

March 27, 1928.

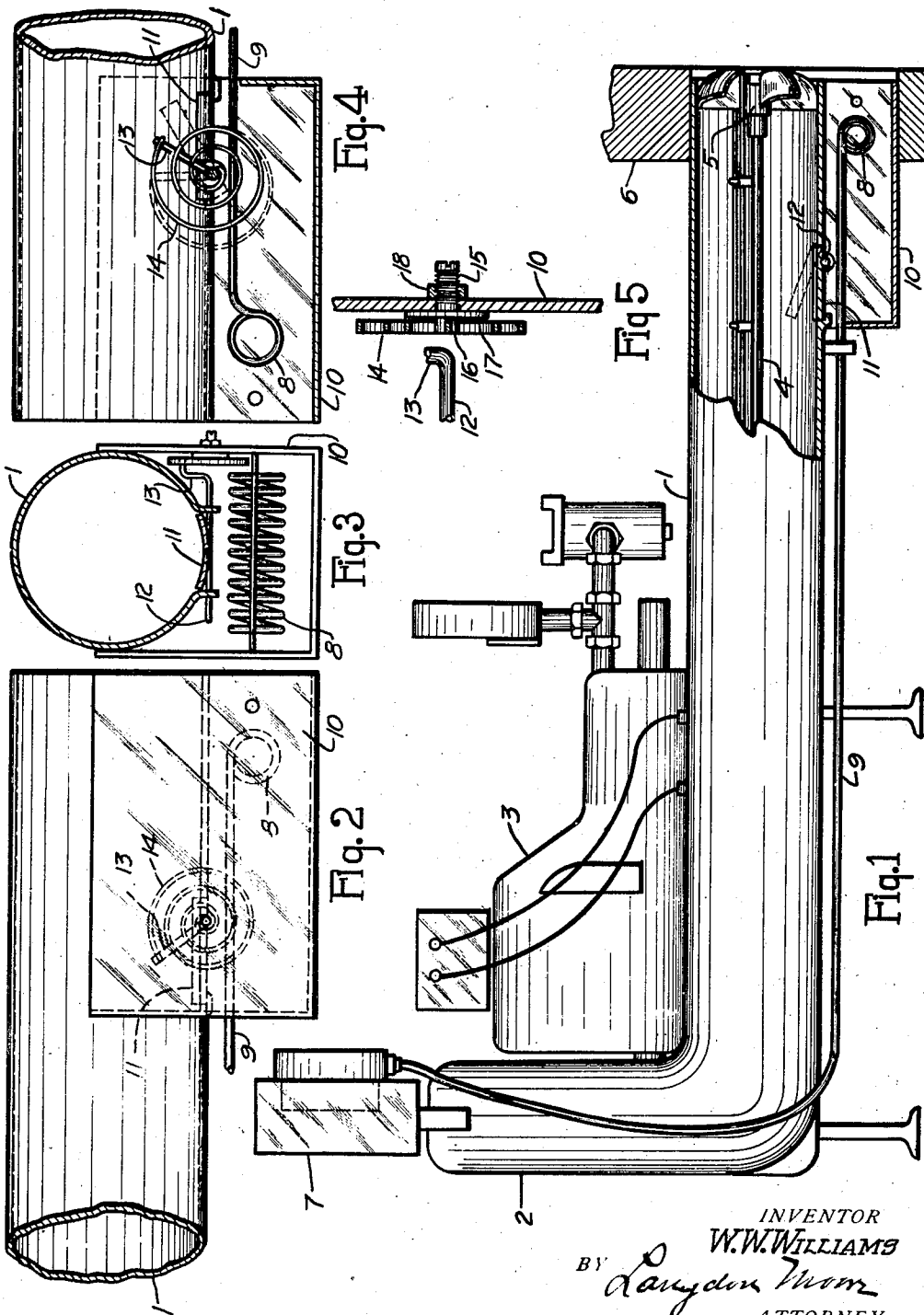
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1,664,339

