L. S. CHADWICK.

OIL BURNER.

APPLICATION FILED APR. 7, 1916.

1,255,582. Patented Feb. 5, 1918.

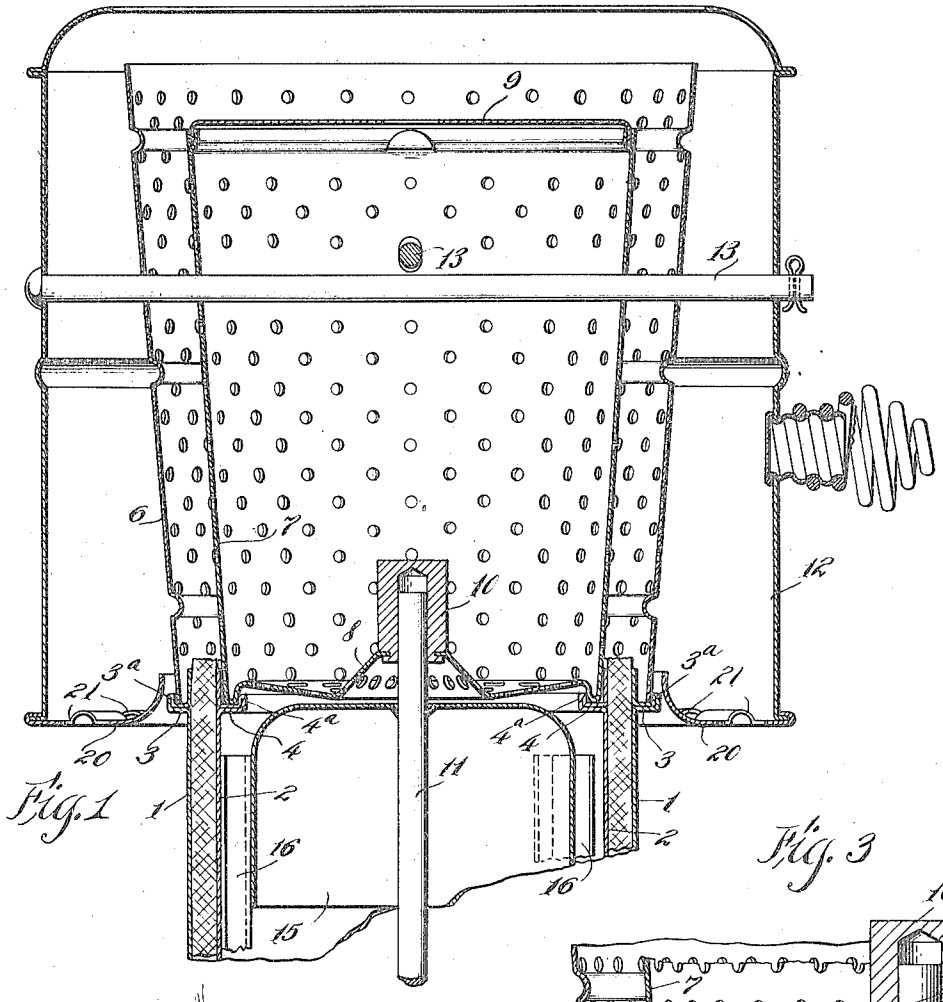
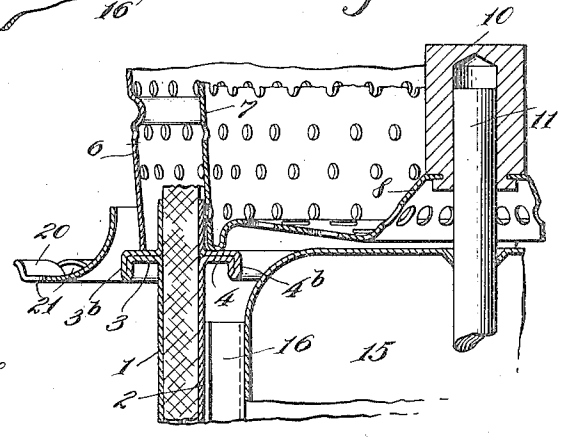


