Oct. 23, 1923.

1,471,381

H. C. CALDWELL

MIXER FOR GAS BURNERS

Filed July 17, 1920

Fig. 1.

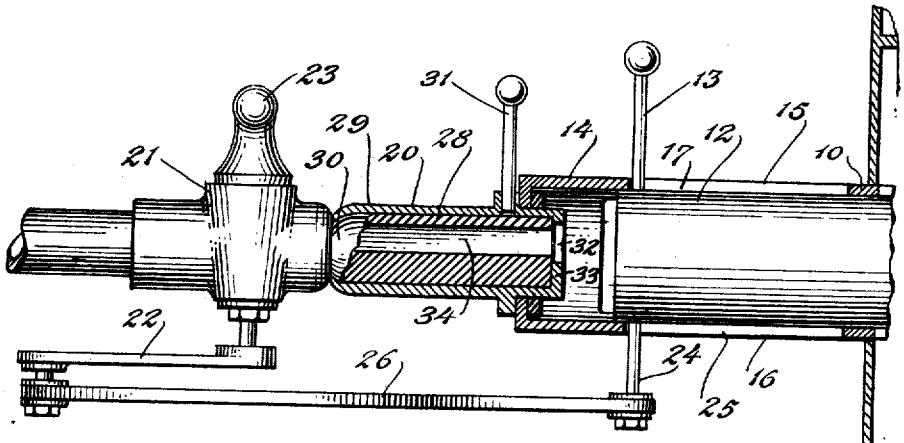


Fig. 2.

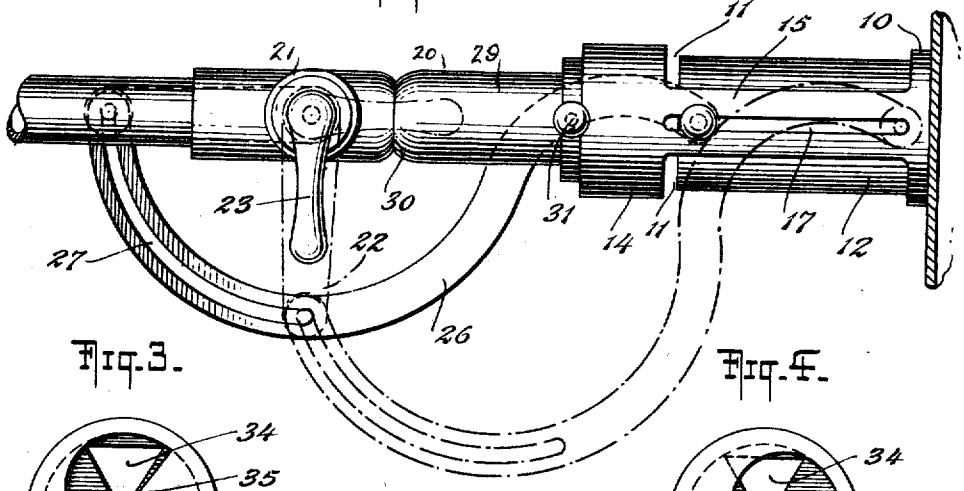


Fig. 3.

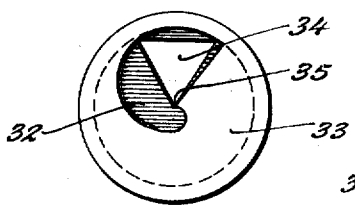


Fig. 5.

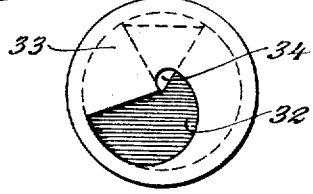
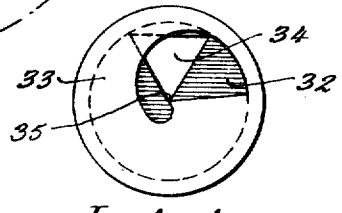


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY C. CALDWELL, OF BUFFALO, NEW YORK.

MIXER FOR GAS BURNERS.

Application filed July 17, 1920. Serial No. 396,906.

To all whom it may concern:

Be it known that I, HENRY C. CALDWELL, a citizen of the United States of America, and a resident of the city of Buffalo, county of Erie, and State of New York, have invented certain new and useful Improvements in Mixers for Gas Burners, of which the following is a full, clear, and exact description.

