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B. ROTH

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SMOKE ABATER AND SMUT REMOVER

Filed Jan. 24, 1929

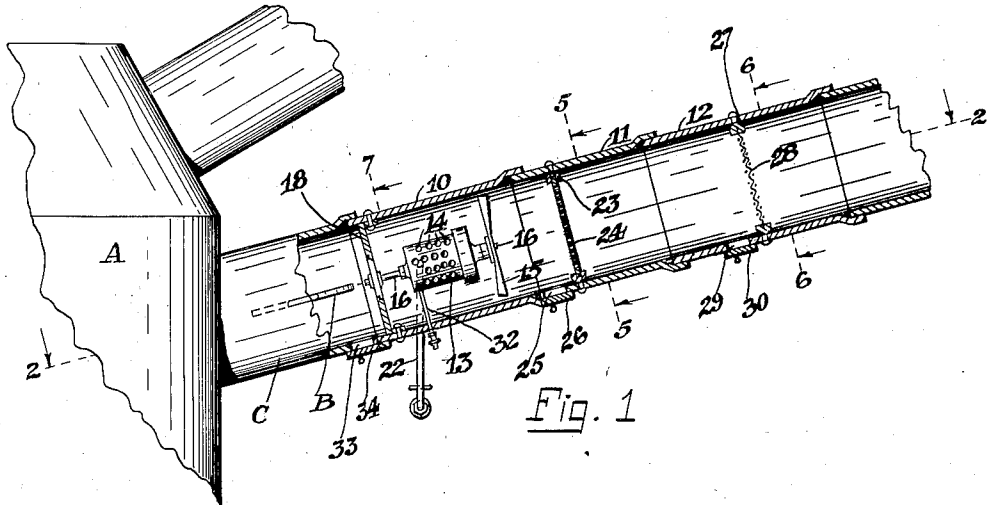


Fig. 1

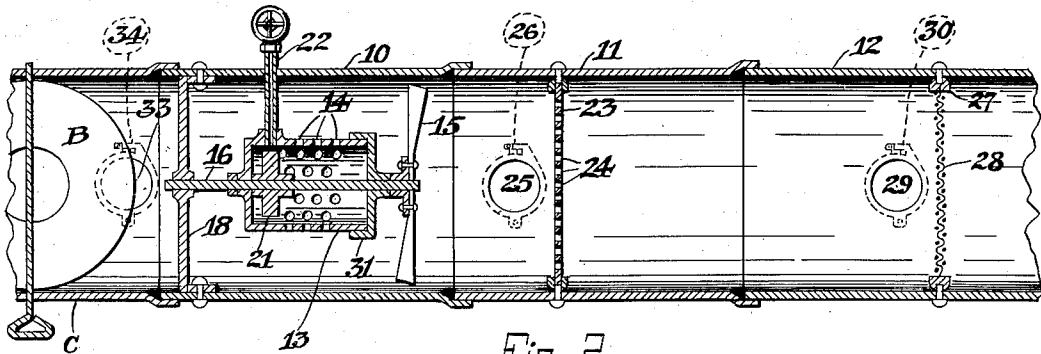


Fig. 2

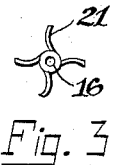


Fig. 3

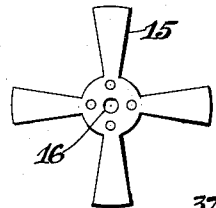


Fig. 4

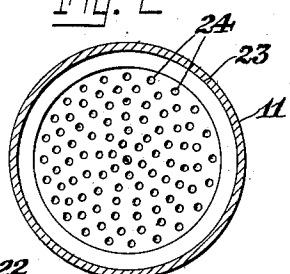


Fig. 5

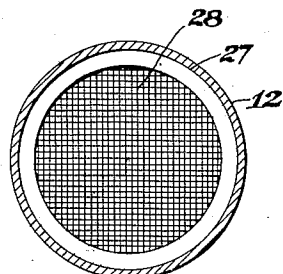


Fig. 6

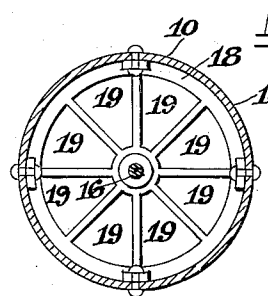


Fig. 7

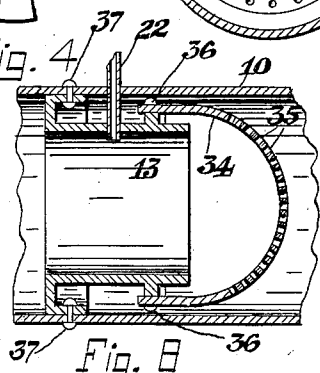


Fig. 8

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SMOKE ABATER AND SMUT REMOVER

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This invention relates to a smoke eliminator, and more particularly to the class of smoke abaters, smut and soot removers.

The main object of the invention is the construction of a device, where the same is attached to and co-functions with the outlet or smoke funnel of a furnace, and, when in operation, will automatically accomplish the consumption of smoke or the abatement thereof; and, co-incidentally, the removal of smut or soot from the flue.

This will obviate the belching of smoke from the chimney of stack during the operation of the furnace.

It will also avoid the accumulation of smut or soot within the flue; hence, the eliminating the seasonal cleaning of the chimney and accompanying plant shut downs.

Another object of the invention is to provide a device that is comparatively simple in its construction, quickly and easily attached to the flue of a furnace, or the like, dependable, reliable and efficient in its purpose and application; one that is inexpensive to manufacture, install and maintain.

The process and functions of this invention comprehends in its entirety the arrest, detention and consumption of smoke, cinders and all unburnt volatile combustibles at the source. The remedies to be applied efficiently in the operation of furnaces using solid fuels are the prevention of waste in the escapement of unconsumed carbons, and the cluttering of flues and smoke stacks due to the accumulation of smut, soot and other uncombustible matter.

