July 29, 1924. 1,503,066

F. R. SHIKORA ET AL

ORCHARD HEATER

Filed June 14, 1922 2 Sheets-Sheet 1

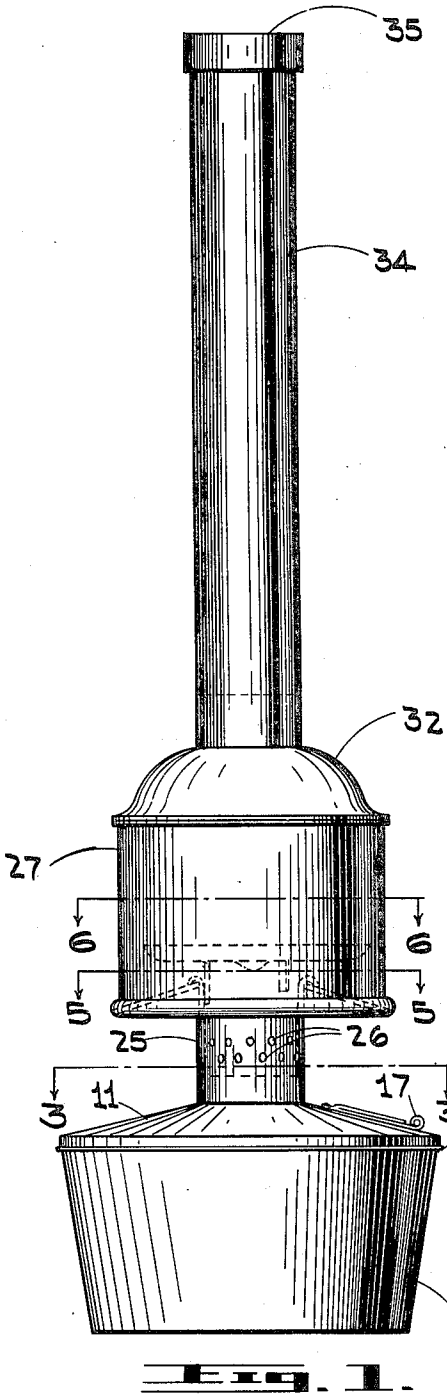


Fig. 1.

