No. 697,481. Patented Apr. 15, 1902.

J. HARRIS.

GAS BURNER.

(Application filed Aug. 19, 1901.)

(No Model.)

FIG I.

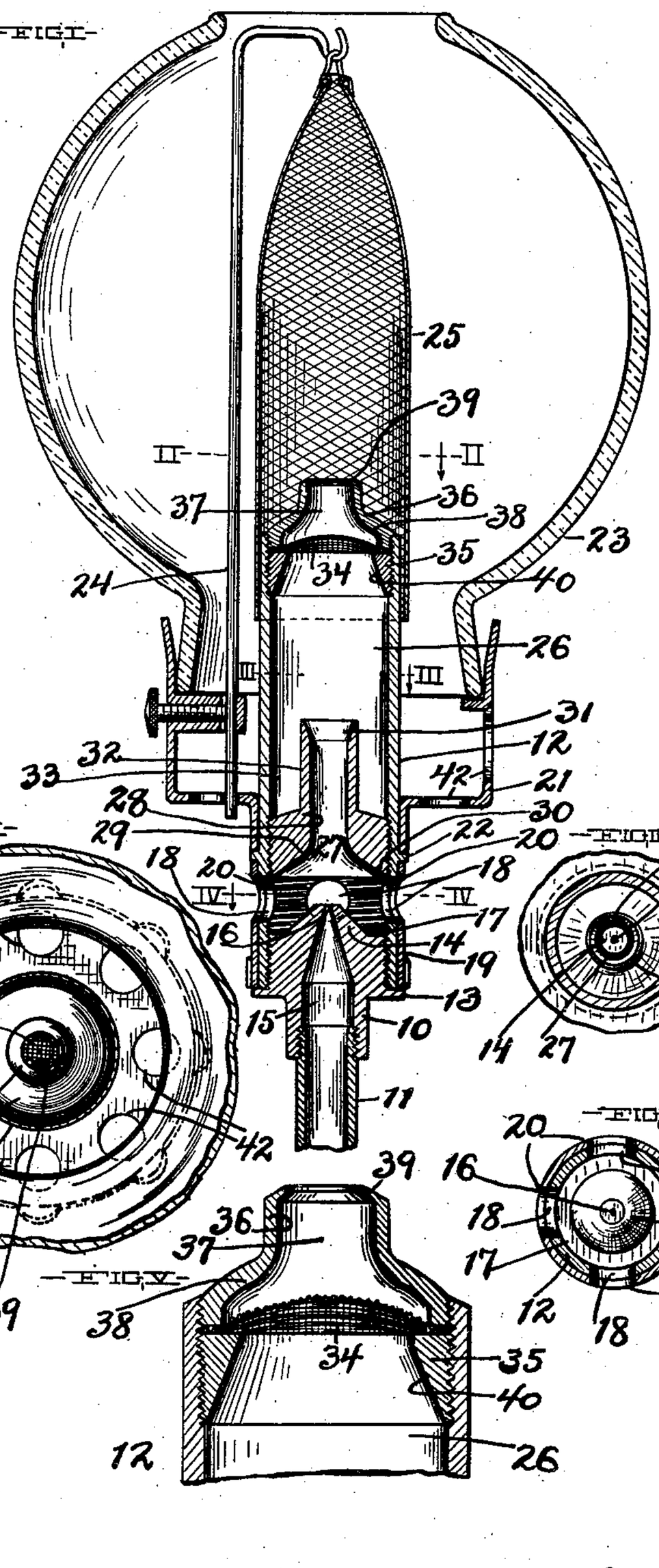

FIG II.

FIG III.

FIG IV.

FIG V.

WITNESSES:

Daniel E. Daly.

A. H. Parratt

INVENTOR

John Harris

BY

Lynch & Dorer

his ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN HARRIS, OF CLEVELAND, OHIO, ASSIGNOR TO SAMUEL HOLMES SMART, TRUSTEE, OF WILLOUGHBY, OHIO.

GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 697,481, dated April 15, 1902.

Application filed August 19, 1901. Serial No. 72,553. (No model.)

To all whom it may concern:

Be it known that I, JOHN HARRIS, a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Gas-Burners; and I 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 pertains to make and use the same.

This invention relates to improvements in gas-burners designed more especially for use in burning acetylene gas and other gases which are rich in carbon.

One object of this invention is to provide a burner which has an exceedingly-large illuminating capacity, which is suitable for successfully burning acetylene gas with a mantle or other body capable of being rendered incandescent by exposure to the flame issuing from the burner, and which is so constructed that it will successfully operate with a low pressure of gas in the gas-supply pipe, that the friction upon the inflammable mixture or the component elements of the said mixture during the flow or passage of the same through the burner is reduced to a minimum, and that objectionable noise during the operation of the burner and the ingress or backing up of the flame into the burner are prevented.

With this object in view the invention consists in certain peculiarities of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure I is a central vertical section of the burner provided with a chimney and with a mantle which is to be rendered incandescent. Fig. II is a top plan in transverse section on line II II, Fig. I. Fig. III is a transverse section on line III III, Fig. I, looking downwardly. Fig. IV is a transverse section on line IV IV, Fig. III, looking downwardly. Fig. V is an enlarged section of the upper portion of the burner.

The burner comprises an upright gas-receiving cylindrical metal tube 10, which forms the lower end of the device. The tube 10 has its lower end screw-threaded internally to render it capable of being screwed onto a gas-supply pipe 11. The tube 10 has its upper end screw-threaded externally and screwed into the correspondingly internally-threaded lower end of a vertically-arranged cylindrical metal tube 12. The tube 10 has an external flange 13, which abuts the lower end of the tube 12. The tube 10 has its upper end forming a cone 14, and the gas-conducting passage-way 15 of the said tube 10 is gradually reduced in size toward the upper end or apex of the said cone, where the said passage-way terminates in a discharge-orifice 16, formed centrally of the cone. The cone 14 forms the central portion of the bottom of an air-receiving chamber 17, which is formed within the lower portion of the tube 12 next above the tube 10. The surrounding wall of the chamber 17 is provided with lateral apertures or air-inlets 18, arranged at suitable intervals around the tube 12. A sleeve 19 turnably embraces the lower portion of the tube 12 and has lateral apertures 20, arranged to register with the air-inlets 18. The sleeve 19 constitutes a valve for controlling the supply of air to the chamber 17. The arrangement of the parts is such that the apex of the cone 14 is centrally of the chamber 17 opposite the lower portions of the air-inlets 18, and the cone is instrumental in directing the air toward the orifice 16. The chimney-holder 21 embraces the tube 12 above and in close proximity to the upper end of the sleeve 19 and rests upon a flange 22, formed upon and externally of the tube 12, and 23 designates the globe, glass, or chimney, which is supported from the holder 21 and surrounds the burner in the usual manner. The chimney-holder 21 bears the mantle-holder 24, which is usually a rod or wire extending upwardly into the chimney 23. The mantle 25, which is to be rendered incandescent, is suspended from the upper end of the mantle-holder 24 and has its lower end embracing the upper and flame-discharging end of the burner. A mixing-chamber 26 is formed within the upper portion of the tube 12 above the chamber 17.

