W. W. KEMP & W. H. VAN HORN.

BRAZING BURNER.

APPLICATION FILED JAN. 18, 1912.

1,066,915.

Patented July 8, 1913.

2 SHEETS—SHEET 1.

Fig 1

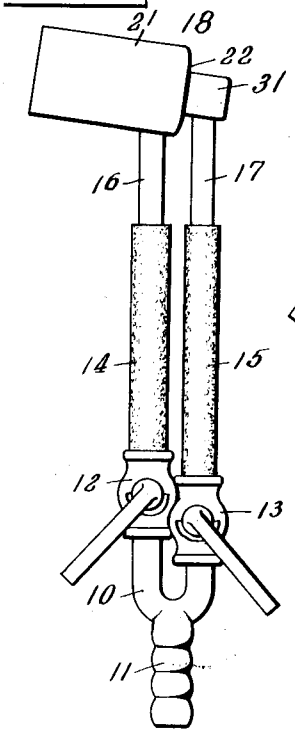


Fig 2

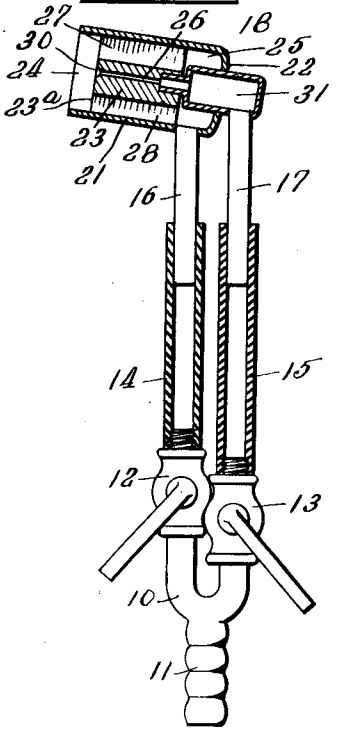


Fig 5

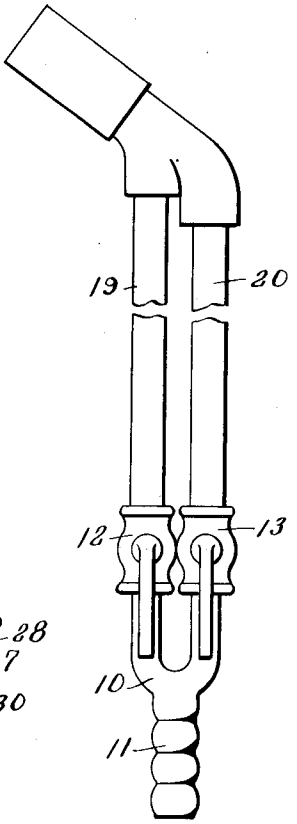


Fig 3

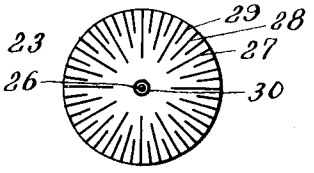


Fig 4

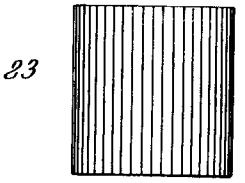
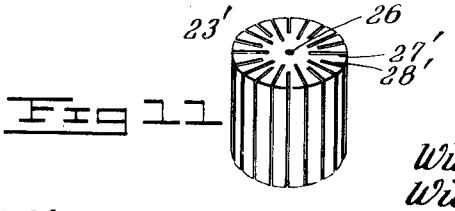


Fig 11



Witnesses

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2 SHEETS—SHEET 2.

