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J. HUTCHINSON.

INCANDESCENT GAS BURNER.

APPLICATION FILED JAN. 24, 1901. RENEWED APR. 15, 1903.

NO MODEL.

Fig. 1.

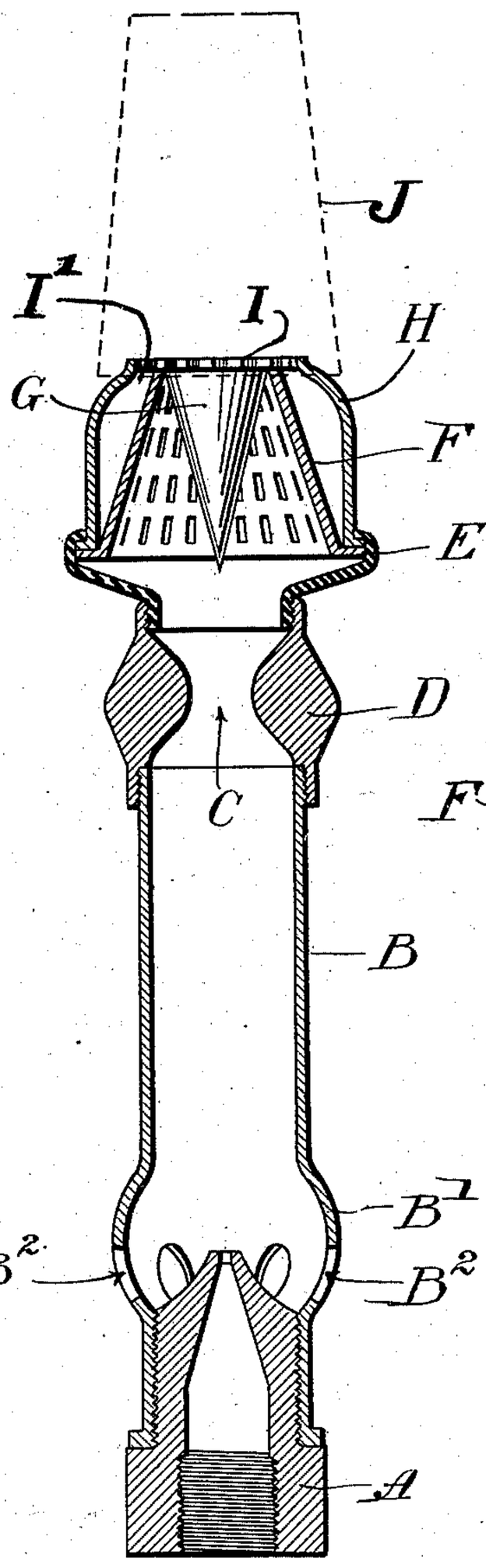


Fig. 4.

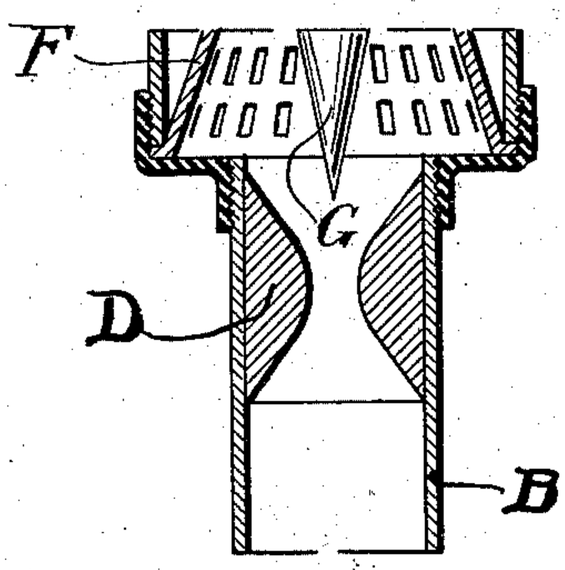


Fig. 2.

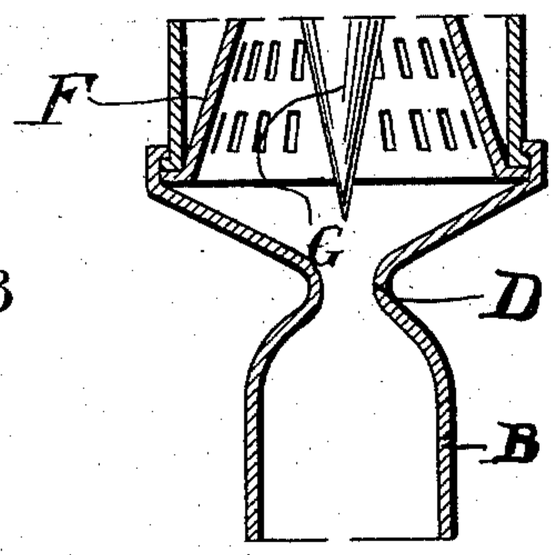
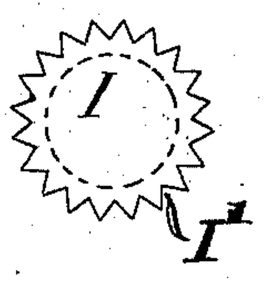


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOSEPH HUTCHINSON, OF NEW YORK, N. Y.

