(No Model.)

F. S. DURAND.

GAS OR OIL BURNER.

No. 455,483. Patented July 7, 1891.

Fig. 1.

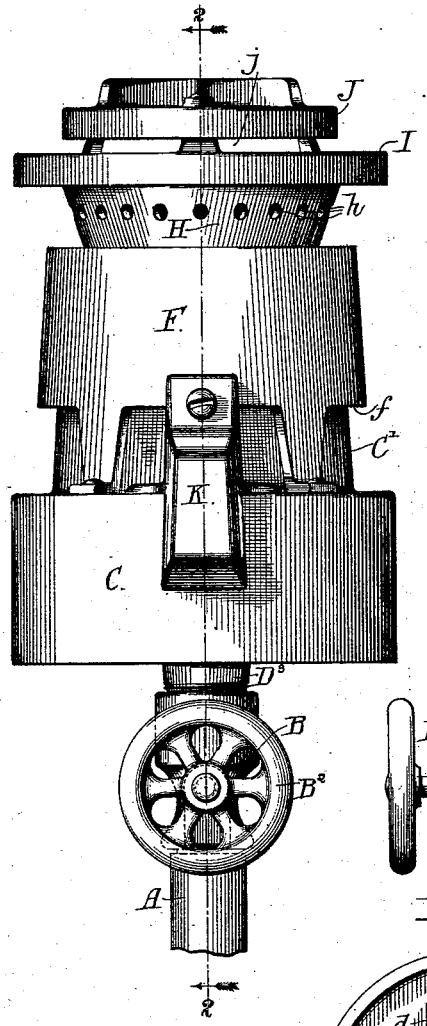


Fig. 2.

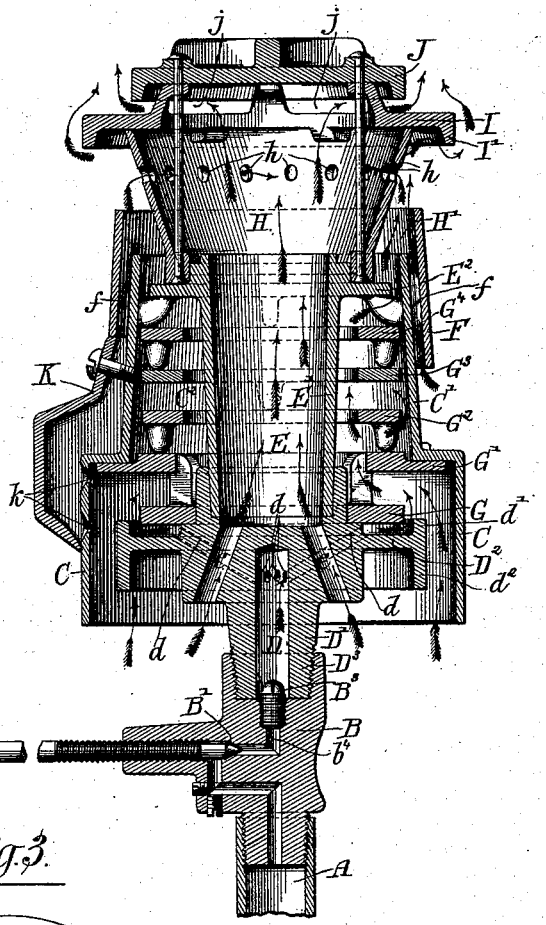
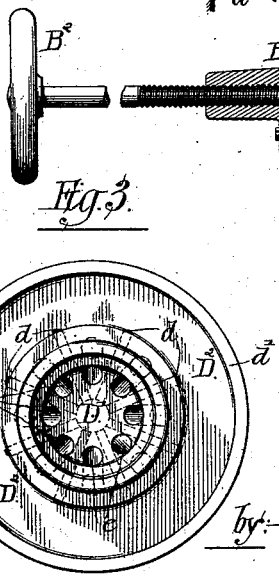


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANK S. DURAND, OF PEORIA, ILLINOIS.

GAS OR OIL BURNER.