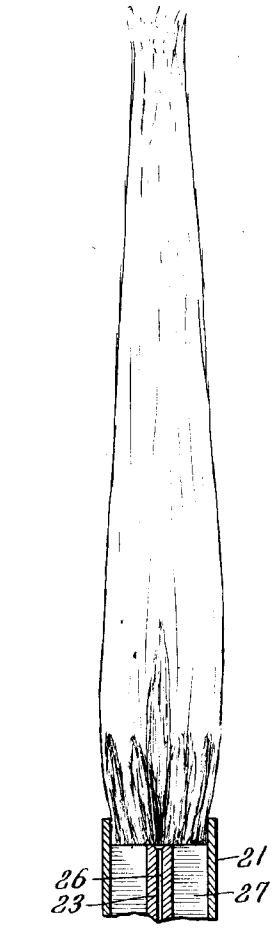


Fig 6

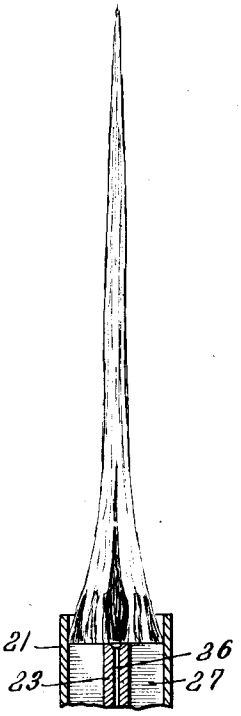


Fig 7

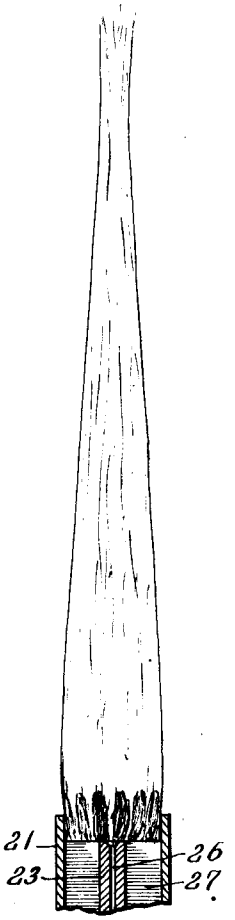


Fig 8

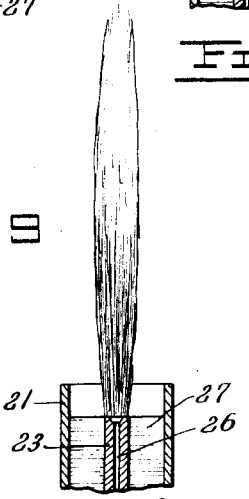


Fig 9

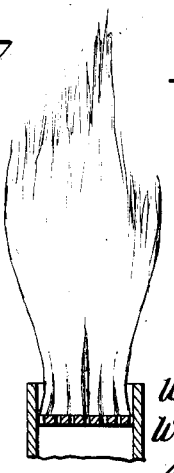


Fig 10

Witnesses

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BRAZING-BURNER.

1,066,915. Specification of Letters Patent. Patented July 8, 1913.

Application filed January 18, 1912. Serial No. 671,907.

To all whom it may concern:

Be it known that we, WILLIAM W. KEMP and WILLIAM H. VAN HORN, citizens of the United States, residing at Baltimore, in the State of Maryland, have invented new and useful Improvements in Brazing-Burners, of which the following is a specification.

This invention relates generally to what are known as blast and brazing burners, but more particularly to the tips or nozzles therefor, and has for its object to provide a tool, especially adapted for use in connection with hydrocarbon gas as a fuel made from a suitable hydrocarbon in the ordinary manner.

Great difficulty has, heretofore, been experienced in using hydrocarbon gas under pressure as a fuel for this type of burner, because of the inability to keep constantly ignited, and at times to ignite, a stream of gas flowing through a small opening to produce a long needle-like flame, so necessary in certain arts and manufactures. The trouble, probably, is due to certain qualities generic to the gas, and its lightness or tenuity which, under pressure, although very small, is sufficient to prevent ignition of the gas or to immediately "blow it out" if it becomes ignited, unless a pilot flame be constantly maintained at or near its point of emission from the burner. Numerous attempts have been made with more or less success to overcome this difficulty, but up to the present time complete success, so far as known to us, has not been realized.

In the present invention, however, practical use has demonstrated its great success, as by its means a continuous and powerful jet flame of relatively great length and either small or relatively large, diameter may be produced, and which may or may not, as desired, terminate in a fine needle-like point; and also what is sometimes called a "soft" flame may be quickly produced as the requirements of the operator demand, by simply varying the feed of gas without change of any kind in the burner tip or nozzle.

The tool to which our improved burner tip or nozzle is herein shown as applied, is simple in construction and inexpensive to manufacture; the parts are few in number and easily assembled by ordinary workmen; there is no danger of "back fire" nor a rapid burning out of the tip or jet nozzle due to the intense heat of the flame.

In the accompanying drawings, wherein like reference numerals are used to designate like parts throughout the several views, Figure 1 is an exterior view of one form of brazing burner, made according to the present invention; Fig. 2 is a longitudinal sectional view of the same; Fig. 3 is an enlarged face view of the burner tip; Fig. 4 is a side view of the same; Fig. 5 is an exterior view of a slightly modified form of brazing burner; Figs. 6, 7 and 8 are views made from photographs showing actual flames of different characteristics produced by varying the flow of gasolene gas to the burner tip of the present invention; Fig. 9 is a view illustrating a flame produced by ordinary illuminating gas and air with the same burner tip; Fig. 10 represents a flame produced with a thin perforated or reticulated disk of known construction used as a burner tip; Fig. 11 is an enlarged, perspective view of the burner tip showing a different arrangement of the radial slots from those shown in Fig. 3.