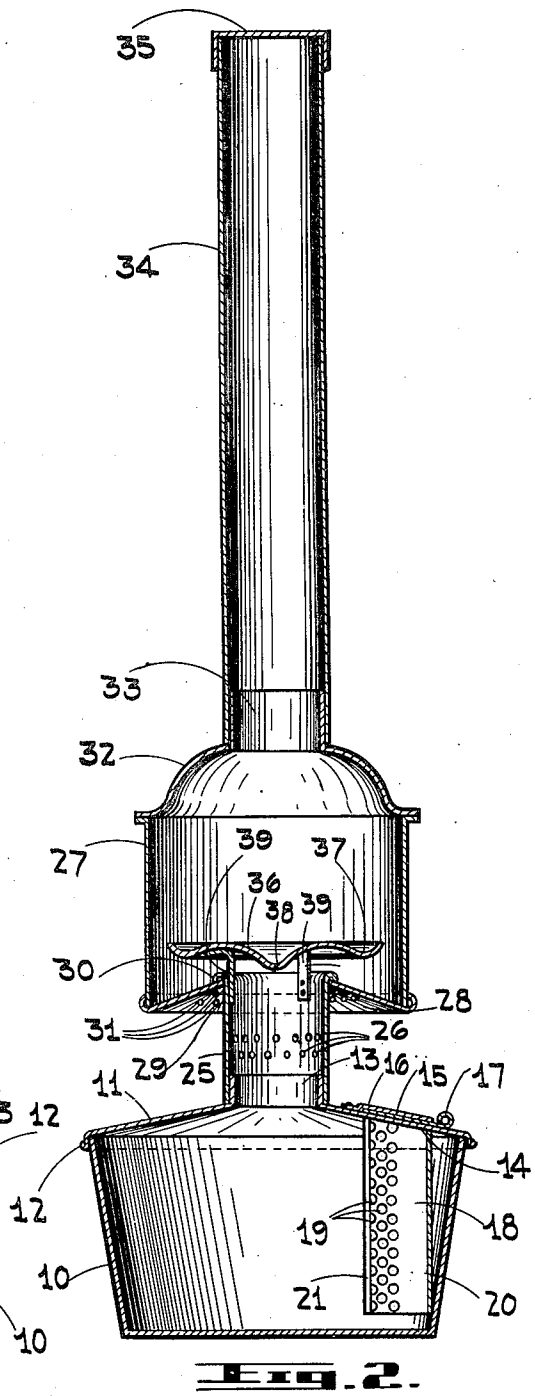


Fig. 2.

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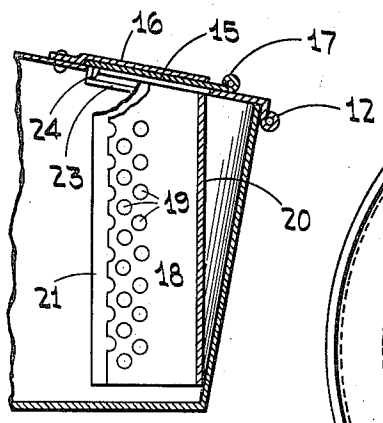


Fig. 4.

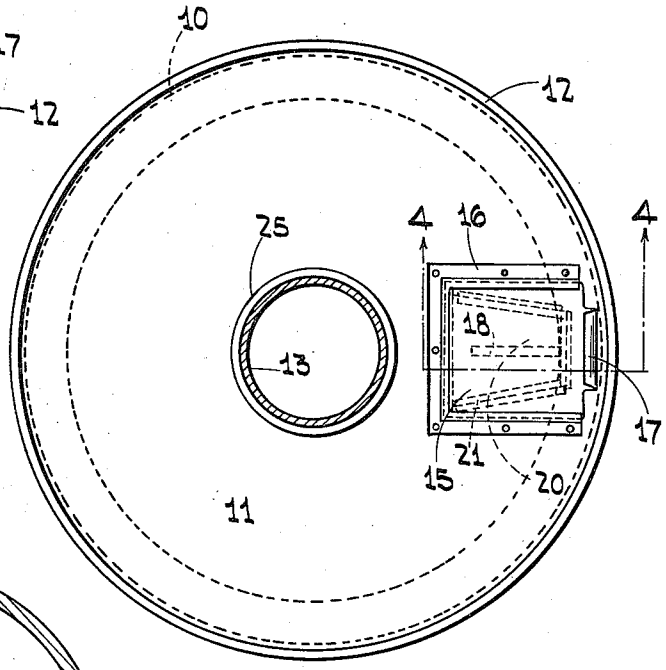


Fig. 3.

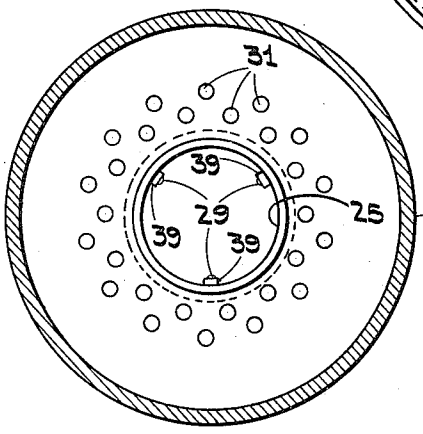


Fig. 5.

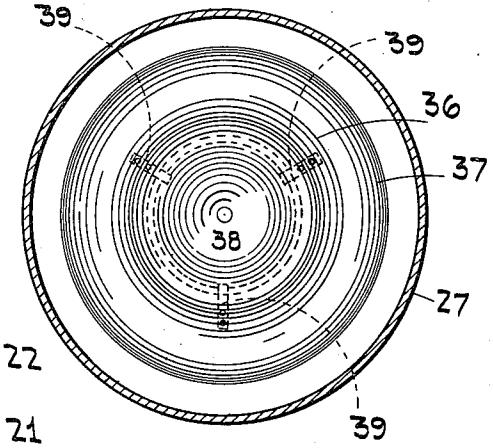


Fig. 6.

