Sept. 25, 1923. 1,469,172

E. L. BARNES

FUEL STOKING STRUCTURE

Filed March 9, 1920 4 Sheets-Sheet 1

Fig. 3.

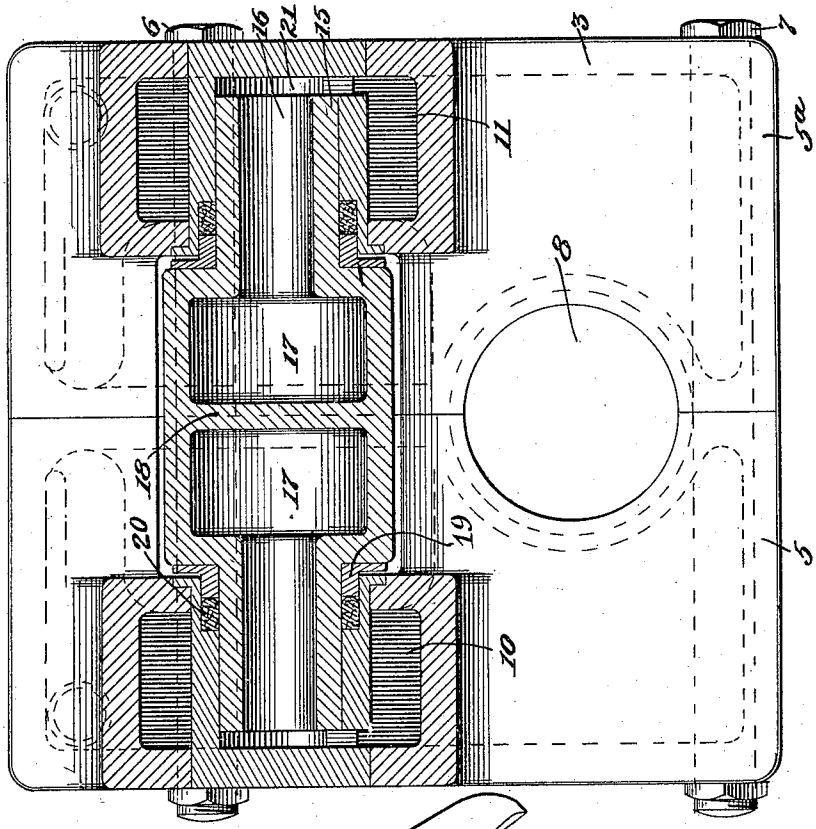
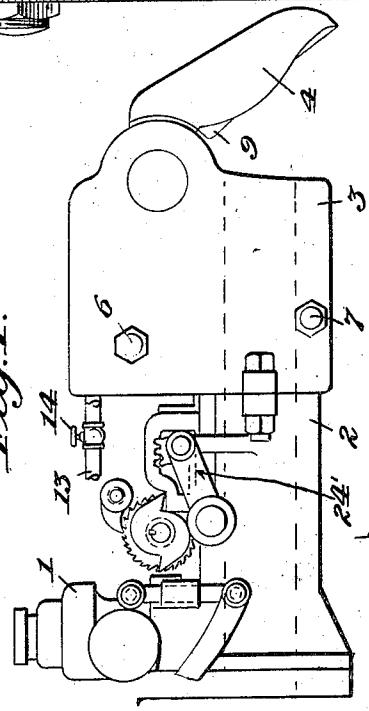


Fig. 1.



Inventor:
Eugene L. Barnes.

Edmund A. Parry
Atty.

