

Nov. 2, 1937.

C. H. AMES

2,097,544

RADIANT ORCHARD HEATER

Filed Feb. 10, 1937

2 Sheets-Sheet 1

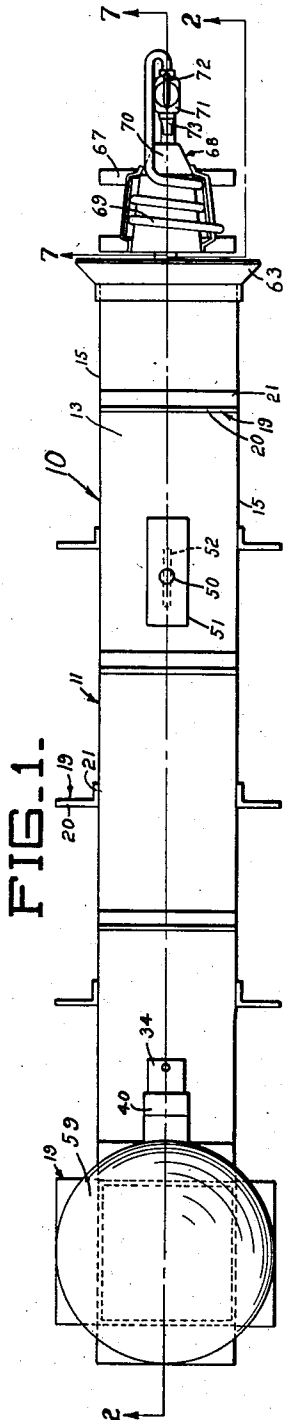


FIG. 5.

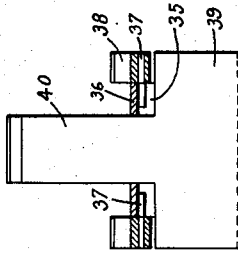


FIG. 4.

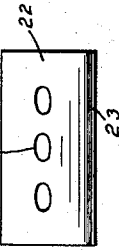


FIG. 3.

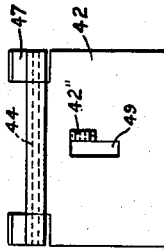
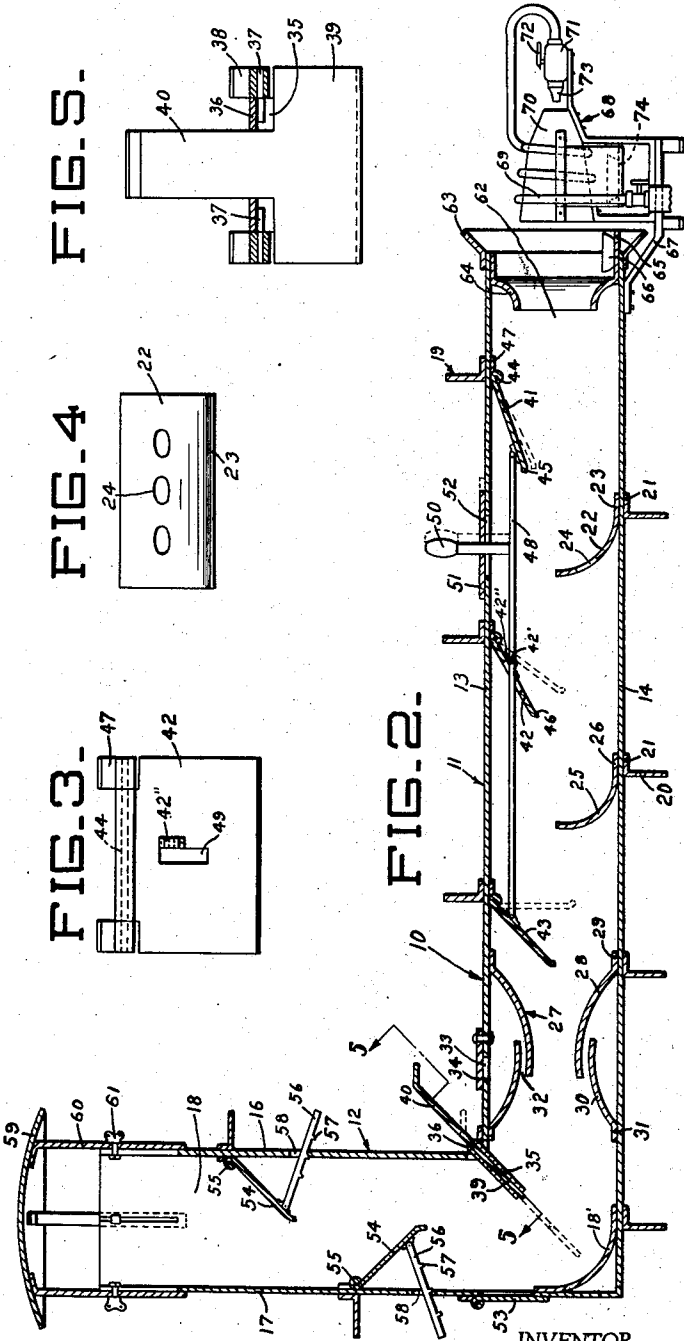