SPECIFICATION forming part of Letters Patent No. 455,483, dated July 7, 1891.

Application filed September 13, 1890. Serial No. 364,881. (No model.)

To all whom it may concern:

Be it known that I, FRANK S. DURAND, a resident of Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Gas or Oil Burners; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to certain new and useful improvements in burners for burning gas or vaporized oil for heating and cooking purposes; and it consists in the matters hereinafter specified, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a side elevation of a burner embodying my invention. Fig. 2 is a central vertical section of the same, taken on line 2 2 of Fig. 1. Fig. 3 is a plan view of one of the parts.

In said drawings, A indicates a supply-pipe, through which gas or vaporized oil is conveyed to the burner.

B indicates a valve controlling the supply of gas or oil.

C indicates the outer shell or casing of the burner.

D is the gas-inlet passage formed in the casting D′, which constitutes the lower part of the burner, and E a central air-passage extending from the lower part of the burner to a point near the top thereof.

F is a jacket surrounding the upper portion C′ of the casing C.

G G′ G^2 G^3 G^4 indicate a plurality of annular deflecting-plates located one above another within the space C^2 between the central air-passage E and the casing C C′.

H is a combustion-chamber located above the central air-passage E, and I J a cover or cap located over the combustion-chamber H.

In the operation of my device gas or vaporized oil enters the passage D in the casting D′ and escapes through smaller radial ducts or passages *d d* into the interior of the casing C beneath the deflecting-plate G. The casting D′ is preferably formed with an annular flange D^2, which has upon its outer margin a downwardly-projecting flange *d′* and an upwardly-projecting flange d^2. The first deflecting-plate G is located at a little distance above the annular flange D^2 of the casting D′, preferably at about the level of the top of the flange d^2, and is made of somewhat smaller diameter than said flange. The passages *d d*, leading from the central passage D, radiate therefrom and open into the space between the flange D^2 and the deflecting-plate G. The flange d^2 gives an upward direction to the current of gas as it comes through the space between the deflecting-plate G and said flange. At this point air mingles with the gas, the air being drawn in through the annular space between the inner surface of the casing C and the vertical flanges *d′* d^2 of the casting D′. This mixed gas and air then passes upwardly through the space within the casing surrounding the central air-passage E, passing first between the deflecting-plates G and G′ and then upwardly into the annular space C^2 between the casing C′ and the central air-passage, which space C^2, for the purpose of description, is herein termed a "mixing-chamber," and around the deflecting-plates G^2 G^3 G^4 to the top of the space C^2, where it meets the flange E^2 upon the upper end of the tubular casing E′ of the air-passage E, where it is again deflected outwardly and passes up between said flange E^2 and the casing C′.

It will be observed by reference to the drawings that the cylindric shell F extends somewhat above the top of the shell or casing C′, forming an annular space H′, surrounding the combustion-chamber H. Said shell or casing F is, furthermore, made somewhat larger in diameter than the upper portion C′ of the casing C, so as to form an annular passage *f* for air between said outer and said inner casings. Fresh air enters through the passage *f* and is drawn upwardly by the current of mixed gas and air which issues from the upper end of the casing C′ and unites with the gas and air at this point, so that when the gas issues from the annular chamber H′ it will have been thoroughly mixed with air. It is evident that the gas and air, which flow to-

