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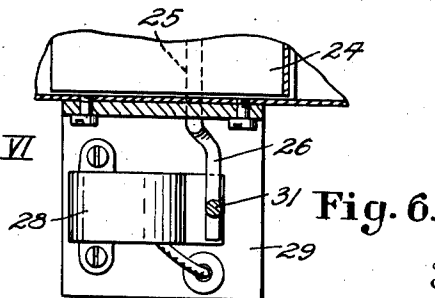
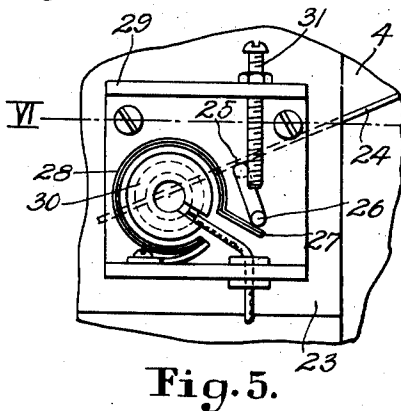
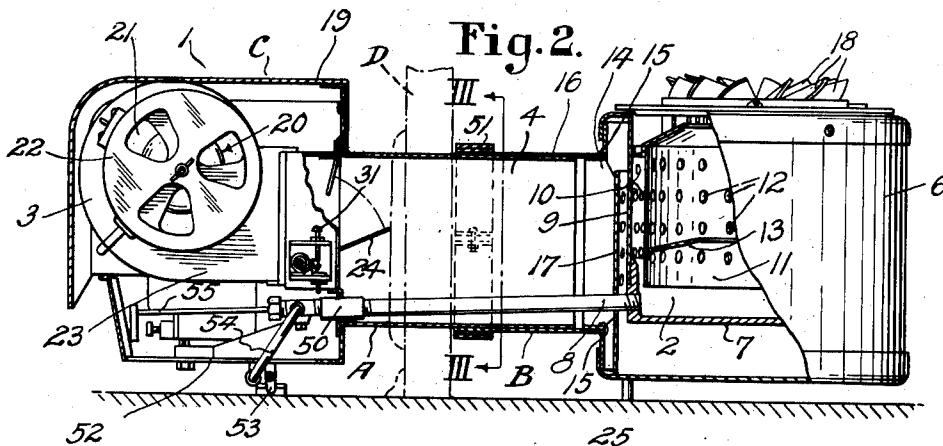
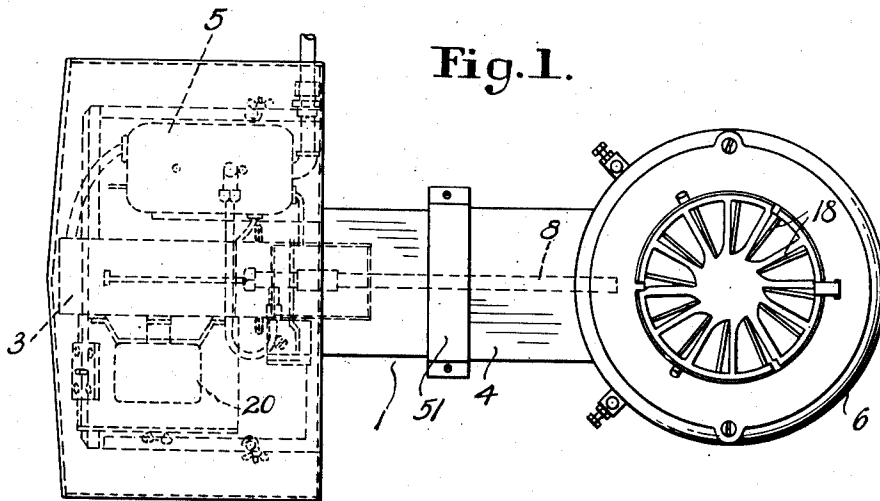
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2,594,062