FIG. 2.



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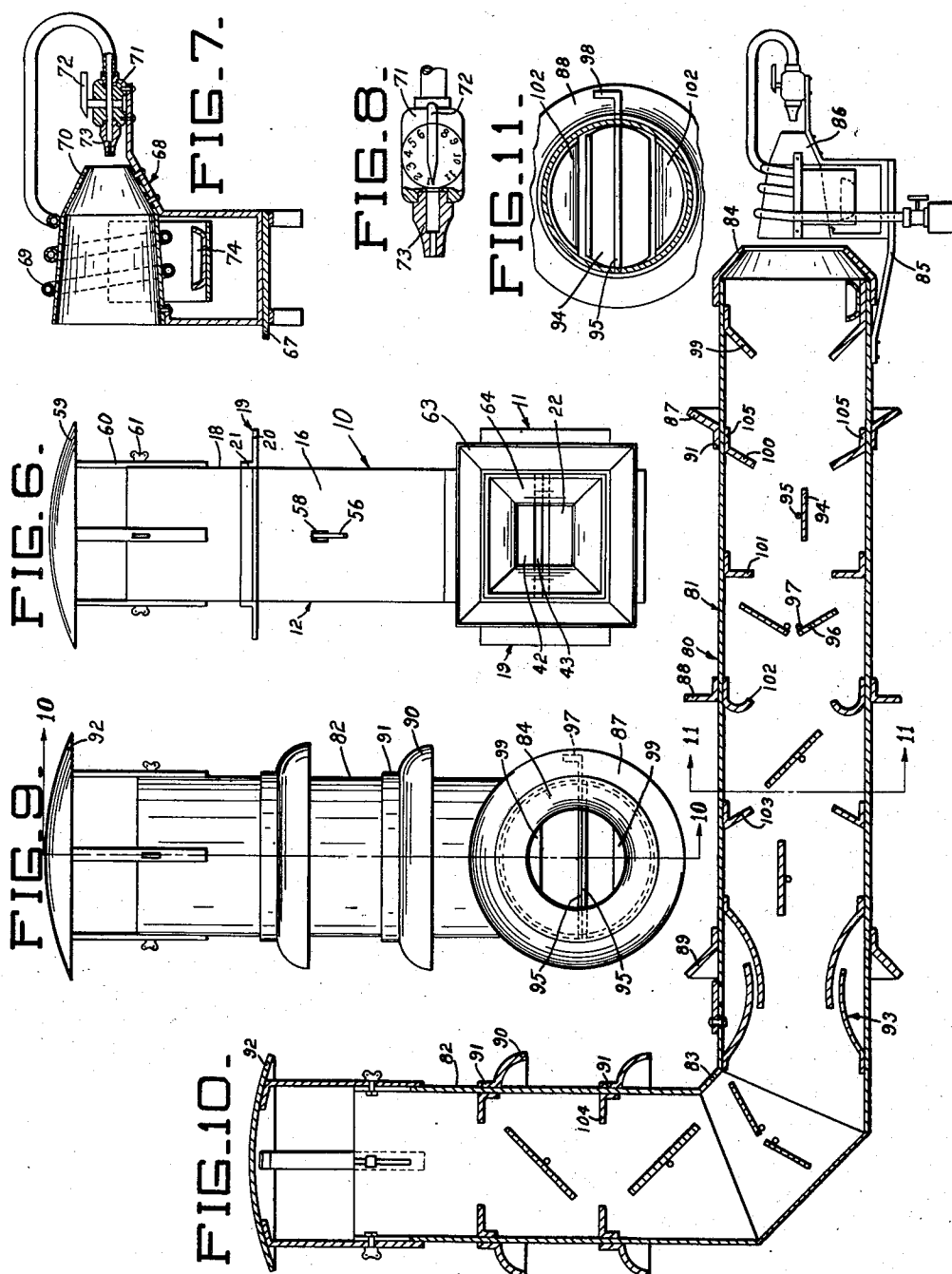
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,097,544

