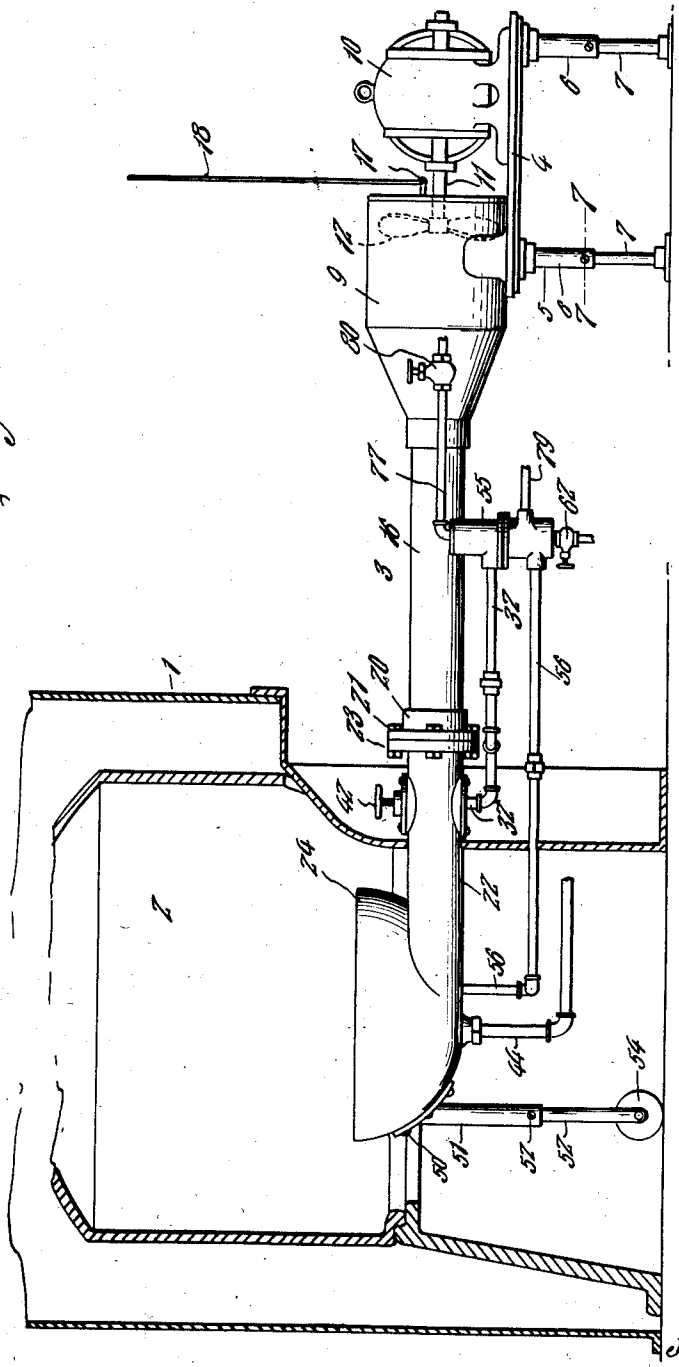
May 15, 1928. 1,670,274

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BURNER

Original Filed April 7, 1926 4 Sheets-Sheet 1



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Original Filed April 7, 1926 4 Sheets-Sheet 2