Fig. 1

Fig. 3



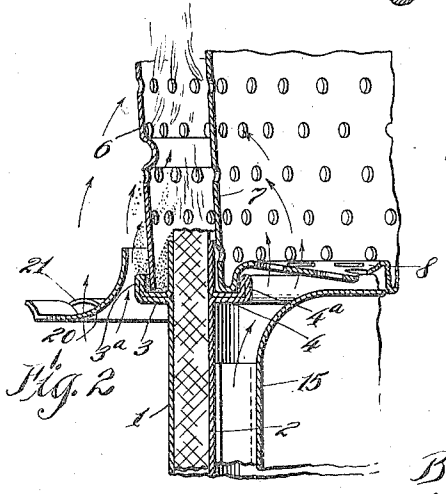


Fig. 2

Inventor

Lee S. Chadwick

By Hull, Smith, Brock & West.

Att'ys.

UNITED STATES PATENT OFFICE.

LEE S. CHADWICK, OF EAST CLEVELAND, OHIO, ASSIGNOR TO THE CLEVELAND METAL PRODUCTS COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

OIL-BURNER.

1,255,582. Specification of Letters Patent. Patented Feb. 5, 1918.

Application filed April 7, 1916. Serial No. 89,573.

To all whom it may concern:

Be it known that I, LEE S. CHADWICK, a citizen of the United States, residing at East Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Oil-Burners, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to improvements in hydrocarbon burners of the sort comprising an inner and an outer wick tube that are spaced apart in substantially concentric relation, the inner one having a ledge extending inward adjacent its upper end, and the outer one a similar ledge extending outward therefrom in substantially the plane of the former ledge, and a pair of perforated commingling tubes associated with each other in a relation similar to that of the wick tubes and having their lower ends bearing upon the aforesaid ledges. Burners of this class further comprise a drum which surrounds and is supported from and in operative relation to the commingling tubes.

These burners, under normal conditions, produce a comparatively blue flame, and operate practically without odor. These highly desirable effects are obviously due to an almost perfect combustion resulting from certain physical peculiarities which characterize these burners.

Going briefly into detail as to the normal operation of these burners, it may be said that, after the burners have become warm from initial operation, there is no flame present at or near the wick. In fact, it is found that no flame occurs below the third row of perforations from the bottom of the commingling tubes. The reason for this is that the gas, generated at this point, is so rich and the draft so strong, that the incoming air cannot promote combustion at the perforations lower than the ones above named. Now it will be understood that the gas is generated by the heat in the vicinity of the exposed portion of the wick, and it will be seen from the foregoing that all of the heat that can be obtained at the wick, must be conducted from the zone of the flame, downward through the combustion tubes, the ledges of the wick tubes, and the portions of the wick tubes adjacent the exposed portion of the wick, and also from direct radiation from the flame that is maintained in the combustion space between the commingling tubes at the elevation above set forth.

The foregoing operation is based upon the supposition that the burner is in perfect condition. If anything occurs to even slightly disarrange the vital parts of the burner, as, for instance, the lower edge of one or both commingling tubes with respect to the supporting ledge or ledges, air will be allowed to enter around the bottom of the commingling tubes, and so combine rich gas with oxygen, that a flame will be maintained, and such a condition will promptly overheat the adjacent portions of the burner and in this manner generate an excess of gas, which is indicated at once at the wick by yellow bars or streaks in the flame, and the giving of a disagreeable odor through the escape of excess gas.

As intimated above, the usual cause for the unsatisfactory operation of the burner is an improper fit between the lower ends of the commingling tubes and the ledges of the wick tubes whereon they are supported. This may result from any of several conditions, as an uneven or distorted ledge; an irregular edge of a commingling tube; or the presence of something upon the ledge that prevents the commingling tube from proper seating. In any of the foregoing instances, air is admitted to the combustion space between the commingling tubes so low down that the difficulties already set forth are experienced. Further than above explained, some of the excess gas which is generated in the vicinity of the wick falls and escapes beneath the commingling tubes from the combustion space and, in the prevailing construction of burners of the type under consideration, is then beyond recovery.

