

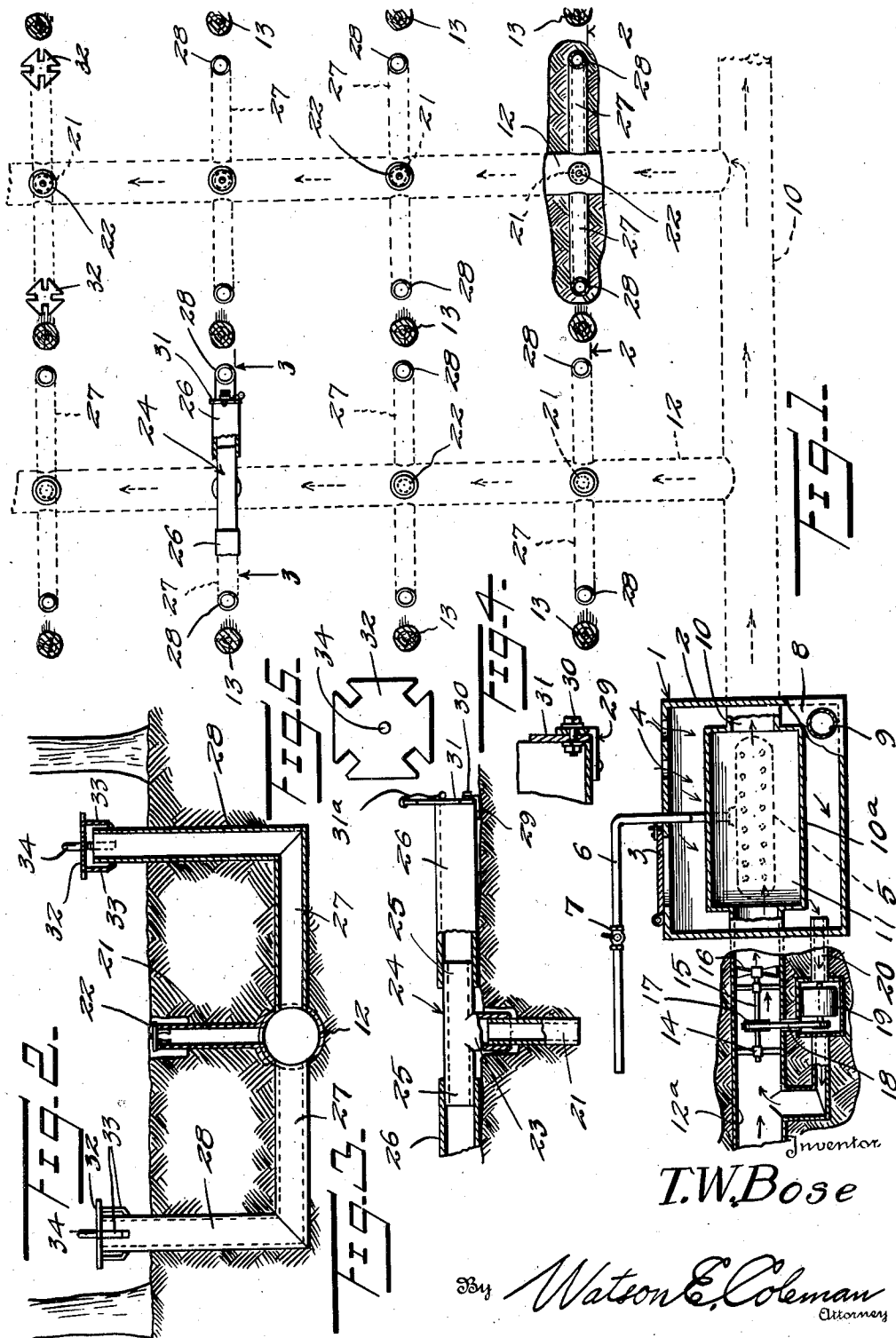
Dec. 21, 1937.

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2,102,989

ORCHARD HEATING SYSTEM

Filed June 5, 1937



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2,102,989

ORCHARD HEATING SYSTEM

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Application June 5, 1937, Serial No. 146,683

5 Claims. (Cl. 47-2)

This invention relates to the class of plant husbandry and pertains particularly to improvements in means for maintaining an even temperature in orchards.

The present invention has for its primary object to provide an improved system of supplying heat to orchards whereby, during unseasonable cold spells of weather, damage to the plants may be prevented by surrounding the same with warmed air which will maintain the general atmosphere at a temperature above the point where damage might be done to the plants.

Another object of the invention is to provide in a system of the above described character, a novel means of heating and circulating air from a novel constructed furnace through pipes for discharge in the vicinity of the orchard trees.

