May 19, 1970 B. WITHORN 3,512,488

COMBUSTION APPARATUS

Filed July 22, 1969

Fig. 1.

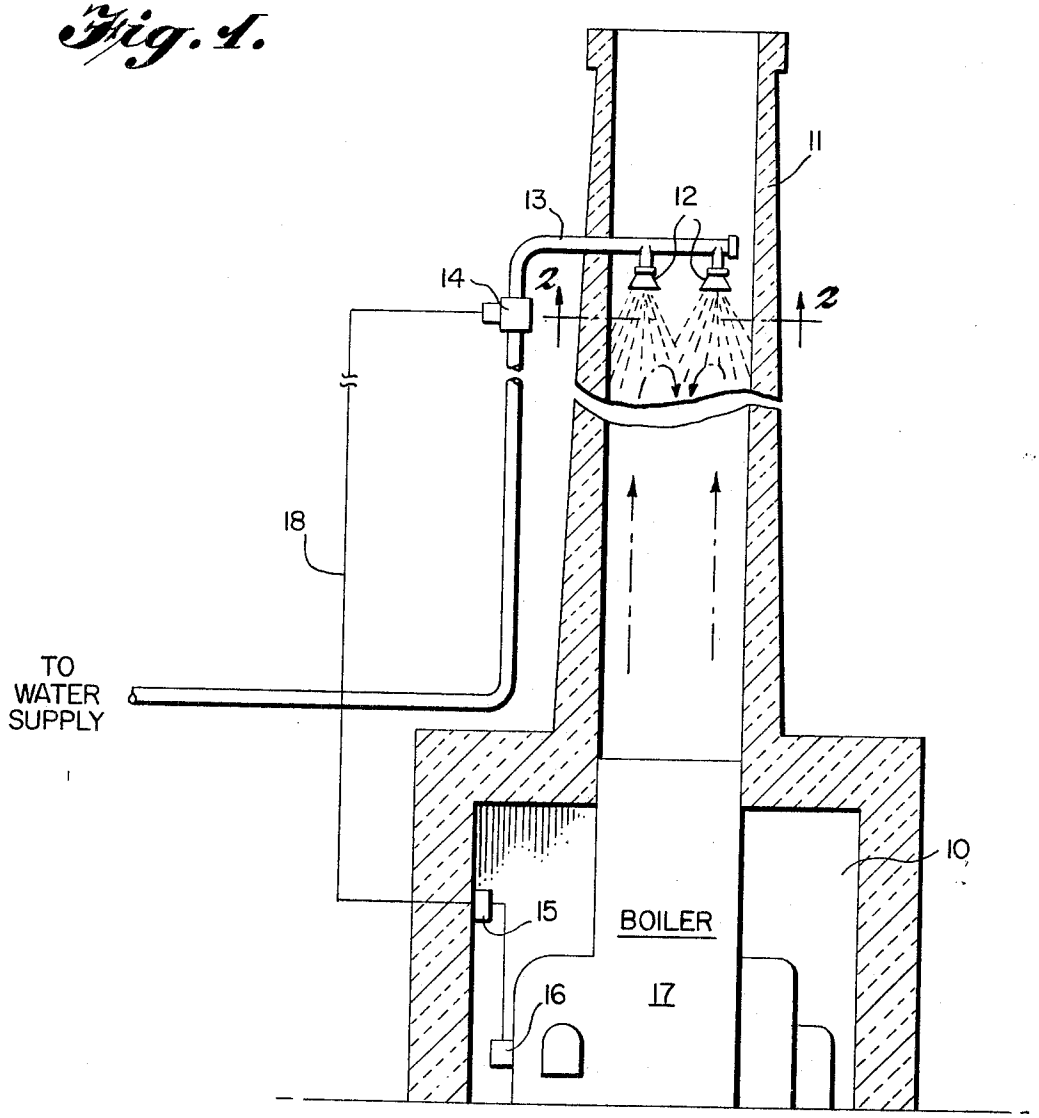
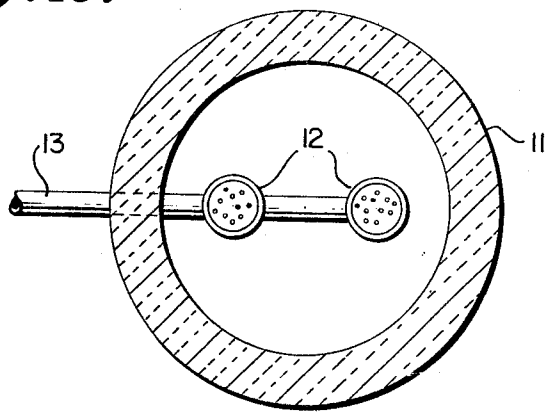