Sept. 25, 1923. 1,469,172

E. L. BARNES

FUEL STOKING STRUCTURE

Filed March 9, 1920 4 Sheets-Sheet 2

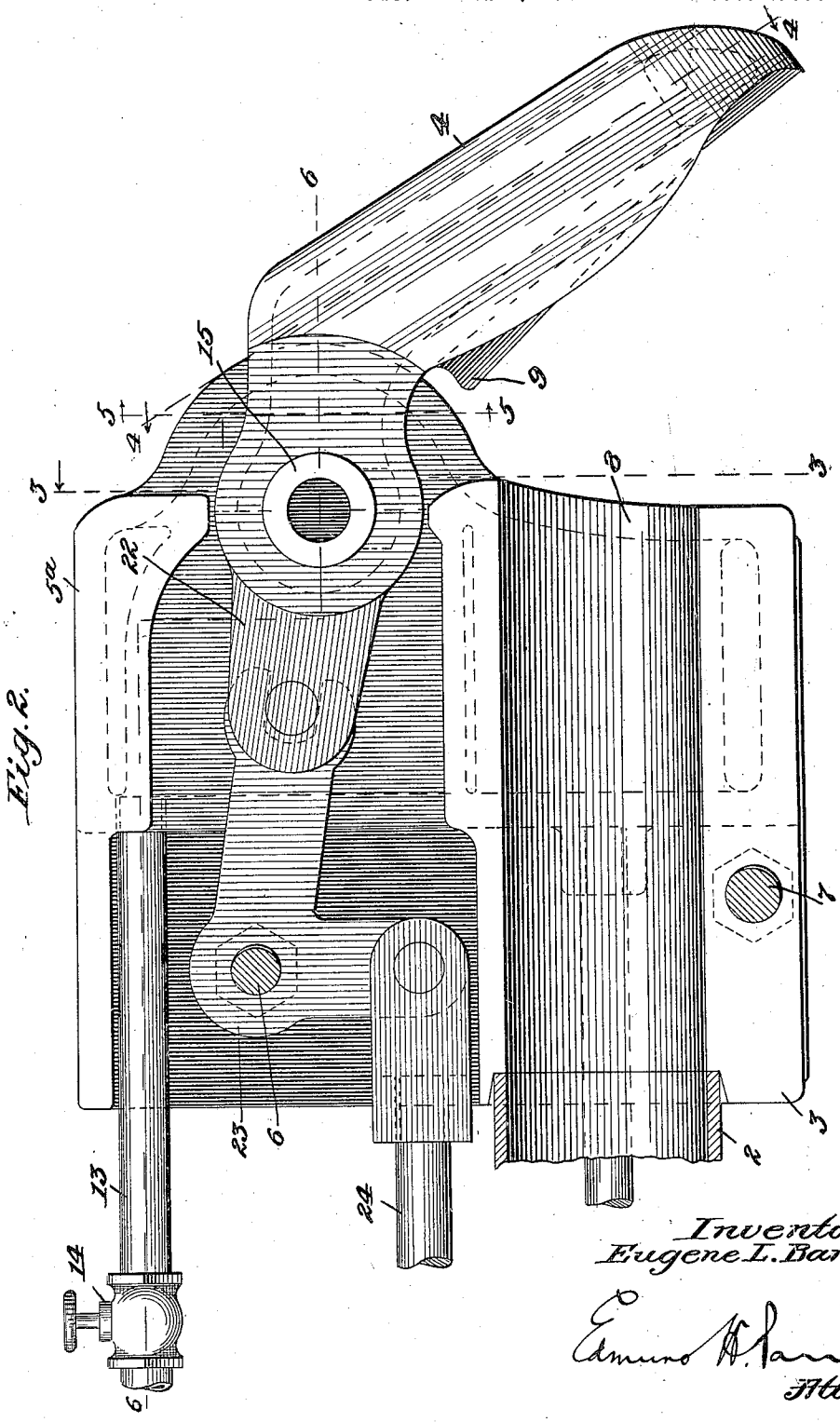


Fig. 2.

Inventor:
Eugene L. Barnes,
Edmund A. Lang
Atty.

Sept. 25, 1923. 1,469,172

E. L. BARNES

FUEL STOKING STRUCTURE

Filed March 9, 1920 4 Sheets-Sheet 3

Fig. 4.

