

No. 838,364.

PATENTED DEC. 11, 1906.

I. M. SULLIVAN.
FURNACE FOR STEAM GENERATING BOILERS.

APPLICATION FILED MAR. 21, 1906.

2 SHEETS—SHEET 1.

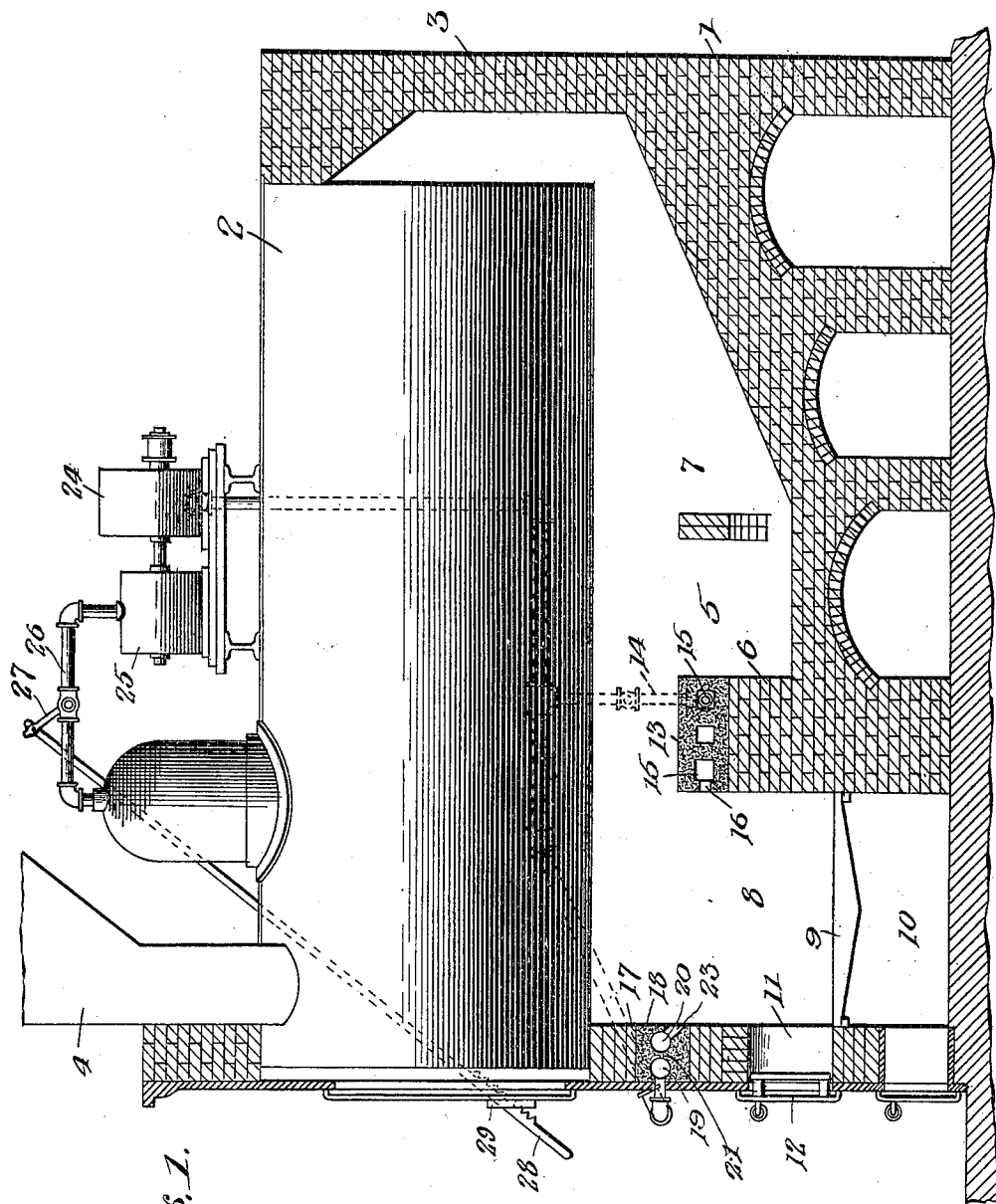


Fig. 1.