Fig. 2.



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3,512,488

COMBUSTION APPARATUS

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Continuation-in-part of application Ser. No. 652,293, July 10, 1967. This application July 22, 1969, Ser. No. 843,605

Int. Cl. F23j *15/00*

U.S. Cl. 110—119 4 Claims

ABSTRACT OF THE DISCLOSURE

The patent specification and drawings disclose an arrangement of parts which can easily be installed in an existing smokestack or stack flue and is adapted to sprinkle either a steam or a fine mist of water against the uprising flue gases so as to mingle with the same and to cause the soot particles to become heavier by the addition thereto of the steam or water mist thus causing rapid precipitation of the same, within the stack thereby preventing their escape into the surrounding atmosphere.

This application is a continuation-in-part of my prior application for patent Ser. No. 652,293, filed July 10, 1967, now Pat. No. 3,456,606.

Also, the addition of steam to the uprising combustion gases changes the color of the uprising gases from one which is usually darkish in color to one which assumes a white or a grayish white color.

BACKGROUND OF THE INVENTION

The present invention relates to an arrangement of parts which may effectively be employed in the elimination of undesirable smoke and soot particles rising upwardly from the smokestacks of establishments such as incinerators, office buildings, apartment houses, etc., where for reason of economy a low grade fuel is employed in the furnaces commonly installed in such establishments.

It is a well known fact that when the furnaces in establishments of the aforementioned type are fired, a dense black smoke issues from the flue stacks and this black smoke is most objectionable inasmuch as it consists of innumerable minute particles of soot which will ultimately settle on the ground or surrounding buildings in the area. Also, such smoke is objectionable from a health standpoint as it will pollute the air in the area surrounding the buildings employing such low grade fuel burning furaces.

Since air pollution has recently entered into a major problem and due to the large number of establishments employing low grade fuels in their furnaces, the structure of the present invention will eliminate the air pollution caused by these establishments and the structure of the present invention is one which may easily be installed in existing flue stacks with relative ease and without necessitating major changes in the flue stacks.

SUMMARY OF THE INVENTION

The present invention provides for an efficient and compact arrangement of parts which may be easily installed in pre-existing flue stacks or installed in stacks as they are being erected which will direct a fine mist of water or steam downwardly against uprising flue gases so as to precipitate the soot particles therein and to simultaneously wash the uprising smoke and to change the color thereof from a darkish color to one which is substantially white, thus eliminating the pollution of the air in the area surrounding the establishments employing low grade fuel burning furnaces.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of the preferred form of the invention, and

FIG. 2 is a sectional view taken on lines 2—2 of FIG. 1, looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, there is shown at FIG. 1 thereof a combustion chamber **10** of conventional construction and made of a suitable refractory material. Secured to the combustion chamber **10** in any suitable manner is a smokestack **11** which extends upwardly therefrom and leads to the atmosphere.

Mounted interiorly of the smokestack are sprinkler heads **12** which are directly downwardly of the smokestack and are adapted to project a steam spray or a fine mist of water against the uprising flue gases. The sprinkler heads **12** are secured in any manner to the smokestack **11** and are supported therein by means of a conduit **13** which extends through one wall of the smokestack **11** in the manner clearly set forth in FIG. 1 of the drawings. Conduit **13** extends to a source of water supply (not shown). The water supply may be any source of tap water which is available in the immediate vicinity of the furnace structure embodying the present invention.

