No. 607,641. Patented July 19, 1898.

A. J. BLACKFORD.

OIL BURNER.

(Application filed Dec. 6, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

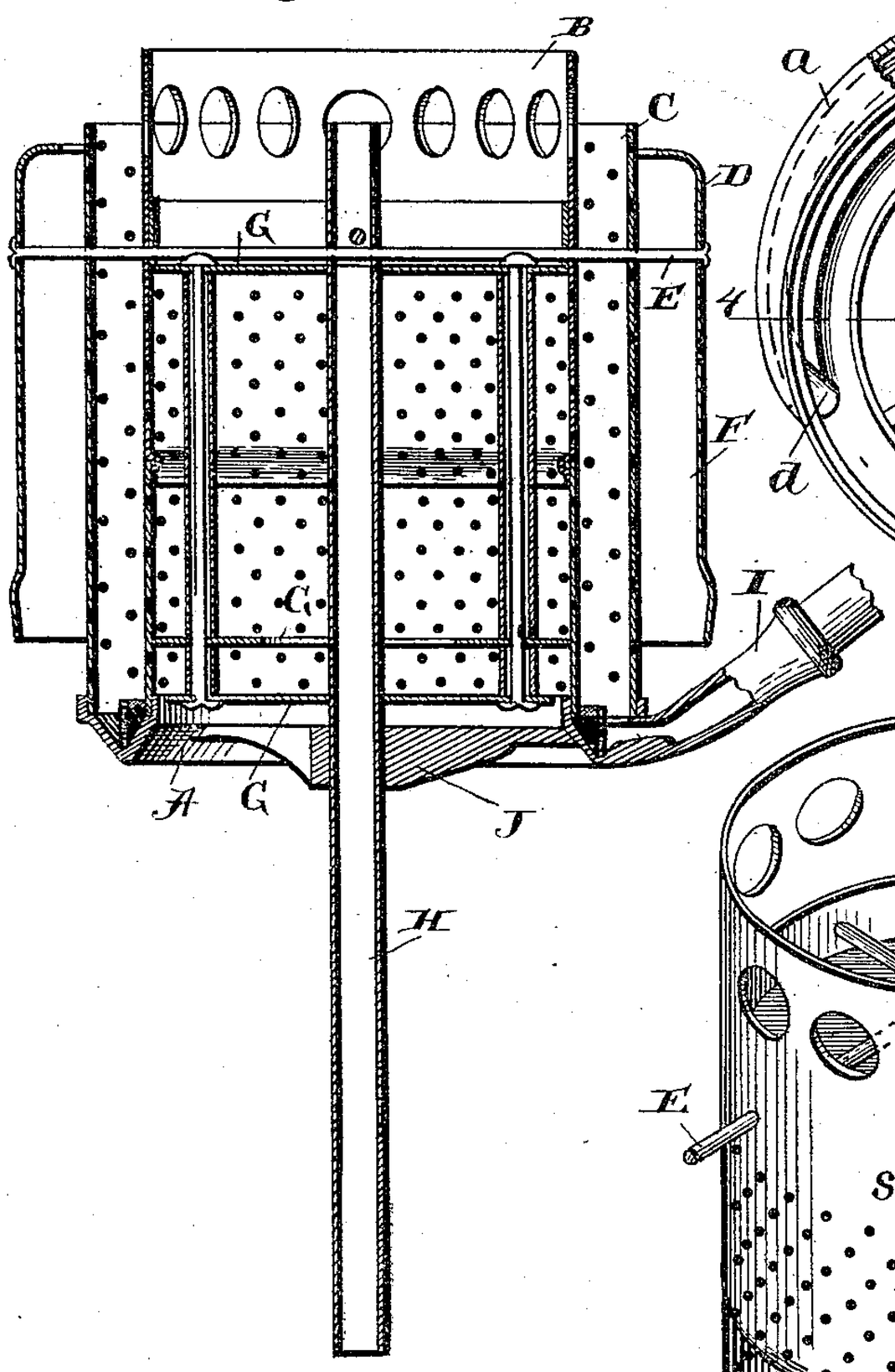


Fig. 2.