In the further consideration of my invention, therefore, allow these points to remain prominently in mind, that the foregoing difficulties may be due, first, to a distorted ledge; second, from an irregular edge of a commingling tube; and third, from the presence of some foreign matter upon the wick tube ledges.

It is the object of my invention to provide a burner of the character referred to having the ledges of the wick tubes stiffened

by beading, flanging, or similarly treating them, so that in shipment and ordinary use, the ledges will not become distorted, thereby obviating the first difficulty. Also, in certain modifications of the invention, to form upwardly opening channels of the flanged or beaded ledges in which the bottoms of the commingling tubes rest. In this case, the heavier gases accumulate within and fill the channel and effectually seal the joint between the commingling tube and ledge against the admission of air. And further, to form the bottom annular wall of the drum in such manner and so dispose it with respect to the ledge of the outer wick tube, that a restricted air passageway is provided about the aforesaid channel so that any gas escaping from beneath the commingling tube will be recovered and carried upward by the incoming air and injected, with the air, into the combustion space, through the perforations of the outer commingling tubes.

Thus it will be seen that, in its broader sense, my invention provides for stiffening or strengthening the wick tube ledges of burners of the class referred to, so that the difficulties arising alone from dented or distorted ledges are eliminated; and more limitedly to provide a construction whereby the escaping gas from the combustion space is utilized as an effectual seal against the admission of air beneath the commingling tubes, and whereby such escaping gas is recovered and returned to the combustion space at a proper elevation to be consumed.

In the drawing accompanying and forming a part hereof, Figure 1 is a central vertical section through a hydrocarbon burner embodying my invention, the lower portion of the burner being omitted for economy of space; Fig. 2 is an enlargement of a portion of Fig. 1, and shows diagrammatically, the action of the air and gases, when the burner is in operation; and Fig. 3 is a view, similar to Fig. 2, and illustrating a modification.

Describing the invention by the use of reference characters, 1 represents the outer and 2 the inner wick tube, the former having a ledge 3 adjacent its upper end, and the latter a ledge 4, shown as in the horizontal plane of the former ledge 3. These ledges are preferably formed by buckling a portion of the metal of each wick tube and pressing it together in a substantially perpendicular plane with respect to that of the tube. The periphery of each ledge is preferably turned upward to constitute a stiffening or strengthening flange, the flanges of the respective ledges 3 and 4 being designated 3^a and 4^a. The lower ends of the outer and inner commingling tubes 6 and 7, respectively, bear upon the ledges of the corresponding wick tubes and are contained within the channels formed by such ledges, their strengthening or stiffening flanges, and the adjacent portions of the wick tubes.

The inner commingling tube is shown as provided with a bottom wall 8 that is preferably formed integral with the upright wall thereof, and the top of this tube is closed by a cover 9. The upright walls of the tubes 6 and 7 are perforated, as usual, and the bottom wall 8 of the inner tube is also provided with perforations. A thimble 10 rises from the center of the wall 8 and receives the upper end of a rod 11 which constitutes a lifter for the commingling tubes and drum 12. It will be observed that the latter is secured in operative relation to the former, and that the former or commingling tubes are secured in proper relative position by rods 13. An inverted cup shaped member 15 is supported within the upper end of the inner wick tube, and properly spaced from the inner wall thereof, by spaces 16, thereby to permit the passage of air upward about the member and into the inner commingling tube through the perforations in its bottom wall 8.

The bottom wall of the drum 12 extends inward from the lower edge of its cylindrical wall, and is turned upward a distance above and spaced slightly from the ledge 3 of the outer wick tube. The bottom wall 20 of the drum has a series of air-admitting holes 21.

