

W. C. BUELL, JR.
GAS AND AIR MIXER FOR GAS BURNERS.
APPLICATION FILED MAR. 29, 1916.

1,289,383.

Patented Dec. 31, 1918.

Fig. 1.

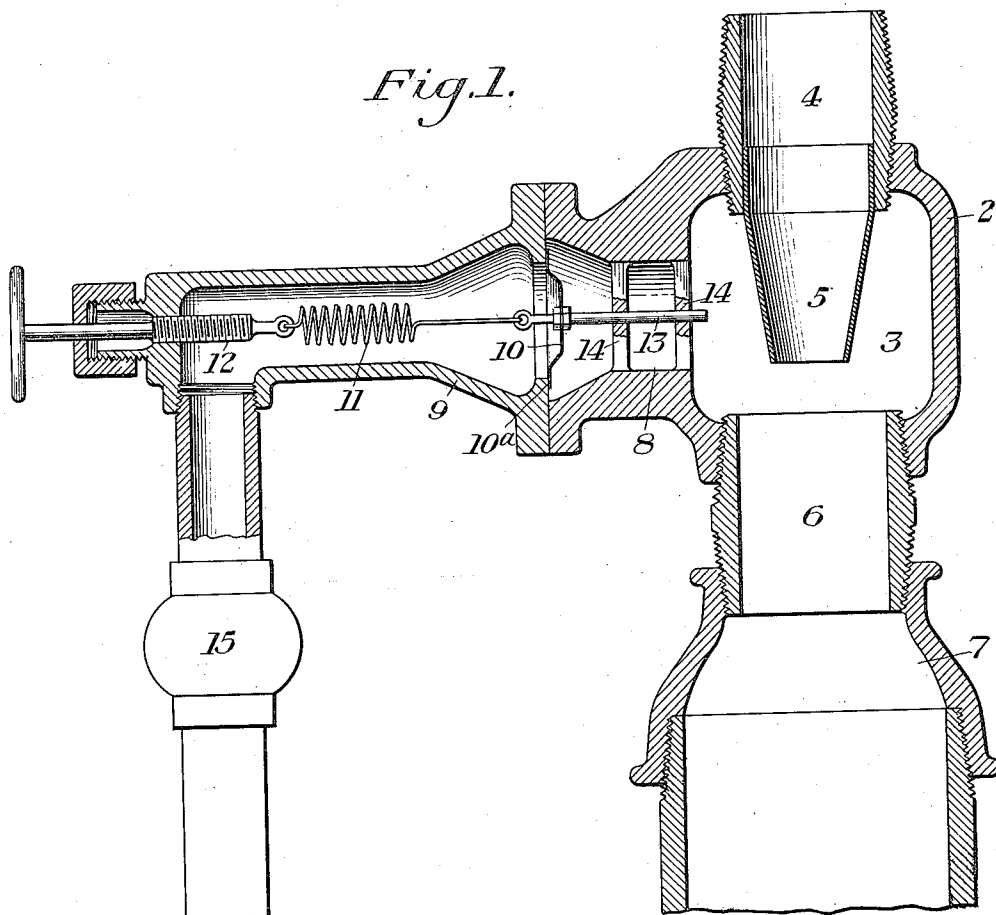


Fig. 2.

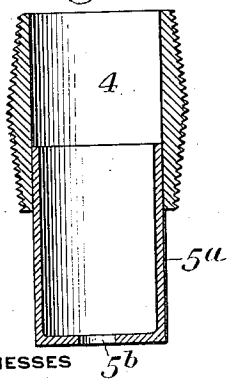


Fig. 3.

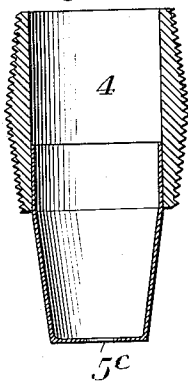
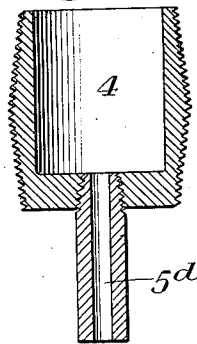


Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

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GAS AND AIR MIXER FOR GAS-BURNERS.

1,289,383.

Specification of Letters Patent.

Patented Dec. 31, 1918.

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To all whom it may concern:

Be it known that I, WILLIAM C. BUELL, Jr., a citizen of the United States, residing at Sewickley, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Gas and Air Mixers for Gas-Burners, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which:—

Figure 1 is a sectional view of one form of gas burner embodying my invention.

Figs. 2, 3 and 4 are detail sectional views showing different forms of injector nozzles which may be employed.

My invention has relation to gas and air mixers for gas burners for the combustion of gaseous fuels, such as natural, coal, coke oven, water, producer, acetylene, hydrogen and other gases containing carbon, hydrocarbon or hydrogen and with which it is necessary to supply oxygen for the combustion, either in the form of air or as oxygen gas.

In the operation of such burners it is the common practice to have the gas and its combustible agent pass through a mixing device at varying pressures. Usually the combustible agent is at a higher pressure than the gas, excepting in the case of producer gas which is usually introduced at the higher pressure.