OIL-FIRED CONVERSION BURNER

Filed Sept. 16, 1948

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

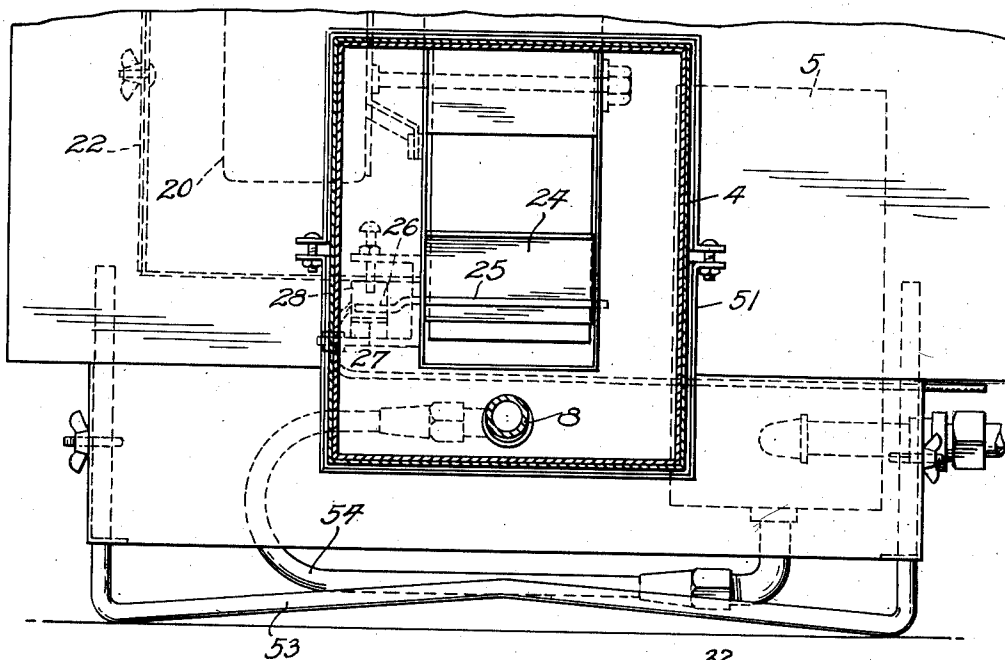


Fig. 3.

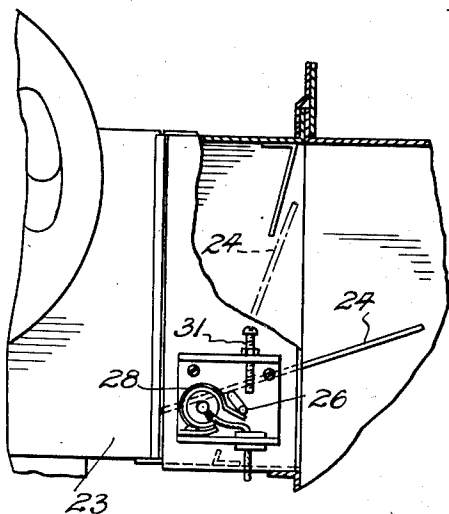


Fig. 4.

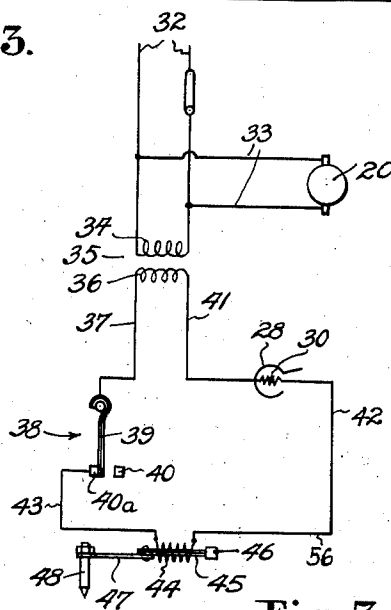


Fig. 7.

