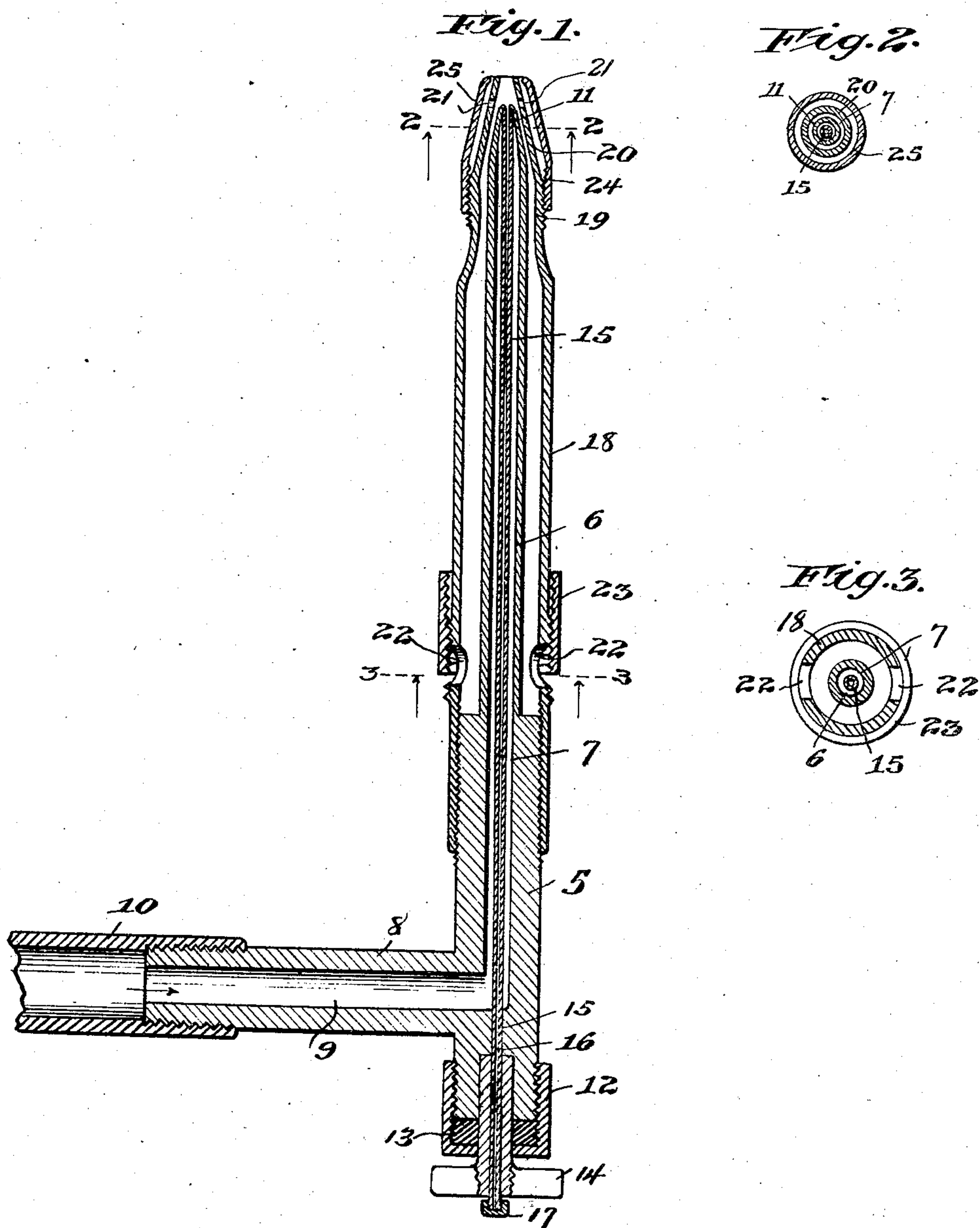


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PATENTED JAN. 23, 1906.

W. KIRKWOOD.
HIGH PRESSURE GAS BURNER.
APPLICATION FILED MAR. 13, 1905.



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UNITED STATES PATENT OFFICE.

WILLIAM KIRKWOOD, OF CHICAGO, ILLINOIS.

HIGH-PRESSURE GAS-BURNER.

No. 810,870.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM KIRKWOOD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in High-Pressure Gas-Burners, of which the following is a specification.

My invention relates to gas-burners, and has reference more particularly to that type of burner commonly employed for brazing and soldering purposes, wherein hydrogen or other gas is burned in a jet form under considerable pressure, the gas uniting with the air at the point of the burner and forming a flame of high calorific intensity.

It is found in practice that where the gas is burned under a pressure exceeding ten to twelve pounds with the ordinary type of burner at present in use it is difficult to maintain the flame ignited, the gas issuing from the tip of the burner at a speed exceeding the rate of combustion, and thus causing the extinction of the burning jet.

