Sept. 30, 1924. 1,510,039

W. CANFIELD

GAS BURNER FOR BOILERS AND OTHER FURNACES

Filed April 26, 1924

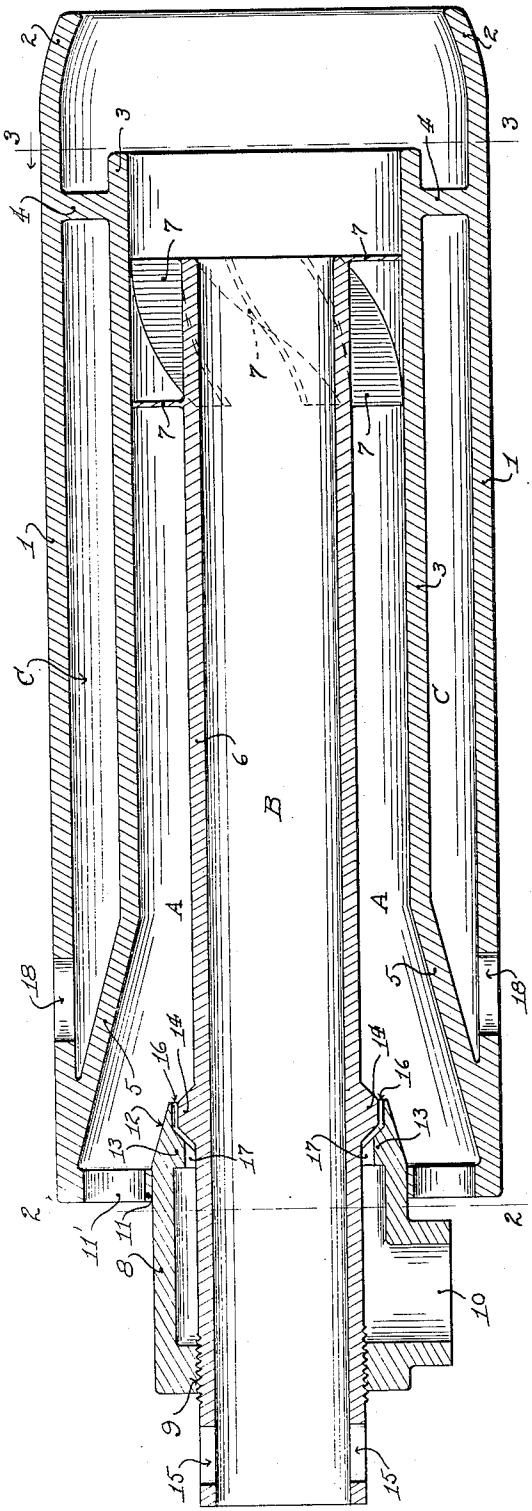


Fig. 1.

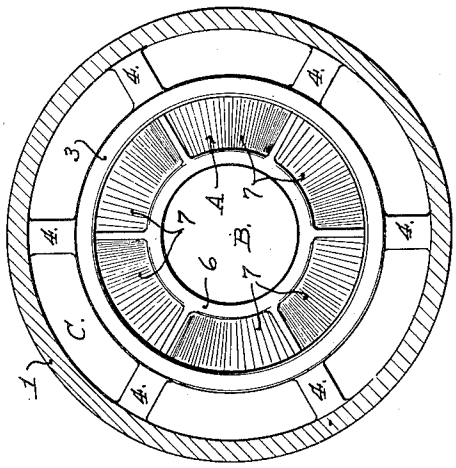


Fig. 2.

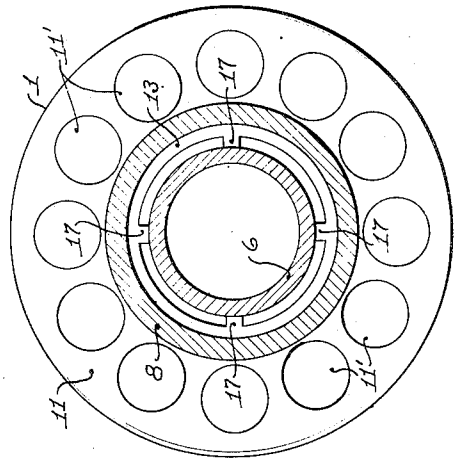


Fig. 3.

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UNITED STATES PATENT OFFICE.

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GAS BURNER FOR BOILERS AND OTHER FURNACES.

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To all whom it may concern:

Be it known that I, WALLACE CANFIELD, a citizen of the United States, residing at Taft, in the county of Kern and State of California, have invented certain new and useful Improvements in Gas Burners for Boilers and Other Furnaces, of which the following is a specification.

My invention relates to gas burners especially adapted for use under boilers or in other furnaces.