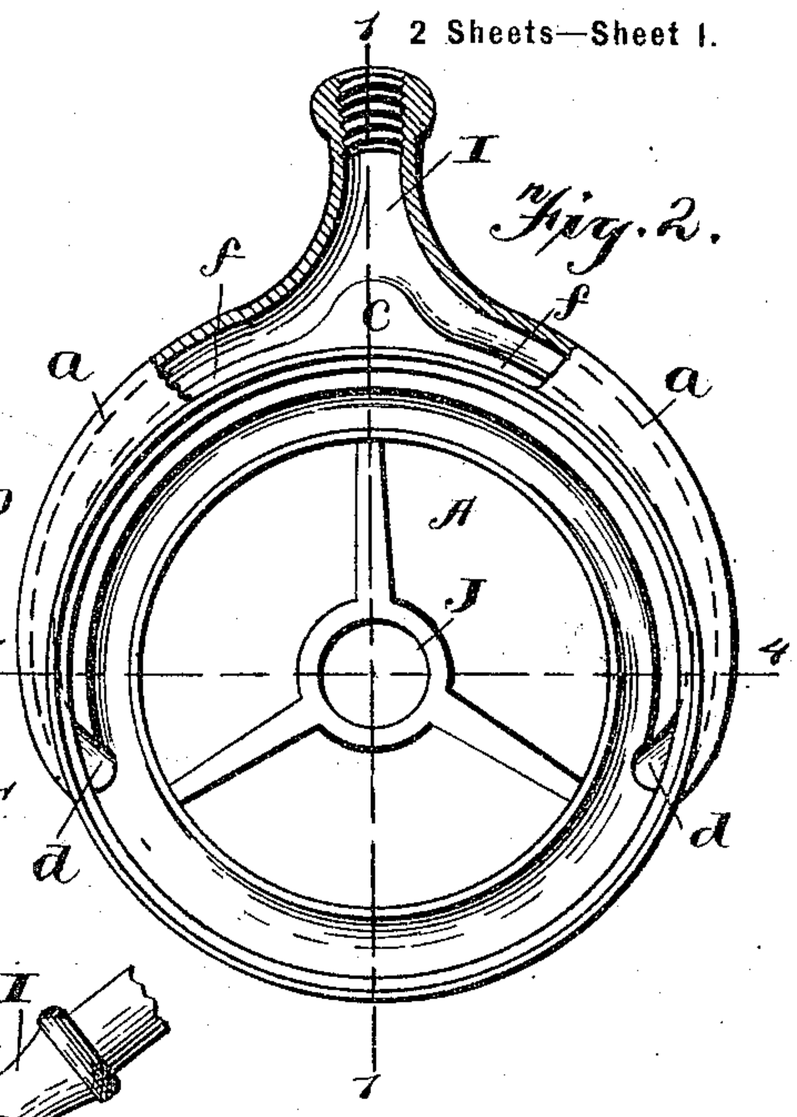


Fig. 3.

