

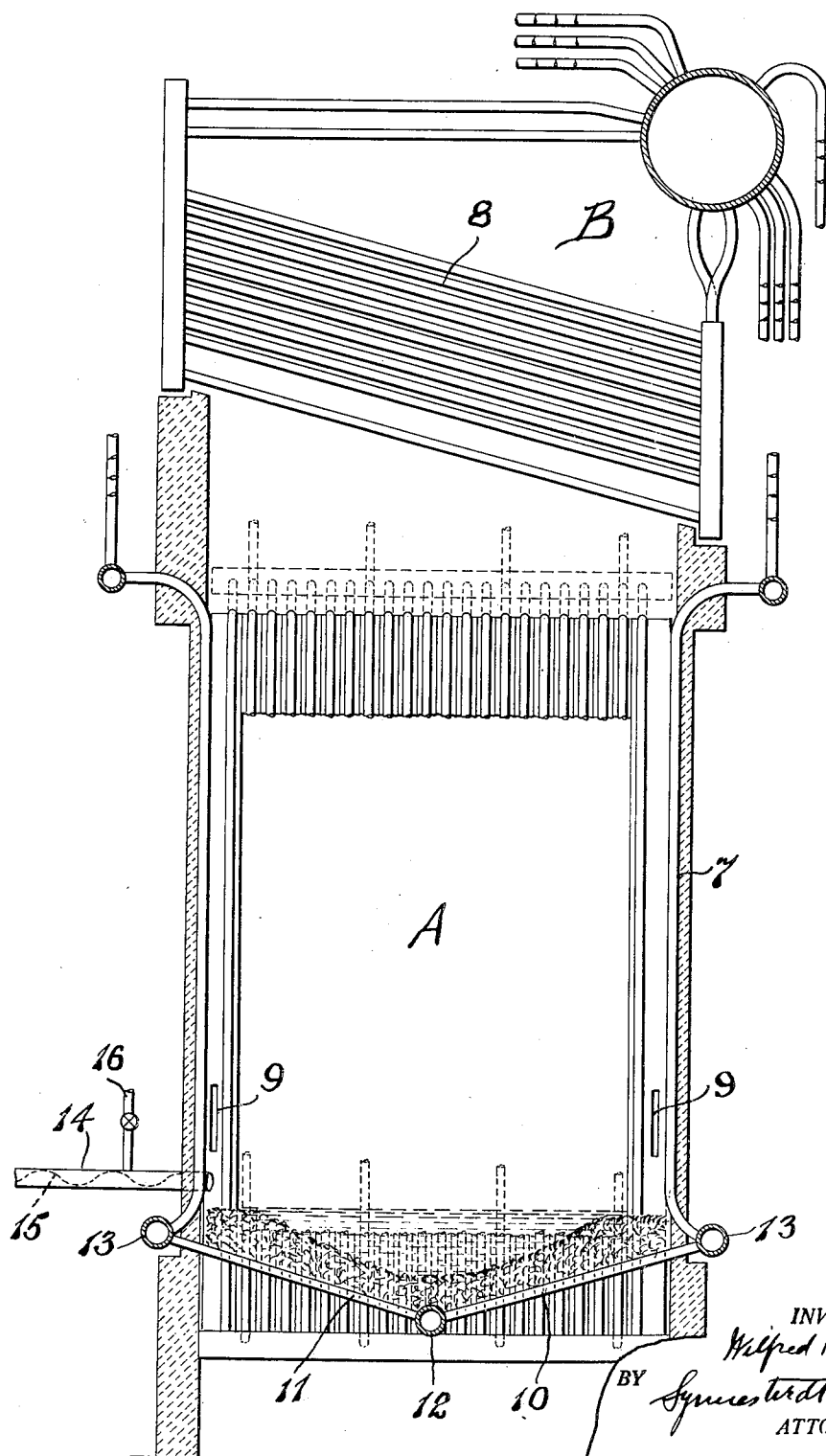
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METHOD OF AND APPARATUS FOR DISPOSING OF FLY ASH

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METHOD OF AND APPARATUS FOR
DISPOSING OF FLY ASH

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1 Claim. (Cl. 110—165)

This invention relates to the method of and apparatus for handling and disposing of fly ash, and it is especially useful in connection with installations burning pulverized coal, in connection with which the invention will be described.

As is known in the art, there is a considerable deposit of fly ash in various parts of a boiler installation, as for example, in passes of the boiler, in a pass in which the economizer is located, and in the stack. It is also known that where the coal is burned in pulverized form, there is considerable ash carried along in the gases which is collected in a number of different ways, as for example, by precipitation. Fly ash as such, is of practically no utility and can be adapted to no particular use.