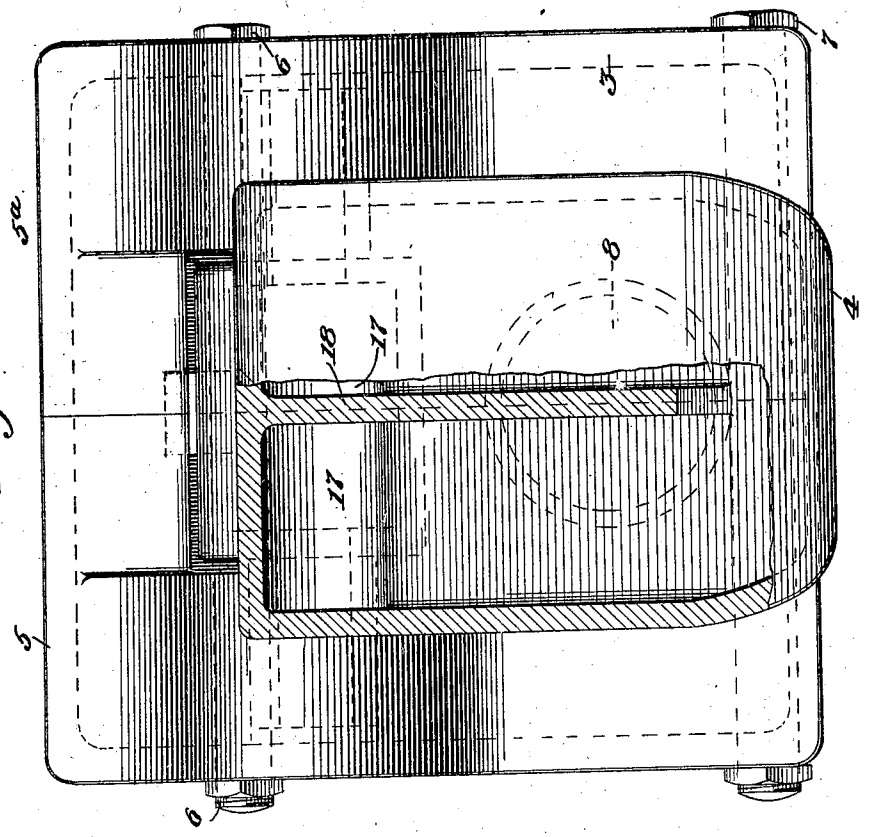
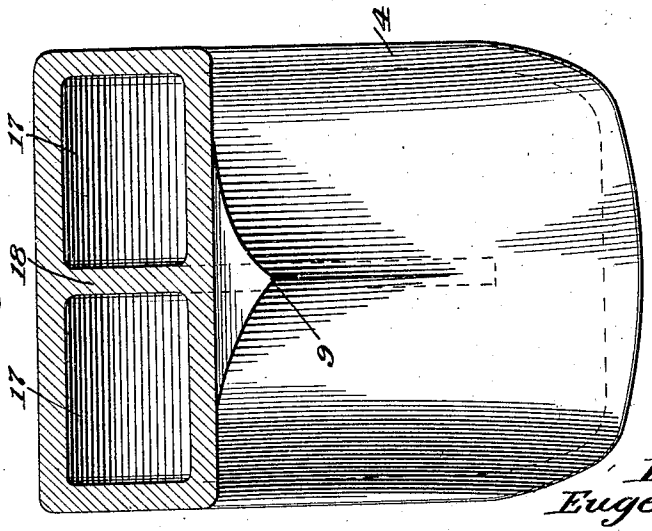


Fig. 5.



Inventor:
Eugene L. Barnes.

Emmons & Barney
Attys.

