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J. HARRIS.

APPARATUS AND PROCESS FOR BURNING ACETYLENE OR SIMILAR GASES.

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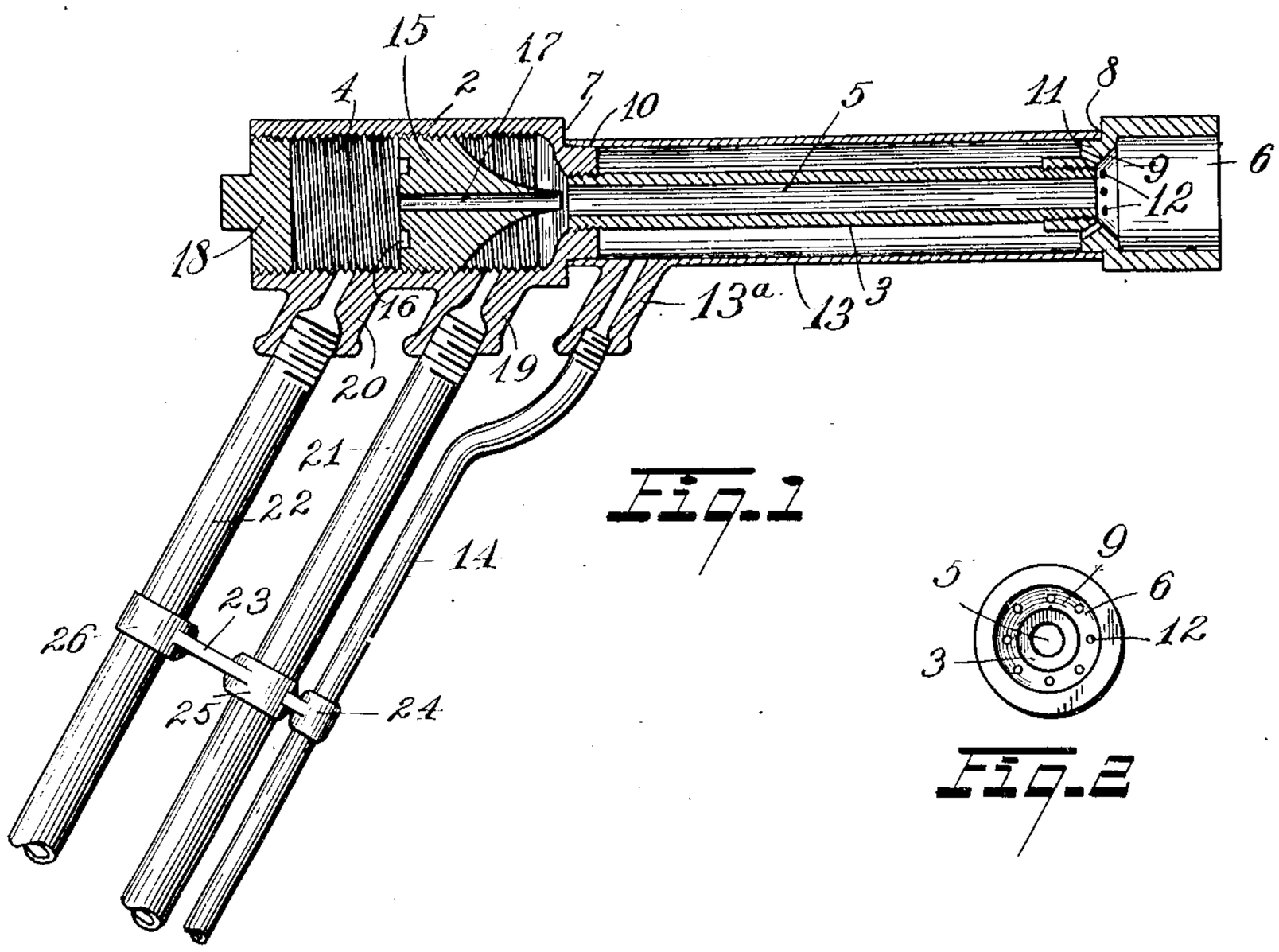