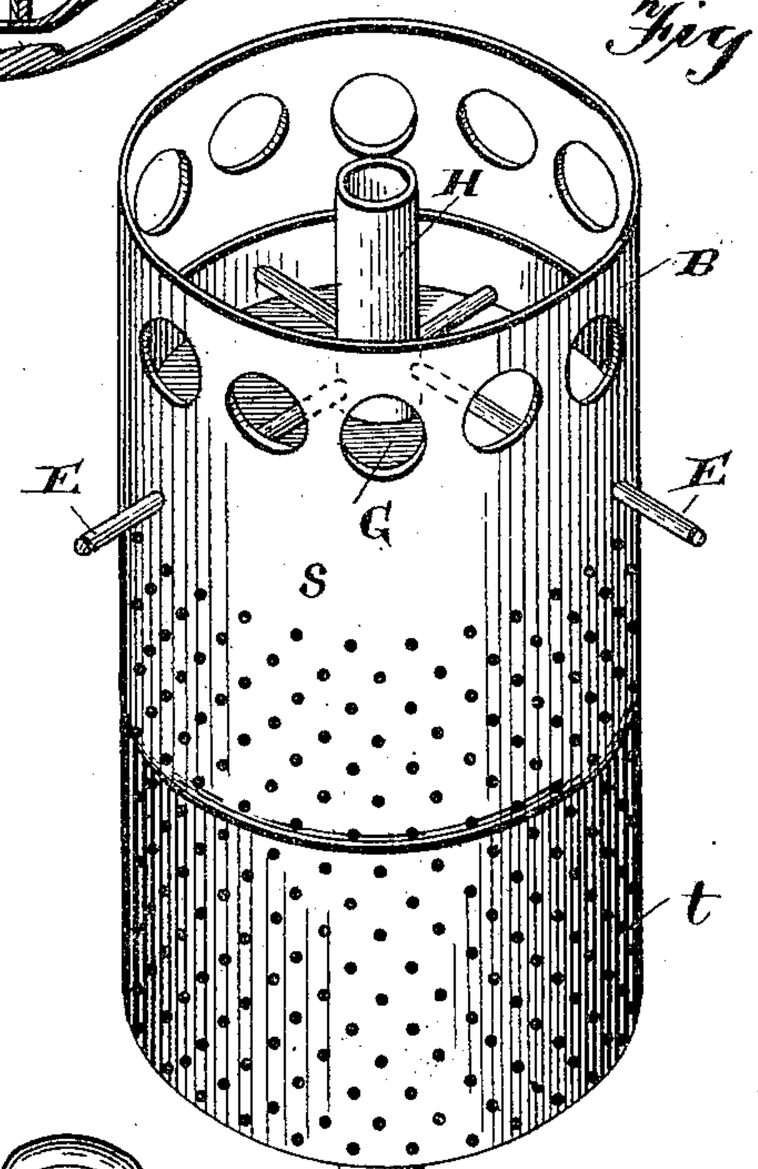
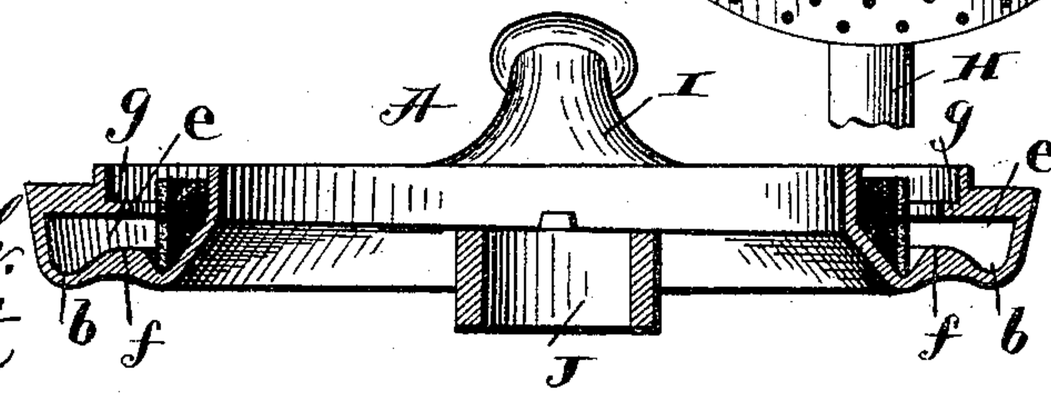


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 5.