It has heretofore been proposed to introduce fly ash into the combustion chamber for the purpose of consuming the combustibles therein, but the ash, in such case, is only again carried out of the combustion space and deposited in various places in the installation, so that there is little net gain to be derived.

It is one of the primary objects of my invention to not only utilize, for the generation of heat, such combustibles as may be present in the fly ash, but to introduce the fly ash in such manner that it will not be again redeposited in various portions of the installation, but will be in a form which can be readily removed from the combustion chamber and, in addition, if desired, be utilized.

I further propose to return the fly ash to the combustion space in such a manner that it will not be carried out of the combustion space proper.

I obtain the foregoing, together with such other objects and advantages as may hereinafter appear, by use of the construction illustrated in the accompanying drawing, wherein the figure is a vertical section through a boiler installation embodying my improvements.

Referring now to the drawing, reference character A indicates a combustion chamber which is defined by rows of upright tubes 7 connected into the boiler proper B in any preferred manner. These tubes are subject to radiant heat and also some heat of convection, as will there appear, and they do a large portion of the work in the generation of steam. Following these tubes are convection tubes 8 which may be of any desired number sufficient to secure the desired lowering of temperature of the waste gases of combustion before the latter are passed over superheaters,

preheaters, economizers, or air heaters, as the case may be.

The powdered coal is introduced into the corners of the combustion space, near the bottom thereof, by burners indicated at 9, arranged so as to deliver streams of coal and combustion air or preheated combustion air, in a known manner, tangent to an imaginary circle. This produces a vertical or whirling flame of intense combustion, the tubes 7 being subject to heat of convection by the sweeping of the flame and gases thereover, as well as to radiant heat.

The installation is calculated to be operated with a slagging or wet bottom. Any preferred means may be provided to constitute a support for such bottom. In the drawing, the support for the slagging bottom comprises the rows of tubes 10 and 11 which incline upwardly and outwardly from the central supply header 12 to the headers 13, and into which the lower ends of the tubes 7, constituting the side walls of the combustion chamber, are expanded. The header 12 is provided in any suitable manner from a supply with the boiler, so that circulation takes place from the header 12 through the tubes 10 and 11 to the header 13, and thence upwardly through the side wall tubes and to the boiler.

The tubes of the rows 10 and 11 are sufficiently closely spaced together that refuse particles which precipitate from the fuel and flame stream will lodge thereon and form a bed. This bed builds up during operation, the portion of the bed adjacent the tubes being maintained in a relatively non-fluid condition by the cooling action of the tubes. The upper portion of the bed, however, slags under the influence of the heat within the combustion chamber, and from time to time the molten material is tapped off through any suitable tap hole. It is to be noted, however, that the normal level of the top of the slagging bottom is below the level of the burners.

I propose to introduce the fly ash which collects or precipitates in the various parts of the installation beyond the combustion chamber proper, into the combustion chamber adjacent the slagging bottom and between such bottom and the burners, and I do this preferably at the corners. By introducing fly ash below the flame, and more especially when introducing at the corners, but a small amount of the fly ash is carried up into the combustion chamber and out through the combustion space. This region of introduction is relatively quiet, whereby there is greater opportunity for the fly ash to come in contact with the sticky, slagging bottom. Once

the fly ash comes in contact with the bottom, it will remain there, and the combustibles will be consumed and the ash will become a part of the slagging bottom and be removed with the molten slag when the latter is tapped off.

In the drawing, I have shown a pipe 14 for introducing the fly ash at a corner of the combustion chamber below the respective burner means 9, it being understood in this connection that the same arrangement may be employed at the other corners. The pipe 14 is supplied with fly ash collected at various portions of the installation, as for example, in a hopper, and it is advanced through the pipe by a screw conveyor or other suitable means diagrammatically connected at 15. In order to effectively ensure that the fly ash remains in the combustion chamber, I prefer to wet the fly ash, to which end I may provide a sprinkler pipe 16 delivering water to the pipe 14 at a suitable point in advance of its discharge outlet, and I terminate the screw 15 short of

such discharge end. By virtue of this arrangement, the fly ash is thoroughly moistened and is compacted and extruded from the pipe in wet lumps or gobs which fall of their own weight onto the top of the slagging bottom and are retained by the slag. 80

I claim:

The method of furnace operation which comprises burning fuel containing incombustible material under conditions causing the incombustible material to become molten, maintaining a pool of the molten material, separating flue dust containing both combustible and incombustible material from the combustion gases, returning the dust in a moistened state to the furnace, and discharging it into the pool of molten material thereby melting the incombustible material while burning the combustible material, and withdrawing molten material from the furnace. 85 90 95

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