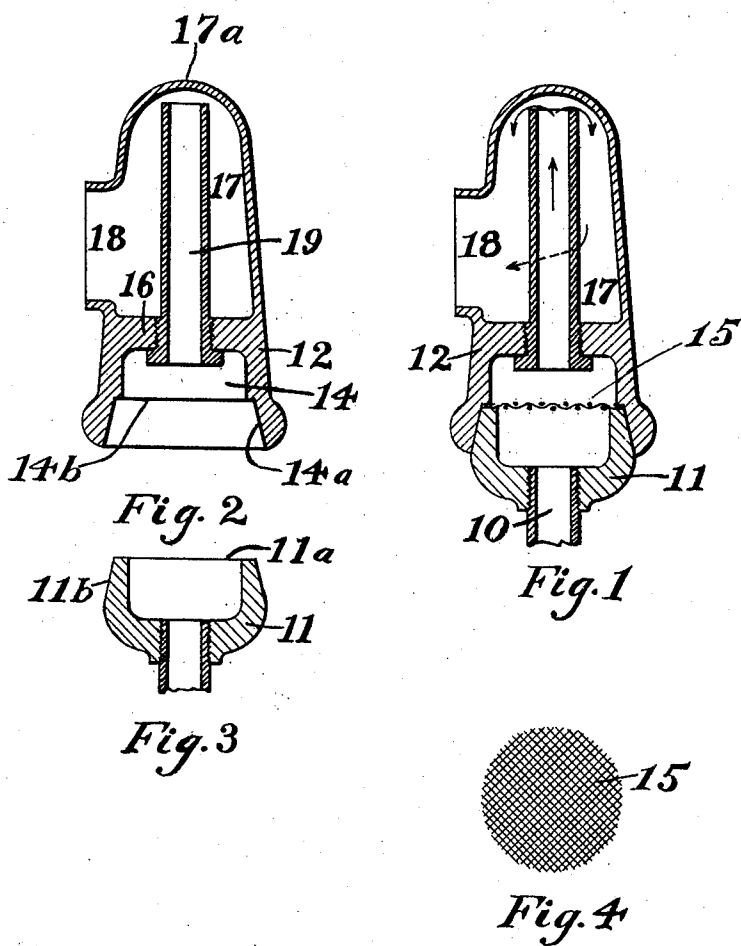


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TEST BURNER.
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1,058,702.

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TEST-BURNER.

1,058,702.

Specification of Letters Patent.

Patented Apr. 8, 1913.

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To all whom it may concern:

Be it known that I, GODFREY M. S. TAIT, a subject of the King of England, and a resident of Montclair, Essex county, State of New Jersey, have invented certain new and useful Improvements in Test-Burners, of which the following is a full, clear, and exact specification, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates particularly to a device for burning a small quantity of gas generated by a producer or like apparatus, such as being burned for the purpose of providing a flame, called a test flame, which furnishes an indication of the nature of the gas being generated and furnishes a means by which the operator can determine upon the nature of the attention which the producer may require from time to time.

My invention has various objects among which are, first, so to arrange the burner that the gas will be brought to the point of combustion at practically atmospheric pressure or so little above the same that it will not show upon a water column and to provide a means for raising the temperature of the gas, maintaining it at such temperature that it will burn continually notwithstanding that the flame may be blown aside by drafts of air; second, so to arrange the burner that a fuel expansion chamber and a burning expansion chamber will be provided which not only serves the purpose of permitting the gas to be preheated as indicated above, but also forms a comparatively large open chamber in which the gas may not only expand, but actually burn, so that should drafts of air interfere with the part of the flame outside of the burner combustion will still go on within this chamber preventing extinguishment of the flame; and third, to construct a burner so that its parts may be very readily accessible and easily disconnected, for the purpose of repair, adjustment or cleaning the parts, thus avoiding the necessity of using tools for this purpose and the consequent tendency of careless operators to neglect the necessary inspection and adjustment of the parts.

My invention has other objects and involves various other features, all of which will be set forth hereinafter and particularly pointed out in the claims.