DOMESTIC OIL BURNER

Filed July 24, 1925

3 Sheets-Sheet 1



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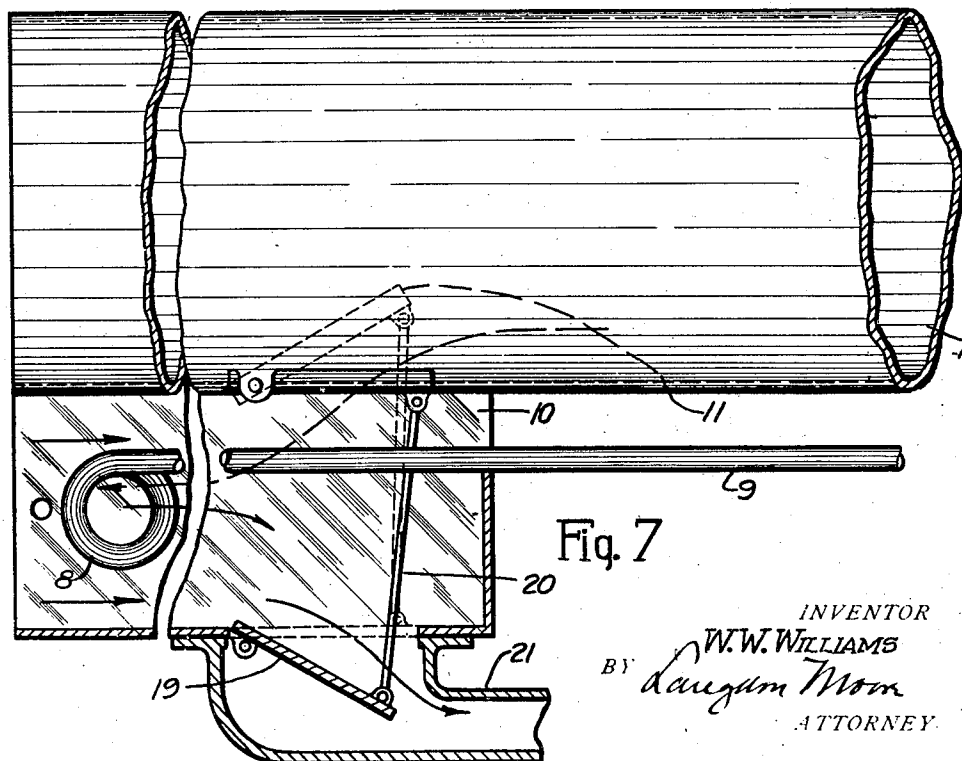
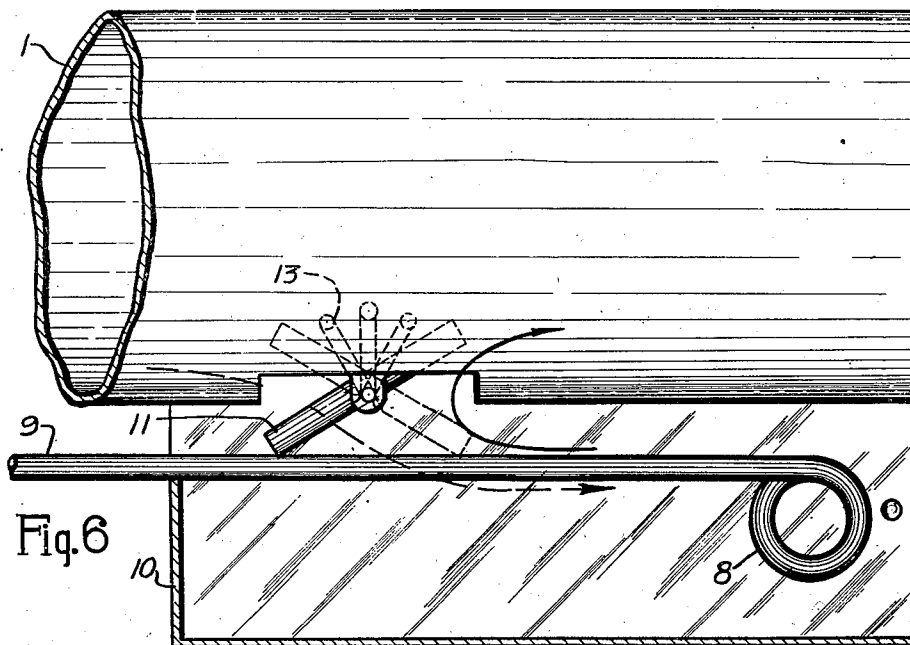
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