In the drawings, which illustrate one form of tool to which the principal feature of the present invention is applied, the numeral 10, indicates a U-shaped coupling from the bend of which projects a stem 11 for the attachment of a gas pipe, preferably a flexible hose, not shown. Screwed to each end of the U-coupling 10, is a valve of any approved type, indicated at 12 and 13, each provided with some convenient means for manually opening and closing the same. From the opposite ends of the valves 12, and 13, extend parallel tubes 14 and 15, respectively, for a suitable distance to form a hand grasp made, preferably, of some heat non-conducting material such as vulcanized fiber. Metal pipes 16 and 17 connect the ends of the tubes 14 and 15 to the head 18 of the brazing burner in a manner to be described later.

Instead of inserting the non-conducting tubes 14 and 15 between the valves 12 and 13 and the head 18, metal pipes 19 and 20 may extend directly from the valves to the head, as in Fig. 5. The pipes in this case are, however, preferably made longer so that they may be grasped sufficiently far from the head to avoid the conducted heat from the burner; or, the pipes 19 and 20 may be covered with a non-conducting material as asbestos, wood or the like.

The head 18 of the brazing burner is

made, as shown in Figs. 1 and 2, of a cylindrical casing 21 closed at one end by a head 22 and open at its opposite end.

Within the casing 21 is placed the improved burner tip or nozzle 23 consisting, in the instance shown, of a cylindrical block or plug, its length being preferably greater than its diameter, and tightly fitting the casing wall. The ends or faces of the tip are preferably, but not necessarily, perpendicular to its axis, the outer face 23^a being within the outer open end of the casing, leaving a space 24 between said end and face to form a combustion chamber. The tip or plug 23 may be located at any position found desirable in the casing 21, such as to dispose the outer face 23^a of the plug flush with the open end of the casing, or to dispose the face 23^a within the open end of the casing, as shown in the present drawings, when it is desired to provide the combustion chamber or space 24. Between the rear face of the burner tip 23 and the casing head 22 is a gas chamber 25 kept filled with gas through the pipe 16 which communicates therewith. A small hole 26 is bored axially through the burner tip 23 and a plurality of thin radial slots 27, 28 and 29 are cut in the tip from its periphery toward the central opening, some of which slots are as near said central opening as practicable and they extend the entire length of the tip. The rear end of the central opening is, in the instance shown, counterbored to receive the reduced end of a coupling or pipe 31 extending centrally through the gas chamber 25 from without the casing 18 where it is connected to the gas pipe 17.

Constructed as described, the gas enters through the stem 11 and passes up both branches of the U-coupling to and through the valves 12 and 13, if open, and thence through the tubes 14 and 15, pipes 16 and 17, and from the former to the gas chamber 25 in the head, and from the latter to the pipe or coupling 31 projecting from the head. The gas in the gas chamber 25 passes through the narrow grooves 27, 28 and 29 in the burner tip and, when ignited, burns against the front face 23^a of the tip 23. The gas in the coupling or pipe 31 passes only to the small central opening 26, in the burner tip and through the same, being ignited and kept burning against the tip by the surrounding flame.

The burner tip 23, which forms the principal features of the present invention, is shown enlarged in Figs. 3 and 4, and in this showing the tip is of cylindrical shape with flat ends perpendicular to the axis of the tip, although it is not absolutely necessary that the ends be so formed. These figures also show the position of the central opening 26 and the arrangement of the peripheral slots 27, 28 and 29, to enable the greatest number possible being cut in the tip. A tip 23′ of less diameter will have the slots disposed as in Fig. 11. When the tip is mounted within the head 18, the inner wall thereof closes the peripheral ends of the slots, so that the gas passing therethrough must make its exit from the front face 23^a of the tip in thin sheets as wide as the depth of the slots and, igniting against the face 23^a, a number of relatively wide flames are formed which unite to form the combined flame. Each wide flame issuing from a slot formed in a relatively long or thick block or tip, is stronger and less liable to be blown out than a series of fine flames emanating from minute holes; hence the advantage of slots over rows of small holes. The flame of the gas from these slots, therefore, will be in the same plane or substantially so as the jet flame, and will serve to keep the latter flame lighted, thus acting as a pilot, although in some instances, as will hereinafter appear, the flames from these slots will serve as the working flame.