Fig. 1

Fig. 2

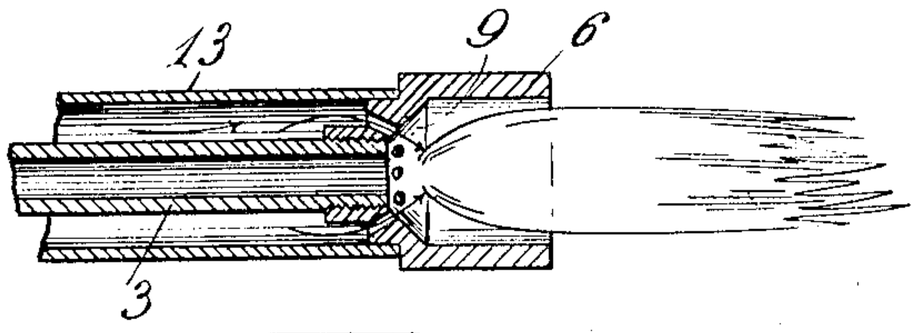

Fig. 3

WITNESSES:

Brennan B. Weaver.

Nathan F. Fretter.

INVENTOR.

John Harris,

By

Bates, Fouts & Hull.

ATTYS.

UNITED STATES PATENT OFFICE.

JOHN HARRIS, OF CLEVELAND, OHIO, ASSIGNOR TO THE HARRIS CALORIFIC COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

APPARATUS AND PROCESS FOR BURNING ACETYLENE OR SIMILAR GASES.

No. 878,461. Specification of Letters Patent. Patented Feb. 4, 1908.

Application filed April 8, 1907. Serial No. 366,916.

To all whom it may concern:

Be it known that I, JOHN HARRIS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Apparatus and Process for Burning Acetylene or Similar Gases, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to an apparatus and a process for the burning of acetylene or other gases rich in carbon such as benzene or other polymers of acetylene, with ordinary atmospheric air as distinguished from oxygen, and has for its object to produce a flame of intense calorific power by the combustion of such gases and ordinary atmospheric air without liability of the flame to blow out or "die out" by the pressure of the air which is supplied to the gas.

In carrying out my process, I mingle air and gas thoroughly in a mixing tube and ignite the mixture at the outlet end of said tube in the manner described in my Patent No. 853,634 issued May 14, 1907. The expanded burning mixture is prevented from dying away or blowing out as the air pressure is increased in the manner described in said application. As an improvement over the process disclosed in the aforesaid application, I introduce a supply of oxygen at the base of the flame produced by the combustion of the mixture of air and gas in such manner as to increase the intensity of the flame and render the adherence of the same to the end of the mixing tube even more effectual than in the case of the construction shown in my aforesaid application.

I carry out the process in a novel form of blow-pipe, also constituting a part of my invention, whereby I am enabled to produce a flame having not only the intense heating qualities of the flame produced by the blow-pipe described in my aforesaid application, but whereby I am enabled at will to shorten and concentrate such flame and produce therefrom greater thermal effects than can be realized by the former blow-pipe.

Generally speaking, the invention may be defined as consisting of the combinations of steps and elements embodied in the claims hereto annexed.

In the drawings forming part hereof, Figure 1 represents a longitudinal sectional view taken through a blow-pipe constructed in accordance with my invention, the connections for supplying air, gas and oxygen thereto being shown in elevation; Fig. 2 represents a front elevation of said blow-pipe; and Fig. 3 represents a detail sectional view of the front or discharge end of the blow-pipe, indicating the manner in which the flame is supplied with oxygen and the general form of the flame when thus supplied.

Describing the parts by reference characters, 1 represents the blow-pipe generally, the same consisting preferably of a tubular body having an enlarged rear portion 2 carrying at its front end an elongated mixing tube 3. The enlarged rear portion is provided with a corresponding enlarged bore or chamber 4 having an internal thread and the tube 3 is provided with a relatively smaller bore 5. The discharge end of mixing tube 3 is provided with an enlarged hood 6, which is preferably threaded onto the front or discharge end of said tube. A shoulder 7 connects the rear portion 2 with the tube 3, the inner surface of said shoulder being generally frusto-conical in contour. The hood 6 is provided with a shoulder 8, the inner surface whereof is generally frusto-conical, the arrangement being such that when the hood is in proper relation to the end of the mixing tube, the frusto-conical surface 9 forms substantially an unbroken extension of the front end of said tube. The front end of shoulder 7 and the rear portion of hood 6 are provided respectively with ledges 10 and 11, the outer surfaces whereof are substantially equidistant from the outer surface of the mixing tube. The ledge 11 is provided with a plurality of small ports 12 extending therethrough and inclined toward the axis of the mixing tube 3.