Another object of the invention is to provide in a heat distributing system for orchards, novel detachable distributing units and means for controlling the escape of heated air therethrough.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawing forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawing but may be changed or modified so long as such changes and modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawing:

Figure 1 is a view in plan of a heated air distributing system constructed in accordance with the present invention, with parts of the system being shown in section.

Fig. 2 is a sectional view taken on the line 2-2 of Fig. 1.

Fig. 3 is a sectional view taken on the line 3-3 of Fig. 1.

Fig. 4 is a sectional view of an end of a cross distributing pipe showing an air escape control plate.

Fig. 5 is a view in plan of a heated air escape control means.

Referring now more particularly to the drawing wherein like numerals of reference designate corresponding parts throughout the several views, the numeral 1 generally designates the air heating structure forming part of the present system. This structure may be referred to generally as the furnace and consists of a housing or casing structure 2 which is preferably of rectangular outline and which is sunken to a suitable depth in the earth. At one side of the fur-

nace housing the wall is provided with a suitable door 3 covering an entrance opening to the furnace and with air inlet apertures 4 and disposed within the furnace is a burner unit 5 of a suitable design for burning fuel oil or gas, the unit being supplied by the pipe line 6 which is controlled by a valve 7. The burner unit 5 has not been illustrated in detail as the specific structure of the same constitutes no part of the present invention, it merely being necessary that there be employed a unit which will properly burn oil or gas, as stated.

A portion of the top wall of the furnace is indicated by the numeral 8 and this has leading thru it the products of combustion escape pipe 9. Except for the outlet or escape pipe 9 and the openings 4, the furnace casing is closed so that when the burner 5 is in operation, a considerable amount of heat will be maintained therein.

Disposed beneath the surface of the ground and leading from one side of the furnace structure, is a heated air conducting pipe 10 which is connected with the drum or hollow plate 10^a which lies over the burner unit 5 in the manner illustrated. The pipe 10 leads to a series of distributing pipes 12 which are also beneath the surface of the ground and pass between the rows of trees in the orchard, the positions of which trees are indicated by the numerals 13.

Upon the side of the furnace structure opposite from the distributing pipes 12, is the air inlet pipe 12^a which leads into the furnace and is connected with the drum 10^a as illustrated to lead air thereinto from above the surface of the ground and in the pipe 12^a upon suitably supported bearings 14 is a shaft 15 on which is mounted a blower fan 16. This shaft 15 also carries a pulley 17, preferably of the type to take a V-shaped driving belt and this pulley is connected by means of the belt 18, with a similar pulley mounted upon the shaft of a motor 19 which may be electrically driven or may be operated by gasoline or oil.

The pipe 12^a has an air pipe 20 leading thereinto from the interior of the furnace structure, as illustrated, so that when the fan 16 is operated by the motor 19, some air will be sucked from within the furnace into the pipe 12^a and driven forwardly through the drum to the distributing pipes 12, being additionally heated in its passage through that portion which lies over the heat plate 11.

Each of the distributing pipes 12 has extending upwardly therefrom at spaced intervals corresponding with the distance between the trees of each row, a pipe 21 which terminates adjacent the surface of the ground and is adapted to be

closed by the removable cap 22, such as is illustrated particularly in Figure 2. When the cap 22 is removed, there may be coupled with the upper end of the pipe 21 the end of the standard portion 23 of a substantially T-shaped pipe unit, which is indicated generally by the numeral 24. These pipe units or T's have the lateral arms 25 thereof inserted into extension pipes 26 so that heated air rising from the distributing pipe 12 into a T-24 will be carried laterally by the extensions 26 for discharge therefrom adjacent the surface of the ground into the air beneath the adjacent trees.

In addition to having the ground level distributing means which comprises the T 24 and the extension pipes 26, each distributing pipe 12 has extending therefrom beneath the ground, a lateral pipe 27 which, at its outer end has an up-turned portion 28 which extends a substantial distance above the surface of the ground to discharge heated air directly upwardly. These upwardly discharging pipes and ground level pipes may be used simultaneously or independently of one another, if desired. When the ground level pipes are employed it will be apparent that the heated air may be discharged laterally over the surface of the ground and in close proximity to the trunks of the adjacent trees, and when the upwardly discharging pipes are opened for use, the heated air passing therethrough will be projected upwardly to rise rapidly into the tree foliage and thus warm the air about the same. Thus it will be apparent that whereas the pipes 28 send the heated air straight up, the ground level pipes will distribute the heated air over the ground surface around the tree trunks to warm the ground vapor before it contacts the trunk and the tree branches.