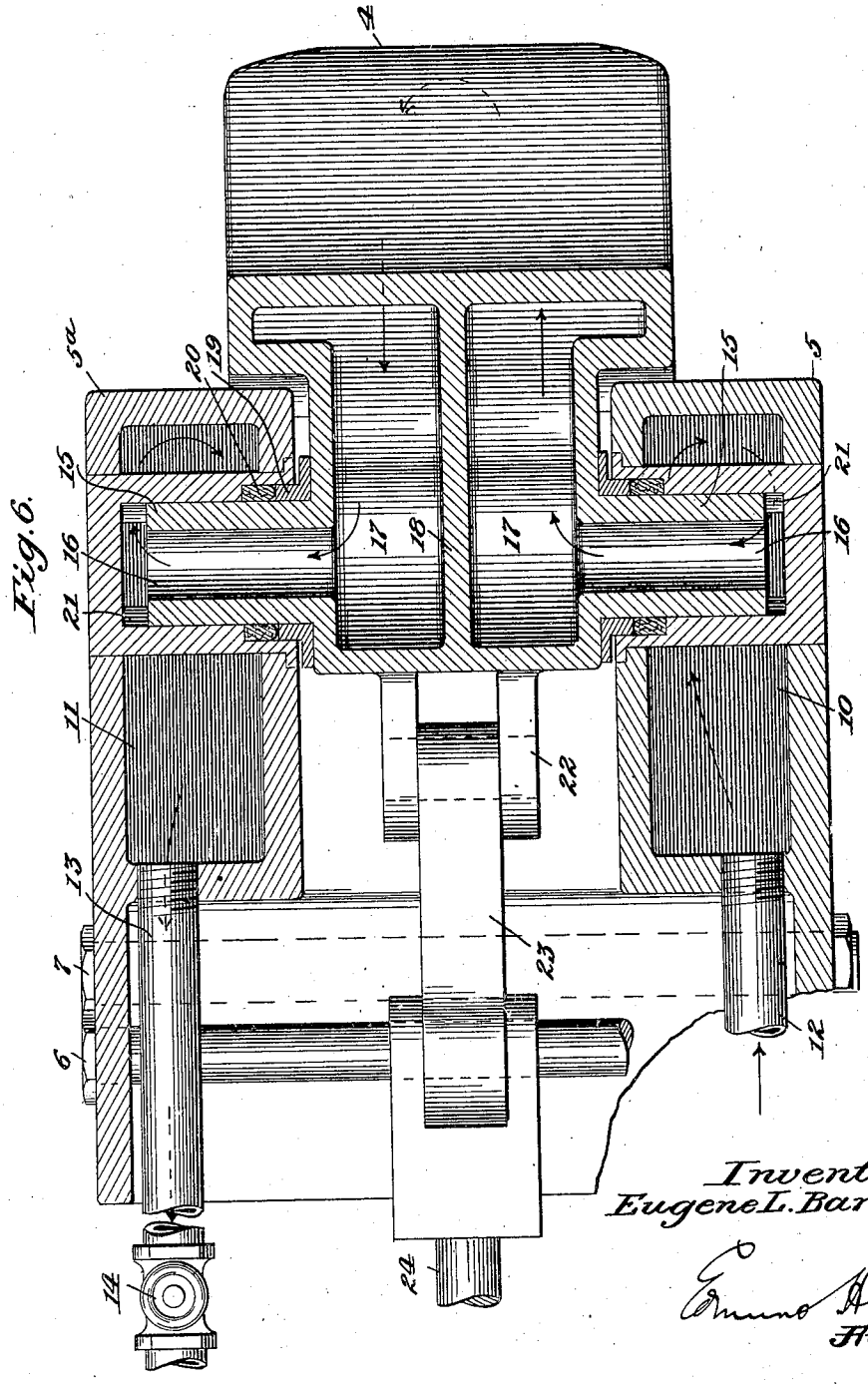
Sept. 25, 1923. 1,469,172

E. L. BARNES

FUEL STOKING STRUCTURE

Filed March 9, 1920 4 Sheets-Sheet 4

Fig. 6.



Inventor:
Eugene L. Barnes.

Edmund A. Lang
Atty.

Patented Sept. 25, 1923. 1,469,172

UNITED STATES PATENT OFFICE.

EUGENE L. BARNES, OF BUFFALO, NEW YORK, ASSIGNOR TO AMERICAN DISTRICT STEAM COMPANY, OF NORTH TONAWANDA, NEW YORK, A CORPORATION OF NEW YORK.

FUEL-STOKING STRUCTURE.

Application filed March 9, 1920. Serial No. 364,564.

To all whom it may concern:

Be it known that EUGENE L. BARNES, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, has invented certain new and useful Improvements in Fuel-Stoking Structures, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention broadly relates to fuel-stoking structures and has more particular reference to means for maintaining certain instrumentalities of the structure in a relatively cool condition during action thereof.

In an application filed by me on April 7, 1919, Serial No. 287,998, there is disclosed an automatically-operated fuel-stoking apparatus; and, as there revealed, this apparatus includes a hopper, a conduit, a nozzle, and a fuel-distributor or baffle hingedly mounted on the nozzle and adapted to be actuated successively to open and restrict passage through the nozzle.

In practice, by reason of the fact that the nozzle and baffle are disposed within a zone of high temperature, considerable difficulty has been encountered in preventing rapid destruction or deterioration of these parts, and particularly the baffle, by reason of the intense heat arising from the associated furnace. Various expedients have been proposed to remedy this difficulty, including the making of the baffle of heat-resisting materials, such as carborundum and the like; but, while such materials will function to the end desired; yet even they are, in time, affected by the heat and either crack or are otherwise injured. As a result of considerable experimentation, I eventually discovered that by circulating a cooling fluid through the baffle and, if desired, through the nozzle, these parts will be unaffected by the heat, no matter how intense it may be. In Figs. 11, 12 and 13 of my said pending application, I have disclosed a fluid-circulating system for cooling the nozzle and baffle; and the structure herein disclosed is an improvement upon that there revealed.