RADIANT ORCHARD HEATER

Charles H. Ames, Whittier, Calif.

Application February 10, 1937, Serial No. 125,000

11 Claims. (Cl. 126—59.5)

This invention relates to orchard heaters.

The general object of the invention is to provide an improved, smokeless apparatus which may be operated with various types of fuels for the purpose of heating orchards of citrus and other trees.

A more specific object of my invention is to provide an improved radiant heater including an elongated, metal member having novel means thereon for causing radiation of heat.

Another object of the invention is to provide an orchard heater including an elongated body and wherein novel means are provided for controlling passage of the products of combustion through the body.

An additional object of the invention is to provide a novel radiating member for use in an orchard heater.

Another object of the invention is to provide a novel burner assembly for use in an orchard heater.

A further object of my invention is to provide a novel damper control for use with my invention.

Other objects and the advantages of my invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a top plan view of an orchard heater embodying the features of my invention;

Fig. 2 is a section taken on line 2—2 of Fig. 1 with the burner in elevation;

Fig. 3 is an elevation showing one of the dampers;

Fig. 4 is an elevation showing one of the baffles;

Fig. 5 is a fragmentary section taken on line 5—5 of Fig. 2;

Fig. 6 is a front view of my heater;

Fig. 7 is a fragmentary section taken on line 7—7 of Fig. 1;

Fig. 8 is a fragmentary plan partly in section showing the burner;

Fig. 9 is a front view showing a modification of my invention;

Fig. 10 is a section taken on line 10—10 of Fig. 9; and

Fig. 11 is a fragmentary section taken on line 11—11 of Fig. 10.

Referring to the drawings by reference characters I have shown my invention as embodied in an orchard heater which is indicated generally at 10. As shown the orchard heater is of general L shape and includes a horizontal portion 11 and a vertical portion 12 with the horizontal

portion somewhat longer than the vertical portion.

The heater is preferably made of galvanized iron or other material which is a good conductor of heat and the portion 11 includes a top 13, a bottom 14 and sides 15 while the portion 12 includes a front 16, a back 17 and sides 18.

At the juncture of the portions 11 and 12 I show a fillet member 19 which is made of metal and which is preferably suitably welded in place.

Arranged on the outer surface of the body I show a plurality of fins 19, each of which includes an outwardly projecting portion 20 and a base portion 21 with the base portion welded to the body. These fins 19 are of metal and are preferably spaced along the sides and top and bottom of the portions 11 and 12 and they serve to conduct heat from the body as will be readily understood.

