

1,269,724.

William W. Martin

Wm H. Mulligan
Gloyd W. Patch

ಹೈ

Richard E. Owen
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM W. MARTIN, OF PITTSBURGH, PENNSYLVANIA.

SMOKE-PURIFIER.

1,269,724.

Specification of Letters Patent.

Patented June 18, 1918.

Application filed August 15, 1916. Serial No. 115,043.

To all whom it may concern:

Be it known that I, WILLIAM W. MARTIN, a citizen of the United States, residing at Southside, Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Smoke-Purifiers, of which the following is a specification.

This invention relates to an improvement in smoke purifiers, and more particularly to devices of this nature of the type in which the smoke and gas laden air from furnaces, boilers, and the like, is passed through a moisture laden closed air space where the products of combustion passing from the fire are subjected to treatment by being permeated and saturated with moisture to thus relieve the air of impurities by washing the same out and causing precipitation thereof.

An object of my invention is to provide a device of the nature described which is so constructed that it may be connected with the usual flue or stack from a furnace, boiler, or other heating arrangement and may have the products of combustion taken from the flue or stack and passed there-through, the impurities being taken out and discharged to a sewer, cesspool, or at some other suitable point and the washed smoke being discharged into the atmosphere.

A further object is to so construct the device that the smoke will be premoistened previous to the subjection of the same to water sprays forming a part of the structure and thus a more perfect saturation will be accomplished.

Yet another object is to provide draft inducing means which will take the products of combustion from the flue or stack, together with a damper located in the flue and mechanism so arranged that upon starting the fan the damper will be closed to thus direct the products of combustion through the apparatus of my invention.

With the above and other objects in view, my invention consists in certain novel features of construction and combinations of parts which will be hereinafter set forth in connection with the drawings and then more particularly pointed out in the claims.

The accompanying drawing shows a diagrammatic illustration of the apparatus of my invention together with the manner of fitting the same in conjunction with a boiler and flue, and illustrates portions of the

structure in section to better disclose the arrangement of the parts.

The boiler 1 has the smoke passage or flue 2 arranged therefrom and with a suitable chimney or stack, these parts being of standard construction and not being required to be specifically arranged for the adaptation of my invention. Any suitable and desired form of damper or draft control may be arranged in conjunction with the flue 2, and a cut-off damper 3, which is of the butterfly type, is mounted in the flue to be normally held open by means of the weight 4 and to be capable of turning movement to close across the flue to entirely shut the passage thereof.

A washing tank 5 is mounted adjacent to the flue and a smoke pipe 6 is connected between the flue 2 and this washing tank 5. A fan casing 7 is mounted adjacent to the washing tank 5 and an air pipe 8 is connected between the fan casing and the washing tank 5, the connection with the washing tank being at a point preferably opposite to the connection of the smoke pipe 6 therewith. A suitable fan 9 is mounted in the fan casing 7 to be operated to create a suction through the air pipe 8 which will consequently cause draft through the smoke pipe 6 and the washing tank 5 to take the products of combustion from the flue 2 through this smoke pipe 6 into the washing tank 5, a discharge pipe 10 being connected with the fan casing 7.

A water pipe 11 is led from a main 12 to extend up through the washing tank 5 and a plurality of branch pipes 12' are connected with this water pipe 11 and are disposed to cover substantially the entire volume of the tank 5, these branch pipes 12' being provided with the perforations as indicated at 13, so that as water is supplied to the pipe 11 from the main 12, this water will be sprayed within the washing tank to saturate the air in all parts thereof, a valve 14 being provided in the pipe 11 to control the supply of water to the pipe 11. As the fan 9 is operated, draft will be created through the smoke pipe 6 and consequently the products of combustion will be taken from the flue and drawn into the washing tank 5, and then with the water valve 14 opened, this smoke is subjected to a washing and purifying action through the passage of the spray water therethrough and the purified smoke

is taken from the tank 5 through the pipe 8 to be discharged from the fan casing 7 to the pipe 10 which is led to open at any desired point. A drain pipe 15 is connected to the bottom of the washing tank 5 to drain the soot and filth laden water from the washing tank 5, and this pipe 15 may be led to connect with a sewer, or cesspool, or which will permit disposal of the water and slimes as taken from the washing tank, a valve 16 being connected in this pipe 15 to control the flow therethrough.

It is preferable that the products of combustion as taken through the smoke pipe 6 be premoistened previous to the passage into the washing tank 5, and for this purpose I have provided a steam pipe 17 leading from the boiler 1 which said pipe has the branch pipes 18 extended within the smoke pipe 6 where suitable jet openings are provided. Valves 19 are connected in the branch steam pipes 18, and thus as these valves 19 may be opened to permit the supply of steam from the steam pipe 17, the flow of the steam through the jet openings of the branch pipe 18 will cause an increase in the draft force exerted through the smoke pipe 6 as they will have an injector action therein, and at the same time the products of combustion passing through this smoke pipe will be subjected to the moistening action of the wet or live steam which is being supplied through the jet openings, this steam acting not only to moisten the products of combustion but also to break up any larger particles which may be contained therein so that when the products of combustion are taken into the washing tank 5 and subjected to the water spray, the water will take up the soot and other foreign particles which may be contained therein and will cause more ready precipitation thereof. While the drawing illustrates only two of the branch pipes 18, it will of course be understood that a greater or lesser number might be employed and that these branch pipes might have the jet openings thereof disposed to direct the streams of steam at various angles, it of course being understood that it is perhaps preferable that the direction of ejection of the streams be with the course of travel of the products of combustion as drawn into the washing tank through the suction action of the fan 9.

