Aug. 3, 1948. M. E. HANNA 2,446,473

COMBUSTION CHAMBER STRUCTURE WITH SPIRAL AIR INLET

Filed Oct. 27, 1944

Fig. 1.

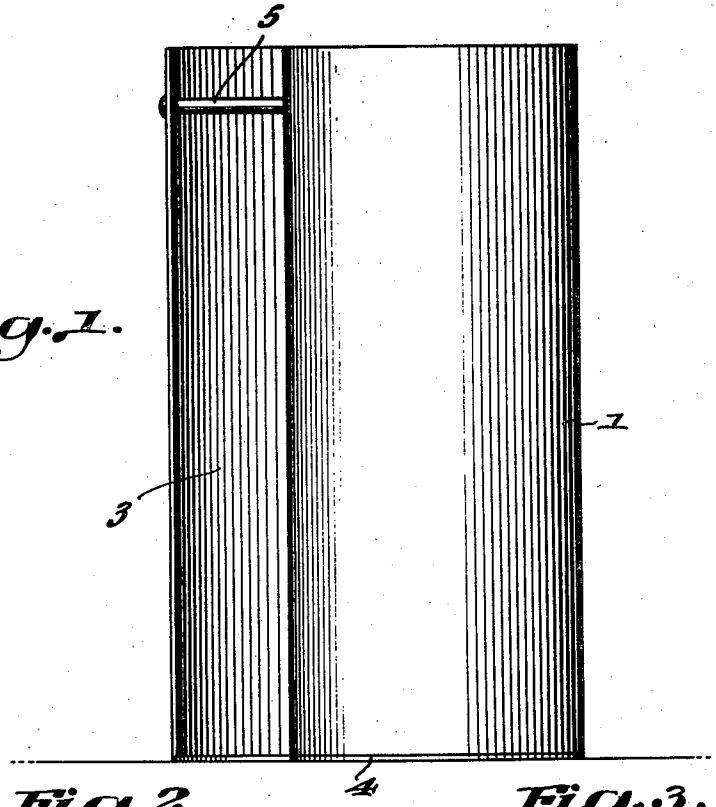


Fig. 2.

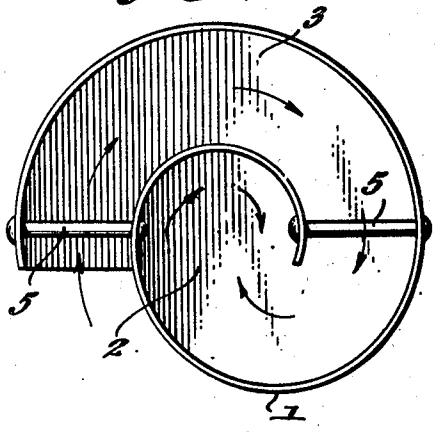
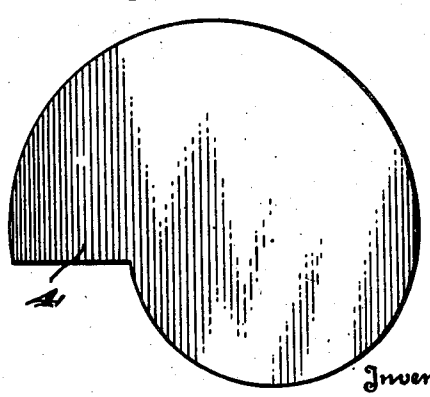


Fig. 3.



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COMBUSTION CHAMBER STRUCTURE WITH SPIRAL AIR INLET

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3 Claims. (Cl. 110—72)

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This invention relates to an improvement in the combustion of fuels, and more especially to an improved method for supplying air to the combustion chamber and a device for effecting this method.

One of the objects of the present invention is to provide a method to insure more active and complete combustion of fuel by imparting a cyclonic motion to air and introducing the same while in circular motion to the combustion chamber.

A further object of the present invention is to provide a device for the combustion of fuels comprising a combustion chamber and a substantially spiral draft duct which communicates tangentially with the chamber.

With these and other objects in view which will be apparent from the subsequent description, the present invention resides in providing a device, to insure a more active and complete combustion of fuels, which comprises a combustion chamber and a draft duct which will impart a cyclonic motion to a draft of air before it enters the combustion chamber. In this type of device, conventional grates, smoke stacks, forced draft and insulation are not necessary for a more active and complete combustion of the fuel although such equipment may be used where the installation requires such conveniences. Preferably, the draft duct and the combustion chamber are integral as in the structure shown in the drawings. Any type of fuel may be used, such as wood, coal, coke, oil, or other hydrocarbons. The device may be designed for outdoor use, for example as a trash burner, a saw mill sawdust incinerator, or a camp stove, or it may be installed for use with a steam boiler, in domestic heating or cooking units, chemical process furnaces, or for other industrial or domestic purposes.

