, where they are mixed with the proper amount of air entering through port a and are burned. If, on the other hand, the valves n^2 and q are closed and

the valves n' and p are open, the products of combustion will be forced into the tank O, below the surface of the body of water or other liquid contained therein. Some of the said products will be arrested by the liquid and the balance will rise through the liquid, by reason of their less specific gravity, and will pass through pipe P into the pipe N^2 and thence to the fire-box, as already described. Again, if the valves n^2 and p be closed and the valves n' and q open, the products of combustion will be forced beneath the surface of the liquid as before, and those that rise through said liquid, freed from impurities, will pass through pipe O into the smoke-pipe H, above the damper h, and thence off.

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

1. The combination with a furnace, of an exhaust apparatus, means connecting its induction port with one of the smoke-flues, the pipe N communicating with its eduction port, the closed reservoir O having a body of liquid therein, the branch pipe N' having valve n' and communicating with the interior of the reservoir below the surface of the liquid therein, the branch pipe N^2 having the valve n^2, and communicating with the combustion chamber, and the pipe P having valve p and communicating at one end with the reservoir, above the surface of the liquid therein and at the other with the branch pipe N^2 between the valve n^2 and the combustion chamber, substantially as set forth.

2. The combination with a furnace, of an exhaust apparatus, means connecting its induction port with one of the smoke flues of the furnace, the pipe N communicating with its eduction port, the closed reservoir O having a body of liquid therein, the branch pipe N' having valve n' and communicating with the interior of the reservoir below the surface of the liquid therein, the branch pipe N^2 having valve n^2 and communicating with the combustion chamber, the pipe P having valve p and communicating at one end with the reservoir above the surface of the liquid therein and at the other with the branch pipe N^2 between the valve n^2 and the combustion chamber, and the pipe Q having valve q and communicating at one end with the reservoir above the surface of the water therein, and at the other with the atmosphere, substantially as set forth.

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