Witnesses

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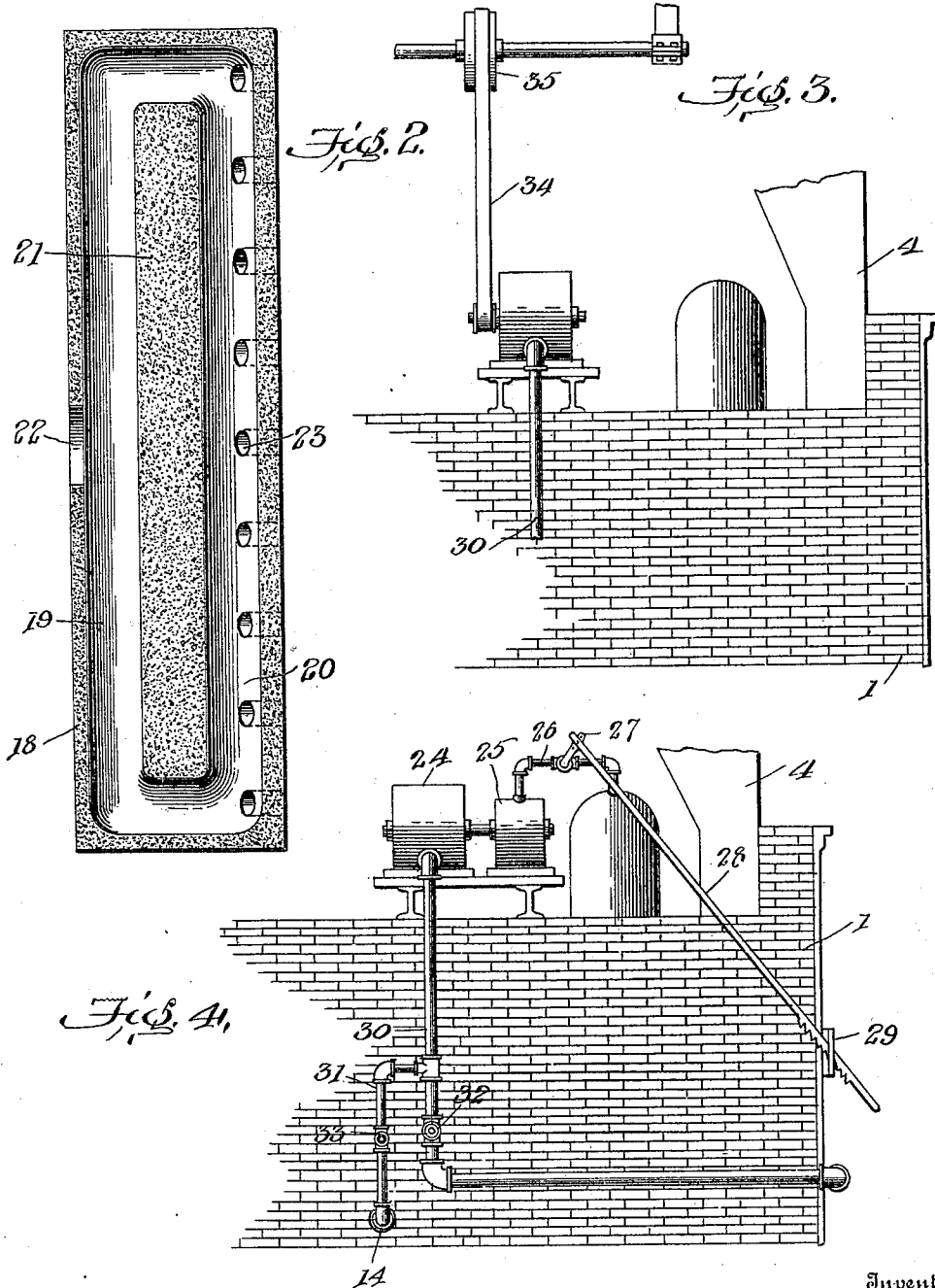
Attorney

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UNITED STATES PATENT OFFICE.

ISAAC M. SULLIVAN, OF SPRINGFIELD, OHIO, ASSIGNOR TO THE NATIONAL SMOKE CONSUMER COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO.

FURNACE FOR STEAM-GENERATING BOILERS.

No. 838,364.

Specification of Letters Patent.

Patented Dec. 11, 1906.

Application filed March 21, 1906. Serial No. 307,165.

To all whom it may concern:

Be it known that I, ISAAC M. SULLIVAN, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Furnaces for Steam-Generating Boilers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in furnaces for steam-generating boilers; and the essential object in view is to forcibly inject into the fire-box air-currents, so as to supply a volume of oxygen above the bed of fuel on the grate, whereby to more effectually and fully perfect and complete the combustion, to more entirely utilize the fuel, and to largely consume and destroy the smoke. These objects I carry into successful practice by means of an air-pressure apparatus or blower, combined with air-nozzles located with reference to the fire-box so as to deliver therein said air-currents in quantities and with rapidity to suit the varying conditions of the fuel-bed, all as hereinafter more fully described, and particularly pointed out in the claim.

