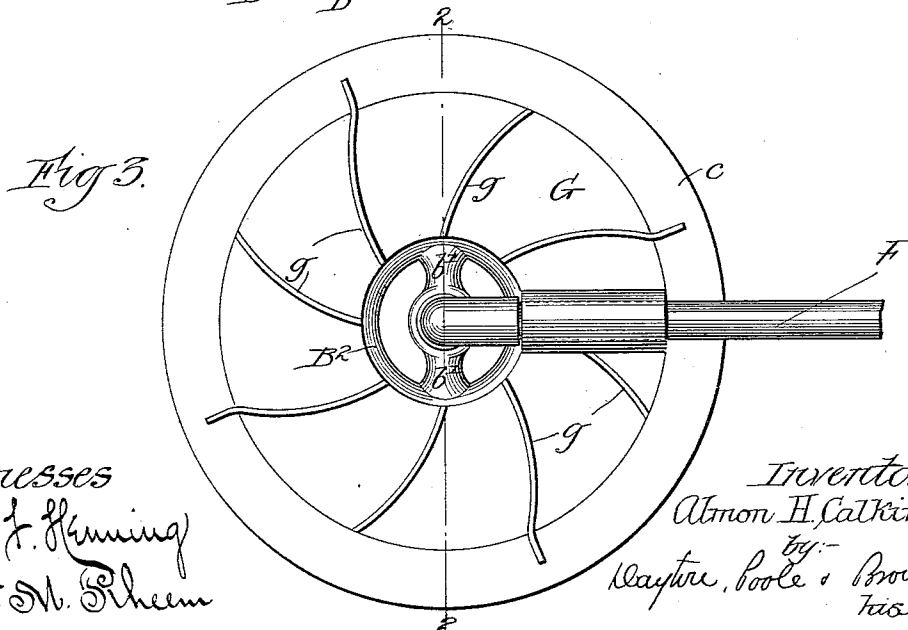
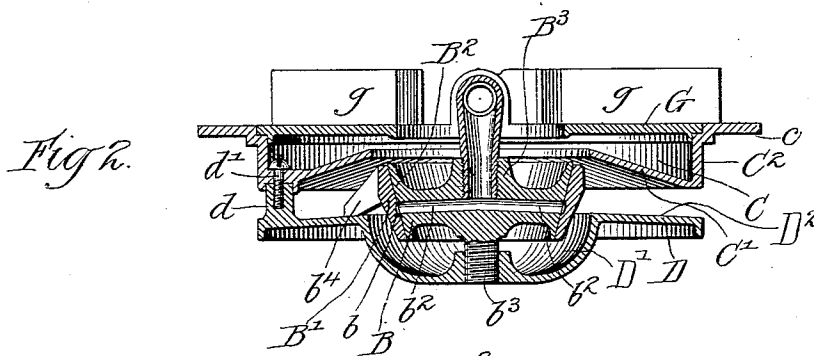
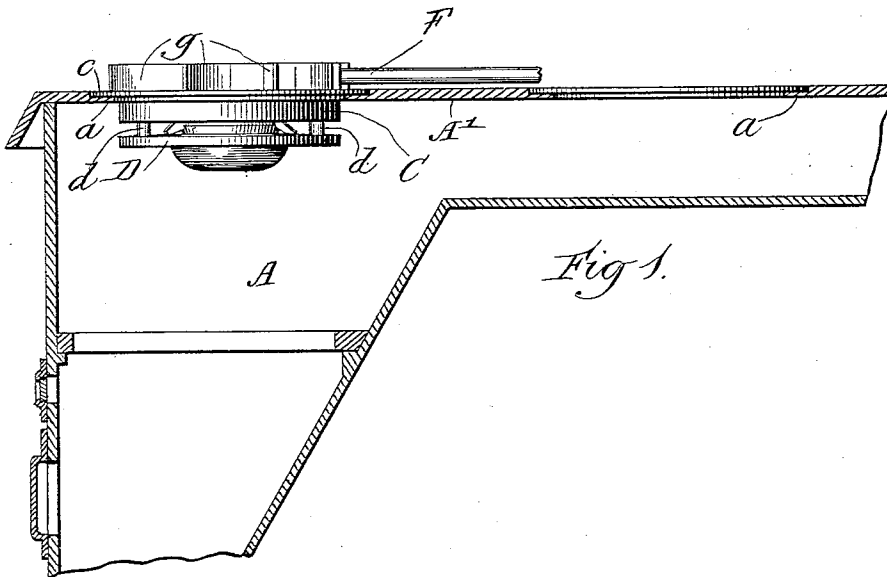


