Feb. 19, 1924. 1,484,107

J. ZANDER

GAS BURNING APPARATUS

Filed Oct. 17, 1921 2 Sheets-Sheet 1

Fig. 1

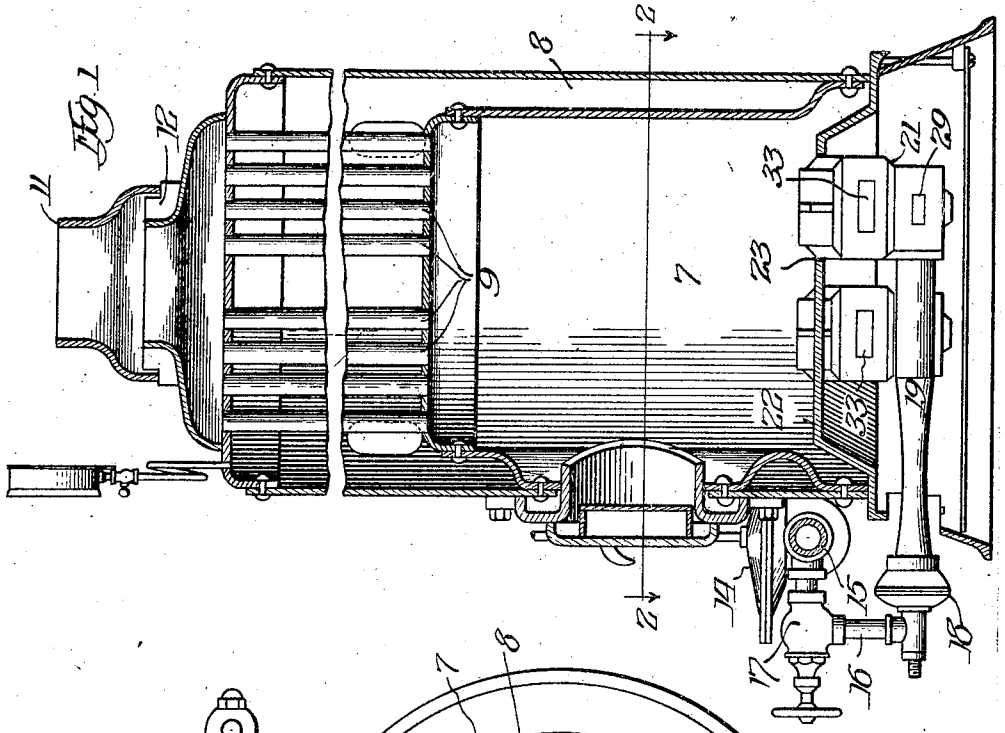
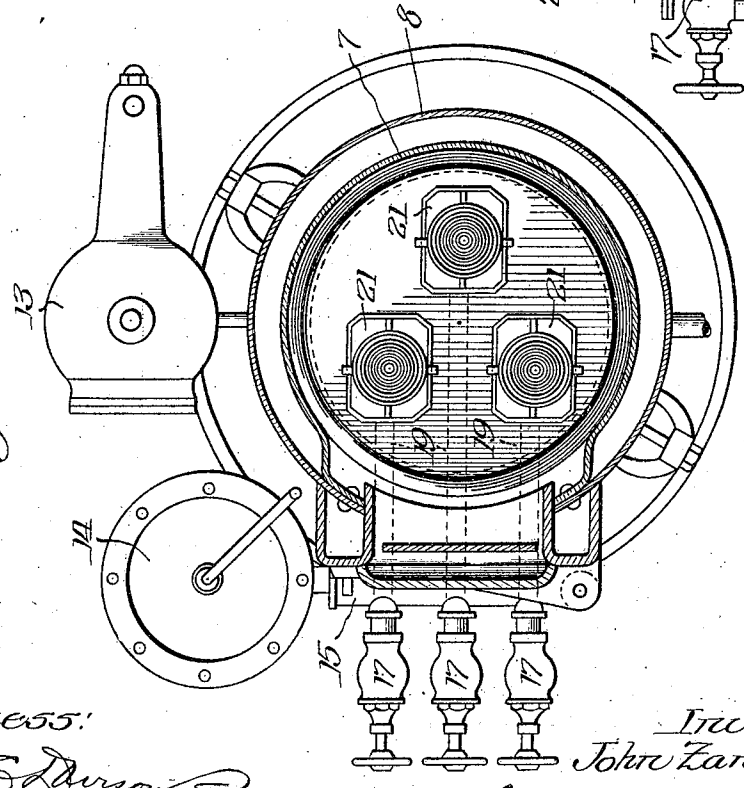