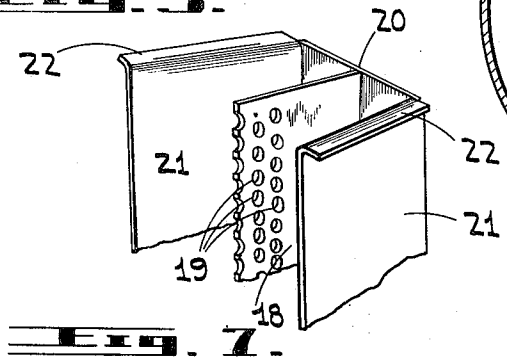


Fig. 7.

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Patented July 29, 1924. 1,503,066

UNITED STATES PATENT OFFICE.

FRED ROBERT SHIKORA AND THOMAS RUSSELL LEWERS, OF KELOWNA, BRITISH COLUMBIA, CANADA.

ORCHARD HEATER.

Application filed June 14, 1922. Serial No. 568,349.

To all whom it may concern:

Be it known that we, FRED ROBERT SHIKORA and THOMAS RUSSELL LEWERS, citizens of the Dominion of Canada, and each a resident of Kelowna, in the county of Yale and Province of British Columbia, Dominion of Canada, have invented certain new and useful Improvements in Orchard Heaters, of which the following is a specification.

This invention has relation to certain new and useful improvements in a heater especially designed for use as an orchard heater but which may be readily adapted to other purposes.

An object of the invention resides in the provision of a heater in which kerosene or the like may be employed as the fuel and which heater will be of such construction and operation as to include primary and final combustion chambers, whereby a complete combustion of gases and thorough radiation of the heat rays from the surface of the combustion chambers are assured.

With the foregoing and other objects in view as will appear as the description proceeds, the invention consists in the novel construction, combination and arrangements of co-operating elements as hereinafter more specifically set forth, claimed and shown in the accompanying drawings forming a part of the present application, in which:

Fig. 1 is an elevation of the complete heater.

Fig. 2 is a vertical section through the heater.

Fig. 3 is an enlarged horizontal section substantially on the plane of line 3—3 of Fig. 1, looking in the direction indicated by the arrows.

Fig. 4 is an enlarged detail fragmentary vertical section substantially on the plane of line 4—4 of Fig. 3, looking in the direction indicated by the arrows.

Fig. 5 is a horizontal section substantially on the plane of line 5—5 of Fig. 1, looking in the direction indicated by the arrows.

Fig. 6 is a similar view on the plane of line 6—6 of Fig. 1, looking in the direction indicated by the arrows.

Fig. 7 is a detail fragmentary perspective view of the grate employed in the heater body.

Referring more in detail to the drawings in which similar reference characters designate corresponding parts throughout the several views, 10 indicates the body which is slightly flared toward its upper side and receives the body cover 11. This body cover 11 has a downwardly turned annular flange 12 engaging over the body 10 to retain the body cover 11 in position. This body cover 11 also has its central portion raised as shown in the drawings and a central opening is provided in the body cover 11 with an upstanding flange 13 arranged around said central opening, as shown clearly in Fig. 2. The purpose of the upstanding flange 13 will presently appear.

The body cover 11 has in one side a large draft opening 14 over which is adjustably mounted the slide cover plate 15 having three of its edges working in the offset portion of the substantially U-shaped guide frame 16 secured around three edges of the large draft openings 14, as shown in Fig. 3. The remaining or free edge 17 of the slide cover plate 15 is rolled back so that the slide cover plate 15 may be readily moved inwardly and outwardly over the large draft opening 14.

A grate is removably suspended in the body 10 and is composed of a vertical grate plate 18 having vertical offset rows of perforations 19 along its inner free vertical edge. The outer vertical edge of the vertical grate plate 18 connects with the plate 20, which has diverging angularly extended side portions 21 spaced from and opposite the sides of the vertical grate plate 18, thereby practically enclosing the vertical grate plate 18 within the plate 20. The height of the grate is such with respect to the height of the body that when the grate is suspended, the bottom thereof is spaced above the bottom of the body 10. The diverging angularly extended side portions 21 of the plate 20 have out-turned flanges 22 which ride in the suspending flanges 23 provided on the under side of the body cover 11 at opposite sides of the large draft opening 14 by properly bending the side walls of the latter. This will be readily understood by referring to Figs. 2, 3, 4 and 5 of the drawings. It will also be evident by referring to the drawings that complete withdrawal of the slide cover plate 15 is prevented by a denpending stop pin 24 carried thereby, near the inner edge.