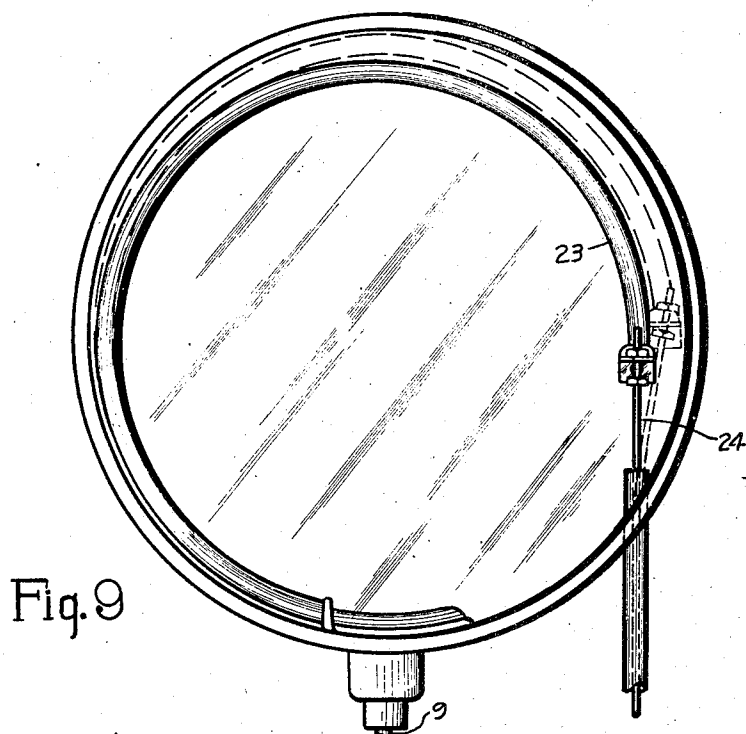


Fig. 9

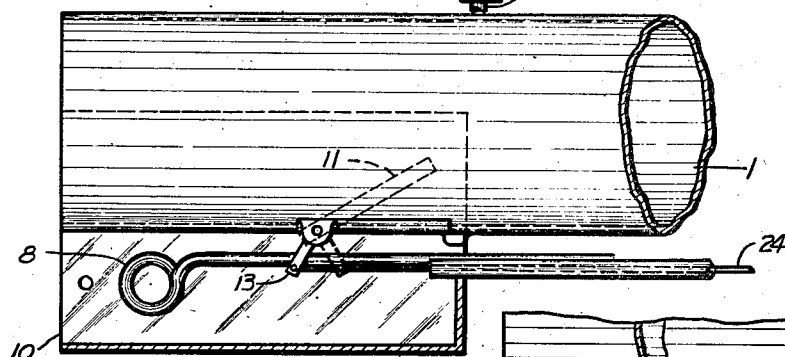


Fig. 10

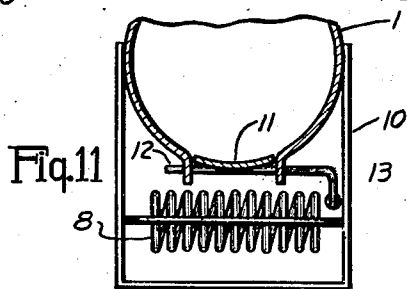


Fig. 11

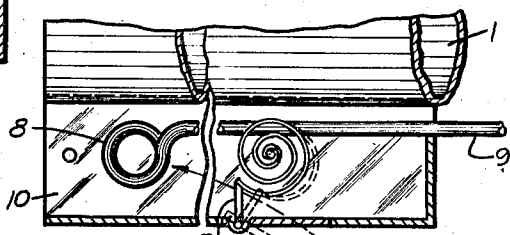


Fig. 8

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DOMESTIC OIL BURNER.

Application filed July 24, 1925. Serial No. 45,753.

This invention relates to improvements in oil burners and more particularly to that type of domestic oil burner heater which includes an air conduit opening into the fire pot or heat generating chamber of a heater or furnace at one end, leading from a fan blower at the other end, with an electric motor for operating the blower adapted to also operate an oil pump for delivering liquid fuel to a fuel burning nozzle arranged centrally of the air conduit adjacent the open end and having a thermal coil arranged in proximity to the burner flame connected to an electric control switch for the motor circuit adapted to allow the ignition of the burner and be actuated by the heat therefrom to close the main circuit and upon extinguishing of the burner by cooling to actuate the control to break the motor circuit. The particular improvement made the subject of this application relates to means for causing the air pressure in the air conduit to render the thermal control switch actuating means more sensitive, and to utilize such air pressure to render the thermal coil more resistive to the intense heat from the burner flame and fire pot under operating conditions.