Generally speaking, the structure of the present application involves a nozzle provided with a fuel passage and with a fluid-receiving channel, operatively associated with a baffle or fuel distributor swingingly mounted on the nozzle for successively opening and restricting the fuel passage, the baffle being likewise channeled to receive the cooling fluid from the nozzle, and whereby a circulation of the fluid through the nozzle and baffle may be successfully and effectively accomplished whether the baffle is in movement or at rest.

The invention resides in the various associated members herein disclosed, in their related aggroupment, and in certain details thereof, all as hereinafter more fully described.

In order that the invention may be more readily comprehended, I have shown the same in the accompanying drawings, these being, however, illustrative of a preferred embodiment of the invention, though it is to be understood that, inasmuch as this structure may be variously modified, such variations are within the spirit of the invention.

In these drawings:

Fig. 1 is a view in elevation of a fuel-stoking apparatus with my improved structure associated therewith;

Fig. 2 is a view in central vertical section, a distributor and one element of a nozzle being shown in elevation and certain portions in section;

Fig. 3 is a view in vertical cross-section on the line 3—3, Fig. 2;

Fig. 4 is a similar view on the line 4—4, Fig. 2;

Fig. 5 is a view in vertical cross-section on the line 5—5, Fig. 2; and

Fig. 6 is a view in horizontal cross-section on the line 6—6, Fig. 2.

Referring to these drawings, it will be noted that the reference numeral 1 designates, generally, a hopper forming a component of the automatic fuel-stoking apparatus disclosed in my aforementioned application; 2 designates a chamber or conduit associated with the hopper; 3 designates a nozzle; and 4 designates an associated fuel-distributor or baffle. It is to be understood that the nozzle is mounted in the wall of a furnace (in general) so that its inner end and the baffle are within the heat-producing chamber of the furnace.

Preferably and as shown, the nozzle in this instance comprises two companion elements 5, 5^a, these being adapted to be secured together as by bolts 6 and 7; and, when thus associated, a central fuel passage 8 is formed, this being in communication with the end of the conduit 2, as shown in Fig. 2.

Through this passage is to be projected a body of fuel that is to be distributed over the fire-bed by the baffle 4, the latter being, to this end, provided with a fuel-spreading extension or surface 9 on its inner face.

Each of the nozzle-elements 5 and 5ª is provided with a longitudinal channel 10 and 11 of any appropriate form and dimensions. Leading into the channel 10 is a supply pipe 12; and leading out of the channel 11 is a discharge pipe 13, the latter preferably being provided with a valve 14 to control the flow of liquid through the system; it being understood that the supply pipe 12 receives its fluid from any suitable source of supply, such as a water system operating under, say, fifty to seventy-five pounds pressure; whereas the pipe 13 may extend to a hot well (not shown) from which the boiler water supply is taken. The control-valve 14, being placed on the discharge pipe, is preferably closed a sufficient amount to supply the required amount of water to the nozzle and baffle.

If pumpage were necessary or advisable to effect circulation of the water through the equipment, a pump could be associated with the supply-pipe 12 in any preferred way and as may be well understood. However, for certain purposes, I may rely upon a gravity circulation of the fluid in which event the latter is heated in the baffle, rises in the pipe, and passes off into the aforementioned hot well.

The baffle or fuel-distributor 4 is, preferably and as shown, provided with trunnion extensions 15, these being hollow to provide passages 16 from their ends into a divided channel 17 formed in the baffle by a partition 18.

Encompassing each of the trunnion-extensions 15 of the baffle is a gland 19 adapted to hold packing 20 in place between the trunnion-extension and the nozzle. As clearly shown in Figs. 3 and 6, the trunnion-extensions 15 are fore-shortened somewhat to provide a space 21 between their ends and the channel walls of the nozzle-elements and, thus, the passage 16 in each trunnion-extension is in communication, through the space 21, with either the channel 10 or 11 in the nozzle-elements, said spaces 21 being a continuation of these channels.

