

(No Model.)

A. H. CALKINS.  
LIQUID FUEL BURNER.

No. 419,824.

Patented Jan. 21, 1890.

Fig 1.

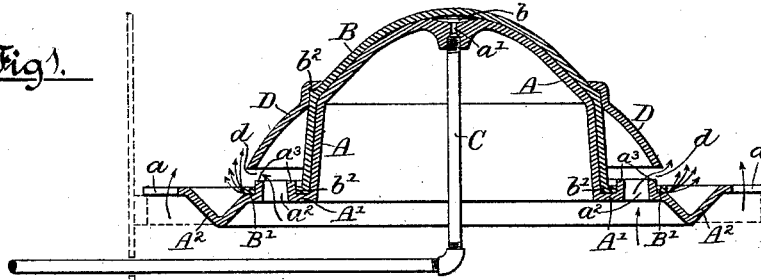


Fig 2.

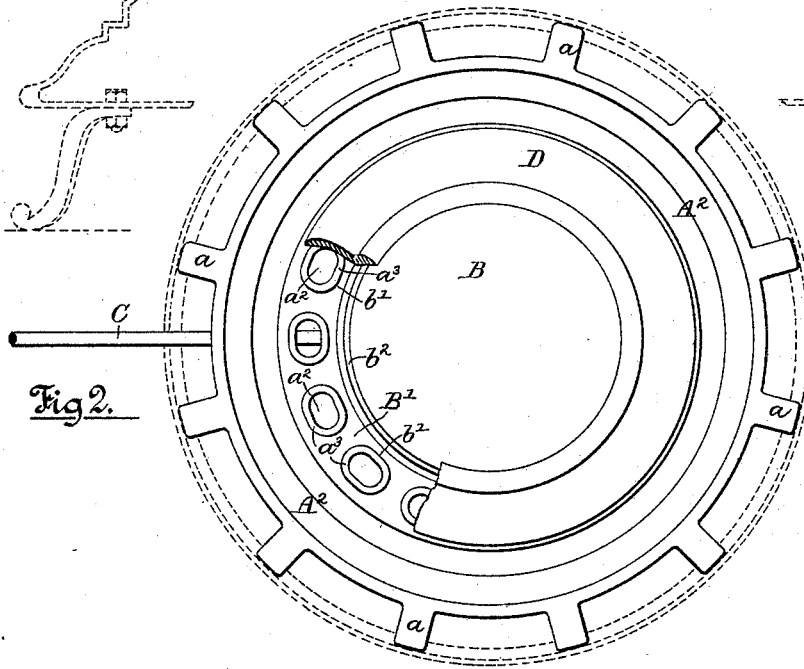
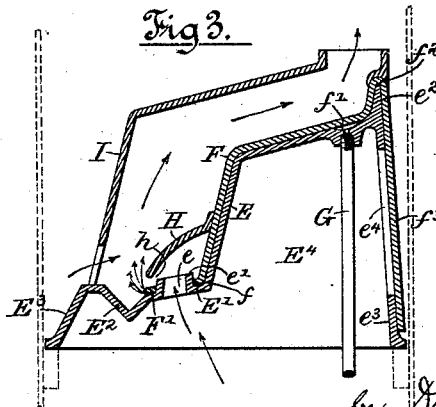


Fig 3.



Witnesses

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# UNITED STATES PATENT OFFICE.

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## LIQUID-FUEL BURNER.

SPECIFICATION forming part of Letters Patent No. 419,824, dated January 21, 1890.

Application filed December 7, 1888. Serial No. 292,935. (No model.)

*To all whom it may concern:*

Be it known that I, ALMON H. CALKINS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful  
5 Improvements in Liquid-Fuel 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,  
10 which form a part of this specification.

This invention relates to an improved burner for converting liquid fuel into vapor or gas and burning the same, of that class comprising two parallel plates placed close  
15 together or nearly in contact with each other, said plates having an extended area of heating-surface, between which the fuel is confined in passing from an oil-supply pipe or inlet-passage to the margins of the plates,  
20 whereat gas produced by the heat of the plates is burned. Such a burner is shown and broadly claimed in a prior application for patent, Serial No. 266,921, filed by me in the United States Patent Office March 12,  
25 1888.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating  
30 my invention, Figure 1 is a central vertical section of a burner embodying the same. Fig. 2 is a plan view of the burner. The part of the top plate of the same is broken away to show the construction of the parts beneath  
35 the same. Fig. 3 is a sectional view of the rectangular burner, embracing the same general features of construction that are illustrated in Figs. 1 and 2.