The leading object of my invention is to eliminate this defect and permit the gas to be burned under a relatively high pressure, such as thirty to forty pounds, while still maintaining the constancy and integrity of the jet. This object I accomplish through a construction of burner which provides, in conjunction with the main jet, a constant or permanently-burning pilot-light in the immediate vicinity of the main jet, which serves to keep the latter constantly ignited.

Another object of the invention is to provide a burner of the class described which may conveniently and efficiently be employed in situations more or less difficult of access, where the supply of air at the discharge-orifice of the burner would ordinarily be insufficient to maintain the Bunsen flame.

To this end another feature of my invention consists in a construction of burner which permits the intake of an air-supply at a point relatively remote from the tip of the burner and the mixing of the air with the gas prior to the discharge of the latter from the tip.

A practical form in which my invention may be embodied is illustrated in the accompanying drawings, wherein—

Figure 1 is a longitudinal central sectional view. Fig. 2 is a cross-sectional view on the line 2 2 of Fig. 1, and Fig. 3 is a cross-sectional view on the line 3 3 of Fig. 1.

Referring to the drawings, 5 designates the

stem or shank portion of the burner-tube, which has a reduced portion 6, both of said parts being axially bored to provide a longitudinal gas-duct 7, extending entirely there- through. Integral with or secured to the stem 5 is an annular branch 8, having an axial duct 9, receiving a supply of hydrogen or other gas under high pressure through a tube 10, having a screw-threaded or other connection with the branch 8, as shown. The outer end portion of the tube 6 is tapered or beveled toward the tip, as shown at 11. The opposite end of the stem or shank 5 is closed by a gland 12, through which is inserted a confining-packing 13 against the end of the tube and around an axially-bored inserted cap 14, which constitutes a support for the rear end of a needle-valve 15, that extends entirely through the bore of the gas-tube 6 and its stem or shank 5. Said needle-valve is of slightly less diameter than the internal diameter of the bore of the gas-tube, thereby providing an annular gas passage-way around said valve, which passage-way is in free communication at its inner or lower end with the gas-duct 9 of the branch 8. The needle-valve 15 may have a fine axial bore 16 extending entirely therethrough, said bore serving as a central air-supply for the needle-valve in some instances and being closed or cut out of use when not required by means of a cap 17, applied to the rear end thereof.

To the stem or shank 5 of the gas-tube and entirely surrounding the reduced outer portion 6 thereof is an outer tube 18, said outer tube being preferably connected to the stem 5 by an ordinary screw-threaded joint, as shown, permitting the easy longitudinal adjustment thereof and at its outer end having a portion 19, preferably of reduced diameter, which terminates in a tapered or beveled end portion 20, surrounding and substantially parallel with the beveled or tapered end 11 of the tube 6. Through this tapered end portion 20 of the tube 18, at points substantially opposite or slightly in advance of the end of the tube 6 and its contained needle-valve, are formed two or more lateral apertures 21. The tube 18 is also preferably provided at a point relatively remote from the tip of the burner and adjacent to its connection to the shank 5 with two or more lateral apertures 22, designed for the admission of air in the manner and under the circumstances hereinafter described, which air-admission may be wholly or partially cut off

when not required by means of a sleeve 23, surrounding the tube 18 and having a screw-threaded sliding adjustment thereover, as shown. The reduced portion 19 of the tube 18 is also externally threaded to receive a short sleeve 24, surrounding the beveled or tapered end portion 20 of the tube 18, said sleeve 24 also being correspondingly beveled or tapered where it surrounds said tapered end of the tube 18, as indicated at 25. It will be observed that the tube 18 and surrounding sleeve 24 extend some little distance beyond the ends of the inner gas-conducting tube 6 and its contained needle-valve 15.

The burner of my invention is capable of operating either on the Bunsen-flame principle, wherein the gas is mixed with air at a point behind or in rear of the discharge-orifice, or on the principle of the atmospheric burner, wherein the air unites with the gas at the tip or discharging-point of the burner. When operating in either way, however, my improved burner provides in association with the main gas-jet, which is under a relatively high pressure, an auxiliary jet adjacent thereto of relatively reduced pressure, which latter is continuously burning when the burner is in operation and serves in the capacity of a continuously-ignited pilot-light, maintaining the main jet in an ignited condition. This is effected in the apparatus described in the following manner: The gas passing through the annular conduit 7 around the valve issues through the outwardly-convergent end 20 of the tube 18, and in so doing, by reason of the great expansibility of the gas and the continuously-contracting character of the discharge-passage, a portion of said gas passes at a less pressure through the lateral apertures 21 into the annular conical passage-way between the parts 20 and 25, thereby creating a fringe of flame entirely surrounding the main jet, which annular flame when ignited maintains itself in a constant burning condition, owing to the reduction of the pressure of the gas supplied thereto, this reduction occurring partly by reason of the relatively increased size of the conduit and partly by reason of the increased friction of the gas against the walls of the conduit. This annular fringe or jet serves to maintain the main jet constantly burning, thus permitting the use of gas under a relatively high pressure, which affords a flame of correspondingly-increased calorific intensity. The proportion of gas passing through the apertures 21 may be increased by screwing the tube 18 outwardly relatively to the tip of the needle-valve, so as to carry the apertures 21 farther in advance of the end of the valve.

