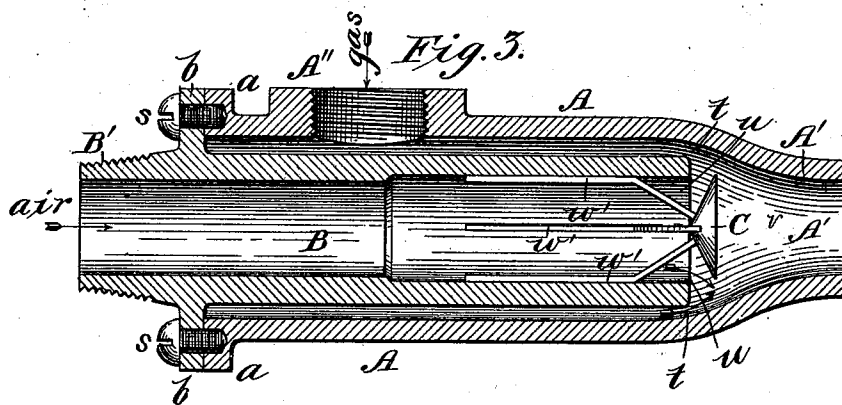
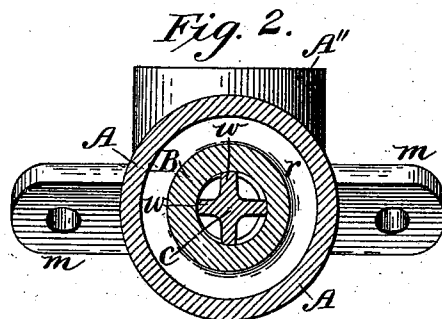
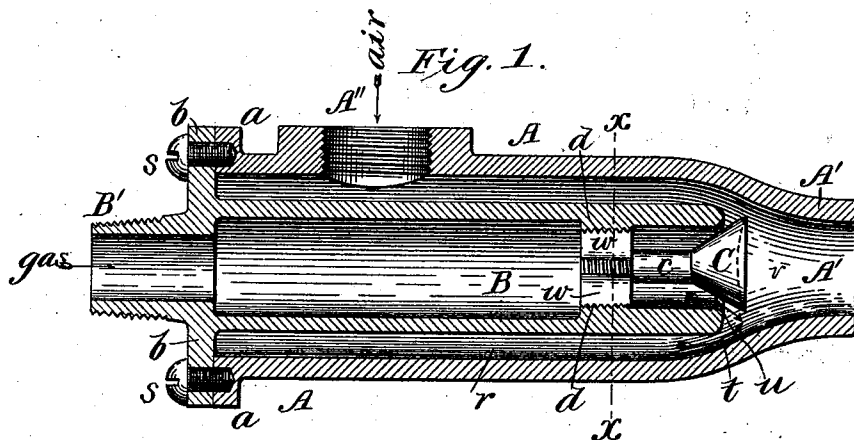


(No Model.)

R. N. OAKMAN, Jr. & G. W. MORRISON.
BURNER FOR FUEL GAS.

No. 562,089.

Patented June 16, 1896.



Witnesses

Gloverance
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Inventors

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UNITED STATES PATENT OFFICE.

RICHARD N. OAKMAN, JR., AND GILBERT W. MORRISON, OF GREENFIELD,
MASSACHUSETTS.

BURNER FOR FUEL-GAS.

SPECIFICATION forming part of Letters Patent No. 562,089, dated June 16, 1896.

Application filed November 25, 1891. Serial No. 413,086. (No model.)

To all whom it may concern:

Be it known that we, RICHARD N. OAKMAN, Jr., and GILBERT W. MORRISON, citizens of the United States, residing at Greenfield, in the county of Franklin and State of Massachusetts, have invented certain new and useful Improvements in Burners for Fuel-Gas; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a burner adapted more particularly for burning a mixture of fuel-gas and air under pressure and injecting or forcing the flame with a blowpipe effect into a furnace or other place of use.

The object of the invention is to produce a thorough and intimate mixture of fuel-gas with air within the burner-nozzle in order to secure more perfect combustion and therefore greater effectiveness and economy than have hitherto been obtained in the use of fuel-gas.

In carrying out our invention we construct the burner of two tubes, one within the other, the outer tube being contracted at its mouth to form a nozzle and mixing-chamber, while the mouth of the inner tube opens into the outer tube within the contracted part or within the lips of the mouth of the outer tube and preferably at a point where the walls of the outer tube converge to form the projecting contracted nozzle, and we provide a conical spreader flaring outward from the mouth of the inner tube, so that the two fluids—fuel-gas and air—flowing through the two tubes in the same direction are diverted by the contracted nozzle and cone, each into or across the path of the other, whereby they are intimately mixed in the chamber in the projecting contracted nozzle before escaping from the mouth of the burner, where they are ignited.

