G. W. HOPKINS

BURNER.

APPLICATION FILED MAY 26, 1913.

1,215,153. Patented Feb. 6, 1917.

Fig. 1.

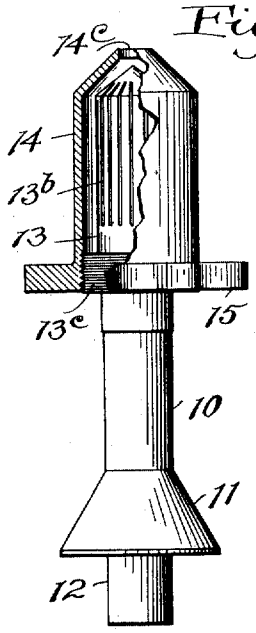


Fig. 2.

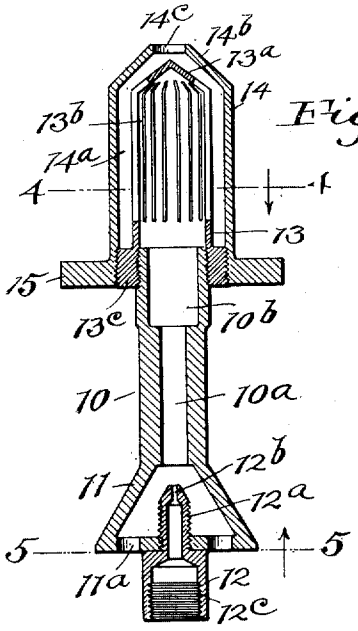


Fig. 3.

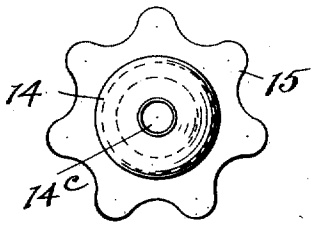


Fig. 4.

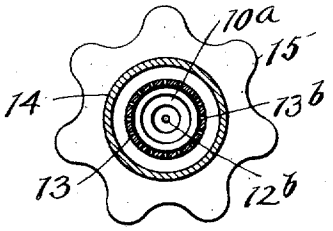
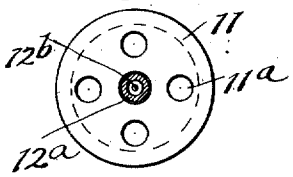


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE W. HOPKINS, OF CLEVELAND, OHIO, ASSIGNOR TO THE ACETYLENE STOVE MANUFACTURING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

BURNER.

1,215,153. Specification of Letters Patent. Patented Feb. 6, 1917.

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To all whom it may concern:

Be it known that I, GEORGE W. HOPKINS, 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 Burners, of which the following is a full, clear, and exact description.

This invention relates to burners adapted particularly for use with acetylene. The main objects of the invention are to provide an acetylene burner which is highly efficient, both as a heating and lighting burner; which by its construction eliminates the liability of the burner becoming heated to the point or temperature at which decomposition of the gas may take place, whether the burner is employed with high or low pressure systems; and which at the same time is strong, durable and inexpensive to manufacture.

Further objects are to provide a burner wherein there is no danger of the flame flashing back into the interior of the burner structure; wherein the flame can be turned very low without liability of being accidentally extinguished, and wherein a good commingling of air and gas is secured at varying gas pressures, and whether the flame is turned high or low.

Acetylene burners are usually provided with an inner burner tube or chambered member having restricted gas orifices, and with an outer delivery cap, one of the chief functions of which is to protect the inner member from being heated to a sufficiently high temperature to cause decomposition of the gas. It has generally been considered essential that this delivery cap (which is commonly constructed of rather thin sheet metal) be so connected to or associated with other parts of the burner, that as little heat as possible may pass by conduction to the inner member or mixing chamber. Usually this is done by insulating the cap entirely from the inner member.

In carrying out my invention, I depart very materially from the prior practice, and from prior constructions (and thereby secure numerous advantages both in construction and efficiency of operation) by intimately attaching or otherwise associating the parts so as to secure good conductivity between them. By utilizing a sufficient amount of material in the construction of the parts and sufficiently large radiating surfaces the heat is dissipated so rapidly by conduction and radiation that the mixing chamber is always maintained at a temperature below that at which decomposition of gas occurs.

The above and other novel features which contribute to the attainment of the objects stated, constitute my invention which may be here briefly summarized as consisting in certain novel combinations and arrangements of parts which will be described in the specification and set forth in the appended claims.