A vertically-arranged port 27 is formed in and centrally of the wall 28, located between the chambers 17 and 27, and has its lower end gradually enlarged downwardly, as at 29— that is, the surrounding wall of the lower end of the port 27 flares downwardly and termi-

nates in the top wall of the chamber 17, which last-mentioned wall flares downwardly, as at 30, to the air-inlets 16. By this construction the air and gas are gradually compressed or more closely associated during their passage through the chamber 17 into the port 27 and friction upon the gas and upon the air during their flow to the said port is reduced to a minimum. The flaring of the top wall of the chamber 17 downwardly to the air-inlets 18 is especially valuable in facilitating the flow of the air to the port 27. The upper end of the port 27 discharges into the chamber 26 and flares upwardly, as at 31, to facilitate the flow of gas and air into the said chamber. The gradual upward enlargement of the upper end of the port 27 is also important in facilitating the manufacture of the burner, because with the said enlargement the gas-supply orifice 16 need not be exactly centrally in line with the port 27, whereas in the absence of the said enlargement an accurate alinement of the orifice 16 and the passage-way 27 will be found quite essential to a satisfactory operation of the burner.

The wall 28 is formed by a metal piece externally screw-threaded and engaging corresponding threads formed upon and internally of the tube 12, and the upper portion of the port 27 is formed by an upwardly-projecting vertical tubular member 32, which is formed centrally of and upon the wall 28 and arranged centrally of the chamber 26. By this construction the port 27 is rendered comparatively long and an annular space 33, enlarging the chamber 26, is formed around the member 32 next above the wall 28. The gas and air are thoroughly mixed in the port 27 and chamber 26.

The tube 12 is provided internally at the upper end of the mixing-chamber 26 with an upwardly-bulging concavo-convex wire screen 34, which is arranged in a horizontal plane and transversely of the said tube. The screen rests upon the upper end of an annular metal bushing or ring 35, which is screw-threaded externally and engages corresponding threads formed upon and internally of the tube 12.

The tube 12 has its upper end above the mixing-chamber and above the screen 34 provided with a metal head 36, which is provided externally with screw-threads engaging corresponding threads formed upon and internally of the tube 12. The head 36 is screwed into the tube 12 far enough to firmly hold the screen against the bushing or ring 35. The head 36 is provided centrally with a vertically-arranged port 37, which has its lower end gradually enlarged toward the screen 34, so that the surrounding wall 38 of the lower end of the port 37 flares downwardly and overhangs the screen. The port 37 is gradually but only slightly reduced in size at its upper extremity, so as to form a slight annular flange 39 internally of and upon the surrounding wall of the outer and discharging end of the said port, with the under side of the said flange flaring downwardly. The enlargement of the port 37 next above the screen 34 accommodates the passage of a larger volume of the inflammable mixture through the said screen than would be the case in the absence of the said enlargement of the said port, and the flow of the said mixture upwardly from the screen is thereby facilitated. The gradual reduction or contraction of the port 37 at and toward its outer or discharging extremity is instrumental in preventing the flame from entering the burner during the operation of the burner and in facilitating the flow of the inflammable mixture to the said extremity. The upward bulge of the concavo-convex screen projects into the lower enlarged end of the port 37 and is also important in preventing the flame from entering the burner.

The space within the bushing or ring 35 and next below the screen 34 forms the upper portion of the mixing-chamber 26, and the inner wall of the said bushing or ring flares downwardly, as at 40, so as to gradually reduce the upper portion of the said chamber toward the screen. The said gradual reduction of the mixing-chamber toward and next to the screen is of vast importance in bringing about a successful operation of the burner, because thereby the pressure of the inflammable mixture is increased immediately before its passage through the screen, and the said passage is facilitated and rendered positive.

By the construction hereinbefore described it will be observed that the screen 34 and the bushing 35 are withdrawable upwardly from the tube 12 upon unscrewing and withdrawing the head 36 from the said tube and that the parts 10 and 28 are also removable from the tube 12, and hence the burner can be readily repaired and cleaned, if necessary.

The burner hereinbefore described will successfully operate with little pressure upon the gas entering the tube 10. The air introduced at the air-inlets 18 is of course under the ordinary atmospheric pressure. Obviously the flame issuing from the burner forms a vacuum or partial vacuum at the discharging end of the burner and results in the creation of suction in the direction of the said end from within the burner, and hence the air is drawn at the air-inlets 18 into the chamber 17 in advance of the orifice 16, at which gas is drawn or forced into the said chamber.