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OIL-FIRED CONVERSION BURNER

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2 Claims. (Cl. 158—91)

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This invention relates to oil-burning apparatus of the automatically controlled type, such as is used in connection with house-heating systems and the like. In its more specific aspects, the invention has particular reference to an oil-fired conversion burner utilizing a combustion vessel in association with thermostatically governed means for delivering oil at various rates of flow to the burner vessel to provide for high and low stages of combustion, together with co-operative means for delivering air to the vessel at differing flow rates in accordance with the demands of said stages in order to effect efficient carburetion and combustion of the oil supplied to the vessel, and wherein said burner is adapted for installation within ordinary types of furnaces originally designed for the burning of solid fuels.

An object of the invention is to provide an oil-fired conversion burner comprising a burner vessel adapted to be positioned in the fire box of a furnace, a blower-containing housing arranged exteriorly of the furnace, and a linearly adjustable air duct and fuel supply conduit extending between the burner vessel and housing for conducting combustion air and liquid fuel to the burner vessel, said duct and conduit being adjustable in their length dimensions to accommodate the burner to various types and sizes of furnaces.

It is another object of the invention to provide an oil-utilizing conversion burner for installation in furnaces originally intended for the burning of solid fuels, and wherein the conversion burner is simple, compact and closely organized in its construction, reliable and safe in operation, and easy and comparatively inexpensive to manufacture and to install within various types and sizes of solid fuel-burning furnaces.

Other objects and advantages reside in certain novel features of the construction, arrangement, and combination of parts, which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of the specification and in which:

Fig. 1 is a top plan view of an oil-consuming conversion burner formed in accordance with the present invention;

Fig. 2 is a vertical longitudinal sectional view taken through the burner, a portion of the oil-vaporizing vessel of the burner being shown in side elevation;

Fig. 3 is an enlarged vertical transverse sec-

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tional view taken through the telescopic duct of the burner on the plane indicated by the line III—III of Fig. 2;

Fig. 4 is a detail longitudinal sectional view, partly in side elevation, disclosing the automatic shutter control for the air outlet of the fan or blower;

Fig. 5 is a detail side elevational view on a larger scale than that of Figs. 2 and 4, and disclosing the thermostatic control for the air shutter;

Fig. 6 is a detail horizontal sectional view on the plane indicated by the line VI—VI of Fig. 5;

Fig. 7 is a diagrammatic view of the electrical circuits employed in the control of the burner.

In the drawings, the numeral 1 designates the oil-burning apparatus in its entirety. Essentially, this apparatus comprises a burner or vaporizing vessel 2, a motor driven fan or blower 3, an air-conducting conduit 4 between the outlet of the fan or blower and the air inlet of the burner vessel 2, a metering valve 5 for governing the flow of oil at different rates to the bottom of the vessel 2, and associated automatic control devices for use in connection with the fan or blower and the valve 5, as will be hereinafter described.

The vaporizing vessel is mounted in a cylindrical outer casing 6, and embodies a cast iron or alloy base 7 provided with a threaded opening for the reception of the inner end of an oil-delivering pipe 8. The entire vessel is adapted to be positioned in the lower part of the combustion chamber of a furnace originally designed for the burning of coal, the present invention providing a means whereby oil may be burned in such a furnace in lieu of coal, hence the use of the expression "oil-fired conversion burner" in generically describing burner apparatus of the type in which my improvement falls.

While I have shown a preferred type of vaporizing vessel in the accompanying drawings, it will be understood that the same constitutes but one of several different forms which may be employed, the burner vessel per se, as shown, forming no part of the present invention. As illustrated, however, the base 7 of the vessel includes an upstanding circumferential flange through which the oil pipe 8 projects. Above this flange, there is provided an outer wall 9 formed with a multiplicity of air ports or perforations 10. Supported concentrically within the outer wall 9 and in spaced relation therefrom is an inner wall or shell 11 having vertically spaced rows of perforations 12.