In the accompanying drawings, Figure 1 is a longitudinal sectional view showing a furnace and its boiler, partly in section and partly in elevation, with my apparatus applied thereto; Fig. 2, an enlarged horizontal sectional view of one of the air-nozzles; Fig. 3, a side elevation of a part of the furnace structure, showing a modified means for operating or driving the air-pressure apparatus or fan; and Fig. 4, a side elevation of the furnace structure, showing an exterior view of what is illustrated in part in Fig. 1.

The numeral 1 designates a furnace structure of any approved type, preferably built of brick and supporting a boiler 2 of any ordinary type—say that in which return fire-tubes traverse the boiler longitudinally, so as to convey the draft from the smoke-box 3 to the smoke-stack 4. The interior of the furnace structure is of the usual or any preferred type, with the exception that in the smoke-way 5 I locate back of the bridge-wall 6 an arched baffle-wall 7, in which respects the furnace structure is the same as that set forth in my application filed of even date herewith, Serial No. 307,164. The fire-box 8 has

the usual grate-bars 9 with an ash-pit 10 below them, and doorways 11, closed by doors 12. On the bridge-wall 6 I locate an air-nozzle 13, constructed in the manner set forth in my said application filed of even date herewith and connected to an air-supply pipe 14 at the outer end of its tortuous passage 15. This air-nozzle has discharge-orifices 16, which direct the air-currents downward and forward across and upon or over the fire-bed and among the unconsumed carbonaceous products of combustion.

In the front wall 17 of the fire-box I locate another air-nozzle 18, having air passages or chambers 19 and 20, divided by a longitudinal partition 21, which serves to deflect the incoming air-supply entering at the opening 22 in either direction, so that it will be equally distributed to and among the discharge-orifices 23, which direct the air-currents downward, rearward, and upon the fire-bed, and also in and among the unconsumed carbonaceous products of combustion and in and among the air-currents discharged by the bridge-wall air-nozzle.

Referring now to the preferred means, and therefore that illustrated for supplying the air-currents to these nozzles, I locate upon the furnace or boiler or at any other suitable point an air-blast apparatus consisting in this instance of a fan-blower 24. This fan may be driven by a steam-motor 25, connected up as indicated in Figs. 1 and 4 and supplied with steam from the boiler by a steam-pipe 26, having a throttle 27, controlled by a throttle-bar 28, having teeth to engage it with a plate 29 to hold the throttle in adjusted positions according to the quantity of steam to be admitted to the motor and the consequent speed of the fan-blower and resulting volume of air and force of the air-currents that may be desired. A pipe conveys the air from the fan-blower to the nozzle 18, and a branch pipe 31 conveys the air from the main pipe to the air-nozzle 13. A cock 32 and a cock 33 are utilized to also control the quantity of air delivered to these nozzles, in addition to the quantity as regulated by the speed of the fan-blower.

In a modified form shown in Fig. 3 I illustrate the fan-blower as driven by a belt 34, operated from the line-shaft and its pulley 35. In some situations this will be the pre-

ferred means of driving the fan-blower, while in others it will be preferable to utilize the small motor shown.

It will now be understood and seen that
5 air-currents in volume and force may be introduced into the fire-box from opposite sides and in conflicting directions to thoroughly intermix with the unconsumed products of combustion and to supply thereto
10 sufficient quantities of thoroughly intermingled oxygen and cause the more complete and perfect combustion of these products. Again, the force of the air-currents and the quantity of air may be varied from
15 the respective nozzles, so that the one or the other may supply the greater or less quantity, or both nozzles may supply substantially equal quantities, according as in use and changing conditions may be most desired.
20 In my use of this apparatus I have ascertained that I can and do consume practically all of the otherwise unconsumed products of combustion arising from the coal-bed, that the quantity of smoke issuing from the stack is inconsequential, and that I economize in the quantity of fuel consumed and intensify the heat.

It will be observed that while the air-nozzle 18 is located in the front wall still its
30 inner face is exposed to the heat, so that it will become hot and will heat the air passing through it, as will also the air-nozzle 13 by

reason of its exposed position. So the air is fed in a hot state, which aids the operation. Any material may be used for the making of
35 these air-nozzles; but I prefer to make them of the material of which the air-nozzle set forth in my application filed of even date herewith is made—namely, of a composition of oil, clay, and asbestos.
40

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

In a boiler-furnace, the combination, with a fire-box and grate-bars, of a bridge-wall
45 and a front wall, an air-nozzle supported on the upper edge of said bridge-wall and provided with a tortuous passage having discharge-outlets substantially parallel with said grate-bars, an air-nozzle supported on
50 the front wall and provided with a tortuous passage having discharge-outlets inclined toward said grate-bars, whereby the air-currents from said nozzles intersect at an acute angle, and an air-blast apparatus connected
55 to the outer end of said tortuous passage, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ISAAC M. SULLIVAN.

Witnesses:

HARRIET L. HAMMAKER,
G. H. WALMSLEY.