The object of my invention is to provide a simple and inexpensive burner which will mix the gas effectively and thoroughly with the proper amounts of air, so that the combustion of the resultant mixture is complete, and takes place reasonably close to the burner, thereby preventing corrosion of the boiler tubes or flue surfaces by direct contact therewith of the burning or partially burned mixture. Another object of my invention is to provide simple and effective means for regulating the amount of gas admitted to the burner. These and other objects of my invention will be more clearly understood from the following specification, but it is to be understood that the construction of the device embodying my said invention may be varied within the limits of the claims hereto appended, from that shown and described herein, without departing from the essential principles of the invention as expressed in said claims.

With this in view a preferred embodiment of my invention will now be fully described with reference to the accompanying drawings, wherein:

Fig. 1 is a longitudinal section of my gas burner.

Figs. 2 and 3 are sections taken in the direction of the arrows on the lines 2—2 and 3—3 of Fig. 1, respectively.

In the drawings, the reference numeral 1 designates a tubular member constituting the outer shell of my burner, said member being slightly tapered inwardly, as shown at 2, at the end at which combustion occurs. 3 is a second tubular member, spaced concentrically within the outer tube 1. The forward end portions of the members 1 and 3 are connected together by spacing lugs 4, and their rear ends are joined by an outwardly flaring portion 5 of the inner tube 3 as shown. Said tubular members may be formed either integrally or separately, as desired, but if separately formed, are permanently connected together.

A third tubular member 6 is spaced concentrically within the tube 3. The forward end of said inner tube 6 is held in spaced relation to the intermediate tube 3 by a series of spaced helically disposed vanes 7, which though they may be carried by either tube or member 3 or 6, are preferably as shown in the drawings, formed integrally with or permanently attached to the outer periphery of the inner tube 6, but are free to slide, both angularly and longitudinally, within the intermediate tube 3, so that said inner tube 6 may be shifted, for a purpose to be later set forth, within said intermediate tube 3.

The rear end of the inner tube 6 extends through and is spaced within a sleeve 8, there being preferably a threaded connection, as shown at 9, between said tube and said sleeve. The sleeve 8 has a connection 10 for a gas supply pipe, by means of which the gas is introduced, under suitable pressure, to the annular space between said sleeve and the tube 6. The sleeve 8 passes through the rear end member 11 common to the outer and intermediate tubes 1 and 3, and is secured thereto, either by being made a drive fit therein or otherwise.

Said rear end member 11 is provided with an annular series of perforations 11′.

The forward end of the sleeve 8 is exteriorly tapered, as shown at 12, and is provided interiorly with an annular flange 13, whose inclined forward face is adapted to coact with the inclined rear face of an annular flange 14 formed exteriorly upon the inner tube 6. These coacting flanges 13 and 14 form the gas regulating valve, and may be separated or brought together, to admit more or less gas, by the rotation, and consequent longitudinal movement, of the inner tube 6 within the sleeve 8. The rear projecting end of said tube 6 may be provided with suitable means to enable it to be turned, as for example a transverse hole 15 through which a bar may be passed. The gas outlet or jet orifice is formed as a cylindrical opening 16 between the outer periphery of the valve flange 14 and the inner periphery of the sleeve 8 at its forward end. Spacing lugs 17, formed upon the extending inwardly from the valve flange 13, bear freely against the tube 6 to insure the proper centering

of the forward end of the sleeve 8 about said tube.

The gas thus issues from the controllable annular jet orifice 16 with the necessary velocity to draw in a stream of air through the apertures 11' of the shell end member 11, and passes forwardly through the annular space A between the inner and intermediate tubes 6 and 3, mingling with said air in its travel. The mixed gas and air then pass between the helical vanes 7, and issue therefrom with a whirling as well as forward motion. The forward motion of this issuing stream draws additional air both through the passage B within the inner tube 6 and through the annular space C between the outer and intermediate tubes 1 and 3, the outer tube 1 being provided with air inlet apertures 18 leading into said space C, Fig. 1. The various apertures and passages are so proportioned that the total amount of air drawn in through the three mentioned channels A, B, and C, is just sufficient to produce the optimum mixture with the gas issuing from the jet orifice 16. The whirling motion of the stream of over-rich mixture issuing from the helical vanes 7, which imparts a like motion to the final mixture, and the fact that the additional air is supplied thereto both from the center, through the passage B, and from the outside, through the annular channel C, cause a complete and effective mixing of gas and air resulting in perfect combustion. It is obvious that the desired whirling motion of the final mixture may be produced by the use of helical vanes, similar to those shown at 7, in any one or all of the three concentric passages A, B, and C.

I claim:

1. A gas burner comprising nested, spaced, open-ended pipes; and means for supplying gas under pressure to the open rear end of the space between said pipes whereby air currents are induced both through said space and through the inner pipe.