The simplified design enables the device to be made at a low cost. It also permits the device to be readily installed in any type of heating unit.

In the drawings:

Figure 1 is a side elevational view of one form of a device constructed in accordance with the present invention for the improved combustion of fuel.

Figure 2 is a top plan view of the device shown in Figure 1.

Figure 3 is a bottom plan view of the device shown in Figure 1.

In order to illustrate the invention, a device for the combustion of fuels of simplified construction is disclosed which comprises a sheet of metal or other non-combustible material, generally designated by the numeral 1, which is spirally wound to form a combustion chamber 2 and a spiral draft duct 3 which communicates with the combustion chamber 2 and extends tangentially with respect thereof. A bottom closure member 4 is secured in any suitable manner to the lower edge of the sheet 1. This closure member 4 together with suitable tie rods 5, positioned between adjacent convolutes of the upper edge of the sheet 1, hold the metal sheet in a spiral shape. While only the inner portion of the spiral has been indicated as forming the combustion chamber 2, a portion or, as in the case of using oil or gas as a fuel, all of the bottom of the spiral duct 3 may be also used as a fuel container. The combustion chamber 2 and the spiral duct 3 are integral in operation acting as one unit. The circular shape of the device may be modified to make allowance for specific conditions.

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A natural cyclonic draft exists potentially in the spiral duct 3 and the central chamber 2, and a cyclonic motion is immediately generated upon ignition of the fuel. This motion is amplified and the velocity increased as the air entering the inlet to the draft duct is preheated during its passage through the spiral duct as a result of contact with the portion of the sheet metal 1 which forms a common wall between the duct 3 and the combustion chamber 2. This cyclonic motion of the air entering the combustion chamber causes and maintains a turbulence which, together with the retention of heat in the combustion chamber due to the rotary motion of the preheated air draft, results in more active and complete combustion.

It is thought that this cyclonic motion of the draft directly causes this improved combustion by causing the gases of combustion, while still hot, to come into contact with the secondary air as well as the primary air. Such conditions are a marked advance over prior constructions in which the secondary air does not come into contact with the gases of combustion until their temperature has been reduced through passage a substantial distance away from the region of combustion.

The device may be used with conventional accessory apparatus, such as mountings, castings, dampers, grates, forced draft blowers, and smoke stacks, but the vortex draft of preheated air makes the use of such equipment unnecessary because of the production of a blast or blower effect. For example, as an outdoor installation, or as an industrial process furnace, a clean hot

fire can be obtained without the use of such equipment.

The degree of curvature and form of spiral, ratio of height to width, relative size of combustion chamber and similar requirements for use with a specific fuel and under specified conditions can be determined by experiment. The combustion chamber may be made of a refractory material instead of sheet metal if desired.

While for purposes of illustration one form of device has been disclosed, it is obvious that various changes in structure may be made to obtain a cyclonic motion of air for draft purposes without departing from the concept of the invention.

I claim:

1. A device without grates for the combustion of fuels comprising a spirally rolled sheet of noncombustible material, a closure member secured to one extremity of the rolled sheet, said closure member serving as a base from which the sheet extends vertically, the inner end of the spiral passageway constituting a combustion chamber, and the remainder of the spiral passageway constituting an inlet duct for admitting combustion air tangentially to the combustion chamber and throughout the height of the combustion chamber, said spiral passageway throughout its entire length being open, and also being open at the top.

2. A device without grates for the combustion of fuels comprising a spirally rolled sheet of noncombustible material, a closure member secured to one extremity of the rolled sheet, said closure member serving as a base from which the sheet extends vertically, the inner end of the spiral passageway constituting a combustion chamber, and the remainder of the spiral passageway constituting an inlet duct for admitting combustion air tangentially to the combustion chamber and throughout the height of the combustion chamber, said spiral passageway throughout its entire length being open, and also being open at the top and means extending across the spiral passageway and through the adjacent portions of the rolled sheet to maintain the structure in proper spaced relationship.

3. A device without grates for the combustion of fuels comprising a spirally formed wall of noncombustible material forming a spiral passageway, means closing the bottom end of said passageway and serving as a base from which the spiral wall extends vertically, the inner end of said spiral passageway constituting a combustion chamber, and the remainder of said spiral passageway having an inlet duct for admitting combustion air tangentially to the combustion chamber and throughout the height of the combustion chamber, said spiral passageway throughout its entire length being open, and also being open at the top.

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