While the fan 9 will doubtless exert sufficient draft force through the smoke passage 6 that the products of combustion will be taken through from the flue 2, where a work draft is used on the fire, some of the products of combustion may find their way up through the flue and out at the chimney or stack, and to insure that the products of combustion will be taken through the smoke pipe 6, it is desirable that means be pro-

vided to close the damper 3 across the flue 2 upon commencement of the operation of the fan 9. In the present disclosure, I have shown the power means for the fan as being an electric motor 20 which is connected to drive the fan through the medium of the belt 21. The circuit wires as indicated at 22, which are connected with this motor 20 are led to connect with a magnetic coil 23 of the solenoid type which is located adjacent to the flue at that point where the damper 3 is mounted. A core 24 is mounted in the coil 23 to be capable of endwise shifting movement and to be affected by the energization of the coil, and this core 24 has a link 25 connected therewith which at its free end is connected with an arm 26 which rocks the damper 3. A switch 27 is connected in the circuit 22 and when this switch is open the circuit will be deenergized and thus the motor 20 will be idle and at the same time the core 24 of the magnetic coil will be free which will allow the damper 3 to be opened by the counterbalance action of the weight 4. As the switch 27 is closed the motor 20 will be started to initiate operation of the fan 9 and at the same time the magnetic coil 23 will be energized to draw the core 24 within the same and through the connection of the link 25 with the arm 26 of the damper 3, the damper will be rocked to take a closed position across the flue.

It will of course be understood that previous to the starting of the fan 20 the water supply valve 14 will have been opened and also it is preferable that the valve 19 of the steam branch pipes 18 be opened before the switch 27 is thrown, the parts being so arranged that the working action is immediately commenced when the smoke and products of combustion start through the smoke pipe 6. This cutting off of the flue 2 and the creation of the suction through the smoke pipe 6 will act to draw all of the products of combustion from the flue and to take the same into the washing tank 5 where they will be thoroughly cleansed after which the purified smoke will be taken through the pipe 8 and will then be passed through the discharge pipe 10 to be released into the atmosphere at any desired point to which the pipe 10 may be led. Immediately the switch 27 is opened, the circuit connection to the motor will be broken and at the same time the fan is stopped the coil 23 will be deenergized and the weight 4 will then be free to swing the damper 3 to the open position so that the flue 2 will be opened for the passage of the products of combustion therethrough.

While I have herein shown and described only specific construction arranged in the formation of the spray device for the washing tank, only specific connections for the smoke and air pipes to and from the wash-

ing tank, and have limited myself in the disclosure to other specific adaptations, it will of course be understood that changes and modifications might be resorted to in the form and arrangement of these parts as herein mentioned, as well as the remaining parts, without departing from the spirit and scope of my invention, and hence I do not wish to be limited to the exact disclosure but rather only to such points as may be set forth in the claims.

I claim:

1. The combination with a flue, of a smoke washing means, a suction means connected with said smoke washing means, a damper positioned within said flue, and means for simultaneously closing said damper and operating the said suction means.

2. The combination with a flue, of a smoke washing means, a suction fan coöperating with said smoke washing means for creating a suction therethrough, a damper positioned within said flue, and means connected to said damper and to said suction fan for simultaneously closing said damper and operating said suction fan.

3. A smoke purifier comprising a stack, a smoke washing tank, a smoke pipe connecting said stack with said washing tank, injector pipes extending into said smoke pipe, means connecting said injector pipe with a steam boiler for furnishing steam thereto, said injector pipes adapted to discharge

steam toward the outlet discharge end of said smoke pipe for driving the smoke into said washing tank, a suction fan coöperating with said washing tank and adapted to create a suction therethrough, a water supply pipe extending into said washing tank, a plurality of laterally extending spraying tubes carried by said water supply pipe and arranged one above the other for extending transversely through said washing tank throughout its entire height and constituting means for thoroughly washing the smoke within the washing tank, and a draining pipe carried by said washing tank.

4. A smoke purifying device comprising a flue, a washing tank, a tube connecting said flue with said washing tank, means for injecting jets of steam through said tube for causing smoke to be discharged from said flue into said washing tank, washing means positioned within said washing tank, means for draining said washing tank, and a suction fan associated with said washing tank for drawing the purified smoke from said washing tank and discharging the same at a desired point.

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

WILLIAM W. MARTIN.

Witnesses:

M. J. FRIEDL, Jr.,

LOUIS DANENHAUER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."