Fig. 2



Witness:
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Fig. 4

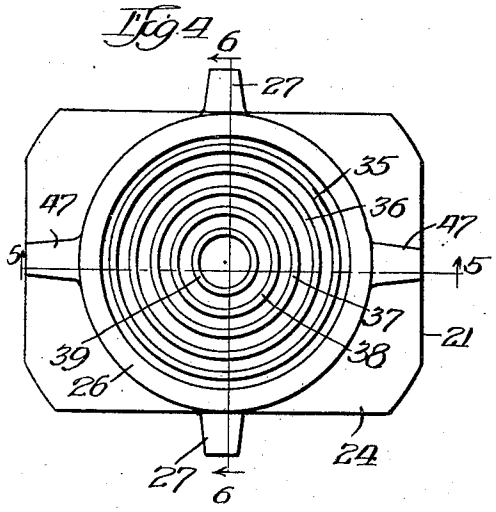


Fig. 3

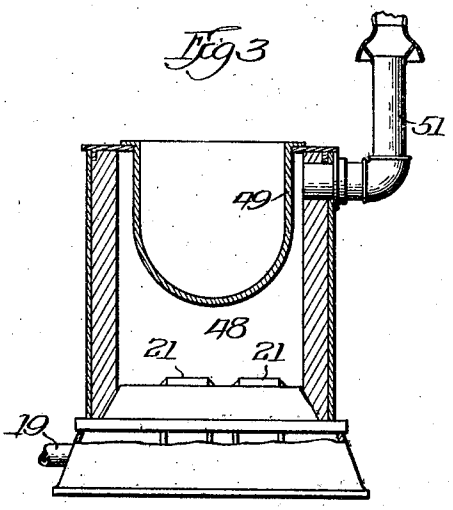


Fig. 5

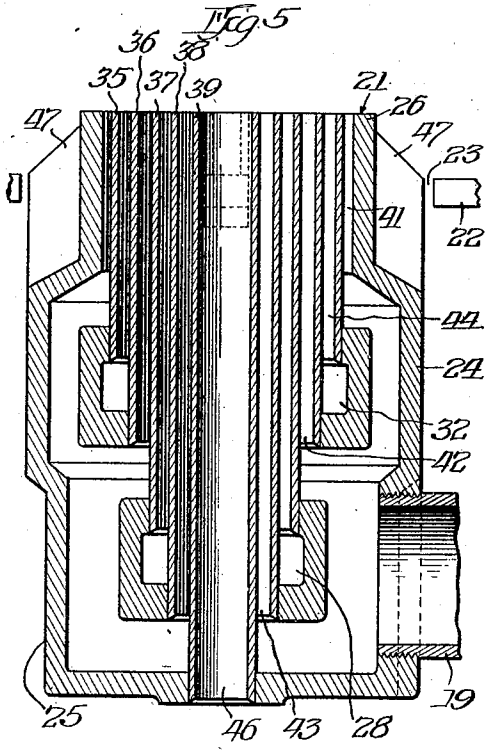
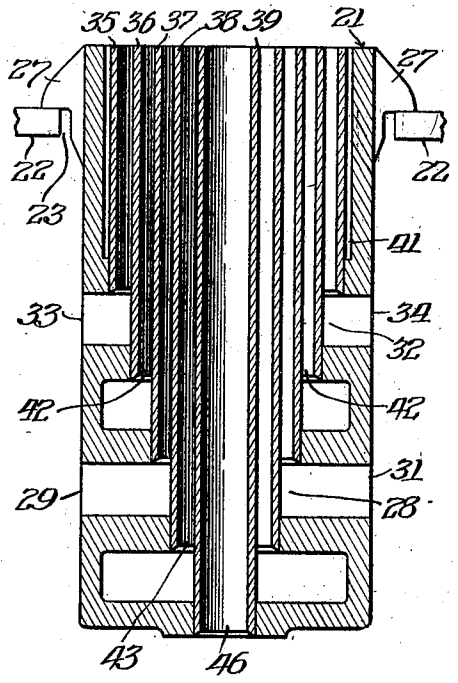


Fig. 6



Witness:
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Patented Feb. 19, 1924. 1,484,107

UNITED STATES PATENT OFFICE.