The burner proper consists in its main or  
40 essential parts of two cup-shaped or convex burner-plates A and B, of which A is the lower plate, which is sustained within the stove or other heating apparatus by means of suitable projections at its edges, and B is a  
45 top plate which rests thereon. The adjacent surfaces of said plates A and B are of exactly the same form, and said plates are fitted so closely together as to leave an exceedingly narrow space between them, through which  
50 the fuel may pass from the point at the center of the plates to the margin thereof. Com-

monly the plates will be made of cast metal with their contact-surfaces of ordinary smoothness, surfaces of this kind, when the upper plate rests by gravity on the lower one, 55 being found to afford ample space for the passage of the fuel between the plates in the manner described. At the base of the main or cup-shaped part of the plate A the latter is provided with an outwardly-extending 60 flange or annular part A', and the plate B with a corresponding outwardly-extending flange or annular part B', said flange B' terminating at the outer margins of the part or flange A', so that an opening is afforded at 65 the margin of said plate or flange B' for the exit of the fuel in vaporous or gaseous form from between the plates. The outer margin of the lower plate A is, however, extended outwardly beyond the part A' and shaped to form 70 an annular trough A<sup>2</sup>, herein shown as made of V shape in cross-section, but which may be of other form, if desired. Upon the outer margin of said trough A<sup>2</sup> is formed a series of radial lugs *a a*, which rest upon any suitable projec- 75 tion or ledge for supporting the burner. In Fig. 1 of the drawings the dotted lines show the outline of a stove, which is provided with an inwardly-projecting ledge, upon which the said lugs *a a* rest. At the center of the plates 80 A and B an oil-supply pipe C communicates with a space between said plates through the medium of the passage *a'* in the bottom plate A, in which plate said pipe is secured. Preferably a small oil-chamber *b* is formed 85 between the plates A and B adjacent to the passage *a'*; but this chamber is not essential.

Within the horizontal part or flange A' of the bottom plate A are formed a series of ap- 90 ertures *a<sup>3</sup> a<sup>3</sup>*, which are surrounded by upwardly-extending flanges *a<sup>3</sup> a<sup>3</sup>*, which project through correspondingly-shaped openings *b' b'* in the annular part B' of the plate B, in the manner illustrated. The said flanges *a<sup>3</sup> a<sup>3</sup>* are fitted as closely as possible within the 95 openings *b' b'*, so that the fuel passing outwardly between said plates A and B will make its escape at the margins of said part B' and not at the joints around said flanges *a<sup>3</sup>*.

D is an annular deflecting plate or flange 100 connected with the plate B thereof, and extending outwardly and downwardly over said

horizontal part B' and terminating near the outer margin of the latter. The outer edge of the horizontal part B' of the plate B and the lower edge of the said flange D form an annular slot or opening  $d$  adjacent to and above the line at which the vapor or gas escapes between the plates A and B. In the construction of the parts herein shown the flange D is cast separate from the plate B and is fitted to a shoulder  $b^2$  upon said plate. This construction is not, however, essential, and said flange may be otherwise formed or constructed, as may be found convenient or desirable.

In the operation of this burner oil is fed by means of the supply-pipe C to the space between the plates A and B, and, said plates being heated by the vapor or gas flame adjacent to and around them, the oil is converted first into vapor and then into gas as it approaches the margins of the plates, and finally issues from between the plates about the margins of the upper plate B, where combustion takes place, giving a circular flame surrounding the central cup-shaped part of the burner. Air for supporting combustion is supplied around the outside of the trough A<sup>3</sup> by means of the spaces formed by the lugs  $a$ , and air is also supplied to the flame by means of the openings  $a^2$  and annular slot  $d$ , hereinbefore described. The air passing upwardly through said openings  $a^2$  enters the space inclosed by or within the flange D and makes its exit from this space through the slot  $d$ , and is thereby delivered at a point close to the flame. By the construction described I provide an ample supply of air at both sides of the flame, with the advantage of producing complete and rapid combustion. The annular trough A<sup>3</sup> is for the purpose of receiving a small quantity of oil, which may be allowed to escape from the oil-pipe C preparatory to lighting the burner, and may be burned within said trough for the purpose of heating the plates A and B sufficiently to vaporize the oil.

It will of course be understood that in starting the burner vapor will be formed when the plates are at a relatively low temperature, but that the burning of the vapor will increase the temperature of the plates until they become so hot that gas is formed and issues from between them.

In Fig. 3 I have shown the features of construction above described as applied to a burner of rectangular form. In this instance E is the lower and F the upper plate of the burner. These plates are provided at their lower edges with nearly horizontal parts E' F', the part E' being provided with holes  $e$ , surrounded by flanges  $e'$ , which pass through and fit in apertures  $f$  in the part F' of the plate F. Over said horizontal parts E' F' the plates E and F extend upwardly in nearly a vertical direction, and at some distance above the said parts E' and F' are bent backwardly, so that their upper parts are nearly