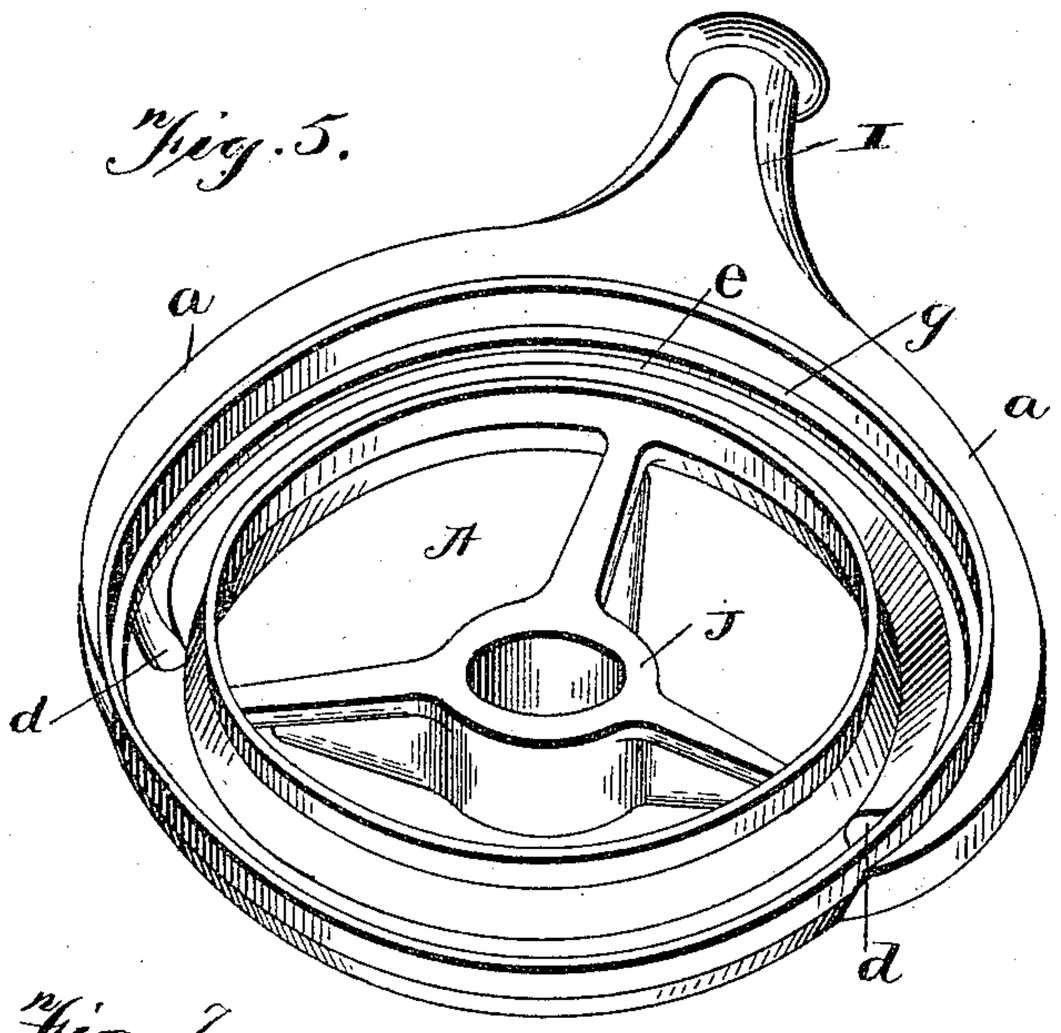


Fig. 7.

