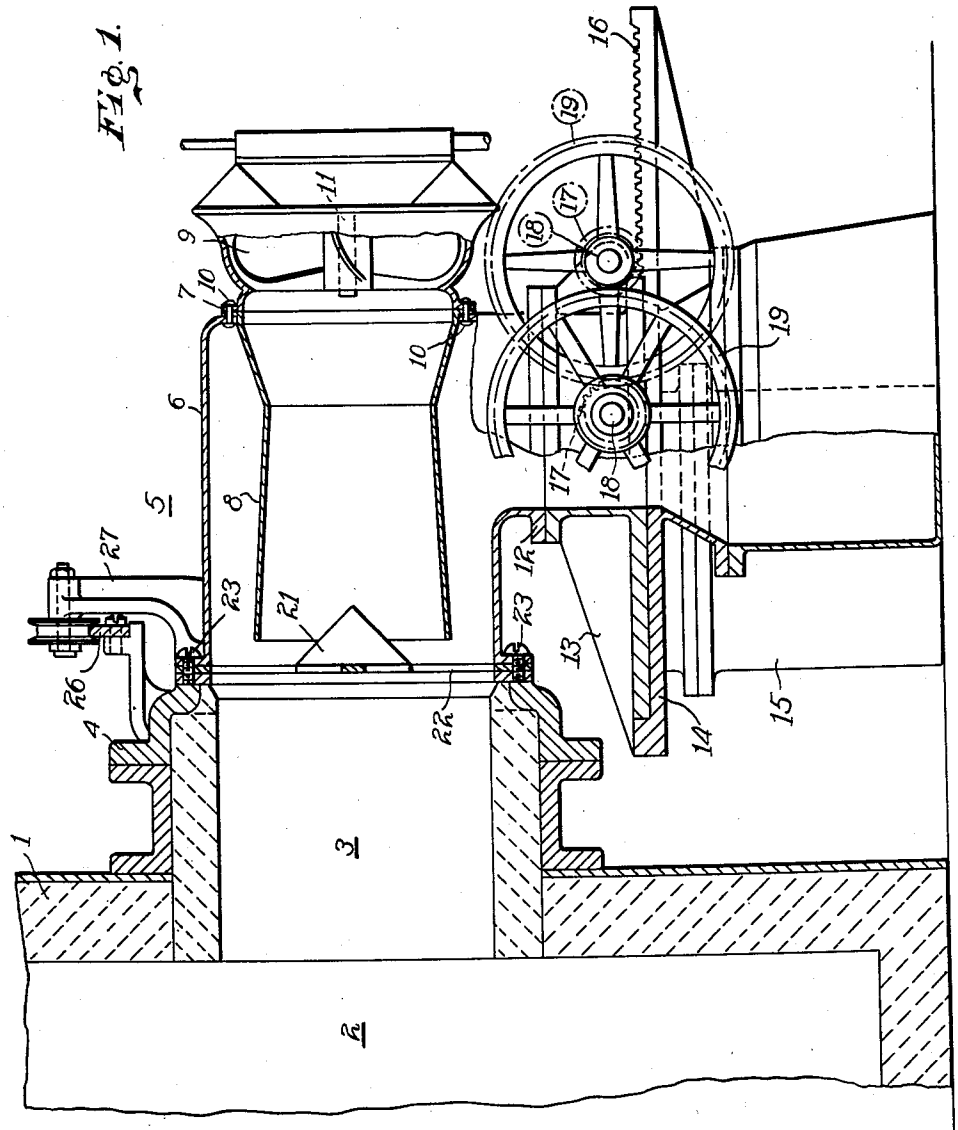
Feb. 3, 1931. W. R. PAULSEN 1,791,011

GAS BURNER FOR BLAST FURNACE STOVES OR FURNACES

Filed Aug. 22, 1928 2 Sheets-Sheet 1

Fig. 1.