JOHN ZANDER, OF CHICAGO, ILLINOIS, ASSIGNOR TO GEO. D. ROPER CORPORATION, OF ROCKFORD, ILLINOIS, A CORPORATION OF ILLINOIS.

GAS-BURNING APPARATUS.

Application filed October 17, 1921. Serial No. 508,271.

To all whom it may concern:

Be it known that I, JOHN ZANDER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Gas-Burning Apparatus, of which the following is a specification.

This invention relates in general to gas burning apparatus, and while capable of use for a variety of purposes, it is shown herein for purposes of illustration as embodied in a small size steam boiler.

One of the primary purposes of my present invention is to provide an apparatus of the character indicated, which will be highly efficient in operation, and with this end in view, I have devised an apparatus in which a mixture of air and gas is admitted to the burners proper, from which it is discharged into the combustion chamber in strata or concentric rings in alternation with similar strata of air admitted at the burner so that each stratum of air and gas mixture is interposed between two strata of air, which enhance the combustibility of the mixture so that a hot and efficient flame is produced.

Another object of my invention is to provide a burner which will supply an adequate quantity of air in proportion to the combustible mixture supplied thereto and to so construct and mount this burner with reference to the floor of the combustion chamber that air will be delivered not only through the center of the burner and at spaced radial distances toward its perimeter, but also around the burner through the opening in which the burner is set, thus insuring an adequate supply of air to the combustion chamber to support complete combustion of the gas.

Still another object is to provide an apparatus which can be economically manufactured and easily assembled and installed, and one which will also be economical, efficient and durable in operation.

Other objects and advantages of the invention should be readily appreciated as the same becomes better understood by reference to the following description when considered in connection with the accompanying drawings.

Referring to the drawings:

Fig. 1 is a vertical sectional view of a steam boiler equipped with my invention;

Fig. 2 is a horizontal sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional view illustrating another application of my invention;

Fig. 4 is a plan view on an enlarged scale of one of the burners; and

Figs. 5 and 6 are cross-sectional views of the burner taken on the lines 5—5 and 6—6 of Fig. 4 respectively.

Referring to the drawings more in detail and particularly Figs. 1 and 2 thereof, it will be observed that I have illustrated a steam boiler comprising the combustion chamber 7 surrounded by the water legs 8 and surmounted by the boiler tubes 9, the stack 11 being provided with an auxiliary air supply passage 12 for the purpose of preventing the exertion of excessive draft upon the combustion chamber and burners which would draw off and dissipate an excessive portion of the heat units resulting from combustion and also exert too strong a pull upon the burners. Since the stack draft is relied upon to draw the auxiliary air into the burner it should be just strong enough to draw in sufficient air to support complete combustion of the gas. The boiler shown is equipped with a boiler water feed apparatus 13 and with a gas controlling valve 14 by means of which the gas is caused to be delivered to the main supply pipe 15 in accordance with the demands upon the boiler.

From this main, the gas is delivered through a plurality of (in the present instance three) branches 16 to the respective burners, the supply to each of these branches being subject to control by means of manually operable valves 17. From the branches 16, the gas is delivered to a mixer 18 of any well known or preferred type, one practical form being illustrated in my co-pending application, Serial No. 508,272, filed October 17, 1921. The mixer causes a predetermined quantity of atmospheric air to be mixed with the fuel gas and this mixture is then delivered through pipes 19, preferably of venturi shape, to the individual burners. The burners are indicated generally in Fig. 1

by reference character 21, and while the burners may vary in number and arrangement, depending upon the particular apparatus employed, I have found that when arranged as shown in Fig. 2, a high efficiency of the apparatus is attained.

The floor 22 of the combustion chamber is somewhat elevated, as will be apparent from Fig. 1, and it is provided with openings 23 through which the individual burners project. Each burner comprises a casing having a substantially rectangular central portion 24, a lower portion 25 of reduced dimensions, and an upper portion 26 which is substantially circular in cross section. The openings 23 through the combustion chamber floor are substantially the same size as the central portions 24 of the burners so that the burners may be introduced into position from above the floor, from which they are suspended by lugs 27 projecting laterally from the upper portion of the burner and overlying the margins of the openings, as is best shown in Fig. 6. The lower portion 25 of each burner casing is tapped to receive the inner end of its supply pipe 19, and after a burner has been positioned, the pipe 19 is threaded into the burner casing so that while the weight of each burner is carried by the lugs 27 from the floor of the combustion chamber, the pipe 19 also serves to steady the burner and hold the same against displacement.