Mounted within the portion 11 along the lower wall 14 I show a curved baffle 22 which extends across the body and has a base portion 23 secured within the body in line with the base portion 21 of one of the exterior fins 19. The baffle 22 is provided with apertures 24 as shown in Figs. 2 and 4.

Another baffle 25 is arranged within the portion 11 as shown in Fig. 2 and includes a base portion 26 opposite the base portion 21 of another of the external fins.

A Venturi member 27 includes an inner tapering member 28 having a base 29 welded to the interior of the portion 11 and an exterior member 30 having a base 31 also welded to the portion 11. A passageway 32 is provided between the Venturi members. Thus the circulation through the portion 11 is increased and if desired an aperture 33 normally closed by a pivoted closure 34 may be opened under certain circumstances to add fresh air and thus increase the combustion within the body portion 11.

At the juncture of the portions 11 and 12 I provide a pivoted damper 35 which comprises a base of metal bent to provide parallel portions and a curved end portion 36 which receives a pin 37 which is hinged to brackets 38 to allow the member 35 to pivot. Between the portions of the member 35 I provide a valve 39 which includes a projecting portion 40 by means of which the valve may be moved in and out to the dotted line position (shown in Fig. 2) or by means of which the damper 35 may be swung about its pivot.

In the rear of the venturi 27 I show a plurality of pivoted baffles 41, 42, and 43 each of which is

mounted on a pintle 44 so that the baffles may swing inwardly. The baffle 41 is provided with an outwardly directed end 45 while the baffles 42 and 43 are provided with inwardly directed ends 46. The pintles 44 are arranged on brackets 47 which are disposed opposite the bases 21 of fin members 19. It will be observed that wherever possible the bases within the body are coextensive with the bases without the body so that good conductivity is secured.

The baffles 41, 42, and 43 are connected by a rod 48 which is pivotally mounted on these baffles and which passes through a slot 49 in the baffle 42. The rod 48 is secured to the baffle 41 near the outer end thereof and is secured to the baffle 42 near the middle thereof by a pin 42' which has a loose fit in a bracket 42'' while it is secured to the baffle 43 near the hinged line thereof and as a result when the rod 48 is moved by means of a handle member 50 the baffle 43 moves more rapidly than does the other baffles so that the baffling effect in a direction away from the inlet to the heater increases with the distance from the inlet.

The operating member 50 may be provided with a closure 51 so that the slot 52 through which the operating member extends will be closed.

The portion 12 of the heater is provided with a pivotal closure 53 by means of which access to the interior of the heater may be had. The portion 12 is also provided with a plurality of hinged baffles 54 mounted on pivots 55 and downwardly directed. These baffles are held in adjusted position by arms 56 which have teeth 57 thereon which engage in wall slots 58 in the portion 12.

It will be noted that the baffles in the horizontal portion 11 are directed forwardly in the direction of movement of the products of combustion through the heater while the baffles in the portion 12 are directed towards the path of movement. Thus as the heated gas is cooled there is more baffling effect so that the passage of gases becomes slower and thus the full heating effect is secured.

The upper end of the portion 12 is closed by a closure member 59 which includes legs 60 which are engaged by thumb nuts 61 to hold the closure 59 in adjusted position. At the entrance end 62 of my heater I provide an outwardly flaring member 63 and within the heater I provide an inwardly flaring member 64. This member 64 includes a table 65 on which a starting pot 66 for volatile fuel is placed.

As shown the heater includes a bracket 67 on which a burner 68 is arranged. This burner includes a preheating coil 69 which passes about a combustion member 70 and enters a burner 71 which includes a valve 72 and a discharge nozzle 73. A starting pot 74 for volatile fuel is mounted on the burner.

