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J. MACN. WILSON.

METHOD OF PREVENTING SMOKE AND IMPROVING COMBUSTION IN FURNACES.

(Application filed Aug. 9, 1898.)

(No Model.)

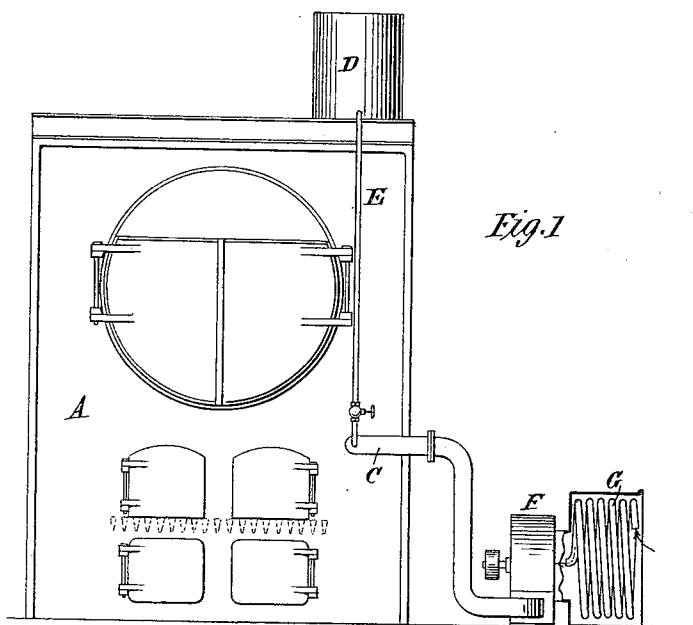


Fig. 1

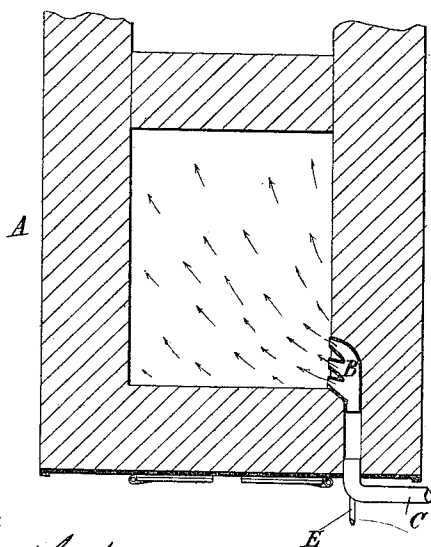


Fig. 2

Witnesses:

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UNITED STATES PATENT OFFICE,

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METHOD OF PREVENTING SMOKE AND IMPROVING COMBUSTION IN FURNACES.

SPECIFICATION forming part of Letters Patent No. 621,884, dated March 28, 1899.

Application filed August 9, 1898. Serial No. 688,177. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN MACNAULL WILSON, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Methods of Preventing Smoke and Improving the Combustion in Furnaces, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

The invention which forms the subject of my present application for Letters Patent is a new and improved process or method for the prevention of smoke in furnaces, especially those in which soft coal is burned, and for rendering more complete and effective the combustion in furnaces, whether using soft or hard coal, and thereby economizing the coal.

It is well known that carbon is released from soft coal at a comparatively low temperature and that under ordinary conditions its combustion is not only incomplete, but that the liberated carbon tends, by reason of its density, to smother or to retard the action of the fire. Many expedients have been adopted and proposed for reducing the volume of smoke which results from this action; but few, if any, plans have been devised which, if effective to any marked degree in consuming the smoke and products of imperfect combustion, can be carried on economically.

My invention has for its primary object to effect a more complete combustion of the smoke or combustible gases and vapors and in a more economical way than has heretofore been done; and to this end the invention in its main features consists in the introduction in a novel manner into the space above the fire in a boiler or other furnace of air, preferably heated, together with certain chemical reagents containing chiefly oxygen, hydrogen, and nitrogen and capable of yielding freely, at a moderate temperature, oxygen and hydrogen, which tend to rapidly raise the temperature of the furnace and more completely effect the combustion of the carbon before it can pass off from the lack of proper supporters of combustion, as carbonic oxid or smoke.

It is well known that air alone, whether hot or cold, or steam, whether with or without air, forced into a furnace above the fire will not prevent the giving off of smoke, particularly if the temperature of the air or steam, or both, be sensibly lower than that in the furnace. It is also known that the presence of chemical reagents which evolve at a comparatively low temperature gases which are supporters of combustion and which have been introduced along with the fuel does not afford an effective or an economical remedy for the trouble; but I have demonstrated that by the union of air and such chemical reagents and their simultaneous introduction into the furnace above the mass of burning fuel in the manner hereinafter set forth the smoke may be almost wholly prevented and fuel saved.