In order that the escape of heated air from the ends of the pipe portions 28, as well as from the ends of the sections 26, may be regulated, each of the outlet ends of these pipes has associated therewith a cover plate, about to be described. The outer end of pipe 26 has secured thereto the angular bracket 29, one arm of which extends across the adjacent open end of the pipe and carries a bolt 30 which passes through an aperture in a cover plate 31 which is located over the open pipe end. By means of a wire 31^a or any other suitable device attached to the plate the position of the plate 31 upon the pipe end may be adjusted, by oscillation on the bolt, to control the amount of heated air escaping from the pipe and the plate can be held in adjusted position by the frictional contact maintained between it and the pipe by tightening screw 30.

In Figs. 2 and 5 there is shown a modified form of the heat control plate by which the escape of heat from the upwardly directed outlet pipes 28 is controlled. In this form the plate is generally indicated by the numeral 32, and it is provided with the integral resilient arms 33 which extend from one face and which are separated a distance to facilitate their engagement about the end of a pipe 28 so as to have firm frictional contact with the outer surface of the same.

A handle 34 is secured to each plate 32, and by this means the plate can be raised or lowered relative to the adjacent end of the pipe on which it is mounted so that the size of the area between the plate and the end of the pipe can be varied to thus regulate the escape of air.

From the foregoing, it will be readily apparent that with the system herein described installed in an orchard, a thorough distribution of heated

air may be made to surround the trunks of the trees and also to envelop the upper parts or foliage of the trees. By means of the ground level pipes, the heated air may be discharged directly against the tree trunks and by using the vertically disposed pipes 28, additional heated air may be discharged directly upwardly into the branches of the trees. Regulation of air flow is readily controlled by means of the damper plates described and it will also be apparent that the ground level pipes may be closed completely so that the vertical pipes only may be made use of or the reverse method may be employed.

I claim:

1. In a heat distributing system of the character described, a heating furnace including a casing and a heating unit therein, air conducting means passing through said casing over said heating unit, distributing pipes connected with said means, said means and distributing pipes being beneath the ground surface, means for forcing circulation of air through the conducting means and said pipes, and heated air escape means for the distributing pipes comprising upwardly directed nipples and substantially T-shaped pipe units each coupled with a nipple and adapted to discharge heated air laterally over the surface of the ground.

2. In an orchard heating system of the character described, a furnace structure including a closed casing having a burner unit therein, air conducting means passing entirely through and closed against communication with the interior of the furnace casing, air distributing pipes connected with said conducting means, air circulating means in said conducting means, means for drawing air from the interior of the furnace casing into the conducting means by said circulating means, that portion of the conducting means lying in the casing being disposed over said burner unit, and tubular distributing arms connected with said distributing pipes at spaced intervals and having upwardly directed outlets opening to the atmosphere above the ground.

3. In an orchard heating system of the character described, a furnace structure including a closed casing having a burner unit therein, air conducting means passing entirely through and closed against communication with the interior of the furnace casing, air distributing pipes connected with said conducting means, air circulating means in said conducting means, means for drawing air from the interior of the furnace casing into the conducting means by said circulating means, that portion of the conducting means in the casing being disposed over said burner unit, tubular distributing arms connected with and projecting laterally from said distributing pipes at spaced intervals and having upwardly directed outlets to the atmosphere above the ground, and means for controlling the escape of heated air from said upwardly opening outlets consisting of plate members adjustably held over the said outlet ends of the pipes.

4. In an orchard heating system of the character described, a furnace comprising a casing and fuel burning means therein, tubular heated air conducting means passing through the furnace over said heating means, an air circulation fan in said means, a plurality of lateral pipes leading from said tubular means, said pipes and tubular means all being disposed beneath the surface of the ground, a plurality of outlet nipples connected with and extending upwardly from said

lateral pipes thru the surface of the ground, substantially T-shaped pipe units coupled with said nipples and arranged to distribute heated air over the surface of the ground, and pipe sections leading laterally from said lateral pipes beneath the surface of the ground and terminating in upwardly extending outlet ends which are disposed above the ground surface.

5. In an orchard heating system including an air heater, underground heated air distributing pipes leading from said heater, upwardly directed

outlet pipes leading from said distributing pipes, horizontal ground level pipes coupled with said outlet pipes, and means for controlling the escape of heated air from said outlet pipes comprising a plate overlying the end of each outlet pipe, a bracket secured to the outlet pipe and having an arm extending across the adjacent plate, and a pivot member connecting said arm with the adjacent plate upon which the plate may be oscillated across the adjacent pipe end.

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