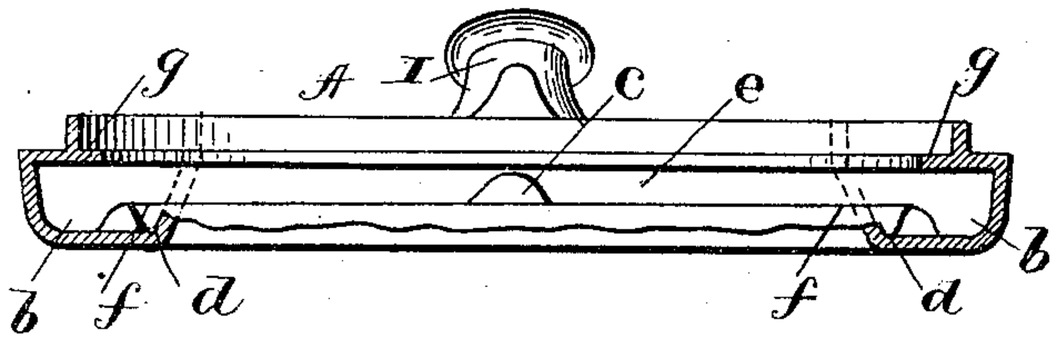
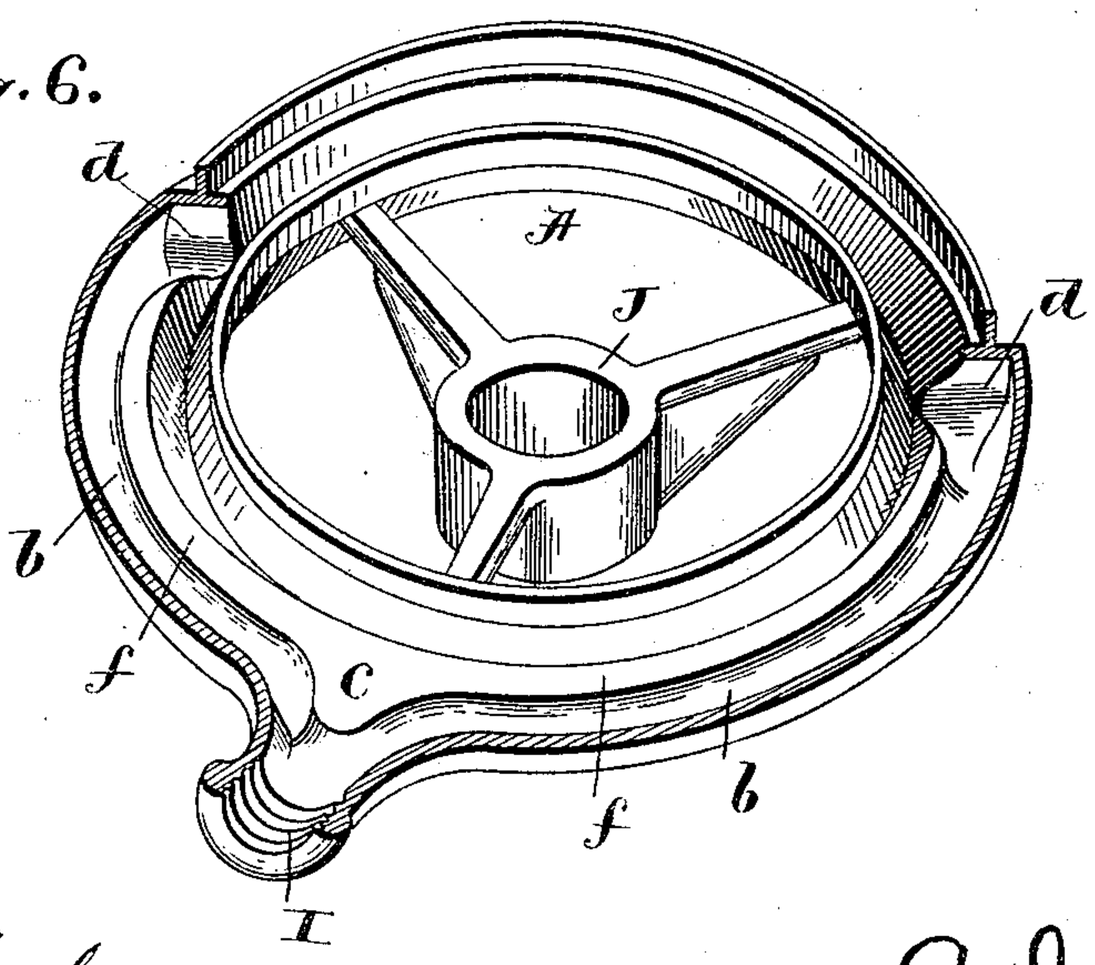


Fig. 6.



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UNITED STATES PATENT OFFICE.

ATWELL J. BLACKFORD, OF CLEVELAND, OHIO.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 607,641, dated July 19, 1898.

Application filed December 6, 1897. Serial No. 660,884. (No model.)

To all whom it may concern:

Be it known that I, ATWELL J. BLACKFORD, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Oil-Burners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in oil-burners, and pertains to a blue-flame oil-burner having a trough constructed to keep a continual flow of oil throughout its circumference or length. Heretofore in burners of this class the oil has been positively fed to the trough at or approximately at the exit end of the supply-pipe, and although such construction is found to work well when the burner is operating at or approximately at its full capacity, yet an even flame cannot be satisfactorily maintained when turned low. I also find that an uneven flame occurs when the burner is not level, on account of a crooked or unlevel floor. In my present construction I feed the oil positively to opposite sides of the trough and am thereby enabled to maintain an even flame when the burner is turned down low and to prevent (within a reasonable degree) an uneven flame on account of the burner being supported out of level. My present construction is such that, while the oil is fed positively at opposite sides of the trough and at points removed from the supply-pipe, a portion of the oil climbs by capillary action over the wall of the channel which furnishes the side supplies and into the vaporizing-channel, thus aiding in maintaining an even supply of oil to the vaporizing-channel. The upper portion of inner perforated tube of the combustion-sections of blue-flame burners is subjected to severe wear on account of the great heat, which keeps it white-hot during the operation of the burner, and unless constructed of metal capable of standing this high degree of heat soon scales or warps and quickly deteriorates. It is also desirable to prevent the conducting of this great heat to the generating-channel.