Operation.—The operation of the structure, involving the circulation of the cooling fluid through the nozzle and baffle is as follows: Whether the fluid is flowing by the ordinary gravity circulation or by reason of pressure effected thereon through a pump, such fluid flows through the pipe 12 into the channel 10 in the nozzle-element 5; thence into the space 21 and through the passage 16 in the trunnion-extension, from which it passes into the channel 17 at the left side of the baffle (as viewed in Fig. 6); thence around the lower end of the partition 18 in the baffle and into the channel 17 on the right hand side of the baffle; flowing thence in through the passage 16 of the right hand trunnion-extension; and thence into the channel 16 in the nozzle-element 5ª; and finally into the pipe 13 which leads, as aforementioned to a hot well or other point of discharge not shown. The course of the fluid is indicated by arrows in Fig. 6.

It is to be understood that the circulation of the cooling fluid, in the manner just explained, occurs not only while the baffle 4 is at rest, but also when it is in movement: When at rest, it normally will restrict the passage 8 against the movement of fuel therethrough and against the distributing surface 9 on the baffle, such movement of the fuel being accomplished by a steam or an air-blast device (not herein shown, but fully disclosed in my pending application; though it is to be understood that the structure herein disclosed may be utilized in connection with any other type of fuel-stoking apparatus). Movement of the baffle 4 is accomplished by any appropriate mechanism whereby it is swung away from the end of the passage 8 to enable it to function as a distributor of the fuel. This movement of the baffle is accomplished by reason of the fact that it moves on a horizontal axis formed by the trunnion-extensions 15, the baffle being provided with an extension 22, with which is connected a bell-crank lever 23 that is pivoted to the end of an actuating member 24, and this is reciprocated by an operating mechanism designated, generally, in Fig. 1 by the reference numeral 24′.

From the foregoing it will be perceived that I have devised a simple but, nevertheless, effective equipment for the exposed end of a fuel-stoking structure whereby those parts which are subjected to the intense heat of the furnace are maintained in a relatively cool condition at all times and, thus, protected from the deteriorative action of the heat. As a result of the inclusion of this cooling equipment in an automatic fuel-stoking apparatus, there has been provided, for the first time so far as I am aware, a successful apparatus of this type. While the construction herein disclosed has been demonstrated to be entirely practical and most successful; nevertheless it is capable of a wide range of modification and variation without departing from the spirit of the invention or sacrificing any of its salient features or underlying principles.

What I claim is:

1. A fuel-stoking instrumentality including a fuel-nozzle adapted to carry fuel to the interior of a furnace, said nozzle having a jacket for the circulation of a cooling

medium through the jacket; a fuel-distributor associated with the nozzle and having a chamber for the circulation of a cooling medium through the chamber; and means establishing communication between the jacket on the nozzle and the chamber in the fuel-distributor.

2. A fuel-stoking instrumentality including a fuel-nozzle adapted to carry fuel to the interior of a furnace, said nozzle having a jacket for the circulation of a cooling medium through the jacket; a fuel-distributor associated with the nozzle and having a chamber for the circulation of a cooling medium through the chamber; and means establishing communication between the jacket on the nozzle and the chamber in the fuel-distributor, said means including a trunnion for the fuel-distributor, the trunnion being provided with a passage establishing communication between the jacket on the nozzle and the chamber in the fuel-distributor.

3. A fuel-stoking structure including a nozzle channeled to receive a cooling fluid, and a fuel-distributor swingingly mounted at one end of the nozzle and likewise channeled to receive a cooling fluid, the channels of the nozzle and fuel-distributor being in communication for the passage of the fluid from one to the other.

4. A fuel-stoking structure including a nozzle provided with a fuel passage and channeled to receive a cooling fluid, a fuel-distributor hingedly mounted on the nozzle and having a swinging movement in respect to said passage alternately to open and restrict the same and channeled to receive a cooling fluid, the channel in the nozzle and the channel in the fuel-distributor being in direct communication for the passage of a cooling fluid from one to the other.

5. A fuel-stoking structure including a fuel-nozzle provided with a fuel-passage through which fuel may be directed to the interior of a furnace, the walls of the fuel-nozzle being channeled to constitute a chamber for the circulation of a cooling medium through the nozzle; a fuel-distributor operatively associated with the fuel-nozzle and provided with a chamber for the circulation of a cooling medium through the fuel-distributor; a mounting element for the fuel-distributor provided with a passage establishing communication between the chamber in the fuel-nozzle and the chamber in the fuel-distributor; and means for circulating a cooling medium through the chambers, operatively associated with one of the chambers.