It is well known to those skilled in the art that the mixers employed on present-day gas burners have a gas cock for regulating the flow of gas into the mixer. In some devices a needle valve is arranged at the orifice for controlling the size thereof. The objection to the first form of device is that the orifice changes in shape for different gas pressures and different rates of flow; and the disadvantage in the second form is that the needle valve must be adjusted to each different gas pressure, if efficient results are to be obtained from the burner.

Furthermore, in present-day burners, it is impossible to supply the proper amount of air to the burner to create proper combustion, without causing back-fire into the mixer tube when the gas is shut off.

In producing my invention, I have sought to provide a device which shall overcome the disadvantages above enumerated and one in which the shut-off cock and the needle valve arrangement shall be dispensed with as a means of regulating the flow of gas to the burner.

Another object has been to provide gas regulating means which shall be located at the extreme inner end of the gas pipe or immediately in front of the gas orifice.

Furthermore, the shape of the gas orifice and the method of controlling the size thereof, is such that the shape of the cross-section of the stream of gas at the orifice shall remain substantially unchanged for different rates of flow of gas from the orifice.

Moreover I have sought to provide a mixer for gas burners, by which it shall be possible to supply all the air that is necessary for efficient combustion, and at the same time one in which back-firing shall be entirely eliminated when the gas is shut off.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings, of which:

Fig. 1 shows a side elevation of my device, partly in section and attached to the end of a suitable burner.

Fig. 2 is a plan view of the same.

Fig. 3 is an enlarged end view of the gas regulating valve showing the gas orifice formed therein in its full open position.

Fig. 4 is a similar view, showing the valve in a partly closed position.

Fig. 5 is a similar view, showing the valve in a nearly closed position.

While I have not shown and will not describe a burner in connection with my invention, it is obvious that the mixer is adaptable for any suitable burner.

In the accompanying drawings, 10 represents the mixing tube which is extended into the burner for conducting the fuel elements thereto. The mixing tube is provided with a large air opening 11 at each side thereof. A throttle tube 12 is slidably mounted within the mixer tube 10 and provided with a suitable handle 13 whereby the throttle tube may be moved within the mixing tube to control the size of the air openings 11 formed therein. The extreme outer end 14 of the mixer tube is connected with the body of the tube by means of webs 15 and 16. The web 15 is provided with a longitudinal slot 17 in which the arm 13 is slidable.

20 is the gas regulating valve of my device, and 21 the gas cock for controlling the supply of gas to the valve 20. Attached to the rotating part of the cock 21 is an arm 22 which is arranged to extend at right angles to the handle 23 of the cock. 24 is a rod which is connected with the throttle tube 12 and extends preferably down through a slot 25 formed in the web 16. Connecting the rod 24 with the outer end of the arm 22 is an S-shaped link 26. The forward end of this link is in the shape of a semi-circle struck from the same radius as the arm 22. The outer end of this arm is provided with a slot 27, with which the outer end of the arm 22 is slidably connected. It will be seen by reference to Fig. 2 that when the gas valve is shut off (as shown in full lines) the outer end of the arm 22 is at the extreme outer end of the slot 27 and has drawn the link 26 forwardly so as to substantially close the throttle tube 12 thereby substantially shutting off the supply of air through the openings 11. When the gas cock 21 is opened, as shown in dotted lines in Fig. 2, the outer end of the arm 22 will slide within the slot 27 without changing the position of the arm 26. During this motion the throttle tube 12 will remain in the position shown by the full

lines in Figs. 1 and 2; and it may then be opened to suit the conditions in the burner. When the throttle tube 12 is in its fully opened position the arm 26 will occupy the position shown by the dot and dash lines in Fig. 2. This arrangement provides means for supplying the necessary quantities of air for proper combustion, and at the same time insures against back-firing by closing the air openings 11 at the same time that the gas is shut off.

The gas regulating valve 20 is provided with a central member 28 having an orifice 34 of substantially triangular cross-section, with its lower apex 35 at substantially the center of the central member. A rotating sleeve 29 is disposed about the central member and has its rear end turned into a groove 30 formed in the central member whereby it is prevented from moving endwise. A handle 31 is provided for rotating the sleeve 29. A cam-shaped opening 32 is formed in the end wall 33 of the sleeve 29 and is so formed that it will cut off the orifice 34, starting at the upper corner and continuing downwardly toward the apex 35. By reference to Figs. 3, 4 and 5 it will be clear that in Fig. 3, the opening 34 is at its maximum, while in Fig. 4 it is partially shut off by the rotation of the sleeve 29. In Fig. 5 the opening is almost entirely closed. The complete closure of the opening is accomplished by a further rotation of the sleeve 29.

