H. A. DREFFEIN & M. S. FLINN.

BURNER CONSTRUCTION.

APPLICATION FILED MAY 3, 1913.

1,166,451.

Patented Jan. 4, 1916.

Fig. 1.

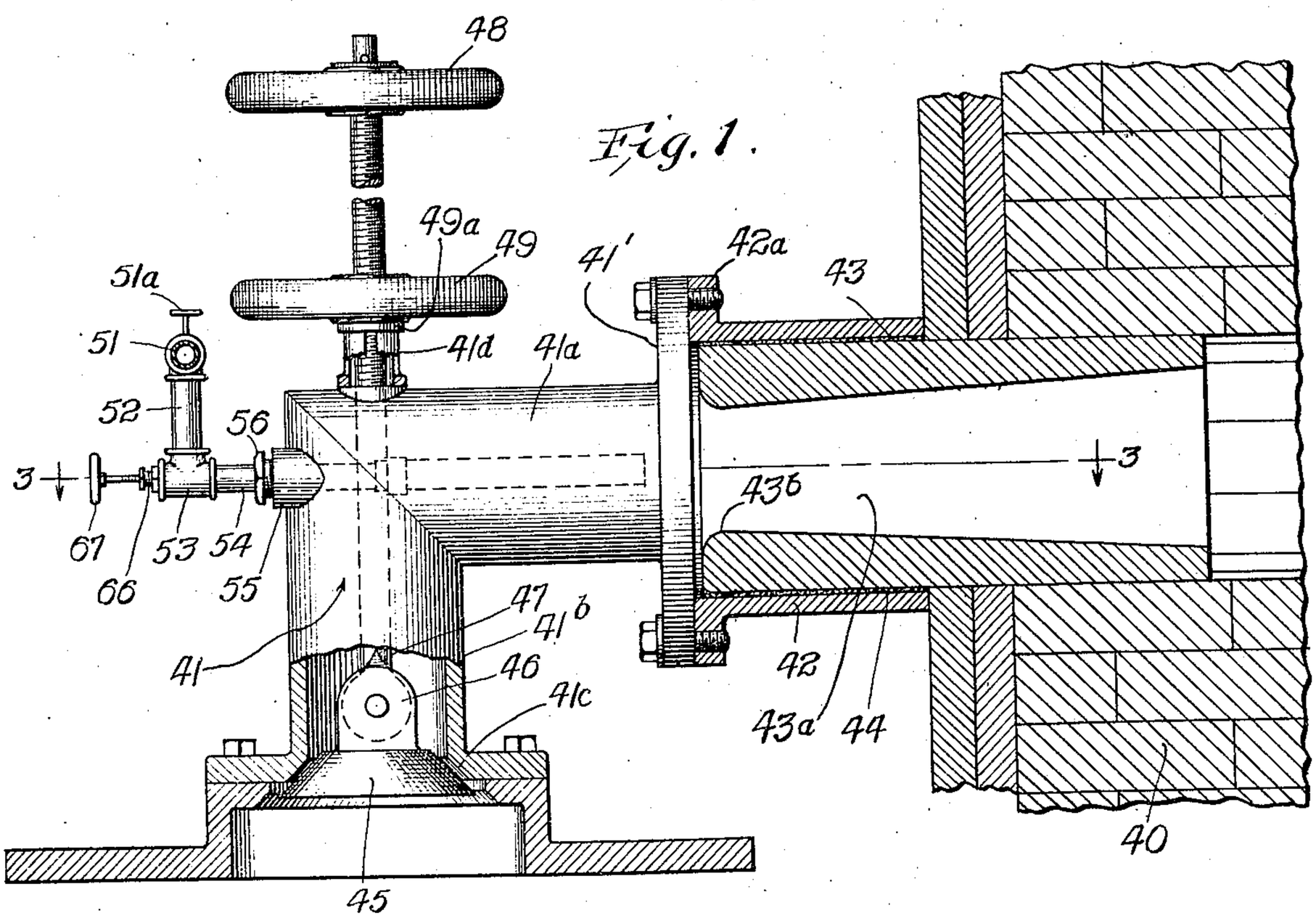



Fig. 2.