In the accompanying sheet of drawings, wherein I have shown the preferred form of my invention, Figure 1 is a side view of the burner with parts broken away to show the interior construction; Fig. 2 is a longitudinal sectional view; Fig 3 is a top plan view; Fig. 4 is a transverse sectional view substantially along the line 4—4 of Fig. 2 looking in the direction indicated by the arrow, and Fig. 5 is a transverse sectional view substantially along the line 5—5 of Fig. 2, looking in the direction indicated by the arrow.

The burner includes a mixing tube 10, at the base of which is an air intake member or chamber 11 to which is secured a check 12, including a nozzle 12^a which extends through the base of the intake, and has a restricted orifice 12^b, in line with and adjacent to the inner passageway 10^a of the mixing tube 10. This restricted orifice 12^b causes the incoming gas (supplied by a pipe which is adapted to be connected to a nipple portion 12^c of the check) to be projected in a fine stream into the passageway 10^a of the mixing tube, and with such velocity that air will be drawn through openings 11^a in the base of the air intake 11, and will envelop and mix with the gas as it is directed upwardly through the mixing tube passageway 10^a.

Near the top of the tube 10, the passageway 10^a is expanded or enlarged, as shown at 10^b, and connected to the upper end of the tube is an expanded mixing chamber 13, in which a further commingling of gas and air takes place. This mixing chamber 13 includes an upright tubular or cylindrical body, terminating at its upper end in a cone 13^a. Between the cone 13^a and the base of the member 13, the latter is provided with restricted orifices which prevent back

flashing of the flame into the interior of the chamber, these orifices being in the form of narrow slots 13^b, which in accordance with an important part of my invention, are vertical or extend lengthwise of the chamber 13, instead of transversely, as heretofore, so as to present the least possible resistance to the flow or passage of gas and air therethrough.

Surrounding the chamber 13 is a delivery cap 14 consisting of a tubular or cylindrical body provided with a conical top, and with a central delivery orifice 14^c, which is directly above the apex of the cone 13^a of the mixing chamber 13. Between the chamber 13 and delivery cap 14 is an annular space 14^a which receives the gas and air as it passes from the slots or restricted orifices of the chamber 13, and in which gas and air still further mix or commingle before passing through the orifice 14^c.

In the above described burner construction, several expedients or features of construction and association of parts coöperate to prevent the heating of either the delivery cap or mixing chamber to a temperature sufficiently high to cause decomposition of the gas, and these include:—first, the capacity for absorbing and conducting away heat from the points nearest the flame; second, the intimate and heat conducting relationship between the mixing tube, mixing chamber and delivery cap; and third, the large heat radiating surface.

The capacity for absorbing and conducting away the heat is due in part to the fact that I employ thicker walls or more material in the construction of the cap and mixing chamber than is usually employed in prior acetylene burner constructions. In prior constructions, thin sheet metal such as brass is generally employed, while in my construction, the cap and mixing chamber are comparatively thick and are preferably formed of cast iron. Although cast iron has a slightly lower heat conductivity than brass, the slight disadvantage resulting from the lower heat conductivity is offset, and more than offset, by utilizing more material or thicker walls in both the mixing chamber and delivery cap,—sufficient material being employed to admit of rapid conductivity away from the upper ends of the mixing chamber and cap.

However, perhaps the most important feature or factor which contributes to the rapid and effective dissipation of heat is the intimate relationship or conductive relationship between the cap, mixing chamber, and mixing tube, these parts being, in accordance with my invention, so associated or connected that heat can very readily pass from one part to another, or from a part of higher temperature to a part of lower temperature. In this respect, I depart very materially from the almost universal practice of ol structing or preventing the flow of he from the cap to the mixing chamber.

It is a matter of no great consequence in just what particular manner the three main parts of the burner are united, as long as the conductive relationship exists. A construction wherein the three parts are integrally united would perhaps be most desirable from the point of heat dissipation or conduction from one part to another, but the integral construction is not suitable for the reason that it gives rise to difficulties in manufacture. A construction wherein the parts are brazed or soldered together, would be as effective for the dissipation of heat, as the specific means of connection which I employ. I prefer, however, to form the three parts separately and to connect the parts in such a way that the flow of heat from one to another is promoted or enhanced, while at the same time, separation of the parts can be had when repairs or inspection or cleaning is necessary, hence, the three parts have threaded connections, as shown in the drawings. It will be observed that the base of the chamber 13 is screwed onto the upper end of the mixing tube, and that the chamber 13 is provided at its base with an integral external flange-like member 13^c, which is threaded exteriorly and onto which the base of the delivery cap is screwed. It is important, however, that the lengths of the threaded engaging portions of the parts be such that heat can flow from one part to another very easily.