The burner shown in Fig. 3 comprises precisely the same elements as the one shown in Figs. 1 and 2, but is modified by having the strengthening or stiffening beads or flanges 3^b and 4^b of the ledges 3 and 4, respectively, turned downward. So far as the strengthening or stiffening effect of the beads or flanges is concerned, the down turned ones 3^b and 4^b are as effectual as the up turned ones 3^a and 4^a. No channels are formed by this latter construction, however, for the reception of the bottoms of the commingling tubes.

In Fig. 2, I have endeavored to show, diagrammatically, the operation of the burner, and the advantages arising from the upwardly opening channels. In this figure, the burner is shown as lighted, and the gases generated in the vicinity of the upper end of the wick, commingling with air that is supplied to the combustion space through the perforations of the commingling tubes. Let it be supposed that, for some reason, such as the irregularity of the bottom of the outer commingling tube, or its resting upon something that has been deposited upon the ledge 3, an opening occurs between the bottom edge of the commingling tube and the ledge. I have represented, by a mass of dots, the heavier gases which fall from the vicinity of the upper end of the wick and accumulate within the channel formed by the

ledge 3 and its flange 3ª. These gases collect within the channel and form an effectual seal against the admission of air beneath the commingling tube. As the heavier gases overflow the aforesaid channel, they are immediately picked up by the inrushing air, directed in proximity to the ledge 3 by the upturned and contracted bottom wall of the drum 12, and are carried with it through the lower perforations of the outer drum to where they are consumed. It will be understood that practically the same conditions as those above prevail in connection with the inner commingling tube and its associated parts.

It will be observed from Fig. 1 that the openings in the inner commingling tube through which the rods 13 pass are slightly elongated vertically. This is to permit of relative movement between the commingling tubes to compensate for any slight difference which may exist between the planes of their lower ends, due to the presence of something upon one of the ledges 3 or 4, or an imperfection of the tube itself. If the planes of the bottoms of the commingling tubes are accurate, and nothing is present upon the ledges of the wick tubes to prevent perfect contact between them and the commingling tubes, the construction disclosed in Fig. 3 is practically as satisfactory as that disclosed in the other figures; but since the construction first described insures perfect operation of the burner under all conditions, notwithstanding slight imperfections or irregularities in the burner itself, or the presence of some foreign matter upon the ledges of the wick tubes, the construction disclosed in Figs. 1 and 2 is considered the preferred form.

Having thus described my invention, what I claim is:—

1. A burner of the class described comprising a pair of wick tubes each having a ledge, a pair of perforated commingling tubes arranged to be supported one upon each of said ledges, each ledge having a flange rising from its edge remote from the wick tube thereby to form a channel in which the lower edge of the respective commingling tube rests, and a drum inclosing the commingling tubes, said drum having an annular bottom the inner portion of which extends inward and upward in close proximity to and above the ledge of the outer wick tube thereby to form a restricted air passageway between itself and such ledge.

2. A burner of the class described comprising an inner and an outer wick tube, the outer wick tube having a ledge, a perforated commingling tube arranged to be supported upon said ledge, the ledge having a flange rising from its edge remote from the wick tube thereby to form a channel in which the lower edge of the commingling tube rests, and a drum inclosing the commingling tube, said drum having an annular bottom the inner portion of which is curved inward and upward in close proximity to and above the aforesaid flange thereby to form a restricted air passageway between itself and such flange.

3. A burner of the class described comprising a pair of wick tubes, and a pair of perforated commingling tubes adapted to be supported in operative relation to the wick tubes, one of the wick tubes having a ledge extending at substantially right angles therefrom and spaced downward from its upper end, the ledge having a flange rising from its edge remote from the wick tube to form with the opposed portion of the tube a channel in which the lower end of one of the commingling tubes is arranged to repose, as and for the purpose specified.

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

LEE S. CHADWICK.

Witnesses:
W. E. Sheppard,
V. J. Barry.