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2 Sheets-Sheet 1

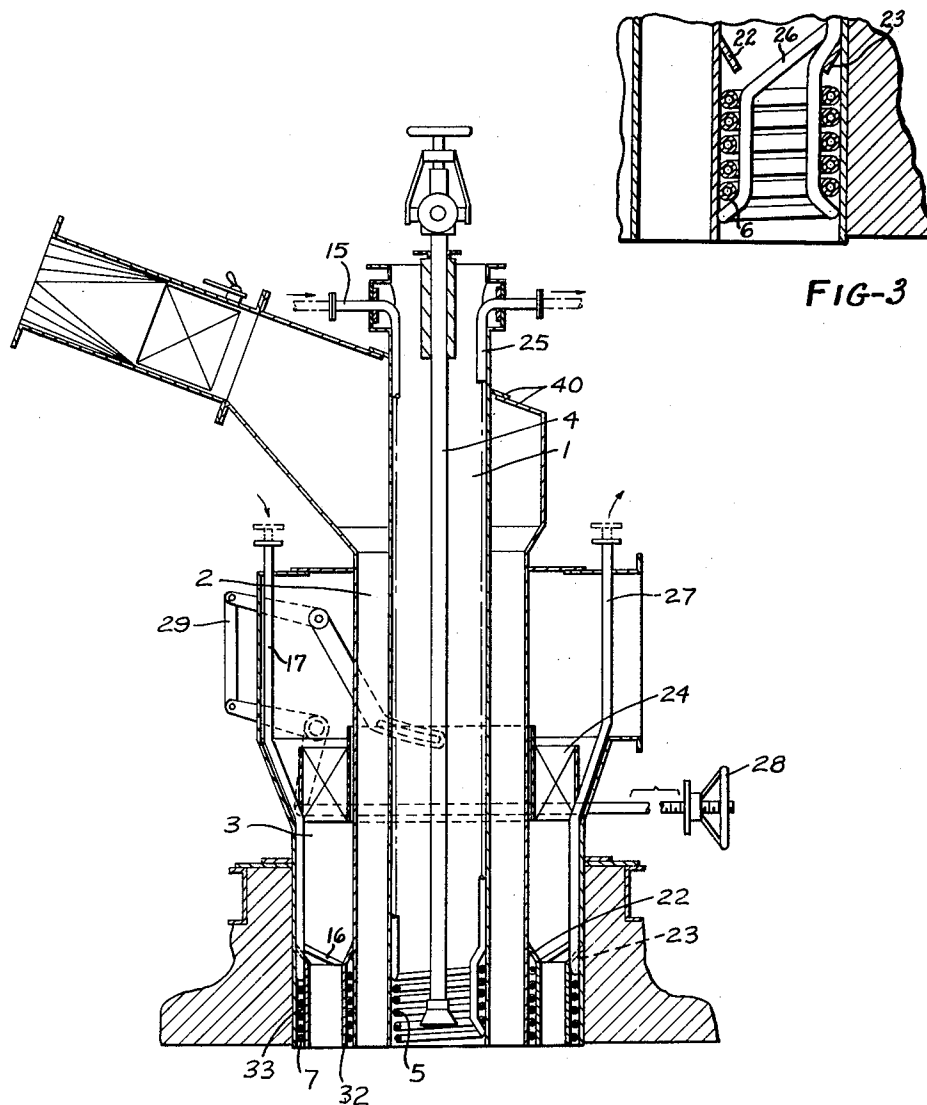


FIG-3

FIG-1

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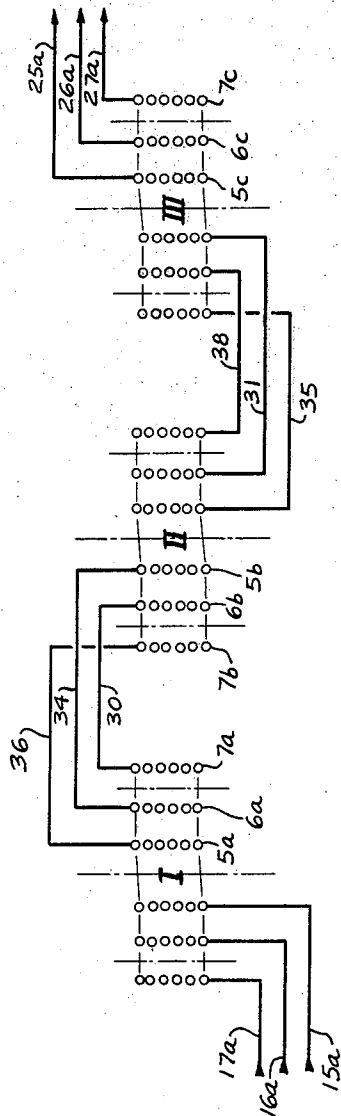


FIG-2

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WATER COOLED CONCENTRIC NOZZLES FOR A BURNER

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6 Claims. (Cl. 122—235)

The present invention relates to a cooled burner with a cooling system connected to a burner circuit.

The invention is characterized primarily in that the cooling pipes including their feeding and discharge pipes are fixedly connected to the burner construction so that after disconnection of the connecting conduits the burners together with the cooling system pertaining thereto can be removed and installed as a unit.

In order to avoid a premature destruction of the feeding and discharge pipes by coal dust passing by, these pipes are, according to a further development of the invention, passed through the air passages of the burner. The cooling pipes may be so designed or coiled that they rest against the inner or outer side of the wall of the air nozzles, or they may form an extension of said wall and may be directly adjacent to that end of the wall which faces the fire chamber.

In the first instance, the cooling coils are always mounted on that side of the wall which is exposed to the air flow. With a burner provided with a central air nozzle, an annular nozzle of fuel-dust-air mixture, and a surrounding or enveloping air nozzle, the wall confining the central air nozzle is cooled by cooling coils resting on the inside of the walls which coils are thus exposed to the air flow in the central air nozzle, whereas the outer wall confining the fuel-dust-air nozzle is on the outside surrounded by cooling coils, and the outer wall of the enveloping air nozzle has cooling coils on the inside. In this way, the cooling coils are exposed only by contact with the air stream.