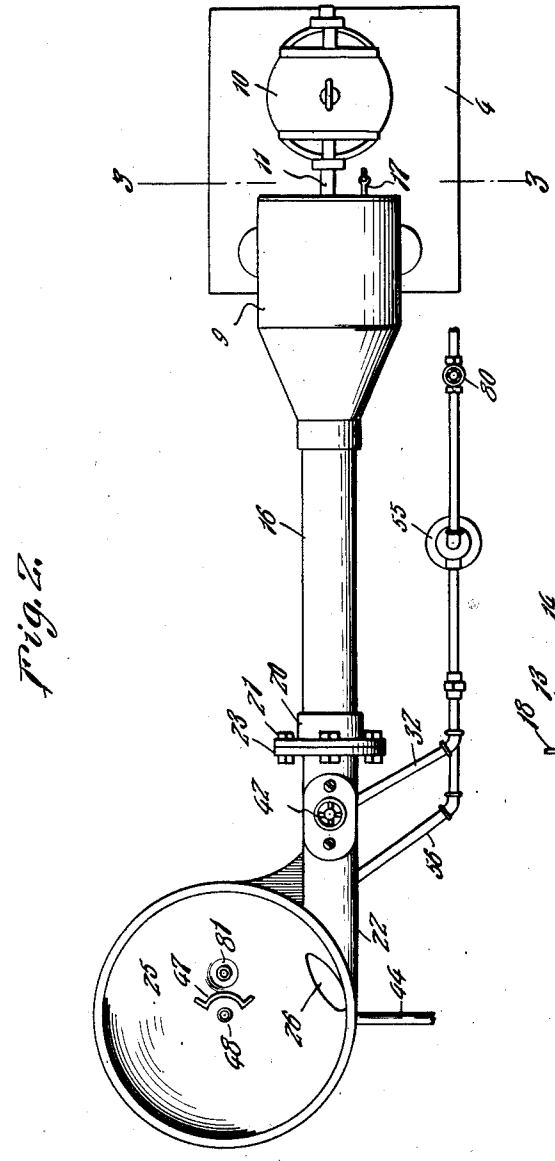


Fig. 2.



Fig. 1.

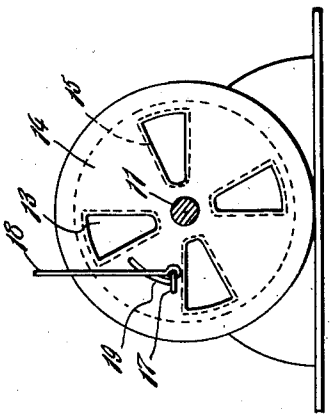


Fig. 3.

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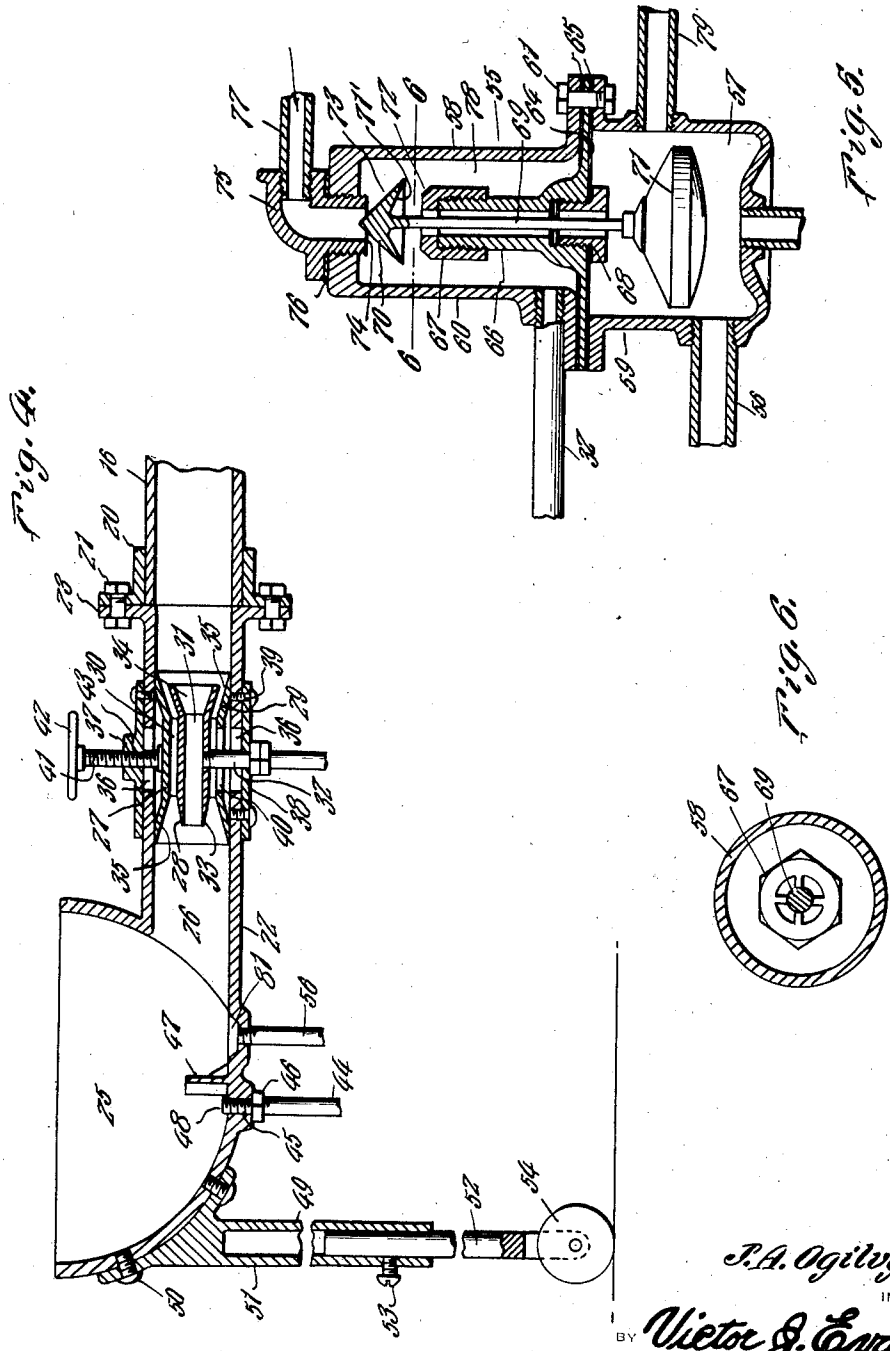