While I have shown and preferably use a gas regulating valve 20, it is clear that the cock 21 may be used to regulate as well as control the supply of gas if desired.

From the foregoing, it will be obvious that, although proper quantities of air may be added to the gas to produce proper and efficient combustion, back-firing cannot occur because, with the shutting off of the gas at the cock 21, the air openings 11 are also substantially closed. The regulating valve 20 does not have to be altered except for a different sized flame or for different gas pressures. Preferably the cock 21 is not used for regulating the flow of gas but is simply for fully shutting off or fully turning on the gas.

Instead of connecting the gas cock with the air-controlling means, clearly, I could, with the same advantage, connect the gas regulating valve with the air-controlling means without materially changing the preferable construction herein shown and described. These and other modifications of the details herein shown and described may be made without departing from the spirit of my invention or the scope of the appended claims, and I do not, therefore, wish to be limited to the exact embodiment herein shown and described, the form described being merely a preferred embodiment thereof.

Having thus described my invention what I claim is:

1. A mixer for gas burners comprising means for controlling the supply of gas to the mixer, means for controlling the supply of air to the mixer, the air controlling means being operable independently of the gas controlling means when the gas means are fully or partially open, and means connecting the gas controlling means and the air controlling means for reducing the air supply when the gas supply is reduced or shut off, if the air supply has been previously increased, thereby preventing back-firing.

2. A mixer for gas burners comprising a mixer tube, a gas cock for controlling the supply of gas to the mixer tube, a throttle tube carried by the mixer tube for controlling the air supply to the burner, means for operating the throttle tube independently of the gas cock when the gas cock is fully or partially open, and means connecting the gas cock and the throttle tube for reducing the size of the air openings when the gas supply is reduced or shut off, if the air supply has been previously increased, whereby back-firing is prevented.

3. A mixer for gas burners comprising a mixer tube, a gas cock for controlling a supply of gas to the mixer tube, a throttle tube carried by the mixer tube for controlling the air supply to the burner, means for operating the throttle tube independently of the gas cock when the gas cock is fully or partially open, an oscillating arm carried by the cock, a link connecting the throttle tube and the arm and formed with an arcuate slot in which the arm is slidable, whereby the gas supply and the air supply may be increased independently of each other and reduced simultaneously, if the air supply has been previously increased.

4. A gas mixer comprising a gas regulating valve, having a single triangularly shaped orifice, a plate having a cam-shaped opening arranged in front of the orifice for regulating the size of the orifice, and means for rotating the plate to control the size of the orifice.

5. A gas mixer comprising a gas regulating valve, being formed with a single triangularly shaped orifice, having one of its apices substantially coincident with the axis of the valve, a plate having a cam-shaped opening arranged in front of the orifice for regulating the size of the orifice, and means for rotating the plate to control the size of the orifice.

6. A gas mixer comprising a gas regulating valve, having a single triangularly shaped orifice, a plate arranged in front of the orifice and so formed that when rotated it will progressively close the orifice in the valve, and means for rotating the plate.

7. A gas mixer comprising a gas regulating valve which is formed with a single triangularly shaped orifice, having one of its apices substantially coincident with the axis of the valve, a plate arranged in front of the orifice and so formed that when rotated it will gradually reduce the orifice in the valve, and means for rotating the plate.

8. A mixer for gas burners comprising a mixer tube, a gas regulating valve for regulating the amount of gas supplied to the mixer tube, a gas cock for controlling the supply of gas to the valve, a throttle tube carried by the mixer tube for controlling the air supply to the burner, means for operating the throttle tube independently of the gas valve and the gas cock when the cock is fully or partially open, means for independently operating the gas valve, and means connecting the gas cock and throttle tube for reducing the size of the air openings when the gas supply is reduced or shut off by the cock, if the air supply has been previously increased, whereby back-firing is prevented.

9. A mixer for gas burners comprising means for controlling the supply of gas to the mixer, means for regulating the gas supply, means for supplying air to the mixer, which are operable independently of the gas controlling means, and means connecting the gas controlling means and air controlling means for reducing the air supply when the gas supply is reduced or shut off by the controlling means, if the air supply has been previously increased, thereby preventing back-firing.

10. A gas mixer comprising a gas regulating valve which is formed with a single triangularly shaped orifice, having one of its apices substantially coincident with the axis of the valve, a plate arranged in front of the orifice and so formed that when rotated it will gradually reduce the orifice in the valve from the outer periphery toward the apex of the orifice which is coincident with the axis of the valve, and means for rotating the plate.

In testimony whereof I have hereunto signed my name.

HENRY C. CALDWELL.