My present invention in respect to the combustion-section consists in so forming a tube that the upper portion will best withstand a high degree of heat with the least damage and deterioration and at the same time the lower portion conduct as little as practicable of the heat to the generating-point, and I accomplish this by providing an inner tube composed of two metals having different degrees of heat-conducting qualities, the upper portion capable of standing the high degree of heat and the lower portion having less heat conductivity.

In the accompanying drawings, Figure 1 is a vertical section taken on the line 1 1, Fig. 2. Fig. 2 is a top plan view, partly in section, of the vaporizing-trough. Fig. 3 is an enlarged detached perspective view of the inner combustion-tube. Fig. 4 is an enlarged transverse section of the trough, taken on line 4 4, Fig. 2. Fig. 5 is an enlarged perspective view of the trough. Fig. 6 is a similar view, partly in section. Fig. 7 is a transverse sectional view on line 7 7 of Fig. 2.

Referring now to the drawings, A is a trough into which oil is fed through a suitable supply-duct I. The trough here shown is V-shaped in cross-section to provide a contracted portion or channel, by which I am enabled to keep a continuous, but limited, supply of oil throughout its entire length or diameter during the operation of the burner. I do not in this application make any claim, broadly, to this form of trough, for this is made the subject-matter of a concurrently-pending application filed August 23, 1897, Serial No. 649,211. A combustion-section is used in connection with the trough, and consists of an inner perforated tube B, an outer perforated tube C, and a surrounding drum or shell D. These tubes are suitably perforated to provide an efficient supply of air to the gases rising between them, and the inner tube is provided with a plurality of diaphragms G to effect a proper deflection of the air, all of which are well understood by those skilled in the art, and since neither the perforations nor diaphragms form any part of my present invention they need not be particularly described.

One improvement of my present invention pertains to the trough, whereby an even flame can be maintained when the burner is "turned down" and is less liable to be affected when the burner is not level. This improvement

consists in providing a groove or channel *b*, communicating with the supply-tube I and with the trough at a point or points removed from the point of supply. In the construction here shown the channel extends more than half-way around the trough and has its ends *d* communicating with the apex or contracted portion of the trough, thus effecting a main or positive feed of the oil to the trough at points considerably removed from the point of supply. The trough is provided with a bulged portion, forming a chamber in which the channel is situated. This construction is found to establish a uniform feed of oil to all parts of the trough when the feed is small and effects a flame that is not made uneven by an unlevel or crooked floor.

It will be noted that the chamber in which the channel is situated is in communication throughout its length with the trough through the passage-way *e*. (Clearly shown in Fig. 7.) A part of the oil fed to the channel *b* climbs over the inner wall *f* of the channel and into the trough, thus producing an auxiliary or supplemental feed of the oil into the trough; also, any vapor generated within the chamber has a free passage therefrom into the trough, and this with the supplemental feed of oil over the inner wall of the channel aids in establishing an even supply of vapor throughout the trough, and consequently an even flame at the top of the combustion-section, as will be readily understood. Through the medium of the channel furnishing a main or positive supply of oil at points removed from the supply the oil more evenly distributes itself throughout the trough.

Another feature of my present invention consists in making the inner combustion-tube B of an upper and lower section, as clearly shown in Fig. 3. The upper portion *s* of the tube is constructed of a material best suited for standing a high degree of heat—such, for instance, as aluminium-bronze—and the lower portion of a material having less heat conductivity, such as steel. The object of this is to prevent the conducting of the intense heat to the vaporizer, which is very objectionable. By means of a tube, as here shown and described, which is composed of two metals, the lower metal having a less heat-conducting quality than the upper portion, a durable, and yet an unobjectionable, tube is produced. Since the outer tube is not subjected to the intense heat of the inner tube, it is preferably constructed of a material which has less heat conductivity than the upper portion of the inner tube, which is found to be sufficiently durable.

The advantages of an inner tube having its upper portion made of a material which is durable, and consequently of high heat conductivity, and its lower portion, which is subjected to comparatively a small degree of heat, composed of a metal having less conducting quality is very advantageous in a burner of this character, irrespective of its durability. Where the tube is used in connection with a wick-burner and is composed throughout of a material of high heat-conducting qualities, sufficient heat is conducted to the wick-tube to char and damage the wick, and when used in connection with a trough or channel adapted to contain a continuous supply of oil throughout its length the trough becomes so heated that the oil is vaporized so rapidly as to prevent its proper distribution throughout the length or diameter of the trough, whereas in a burner of the character here shown it is especially desirable, and indeed imperative, to the proper operation of the burner to have practically a distribution of the oil throughout the entire length or circumference of the oil-vaporizing channel.