In order to reduce the formation of turbulence in the enveloping air nozzle, guiding baffles are arranged which cover the cooling coils in the enveloping air nozzle. If desired, the guiding baffles may extend up to the nozzle mouth whereby the coils would be completely surrounded between wall and guiding baffle. In the second instance, either those walls confining the flow of air in the enveloping or annular nozzle are extended toward the mouth and thus cover the pipes with regard to the fuel-air nozzle or stream, or the intermediate spaces between the pipe walls are covered by welding thereto wires so that an approximately uniform surface will be formed which will reduce the formation of turbulence on the walls and will thereby prevent the fuel dust particles from attacking the pressure conveying parts.

The feeding and discharge pipe portions are passed partly along the walls of the central air nozzle and partly along the outer walls of the enveloping air nozzles, and are connected either through flange connection or in a customary manner by welding to the burner cooling circuit.

FIG. 1 illustrates the employment of the present invention in connection with a round burner.

FIG. 2 illustrates the circuit scheme of the cooling coils for three burners.

FIG. 3 illustrates a modified form of cooling pipe system.

The burner according to FIG. 1 comprises conduit means including a central air nozzle, designated with the reference numeral 1, while the annular nozzle through which the fuel-dust-air mixture passes is designated with the reference numeral 2, and the enveloping or surround-

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ing air nozzle is designated with the reference numeral 3. The arrangement of FIG. 1 furthermore comprises an oil burner 4 which may be employed as ignition burner or auxiliary burner. Arranged at the mouth of the central air nozzle on the inside of the wall is a cooling pipe system 5 for cooling the wall between the central air nozzle and the annular passage for the fuel-air mixture. The feeding line 15 leading to this cooling pipe system is first passed along the wall of central air nozzle 1 down through coils 5 and thence to discharge through outlet pipe 25. The central air nozzle may thus, following the disconnection of the connecting flanges 40, be installed or removed together with the cooling system pertaining thereto. Within the surrounding air nozzle 3 there is arranged a vane ring 24 to give a vortex to the surrounding air stream. The vane ring may be displaced axially by means of a handwheel 28 and a lever system 29.