The accompanying drawings represent, as

an example, the preferred manner of practically embodying my invention, in which drawings—

Figure 1 is a longitudinal section of the burner; Fig. 2 is a section of the upper part showing it disconnected from the other members; Fig. 3 is a section of the lower part disconnected from the other members; and Fig. 4 is a view of the barrier screen.

Referring to these drawings and the reference numerals marked thereon, 10 indicates the gas supply pipe which passes from the producer pipe line or other source and which is threaded or otherwise suitably secured into the cup-like lower section 11 of the burner. This is open at its top and is furnished with a true upper edge 11^a, the outer walls of said section 11 tapering to said edge 11^a, as indicated at 11^b. These tapering walls 11^b are preferably ground or finished true and smooth, for a purpose which will fully appear hereinafter.

The upper section 12 of the burner is of metal and has a downwardly opening chamber 14 at its lower end, furnished with a ground, tapering inner wall surface 14^a matching with the surface 11^b, so that when the upper section 12 is rested on the lower section 11 with the surfaces 11^b and 14^a engaged with each other, these surfaces match accurately together, constituting a ground joint which is gas tight and yet allows of ready separation of the two sections of the burner. The ground interior wall surface 14^a of the upper section 12 terminates in a shoulder 14^b which opposes the edge 11^a of the lower section 11, but does not come into actual contact therewith, thus providing for the reception of the wire gauze disk 15 in the manner indicated in Fig. 1, in which view the gauze is shown in section. This secures the gauze in place and yet by a very simple operation the two parts 11 and 12 may be separated and the gauze removed for cleaning. The chamber of the lower section 11 and the chamber 14 of the upper section therefore form jointly a fuel expansion chamber across which the gauze or barrier 15 extends so that the gas from the pipe 10 expands in this chamber and passes through the gauze. The comparatively large area presented by the gauze lessens the tendency to clog the same and renders the necessary cleaning less frequent. The gauze 15 is a flame barrier preventing back-flashing and

also constitutes a barrier for solid particles in the gas.

Above the chamber 14 in the top section 12 is a wall 16 and above this is the burning expansion chamber 17 with a comparatively large outlet opening 18 in the vertical side thereof.

19 indicates a constricted metal tube which passes through an opening in the wall 16 and leads the gas from the chamber 14 to the upper end of the chamber 17, past the opening 18. The tube brings about an increase in the pressure of the gas as it flows through said tube and out of the same against the curved or crowned upper wall 17^a of the chamber 17. The gas thus flowing from the pipe 19 follows downward on these curved or crowning walls to the lower part of the chamber and thence out through the opening 18. After the burner is in operation for a few minutes the parts become heated, thus heating the gas which flows through them and facilitating the combustion of the gas. The gas flows from the opening 18 and when the gas is of proper quality it burns in a full, regular jet projecting from said opening 18. This flame also extends back into the chamber 17 to a greater or less extent determined by the volume of the gas and the pressure thereof.

The mode of operation of my improved burner is novel and important.

Ordinarily producer gas should contain but a trace of carbon dioxid, 2% being the maximum for good results. When the carbon dioxid is in correct proportion in the gas, the flame burns full and completely fills the orifice 18, notwithstanding the large area of the same. The gas passes through the nozzle tube 19 and is heated thereby. It is further heated by contact with the walls of the chamber 17. This gives the gas sufficient sensible heat to insure its proper combustion and to insure combustion at a rate sufficiently vigorous to prevent the flame from being blown out by currents of air. Air currents may blow the flame from the orifice 18, but owing to the arrangement shown, the flame retreats, so to speak, into the chamber 17 and is thereby preserved until the air currents permit the flame to reassume its normal form.