With these and other objects in view, reference is made to the accompanying drawings which illustrate the application of this invention to the particular oil burner referred to but it is to be understood that this invention is not restricted to that construction alone as any other use for the same purpose is within the scope of this invention.

In the drawings:

Figure 1 illustrates an embodiment of this invention in side elevation as applied to the particular type of oil burner described, with the parts adjacent the furnace or heater broken away and in section.

Figure 2 is an enlarged detail view in elevation of the right side of the open end of the air conduit.

Figure 3 is a front elevation of Figure 2.

Figure 4 is a view similar to Figure 2 from the other side.

Figure 5 is an enlarged detail view, partly in section, of the means for adjustably securing the air conduit valve or closure spring.

Figure 6 is an enlarged detail view similar to Fig. 2 illustrating a modified form of this invention.

Figure 7 is a view similar to Figure 4 illustrating another modification.

Figure 8 is a view similar to Figure 4 illustrating another modification.

Figure 9 is a view in front elevation of one type of electric switch control, with cover removed and switch operating mechanism omitted, illustrating an actuating means for another form of this invention.

Figure 10 is a view similar to Figure 4 to which the actuating means of Figure 8 is applied.

Figure 11 is a view in front elevation of Figure 9.

The embodiment of this invention is illustrated as applied to a domestic oil burner heater, which is shown in Figure 1 as including a cylindrical air conduit 1 leading from a fan blower casing 2 with the motor for operating the fan and liquid fuel pump within casing 3 from which pump the pipe 4 leads centrally within the air conduit to the oil burner nozzle 5 at the end of the air conduit received within the heater or furnace wall 6. This type of burner mechanism includes an electric control switch, preferably mounted in a box 7 upon the fan casing 2, one element of which is actuated by a thermal coil 8 comprising a metallic tube 9 closed at one end, coiled, as shown, in proximity to the burner nozzle and leading therefrom to the control element in the box 7 with a thermal fluid within said tube, the expansion and contraction of which in response to the temperature of the burner flame actuates said electric control element. The coil 8 is mounted in a housing 10 preferably depending from the open end of the air conduit, as illustrated, which is also received within the wall 6 of the heater and opens into the fire pot therein, the outer end of the housing is preferably closed or partially closed, as shown. The coil 8 is arranged near the open end of the housing to be directly subjected to the heat from the burner flame when ignited and the heat generated thereby within the fire pot of the heater or furnace. In this type of burner construction, a port is provided on the under side of the air conduit opening within the depending housing having an upwardly extending deflecting plate for directing a portion of the air from the fan through the housing, about the coil, and into the fire pot, which passage of cool fresh air from the

fan envelopes and maintains the coil at a lower temperature than that of the burner flame and protects the metal of the coil from the destructive high temperature of the fire pot and also produces a rapid cooling of the coil upon the extinguishing of the burner flame.

This invention relates particularly to means for varying the admission of air from the fan to the coil so that when the burner flame is first ignited the coil will receive the full heat therefrom to operate with the least possible delay the control actuated by the coil to close the main circuit through the motor and thereafter admit sufficient passage of cool air from the conduit to provide the protective envelope for the metal of the coil. As shown in the first four figures of the drawing, an opening is provided upon the under side of the air conduit 1 adjacent the rear of the housing 10 and a closure or valve 11 is pivotally mounted, preferably in ears struck down from the air conduit, to swing about the end adjacent the coil 8 to close the opening or to swing upward to form a deflecting plate to deflect a portion of the air from the fan blower through the opening and about the coil into the fire pot. To swing the closure 11 from one position to another, it is preferable to mount the closure upon a shaft 12 having a crank 13 at one end with a right angular extremity adapted to engage the outer free end of an expansible thermostatic or bi-metal coil 14 which is secured at the inner end of the coil to a side of the depending housing 10. The inner ends of the coil is adjustably secured to the housing, preferably as illustrated in Figure 5, by a shaft 15 passing through an aperture therefor in the housing wall having a split end 16 on the inside thereof adapted to receive and secure the inner end of the coil 14 with a cylindrical disc 17 adapted to bear upon the inner face of the housing and the portion of the shaft exterior of the housing screw threaded to receive a locking nut 18, having a slot in the outer end to receive a screw driver or other tool whereby when the nut is loosened the shaft may be turned in the proper direction to cause the coil 14 under normal temperature to adjust the closure 11 to close the opening in the air conduit and the nut then taken up will hold it in the adjusted position. With the valve closure 11 in this position all of the air forced through the air conduit will pass directly therethrough and about the burner nozzle when the flame is first ignited and the thermal coil 8 will be subjected to the entire heat from the flame and the fire pot causing the thermal liquid therein to expand at once and quickly operate the electric control element, at the same time the heat from the flame and fire pot will also act upon the thermal metal coil 14 within