In operation volatile fuel is placed in either or both of the starting pot 66 or 74 and is ignited. The valve 72 is then operated and the fuel passing from nozzle 73 is ignited. This fuel passes through the combustion member 70 and through the members 63 and 64 into the horizontal portion of the heater.

For fuel I may employ various types of oil, gas or other combustible fluid. The results of the products of combustion pass into the horizontal portion 11 of the heater heating this portion and also heating the portion 12 so that radiation without smoke results. The disposition of baffles within and fins without the heater

cause the column of fluid passing through the heater to transfer the heat from the moving column of fluid to the body and fins whence it passes into the air thus heating the air about the orchard heater.

By proper control of the baffles, the valve 30, and dampers and by controlling the valve 72 the desired heating effect can be secured irrespective of the conditions of cold in the orchard. On relatively warm nights less fuel may be employed while on cold nights the maximum of fuel may be employed. In either condition my device will operate with the maximum of efficiency.

In Figs. 9, 10, and 11 I have shown a modification of my invention wherein a heater indicated generally at 80 includes a cylindrical horizontal portion 81 and a cylindrical vertical portion 82 joined by an angularly arranged portion 83. At its entrance the body includes a tapering end member 84 and a bracket 85 on which I show a burner 86 which may be similar to the burner previously described.

Without the cylindrical body portion 81 I arrange fin members 87, 88, 89, and 90. Each of these fin members includes bases 91 which are in the nature of cylindrical collars fitting about the portions 81 and 82. The fin member 87 inclines towards the entrance; the member 88 in the nature of a plane disk; the member 89 inclines towards the exit end while the members 90 are curved.

The portion 82 is provided at its upper end with a closure 92 which is held in place by thumb screws in the same manner as the closure 59 previously described. Within the portion 81 I arrange a venturi 93 which is similar to the venturi 27 previously described.

Mounted within the portions 81 and 82 I show single dampers 94 mounted on pivoted rods 95 which are disposed in advance of certain of the interior baffles to be presently described. I also arrange within the heater pairs of opposed dampers 96 mounted on pivots 97. These dampers 96 as well as the dampers 94 may be operated by turning suitable members 98 disposed on the ends of the pivots 95 and 97.

The interior of the modified heater is provided with suitable baffle members 99, 100, 101, 102, 103, and 104 which are each provided with bases 105 which are coextensive with the bases 91 previously described.

The operation of the modification of my invention is similar to that of the main embodiment previously described and a further description of the operation is believed to be unnecessary.

From the foregoing description it will be apparent that I have provided a novel orchard heater which can be economically manufactured and which is highly efficient in use.

Having thus described my invention I claim:

1. In an orchard heater, an elongated L-shaped body comprising a wall, fixed baffles secured about the exterior of said body, each of said baffles having an outwardly extending fin portion and having a base portion welded to the body, a plurality of baffles within said body, said baffles within the body including fin portions directed towards the center of the body and base portions secured to the interior of the body, a damper at the juncture of the two portions of the L, a Venturi member in said body, said Venturi member comprising a pair of tubular members inwardly directed and tapering with one member disposed within the other member, certain of said inner baffles on one wall

being curved to direct heated products of combustion towards the opposite wall.

2. In an orchard heater, an elongated L-shaped body comprising four walls, a plurality of fixed baffles secured on all sides about the exterior of said body, each of said baffles having an outwardly extending fin portion and having a base portion welded to the body, a plurality of baffles within said body, said baffles within the body including fin portions directed towards the center of the body and base portions secured to the interior of the body, said base portions on the interior of the body being coextensive with the base portions on the exterior of the body, a pivoted damper at the juncture of the two portions of the L, means to operate said damper and valve from without the body, said baffles being disposed to direct heated products of combustion towards the wall.