By the construction of burner hereinbefore described objectionable noise during the operation of the burner is avoided, perfect combustion is obtained, and backing of the flame into the burner is prevented.

It is well known that perfect combustion in burning acetylene gas is obtained only when the air is mixed with the gas in the proportions of about thirteen parts of air to one part of gas. Obviously, therefore, the size of the air-inlets 18 should be regulated by properly manipulating the valve 19 to supply a quan-

tity of air thirteen times as great as the quantity of gas issuing from the orifice 16.

Of course the chimney-holder 21 is provided with any suitable number of air-inlets 42 to supply air to the flame issuing from the burner.

What I claim is—

1. A gas-burner having the following: an upright tube 12; a mixing-chamber 26 formed within the tube and having its upper end gradually reduced upwardly; a head 36 provided at the upper end of the tube and having an upwardly-discharging port 37 whose lower portion is enlarged downwardly; an upwardly-bulging screen 34 arranged between the lower end of the said port 37 and the upper reduced end of the mixing-chamber, and means for supplying air and gas to the said chamber.

2. A gas-burner having the following: an upright tube 12; a mixing-chamber 26 formed within the tube; a bushing 35 removably secured within the upper portion of the tube and having the inner wall thereof flaring downwardly, with the upwardly-reduced space within the said bushing forming the upper portion of the mixing-chamber; a screen 34 resting upon the upper end of the said bushing; a head 36 provided at and removably secured within the upper end of the tube and arranged to hold the screen against the aforesaid bushing, which head has an upwardly-discharging port 37 whose lower portion flares downwardly toward the screen, and means for supplying air and gas to the mixing-chamber.

3. A gas-burner having the following: a vertically-arranged tube 12, a chamber 17 formed within the lower portion of the said tube, a mixing-chamber 26 formed within the tube above the first-mentioned chamber; a head 36 provided at the upper end of the tube and having a centrally-located upwardly-discharging port 37 whose lower portion is enlarged downwardly; an upwardly-bulging concavo-convex screen 34 held in place within the tube at the lower end of the said head; an upright port 27 formed in and centrally of the wall located between the aforesaid lower chamber 17 and the mixing-chamber 26 with its lower end flaring downwardly and with its upper end flaring upwardly, and means for supplying air and gas to the lower chamber 17.

4. A gas-burner having the following: an upright tube 12; a chamber 17 formed within the lower portion of the said tube; lateral apertures or inlets 18 formed in the surrounding wall of the said chamber; a sleeve 19 rotatably embracing the lower portion of the tube 12 and having lateral apertures or holes 20 arranged to register with the aforesaid lateral air-inlets 18; a mixing-chamber 26 formed in the upper portion of the tube 12; an upright port 27 formed in and centrally of the wall located between the aforesaid chambers 17 and 26 and having a downwardly-flaring lower end and flaring upwardly at its upper end; a head 36 provided at the upper end of the tube 12 and having a centrally-located upwardly-discharging port 37 whose lower portion is enlarged downwardly and whose upper end has a slight internal annular flange having a downwardly-flaring under side, and means for discharging gas upwardly into and centrally of the aforesaid lower chamber 17 opposite the air-inlets 18.

5. A gas-burner having the following: an upright tube; a mixing-chamber 26 formed within the tube and having its upper end gradually reduced upwardly; a head provided at the upper end of the tube and having an upwardly-discharging port whose lower portion is enlarged downwardly; means for supplying air and gas to the lower end of the mixing-chamber, and a screen arranged between the lower end of the aforesaid port and the upper extremity of the gradually-reduced upper end of the mixing-chamber and next adjacent to the said extremity.

Signed by me at Cleveland, Ohio, this 7th day of August, 1901.

JOHN HARRIS.

Witnesses:

C. H. DORER,

A. H. PARRATT.