gether through the mixing-chamber C^2, will by their contact with the deflecting-plates and by being repeatedly deflected from one side to the other of said chamber by said deflecting-plates therein become thoroughly mixed together and the burning and heating properties of the gas greatly increased. Furthermore, by the mixing of an additional current of fresh air with the admixture of gas and air the burning and heating properties thereof will be still further increased. The admixture of gas and air comes against the under side of an annular flange I′ of the cap I and is deflected outwardly thereby, passing up around the edge of said annular flange I′. In the meantime air is drawn through the small air-ducts *e e e* in the casting D′ into the central air-passage E, and, rising through said passage to the interior of the combustion-chamber H, passes out at the openings *j j* between the caps J and I, where it unites with the burning gas and air around said cap. A small portion of the burning gas and air will be drawn in through the small perforations *h h* to the interior of the chamber H by the upward current of air through the central passage E and said chamber H, forming a net-work of flame across the interior of said chamber H, and the current of air which escapes through the apertures *j j* will have been heated to a very high temperature by direct contact therewith in passing through the said chamber H, so that by the time it unites with the current of burning gas and air about the outside of the cap J it will be in a condition to materially aid and promote the combustion of the gas at this point by the addition thereto of a large proportion of oxygen in a highly-heated condition. The arrows in Fig. 2 of the drawings indicate the directions of the currents of gas and air. It is obvious that by this construction the gas as it passes from the supply-pipe to the top of the burner is, by the successive mixing of fresh supplies of air therewith, rendered very highly combustible, and by the further mixing of the heated air at the top of the burner, as described, the combustion is still further aided and facilitated. I find in practical use of my improved burner that a perfectly blue flame is obtained at the top of the same. It is therefore evident that practically perfect combustion of the gas or vaporized oil is obtained, inasmuch as the presence of yellow or white color in the flame would indicate that the gas or oil was not being perfectly consumed, while the absence of any color but blue indicates perfect combustion of the gas or oil.

As a separate and further improvement, I provide a lighting device for starting the burner, (indicated as a whole by K.) The same consists, as herein shown, of a hollow casing attached at its upper end to the shell F and communicating with the annular space *f*, said casing being extended downwardly outside of the shell or casing C and arranged to communicate at its lower end with the interior of said casing at or near the level of the horizontal flange D^2 of the casting D′. This shell is designed to convey the flame from the upper portion of the burner to the lower portion thereof within the casing C when the gas is ignited at the top of the burner. By this arrangement the burner is heated so as to cause a much stronger draft of air through the various air-passages, and at the same time to heat the gas and air as they pass through the burner.

In practice I find that as soon as a light is applied to the gas as it escapes from the top of the burner the gas within the interior of the shell K will become ignited and will communicate the flame to the gas in the interior of the shell C through the apertures *k k*.

By the use of the lighter, as herein described, the necessity of lighting the gas at the bottom as well as at the top of the burner is obviated, and the proper operation of the burner when in unskillful hands is thereby insured. A small portion of the gas is burned at this point at about the time of the first mixture of air therewith; but as soon as the flame comes in contact with the deflecting-plate G′ and before it enters the mixing-chamber C^2, it is put out by its contact with said plate G′. As a result of the combustion of a portion of the gas below the chamber C^2 said chamber and the deflecting-plates therein, as well as the entire casing of the burner, are heated, so that by the time the mingled gas and air reach the top of the burner they are in the best possible condition to obtain perfect combustion.

As a separate and still further improvement, I provide in the inlet-passage means for regulating the maximum flow of gas through said passage to the burner, so that in case the valve is opened accidentally or carelessly to an extent beyond the capacity of the burner no more gas than can be perfectly consumed by the burner will be permitted to pass through said passage. I find it convenient to employ for this purpose an ordinary gas-tip, such as are commonly in use upon gas-burners for illuminating purposes. These tips are made of various capacities, so that any desired amount of flow of gas may be obtained through the same.

As shown in the drawings, B^3 indicates an ordinary gas-tip located in the gas-inlet passage b^4, the same being conveniently fitted within the upper end of said passage.

Supposing that the best results could be obtained from a burner with a flow of six cubic feet of gas per hour when working at its full capacity, it is evident that by placing in the inlet-passage a six-foot gas-tip the maximum flow of gas to the burner cannot exceed six feet per hour. A very common cause of complaint in burners of this class is the great expense of operation, the amount of gas consumed thereby being very great. This may

result from a poor construction of the burner or from an extravagant use of gas by the carelessness of the operator in adjusting the valve which controls the admission of the gas. It is therefore obvious that by the provision of means in the inlet-passage for limiting the maximum supply of gas to the burner the liability of wasting the gas by careless adjustment of the valve is obviated and the consumption of gas by the burner kept within an economical limit.

It is obvious that the casing C′ may be made as long as may be desired and the number of deflecting-plates employed varied in burners of different capacities.