It mechanically applies well known scientific principles, efficiently arranged, to assure the maximum economy in the burning of fuel and obviating the periodical chimney sweeping and flue cleaning, thus avoiding plant shut downs due to these causes. The enhancement of human health, comfort, and community cleanliness is insistently demanding a solution of the "smoke problem" in our large industrial centers. The belching of smoke and unconsumed carbons from thousands of chimneys in any large city with the initial wastes and consequent wastes in the depositions of black filth over wide areas runs into losses that are beyond calculation.

The motive and predication of this invention is the elimination of these evils and the effectuation of the objects mentioned.

With these and other objects in view, the invention consists in the features of construction, combination and arrangement of parts, which will be hereinafter more fully described in detail, illustrated in the accompanying drawings; showing the embodiment of the invention, and pointed out in the claims hereto appended.

In the accompanying drawings:—

Figure 1 is a side elevation, partly in section, disclosing a smoke flue of a furnace of my improved smoke abater and smut remover attached;

Figure 2 is a longitudinal section on the line 2—2 of Figure 1, showing the ordinary damper in elevation;

Figure 3 is a detached view of one of the fans;

Figure 4 is a plan view of the larger fan;

Figure 5 is a cross section on the line 5—5 of Fig. 2 enlarged;

Figure 6 is a cross section on the line 6—6 of Fig. 2 enlarged;

Figure 7 is a cross section on the line 7—7 of Fig. 2 enlarged; and

Figure 8 is a longitudinal section of a modified form, wherein the fans are omitted.

Similar reference characters indicate similar parts throughout the several views of the drawings.

Referring to the drawings in detail, A designates a portion of furnace, which may be of any ordinary construction and has arranged therein a swinging damper B, which is normally opened, the damper being pivotally supported centrally within the flue C.

Attached to the outer end of the flue C are pipes 10, 11 and 12.

On the inner side of the pipe 10 is secured centrally the steam exhaust chamber 13, having perforations 14, to which the head portion 31 is secured. On the top of this steam exhaust chamber is secured the fan 15 having a shaft 16 passing through said steam exhaust chamber and through the bearing plate 18 secured to the inner side of said pipe 10,

this bearing plate 18 having openings 19 as clearly shown in Figure 7.