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Within the inner shell 11, there is also provided an annular baffle ring 13. The outer casing 6 is formed at one side with an opening 14 which is surrounded by a flange 15, the latter receiving the inner end of the outer section 16 of the telescoping air conduit 4. A perforated shield 17 may be arranged within the vessel in front of the opening 14 to provide for a distribution of air around the perforated outer wall 9 so that air under fan pressure will flow uniformly through the perforations 10 and also the perforations 12 and into the vaporizing zone of the vessel. Oil under regulated flow enters the bottom of the vessel and spreads out thereover in the form of a film or shallow pool, where it is subject to the heat of the burner, the oil vaporizing and passing upwardly through the inner shell 11, where air enters into admixture with the oil vapors and forms a highly combustible fuel mixture. When there is a demand for heat from the burner, active flame combustion takes place above the open top of the vessel in the combustion zone of the furnace. However, when the amount of oil entering the vaporizing vessel is restricted, to maintain what is known as a low-fire or pilot stage of combustion, flame is produced in the bottom of the vessel principally below the baffle ring 13. In the present instance, the open top of the vessel has been shown as provided with a series of angular and radially disposed blades 18, which deflect the combustible vapors as they emerge from the open top and impart thereto a swirling motion which shortens the height of flame propagation and tends to increase the diameter thereof, thus confining the flame more effectively in the combustion zone of the furnace. Combustion so produced heats the walls of the furnace, so that air under any suitable circulating system may pass over the exterior surfaces of such heated walls for delivery to the various rooms of a building in which the furnace is installed.

The air conduit 4 extends through the furnace to the exterior thereof, and at its outer end the conduit is joined with a housing 19 in which is situated the fan or blower 3, the electric motor 20 employed in driving the fan or blower, and the oil-metering valve 5. The casing of the fan or blower is provided with a multiplicity of air inlets 21, the effective area of which may be varied by a perforated rotatable disk 22. The air outlet 23 of the fan or blower casing carries a swing shutter 24, the latter being pivotally supported by a shaft 25 provided at one end with a crank extension 26. This extension is disposed in engagement with a laterally offset lip 27 provided on one end of a substantially circular bimetallic element 28 supported in connection with an adjustable bracket 29 carried by one of the side walls of the fan outlet. Disposed axially of the bimetallic element is an electrically energized heating coil 30. When this coil is energized and heat liberated therefrom, as will be presently explained, the element 28 flexes to cause the lip 27 to move downwardly, thus allowing the over-weighted or counterbalanced shutter to swing to a downward position, shown in full lines in Figs. 2 and 4, so that the shutter opens the air outlet of the fan providing for full delivery of the air to the burner vessel. When the bimetallic element 28 cools, the same flexes to move the lip 27 thereof upwardly to partially rotate the shutter 24 to a position in engagement with the stop shown at 31. When in this position of closure, there is a sufficient amount of air forced

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by the fan past the shutter to sustain pilot combustion, the fan or its motor being maintained in continuous operation.

As set forth in Fig. 7, conductors 32, connected with a source of electric current supply, have joined therewith conductors 33 which lead to the windings of the motor 20, which in the operation of the burner, is normally energized for continuous rotation, producing corresponding operation on the part of the associated fan or blower. The conductors 32 lead to the primary windings 34 of a step-down transformer 35, and the secondary windings 36 of this transformer are joined with a conductor 37 which leads to a room mounted thermostatic switch 38, the bimetallic element 39 of this switch oscillating between fixed contacts 40 and 40a.

Also leading from the secondary side of the transformer is a conductor 41 which leads to the heating coil 30 of the bimetallic element 28, and from the coil 30 a conductor 42 extends to the contact 40a of the room thermostat.

When the thermostat 38 is cool, or when there is a demand for heat, the free end of the element 39 thereof is maintained in engagement with the contact 40a and a conductor 43 leads from this contact to a resistance coil 44 which is arranged about a bimetallic warping bar 45, one end of the bar being fixed as at 46 while the other or free end thereof is connected by an extension bar 47 with a movable valve stem 48 forming a part of the metering valve 5.

When the coil 44 is energized, sufficient heat is liberated thereby to warp the bar in a direction moving the valve stem 48 to a position providing for the flow of oil from a source of supply, not shown, through the metering valve 5 and a pipe line 8 to the bottom of the burner vessel 2. The pipe line 8 is provided with a threaded union or coupling sleeve 50, similar to a turnbuckle having oppositely pitched internal threads at its respective ends threadedly connected with cooperatively threaded portions on the line 8, so that upon rotation of the sleeve 50 the effective length of the line 8 may be varied to adapt the same to the telescoping features of the air conduit or duct 4.