13 denotes a sleeve which surrounds the mixing tube 3 with the rear end thereof fitting ledge 10 and the front end thereof fitting ledge 11. In assembling, the sleeve 13 is slipped over the tube 3 and ledge 10. The hood 6 is then threaded onto the outer end of mixing tube 3 and said sleeve is firmly clamped between the front and rear vertical faces of shoulders 7 and 8 respectively. The sleeve 13 is provided with a hollow boss 13^a to which is secured the end of the tubular connection 14 through which oxygen is supplied to the annular space or passageway between tube 3 and sleeve 13. The plug 15

is threaded into the chamber 4, said plug being provided with suitable recesses 16 for the accommodation of a wrench. The front of this plug is generally conical in outline and its end is in axial alinement with the tube 3. By adjusting said plug, the width of the port formed between the front end thereof and the rear end of tube 3 may be regulated. Plug 15 is provided with a central passageway 17 extending therethrough in axial alinement with bore of tube 3 and communicating with the chamber formed between the rear end of said plug and a plug 18 which closes the end of said chamber. The enlarged rear portion 2 of the blow pipe is provided with two hollow bosses 19 and 20, to the former of which is secured the connection 21 for acetylene and to the latter of which is secured the connection 22 for air under pressure. The connections 14, 21, and 22 extend downwardly from the blow pipe and at about the same angle and are brought close together to form a convenient hand grip for manipulating the blow pipe. A band 23 having collars 24, 25 and 26 is applied to said connections for the purpose of preventing the proper relation between said connections and the blow-pipe from being disturbed.

In operation, acetylene (or other gas rich in carbon) is supplied through connection 21 into the chamber 27 which is provided in front of the plug 15. Thence it passes between the front end of said plug and the inner surface of shoulder 7 in a thin converging sheet into the bore 5. Air under pressure is supplied through connection 22 into the chamber between plugs 15 and 18 and through passageway 17 into bore 5, axially thereof and centrally of the gas supplied thereto. The mixture may now be ignited and will burn with the base of the flame within the hood 6, the hood acting as a shield for the base of the flame in the manner explained in my application No. 284,596. The flame will persist and will not die out even though the pressure of the air supplied thereto be increased to as high as one hundred pounds to the square inch, and the flame will be a long oxidizing flame, the inner end or base whereof will adhere closely to the end of the mixing tube 3, even under the high pressure referred to, and will not "light back" within the burner. This flame produces a very high degree of heat and has proved of great value in the industrial arts. It frequently happens, however, that it is desirable to obtain an even greater temperature than that which can be procured from the ignition of the mixture of acetylene and air. To accomplish this result, oxygen is supplied through the connection 14 into the annular space between tube 3 and sleeve 12. The oxygen flows in a number of converging jets through ports 12 into the hood 6 and strikes the burning gases at about the base of the flame, as indicated by the arrows in Fig. 3. The result of admitting the oxygen in this manner and in the limited quantity which can be supplied through the small ports 12 is to reduce the length of the flame to about one-fourth of the length which is produced by the burning of the air and acetylene. This flame is not pointed but is somewhat brush-shaped, as shown in Fig. 3, and, owing to the concentration of the combustion, the temperature of this flame is several hundred degrees higher than that produced by the burning of the acetylene and air alone. The obtaining of this increased temperature is facilitated by the fact that the pressure of the air which is supplied to the burner may be increased to double that which may be ordinarily used without danger of the flame blowing out or dying away from the end of the blow-pipe. By the above apparatus, I am enabled to carry out successfully my improved process of burning acetylene and similar gases rich in carbon without the danger of "lighting back". There is no mixing of the oxygen with the air and acetylene within any of the passageways or ducts of the burner proper as this mixing takes place at the point of ignition, making it impossible for the mixture to "light back." Furthermore, the projecting of the acetylene in a converging sheet into the tube 3, the directing of the air under pressure centrally and axially of said sheet and of said bore 5, and the admission of the oxygen in limited quantity at the base of the flame and in converging jets are believed to produce the marked results which are obtained in the operation of my blow-pipe.

It will be understood that suitable valves (not shown) will be provided for controlling the flow of air and gases to the blow-pipe.

By the term "oxygen" which is employed herein, I do not mean oxygen in diluted condition as it exists in air, but substantially pure oxygen, such, for instance, as is supplied to the trade in tanks.