the housing and, as the temperature within the housing increases, it will gradually expand causing the closure 11 to rotate to open the aperture in the air conduit and deflect the air forced therethrough into the housing 10 about the coil 8 and into the fire pot. Full advantage of the heat from the flame and fire pot is thereby first utilized to deflect the cool air from the fan to envelope and protect the metal of the thermal coil 8 from the destructive intense heat of the fire pot. Upon extinguishing of the burner flame the full amount of deflected air will continue to pass through the housing and about the thermal coil 8 and cool the liquid therein to actuate the electric control element to break the motor circuit and then as the temperature within the housing diminishes the coil 14 will contract and rotate the valve 11 to close the aperture in the air conduit so that the parts are all returned to normal and are prepared to function when the burner flame is again ignited.

At times it is desirable to pass the heat from the burner flame and fire pot about the thermal coil 8 when the burner is first ignited to utilize the maximum effect of the heat thereon to actuate the electric control. When this is desired the valve 11 is mounted for movement in both directions, such as shown in Figure 6. The thermostatic or bi-metal coil 14 is mounted in the same manner as illustrated in Figure 2, while the valve shaft 12 is secured centrally of the closure 11 so that the valve may be rotated to depress either opposite end. The thermal or bi-metal coil 14 is so adjusted that at normal temperature it will hold the innermost end of the valve closure 11 extending downward into the housing thereby raising the end adjacent the flame upward into the air conduit whereby, when the fan blower first operates, the air therefrom passing through the conduit and over the upward extending portion of the valve 11 will act as an injector and draw the heat from the burner flame and fire pot through the housing about the coil 8 and into the air conduit, as indicated by the arrow. As the temperature within the housing rises the coil of thermostatic or bi-metal 14 expands which will swing the valve closure about its bearings to first close the aperture in the air conduit and then extend the innermost end of the valve upward into the conduit to deflect a portion of the air under pressure from the fan into the housing, envelope the thermal coil 8, and pass into the fire pot, as shown in dotted lines and indicated by the dotted arrow.

Figure 7 illustrates another construction for accomplishing the same result in a different manner. In this form an opening is provided in the bottom of the housing at the rear of the thermal coil 8 which is pro-

vided with a closure or valve 19 mounted for movement about its forward end below the air conduit valve closure 11 and is connected at its free end to the free end of the air conduit valve closure 11 by a connecting rod, or other connection 20 of such a length and adjustment that when the air conduit valve closure 11 is normally closed the rear end of the housing valve closure 19 is depressed to uncover the opening therein so that when the burner flame is first ignited a draft is set up from the fire pot through the housing, about the coil 8, and out through the uncovered opening into the atmosphere, as indicated by arrows in full lines in Figure 7. It may not be desirable to allow the fumes from the flame and fire pot to escape in this manner into the atmosphere about the burner mechanism or it may be desirable to create a more powerful or positive draft through the housing from the fire pot. In the first case, a housing discharge pipe 21 may be secured to the housing about the under side of the opening to lead to the atmosphere outside the building and, in the second case, the discharge pipe 21 may be led into the stack or chimney of the heater above the fire pot or to the intake of the fan blower. When the discharge pipe leads to the intake of the fan blower a positive suction is caused to draw the heat from the burner flame and fire pot about the coil 8 to actuate the electric control element. The valve closure 11, of the air conduit is constructed and operated in the same manner as shown and described in the construction illustrated in the first four figures of the drawing so that as the temperature in the housing increases the air conduit valve closure is opened to deflect the air under pressure from the blower through the housing and at the same time close the opening in the under side thereof so that the deflected air will envelope the coil 8 and pass into the fire pot, as indicated by the dotted arrow. Where the heater or furnace has a high stack or is so constructed as to have a positive strong draft from the fire pot under normal conditions the air conduit closure valve 11 may be omitted and the same result accomplished by arranging the thermal or bi-metal coil 14 to operate a valve closure similar to that shown on the underside of the housing 10 in Figure 7. In such a case, as shown on Figure 8, the coil 14 is adjusted to normally close the housing valve closure 22 and as the temperature in the housing increases, after the burner flame is ignited, the coil 14 opens said closure to cause the draft from the fire pot through the stack or chimney to draw cool atmospheric air through the housing opening to envelope the coil 8, as indicated by the arrow shown in dot and dash lines. There are times it is desirable to positively operate the valve closure 11 in