The upper end of the grate is bevelled or inclined to correspond with the body cover

11 and the grate is positioned so that the free vertical edge of the vertical grate plate 18 is directed toward the centre of the body 10. This may be readily understood by referring to Figs. 2, 3, and 4.

The primary combustion chamber 25 is composed of a cylindrical member having one end mounted on the upstanding flange 13, as clearly shown in Fig. 2. This primary combustion chamber 25 has two or more offset rows of perforations or air openings 26 arranged around the same above the upstanding flange 13. The final combustion chamber 27 is positioned above the primary combustion chamber 25. This final combustion chamber 27 is considerably larger than the primary combustion chamber 25 and has a bottom plate 28 with a central opening 29, the material around said central opening 29 being rolled back upon itself and secured in the out-turned or rolled upper edge 30 of the primary combustion chamber 25, as shown clearly in Fig. 2. The bottom plate 28 of the final combustion chamber 27 is inclined from the outer edge thereof to its central opening 29, as shown in the drawings and offset concentric rows of perforations 31 are provided in the bottom plate 28 around the central opening 29 thereof. The final combustion chamber 27 has a contracted top member 32 provided with a central opening and an upstanding annular flange 33 in the edge of said central opening. The stack 34 has its lower end mounted on the upstanding annular flange 33 and a removable cap 35 is provided for covering the upper end of the stack 34, when the heater is not in use. It will be seen by referring to Figs. 1 and 2 that the stack 34 is of considerable height as compared with the other parts of the heater, thereby providing for complete combustion and consumption of the products of combustion before escape of the same from the stack 34.

A baffle plate 36 is supported in the lower portion of the final combustion chamber 27 and located centrally over the primary combustion chamber 25. This baffle plate 36 is of circular form with its outer edge 37 curved upwardly while its central portion 38 is depressed. Suitable angular supporting brackets 39 are employed for supporting the baffle plate 36 in position, the depending ends of the angular supporting brackets 39 being secured in the upper portion of the primary combustion chamber 25 by suitable securing members 40, the other turned ends of the angular supporting brackets 39 being secured to the underface of the baffle plate 36. While any suitable number of angular supporting brackets 39 may be employed for the baffle plate 36, three angular supporting brackets 39 for this purpose have been indicated in the drawings, particularly Fig. 6, in which view the angular supporting brackets 39 are indicated by dotted lines.

It is believed the complete construction, and operation of the heater may now be apparent from the foregoing paragraphs taken in connection with the accompanying drawings. The operation may be briefly stated, however, as follows. When it is desired to employ the heater, the removable cap 35 should be removed to permit a draft through both of the combustion chambers 25 and 27 and the stack 34, the air entering the body 10 by way of the large draft opening 14. The slide cover plate 15 should be withdrawn sufficiently to expose the grate. It is also to be understood that the body 10 should be filled with kerosene or the like. The pilot flame may be started by placing over the grate a lighted torch which emits a small quantity of kerosene and gasoline mixed. Owing to the vertical offset rows of perforations 19 in the vertical grate plate 18 the surface of the fuel oil immediately surrounding the vertical grate plate 18 is raised and enlarged by capillary attraction, thereby expediting ignition of the fuel and accelerating combustion and also gas generation at this point. The slide cover plate 15 may be readily adjusted to regulate the draft through the heater. It is also evident that as the gases generated within the body 10 rise into the primary combustion chamber 25 to meet the oxygen in the air entering the latter, by way of the perforations or air openings 26, the pilot flame leaps into this primary combustion chamber 25. A partial combustion of the gases within the primary combustion chamber 25 results and as the unburnt gases pass through the primary combustion chamber 25 they are heated and expanded.