The cooling pipe system 6 for cooling the outer wall of the annular nozzle for the fuel-air mixture is arranged in the enveloping air nozzle 3. The feeding pipe 16 for this cooling system is passed along the outer wall of the enveloping air passage and from there outwardly and is connected to the outer wall. A similar arrangement is employed for the discharge pipe 26. The cooling pipe system for the outer wall of the fuel-air nozzle is thus supported by the outer wall of the enveloping air passage. A further cooling coil 7 cools the outer wall of the enveloping air passage. In this instance, feeding pipe 17 extends parallel to the pipe 16 along the outer wall and is then passed toward the outside. The discharge pipe 27 is, in conformity with the arrangement of FIG. 1, located in front of pipe 26. Thus, the cooling pipe system 6 as well as the cooling pipe system 7, together with their feeding and discharge pipes, are supported by the outer wall of the enveloping air passage.

When it is intended to remove the systems, first the connections of the feeding and discharge pipes are disconnected. Thereupon, the burner consisting of all three nozzles can be pulled out as a unit together with all cooling pipe systems. However, there also exists the possibility of first withdrawing the central air nozzle 1 with the cooling system 5, then pulling out the annular fuel-air nozzle for the fuel-air mixture; and subsequently the annular nozzle with the guiding plates or baffles, is withdrawn. In both instances, the cooling pipe system will, after removal of the burner, not remain in the nozzle opening so that those difficulties which heretofore have been encountered in connection with the removal and installation of systems of the general type involved, will be avoided.

Each of the three concentric nozzles terminates in a mouth piece.

FIG. 2 shows the circuit scheme of the cooling coils for three burners I, II and III. The cooling system of burner I comprises the inner coils 5a, the middle coils 6a and the outer coils 7a. The corresponding coils of burner II are 5b, 6b and 7b, and those of burner III 5c, 6c and 7c. 15a is the feeding pipe for coils 5a, 16a that for coils 6a and 17a that for coils 7a. The discharge pipes are: for coils 5c pipe 25a, for coils 6c pipe 26a and for coils 7c pipe 27a.

Coils 7a being connected with coils 6b by line 30, coils 6b with coils 5c by line 31, one cooling fluid stream flows successively through one system of outer coils, one system of middle coils and one system of inner coils.

In the same manner middle coils 6a are connected with inner coils 5b by line 34 and these with outer coils 7c by line 35, while inner coils 5a are connected by line 36 with outer coils 7b and those with middle coils 6c by line 38.

In the arrangement shown in FIG. 3, reference numerals

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22 and 23 indicate guide plates mounted before the cooling pipe coils 6 to prevent turbulence of the air stream. These guide plates may, as will be understood, extend to the end of the coils as shown by reference numerals 32 and 33 in FIG. 1.

It is, of course, to be understood that the present invention is, by no means, limited to the particular construction shown in the drawings, but also comprises any modifications within the scope of the appended claims.

What we claim is:

1. In a burner; a central air nozzle, an annular nozzle for a fuel air mixture surrounding said air nozzle, and an enveloping air nozzle surrounding said annular nozzle, each of said nozzles terminating in a mouth piece, said burner having parts thereof fluid cooled, cooling pipe means including connecting pipes for connection with cooling fluid supply and discharge pipe lines respectively, said cooling pipe means including said connecting pipes being fixedly connected to the respective adjacent burner parts so as to permit installation and withdrawal of the burner parts with said cooling pipe means when the latter are not connected to fluid supply and discharge pipe lines, said cooling pipe means including coils within the mouth pieces of the nozzles and located within said central nozzle and said enveloping nozzle thereby leaving the annular fuel air nozzle unobstructed, and guiding means covering the said coils at least on the side which is upstream relative to the flow of air in the nozzles.

