No. 738,433. PATENTED SEPT. 8, 1903.

J. L. GRAHAM.

GAS BURNER.

APPLICATION FILED AUG. 25, 1902.

NO MODEL.

Fig. 2

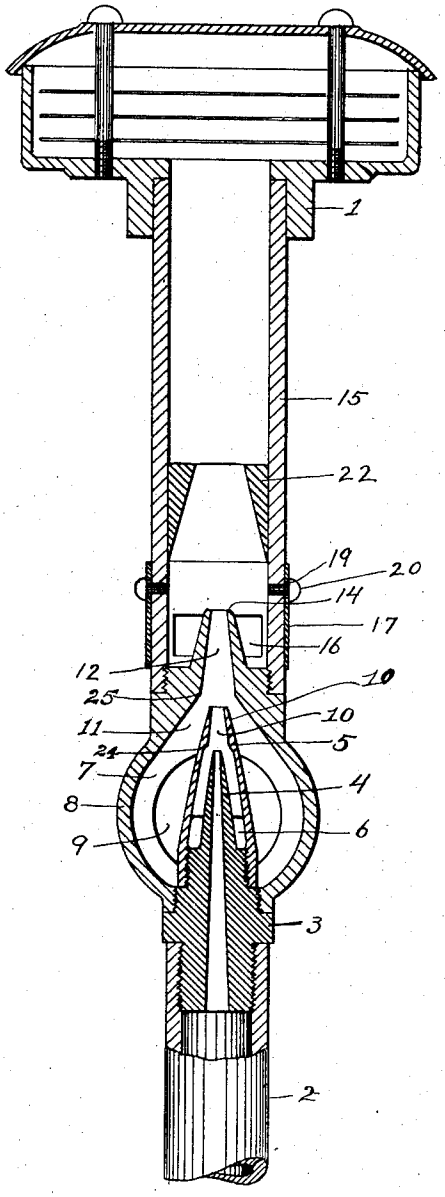
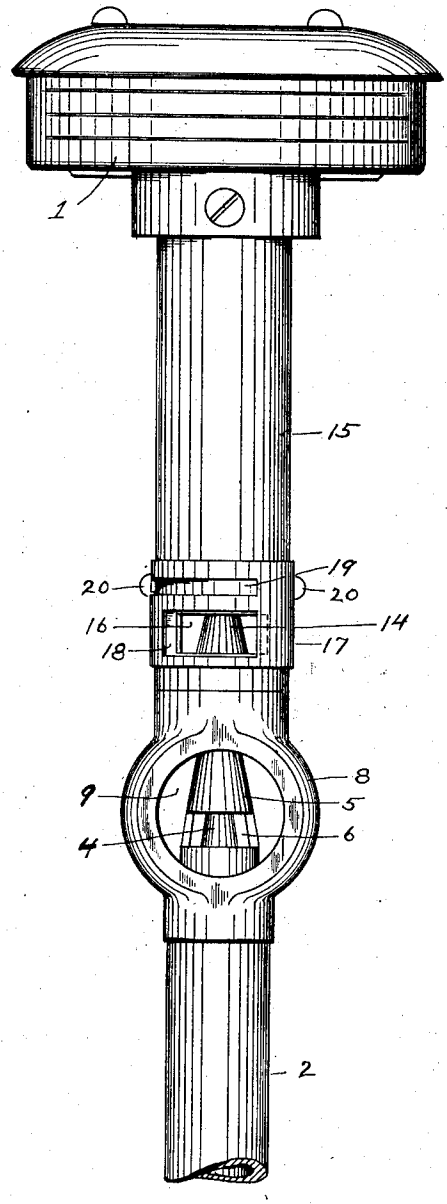


Fig. 1



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 738,433. Patented September 8, 1903.

UNITED STATES PATENT OFFICE.

JAMES L. GRAHAM, OF ALLEGHENY, PENNSYLVANIA.

GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 738,433, dated September 8, 1903.

Application filed August 25, 1902. Serial No. 120,920. (No model.)

To all whom it may concern:

Be it known that I, JAMES L. GRAHAM, a resident of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Gas-Burners; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to gas-burners; and its object is to provide a burner for gas wherein the danger of back firing or back flashing is largely overcome.

To this end it comprises gas and air supplying means for said burner constructed upon the principle of an injector and whereby the air and gas will be supplied to the burner with considerable velocity, so that even in case the pressure is quite low, as in the case of artificial gas, back flashing or back firing will not occur.

The invention also consists in the details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of my improved burner, and Fig. 2 is a vertical section through the same.

The top is shown at 1, and this may be of any desired shape or construction or may be entirely omitted, the specific form of top shown in the drawings being selected for purposes of illustration merely.