To the bottom of the steam exhaust chamber 13 is secured the drain pipe 32.

5 Slightly below the plate 18 is the opening 33 having the pivoted door 34 for the purpose of cleaning the flue of any accumulation of smut or soot.

10 On the inner side of this steam exhaust chamber and connected to the shaft 16 of the fan 15 is secured a secondary cup shaped fan 21 which is opposite the steam inlet pipe 22.

15 In the pipe section 11 is secured a disk 23 having perforations 24, and at one side thereof an opening 25 with a sliding door 26, for the purpose of cleaning the flue when necessary.

20 In the pipe section 12 is a similar disk 27 having a very fine wire mesh 28, and at one side thereof an opening 29 with a sliding door 30 for the purpose of cleaning that part of the flue when necessary, so that any particle of the smut or soot that may pass the disk 23 will not pass the wire mesh portion 28.

25 In the operation of this smoke consuming and abating device, the smoke surcharged gases are initially mixed with the exhaust steam from the steam exhaust chamber which process establishes the desirable degree of humidity, thereby assisting gravity to deposit at the base of the flue cinders and other solid contents coming from the combustion chamber of the furnace. Gravity is in constant contention with the natural and induced currents within the flue.

30 The gases thus particularly clarified are impounded against screen 23 by the induced current (accelerated by the natural current) generated by the fan 15. Fan 15 obtains its motion from the shaft 16 attached to multi-cupped wheel 21 which obtains its power from steam conveyed through the pipe 22.

35 The lighter solids and volatile contents are captured at screen 28 and deposited at the flue bottom. Proceeding from screen 23 (which is moderately coarse in mesh) to screen 28 consisting of a much finer mesh, the small solids that escape the screen 23 are detained and deposited.

40 The visible volatile and unconsumed carbons are disintegrated and finally processed into invisible gases before their escapement into the extended chimney and atmosphere.

45 It is, of course, to be understood that changes, variations and modifications may be made in the invention, as come properly within the scope of the appended claims, without diverting from the spirit of the invention or sacrificing any of its advantages.

50 In the modified form of steam exhaust chamber shown in Fig. 8, I have provided a substitute method for accelerating the natural flow of the gases through the flue, and at the same time take care of the requirements of humidity. The substitution merely in-

volves a difference of method, not principle.

In lieu of the mechanical method of a rotating fan to create induced current, I have provided for a jet of steam entering steam exhaust chamber 13 from piped inlet 22, mixing with gases in flue, thence escaping through perforations 35 of conical hood 34, attached to steam exhaust chamber 13 by bolts 36. Steam exhaust chamber 13 is secured to flue 10 by bolts 37.

What I claim as new is:

1. In a smoke consumer and abater of the character described comprising a segmented flue having smoke screens therein, a fan in one of the flue segments, a steam inlet pipe in communication with said flue segment, and means in relation to said steam inlet for operating the fan.

2. In a smoke consumer and abater of the character described, a steam chamber having an inlet and an outlet, a fluid driven rotatable element in said chamber opposite said inlet and adapted to be driven by the discharge therefrom, a fan in advance of the steam chamber outlet and adapted to mix the steam with the smoke, and a driving connection between said fan and the fluid driven rotatable element.

3. A smoke consumer and abater comprising a segmented flue, spaced transversely disposed screens therein, said screens being of different mesh, the flue having cleanout openings in advance of each screen, closures for said openings, a steam-receiving casing having steam inlet and outlet means, means supporting said casing concentrically within said flue and including said steam inlet, a shaft carried by said casing and disposed substantially concentrically of said flue and transversely of said steam inlet, a fluid driven impeller fast on said shaft and disposed in the path of the steam from said inlet for rotating said shaft, and a mixing fan carried by said shaft beyond said casing.

In testimony whereof I hereunto affix my signature.

BENJAMIN ROTH.