A. H. CALKINS.
OIL BURNER.

No. 559,994.

Patented May 12, 1896.



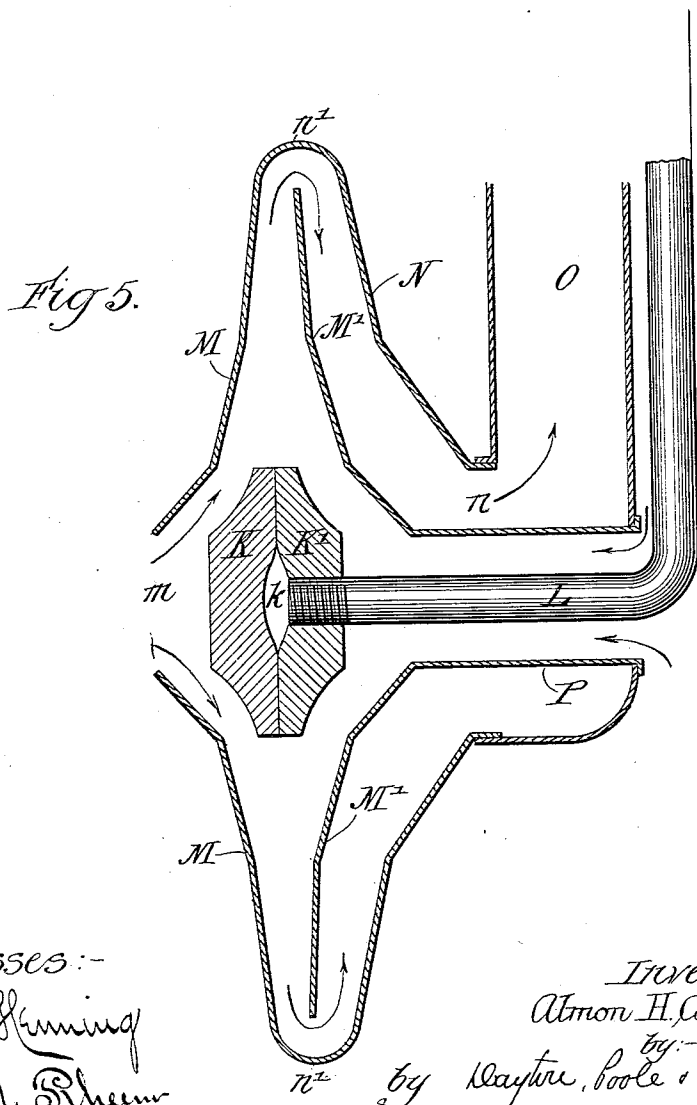
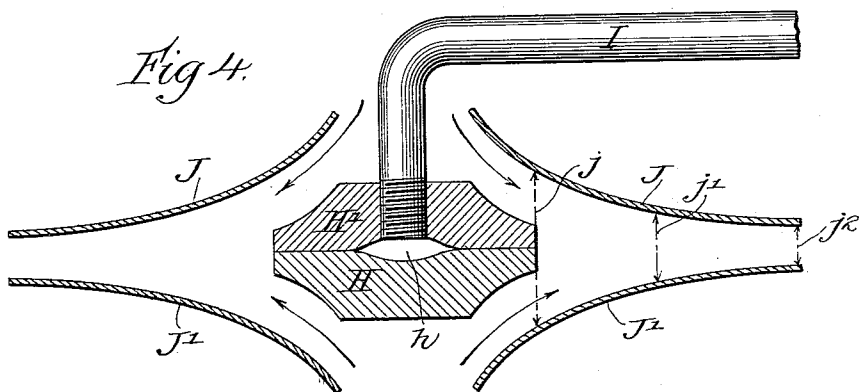
Witnesses
Wm. F. Heming
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by—
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His Attys

UNITED STATES PATENT OFFICE.