I claim:

1. The process of burning acetylene or similar gas rich in carbon which consists in projecting said gas in a converging direction into a mixing tube, projecting air under pressure centrally of the converging gas, mingling the gas and air in said tube, permitting the mixture to expand, and admitting to such expanded mixture, beyond the end of the mixing tube, a relatively limited supply of oxygen, substantially as specified.

2. The process of burning acetylene or similar gas rich in carbon which consists in projecting the gas in a converging direction into a mixing tube, projecting air under pressure centrally and axially of the converging gas and of said mixing tube, permitting the mixture to expand beyond the end of the

mixing tube, igniting the mixture, and supplying to the base of the flame thus produced oxygen in a limited quantity, substantially as specified.

3. The process of burning acetylene which consists in mingling acetylene with air under pressure in a mixing tube, permitting the mixture to expand within a chamber, and projecting oxygen in a series of converging jets into said mixture, substantially as specified.

4. The process of burning acetylene which consists in mingling acetylene with air under pressure in a mixing tube, permitting the mixture to expand within a chamber, igniting the mixture, and projecting oxygen in a converging direction into the base of the flame.

5. The process of burning acetylene or similar gas rich in carbon which consists in mingling the gas with air under pressure in a mixing tube, permitting the mixture to expand beyond the end of the mixing tube, and supplying oxygen in limited quantity to said mixture adjacent to the outlet end of the mixing tube, substantially as specified.

6. The process of burning acetylene or similar gas rich in carbon which consists in mingling the gas with air under pressure in a mixing tube, permitting the mixture to expand beyond the outer end of the mixing tube, and admitting oxygen in a converging direction to the mixture adjacent to the outlet end of the mixing tube, substantially as specified.

7. In an apparatus for burning acetylene or similar gas, the combination of a mixing tube, means for projecting such gas into said tube, means for projecting air under pressure into said tube, a chamber surrounding the outlet in said tube, and means for supplying to said chamber one or more jets of oxygen.

8. In an apparatus for burning acetylene, the combination of a mixing tube, means for projecting such gas into said tube, means for projecting air under pressure into said tube, a chamber surrounding the outlet in said tube, and means for supplying oxygen to said chamber in a series of converging jets, substantially as specified.

9. In a blow-pipe, the combination of a mixing duct, means for supplying gas and air to said duct, a shield for the outlet end of said duct, and means for supplying oxygen through said shield to the mixture of gases issuing from said duct, substantially as specified.

10. In a blow-pipe, the combination of a mixing duct terminating in an enlarged outlet chamber, means for supplying gas and air to said duct, and means for supplying oxygen to said chamber, substantially as specified.

11. In a blow-pipe, the combination of a mixing duct terminating in an enlarged outlet chamber having a plurality of converging ports therethrough, means for supplying gas and air to said duct, and means for supplying oxygen through said ports into the said chamber, substantially as specified.

12. In a blow-pipe, the combination of a duct terminating in an enlarged outlet chamber, a sleeve surrounding said duct and forming therewith and with said chamber an annular passageway, means for supplying gas through said duct, and means for supplying oxygen to said annular passageway, there being one or more ports for permitting the flow of oxygen from the passageway into the outlet chamber, substantially as specified.

13. In a blow-pipe, the combination of a mixing duct terminating in an enlarged outlet chamber, a sleeve surrounding said duct and forming therewith and with said chamber an annular passageway, means for supplying gas and air to said duct, and means for supplying oxygen to said passageway, there being a plurality of inclined ports permitting the flow of oxygen from the passage-way into said chamber, substantially as specified.

14. In a blowpipe, the combination of a body provided with inlets for air and gas and with a mixing duct projecting therefrom, said duct terminating in an enlarged outlet chamber having a shoulder projecting beyond the outer surface of said duct and provided with inclined ports extending therethrough, a sleeve surrounding said duct and said shoulder and forming therewith an annular passageway, means for supplying air and gas to said duct, and means for supplying fluid to said passageway, substantially as specified.

15. The process of burning acetylene or similar gas rich in carbon which consists in supplying said gas in a converging direction into a mixing tube, projecting air under pressure into said tube and centrally of the converging gas, permitting the mixture to expand beyond the outer end of the mixing tube, igniting said mixture, and shielding the base of the flame thus produced, substantially as specified.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

JOHN HARRIS.

Witnesses:
J. B. HULL,
G. A. MYERS.