While I here show my improved combustion-tube in connection with a trough generator, it is equally if not more desirable in connection with a wick-burner.

I do not limit myself to any particular form of trough, for it may be annular, as shown, straight, or angular in plan view without affecting the spirit or operation of my improvement as herein shown and described.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A burner comprising a trough having an oil-vaporizing channel, and an oil-feeding channel parallel therewith and communicating with the vaporizing-channel through the dividing-walls, substantially as described.

2. A burner comprising a trough having an oil-vaporizing channel, an oil-feeding channel communicating therewith through the dividing-wall, and an oil-supply communicating with the oil-feeding channel at a point removed from the communication between said channels, substantially as described.

3. An oil-burner comprising an annular trough having an oil-vaporizing channel and an oil-supply channel concentric therewith and in practically the same horizontal plane, the dividing-wall having a passage-way establishing communication between said channels, substantially as described.

4. An oil-burner comprising an annular trough having an annular oil-vaporizing channel, and a concentric oil-feeding channel, the dividing-wall between said channels having passage-ways at opposite sides of the center of the trough which establishes communication between said channels, substantially as described.

5. An oil-burner comprising an annular trough provided with an annular oil-vaporizing channel, a concentric U-shaped oil-feeding channel, the dividing-wall having passages at the ends of the oil-feeding channel, and an oil-supply communicating with the oil-feeding channel at a point intermediate its ends, substantially as described.

6. An oil-burner comprising a trough having an oil-vaporizing channel, and an oil-feeding channel having positive and auxiliary oil-

feeding communications with said oil-vaporizing channel, substantially as described.

7. An oil-burner comprising a trough having an oil-vaporizing channel, and an oil-feeding channel, the dividing-wall having a passage-way practically in a horizontal plane with the bottom of the oil-vaporizing channel forming a positive feed, and a passage-way in a plane above the bottom of said oil-vaporizing trough forming an auxiliary oil-feed, substantially as described.

8. An oil-burner comprising a trough having an oil-vaporizing channel and an oil-feeding channel, the dividing-wall having an elongated passage-way in a plane above the bottom of the oil-vaporizing channel, and a comparatively small passage-way in practically a horizontal plane with the bottom of the oil-vaporizing channel, substantially as described.

9. An oil-burner comprising a trough having a V-shaped oil-vaporizing channel, and an oil-feeding channel, the dividing-wall having a passage-way communicating with the apex of the V, and a passage-way in a horizontal plane above said apex, substantially as described.

10. An oil-burner comprising an annular trough provided with an annular vaporizing-channel, and an oil-feeding channel, the dividing-wall having passage-ways between the channels at points situated at opposite sides of the oil-vaporizing trough, substantially as described.

11. An oil-burner comprising an annular trough provided with an annular V-shaped oil-vaporizing channel, an inclosing oil-feeding channel, the outer wall of the oil-vaporizing channel provided with passage-ways communicating with the oil-feeding channel at opposite sides of the oil-vaporizing trough, substantially as described.

12. A perforated combustion-tube for oil-burners having its top and bottom portions composed of two metals, the metal forming the lower portion having relatively a less heat-conducting quality than the upper portion.

13. A combustion-tube for oil-burners composed of an upper and lower section united at their meeting-point, the upper portion composed of a durable metal, and the lower portion of a metal having a less heat-conducting quality than the upper portion.

14. A combustion-section for oil-burners composed of an inner and an outer tube, the inner tube having an upper and a lower section, the upper section composed of durable material and the lower section of a material having a less heat-conducting quality than the upper section, and the outer tube composed of a material having less heat-conducting qualities than the upper section of the inner tube.

15. The combination with an oil-burner having a vaporizing-chamber, of an inner perforated combustion-tube composed of two metals, the upper portion where the heat is greatest composed of a metal having a greater heat-conducting quality than the lower portion, whereby the upper portion is prevented from being warped and scaled, and the lower portion from conducting heat to the vaporizing chamber or point, substantially as and for the purpose described.

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

ATWELL J. BLACKFORD.

Witnesses:

L. A. REED,

E. D. DAKE.