The use of a thin perforated or reticulated disk, or one having notches in its periphery and a central outlet, is well known, but from practical experience it has been found that the use of a disk as a burner tip is impractical as it will not hold the flame under proper working pressure; it will burn out very quickly, owing to the intense heat and, therefore, requires constant renewal; but with a thick block for a tip, such as is herein used, it will keep relatively cool; will hold the flame under proper working pressure and will not be destroyed by the flame. Another disadvantage of a thin disk for a tip is the impossibility of concentrating the flame, which spreads laterally, is very thin and generates little heat. The long tip of the present invention, by reason of its length, directs and concentrates the flow of gas therethrough and intensifies the heat of the flame. The burner tips 23 are cheap and easily made from stock of suitable cross-section, cut to proper lengths, bored and kerfed on a suitable machine tool.

It is to be noted that the present burner uses gas of one kind only, hydrocarbon gas made from a mixture of hydrocarbon vapor and air, fed to a U-coupling on the burner through a single flexible pipe. The gas is divided by said coupling, one part passing to the peripheral slots in the burner tip, the other part to the small central opening in the same, the flow of gas to the slots and the central opening being controlled by separate valves. By this arrangement, in connection with the novel burner tip, flames of different characters are produced specially suitable for various purposes, as shown in Figs. 6, 7 and 8, which are views made from photographs of actual flames

produced by a burner tip made according to the present invention.

In Fig. 6 both valves are open to their fullest extent producing a large intensely hot flame of great length and designed for heating large bodies quickly to a high temperature. This flame is also useful for furnaces, and when a number of them are arranged in a group a very high temperature results.

Fig. 7 shows a fine needle-like flame with a fine sharp point. In this case the full flow of gas passes through the central opening in the burner tip, but a reduced quantity only is permitted to pass through the slots, the flow being controlled by manipulating the valve 12. With this type of flame, which is exceedingly hot, limited areas may be highly heated or melted, soldering and brazing may be quickly performed with limited spread of heat in the parts being operated upon, and numerous other uses to which a flame of this type may be put will readily suggest themselves to the skilled mechanic. The length of this flame is not necessarily governed by the quantity of gas issuing from the central opening. The full supply of gas may flow through said opening and by gradually turning the valve 12, cutting off gas to the peripheral slots of the tip, the needle-like flame will gradually lessen in length until it is finally extinguished or "blows out" before extinguishment of the "slot" flame, notwithstanding the gas continues to flow with full force through the central opening.

Fig. 8 illustrates what is called a "soft" flame, that is, a long flame with little force produced by gas flowing from a great number of outlets over a relative large area. In this case, the gas to the central opening is wholly cut off, the flame being supplied by gas passing through the numerous peripheral slots. The heat of this flame is not as intense nor as forceful as in the other flames, and is, therefore, useful for annealing, moderately heating bodies, laboratory work and many other purposes.

Fig. 9 shows the flame of a mixture of ordinary illuminating gas and air supplied to the same burner producing the flames of Figs. 6, 7 and 8. It will be observed that the flame is shorter, broader and without the fine point of Fig. 7. Furthermore, it generates less heat.

Fig. 10 represents the flame of a burner with a thin disk burner tip of known construction, instead of the thick or long tip of the present invention. With this thin disk construction, it will be seen that the flame is dispersed and thin and cannot be concentrated, and the heat generated therefore is relatively small. Only a small quantity of gas under low pressure can be used with this burner, because it will blow out or extinguish itself when subjected to the amount employed with a relatively long plug tip; nor can the burner be relighted when blown out without reducing the flow of gas.

While we have herein shown and described our improved form of burner-tip as applied to a brazing burner, we do not wish to be understood as specifically limiting ourselves to this particular application of the tip, as obviously it may be employed in connection with other types of burners. Nor do we wish to be understood as limiting ourselves to a burner tip made of a block or body that is truly cylindrical in cross section as other cross sectional shapes may be employed without departing from the spirit of the invention.

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

1. In a burner, a tip therefor comprising a body having a small axial opening therethrough adapted to deliver a stream of gas at high pressure and a number of radial slots running from end to end of the body and extending from the periphery to near the axial opening of the body to discharge gas at low pressure in thin films from the end of the tip around the high pressure gas, said body being elongated whereby to collect and condense the gas in the axial opening and the radial slots to project the gas from the end of the tip to a considerable distance in a compact and condensed condition.