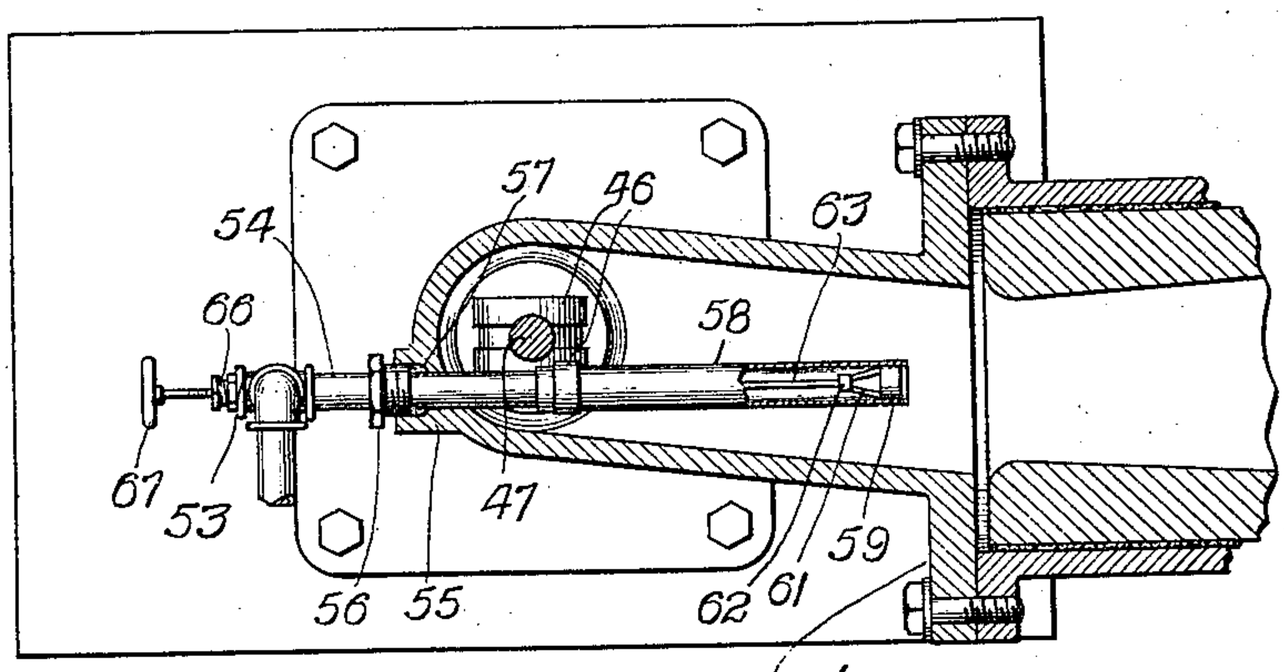
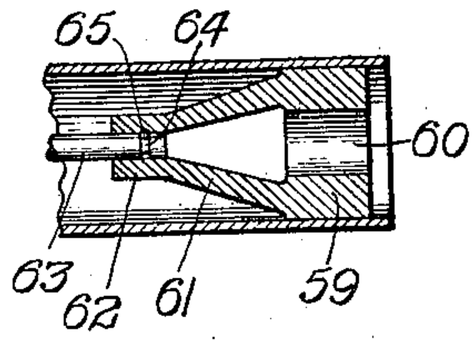



Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## BURNER CONSTRUCTION.

1,166,451. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed May 3, 1913. Serial No. 765,333.

*To all whom it may concern:*

Be it known that I, HENRY A. DREFFEIN and MELVILLE S. FLINN, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Burner Construction, of which the following is a specification.

This invention relates to improvements in burner construction, especially adapted for use with gas producing and consuming systems. We have produced a new and improved form of burner construction, especially adapted for use with gas producing systems in which bituminous coal or similar fuel is used for the generation of gas, which latter is highly charged or impregnated with free carbon and gummy material. In burning this gas it is practically impossible to deliver the same with the aid of fan blowers or the like, since unless the gas is thoroughly scrubbed and cleaned the blowers or pumps will become clogged or gummed so as to interfere with their efficient operation. Our improved burner construction contemplates the use of a gas supply duct in communication with the source of supply, and also an induction tube, as we term it, extending into said supply tube and in communication with a supply of an inducing medium such as air or the like. In the embodiment shown and described herein, this induction tube is connected with an air supply and is intended to supply air not only for induction of the gas supply and delivery of the same to the burner, but also utilizes this inducing medium for mixture with the gas to enhance and promote the combustion thereof.

Still another object of our invention is to associate with the induction tube, means whereby the flow of air or the like therethrough as to quantity and volume may remain constant while the induction effect thereof may be varied.

Another object is to provide in association with our device, an improved form of valve for shutting off the gas supply.

We attain these and other objects by means of the construction described and shown in the following specification and accompanying drawings, in which—

Figure 1 is a side view, partially in section, of our improved burner and valve structure. Fig. 2 is a horizontal longitudinal section, taken along the line 3—3 of Fig. 1; and Fig. 3 is a detail section of a portion of our improved burner.

Like numerals refer to like elements throughout the drawings.