ALMON H. CALKINS, OF CHICAGO, ILLINOIS.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 559,994, dated May 12, 1896.

Application filed April 4, 1893. Serial No. 468,977. (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 Improvements in 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 improvements in burning devices for oil or liquid fuel; and it consists in the matters hereinafter described, and pointed out in the appended claims.

15 An oil-burning device embodying my invention embraces as its principal features an oil-burner of circular form or one which gives an annular or ring-shaped flame and a burner-casing having opposite annular walls arranged concentrically with reference to the circular burner, and provided with central air-inlet openings admitting air to both sides of the flame from the burner and a relatively-narrow peripheral outlet-opening through
25 which the flames escape from the casing. The part hereinafter referred to as the "burner" is that by which the oil is held or confined while being burned, either in a liquid or gaseous state—as, for instance, it may consist of two
30 plates arranged in contact with each other, or practically so—and having an oil-supply passage leading to the space between them, the oil in such case being vaporized or converted into gas by the heat of the plates as it passes
35 between them and burning at the margins of the plates in the form of a circular or ring-shaped flame. As far as the general purposes of my invention are concerned, however, the burner may be one adapted to hold a supply
40 of oil which is burned without being converted into gas, as in those burners having a porous body or bed to which the oil is supplied and at which combustion takes place.

The invention may be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a sectional view of a stove-top, showing an oil-burner embodying my invention applied thereto. Fig. 2 is a sectional view
50 of the burner shown in Fig. 1. Fig. 3 is a top or plan view of the burner shown in Fig. 2. Figs. 4 and 5 are sectional views illustrating

different forms of burning apparatus embodying the main features of the invention.

To first refer to the form of burning apparatus shown in Figs. 1, 2, and 3, this form is more particularly adapted for use in connection with a cooking-stove, being constructed for insertion in one of the holes in the top of such a stove and adapted for use for heating
55 such a stove in the place of ordinary fuel. As shown in said Figs. 1, 2, and 3, A indicates the fire-pot of a cooking-stove, and A' the top plate thereof provided with holes *a a* for cooking utensils in the usual manner. The burning apparatus illustrated in these figures consists generally of an annular burner (indicated as a whole by B) and two main plates or castings C D, of which the upper one, C, is provided with an annular flange *c*, adapted to fit
60 within the hole *a* of the stove-top and to thereby support the other parts of the burner, which are attached to said plate C in the manner hereinafter described.

The main or central part of the upper casting C has the form of a conical wall or plate C', provided with a central opening of considerable size and inclining outwardly and downwardly from said opening, said conical plate or wall being united at its outer margin
75 with a cylindric part or flange C², on the upper edge of which the flange *c* is formed. The lower casting D is of circular form and secured to the casting C with outer margin a short distance below the same, so as to form
80 an annular space or slot constituting the exit-opening of the burner through which the flames and products of combustion pass in escaping from the same into the space within the stove in which the burner is located, which
85 space is connected with the chimney or outlet-flue. The said casting D has generally the form of a dish or saucer having a central recess D' and a marginal flange D², which latter is of approximately the same width as the
90 conical wall or plate C'. The central recessed part of the casting D receives or surrounds the lower part of the burner B, and the top surface of the flange of the casting D, exterior to the central recessed part, forming a smooth
95 or continuous surface beneath the wall C' of the upper casting C. The said surface formed by the flange D² of the casting D is inclined relatively to the said wall C' of the casting C
100