INCANDESCENT GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 743,510, dated November 10, 1903.

Application filed January 24, 1901. Renewed April 15, 1903. Serial No. 152,800. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH HUTCHINSON, a citizen of the United States, residing at New York, New York county, State of New York, have invented certain new and useful Improvements in Incandescent Gas-Burners, of which the following is a full, clear, and exact description.

My invention relates to so-called "incandescent gas-burners," in which a mantle formed of a suitable refractory material is employed. The burner proper is of the well-known Bunsen type, and the improvements are directed mainly thereto. There are many forms of Bunsen burners used in connection with incandescent mantles. Among them may be found burners in which the so-called "mixing-tube" is contracted at several points intermediate its length, the intended purpose of the contractions being to cause the gas and air, which enter at the bottom of the tube, to alternately contract and expand and to become thereby thoroughly mixed. There are other burners of this type in which the mixing-tube is contracted at a point about halfway in its height, so as to give the appearance of two conical sections with their smaller diameters united at the center. These old forms of burners are objectionable in that when the lower part of the tube becomes heated the gas and air are expanded below the lowermost contraction practically at the instant these elements enter the lower end of the tube. Consequently this expansion, in addition to the resistance of the contractions, not only retards the upward flow of the gas and air, but sets up a counter action tending to work the gas and air backward toward the air-ports. As a result of this the burner "throbs" or "pumps," as it is termed, unless the gas-pressure is substantially increased. To overcome this defect by the increase of the gas-pressure is a makeshift and is manifestly unscientific and objectionable, because it causes an extravagant use of the one costly element without entirely correcting the fault. Furthermore, the increase in gas-supply in the effort to overcome the throbbing or pumping produces a flame greater than can be properly utilized by the refractory mantle and not of the desired character, owing to the improper proportions of the mixture.

It is my object to get a very high efficiency by the economical use of the illuminating elements, and this result I attain by a new and peculiar formation of the gas-conduit leading to the tip of the burner.

It will be seen in the following description that the preferred form of the burner comprises an uninterrupted cylindrical portion and a relatively short contraction therein located as near the upper end thereof as practicable, the metal around said contraction being of increased thickness, so that when it becomes heated to the maximum its temperature remains at practically a uniform point during the use of the burner. In addition to this I provide a spreader to change the shape of the column of mixed gas and air from a solid column to a tubular form. This reshaped volume of gas is again heated and divided and finally delivered to the flame in such manner as to produce the most effective results. When the air and gas are admitted in the cylindrical portion of the conduit, its length and cross-sectional area relatively to the length and cross-sectional area of the contracted point at the upper end of the tube is so very great that its expansion is of such insignificant moment as to in no way cause the aforesaid throbbing or pumping. This is due to the fact that the large area within the cylindrical portion of the conduit affords a large chamber in which the gas and air may compress or expand without materially varying the flow through the contracted passage at the top of said conduit and without producing the counter tendency to drive the mixture out of the air-ports. When the gas and air reach the contracted portion, the greater degree of heat at this point acts to attenuate the stream of gas and air in such manner as to bring the mixture to a high degree of heat and greatly expand its volume as it passes upward. The higher degree of heat above said point added to the natural tendency of the mixture to expand in the direction of the flow results in an acceleration of the draft, so that no extraneous means to increase the draft is required or necessary.

The making of the contracted end of the mixing-tube out of a heavy piece of metal—that is, relatively thicker than the thickness of the cylindrical portion of the tube—is a peculiarity of construction which can be advantageously adopted and is preferred. This greater bulk of metal retains the heat at a more uniform point than would a lesser bulk of metal and is not as sensitive in responding to outside drafts of air or changes in the temperature.

In the accompanying drawings, Figure 1 is a vertical sectional elevation of the preferred form of my burner. Fig. 2 is a fragmentary view of a modification, and Fig. 3 is a plan view of one of the details of construction. Fig. 4 is a fragmentary view of a modification.

A is a gas-supply tip, which may be suitably secured to the end of a gas-fixture. This tip may be contracted at its upper end in such manner that the gas which passes into the superposed tube, hereinafter referred to, is required to flow through a fine opening.

B is a cylindrical tube. The lower portion of this tube may be suitably secured, as by screw-threads, to the tube A, and, if desired, may have a slight swell B′ mainly for ornamental purposes.

B^2 represents air-inlets formed in the tube B, preferably about on the level of the upper end of the tip A.

C is a contracted passage located at the upper end of the tube B, through which the gas and air which are supplied to the lower end of the cylindrical tube B are obliged to pass on their way to the burner-exit. This contracted passage is preferably formed by a thick ring D, which may be screw-threaded to the tube B or otherwise attached thereto. The ring D may be made of some suitable material, so as to be readily inserted within the tube, as shown, for example, in Fig. 4, at a point between the burner-head and the air-inlet and held in place conveniently.

E is a flange secured to the upper end of the ring D.

F is a strainer through which the mixture of gas and air pass on the way to the flame.