Fig. 6.

Fig. 9.

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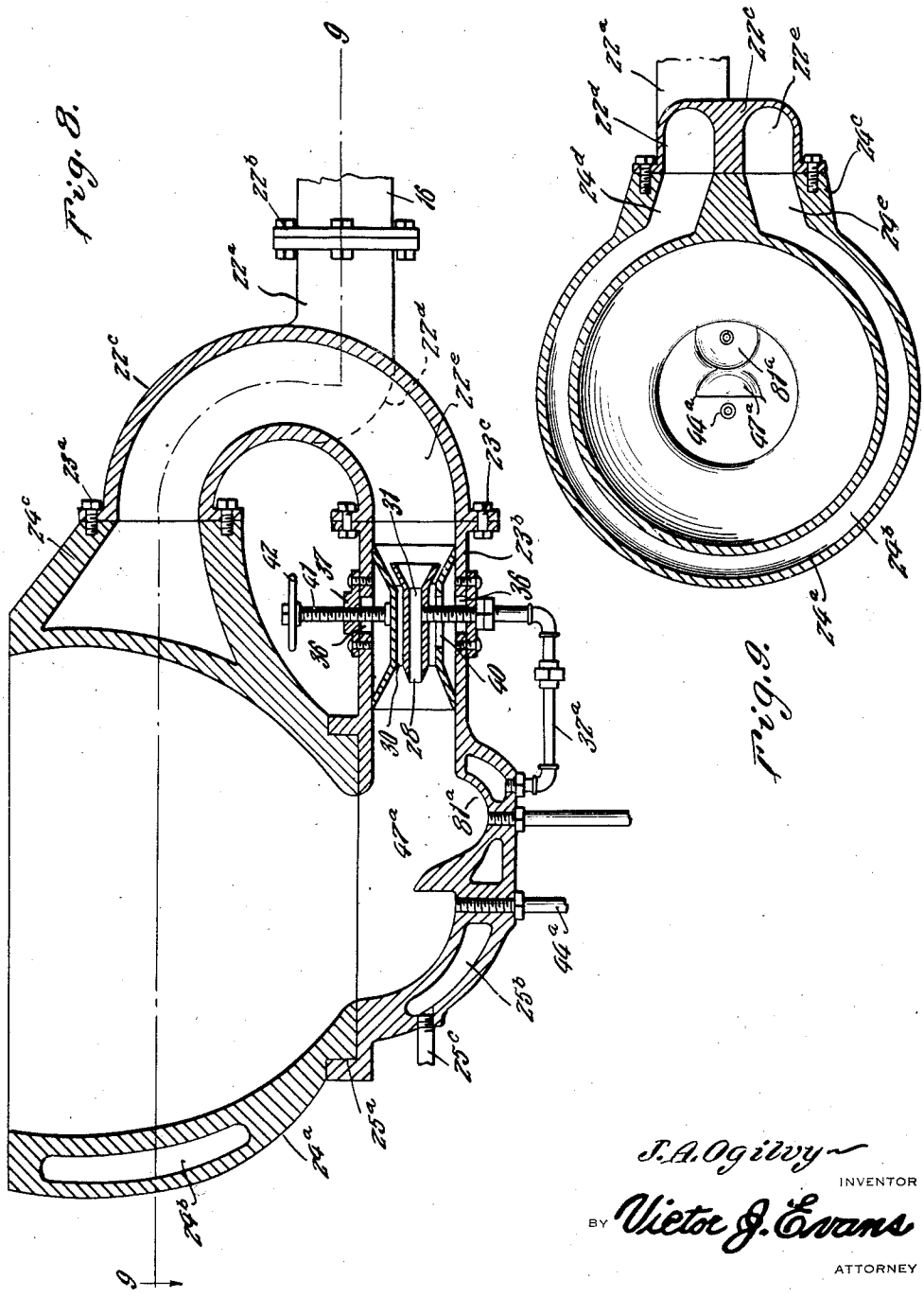