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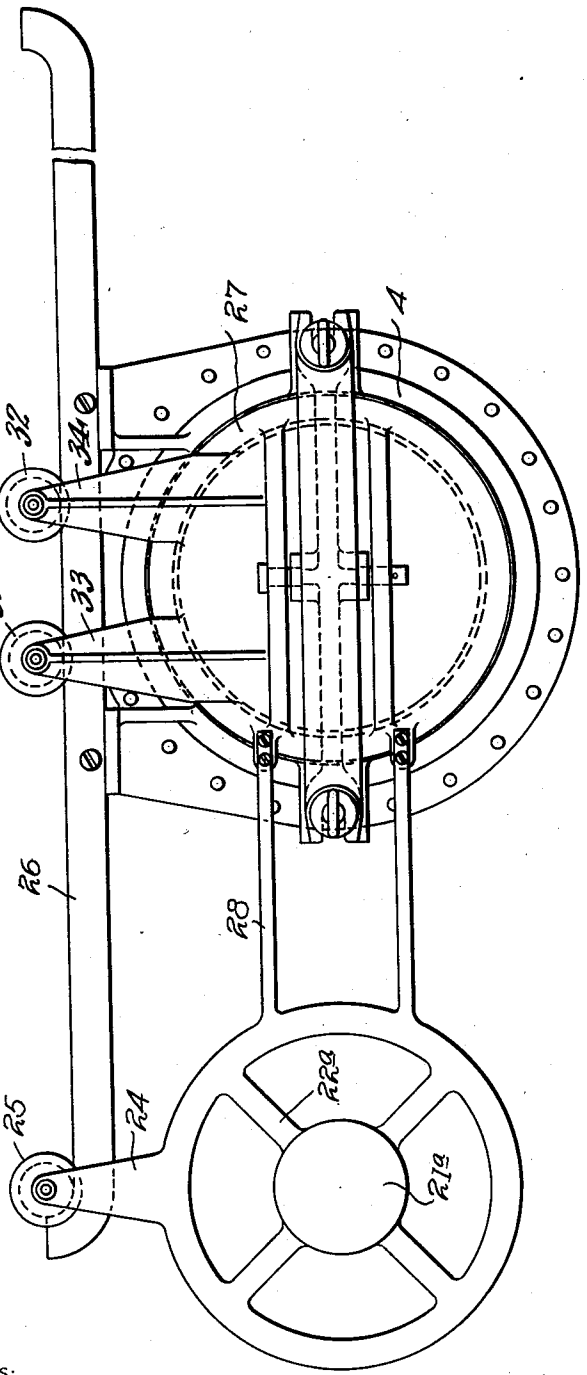


Fig. 2.

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UNITED STATES PATENT OFFICE

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GAS BURNER FOR BLAST-FURNACE STOVES OR FURNACES

Application filed August 22, 1928. Serial No. 301,384.

This invention relates to gas burners for blast furnace stoves or furnaces of that character, and more especially to a burner with which a deflecting baffle is provided for effecting retardation and proper mixing of the air and gas passing through the burner.

Various types of burners for injecting a mixture of gas and air into a hot blast stove have heretofore been used. Where the gas and air are driven directly into the stove from the burner there has existed a difficulty in that with variation in pressure of gas and/or air, the combustion may take place at different parts of the stove. Sometimes if the velocity of the air or gas is too great, unburned fuel may be forced entirely through the stove, which results in loss of fuel, and loss of heating effectiveness. Sometimes in the same way the combustion point is driven too far into the furnace, and then suddenly flares back to or into the burner with an explosive force that is harmful to the mechanical structures.

The present invention has for its primary object the provision of a retarding and mixing element adapted to be positioned directly in the path of the gas and air at the inlet to the stove, and to be movable with, or independently of the burner, for the purpose of retarding the flow of gas and air at the point of admission to the stove, and for the purpose of so mixing and scattering the gases as to insure a more certain and uniform combustion, to prevent unburned gas from being driven through the furnace, as well as to avoid flare-back explosions due to the causes mentioned.

Other objects will become apparent and a better understanding of the invention will be had when the following detailed description is read in conjunction with the accompanying drawings, in which Fig. 1 is a sectional view taken through the center of a portion of a hot blast stove and a burner in which the preferred embodiment of my invention is incorporated; and Fig. 2 is a detail drawing of a deflecting baffle and its supporting frame connected integrally with the door of the stove.

In practicing the invention a burner which is adapted to be moved into or out of an opening extending into the combustion chamber of a hot blast stove or furnace is provided for mixing and introducing blast furnace gas into the combustion chamber, and for insuring the positive mixing of the gas and air as it passes through the burner a deflecting baffle is provided which may be secured in the outer end of the burner or positioned between the burner and stove when the burner is in operating position.

Referring now to the drawings a portion 1 of a combustion type of hot blast stove is shown. Extending into combustion chamber 2 of the stove is an inlet 3 which is located near the bottom of the stove and through which the mixed gas and air are introduced thereinto. A casing 4 is provided at the mouth of inlet 3 against which the outer end of a burner may be placed, or in which a door 27 may be positioned to close the opening.

In the operation of hot blast stoves it is desirable that the burners be made so that they may be moved into the inlet opening extending into the combustion chamber when they are in operation and out of it when they are not in operation. Burner 5 illustrated in the drawings is such a burner and comprises a cylindrical outer tube 6 through which gas is passed into the stove. Fitted into an opening 7 at the outer end of this tube is a smaller concentric tube 8 which is supported horizontally therein by means of bolts 10. Air necessary for supporting combustion in the burner is passed through tube 8, driven by a fan 9 mounted in the outer end of the tube. Any suitable means such as a turbine or electric motor, not shown, may be coupled to shaft 11 for driving the fan.