6. A fuel-stoking structure including a fuel-nozzle provided with a fuel-passage through which fuel may be directed to the interior of a furnace, the walls of the fuel-nozzle being channeled to constitute a chamber for the circulation of a cooling medium through the nozzle; a fuel-distributor operatively associated with the fuel-nozzle and provided with a chamber for the circulation of a cooling medium through the fuel-distributor; a mounting element for the fuel-distributor provided with a passage establishing communication between the chamber in the fuel-nozzle and the chamber in the fuel-distributor; and means for circulating a cooling medium through the chambers, operatively associated with one of the chambers; said means including a pipe leading into one of the chambers, and a pipe leading out of one of the chambers.

7. A fuel-stoking structure including a fuel-nozzle provided with a fuel-passage through which fuel may be directed to the interior of a furnace, the walls of the fuel-nozzle being channeled to constitute a chamber for the circulation of a cooling medium through the nozzle; a fuel-distributor operatively associated with the fuel-nozzle and provided with a chamber for the circulation of a cooling medium through the fuel-distributor; a mounting element for the fuel-distributor provided with a passage establishing communication between the chamber in the fuel-nozzle and the chamber in the fuel-distributor; means for circulating a cooling medium through the chambers, operatively associated with one of the chambers; said means including a pipe leading into one of the chambers, and a pipe leading out of one of the chambers; and means for controlling the circulation of cooling medium about the chambers.

8. A fuel-stoking structure including a nozzle provided with a longitudinal fuel passage and channeled to receive a cooling fluid, a supply pipe, adapted to lead cooling fluid to the channel connected with the nozzle, a discharge pipe leading out of the same, a fuel-distributor hingedly mounted on the nozzle and having a swinging movement in relation to the passage therein for successively opening and restricting said passage, the fuel-distributor being channeled to receive a cooling fluid, and a hinge instrumentality for mounting the fuel-distributor on the nozzle and hollow to provide a passage for the cooling fluid from the nozzle to the fuel-distributor.

9. A fuel-stoking structure including a nozzle provided with a longitudinal fuel passage and channeled to receive a cooling fluid, a supply pipe, adapted to lead cooling fluid to the channel, connected with the nozzle, a discharge pipe leading out of the same, a fuel-distributor hingedly mounted on the nozzle and having a swinging movement in relation to the passage thereon for successively opening and restricting said passage, the fuel-distributor being channeled to receive a cooling fluid, a hinge instrumentality

for mounting the fuel-distributor and hollow to provide a passage for the cooling fluid from the nozzle to the fuel-distributor, and means for controlling the flow of the cooling fluid.

10. A fuel-stoking structure including a nozzle provided with a longitudinal fuel passage and channeled to receive a cooling fluid, a supply pipe, adapted to lead cooling fluid to the channel connected with the nozzle, a discharge pipe leading out of the same, a fuel-distributor hingedly mounted on the nozzle and having a swinging movement in relation to the passage therein for successively opening and restricting said passage, the fuel-distributor being channeled to receive a cooling fluid, a hinge instrumentality for mounting the fuel-distributor on the nozzle and hollow to provide a passage for the cooling fluid from the nozzle to the fuel-distributor, and means independent of the nozzle for actuating the fuel-distributor.

11. A fuel-stoking structure including a nozzle provided with a longitudinal fuel passage and having its walls channeled for the passage of a cooling fluid, a hinge-mounting on the nozzle and provided with a passage in communication with the channel in the nozzle, a fuel-distributor mounted on the hinge-member and channeled to establish communication with the channel in the nozzle through the hollow portion of the hinge mounting, pipes leading into and out of the channel in the nozzle for supplying and withdrawing a cooling fluid, and means for controlling the flow of the fluid therethrough.

12. In a fuel-stoking structure, a fuel-distributor including an interior chamber for the circulation of a cooling medium through the fuel-distributor; and a mounting element for the fuel-distributor, said mounting element including a trunnion provided with a passage establishing communication, through the trunnion, with the chamber in the fuel-distributor.