2. A gas burner comprising nested, spaced, open-ended pipes; and means for controllably supplying gas under pressure to the open rear end of the space between said pipes whereby air currents are induced both through said space and through the inner pipe.

3. A gas burner comprising nested, spaced, open-ended pipes; means for supplying gas under pressure to the open rear end of the space between said pipes whereby air currents are induced both through said space and through the inner pipe; and means associated with the delivery end of said space for whirling the fluids passing therethrough, to mix them with the air delivered from the inner pipe.

4. A gas burner comprising nested, spaced, open-ended pipes; means for controllably supplying gas under pressure to the open rear end of the space between said pipes whereby air currents are induced both through said space and through the inner pipe; and means associated with the delivery end of said space for whirling the fluids passing therethrough, to mix them with the air delivered from the inner pipe.

5. A gas burner comprising an inner pipe, an outer pipe, and an intermediate pipe, in spaced relation, each pipe being open at its ends; and means for supplying gas under pressure to the open rear end of the space between the inner and intermediate pipes whereby air currents are induced through all said pipes.

6. A gas burner comprising an inner pipe, an outer pipe, and an intermediate pipe, in spaced relation, each pipe being open at its ends; means for supplying gas under pressure to the open rear end of the space between the inner and intermediate pipes whereby air currents are induced through all said pipes and means for controlling the supply of gas admitted to said space.

7. A gas burner comprising an inner pipe, an outer pipe, and an intermediate pipe in spaced relation, each pipe being open at its ends; means for supplying gas under pressure to the open rear end of the space between the inner and intermediate pipes whereby air currents are induced through all said pipes; and means associated with the delivery end of said space for whirling the fluids passing therethrough to mix them with the air delivered from the inner and outer pipes.

8. A gas burner comprising an inner pipe, an outer pipe, and an intermediate pipe in spaced relation, each pipe being open at its ends; means for supplying gas under pressure to the open rear end of the space between the inner and intermediate pipes whereby air currents are induced through all said pipes; means associated with the delivery end of said space for whirling the fluids passing therethrough to mix them with the air delivered from the inner and outer pipes, and means for controlling the supply of gas admitted to said space.

9. A gas burner comprising an inner open ended pipe; an open-ended pipe surrounding and spaced from said inner pipe; and a gas-supply sleeve spaced about the rear portion of the inner pipe and opening into the rear end of the space between the pipes.

10. A gas burner comprising an inner open-ended pipe; an open-ended pipe surrounding and spaced from said inner pipe; a gas-supply sleeve spaced about the rear portion of the inner pipe and opening into the rear end of the space between the pipes, and means controlled by a relative movement of said sleeve and inner pipe for controlling the discharge of gas into said space.

11. A gas burner comprising an inner, open-ended pipe; an open ended pipe surrounding and spaced from said inner pipe; a gas-supply sleeve spaced about the rear portion of the inner pipe and opening into the rear end of the space between the pipes; and angularly disposed fluid directing vanes associated with the delivery end of said space.

12. A gas burner comprising an inner, open-ended pipe; an open-ended pipe surrounding and spaced from said inner pipe; a gas-supply sleeve spaced about the rear portion of the inner pipe and opening into the rear end of the space between the pipes; angularly disposed fluid directing vanes associated with the delivery end of said space, and means controlled by a relative movement of said sleeve and inner pipe for controlling the discharge of gas into said space.

13. A gas burner comprising an inner pipe, an outer pipe and an intermediate pipe, in spaced relation, each pipe being open at its ends; a gas supply sleeve spaced about the rear portion of the inner pipe and opening into the rear end of the space between the inner and intermediate pipes; and means controlled by the relative movement of said sleeve and inner pipe for controlling the discharge of gas into said space.

14. A gas burner comprising an inner pipe, an outer pipe and an intermediate pipe, in spaced relation, each pipe being open at its ends; a gas supply sleeve spaced about the rear portion of the inner pipe and opening into the rear end of the space between the inner and intermediate pipes; means controlled by the relative movement of said sleeve and inner pipe for controlling the discharge of gas into said space, and angularly disposed fluid directing vanes associated with the delivery end of said space.

15. A gas burner comprising an inner open ended pipe; an open-ended pipe surrounding and spaced from said inner pipe; a gas supply sleeve spaced about the rear portion of the inner pipe and opening into the rear end of the space between the pipes; coacting members upon the sleeve and inner pipe forming a gas delivery valve-passage into said space; and means for relatively moving said sleeve and inner pipe to control said valve passage.

16. A gas burner comprising nested open ended pipes in spaced relation; and means for supplying gas under pressure through the inner pipe to induce an air current both through the space between the pipes and through the inner pipe.

In testimony whereof I have signed my name to this specification.

WALLACE CANFIELD.