In the lower side of tube 6 an elbow type of outlet 12 is provided for attaching tube 6 to sliding member 13, which rests upon stationary member 14, forming the upper face of supporting frame 15. Frame 15 is provided in the usual manner with an opening in its central portion through which the furnace gas is passed into the burner. A rack 16 is provided on the stationary plate 14 and a gear 17 mounted on a shaft 18 journalled in sliding

member 13 is meshed therewith. Keyed to the shaft 18 is a large wheel 19 by means of which gear wheel 17 may be rotated to move the burner into and out of inlet 3 extending into combustion chamber 2. This type of burner and adjusting mechanism is so well known in the art that detailed description of it is deemed unnecessary.

To facilitate the positioning of door 27 in the opening at the end of inlet 3, when the burner is moved to its inoperative position, it may be slidably supported on a track 26 attached to the side of the stove by means of rollers 31 and 32 mounted in the upper ends of support members 33 and 34, respectively.

The usual practice is to introduce the gas into the burner through the outer tube and the air through the inner tube, but such practice may be and frequently is reversed. The purpose of arranging the air and gas tubes in the manner described is to cause the gas and air to become commingled as they pass from the burner. Where no other provision is made for mixing the gas and air, if the injecting velocity of the gas and air becomes greater than the speed of the propagation of the flame, the mixture will tend to move along unburned until it reaches a point in the combustion chamber where the speed has been reduced enough to support combustion. The mixture will then ignite explosively and flare back to the burner. This explosion will be immediately followed by another as the process is repeated and the result is a series of minor explosions in rapid succession which tend to loosen the refractory material in the stove, and in other ways disturb its efficient operation.

To overcome these disadvantages a deflecting baffle 21 is provided. This may be placed in the discharge end of the burner at the point where the gas is introduced into the inlet 3 of the stove. It may be attached to the burner as shown in Fig. 1, or made movable, as shown in Fig. 2. Preferably the baffle is made in the shape of a cone but it may take other suitable forms such as a flat disc, as shown in Fig. 2. A convenient way of mounting the deflecting baffle is to secure it in the center of a spider-like frame 22 and attach the frame to the outer end of tube 6 by means of bolts 23. In such a construction the baffle is positioned immediately in front of the discharge end of the air inlet tube 8 so that as the air issues from this tube it will impinge against the baffle and be deflected radially outward into the stream of the incoming gas and becomes thoroughly mixed with the gas as it enters the inlet leading into the combustion chamber of the stove. With the baffle member mounted integrally with the burner it will be moved out of the inlet opening when the burner is moved out.

In some installations it is desirable to move the deflecting baffle separately from the burner and especially when it is adapted for use with apparatus already installed. To provide a baffle which may be moved separately frame 22*a* is provided with a hanger arm 24 having a roller 25 disposed in its upper end adapted to run on track 26. Also mounted on track 26 is a door 27, utilized for closing the inlet opening 3 when the burner is not in operation.

In order that the deflecting baffle 21*a* may be moved into position with the same operation that moves the door to its open position, struts 28 may be utilized to attach door 27 and frame 22*a* together. If so constructed, when the door is in its closed position the baffle will be in its inoperative position, and when the door is moved to its open position the baffle is moved into its operative position.

According to the provisions of the patent statutes, I have explained the principle and operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically shown and described.

I claim as my invention:

1. In combination with a gas burning furnace having a combustion chamber, a gas burner comprising an inner and an outer tube by means of which air and gas are passed through the burner, said burner being adapted to be moved into and out of position to supply gas and air to the furnace combustion chamber, and a movable deflecting baffle adapted to be disposed between the outer end of said burner and the combustion chamber when the burner is positioned for operation, whereby to deflect the fluid issuing from one tube into, and causing it to be mixed with that issuing from the other tube.

2. In combination with a gas burning furnace having a combustion chamber and a burner opening extending thereinto, a gas burner comprising an inner and an outer tube by means of which gas and air are passed through the burner, said burner being adapted to be moved into and out of said opening to supply gas and air to the furnace combustion chamber, and a deflecting baffle movably mounted so that it may be positioned in said opening between said furnace and said burner.

3. In combination with a gas burning furnace having a combustion chamber and a burner opening extending thereinto, a gas burner comprising an inner and an outer tube by means fo which gas and air are passed through the burner, said burner being adapted to be moved into and out of said opening to supply gas and air to the furnace combustion chamber, a movable deflecting baffle for deflecting the fluid issuing from one of said tubes into and mixing it with that is-

suing from the other tube, said baffle being adapted to be placed in the opening in said combustion chamber at the end of said burner, a movable door for closing said opening when said burner is not in use, and means connecting said baffle and said door together whereby the two of them are moved with the same operation.

4. The combination with a gas burning furnace having a combustion chamber and a burner opening extending thereinto, a gas burner comprising an inner and outer tube through which gas and air are passed into the combustion chamber, manually operable means for moving said burner into and out of said burner opening, a detachable baffle adapted to be arranged between the end of said burner and said burner opening to deflect the fluid issuing from one of said burner tubes into that of the other to aid combustion, and a door for closing the burner opening when the burner is not in use, said door being operably connected to said baffle to permit the movement of both of said elements with a single operation.

In testimony whereof, I sign my name.

WILLIAM R. PAULSEN.