the air conduit at predetermined times by other means than the thermal or bi-metal coil in the housing as illustrated in the foregoing figures. When the electric control element is operated by a Bourdon tube, such as 23 illustrated in Figure 9, actuated by the thermal coil 8, the Bourdon tube is contracted under normal conditions when the burner mechanism is not operating and upon the ignition of the burner flame it is actuated by the increase in temperature of the coil 8 from the heat of the flame and fire pot to expand and operate the electric control to close the main motor circuit. This movement of expanding and contracting of the free end of the Bourdon tube may be utilized to open and close the air conduit closure valve 11 by means of a wire 24, or other connection, from the free end of the tube to the end of the operating crank 13 of the valve closure 11, as shown in Figures 9, 10 and 11.

What I claim is:

1. In a fuel burner construction including a fire pot and an electrically operated fuel feed having a thermostatically operated control in circuit therewith actuated by the temperature at the burner nozzle, means subjecting the thermostatic element to the increasing temperature at the nozzle upon ignition of the burner flame, and additional means actuated by said increasing temperature allowing an increasing current of atmospheric air to envelope said thermal element and pass into the fire pot.
2. In a fuel burner construction including an electrically operated fuel feed having a thermostatically operated control actuated by the temperature at the burner nozzle, means subjecting the thermostatic control element to the increasing temperature at the nozzle upon ignition of the burner flame, and a thermostatically operated means actuated by said increasing temperature causing an increasing current of atmospheric air to pass about said thermostatic control element.
3. In a fuel burner construction including an electrically operated fuel feed having a control therefor provided with a thermostatic actuating element arranged adjacent the burner nozzle and upon ignition of the burner flame subjected directly to the variations in temperature thereof, means inclosing the other sides of said element, and a valve in said inclosure having thermostatically actuated means for operating said valve to cause an increasing current of air at atmospheric temperature to enter said inclosure and to envelope said control element in passing therethrough.
4. In a fuel burner construction including an electrically operated fuel feed having a control therefor actuated by a thermal element arranged adjacent the burner nozzle, an inclosure about said nozzle and element subjecting the element to the increasing tem-

perature at the nozzle upon ignition of the burner flame, a port in said inclosure having a valve normally closed, and means actuated upon ignition of the burner flame to gradually open said valve to cause an increasing current of air to enter said inclosure and envelope said control element in passing there-through.

5. In a burner construction including an electrically operated fuel feed having a control therefor actuated by a thermal element arranged adjacent the burner nozzle, an air conduit surrounding said nozzle, a port therein adjacent said nozzle having a valve normally closed and means actuated upon ignition of the burner flame to open said valve and allow an increasing current of air from the conduit to pass about and envelope said control element.

6. In a burner construction having an air conduit with a burner nozzle therein and an electrically operated fuel feed having a control actuated by a thermal element arranged adjacent said nozzle and separated therefrom, a housing about said element, and means upon ignition of the burner flame to induce the heat therefrom about said element and then pass a portion of the air from the conduit thereabout.

7. In a burner construction having an air conduit with a burner nozzle therein and an electrically operated means for feeding fuel to the nozzle and air to the conduit having a control therefor actuated by a thermal element exterior to the conduit adjacent the

nozzle, a housing about the thermal element adapted to subject the element to the increasing temperature at the nozzle upon ignition of the burner flame, a port in said conduit opening into said housing, a closure for said port and thermostatically operated means actuated by variations in temperature at the nozzle to actuate said closure to first subject the control element to the full heat of the burner flame and then divert a portion of the air from the conduit to pass about and envelope said element.

8. In a burner construction, an air conduit, a burner nozzle arranged adjacent the open end thereof, electrically operated means for feeding fuel to the nozzle and forcing air through said conduit having a thermostatically operated control therefor, the thermostatic element of the control arranged exterior of the conduit adjacent the nozzle, a housing about the element subjecting the element to the increasing temperature at the nozzle upon ignition of the burner flame, a port provided in the air conduit opening into the housing at the rear of the nozzle and thermal element, a pivoted closure for said opening, and a thermal coil arranged within the housing to swing said closure about its pivot to first subject the control element to the full heat of the burner flame and then direct a portion of the air from the conduit to pass about and envelope the control element.

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