G is a spreader of conical form and preferably formed of a heavy piece of metal, so as to retain a high degree of temperature during the use of the burner. This spreader being nearer to the flame than the ring D is in use heated to a higher degree, and consequently heats the mixture of gas and air to a higher degree than will said member D. The spreader G converts the form of the gas and air supply from a solid column to a tubular flared column, the direction of which is such that it passes freely through the strainer F without setting up any counter-currents to impair the effectiveness of the burner. The diameter of the base of the spreader G corresponds substantially to the diameter of the upper end of the strainer F, and it is supported, preferably, by being secured to the under side of a disk I, which in turn is supported upon the upper end of the strainer F.

H is a casing surrounding the strainer and the disk I, the latter being of a diameter to approximately fill the upper open end of said casing.

I′ represents gas-passages at or near the outer edge of the disk I at frequent intervals, each of said passages allowing a fine stream of the gas and air mixture to flow upwardly to supply the flame.

J is a diagrammatic illustration of an incandescent mantle mounted above the burner. This mantle may receive its support in any approved way.

In Fig. 2 I have shown the ring D formed integrally with the tube B, at the upper end thereof, and although this is not the preferred form it may be advantageously employed.

In Fig. 4 the ring D is shown situated inside the tube B.

From the foregoing it will be observed that when in use that portion of the burner adjacent to and above the ring D will become very hot, while that portion of the burner below said ring will by action of the free passage of the cool gas and air remain relatively cool. It has been found that the best results are attained by securing these conditions. The relatively large area of the tube B in which the gas and air first come in contact and before they are thoroughly mixed allows the said more or less imperfect mixture of gas and air to expand and contract quite considerably without affecting the flame. As a consequence when the gas and air flow through the contracted passage C the same are more thoroughly mixed and heated. Above this contraction this now more or less thoroughly effected mixture is heated to a higher degree of temperature by coming in contact with the spreader G, whereby instead of preserving the form of a solid column it is divided into the form of a flared tubular column and caused to pass through fine openings in the strainer F, which still further perfects the mixture. Just prior to reaching the flame the mixture is again strained, as it were, by flowing through the annular row of small passages around the disk I, so that when the said illuminating mixture is finally delivered to the flame it is in a condition to give the most satisfactory results. By this means the most economical and effective results are attained. The mantle is raised to a state of incandescence capable of giving an illuminating power of greatest efficiency and preserving the same in prolonged continuous use.

What I claim is—

1. In a gas-burner, a gas-tip, a mixing-tube, air-ports therein, a contracted opening near the upper end of said tube, a strainer above said tube, a spreader supported above said

strainer, a casing surrounding said strainer, a disk surmounting said strainer and spreader, and an annular row of gas-passages between said casing and said strainer.

2. In a gas-burner, a gas-tip, a mixing-tube, air-ports therein, a contracted opening near the upper end of said tube said opening forming a passage of less cross-sectional area than the cross-sectional area of said tube, the metal about the contracted opening being substantially thicker than the metal of said tube, a strainer above said opening, a spreader above said strainer, a casing laterally surrounding said strainer and an annular row of passages between said casing and said strainer.

3. In a gas-burner, a gas-tip, a mixing-tube, air-ports therein, a contracted opening in said tube, a strainer above said tube, a spreader supported above said strainer, a casing surrounding said strainer, and an annular row of gas-passages between said casing and said strainer.

4. In an incandescent gas-burner, a gas-tip, a cylindrical tube, and a contracted section located at the upper end thereof forming a gas-passage of substantially less cross-sectional area than the cross-sectional area of the tube, a spreader located above and adjacent to said contracted passage, and a strainer adjacent said spreader and a disk above said strainer having an annular row of gas-passages.

5. In an incandescent gas-burner, a gas-tip, a cylindrical tube, and a contracted section located at the upper end thereof forming a gas-passage of substantially less cross-sectional area than the cross-sectional area of the tube, a spreader located above and adjacent to said contracted passage, a strainer adjacent said spreader, and a disk above said spreader and strainer having an annular row of gas-passages therein.

6. In an incandescent gas-burner, a gas-tip, a cylindrical tube, and a contracted section located at the upper end thereof forming a gas-passage of substantially less cross-sectional area than the cross-sectional area of the tube, a removable spreader located above and adjacent to said contracted passage, and a strainer adjacent said spreader, said strainer being surrounded by a casing leaving a gas-passage between the said strainer and the upper edge of said casing.

7. In an incandescent gas-burner, a gas-tip, a cylindrical tube, and a contracted section located at the upper end thereof forming a gas-passage of substantially less cross-sectional area than the cross-sectional area of the tube, a removable spreader located above and adjacent to said contracted passage, a strainer adjacent said spreader, and a disk above said spreader and strainer having an annular row of gas-passages therein.

8. In an incandescent gas-burner, a gas-inlet, a mixing-tube, a contracted opening near the upper end of said tube said opening forming a passage of less cross-sectional area than the cross-sectional area of said tube, a strainer located above said contracted opening, a disk above said strainer, a casing surrounding said strainer leaving a plurality of gas-passages at the edge of said disk.

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Witnesses:
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