3. In an orchard heater, an elongated metal L-shaped body comprising four walls and having an entrance and an exit, a plurality of fins secured about the exterior of said body, a plurality of baffles within the body, a damper at the juncture of the two portions of the L, a plurality of said inner baffles being pivotally mounted, means to differentially move said pivoted baffles, said moving means being connected to the baffles to cause a maximum movement of the baffles which are farthest from the entrance to the body, certain of said inner baffles on one wall being curved to direct heated products of combustion towards the opposite wall, a sliding hood on the upper end of said body, an inwardly flaring collar within the heater at the entrance end thereof, a platform in said inwardly flaring collar, a starting pot disposed on said platform, a burner mounted on said body, said burner including a preheating coil and a burner proper.

4. In an orchard heater, an elongated metal L-shaped body comprising four walls and having an entrance and an exit, a plurality of fixed baffles secured on all sides about the exterior of said body, each of said baffles having an outwardly extending fin portion and having a base portion welded to the body, a plurality of baffles within said body, said baffles within the body including fin portions directed towards the center of the body and base portions secured to the interior of the body, said base portions on the interior of the body being coextensive with the base portions on the exterior of the body, a pivoted damper at the juncture of the two portions of the L, a sliding valve member mounted on said pivoted damper, means to operate said damper and valve from without the body, a fillet member at the outer portion of the juncture, a plurality of said inner baffles being pivotally mounted, means to differentially move said pivoted baffles, said moving means being connected to the baffles to cause a maximum movement of the baffles which are farthest from the entrance to the body.

5. In an orchard heater, an elongated L-shaped body comprising four walls, a plurality of fixed baffles secured on all sides about the exterior of said body, each of said baffles having an outwardly extending fin portion and having a base portion welded to the body, a plurality of baffles within said body, said baffles within the body including fin portions directed towards the center of the body and base portions secured to the interior of the body, said base portions on the interior of the body being coextensive with the base portions on the exterior of the body, a pivoted damper at the juncture of the two portions of the L, means to operate said damper and valve from without the

body, a fillet member at the outer portion of the juncture, a Venturi member in said body, said Venturi member comprising a pair of tubular members inwardly directed and tapering with one member disposed within the other member, certain of said inner baffles on one wall being curved to direct heated products of combustion towards the opposite wall, and a burner mounted on said body, said burner including a preheating coil and a burner proper.

6. In an orchard heater, an elongated metal, L-shaped body comprising four walls and having an entrance and an exit, a plurality of fixed baffles secured on all sides about the exterior of said body, each of said baffles having an outwardly extending fin portion and having a base portion welded to the body, a plurality of baffles within said body, said baffles within the body including fin portions directed towards the center of the body and base portions secured to the interior of the body, a pivoted damper at the juncture of the two portions of the L, means to operate said damper, a plurality of said inner baffles being pivotally mounted, means to differentially move said pivoted baffles, said moving means being connected to the baffles to cause a maximum movement of the baffles which are farthest from the entrance to the body, certain of said inner baffles on one wall being curved to direct heated products of combustion towards the opposite wall, a sliding hood on the upper end of said body, an outwardly flaring collar at the entrance to said body, an inwardly flaring collar within the heater at the entrance end thereof, a platform in said inwardly flaring collar and a starting pot disposed on said platform.

7. In an orchard heater, an elongated, metal, L-shaped body comprising four walls and having an entrance and an exit, a plurality of fixed fins secured on all sides about the exterior of said body, each of said fins having an outwardly extending portion and a base portion welded to the body, a plurality of baffles within said body, said baffles within the body including fin portions directed towards the center of the body and base portions secured to the interior of the body, said base portions on the interior of the body being coextensive with the base portions on the exterior of the body, a pivoted damper at the juncture of the two portions of the L, a sliding valve member mounted on said pivoted damper, means to operate said damper and valve from without the body, a fillet member at the outer portion of the juncture, a plurality of said inner baffles being pivotally mounted, means to differentially move said pivoted baffles, said moving means being connected to the baffles to cause a maximum movement of the baffles which are farthest from the entrance to the body, a Venturi member in said body and spaced from the entrance thereto, said Venturi member comprising a pair of tubular members inwardly directed and tapering with one member disposed within the other member, certain of said inner baffles on one wall being curved to direct heated products of combustion towards the opposite wall, a sliding hood on the upper end of said body, an inwardly flaring collar within the heater at the entrance end thereof, a platform in said inwardly flaring collar, a starting pot disposed on said platform, a burner mounted on said body, said burner including a preheating coil and a burner proper.