Extending upwardly from the gas supply conduit is the pipe elbow 41, having the horizontally disposed portion $41^a$. This portion terminates in the flange 41′, to which is secured by bolts, etc., flange $42^a$ of burner pipe 42. This burner pipe constitutes a sleeve, to which is secured the burner 43 constructed of refractory material, such as firebrick. This burner is secured to the sleeve 42 by cement 44, and is formed with the central bore $43^a$ tapering outwardly from adjacent one extremity, the minimum diameter of the bore 43 being at a point $43^b$ adjacent one end of the burner, the latter being enlarged from the point 43 to the adjacent end, as shown in Fig. 1.

The vertical portion $41^b$ of the elbow 41 is provided at its lower extremity with the valve seat $41^c$, with which coacts the frustoconical valve 45, provided with the upwardly extending spaced flanges or lugs 46, between which is pivotally secured the enlarged extremity of the valve stem 47. This valve stem extends upwardly through the elbow 41, the latter being provided with the outstanding collar $41^d$. The stem 47 is threaded at its upper portion and carries the operating hand-wheel 48 secured to its upper extremity. A second wheel 49 is threadably mounted upon the stem 47, being provided with the central enlarged hub $49^a$ adapted to seat upon the upper extremity of the collar $41^d$. The purpose of this construction is as follows:—The wheel 49 being normally seated on the collar $41^d$, the hand wheel 48 may be rotated to move the stem 47 and valve up or down, as desired. Occasionally we have found deposits of gummy carbon and similar material formed on the surface of the valve and valve seat, so as to cause the latter to stick. In the ordinary form of valve it becomes necessary to use a bar or long wrench to rotate the hand wheel, thereby unduly straining the threads and other portions of the valve structure. In our device, however, it is merely necessary to rotate the wheel 49 upwardly a slight dis-

tance from the collar 41ᵈ, whereby a direct blow may be applied to the upper end of the valve stem, and the valve and stem may thus be forced downwardly directly until the hub 49ᵃ again seats upon the collar 41ᵈ.

Located in proximity to the elbow 41, and slightly above the latter, is provided the air supply pipe 51, adjacent the elbow, with the connecting pipe 52 secured to one portion of the T 53, which has, projecting therefrom, the pipe 54. A valve 51ᵃ is provided in the pipe 51. A pipe 54 projects through the elbow, as shown in Fig. 1, a projecting apertured boss 55 being provided, with which coacts the gland follower 56, packing 57 being located around the pipe 54 to prevent leakage from the elbow. This pipe 54 may be formed integral with or threaded through the gland follower as desired. The portion 41ᵃ of the elbow 41 is inclined slightly, as shown in Fig. 2, to permit the projection of the pipe 54 therethrough without interference with the valve stem 47.

Carried by and secured to the pipe 54 in the portion 41ᵃ of the elbow 41 is the induction tube as we term it 58, in which is slidably mounted the nozzle 59, having the centrally located aperture 60 therethrough. Arms 61 extend rearwardly from nozzle 59 and terminate in a ring 62, in which is rotatably mounted a rod 63, having a groove 64 therein. A pin 65 is carried by the ring 62 and seats in a portion of the groove 64, so that the rod 63 may be rotated with respect to the nozzle and ring, but relative reciprocation thereof will be prevented. The rod 63 extends rearwardly from the nozzle through the tube 58 and pipe 54, and projects through a gland or stuffing box 66 carried by the T 53. This rod is provided with the operating handle 67 and is in threaded engagement with the gland follower 66, so that rotation of the handle 67 will operate to advance or retract the nozzle 59 with respect to the open extremity of the tube 58, which terminates short of the adjacent end of the burner 43, as shown in Fig. 2. The operation of this construction is as follows: Valve 51ᵃ being opened to permit the flow of air therethrough, air will flow through pipe 54, tube 58, and nozzle 59; from thence it will flow through the burner 43 into the furnace 40. This flow of air through elbow portion 41ᵃ and burner 43 will induce the flow of gas from the producer, this inducing air not only serving to deliver gas to the furnace, but also causing the proper mixture of air and gas prior to combustion thereof in the burner. Furthermore, this induced flow causes a suction in the entire delivery line, and the same is transmitted to the producer to balance the pressure caused by the supply of steam and air, so that approximately atmospheric pressure will be obtained in the producer, thereby eliminating the danger of flare up of gas or flame when poking or changing the producer. It will be apparent that the suction, as well as the flow of gas, will be regulated by the action of the air supply line at the burner, so that, assuming the nozzle to be stationary, increased flow and increased suction will result from increasing the flow of air. It will be obvious, however, that at times, owing to varying conditions of the gas or atmosphere, a varied proportion of air and gas will be found desirable. Were the nozzle 59 fixed, it would be impossible to vary this proportion without varying the flow of gas and the suction, since an increase in the amount and velocity of air would result in an increased flow and an increased suction. To obviate this difficulty, we have provided the sliding nozzle construction described above, so that, in obedience to well known physical laws, when it is desired to increase the ratio of the air to the gas, the nozzle 59 may be retracted from its normal position, thereby resulting in a decrease in the velocity of efflux of air from the tube 58 thereby lessening the induction effect of the air and resulting in a reduced flow of gas for the same air supply, and a consequent varied mixture. Similarly the nozzle may be adjusted so that the same air supply or gas may be induced, assuming that the nozzle is in position to permit such adjustment.