By reference to Fig. 2 particularly, it will be noted that this duct includes sections A and B, the former being carried by a housing C in which is contained the motor driven fan or blower unit and the fuel metering valve, the said housing being disposed exteriorly of the wall structure D of an associated furnace in which the burner vessel is disposed. A clamping band 51 surrounds the sections A and B to maintain their positions of relative adjustment. The housing C includes an opening 52 in the lower part of the front thereof for admitting air into the housing and the air inlets of the fan structure. Also, the housing carries a vertically adjustable yoke 53, which engages the floor of a furnace room to support the housing at a desired level.

The metering valve 5 has an outlet connected with a pipe 54 which extends to the inlet end of the pipe 8. Also, the inlet end of the pipe 8 is provided with a slidable stem 55 for pipe-cleaning purposes.

The heating coil 44 is joined by a conductor 56 with the return side of the secondary circuit of the transformer 35. When the switch 39 is in engagement with the contact 40a, the coil 30 is energized to produce heat and open the valve shutter 24. With the shutter in its lowered or open position, air from the fan or blower is de-

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livered to the burner vessel in volumes adequate to produce peak combustion of fuel in and above the burner vessel.

In view of the foregoing, it will be seen that the present invention provides in an oil-fired conversion burner an improved automatic shutter control which functions in combination with a continuously running motor driven fan or blower to deliver air to an associated burner vessel in quantities to produce peak or high stage combustion. When the demand for such combustion is satisfied, the heat motor, as represented by the bimetallic element 23 and its heater 30, serves to return the shutter to its position of closure, arresting high volume delivery of forced air to the burner vessel, so that low stage or pilot combustion of the fuel will take place between the intermittent periods of high stage combustion. The shutter thus offers safety devices in the operation of such automatic oil burners.

Another feature of value in applicant's invention resides in the employment of the telescopic conduit or duct construction indicated at 4 by which the units of the burner arranged interiorly and exteriorly of a furnace may be relatively disposed in proper spaced relationship, adapting the burner to furnaces of different configurations and dimensions.

While I have described what I consider to be a preferred form of my invention, it will be apparent that other equivalent constructions may be used without departing from the spirit and scope of the following claims.

I claim:

1. In a fluid fuel-burning conversion burner for furnaces, a burner vessel for insertion within a furnace; a casing disposed around said vessel; an air-admitting duct communicating with said casing and extending a distance outwardly therefrom and providing for the admission of combustion air to said vessel; a second duct slidably and telescopically connected at one end with said air-admitting duct and forming a continuation of the latter, a housing connected with and supporting the opposite end of said second duct and adapted to be arranged exteriorly of the furnace; a blower carried in said housing and having a discharge outlet connected with said second duct and operable to force air through said second duct,

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said air-admitting duct and into said casing; adjustable clamp means connected with one of said ducts for preventing movement relative to the other of said ducts; a fuel supply conduit connected with said burner vessel and extending through said ducts for conducting fuel to said vessel; and means connected intermediately of said conduit means for varying the effective length thereof.

2. In a liquid fuel-burning conversion burner for furnaces, a burner pot for insertion within a furnace; a casing partially surrounding said burner pot; a first duct communicating at one end with said casing and extending laterally outwardly therefrom; a second duct slidably and closely fitting the outer end portion of said first duct and providing a longitudinal continuation of the latter; a housing connected with and supporting the end of said second duct opposite the end thereof connected with said first duct and adapted to be positioned exteriorly of a furnace in which said burner pot is positioned; a motor-driven blower carried in said housing and having a discharge outlet communicating with said second duct and operable to force air through said first and second ducts and into said casing for supplying combustion air to said burner pot; means connected with at least one of said ducts and adjustable to prevent relative movement between said first and second ducts; a fuel supply conduit extending through said ducts and connected at one end with said burner pot for supplying fuel thereto; and means disposed intermediately of said conduit for increasing or decreasing the length thereof within said ducts.

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