By retracting the sleeve 23, so as to partially or wholly expose the lateral openings 22 of the tube 18 a supply of air is drawn in by the suction created by the gas-jet, which

air mingles with the gas at the point where the latter leaves the end of the gas-tube 6, thereby producing the intense Bunsen flame at the tip of the burner. In this case more or less of the air thus drawn in commingles with the gas escaping through the apertures 21, thereby producing an annular pilot-flame of similar character. This last-described feature, while not essential to the efficiency of the burner when employed in entirely open and unobstructed situations, wherein there is a free and ready air-supply at the tip of the burner, is nevertheless of value and importance where the flame has to be introduced into holes, sockets, angles, or other recesses, where the air-supply at the tip of the burner is somewhat limited. Where it is desirable to still further increase the air-supply to the burner, the needle-valve 15 is provided with an axial bore, as shown, and by removing the cap 17 a certain volume of air is also drawn in by the gas from this source. Obviously the supply of air for the Bunsen flame may in the construction shown be taken wholly through the openings 22 or through the axial duct in the needle-valve or through both. It will be observed as constituting an important practical advantage of the device shown and described that all of the several parts which control the flow of both the gas and the air, as well as their mixture at the point of the burner, are capable of relative adjustment, so as to effect the flow and mixture in the desired degrees and proportions to give a flame of the intensity desired or required for each particular use of the device. When the device is used with the internal air-supply, the sleeve 18 will be screwed well forward, so as to carry the gas-discharge tip and its contained needle-valve relatively well back of the discharge-orifice of the burner-tip in order to permit a through commingling of the air and gas and the passage of a portion thereof at reduced pressure through the lateral ports 21 and the annular passage-way therefrom to the tip of the burner. In this connection it should also be noted that by screwing the sleeve 24 in or out relatively to the tube 18, on which it is mounted, the outer end of said sleeve determines the size of the annular orifice supplying the gas or mixture for the pilot-flame, thus constituting, in effect, a controlling-valve, and by this simple manipulation the size of the pilot-flame can be easily controlled.

It is evident that the construction as hereinabove described, and shown in the drawings, might be considerably modified and varied by those skilled in the art without departing from the real spirit of the invention or sacrificing any of the advantages thereof.

I claim—

1. A burner for high-pressure gas, comprising an axially-bored burner-tube, a sleeve surrounding said tube and having one or more

lateral apertures substantially opposite the tip of the latter, said sleeve being provided with means for directing a part of the gas through said apertures, and an outer sleeve 5 surrounding the end of said first-named sleeve and providing in conjunction with the latter a burner for an annular pilot-flame for the main jet, substantially as described.

2. A burner for high-pressure gas, comprising an axially-bored burner-tube, a sleeve 10 surrounding said tube, said sleeve having one or more lateral apertures substantially opposite the tip of the burner-tube and also one or more lateral air-entraining apertures in rear thereof and being so formed as to direct a 15 portion of the gas through said first-named apertures, and an outer sleeve surrounding the end of said first-named sleeve and providing in conjunction with the latter a burner for 20 an annular pilot-flame for the main jet, substantially as described.

3. A burner for high-pressure gas, comprising an axially-bored burner-tube having a contracted tip, a sleeve surrounding said 25 tube and having a contracted end surrounding said tip, said sleeve having one or more lateral apertures substantially opposite the tip of the burner-tube and also one or more lateral air-entraining apertures in rear thereof,

and an outer sleeve secured to said last-named 30 sleeve and having a contracted end portion surrounding the contracted end portion of the latter to provide in conjunction therewith an annular pilot-flame for the main jet, substantially as described. 35

4. A burner for high-pressure gas, comprising an axially-bored burner-tube having a contracted tip, a needle-valve in said burner-tube, a sleeve surrounding said tube and having a contracted end surrounding said tip, 40 said sleeve having one or more lateral apertures substantially opposite the tip of the burner-tube and also one or more lateral air-entraining apertures in rear thereof, an outer sleeve secured to said last-named sleeve, and 45 having a contracted end portion surrounding the contracted end portion of the latter to provide in conjunction therewith an annular pilot-flame for the main jet, and a sleeve controlling said air-entraining apertures, said 50 tube and sleeves being longitudinally adjustable relatively to each other, substantially as described.

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