The lower portion of each burner casing is provided with a transversely extending passage 28 opening at opposite sides of the casing to atmosphere through ports 29 and 31, and similarly, the central portion of the casing is provided with a transversely disposed passage 32 opening at each side of the casing through ports 33 and 34. From Fig. 5, it will be observed that these passages 28 and 32 are closed against communication with the interior of the burner casing. The mixture of air and gas which is delivered to the casing through the pipe 19 is accordingly prevented from entering these passages, but is permitted to pass upwardly through the burner and be delivered at the upper end thereof in a plurality of rings or strata separated by similar rings or strata of air which enter from the sides of the burners into the passages 28 and 32.

A pipe or cylinder 35 extends from the upper end of the casing into the passage 32 and a smaller but longer pipe 36 passes through the passage 32 and terminates at the lower end of the bottom wall of this passage, as will be apparent from Figs. 5 and 6. Similarly, a pipe 37 communicates with passage 28 and a pipe 38 extends through passage 28 and communicates with the interior of the casing beneath this passage. Within the pipe 38 there is disposed still another and a smaller pipe 39 which extends entirely through the burner casing from end to end thereof and communicates with the atmosphere at the bottom of the casing.

This arrangement of pipes provides for the delivery at the top of the burner of a plurality of rings or strata of mixed air and gas, delivered by the pipe 19 into the burner casing, from the passages 41, 42 and 43 respectively, while atmospheric air is delivered in interposed strata from the passages 44, 45 and 46. The outermost strata is that delivered by the passage 41, and being composed of a mixture of air and gas, it is advisable to deliver additional air around this strata. This supply is automatically furnished by reason of the fact that the upper portion 26 of the burner is considerably smaller than the opening 23 in the floor so that a quantity of air may flow upwardly through this opening around the burner. In order to maintain the burner in predetermined position in the opening, it is equipped at opposite sides with fins or ribs 47 which serve as guides to retain the burner in position without materially obstructing the upward flow of air around the burner.

In the operation of an apparatus embodying my invention, a mixture of air and gas is delivered to each burner casing through its supply pipe 19 from whence it flows upwardly through the communicating passages 41, 42 and 43 in concentric rings or strata. Air simultaneously is delivered at the top of the burner through the passages 44, 45 and 46, the supply to passage 44 being received from opposite sides of the burner through the ports 33 and 34 and the supply to passage 45 being likewise received from opposite sides of the burner through the ports 29 and 31. At the same time, air flows upwardly around the burner so that there is delivered by each burner into the combustion chamber, a series of strata of fuel mixed with air interspersed with strata of air, with the result that sufficient air to support complete combustion of the gas is delivered to the point of combustion without danger of flash back such as would occur if this amount of air were mixed with the gas before its delivery from the burner.

It should be manifest, therefore, that I have provided an apparatus which is economical to manufacture, easy to install, and one which is highly efficient and economical in operation. It should also be apparent that the invention is capable of a wide variety of uses and in Fig. 3, I have illustrated it as applied to a metal melting furnace wherein the combustion chamber 48 is adapted to receive a melting pot 49, the products of combustion in this instance being carried off through a stack 51. Vari-

ous other applications of the invention will readily suggest themselves, and it should be understood therefore, that my invention is not circumscribed by the details of construction illustrated and described herein, but is capable of considerable modification within the scope of the following claims.

I claim:

1. In a gas burning apparatus, the combination of a combustion chamber provided with a floor, a burner casing projecting through said floor, the upper portion of said casing being of less cross sectional area than the floor opening, a plurality of lugs projecting from said burner over the margin of the floor opening, whereby said burner is suspended from the floor, and a plurality of fins projecting laterally from said burner for maintaining said burner in position in said opening.

2. In a gas burning apparatus, the combination of a combustion chamber, a plurality of burners suspended from the floor thereof, means for supplying a mixture of gas and air to the interior of each burner, said burners each comprising air passages extending transversely of the burner casing and opening at each side of the casing, a plurality of concentrically arranged tubes communicating with said passages and with the interior of the burner around the passages in alternation, and a centrally disposed tube extending longitudinally through the burner from end to end thereof.

JOHN ZANDER.