The unburnt gases passing through the primary combustion chamber 25 are further heated and expanded by the baffle plate 36 as they are temporarily retarded and spread to the sides of the final combustion chamber 27 upon entering the latter. The depending or conical central portion 38 of the baffle plate 36 serves to promptly break up the gases without danger of forcing the latter to return to the primary combustion chamber 25. The baffle plate 36 extends over the offset concentric rows of perforations 31 and it is therefore evident that the gases spread in the final combustion chamber 27 by the baffle plate 36 will mix with oxygen in the air entering the final combustion chamber 27 by way of said offset concentric rows of perforations 31. This should be readily understood by referring to Fig. 2. This view should also make it evident that final consumption of the combustible gases will take place in the final combustion chamber 27 and all combustible gases should be

completely consumed before reaching the top of the stack 34.

The heat should radiate from the primary combustion chamber 25 and the final combustion chamber 27 without waste of heat elements in the stack 34. This radiation of the heat rays from the primary combustion chamber 25 and final combustion chamber 27 will serve to quickly increase the temperature of the surrounding atmosphere. It is also evident that, when an appropriate number of heaters are arranged at proper distances, the temperature of the atmosphere around and between the several heaters will be raised and maintained at the proper degree to prevent damage to young and tender plants from a sudden and temporary decrease in the atmospheric temperature. It is also evident that the slide cover plate 15 of each heater should be properly regulated to control the air draft through the heater. When the operation of the heater is no longer required the flame may be readily extinguished by closing the slide cover plate 15 and placing the removable cap 35 on the upper end of the stack 34.

Attention may be called to the fact that the primary combustion chamber 25 is considerably smaller than the final combustion chamber 27 and this final combustion chamber 27 is of sufficient size to permit of a thorough mixing and complete combustion of the gases entering the final combustion chamber 27 from the primary combustion chamber 25 and the oxygen drawn through the offset concentric rows of perforations 31 into said final combustion chamber 27. It is believed that further description is unnecessary.

While the preferred embodiment of the invention has been disclosed it is to be understood that minor changes in the details of construction, combination and arrangement of co-operating elements may be resorted to within the scope of what is claimed without departing from the spirit of the invention.

What we claim as new is:

1. A heater comprising a body; a primary combustion chamber mounted on said body; a final combustion chamber mounted on said primary combustion chamber; said body having an air inlet opening; means adjustable over said air opening to control the air draft through said body and through the primary and final combustion chambers; said primary and final combustion chambers having air openings provided therein; a vertical perforated grate plate within said body and suspended therein with its bottom above the bottom of said body for causing capillary attraction of the liquid fuel contents of the body toward the air inlet opening of said body for ignition of the liquid fuel and conversion of the liquid fuel into a gaseous fuel whereby the gaseous fuel may mix with air entering the heater to produce a combustible mixture for complete consumption within said primary and final combustion chambers; said primary and final combustion chambers having air inlet openings; and a spreader member spaced from the upper end of the primary combustion chamber within said final combustion chamber to deflect and spread the combustible gases entering said final combustion chamber.

2. A heater comprising a body; a primary combustion chamber mounted on said body; a final combustion chamber mounted on said primary combustion chamber; said body having an air inlet opening; means adjustable over said air inlet opening to control the air draft through said body and through the primary and final combustion chambers; said primary and final combustion chambers having air openings provided therein; a vertical perforated grate plate within said body and suspended therein with its bottom above the bottom of said body for causing capillary attraction of the liquid fuel contents of the body toward the air inlet opening of said body for ignition of the liquid fuel and conversion of the liquid fuel into a gaseous fuel whereby the gaseous fuel may mix with air entering the heater to produce a combustible mixture for complete consumption within said primary and final combustion chambers; said primary and final combustion chambers having air inlet openings; a spreader member spaced from the upper end of the primary combustion chamber within said final combustion chamber to deflect and spread the combustible gases entering said final combustion chamber; a stack extended from said final combustion chamber; and a cap for closing the upper end of said stack.