2. In a burner, an open ended casing and a body located within the casing, said body having a relatively small axial opening and a relatively large number of narrow slits extending from the periphery of the body to a point near said axial opening and extending throughout the entire length of the body.

3. In a burner, a tip therefor comprising a relatively long cylindrical block having a small axial opening therethrough and a plurality of narrow longitudinal slots extending from the periphery of the tip toward said opening, the outlets of the axial opening and the slots being in the same plane, a casing fitting tightly around said tip and closing the peripheral openings of said slots, said casing projecting beyond said tip at one end to form a combustion chamber, and at its opposite end to provide a gas chamber communicating with the slots, means for supplying gas to the axial opening in the tip, and separate means for supplying like gas to the gas chamber.

4. In a burner, a tip therefor comprising a relatively long cylindrical block having a small axial opening therethrough, and a plurality of narrow longitudinal slots extending from the periphery of the tip to-

ward said opening, a casing fitting tightly around said tip and closing the peripheral openings of said slots, said casing projecting beyond said tip at one end to form a combustion chamber and at its opposite end to provide a gas chamber communicating with the slots, means for supplying gas to the axial opening in the tip, separate means for supplying like gas to the gas chamber, valves for independently controlling the gas passing through the supplying means, and a feed pipe common to both of said gas supplying means for delivering gas of one kind thereto.

5. A gas burner comprising a relatively long tip, a casing open at one end tightly surrounding the same, said open end projecting beyond the tip, said tip having a small axial opening therethrough, and a plurality of narrow longitudinal slots projecting toward the axial opening from its outer surface, a pair of gas tubes connected at one end and there provided with means for receiving hydrocarbon gas, and a valve in each tube, one of said tubes carrying gas to the axial opening in the tip, and the other tube supplying gas to the longitudinal slots in the same.

6. In a burner, a tip therefor, its length being greater than its diameter, and its ends perpendicular to its axis, said tip having a small axial opening formed therethrough, and a plurality of narrow longitudinal slots extending toward said axial opening from the peripheral surface of said tip, means surrounding the tip for closing said slots except at their ends, and separate controllable means for supplying hydrocarbon gas to the axial opening and collectively to the narrow slots.

7. In a burner, a tip therefor comprising a relatively long cylinder having a small axial opening therethrough, and a plurality of narrow peripheral slots extending from end to end of the tip and inwardly toward the axial opening, a casing for said tip having a cylindrical opening in which said tip fits tightly between the ends of said opening to form a gas chamber at one end, and a combustion chamber at its other end, and means for supplying gas to said gas chamber.

8. In a gas burner, a tip therefor comprising a relatively long body having a central perforation and a plurality of narrow peripheral slots extending inwardly to near the center of the body, said slots extending throughout the length of the body, combined with a casing having an open end of the diameter of the casing into which said tip is fitted, the wall of said casing projecting beyond the outlet end of the tip to form a combustion chamber within which ignition of the gas issuing from the perforation and the slots takes place.

9. In a gas burner, a tip therefor comprising a relatively long body having a small axial gas opening and a plurality of narrow peripheral slots extending from end to end of the tip and forming gas passages, and a casing of uniform diameter fitting tightly around said tip and closing the peripheral slots, said casing having an open end projecting beyond the outlet end of the tip to form a combustion chamber within which ignition of the gas issuing from the axial opening and the slots takes place.

10. In a burner, a tip therefor comprising a relatively long body having a small longitudinal gas bore, and a plurality of narrow longitudinal slots extending from end to end of the tip and radially disposed to form narrow gas passages independent of the said bore, combined with a casing fitting tightly around said tip and closing the said radial slots, said casing being of the same diameter throughout and having an open end projecting beyond the outlet end of the tip to form a combustion chamber within which ignition of the gas issuing from the longitudinal bore and the slots takes place.

11. A burner tip comprising a relatively long block having a plurality of narrow slots cut longitudinally therethrough from end to end, said slots radiating from a point near the center of the block and extending through the periphery thereof, some of the slots being deeper than others.

12. A burner tip for use with hydrocarbon or oil gas comprising a relatively long block having a small axial opening and a plurality of narrow slots cut longitudinally therethrough from end to end of the block, said slots radiating from substantially the center of the block and extending through the periphery thereof, some of the slots being deeper than others, the deeper slots extending nearly to the said axial opening and alternating with the shorter slots.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

WILLIAM WALLACE KEMP.
WILLIAM H. VAN HORN.

Witnesses:
EDGAR JOSEPH S. KEMP,
JOHN S. COLE.