13. In a fuel-stoking structure, a fuel-distributor including an interior chamber for the circulation of a cooling medium through the fuel-distributor; a mounting element for the fuel-distributor, said mounting element including a trunnion provided with a passage establishing communication, through the trunnion, with the chamber in the fuel-distributor; and an encompassing portion of the fuel-distributor extending outwardly beyond the trunnion and constituting a housing for the trunnion.

14. A fuel-stoking structure including a fuel-distributor of a width relatively greater than its thickness and having one portion provided on its inner face with a fuel-deflecting surface, the fuel-distributor being hollow and partitioned to provide a channel extending therethrough longitudinally of the deflecting surface.

15. A fuel-stoking structure including a fuel-distributor having its inner face provided with a fuel-speading extension said fuel-distributor being hollow and partitioned approximately centrally to provide a channel at opposite sides of the extension, and trunnion portions extending from the fuel-distributor and also hollow for the passage of a fluid therethrough into the channel in the fuel-distributor.

16. A fuel-stoking structure including a nozzle formed of two companion elements securable together, each element being provided with a channel for the passage of a cooling fluid, and a fuel-distributor swingingly mounted on the nozzle and channeled to receive the cooling fluid from the nozzle.

17. A fuel-stoking structure including a nozzle comprising a plurality of companion elements securable together and each formed with a channel for the passage of a cooling-fluid, and a fuel-distributor hingedly mounted on the nozzle and provided with trunnion extensions each formed with a passage that communicates with the channel in a companion element, the fuel-distributor being channeled to receive a cooling fluid from the nozzle.

18. A fuel-stoking structure including a nozzle comprising a plurality of companion elements securable together and each formed with a channel for the passage of a cooling-fluid, a fuel-distributor hingedly mounted on the nozzle and provided with trunnion extensions, each formed with a passage that communicates with the channel in a companion element, the fuel-distributor being channeled to receive a cooling fluid from the nozzle, and packing interposed between the trunnion-members and the nozzle to preclude leakage of the cooling fluid.

19. A fuel-stoking structure including a nozzle comprising two companion elements, each provided with a longitudinal channel for the passage of a cooling fluid, a fuel-distributor mounted on the nozzle and formed with trunnion-portions extending into the channels in the companion elements and hollow for the passage of the cooling fluid, a pair of glands encompassing the trunnion-portions, and packing interposed between the glands and the walls of the nozzle, the fuel-distributor being channeled to receive the cooling fluid from the nozzle.

20. A fuel-stoking structure including a nozzle comprising two companion elements, each provided with a longitudinal channel for the passage of a cooling fluid, a fuel-distributor mounted on the nozzle and formed with trunnion-portions extending into the channels in the companion elements and hollow for the passage of the cooling fluid,

a pair of glands encompassing the trunnion-portions, packing interposed between the glands and the walls of the nozzle, the fuel-distributor being hollow and channeled to receive the cooling fluid from the nozzle, said channel being formed by a partition approximately central of the fuel-distributor.

21. A fuel-stoking structure including a nozzle comprising two companion elements, each provided with a longitudinal channel for the passage of a cooling fluid, a fuel-distributor mounted on the nozzle and formed with trunnion-portions extending into the channels in the companion elements and hollow for the passage of the cooling fluid, a pair of glands encompassing the trunnion-portions, packing interposed between the glands and the walls of the nozzle, the fuel-distributor being hollow and channeled to receive the cooling fluid from the nozzle, said channel being formed by a partition approximately central of the fuel-distributor, and pipes extending into and out of the channels in the nozzle, and means for actuating the fuel-distributor in respect to the nozzle.

22. A fuel-stoking structure including a nozzle comprising two companion elements, each provided with a longitudinal channel for the passage of a cooling fluid, a fuel-distributor mounted on the nozzle and formed with trunnion-portions extending into the channels in the companion elements and hollow for the passage of the cooling fluid, a pair of glands encompassing the trunnion-portions, packing interposed between the glands and the walls of the nozzle, the fuel-distributor being hollow and channeled to receive the cooling fluid from the nozzle, said channel being formed by a partition approximately central of the distributor, pipes extending respectively into and out of the channels in the nozzle, means for actuating the fuel-distributor in respect to the nozzle, and means for controlling the flow of the cooling fluid through the nozzle and fuel-distributor independently of the actuation of the fuel-distributor.

In testimony whereof I affix my signature in presence of two witnesses.

EUGENE L. BARNES.

Witnesses:
HOWARD LONG,
GEO. H. WEST.