In carrying out my invention I employ, by preference, as the chemical reagent saltpeter, either alone or together with black oxid of manganese in varying proportions up to equal parts of each, according to the character of the fuel; but any other chemical equivalent for the same may be employed, provided it will give off the proper gases for supporting combustion in a similar manner. This material or compound is conveyed into the furnace and distributed over the fire-bed in a fine state of subdivision by a jet or blast of air. If the material is used in a dry state, it is reduced to a finely-powdered condition and blown into the furnace in properly-regulated quantities; but I prefer to use the saltpeter or its equivalent in solution, either with or without powdered manganese dioxid in suspension therein, and to introduce it in the form of spray into the fire-box.

Any apparatus may be employed for carrying out my invention that is suitable for the purpose and that will secure the described results; but in order to more clearly illustrate the nature and purposes of the improvement I have shown a convenient means in the accompanying drawings which is or may be used for the purpose.

In the drawings hereto annexed, Figure 1 is a front view of a furnace to which my invention is applied. Fig. 2 is a horizontal section of the furnace through the fire-box.

As previously implied, the furnace A is of any ordinary description. At any convenient point, preferably in one corner of the fire-box above the grate-bars, is located the device for distributing the air and the chemical reagent over the fire. In the present case I have shown, conventionally, a spraying-nozzle or series of orifices B, to which leads a pipe C.

D is a tank or receptacle for containing the chemical solution or mixture. A small pipe E runs down from said tank and delivers the solution in regulated quantities into the pipe C, from whence it is blown or sprayed into the fire-box.

Any convenient means may be employed to produce the necessary pressure of air to force it through the pipe C—as, for example, a rotary blower F.

The air is heated prior to its introduction into the furnace in any convenient way, as by being forced or drawn through a coil of pipes G, heated by live or exhaust steam or direct application of heat.

The exact location of the sprayer or the number of such sprayers is largely immaterial, it being only necessary that the proper distribution of the materials should be effected.

The pressure of the air, which is introduced along with the chemical reagents into the furnace and which sprays and distributes the same, may vary within considerable limits; but under ordinary working conditions a pressure of two ounces to the square inch will be found sufficient to distribute the chemical in proper amounts over all parts of the furnace and render the assistance to combustion which is desired.

In describing my invention I have referred only to the use of air as the medium for spraying or distributing the chemical and assisting in the combustion; but it will be understood that any equivalent gas or vapor may be substituted—as, for example, steam.

Inasmuch as the method results in economy in the consumption of fuel, the chemical may be distributed and the air-blast maintained during the entire time that the boilers are in operation; but it will be understood that the process may be discontinued after the carbon has been consumed if smoke prevention is the only object.

Among the advantages of my invention it results that the fuel requires no special treatment or manipulation. No special construction of furnace or boiler is required, as the improvement may be applied to any existing

furnace at very small cost and by the use of many devices in common use.

Having now described my invention, what I claim is—

1. The method of preventing smoke from furnaces which consists in introducing into the fire-box, above the fire and so as to combine with the unconsumed products of combustion therein, a chemical reagent, substantially as described, which yields gases which are supporters of combustion, and air, as set forth.

2. The method of preventing smoke from furnaces, which consists in introducing into the fire-box above the fire, and so as to combine with the unconsumed products of combustion therein, a chemical reagent in a finely-divided condition which, at a comparatively low temperature, yields gases which are supporters of combustion, and air, as set forth.

3. The method of preventing smoke from furnaces which consists in introducing into the fire-box, above the fire, and so as to combine with the unconsumed products of combustion therein, a chemical solution in the form of spray, which, at a comparatively low temperature, yields gases which are supporters of combustion, and air, as set forth.

4. The method of preventing smoke from furnaces, which consists in introducing into the fire-box, above the fire and so as to combine with the unconsumed products of combustion therein, a solution of a chemical reagent which yields gases which are supporters of combustion, and spraying said solution by a jet or blast of air within the fire-box, as set forth.

5. The method of preventing smoke from furnaces which consists in distributing in the fire-box, and above the fire so as to combine with the unconsumed products of combustion therein, a finely-divided chemical reagent which yields gases which are supporters of combustion, by a jet or blast of hot air, as set forth.

6. The method of preventing smoke from furnaces, which consists in introducing together into the fire-box, above the fire, and so as to combine with the unconsumed products of combustion therein, a chemical reagent of the kind described, which yields gases which are supporters of combustion, and hot air, as set forth.

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Witnesses:

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