

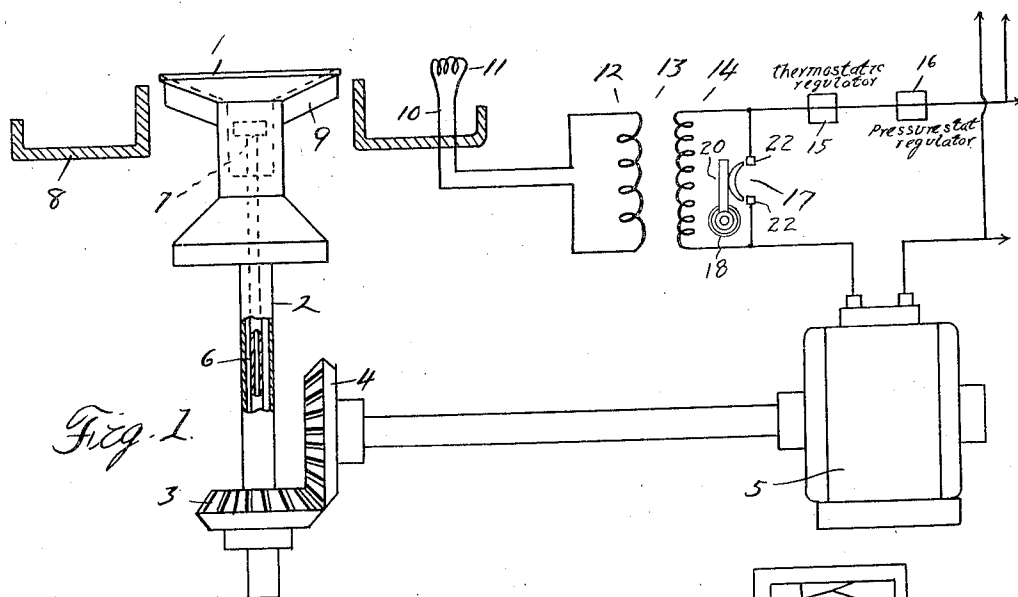
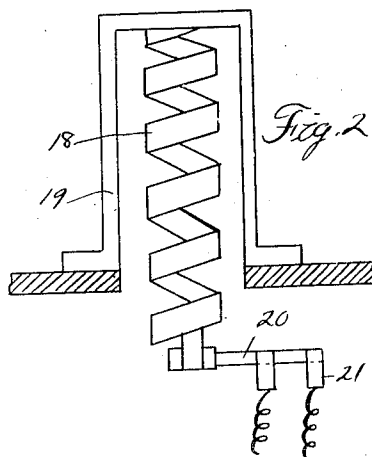
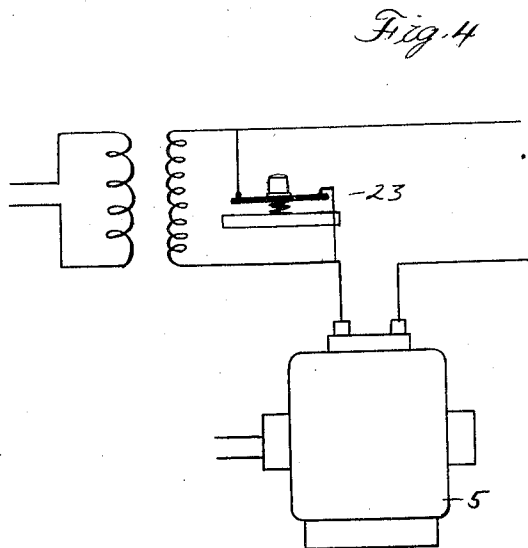
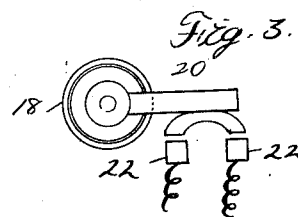
Nov. 15, 1927.

1,648,924

C. F. WARRICK

IGNITION AND CONTROL MECHANISM FOR OIL BURNERS

Filed Oct. 6, 1924



Inventor
Charles F. Warrick

By *Whittemore, Hubert, Whittemore & Bellamy*
Attorneys

UNITED STATES PATENT OFFICE.

CHARLES F. WARRICK, OF DETROIT, MICHIGAN, ASSIGNOR TO PENBERTHY INJECTOR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

IGNITION AND CONTROL MECHANISM FOR OIL BURNERS.

Application filed October 6, 1924. Serial No. 741,981.

The invention relates to ignition controlling mechanism for oil burners and is particularly adapted for use with a centrifugal oil burner having a rotary atomizing nozzle driven by an electric motor.

The primary object of the invention is to provide electrical ignition adapted to light the oil from the burner when the rotary mechanism is started in operation. Another object is to obtain an arrangement automatically preventing the driving motor from starting if the heating coil circuit is open by mechanical injury or by burning out of the heater element. A further object of the invention is to operate the motor at reduced speed during the starting period, thus cutting down the velocity of air from the burner head and making ignition easier and also reducing the cooling effect on the heating coil itself. Still another object is to enable the oil to accumulate to a greater degree in the atomizing nozzle, thereby providing a priming charge which is ejected from the nozzle when the motor is turned on at full speed. A still further object is to provide automatic means for de-energizing the heating coil after a predetermined operation of the same.

These and other objects are attained by the novel construction hereinafter more fully described and illustrated in the accompanying drawings wherein:

Figure 1 is a diagrammatic illustration of the rotary burner and the electrical control means therefor;

Figure 2 is an elevation of a thermostatic switch adapted to control the ignition;

Figure 3 is a plan view thereof;

Figure 4 is a diagram showing a manually operated ignition system.