Located in conduit **13** is a solenoid valve **14** of conventional construction. The solenoid valve **14** is adapted to be responsive to an electric switch **15** which is mounted in close proximity to a firing assembly **16**. Mounted interiorly of the combustion chamber is a conventional boiler **17**, again of conventional construction. The electric switch **15** is made responsive to a thermostat (not shown) or other heat sensing equipment and is designed, when actuated, to provide the necessary electrical forces to operate the conventional fuel pump which forms a part of the firing assembly, aforesaid.

Electrical connection **18** extends between the solenoid valve **14** and electric switch **15** and the solenoid valve **14** is designed to operate in a manner more fully set forth hereinafter.

The installation disclosed in FIGS. 1 and 2 is designed to operate in the following manner.

With the conduit **13** connected to a suitable source of supply of water and/or steam and with the sprinkler heads **12** mounted on conduit **13** and facing downwardly in the smokestack, upon actuation of switch **15** which in turn will activate the firing assembly **16**, the solenoid valve **14** will be caused to open and to thereby admit into conduit **13** a supply of steam and/or water and this steam and/or water will be caused to exit through the sprinkler heads **12** counterflow to the direction of the uprising flue gases. As can be appreciated, immediately upon the initial firing of the firing assembly, the sprinkler heads will be set in operation to deliver a supply of steam and/or water downwardly against the uprising gases. This is an improvement over the prior art inasmuch as upon the initial firing of the firing assembly within the furnace, the steam and/or water is caused to be directed downwardly thereby insuring that any uprising gases containing soot or other unburned petroleum products will contact the downwardly directed steam and/or water and to thereby be cleansed before issuing outwardly of the smokestack, thus eliminating the undesirable black smoke which is normally discharged from a smokestack particularly when the furnace employs a low grade fuel for firing the furnace and boiler assembly.

As can be appreciated, most establishments employing large furnaces for heating and/or producing steam, employ a low grade fuel since the same can be burned fairly economically. However, such low grade fuel does not

combust in its entirety with the resultant fact that the smoke issuing from a smokestack is black due to the soot contained therein which pollutes the air surrounding the establishment. Also, such soot settles on adjacent buildings and is a source of annoyance since the same must be removed from time to time in order to renovate the outward appearance of such buildings.

With the employment of the present invention, immediately upon the actuation of the firing assembly a spray is caused to be directed downwardly against any uprising gases since the solenoid valve is in circuit with the electric switch which controls the firing assembly. This insures the opening of the solenoid valve at the same instant as the electric switch **15** is actuated and permits for instant downward flow of the steam and/or water for the purposes aforesaid.

While the above invention has been described in connection with the use of steam and/or water for effecting a cleaning of the gaseous components rising within a flue or the like, it is within the purview of this invention to employ a chemical which will be caused to mist with the uprising gases in the manner described in conjunction with the steam and/or water. The chemical employed will be one which will neutralize the sulphurous components usually present in the uprising gases.

I claim:

1. In combination with a combustion apparatus, a flue for the passage of gases of combustion outwardly from

said combustion apparatus, spray heads mounted and facing downwardly from said flue for spraying a fluid medium against their counterflow, the uprising combustion gases, a conduit for delivering said fluid medium to said spray heads, a valve in said conduit for opening or closing said conduit for admitting or cutting off the flow of said fluid medium to said spray heads, electrical means for starting and stopping a fuel firing assembly in said combustion apparatus, said electrical means also actuating simultaneously said valve to thereby admit or cut off the supply of said fluid medium to said spray heads.

2. The structure of claim **1** wherein said fluid medium comprises water.

3. The structure of claim **1** wherein said fluid medium comprises steam.

4. The structure of claim **1** wherein said fluid medium comprises a chemical mixture.

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KENNETH W. SPRAGUE, Primary Examiner