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AUTOMATIC ORCHARD HEATER

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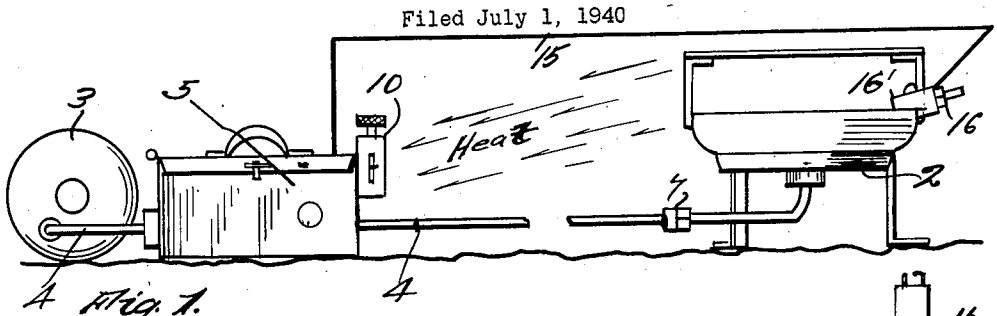

Fig. 1.

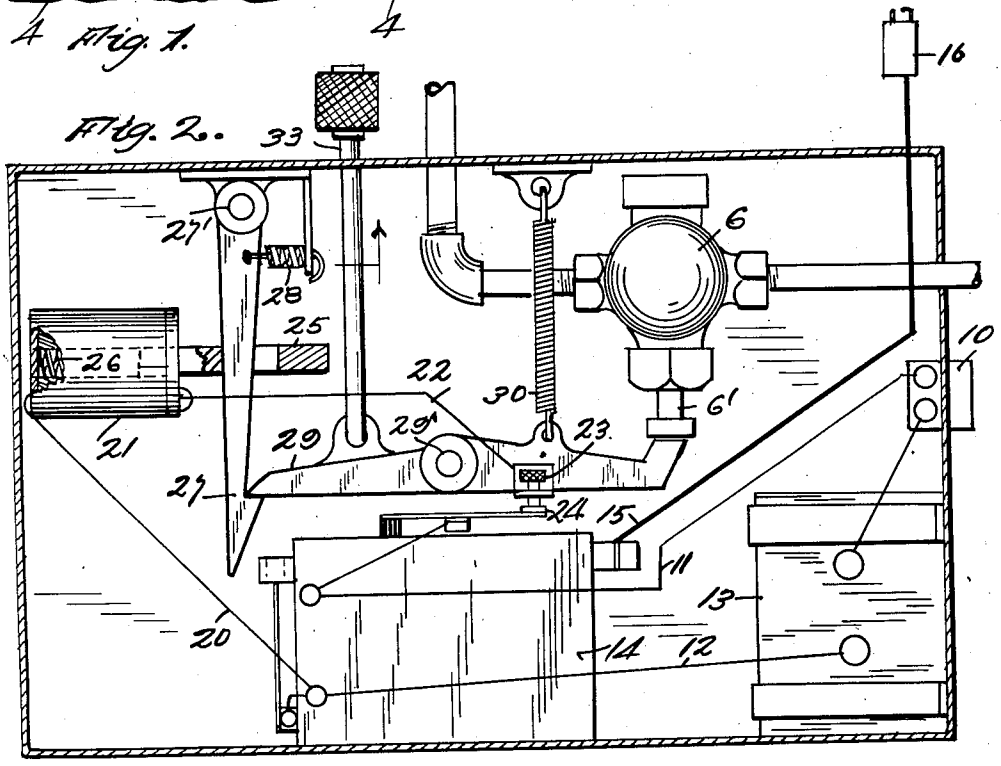

Fig. 2.

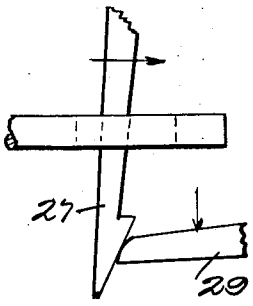

Fig. 3.

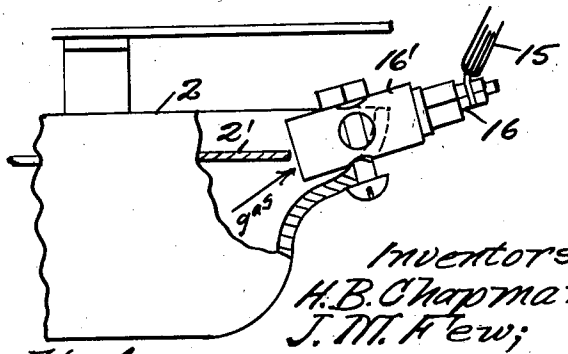

Fig. 4.