8. In an orchard heater, an elongated L-shaped body comprising a cylindrical wall made of heat conducting metal, a plurality of cylindri-

cal baffles secured about the exterior of said body, each of said baffles having an outwardly extending fin portion and having a base portion welded to the body, a plurality of baffles within said body, said baffles within the body including fin portions directed towards the center of the body and base portions secured to the interior of the body being coextensive with the base portions on the exterior of the body, dampers pivoted within the body, each of said dampers being disposed in advance of one of said interior baffles, means to operate said dampers from without the body, a Venturi member in said body, said Venturi member comprising a pair of tubular members inwardly directed and tapering with one member disposed within the other member, certain of said inner baffles on one wall being curved to direct heated product of combustion towards the opposite wall.

9. In an orchard heater, an elongated L-shaped body comprising a cylindrical wall made of heat conducting metal, a plurality of cylindrical baffles secured about the exterior of said body, each of said baffles having an outwardly extending fin portion and having a base portion welded to the body, a plurality of baffles within said body, said baffles within the body including fin portions directed towards the center of the body and base portions secured to the interior of the body, said base portions on the interior of the body being coextensive with the base portions on the exterior of the body, a pair of pivoted dampers at the juncture of the two portions of the L, a plurality of dampers pivoted within the body, each of said last mentioned dampers being disposed in advance of one of said interior baffles, means to operate said dampers from without the body, a Venturi member in said body, said Venturi member comprising a pair of tubular members inwardly directed and tapering with one member disposed within the other member, certain of said inner baffles on one wall being curved to direct heated product of combustion towards the opposite wall, a support at the entrance to said body, and a starting pot disposed on said platform.

10. In an orchard heater, an elongated L-shaped body comprising a cylindrical wall made

of heat conducting metal, a plurality of cylindrical baffles secured about the exterior of said body, each of said baffles having an outwardly extending fin portion and having a base portion welded to the body, a plurality of baffles within said body, said baffles within the body including fin portions directed towards the center of the body and base portions secured to the interior of the body, said base portions on the interior of the body being coextensive with the base portions on the exterior of the body, a pair of pivoted dampers at the juncture of the two portions of the L, a plurality of dampers pivoted within the body, each of said last mentioned dampers being disposed in advance of one of said interior baffles, means to operate said dampers from without the body, a bevelled member at the outer portion of the juncture, a Venturi member in said body, said Venturi member comprising a pair of tubular members inwardly directed and tapering with one member disposed within the other member, certain of said inner baffles on one wall being curved to direct heated product of combustion towards the opposite wall, a sliding hood on the upper end of said body, means to hold said hood in adjusted position, a flaring collar at the entrance to said body, a platform in said flaring collar, a starting pot disposed on said platform, a burner mounted on said body, said burner including a preheating coil and a burner proper.

11. In an orchard heater, an elongated metal L-shaped body having an entrance and an exit, a plurality of fins secured about the exterior of said body, a plurality of baffles pivotally mounted on the body, means to differentially move said pivoted baffles, said moving means being connected to the baffles to cause a maximum movement of the baffles which are farthest from the entrance to the body, certain of said inner baffles being disposed to direct heated products of combustion towards the opposite wall, an inwardly flaring collar within the heater at the entrance end thereof, a platform in said inwardly flaring collar, a starting pot disposed on said platform, a burner mounted on said body, said burner including a preheating coil and a burner proper.

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