2. A burner according to claim 1, in which said guiding means extends to the end of said enveloping air nozzle.

3. In a burner; a central air nozzle, an annular nozzle for a fuel-air mixture surrounding said air nozzle, and an enveloping air nozzle surrounding said annular nozzle, each of said nozzles terminating in a mouth piece, said burner having parts thereof fluid cooled, cooling pipe means including connecting pipes for connection with cooling fluid supply and discharge pipe lines respectively, said cooling pipe means including said connecting pipes being fixedly connected to the respective adjacent burner parts so as to permit installation and withdrawal of the burner parts with said cooling pipe means when the latter are not connected to fluid supply and discharge pipe lines, said cooling pipe means including coils within the mouth pieces of the nozzles and located within said central nozzle and said enveloping nozzle thereby leaving the annular fuel air nozzle unobstructed, and guiding means for covering the said coils at least on the side thereof that is upstream relative to air flow in the nozzles, that portion of the said coils which is intended for cooling the outer wall of the annular nozzle being connected to the outer wall of the enveloping nozzle.

4. A burner for a boiler firing system, said burner comprising nozzle means including first nozzle means for conducting gas and second nozzle means for conducting fuel and surrounding said first nozzle means, said nozzle means terminating in mouth portions, cooling coils asso-

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ciated with the mouth portions of said nozzle means, the cooling coils associated with said first nozzle means being located inside the mouth portion of said first nozzle means, and the coils associated with said second nozzle means being located outside the mouth portion of the second nozzle means so as to be confined on one side by the second nozzle means, and guide plates connected to said second nozzle means and being disposed over the cooling coils pertaining to the second nozzle means.

5. A burner for a boiler firing system comprising; inner and outer concentric nozzle means for air and fuel, respectively, cooling coils associated with said nozzle means at the discharge ends thereof, the cooling coils associated with the nozzle means for air being mounted on the inner wall of said nozzle means and thereby directly confining the air, the cooling coils pertaining to the nozzle means for fuel being mounted on the outside of the respective nozzle means, and the last mentioned cooling coils being connected in parallel with the cooling coils pertaining to the first mentioned nozzle means.

6. A cooling system for a group of fluid cooled burners in which each burner comprises a plurality of concentric nozzles to be cooled: cooling pipe means arranged adjacent the respective concentric burner nozzles to be cooled and adapted to convey cooling fluid, the cooling pipe means for each said burner nozzle including inlet and outlet means for cooling fluid supply and cooling fluid discharge respectively, said cooling pipe means also including coil means fixedly connected to the respective concentric burner nozzles in heat exchange relation thereto, the cooling pipe means for the respective nozzles of each individual burner being arranged in parallel to each other while the outlet means of the cooling pipe means of each nozzle of each burner of the group of burners considered in the direction of the flow of cooling fluid is connected to the inlet means of the cooling pipe means for different of said concentric nozzles of the next succeeding burner, and the inlet means of the cooling pipe means of the respective concentric nozzles of the first burner of the group of burners being connected to a supply of cooling fluid while the outlet means of the cooling pipe means of the respective nozzles of the last burner of the group of burners are connected to discharge pipe means, whereby the cooling fluid discharged at each of the respective outlet means of the cooling pipe means of the nozzles of the said last burner will be at about the same temperature.

References Cited in the file of this patent

UNITED STATES PATENTS

114,739	Wood	May 9, 1871
860,983	MacDonald	July 23, 1907
1,936,161	Hedrick	Nov. 21, 1933
2,011,026	Bailey et al.	Aug. 13, 1935
2,275,515	Dunham	Mar. 10, 1942
3,007,458	Leon et al.	Nov. 7, 1961