Inventors,
H. B. Chapman,
J. M. Few;
By their Attorney
Frederick E. Maynard.

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AUTOMATIC ORCHARD HEATER

Henry B. Chapman and Jesse M. Few,
Los Angeles, Calif.

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10 Claims. (Cl. 158—28)

This invention is a heating system peculiarly adapted for orchard heating but not restricted to that field of use alone as it may be adapted for other purposes.

The most general means to economically heat large open fields and orchards is to burn "smudge pots" but because of the great smudge produced with the generation of heat from burning low grade fuel oil a storm of protest is raised in the smudged communities.

But that is not the only objection to burning smudge pots. The use of these pots requires the employment of troops of men to stand watch every night at the considerable number of pots set out in the orchards. At the critical moment, just above 28° F., the attendants must rush about and light the pots by hand. If the freezing point is not reached during the watch period then the men must be paid for their time just as though they had fired the pots.

The present invention has for one object to provide an entirely automatic-lighting, pilot-less, heating system; thus to dispense with manual watchers.

Another object is to provide a small, low-cost, compact, reliable, manually portable, automatic heater comprising combined burner means and automatic, electric igniter means, and in this connection an object is to provide a temperature controlled heating system in which a fuel supply valve is automatically opened at a predetermined temperature degree and is closeable at any time thereafter by manual or other action.

A further object of the invention is to provide an electric-igniter heater system under temperature control and which provides for an automatic shut off of all electric circuits therein as soon as temperature adjacent the heater control is raised by the heater to a degree above the given starting temperature of the system and this without in any way affecting the operating burner; whereby to enable the use of small sources of electric current and without need of tapping commercial power feeders.

And a noticeable object is to provide a heating system which, while entirely automatic in turning on and turning off the electric circuits of the system, and which opens a fuel supply valve to a burner or burners, does not shut off the fuel to the burner (in the preferred adaptation) and includes a simple control means for the fuel valve and the circuits whereby the valve may be closed at will and the controls re-set all in one simple operation.

Particularly, an object is to provide a spark circuit to ignite fuel at the burner and in this connection provide, also, electrically and thermostatically controlled valve-actuator means and to provide for the concurrent action of the two electric circuits and the later sequential break of the circuits, first, the valve control and then the spark circuit; all such actions being without effect on the opened fuel valve so that the burner is left in operation.

The invention consists in certain advancements in the stated art, as set forth in the ensuing disclosure and having, with the above, additional objects and advantages as hereinafter developed, and whose construction, combination, and sub-combinations, and details of means, and the manner of operation will be made manifest in the description of the herewith illustrative embodiment; it being understood that modifications, variations and adaptations may be resorted to within the spirit, scope and principle of the invention as it is more particularly claimed hereinbelow.

Figure 1 is a side elevation of the connected-up burner and its control unit.

Figure 2 is a sectional plan of the unit in chassis assembly.

Figure 3 is a detail of the released burner master-lever and its retainer.

Figure 4 is a sectional detail of a part of a burner and its juxtaposed spark plug and mount.

This heating system embodies any suitable fuel burner **2**, preferably a gas burner, of capacity to provide heat to raise temperature in its setting in a group of orchard trees, or such other use as may be designed. If orange trees, these are sensitive to a temperature of about 28° F. and the atmosphere in such an orchard must not fall to that degree, or the hazard is great. A suitable number of burners may be served from a common source **3** of fuel with a pipe **4** to each burner. Or if preferred one bottle or tank of fuel may serve but one burner.

The control means for each burner, or if preferred a cluster of burners, is an organized chassis unit preferably fully enclosed in a suitable box **5**, which is preferably wholly manually portable so that each system may be easily carried from a service truck or central service station to its place of installation in an orchard, or other station of use.

Fixed in the box is a self-closing valve connected to the fuel pipe **4** which serves the burner **2**. A simple union **7** enables the quick connection of a relative burner, or branched burners, to

each control box when they have been arranged in service place.

The box 5 is provided with an appropriate type of circuit controlling thermostat 10 with adjustable contacts set to close circuit through wires 11 and 12, battery 13, and a spark coil 14; the circuit closing, for orange orchard use, at about 30° F. At that temperature the closed circuit will excite the spark coil and send a high tension current by wire 15 to a spark device 16 fixed on the burner.