To still further promote the dissipation of heat, the burner is provided with a large heat radiating surface which is augmented by a special radiating member 15 provided preferably at or adjacent the union of the three main parts of the burner. In this instance, the radiating member is in the form of a corrugated flange extending outwardly from the base of the cap, and is here shown as integral therewith, although it is not essential that it be integral with the cap, nor that it project from or be connected to the cap, as it may be formed integral with or be connected to one of the other parts.

The arrangement of the slots 13^b in the wall of the mixing chamber assists in maintaining the burner cool. The normal tendency of increasing the thickness of the chamber wall would be to increase the back pressure or resistance to flow of gas and air through the slots, and such augmented resistance would exist if the slots were arranged horizontally or transversely with respect to the axis of the burner. However, by arranging the slots longitudinally of the mixing chamber, there is even less back pressure, and the said slots afford less re-

sistance to the flow of gas and air therethrough than do horizontally or transversely arranged slots of the same width provided in a relatively thin chamber wall. Hence, these slots by the decreased resistance which they offer to the flow of gas and air, admit of the passage of a greater volume of air through the burner, and hence of greater cooling action by the medium passing through the burner.

A still further advantage arising from the use of the longitudinally disposed slots lies in the fact that the small resistance which they offer to the flow of gas and air through the same, admits of the flame being turned very low, with practically no danger of its extinguishment, assuming of course, that external conditions are suitable for a low burning flame,—such for example, as lack of drafts, etc.

The construction above described not only results in a burner of high efficiency, but the novel features above described contribute to the production of a burner which is extremely strong and durable, and inexpensive to manufacture.

Having thus described my invention, what I claim is:

1. A burner comprising a chambered member having restricted orifices and a delivery cap surrounding the same and provided with an orifice, the base portions of the chambered member and cap having engaging threaded portions of considerable length and area.

2. A burner comprising a chambered member having restricted orifices and a delivery cap surrounding the same and provided with an orifice, the base portions of the chambered member and cap having engaging threaded portions of considerable length and area, there being a mass of heat conducting material at the junction of said member and cap.

3. A burner comprising a conduit for conveying the medium to be burned, a chamber provided with restricted orifices having a threaded connection with said conduit, the engaging threaded portions being of considerable length and area, and a delivery cap surrounding the chamber.

4. A burner comprising a conduit for conveying the medium to be burned, a chamber provided with restricted orifices having a threaded connection with said conduit, the engaging threaded portions being of considerable length and area, and a delivery cap surrounding the chamber, there being a mass of heat conducting material at the junction of the conduit and chamber.

5. A burner comprising a conduit for supplying the medium to be burned, a chamber provided with restricted orifices communicating with the conduit, and a delivery cap provided with a delivery orifice, surrounding the chamber, the base of the cap being screwed onto the base of the chamber, there being a mass of heat conducting material at the junction of the chamber and cap.

6. A burner comprising a conduit for conveying the medium to be burned, a chamber communicating with the conduit and provided with restricted orifices, a cap surrounding the chamber and provided with a delivery orifice, the end of the conduit, the base of the chamber and the base of the cap having threaded connections and the engaging threaded portions being of considerable length and area.

7. A burner comprising a conduit for conveying the medium to be burned, a chamber communicating with the conduit and provided with restricted orifices, a cap surrounding the chamber and provided with a delivery orifice, the end of the conduit, the base of the chamber and the base of the cap having threaded connections, there being a mass of heat conducting material at the junction of the conduit, chamber and cap.

8. A burner comprising a conduit for conveying the medium to be burned, a chamber communicating with the conduit and having restricted orifices, said chamber having an enlarged externally threaded base, a delivery cap surrounding the chamber and having an internally threaded portion at its base in threaded engagement with the enlarged portion of the chamber.

9. A burner comprising a conduit for conveying the medium to be burned, a chamber provided with restricted orifices, a delivery cap surrounding the chamber and provided with a delivery orifice, the chamber having at its base a thickened portion threaded internally and externally, the end of the conduit having a threaded connection with the interior of the base of the chamber and the delivery cap having a threaded connection with the exterior of the base of the chamber.

10. A burner comprising an upright tubular chamber provided with a conical upper end, a cap surrounding the chamber and provided at its upper end with a conical portion having a delivery orifice, said chamber having a plurality of restricted orifices consisting of upright elongated slots extending lengthwise of the chamber through the major portion of the length of the latter.

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

GEORGE W. HOPKINS.

Witnesses:
E. K. HUGE,
A. F. KWIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."