Another advantage of this construction is that we may regulate the flow of gas wholly by the air jet, whereby we may maintain the valve 45 in full open position, so that the possibility of it becoming "gummed up" or covered with deposit—so as to greatly reduce or impede the flow of gas—is practically eliminated.

To vary the amount of air flowing from the tube 58 the valve 51ᵃ may be operated. It will be apparent that the range of variation of the induction and mixing of the gases may be varied by choosing various sizes of induction tube and nozzle.

Still another advantage of our construction is that by utilizing the form of burner shown and described a greater efficiency of induction is obtained, and a more efficient mixing action is found to be present. Furthermore, the burner 43, constructed of refractory material, is unharmed by the heat and at the same time conducts sufficient thereof to the metal sleeve 42 to heat the latter and, by conduction from the latter, the elbow 41 will become so heated as to enhance the mixing action between the air and the gas and prevent condensation of hydrocarbon products in the elbow.

While we have shown and described our improved system and construction with more or less particularity, it is to be noted that the construction shown and described is susceptible of many changes in detail and

form, and we do not wish to be restricted to the showing or description beyond the scope of the appended claims.

What we claim is:

1. In combination with a fuel duct, an inducing member located therein, and means associated with said member to vary the induction effect thereof without affecting the flow of inducing medium therethrough.

2. In combination, a fuel duct, an induction member located therein, and means to vary the induction effect of said member without varying the flow of inducing medium through said member.

3. In combination, a fuel supply duct, a tube located in said duct and arranged to supply an inducing medium to induce fuel through said duct, and means associated with said tube operable to vary the induction of said fuel without varying the flow of inducing medium through said tube.

4. In combination, a fuel supply duct, a tube extending into said duct, a nozzle located in said tube, said nozzle comprising an apertured collar having rearwardly extending arms, and means to vary the position of said nozzle in said tube.

5. In combination, a fuel supply duct, a tube extending into said duct, a nozzle located in said tube, said nozzle comprising an apertured collar having rearwardly extending arms, and means to vary the position of said nozzle in said tube, said means comprising a rod pivotally attached to said arms.

6. In combination, a fuel supply duct, an induction tube having a portion extending into said duct, a nozzle slidably mounted in said tube and comprising an apertured collar having rearwardly extending arms, and a rod extending outwardly of said tube and in engagement with said nozzle for adjustment of the latter in said tube.

7. In combination, a fuel supply pipe comprising an elbow having angularly disposed portions, a valve adapted to control flow of fuel through said pipe, said valve having its stem projecting through one of said portions, an air supply pipe extending through another portion of said fuel pipe, and a burner carried by said last named portion of said fuel pipe.

8. In combination, a fuel supply pipe, a metal sleeve secured to said pipe, and a refractory burner cemented to the interior of said sleeve, said burner being in communication with said fuel supply pipe, an extremity of said pipe lying adjacent an extremity of said burner, the bore of the latter at the said extremity being of greater diameter than the bore of the said pipe, said bore of said burner being restricted to a diameter less than the diameter of said bore of said fuel supply pipe.

9. In combination, a fuel supply pipe, a metal sleeve secured to said pipe, and a refractory burner cemented to the interior of said sleeve, said burner being in communication with said fuel supply pipe, an extremity of said pipe lying adjacent an extremity of said burner, the bore of the latter at the said extremity being of greater diameter than the bore of the said pipe, said bore of said burner being restricted to a diameter less than the diameter of said bore of said fuel supply pipe and flaring outwardly from said restricted portion toward its other extremity.

10. In apparatus of the class described, a fuel supply pipe, an air pipe located within said fuel supply pipe and adapted to supply air for mixture with and combustion of said fuel, said air supply being further arranged to induce the flow of gas through said fuel supply pipe, and means mounted in said air pipe to vary the inducing effect of said air supply without varying the amount of air supplied, said means comprising a nozzle movable in said pipe.

In testimony whereof, we have subscribed our names.

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