Fig. 4 shows the spark device or plug 16 set in such a position at a baffle plate 2' that the fuel flows into a perforated mixing tube 16' in which the spark gap of the plug 16 is exposed so that the fuel will reliably be ignited when the spark circuit is made.

Concurrently with the production of the spark a means is set in action to automatically open the self-closed valve 6. A second circuit from the battery 13 includes a wire 20 from wire 12 to a solenoid coil 21 and a wire 22 from the coil 21 to a contact 23 which normally engages a contact 24 joined to battery wire 11. Thus when the thermostat closes the circuit in the wires 11—12 it at the same instant energizes the solenoid 21 and the axial plunger 25 is suddenly pulled in against the light reaction of an engaged spring 26 which normally holds the plunger outward.

A hook 27 is pivoted at 27' and is pulled by a spring 28 against the near end of a valve master in the form of a lever 29 medially pivoted at 29'. One end of the lever is disposed adjacent the near end of a yieldable stem 6' of the fixed valve 6 and the lever is constantly urged toward the stem by a master spring 30 which serves to press the lever 29 against the restraining hook 27 in the normal set position of the control means in readiness for releasing action by the solenoid when this is energized.

In the set position of the lever 29 it is just out of contact with the valve stem 6' so that the valve is safely and fully closed.

The contact 23 is mounted on the master arm or lever 29 with the consequence that when the solenoid is energized by closure of its circuit at the thermostat contacts the plunger 25 is pulled into the solenoid coil and acts with hammer momentum as it strikes the interposed hook 27 and this is pulled off the master lever 29. The release of the lever causes it to be automatically pulled against the valve stem 6' by action of main spring 30 and therefore to open the valve for fuel to the burner.

The lever 29 has a pull bar 33 accessible from the exterior of the box and may be pulled by the attendant at any time desired to cut off the fuel supply to the burner and to again bring the lever under restraint by the control hook 27—that is, the pull bar is operated by the attendant to reset the system for another automatic action under control of the thermostat.

It is understood that the hammering plunger springs to outer position at the instant the contacts 23—24 of the solenoid circuit open and that these contacts stay in open position until the master lever 29 is reset by its stem or bar 33.

The thermostat is placed in such contiguity to the nearest burner it serves so that as soon as the temperature at the thermostat is raised a few degrees (say above 30° F.) by the heat from the burner then the circuit in wires 11—12 is broken (in the thermostat) and the spark coil is de-energized for the purpose of conserving the battery power: meanwhile the valve 6 remains open to serve fuel to the burner until the lever 29 is reset, manually or otherwise, to allow the valve to close itself.

To reiterate, the solenoid circuit breaks as the contacts 23—24 open when the lever 29 acts to open the fuel valve, and a few moments later (according to air temperature) the spark is cut off by the break in the thermostat.

What is claimed is:

1. An automatic fuel burning heating system having, in combination, a burner, a self-closing fuel supply valve for the burner, self-acting means to open the valve, means to restrain the opening action of the opening means, and a circuit including a thermostatic control exposed to heat from the burner and an electromagnetic controller for the restraining means to effect the release and the opening of the burner valve, and an ignition means, at the burner, controlled by said circuit.

2. The system of claim 1, and a means to reset the self-acting means to effect the closing of the valve at any time.

3. The system of claim 1, and said ignition means including an automatic spark device for the burner which is energized concurrently with said electromagnet, to ignite the fuel supplied to the burner.

4. The system of claim 1, and means to break the said circuit concurrently with the opening of the valve.

5. The system of claim 1, and said ignition means including an automatic spark device which is energized concurrently with the said electromagnet, and means acting with the valve opener to break the said circuit.

6. In a heating system control apparatus, the combination including a fuel burner, a self-closing valve for fuel to the burner, a control device to automatically open the valve, a restraining device and an electromagnetic control means therefor normally holding the control device to prevent opening of the valve, and a thermostat circuit operative to automatically trip the restraining device and including a thermostat subject to heat from the burner and a manual device for resetting the restraining device and releasing the valve for closing function.

7. The system of claim 6, and a circuit breaker controlled by valve opening function of the control device.

8. The system of claim 6, a spark circuit to ignite fuel at the said burner and whose circuit is made and broken by the said thermostat.

9. The system of claim 6, a spark circuit for the burner, and said thermostat operative to automatically trip the restraining device by actuation of said electromagnetic means effective on the restraining device and which said thermostat also controls make and break of the spark circuit.

10. The system of claim 6, and including a means to reset the control device at will to effect closure of the valve, and a circuit breaker which is closed by resetting of the said device.

HENRY B. CHAPMAN.
JESSE M. FEW.