With our invention it is immaterial whether the burner be constructed for the flow of the fuel-gas through the inner tube and the flow of air through the outer tube, or vice versa; but when the inner tube is to be used as an air-supply tube we make it, as hereinafter described, and shown in the drawings, somewhat larger in diameter than when it is to be used

as a conductor of the fuel-gas. The two fluids in both cases are caused to flow at substantially the same pressure.

In the drawings, Figure 1 represents a longitudinal section of our improved burner, the inner tube being of a size proportional to the size of the whole burner that we prefer where the fuel-gas is to flow through it. Fig. 2 represents a cross-section of the same on line x x , looking toward the rear of the burner. Fig. 3 represents a longitudinal section of our improved burner, the parts being of suitable proportions for the use of the inner tube as the air-supply tube.

In both cases the outer shell or tube A is composed of iron or other suitable metal and is formed with a contracted mouth or nozzle A', containing the mixing-chamber v , with a short lateral branch A'', screw-threaded for receiving a supply-pipe and with an outwardly-projecting flange a at its rear end. The inner tube B is preferably straight, as shown, and is inserted in the tube or shell A, so as to leave an annular space or chamber r between the two tubes the entire length of the inner tube, as shown. Tube B is provided with an annular flange b , through which are inserted screws s , extending into flange a for securing the two tubes together. Tube B is provided at its rear end with an extension B', which is threaded, as shown, for connection with a supply-pipe.

The inner tube B is preferably constructed and arranged with its inner end or mouth just within the converging walls of the contracted nozzle—that is, at a point where the walls incline inward to the contracted nozzle A', as shown, so that a conical mixing-chamber v is provided between its end and the mouth of nozzle A'.

A conical spreader C is arranged with its apex in the mouth of the inner tube B, and may be adjustably held in place by two or more modified forms or devices, as shown, respectively, in Figs. 1 and 3. In the burner, at Fig. 3, the conical spreader is held in place by spring-arms w' , bearing upon the inside of tube B, so that the cone may be adjusted out or in, as desired. As shown in Fig. 1, the cone C is provided with a projecting stem c , having, preferably, at its rear end wings w ,

threaded on their outer edges to take into the internal screw-threads d of the inner tube B. The cone C, Fig. 1, is provided in its face or base, as indicated by dotted lines, with a slot to receive a screw-driver, by which it may be screwed into any desired position. As shown, the cone with either form of holding device is adjustable; but in practice, after the cone is placed in position, the regulation of the relative amounts of fuel-gas and air to be used in the burner may be had by means of valves in the fuel-gas and air-supply pipes. (Not here shown.)

As shown in the drawings, the conical spreader C is flared out beyond the internal diameter of the inner tube B, is of less diameter than the contracted throat or passage t of the outer tube A, and by its arrangement forms an outwardly-flaring annular passage u between its surface and the edge or lip of tube B, by means of which the current of fluid issuing from tube B is deflected outward across the inwardly-inclined passage t and against the converging walls of the outer tube A. By means of the inclined or converging walls of tube A an inwardly-inclined annular passage t is formed, by means of which the current of fluid passing through tube A is deflected inward and across the path of the fluid issuing from tube B, whereby the two fluids—fuel-gas and air—flowing at substantially the same pressure, will be caused to flow each into or across the path of the other and thus become intimately mixed together in chamber v before escaping through the projecting contracted nozzle A'. This results in perfect combustion and the production of a solid concentrated flame issuing from the burner-nozzle with a blowpipe effect and producing an intense heat at the point desired.

Many difficulties were encountered in pro-

ducing a burner that would most effectively and economically burn fuel-gas, and many experiments and tests were required to produce the successful burner forming the subject of this application. This burner gives entirely satisfactory results in practical operation.

We preferably use water-gas or a mixture of water-gas and producer-gas, commonly known as "fuel-gas," in this burner.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The herein-described fuel-gas burner consisting of an outer tube or shell A, having a conical nozzle A', containing a mixing-chamber v , an inner tube B, having its mouth placed adjacent to the converging walls of said nozzle, and forming with said walls an inwardly-inclined passage t , and a conical spreader C, having means for adjusting it longitudinally, and placed at the mouth of tube B, within nozzle A', and forming the outwardly-flaring passage u , intersecting said passage t , substantially as and for the purpose described.

2. In combination with the outer tube or shell having a contracted nozzle containing a mixing-chamber the inner tube arranged with its mouth or opening within such nozzle, the conical spreader at the mouth of the inner tube, having a stem, c , and wings, w , threaded at their outer edges and engaging with screw-threads, d , in said inner tube, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

RICHARD N. OAKMAN, JR.
GILBERT W. MORRISON.

Witnesses:

BURDEN LOOMIS,
W. H. H. YOUNG.