horizontal. Near the upper edges of the said plates is formed a horizontal oil-supply passage  $f'$ , with which is connected the oil-supply pipe G. The oil fed to said passage  $f'$  passes into the space between said plates E and F throughout the entire length of the same. At the outer or rear margin of the plates E and F, at the rear of the oil-passage  $f'$ , the plate E is provided with an upwardly-extending flange  $e^2$ , while the adjacent part of the plate F is constructed to fit over said flange, thereby forming a U-shaped part  $f^2$  upon said plate. Said flange  $e^2$  and the part  $f^2$  fitting thereon form a practically-tight joint at these edges of the plates. The plate F is preferably continued downwardly outside of the flange  $e^2$ , forming a wall  $f^3$ , which extends nearly to the bottom of the burner, while the plate E is connected at its rear edge with a depending plate  $e^3$ . Said plate E, together with the part  $e^3$  thereon, forms a hollow or concave shell or casting, over which the plate F and its depending flange  $f^3$  are placed, and upon which they are held by gravity. The flange or casting  $e^3$  is desirably cut away or recessed to a point near its upper edge, as indicated at  $e^4$ , thereby allowing the escape into the space beneath the plate E of any vapor or gas which may pass through the joint formed by the flange  $e^2$  and the part  $f^2$ , which fits over the same. The vapor or gas thus escaping is confined within the inner space of the burner by means of the said flange  $f^3$ , and finally passes to the burner with the air for supporting combustion, in the manner described in a separate application for patent, Serial No. 292,934, filed simultaneously herewith. A flange or wall operating in this manner is fully described and claimed in said separate application, and forms no part of the matters claimed herein.

A horizontal trough E<sup>2</sup> is cast upon the margin of the part E' of the plate E, said trough being for the purpose of receiving oil for starting the burner, in the manner hereinbefore described. A part or wall E<sup>3</sup>, cast upon the outer edge of the trough E<sup>2</sup>, serves as a means of sustaining the lower or front edge of the casting composing the said plate E and trough E<sup>2</sup>. A vertical end wall E<sup>4</sup> at each end of the burner serves to connect the ends of the plate E, trough E<sup>2</sup>, front wall E<sup>3</sup>, and rear wall  $e^3$ , all of which parts in the particular burner shown are cast integral with said end wall.

H is a deflecting plate or flange attached to the top plate F of the burner and extending downwardly to a point adjacent to and above the outer margin of the said plate F. At its lower edge a horizontal slot  $h$  is formed between said flange and the adjacent margin of the plate F, through which air passes to the flame.

I is a flame-deflecting plate supported over and adjacent to the plates E and F and acting to confine adjacent to said plates the flames resulting from the combustion of the

vapor or gas issuing from between said plates E and F, so that the plates will be maintained at a high temperature during the operation of the burner. The burner shown in Fig. 3 operates in the same manner as that hereinbefore described, air for supporting combustion being supplied both from the outside of the trough E<sup>2</sup> and by means of the openings *e e* and slot *h*.

10 As far as that part of my invention which relates to means for supplying air to both sides of the flame is concerned, the plates themselves may be flat, conical, cup-shaped, or of other form. Preferably, however, said  
15 plates are made of cup shape, with their margin at which combustion takes place at the lower part thereof, so that an annular flame is produced, which surrounds the central elevated parts of the plates, and thus  
20 serves to maintain the same at a high temperature. When said plates are of other shape than herein shown, however, a deflector may be supplied to direct the flames over or into contact with the plate. A construction  
25 of this kind is illustrated in a separate application, Serial No. 292,934, filed simultaneously herewith.

I claim as my invention—

1. A burner for converting liquid fuel into  
30 gas and burning the same, comprising two parallel plates placed close to each other, an oil-supply pipe for supplying oil between said plates, said plates being provided with a  
35 plurality of openings extending through the same near their margins at which the gas issues, whereby air is supplied to the inner side of the flame of the burner, substantially as described.

2. A burner for converting liquid fuel into  
40 gas and burning the same, comprising two parallel plates placed close to each other, an oil-supply pipe for supplying oil between said plates, the lowermost of said plates being provided with a plurality of openings surrounded  
45 by flanges which extend through openings in the upper plate, whereby air is supplied to the inner side of the flame of the burner, substantially as described.

3. A burner for converting liquid fuel into gas and burning the same, comprising two  
50 parallel plates placed close to each other, an oil-supply pipe for supplying oil between said plates, said plates being provided with a plurality of openings which extend through  
55 both plates near the margins thereof at which the gas is burned, and a deflecting plate or flange located over the said opening, with its free edge over and adjacent to the margin of the upper plate, whereby the air passing through said openings is delivered at the base  
60 of the flame, substantially as described.

4. A burner comprising a circular cup-shaped lower plate having a horizontal marginal part provided with a plurality of openings surrounded by upwardly-extending  
65 flanges, a cup-shaped top plate provided with a horizontal marginal part having apertures to receive said flanges, and an oil-supply pipe communicating with the space between said plates at the center of the same, substan-  
70 tially as described.

5. A burner comprising a circular cup-shaped lower plate having a horizontal marginal part provided with a plurality of openings surrounded by upwardly-extending  
75 flanges, a cup-shaped top plate provided with a horizontal marginal part having apertures to receive said flanges, an oil-supply pipe communicating with the space between said plates at the center of the same, and an out-  
80 wardly and downwardly extending flange supported upon the top plate and overhanging the said horizontal marginal part of the same, and forming with the margin of said top plate an annular slot, through which the air enter-  
85 ing the said openings passes to the flame, substantially as described.

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

ALMON H. CALKINS.

Witnesses:

C. CLARENCE POOLE,  
M. E. DAYTON.