in such manner that the space between these parts is much greater in width at their inner than at their outer margins. The castings C and D may be connected with each other in any suitable manner, but, as herein shown, the casting D is provided with upwardly-extending studs or posts d d , which rest against the lower surface of the casting C, screws d' d' being inserted through the casting and into said studs to hold the parts together. The burner B illustrated in the figures consists of an outer ring B' and an inner ring B², these rings being of conical shape and fitted one within the other in the manner shown. At their lower margins the rings are fitted tightly and accurately to each other, so as to prevent the passage of oil at their lower parts, while their upper portions merely rest in contact or are loosely fitted, so that an exceedingly thin film of oil may easily pass from the annular space or passage b , formed between the plates near their lower edges upwardly to their upper margins. The inner burner-ring B² is provided with a central hub B³, united by radial arms b' b' with the opposite sides of the ring, and attached to said hub is an oil-supply pipe F, which communicates with the annular passage b by means of transverse supply-passages b^2 b^2 , passing through the arms b' b' . The central hub B³ is shown as provided with a screw-threaded stud b^3 , which enters a central screw-threaded aperture in the lower casting D, so as to hold the burner-rings securely in place relatively to the said casting. The outer burner-ring B' is provided with a plurality of arms or lugs b^4 b^4 , which extend outwardly and are adapted to engage the top surface of the casting D, so as to sustain said ring B' in position. It is obvious that when the ring B' is inserted with the lugs b^4 b^4 , in contact with the casting D, and the inner ring is then engaged with the lower casting D by means of the screw-threaded stud b^3 , and is then drawn downwardly within the ring B' by turning said ring B² so as to screw the studs downwardly in the casting D, the bearing or contact surfaces at the lower margins of the two burner-rings will be drawn or forced tightly into contact with each other, so that a tight joint is thereby formed between said burner-rings, while at the same time both burner-rings are held accurately and rigidly in operative position. The oil-supply pipe F is shown as being brought horizontally over the upper casting C and as being bent at right angles to form a downturned end, which is connected with the central hub of the inner burner-ring. The burner-rings are so located within the casing formed by the upper and lower castings C and D that the upper margins of said rings at which the vaporized oil escapes and where it is burned are located at a point intermediate to the wall C' and casting D, so that air entering through the central opening of the wall C and the recess D' approaches the annular flame from opposite sides thereof,

while the flame itself passes outwardly between the upper and lower castings until it makes its escape from the annular opening or slot at the margins of the same. Air supplied to the lower surface of the flame is that which passes downwardly through the central opening in the burner-rings, and which, passing around the lower margins of said burner-rings, rises between the outer burner-ring and the inner margin of the annular flange D² of the casting D. The air supplied to the upper surface of the flame passes directly to the same through the central opening in the conical wall C'.

When the burner constructed as described is placed within the hole in the stove-top and oil supplied through the oil-supply pipe F, such oil is vaporized in passing from the passage b to the upper margin of the plates by the heat of the latter, and in its vaporized or gaseous condition is burned at the upper margins of said plates, the annular flame thus produced flowing outwardly between the opposite converging walls of the burner-casing until they pass through the annular marginal slot or opening of the burning apparatus, after which they are free to spread beneath the stove-top. Said annular slot or opening of the burner-casing being arranged horizontally and below the level of the stove-top, the annular flame passing outwardly through said slot will obviously tend to spread throughout and beneath the entire surface of the stove-top, thereby not only serving to communicate heat to the cooking utensils placed upon the other holes in the stove, but also to heat generally the oven and other parts of the stove in the same manner as a coal or wood fire. A burner constructed as described and placed in one of the holes of the stove-top may be used merely for heating cooking utensils placed over the other holes of the stove-top or for heating the stove generally. In order, however, to enable the space above the burner to be utilized for supporting a cooking utensil without cutting off the supply of air to the burner, I provide a circular plate G, which is fitted within the upper part of the casting C and is provided with upwardly-extending flanges g g , which serve as a support for a kettle or other cooking utensil, while at the same time permitting free access of air to the central opening of the said plate G, which is provided for admitting air to the main part of the casing of the burner. Said flanges g g will, in case the supply-pipe is arranged as shown, be made to extend somewhat above the top surface of said supply-pipe, so that the presence of the latter will not interfere with the placing of cooking utensils over the burner. It is of course obvious that the entrance of cold air to the burner beneath the cooking utensil will tend to some extent to cool the bottom of the cooking utensil; but inasmuch as the burner-plates will commonly become highly heated in the operation of the burner suffi-