3. A heater comprising a body; a primary combustion chamber communicating with said body; a final combustion chamber communicating with said primary combustion chamber; a stack extending from said final combustion chamber; means within said body and suspended therein with its bottom above the bottom of said body for causing capillary attraction of the liquid fuel within said body and generation of gaseous fuel from said liquid for ignition in said body and complete consumption in the primary and final combustion chambers; said body having an air inlet opening; a slide cover plate for said air inlet opening to control the air draft through the heater; the said means within the body including a grate plate having offset rows of perforations along one vertical edge; an angular grate plate partially enclosing the first mentioned grate plate and including diverging side members having out-turned flanges at their outer inclined edges; and means at the oppo-

site sides of the air inlet opening of the body to receive the out-turned flanges of said diverging side members for supporting the grate plates in suspended position within said body and opposite the air inlet opening thereof.

4. A heater comprising a body; a primary combustion chamber mounted on said body; a final combustion chamber mounted on said primary combustion chamber; said body having an air inlet opening; means adjustable over said air inlet opening to control the air draft through said body and through the primary and final combustion chambers; said primary and final combustion chambers having air openings provided therein; means within said body and suspended therein with its bottom above the bottom of said body for causing capillary attraction of the liquid fuel contents of the body toward the air inlet opening of said body for ignition of the liquid fuel and conversion of the liquid fuel into a gaseous fuel whereby the gaseous fuel may mix with air entering the heater to produce a combustible mixture for complete consumption within said primary and final combustion chambers; said primary and final combustion chambers having air inlet openings; a spreader member spaced from the upper end of the primary combustion chamber within said final combustion chamber to deflect and spread the combustible gases entering said final combustion chamber; the said means within the body including a grate plate having offset rows of perforations along one vertical edge; an angular grate plate partially enclosing the first mentioned plate and including diverging side members having out-turned flanges at their outer inclined edges; and means at the opposite sides of the air inlet opening of the body to receive the out-turned flanges of said diverging side members for supporting the grate plates in suspended position within said body and opposite the air inlet opening thereof.

5. A heater comprising a fuel containing body; a primary combustion chamber mounted on said body; a laterally-enlarged final combustion chamber mounted on and communicating with said primary combustion chamber; a baffle member within said final combustion chamber; a stack extending from said final combustion chamber; said primary and final combustion chambers having air inlet openings; a grate within said fuel body and having a plurality of openings; said fuel body having an air opening to permit the passage of a draft through the body and through the combustion chambers and stack; said grate being suspended in said body beneath said last mentioned air opening with its bottom above the bottom of said body; and a slide cover plate for said last mentioned air inlet opening to regulate the draft through the body and through the combustion chambers and stack.

6. A heater comprising a fuel containing body; a primary combustion chamber mounted on said body; a laterally-enlarged final combustion chamber mounted on the primary combustion chamber and having air inlets in its lower wall; a stack carried by said final combustion chamber; a grate suspended within said body with its lower end above the bottom of said body; said grate including a perforated member whereby gases may be drawn from the liquid contents of the body through the perforations of the grate member by capillary attraction; said body having an air inlet opening whereby the capillary attraction may be increased by passage of air upwardly through the body and through the primary and final combustion chambers and the stack during the consumption of the gases in said primary and final combustion chambers; an adjustable cover member for said air inlet opening of the body; said primary and final combustion chambers having air inlet openings; and a flame extinguishing cap for engagement on said stack.

7. A heater comprising a fuel containing body; a cover for said fuel containing body; a vertical grate suspended by said cover in said fuel containing body and having a plurality of openings; a comparatively small primary combustion chamber mounted centrally on said cover and communicating with said fuel containing body; said grate having its lower end terminating above the bottom of said body; a laterally large final combustion chamber mounted on said primary combustion chamber and communicating therewith; said primary and final combustion chambers having air inlet openings; a baffle plate mounted in said final combustion chamber over the primary combustion chamber; said final combustion chamber having a contracted upper portion; a stack mounted centrally on said contracted upper portion of the final combustion chamber; said fuel containing body having a draft opening; and a slide cover plate adjustably mounted on said cover over the draft opening to regulate the draft of air through the heater.

In testimony whereof we affix our signatures.

FRED ROBERT SHIKORA.
THOMAS RUSSELL LEWERS.