In ordinary practice the mixture of the gases is controlled by two valves, one operating on the gas line and the other on the combustible agent or air line. Such adjustment as may be necessary to secure combustion is a matter of manual operation and the completeness or perfection of the combustion depends entirely upon the experience or ability of the operator in the manipulation of these valves. Experience shows that in the majority of cases the gas and air are not introduced in the proper proportions for perfect combustion and there is a very considerable loss in the heating value of the fuel.

My invention provides a gas burner having what may be termed a proportional mixer in which the proportion of the fuel and air may be adjusted and fixed in a manner to obtain automatically the proper mixture of gas and air under varying conditions.

The nature of my invention will be best

understood by reference to the accompanying drawings in which I have shown a preferred form thereof, and which will now be described, it being premised, however, that various changes can be made in the details of construction and arrangement of the parts without departing from the spirit and scope of my invention, as defined in the appended claims.

In these drawings, the numeral 2 designates a casing having therein a mixing chamber 3. 4 is a connection leading to the supply line for air or other combustible agent, and which terminates in the injector nozzle 5. 6 is a nipple connecting the casing 2 with the burner connection 7, and the passage through which is of a somewhat restricted or throat form. The nozzle 5 may be of the conical form shown in Fig. 1, or it may be of any other suitable form.

In Fig. 2 I have shown the nozzle 5^a as having a restricted delivery orifice 5^b.

In Fig. 3, I have shown another form similar to that shown in Fig. 1 except that the inner end of the cone is partially closed, but is provided with a central delivery orifice 5^c.

Fig. 4 shows still another form in which the delivery is through the small pipe 5^d. As above stated, this nozzle may be of any usual or suitable form for increasing the velocity of the air, or which will increase the velocity and govern the ultimate quantity, or which will govern the ultimate quantity without increasing the velocity of the air which may pass at a given pressure.

By a proper design of the throat 6 and of the burner, or burners, the injector nozzle will act to produce a vacuum in the chamber 3 which will be at all times proportional to the air pressure in the injector nozzle. This throat may also be of various forms and shapes designed to increase, decrease, or hold constant the velocity of the mixture as may be desired. The burners may be of single or multiple orifice type and may be of any of the conventional types used in the burning of a gaseous fuel where a combustible mixture is produced before the burner orifices are reached.

The chamber 3 has an extension 8 at one side for connection with a gas supply pipe or conduit 9. The outlet from the supply pipe or conduit 9 is controlled by a valve 10. This valve is preferably in the form of a

diaphragm having a peripheral seating portion adapted to close against a true seating face at 10^a so that when closed no gas will pass the valve. 11 is a spring which is connected to the diaphragm at one end and to an adjusting screw 12 at the opposite end. At the other side of the valve is a guide rod 13 having bearings in the spiders 14. The spring 11 acts upon the valve in the opposite direction to the pull exerted thereon by the vacuum produced in the chamber 3; and is preferably so adjusted that the tension which it exerts is slightly more than sufficient to overcome the gas pressure in the pipe or conduit 9. If no air is passing through the injector, the valve therefor remains closed; but as soon as air is passed through the injector and a vacuum is thereby created in the chamber 3, the valve is moved inward away from its seat, thereby admitting sufficient gas to produce a combustible mixture. The greater the degree of vacuum produced in the chamber 3, the greater is the opening movement of the diaphragm valve. The tension of the spring 11 may be readily adjusted. The supply pipe or conduit 9 may or may not be provided with a gas governor at 15. If such governor is used, it may be of any well known type operating to hold a given pressure between the governor and the valve.

In using the burner with a gas, such as producer gas, which is under a higher pressure than that of the combustible agent, the supply connections are reversed, the gas entering the chamber 3 through the connection 4 and nozzle 5, and the combustible agent entering such chamber from the conduit 9 and controlled by the valve 10. In such use, the operation is generally the same as that de-

scribed, but the vacuum action is produced by the gas, and the air supply is automatically controlled in accordance with the changes in such vacuum action.

The valve may be arranged in various other ways than that shown and any suitable means may be provided for normally holding it to its seat and for properly guiding its movements. The general construction of the burner parts may also be widely varied.

My invention provides a burner in which the admission of the gas to be mixed with a combustible agent to form a combustible mixture is automatically controlled, the gas admission being in proportion to the vacuum created by the air supplied to the burner and varying with the air pressure.

I claim:

A mixing device for gas burners, for automatically mixing air and gas in definite proportions, comprising a mixing chamber having an air inlet, a gas inlet, and an outlet leading to a burner, one of said inlets terminating in a contracted nozzle in injector relation to the other inlet, a valve controlling the last-named inlet and opening in the direction of the mixing chamber, under the injector action of said nozzle, and a loading device arranged to exert an increasing closing load on said valve as the valve opens, whereby the volume of fluid permitted to pass the said valve into the mixing chamber is directly proportional to the velocity pressure in said nozzle; substantially as described.

In testimony whereof, I have hereunto set my hand.

WILLIAM C. BUELL, Jr.

Witnesses:

GEO. B. BLEMING,
GEO. H. PANELEE