cient heat will be thereby generated to make the burner of considerable utility in actual use as a means of heating a vessel placed over the same. It will be noted that the opposing parts of the plates which form the annular space or chamber through which the flames pass from the burner before making their escape through the annular slot or opening between the upper and lower castings is much wider adjacent to the burner than at the said slot or exit-opening. The convergence of the opposite wall of said annular chamber is, however, such in degree that approximately the same space for the passage of the flames and products of combustion is afforded at all points in the outward passage of the flame. In other words, the space containing the flames is narrowed in receding from the burner to such extent as to compensate for the larger circumference of the opening in passing from the burner outwardly, so that the air is closely confined in proximity to the gases and products of combustion during the outward passage of the flames and until the latter escape from the peripheral slot or outlet-opening of the burner. As shown in the drawings, the top surface of the flange D^2 and the marginal part of the casting D are inclined to a slight degree downwardly in the same direction as the wall C' above the same; but the particular inclination of these walls is unimportant and the same may be inclined in opposite directions, if preferred, it only being necessary that the inner parts of the opposing walls which form the annular combustion-chamber should be at a greater distance apart than the outer parts or margins of said walls.

Fig. 4 is a diagrammatical view or section illustrating a very simple form of burning apparatus without any support or attaching devices for the plates or castings which form the annular combustion-chamber around the circular burner. In this instance $H H'$ illustrate two circular burner-plates, which rest in contact with each other, and are provided with a central opening or chamber h , to which oil is supplied through a supply-pipe I .

$J J'$ indicate two similar oppositely-arranged plates or castings of annular form constituting an annular combustion-chamber, which is provided with air-inlets formed by central openings in the plates and with an annular exit-opening or slot formed by the space between the margins of said plates. The plates $J J'$ and the burner-plates between the same may, in a construction of this kind, be supported in the same manner as the corresponding parts illustrated in Figs. 1, 2, and 3 or in any other suitable manner, and, furthermore, the burner may be arranged horizontally, as shown, or in a vertical or other position—as, for instance, it may be placed or sustained centrally within an open fireplace with its marginal opening in a vertical plane, in which case the flame issuing therefrom will issue radially in all directions, giving

ing a circular or annular flame or one of wheel form.

In the construction shown in Fig. 4 the area for the passage of flame, products of combustion, and air from the margin of the burner-plates outwardly to the marginal opening of the casing is made practically the same at all points—that is to say, the area of the space represented by a zone at the margin of the burner-plates will be practically the same as the area of a zone located at the margins of the plates or castings $J J'$, and the same is true of the area corresponding with the zone or belt located at any intermediate point. Said zones or belts may be represented by the dotted lines $j j' j^2$, Fig. 4, it being understood that the convergence of the plates is such that the area of the cylindric surface (indicated in diameter and length by the line j) will be the same as that of the cylinders, the diameter and length of which are indicated by the lines $j' j^2$.

Fig. 5 illustrates in a sectional and diagrammatic view, without details of supporting and attaching devices, a burner generally like that shown in Fig. 4, but which is adapted to be located within an apartment and connected, by means of a smoke-pipe or exit-flue, with a chimney. In this instance $K K'$ indicate burner-plates arranged in contact with each other and having a central chamber k , which is supplied with oil by means of a supply-pipe L .