Having described my invention, what I claim is—

1. The herein-described burner, consisting of a tubular outer shell or casing, a central air-tube, a plurality of annular deflecting-plates located in the space between said outer casing and said central air-tube, said space forming a mixing-chamber, and a gas-supply pipe provided with a plurality of radial ducts communicating with said space between the casing and said central air-passage, substantially as described.

2. The herein-described burner, consisting of a tubular shell or casing, a central air-tube therein, a gas-supply pipe provided with a plurality of radial ducts communicating with the bottom of the annular space between said shell and tube, said space forming a mixing-chamber, and a cap or cover located above the top of said central air-tube and forming a closed chamber communicating with the interior of said tube, said cap being provided at its top with air-exit openings, substantially as described.

3. The herein-described burner, consisting of a tubular shell or casing, a central air-tube therein, a plurality of annular deflecting-plates located within the annular space between said outer shell or casing and said central tube, said space forming a mixing-chamber, a gas-supply pipe provided with a plurality of radial ducts communicating with said annular space, and a cap or cover located above the top of said central air-tube and forming a closed chamber communicating with the interior of said tube, said cap being provided at its top with air-exit openings, substantially as described.

4. The herein-described burner, consisting of a tubular shell or casing, a central tube therein, a gas-supply conduit communicating with the bottom of the annular space between said shell and tube, and a cap or cover located above the top of said central air-tube and forming a closed chamber communicating with the interior of said tube, said cap being provided at its top with air-exit openings and in its side walls with perforations for the admission of flame, substantially as described.

5. The herein-described burner, consisting of a tubular shell or casing, a central air-tube therein, a plurality of annular deflecting plates located within the annular space between said outer shell or casing and said central tube, a gas-supply conduit communicating with said annular space, and a cap or cover located above the top of said central air-tube and forming a closed chamber communicating with the interior of said tube, said cap being provided at its top with air-exit openings and in its side walls with perforations for the admission of flame, substantially as described.

6. The herein-described burner, consisting of a tubular shell or casing, a central air-tube extending upwardly through said casing, a cylindric jacket located outside of said casing and extending above the top of the latter, said jacket being made somewhat larger in diameter than said casing, a plurality of annular deflecting-plates located within the space between the central air-tube and said casing, a gas-supply conduit communicating with said space, and a perforated cap or cover located above the top of said central air-passage, substantially as described.

7. The herein-described burner, consisting of a tubular shell or casing, a central air-tube, an outer jacket surrounding said casing, said jacket being made larger in diameter than said casing and extending above the top of the latter, a hollow perforated cap or cover located over the top of said central air-passage, a plurality of annular deflecting-plates located within the space between said central air-passage and said shell or casing, a gas-supply pipe communicating with said space, a valve for governing the supply of gas, and a removable apertured plug located in said supply-passage for limiting the supply of gas to the burner, substantially as described.

8. The herein-described burner, consisting of an outer tubular shell or casing and a central air-supply tube, a part D′, provided with a horizontal flange and located in the lower portion of said outer casing below said air-tube and provided with air-inlet passages communicating with the interior of said air-tube, and being further provided with a central gas-supply passage and a plurality of radial ducts communicating therewith and opening at the upper side of said plate within the outer shell or casing, an annular deflecting-plate G, located above said openings, and a plurality of deflecting-plates located above said plate G within said outer shell or casing, substantially as described.

9. The herein-described burner, consisting of an outer tubular shell or casing and a central air-supply tube, a part D′, located in the lower portion of said outer casing below said air-tube and provided with air-inlet passages communicating with the interior of said air-tube, said plate being further provided with a central gas-supply passage and a plurality of radial ducts communicating therewith and opening at the upper side of said plate with-

in the outer shell or casing, an annular deflecting-plate G, located above said openings, a deflecting-plate G′, located above said plate G and provided with a central annular opening, and a plurality of deflecting-plates located above said plate G′ within said outer casing, substantially as described.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

FRANK S. DURAND.

Witnesses:
W. J. McPEAK,
FRANK STEUART.