In general, my improved ignition system consists in placing the primary of a suitable transformer in series with the alternating current motor for driving the rotary atomizing nozzle. The heating element is connected in a closed circuit with the secondary of the transformer, the latter being so proportioned with respect to the primary as to supply sufficient energy to the heating element to heat the same to incandescence while the motor is operated at a reduced speed because of the energy withdrawn from its circuit for supplying the heat. The transformer is also arranged so that upon the opening of the secondary circuit it

acts as a choke coil preventing the operation of the motor. Suitable means is also provided for short circuiting the transformer primary whereby the motor may be run at full speed on full voltage and the ignition coil de-energized. This short circuiting means may be automatically operated after a suitable interval of time has elapsed to insure the ignition of the oil or it may be manually operated if so desired or operated thermostatically by the action of the heat from the burner flame, the various modifications in the apparatus being more specifically illustrated hereinafter.

As shown in Figure 1, 1 is a rotary atomizing nozzle driven through a hollow spindle 2 and the bevelled gears 3 and 4 by a suitable alternating current electric motor 5. Oil is supplied to the burner through the hollow shaft 6 and distributed into the annular well 7 where the centrifugal force of the atomizing nozzle carries the oil to the outer periphery of the rotating nozzle and throws it outward in the form of fine spray. 8 represents an annular burner pan surrounding the nozzle, and 9 the fan blades for supplying the air for combustion.

Suitably arranged in the burner pan 8 is a standard 10 for receiving the filament or heating coil 11 arranged in the path of the oil spray. The coil is electrically connected in a closed circuit with the secondary 12 of a suitably electrically balanced transformer 13, the primary 14 of which is arranged in series with the motor 5 and connected to a suitable source of alternating current supply. 15 and 16 represent respectively a thermostatic regulator and a pressurestat regulator by means of which the current to the motor may be controlled in a manner well understood in the art. In order to de-energize the heating coil, there is provided a switch 17 shunted across the terminals of the transformer primary, one type of switch being illustrated in Figure 1 and specifically shown in the various modifications represented by the remaining figures.

With the system as thus far described, the current supplied to the motor passes through the primary 14 of the transformer whenever the switch 17 is opened, thus inducing a corresponding current in the secondary of the transformer and energizing the coil 11. Preferably the transformer is arranged to reduce

the voltage in the secondary coil and to correspondingly increase the value of the current passing through the heating coil. The motor 5 is driven at reduced speed during the heating of the coil 11 because of the arrangement of the primary in series therewith and furthermore, if the secondary circuit is opened by reason of a burning out of the coil 11, or for any other reason the motor will cease to operate because the transformer will act as a choke coil. As soon as the oil from the burner has been ignited, the switch from the circuit may be closed thereby short circuiting the transformer, de-energizing the coil 11 and supplying full current to the motor 5. The resulting increase in the speed of the motor 5 provides a greater centrifugal effect upon the oil in the annular well 7, thereby increasing the amount of fuel thrown out by the nozzle and resulting in complete combustion.

In case it is desired to provide automatic ignition of the fuel upon the starting of the motor, the switch 17 may be controlled by a suitable mechanism for closing the same after a predetermined energization of the heating coil. One arrangement for accomplishing this purpose is illustrated in Figures 2 and 3 where the switch 17 is closed by means of a thermostat suitably arranged in the path of the hot gases from the burner. With this construction, the switch is initially open and is closed only after the thermostat reaches a predetermined temperature so that the ignition coil is kept energized until the thermostat is heated to the desired temperature. Any suitable thermostatically controlled switch may be employed but as illustrated in the drawings, a bi-metallic element 18 is suspended within a protecting housing 19 and carries a contact arm 20. The latter is provided with a contacting bridge 21 adapted to engage the terminals 22 whenever a sufficient torsional movement is imparted by the thermostat due to the expansion of the bi-metallic element. It should be understood that this is only one specific means of thermostatically operating the switch 17 and that other types of thermostatically operated electric switches might be substituted therefor without departing from the spirit of this invention.

Figure 4 shows another feature of the apparatus where the transformer primary 14 is normally short circuited by means of the manually controlled push button 23.

Upon the closing of the motor circuit, the motor operates at full speed thereby distributing the oil from the burner head and the operator then manually operates the push button 23 to open the switch and energize the heating coil 11. The switch arm is maintained manually in open position for a short space of time until ignition takes place, the motor running at a reduced speed during this interval. After the burner has been lighted the operator may release the push button 23 thereby de-energizing the heating coil 11 and causing the motor to again run at full speed.

What I claim as my invention is:—

1. The combination with an oil burner having an electric motor for operating the same, and an ignition coil for said burner, of a transformer having a primary connected in the motor circuit, and a secondary connected to said heating coil, and means for short circuiting the primary of said transformer.

2. The combination with an oil burner having an electric motor for operating the same and an electrical igniter for said burner, of a transformer having a primary connected in series with said motor and a secondary connected to said igniter, an electric switch connected into said motor circuit in parallel with said primary and means for operating said switch to energize or de-energize said primary.

3. The combination with an oil burner having an electric motor for operating the same and an electrical igniter for said burner, of a transformer having a primary in the motor circuit and a secondary in circuit with said igniter, said transformer having a step-down voltage ratio whereby said igniter is operated by a lower voltage and higher amperage than said primary and means for short circuiting said primary to de-energize said igniter.

4. The combination with an oil burner having an electric motor for operating the same and an electrical igniter for said burner, of a transformer winding in series with said motor, a transformer winding in series with said igniter forming a separate closed circuit, said transformer windings being arranged in inductive relation whereby the opening of the igniter circuit increases the impedance of the motor circuit and thereby reduces the speed of said motor.

In testimony whereof I affix my signature.

CHAS. F. WARRICK.