$M M'$ are two plates forming a combustion-chamber which surrounds the burner-plates, and N is an external shell or casing having a central opening n , which is connected with a smoke-pipe O , said shell N being connected at its outer margin by a curved wall or flange n' with the outer margin of the plate M . A tube P extends through the opening n and the opposite wall of the pipe O , and is connected with the central opening in the plate M' . The pipe P is open at its outer end to the atmosphere, and similarly a central opening m in the plate M affords free access of air to the interior of the burner-casing. In this construction air enters between the plates $M M'$ at both sides of the burner-plates through the pipe P and opening m , so as to afford a supply of air to the opposite sides of the annular flame at the margin of the burner-plates, and the flames and products of combustion after passing from between the margins of said plates $M M'$, pass through the space between the plate M' and the shell N and then outward through the pipe O to a smoke flue or chimney. A burner of this kind may be placed in any position, but is specially adapted to be hung or suspended on the wall of a room.

While I believe the best results are to be secured by converging or bringing together the opposite plates forming the burner-casing in such manner as to preserve practically the same area for the products of combustion as the same pass outward from the central

burner to the exit-opening or slot of the burner-casing, yet advantageous results may be obtained by making the opposite walls of the annular combustion-chamber convergent, or by making the exit slot or opening of the burner-casing narrower than the distance between said walls at a point adjacent to the burner without preserving the exact conditions stated, and I therefore desire to cover, broadly, this feature of construction without limitation to the exact arrangement and proportion of the parts illustrated.

I claim as my invention—

1. The combination with a burner consisting of two burner-plates, at the margins of which the fuel is burned in gaseous form, of two oppositely-arranged plates forming a combustion-chamber around the burner, provided with a central air-inlet opening and a narrow peripheral outlet slot or opening, substantially as described.

2. An oil-burning apparatus comprising an annular burner, an upper plate of annular form fitting a hole in the stove-top, and a lower plate connected with the upper plate and forming with the same an annular combustion-chamber having a central air-inlet opening, said upper and lower plates being separated at their margins to form an outlet slot or opening for the combustion-chamber, substantially as described.

3. A burning apparatus for liquid fuel, comprising an oil-burner, consisting of two burner-plates at the margins of which the fuel is burned and two oppositely-arranged annular plates forming an annular combustion-chamber having a central air-inlet opening, said plates being arranged to approach each other or converge at their outer parts to form an outlet slot or opening at their outer edges and a gradually-narrowing space leading thereto, substantially as described.

4. An oil-burning apparatus comprising a burner, consisting of two burner-plates, at the margins of which the fuel is burned and two annular plates forming an annular combustion-chamber surrounding the burner-

plates, and provided with a central air-inlet opening and with a peripheral outlet slot or opening, the uppermost of said plates being provided with a flange adapted to fit a hole in a stove-top, substantially as described.

5. An oil-burning device comprising a burner consisting of two burner-plates at the margins of which the fuel is burned, and two annular plates forming an annular combustion-chamber, having a central air-inlet opening and a peripheral outlet slot or opening, the uppermost of said plates being provided on its top surface with upwardly-extending ribs or projections for supporting a cooking vessel over the same, substantially as described.

6. An oil-burning apparatus consisting of an annular or ring-shaped burner, and upper and lower plates C and D, the upper plate being of annular form and having a conical wall C' forming a central air-inlet opening and the upper wall of a combustion-chamber formed by the said plates, and an annular plate G fitting the top of the casting C and provided with upwardly-extending projections or flanges to sustain a vessel over the burner, substantially as described.

7. An oil-burning apparatus comprising an oil-burner and upper and lower plates forming an annular combustion-chamber surrounding the burner, said upper plate being adapted to fit in a hole in a stove-top, and the lower plate being rigidly connected with the upper one, said oil-burner consisting of a burner-ring having a screw-threaded stud engaging the said lower plate, and a second burner-ring provided with lugs or projections by which it is sustained above the said burner-plate, 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,
G. W. HIGGINS, Jr.