Should the carbon dioxid content of the gas rise materially above 2%, to 3% or 4%, for example, this condition will be at once indicated by the form of the flame at the burner. That is to say, the flame will bear up from the lower edge of the orifice 18 and cease to burn at this point. The worse the condition of the gas becomes the higher will this dead zone reach until the flame is ultimately extinguished from lack of sufficient combustible matter. This peculiar action of the flame gives an instant indication of improper conditions in the producer and en-

ables the operator promptly to correct them. It would seem peculiar that upon an excess of carbon dioxid the flame dies away at the bottom of the jet, but I attribute this to the fact that as the flame lessens in intensity the heavy carbon dioxid constituent of the gaseous mixture drops and, filling the lower part of the orifice 18, stops the flame at this point and produces the effect which appears in practice, the dead space at the bottom increasing as the amount of carbon dioxid content in the gas increases.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. A gas test burner constructed of heat conducting material and having a burning expansion chamber with a relatively large open gas outlet in the side thereof, whereby the gas burns at the outlet and back in the chamber and is preheated by the heated wall of the burner, and a gas supply tube of heat conducting material passing through the interior of said chamber and discharging at the upper portion thereof.

2. A gas test burner having two sections jointly forming a fuel expansion chamber and furnished with matching surfaces ground or planed to each other, said sections having abutting surfaces, a gauze sheet held between said last mentioned surfaces and extending across the said fuel expansion chamber, one of said sections communicating with a source of gas supply and the other having a burning expansion chamber with a gas outlet and a supply tube to the second-named chamber passing from the first-named chamber through the second chamber and discharging at the upper portion thereof.

3. A gas test burner having a burning expansion chamber with a single relatively large gas outlet in the side thereof, and a gas delivery tube extending up into said chamber and terminating closely adjacent the top wall thereof above said outlet and being of smaller cross-sectional area than said outlet.

4. A gas test burner formed of two sections detachably secured together to provide a fuel expansion chamber therebetween, one of said sections having a gas inlet, the other section having a burning expansion chamber with a crowning top wall and a relatively large gas outlet in the side thereof, a gauze sheet within said first-mentioned chamber and held between said sections, and a tube delivering from said first-mentioned chamber at the opposite side of said gauze from said gas inlet to a point within said expansion chamber above said outlet and beneath said top wall, said tube being of smaller cross-sectional area than said outlet.

5. A gas test burner having two sections jointly forming a fuel expansion chamber and a gauze sheet extending across said

chamber, said sections being provided with conical matching surfaces ground or planed to each other, said sections at the smaller end of their respective conical surfaces having abutting surfaces serving to hold said gauze sheet therebetween when said conical surfaces are in engagement with each other, one of which sections has a gas inlet, and the other has a gas outlet.

6. A gas test burner having two sections jointly forming a fuel expansion chamber and a gauze sheet extending across said chamber, said sections being provided with conical matching surfaces ground or planed to each other, and abutting surfaces at the smaller ends of their respective conical surfaces, and said last mentioned surfaces serving to hold said gauze sheet therebetween when said conical surfaces are in engagement with each other, one of said sections communicating with a source of gas supply and the other having a burning expansion chamber communicating with the first mentioned expansion chamber and having a gas outlet.

7. A gas test burner having two sections jointly forming a fuel expansion chamber and a gauze sheet extending across said chamber, said sections being provided with matching surfaces ground or planed to each other, and abutting surfaces serving to hold said gauze sheet therebetween when said first mentioned surfaces are in engagement with each other, one of said sections com-

municating with a source of gas supply and the other having a burning expansion chamber communicating with the first-mentioned expansion chamber and having a closed top and a relatively large gas outlet in a side thereof below said top, and a tube for establishing communication between said expansion chambers.

8. A gas test burner constructed of heat conducting material and having a burning expansion chamber closed at the top and provided with a single relatively large unobstructed gas outlet in the side thereof, whereby the gas burns at the outlet and back into the chamber, and means for delivering gas to said chamber at a point above said outlet.

9. A gas test burner having a burning expansion chamber closed at the top and opening to the atmosphere through a single relatively large, unobstructed gas outlet in the side thereof, said chamber having a single gas inlet of materially smaller cross-sectional area than said outlet and delivering against a wall of the chamber to reduce the facility of flow toward the said outlet.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GODFREY M. S. TAIT.

Witnesses:

GEO. H. LAUDFEAR,
LAURA NOOTT.