The gas supply or service pipe is shown at 2. Connected to this pipe is a fitting 3, having at its upper end a conical nozzle 4, which projects into the conical interior of a nozzle 5, screwed onto the fitting 3 at its lower end and provided with openings 6 near its base. The nozzle 5 also is conical on its outer surface and projects into a chamber 7, formed in a fitting 8, screwed onto the fitting 3 and provided with the openings 9, communicating with the atmosphere. The nozzle 5 at its upper end is provided with a restricted orifice 10, and the end of the nozzle 4 projects into such proximity to said opening that the gas emerging from the nozzle 4 draws the air in through the openings 9 and 6 on the principle of an ordinary injector. The nozzle 5 also is conical externally and projects up into a conical portion 11, formed in the upper end of the chamber 7 and leading to the restricted outlet-orifice 12. The upper end of the nozzle 5 is located in such proximity to this restricted orifice that the action between this nozzle and the inner walls of the chamber 7 also operate on the principle of an injector. It will thus be seen that a double injector is provided.

The fitting 8 is provided at its upper end with a projection or nozzle 14, which also preferably is conical, as shown, and which projects up into the burner-tube 15, the latter being secured onto the fitting 8 at its lower end and carrying at its upper end the top 1 when the latter is to be used. This tube is provided with air-openings 16, the upper edges of which are just below the upper end of the nozzle 14. Through these openings an additional supply of air is drawn in. To regulate this air-supply, a sleeve 17 is fitted about the tube 15 and is provided with openings 18, which may be brought into register with the openings 16 in the tube. The sleeve 18 is provided with slots 19, through which project screws 20, these screws serving to hold the sleeve in place, while the slots permit rotation thereof to bring the openings 16 and 18 into register to any desired extent.

It will be observed that the end of the nozzle 4 projects into the chamber of nozzle 5 into proximity to the restricted orifice 10 of the latter, and the end of the nozzle 5 also projects into chamber 11 into proximity to the restricted orifice 12. It will also be observed that the conical interior of the nozzle 4 is provided with a shoulder 24 just at the base of the restricted orifice 10 and that the chamber 11 also has substantially a shoulder 25 at the base of the restricted orifice 12. As a consequence the gas escaping from the nozzle 4 and the air and gas escaping from the nozzle 5 do not merge into chambers of any considerable capacity, so that they cannot expand to such an extent as to lose an appreciable amount of their pressure. Furthermore, the ends of the nozzles 4 and 5 are but very slightly below the shoulders 24 and 25, respectively, so that the incoming air is directed or thrown by these shoulders over the jets escaping from the nozzles 4 and 5. This serves to thoroughly mingle the air with the gas, thus increasing the volume of the

latter and forcing the mixture through the orifices 10 and 12 at a pressure practically the same as the original pressure of the gas.

By means of the injectors shown the air and gas is given considerable velocity, so that it is supplied to the burner under sufficient pressure to entirely prevent the back firing or back flashing which ordinarily occurs. This is of great importance when using artificial gas, which generally is of low pressure and does not readily mix with the air. Back firing is one of the difficulties encountered in burning artificial gas, and my burner entirely overcomes this. To further aid in preventing back firing, I place in the pipe 15, near the bottom thereof, a suitable obstruction, such as the bushing 22, which has a funnel-shaped opening therethrough, thus providing a restricted orifice through which the air and gas pass and presenting practically square shoulders toward the top. The restricted orifice through this bushing gives to the air and gas an increased velocity at the upper end of said bushing, so that any flame that may leap backward is again blown forward by the greater velocity of the air and gas.

By means of my burner air is drawn into the same at a high velocity at three different points and mixed in three different chambers, so that a very thorough mixing of the air and gas is secured. I have found by actual experiment that with this burner a very much larger proportion of air can be mixed with the gas than with burners as ordinarily constructed, this being due to the fact that the air and gas is given a high velocity at the several different points by the injectors. The additional amount of air in turn adds to the lightness of the mixture and to the velocity with which the mixture passes through the burner-tube.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a gas-burner, the combination with the burner-tube, of an injector connected thereto, the outer member of said injector having a conical interior with a restricted orifice at its apex forming a shoulder at the base of said orifice, an air connection at the base of said outer member, the inner member of said injector having a conical exterior substantially parallel to the conical interior of the outer member and having its end located in proximity to the shoulder at the base of the restricted orifice of the outer member, and a gas connection for said inner member.

2. In a gas-burner, the combination with the burner-tube, of a plurality of injectors connected in series thereto, the outer members of each injector having substantially straight conical interiors with restricted orifices at their apices forming shoulders at the base of said orifices, the inner members of said injectors having straight conical exteriors and having their ends lying in proximity to the shoulders at the bases of the restricted orifices in the outer members, an air-inlet through the outer member of each injector, and a gas connection for the inner member of the first injector.

3. In a gas-burner, the combination with the burner-tube, an obstruction near the base of said tube providing a restricted passage therethrough, an air-opening into said tube beneath said obstruction, an injector projecting into said tube with its end at least as high as the upper edge of said air-opening, the outer member of said injector having a conical interior with a restricted orifice at its upper end forming a shoulder at the base of said orifice, the inner member of said injector having its end lying in proximity to the shoulder at the base of the restricted orifice of the outer member, an air connection for said outer member, and a gas connection for said inner member.

In testimony whereof I, the said JAMES L. GRAHAM, have hereunto set my hand.

JAMES L. GRAHAM.

Witnesses:
F. W. WINTER,
ROBERT C. TOTTEN.