Fig. 8.

Fig. 9.

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UNITED STATES PATENT OFFICE.

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BURNER.

Application filed April 7, 1926, Serial No. 100,378. Renewed March 12, 1928.

The purpose of the present invention is to provide, in a fuel oil burner of the type for installation within furnaces, means for atomizing the fuel such as oil, together with air, into a combustion chamber, the combustion chamber being a part of the burner and adapted for location within the fire box of the furnace.

Another purpose is to provide means for location in the fuel pipe and including an adjustable element for insuring the proper proportions of primary and secondary mixtures of the fuel for the purpose of attaining the best possible combustion in the chamber.

A still further purpose is to provide means actuated by a flood of fuel or oil in the combustion chamber, in case the blaze from the combustion of the fuel in the chamber extinguishes, said means in turn actuating a valve for closing off the flow of oil.

A further purpose is to provide adjustable supporting legs affording a substantial advantage in placing the combustion chamber of the burner in proper position where it will produce the best results according to the type and size of furnace in which the burner may be installed.

It is to be understood that the particulars herein given are in no way limitations, and while still keeping within the scope of the invention, any desired proportions may be made in the apparatus according to circumstances.

The invention comprises further features and combinations of parts as will be hereinafter set forth, shown in the drawings and claimed.

In the drawings:

Figure 1 is a view in section of the lower part of a conventional type of furnace, showing its fire box, and illustrating in side elevation the application of the improved fuel oil burner.

Figure 2 is a plan view of the fuel oil burner.

Figure 3 is a sectional view on line 3—3 of Figure 2.

Figure 4 is a sectional view of the fuel pipe or duct, showing the atomizing device therein, and also illustrating the fire-pot and one end of the pipe or duct.

Figure 5 is a sectional view through the means for automatically shutting off the fuel or oil, in case the fire-pot of the burner floods.

Figure 6 is a sectional view on line 6—6 of Figure 5.

Figure 7 is a sectional view on line 7—7 of Figure 1.

Figure 8 is a sectinal view through a modified construction of fuel oil burner for installation within a furnace.

Figure 9 is a sectional view on line 9—9 of Figure 8.

Referring to the drawings, 1 designates a conventional type of furnace, the lower part of which is shown in section in Fig. 1, and 2 denotes the fire box, and 3 the fuel oil burner as a whole.

The fuel oil burner includes a suitable support 4 in the form of a bench provided with legs 5, each of which consists of two sections 6 and 7, the sections 6 being rigid with the bench 4, while the sections 7 are adjustable telescopically within the sections 6 and held in different positions by means of screws 8. In other words, the legs are capable of adjustment to position the burner relative to the furnace according to the type in which the burner is to be installed.

The bench supports a conventional fan housing 9, and a motor 10, that is of an electric type. The shaft 11 of the motor carries a fan 12, and it will be noted that the larger end of the housing 9 is provided with a plurality of shutter openings 13 and a shutter 14, which is capable of rotating on the shaft 11, for positioning the shutter, whereby the openings 15 of the shutter may be moved in and out of register with the openings 13 of the end of the fan housing, for the purpose of regulating the amount of air to be drawn into the housing and injected into and through the air flue or pipe 16. The shutter 14 has a projection provided with an eye 17, to which a rod or the like 18 is connected. The projection passes through an elongated arcuate slot 19 formed in the end wall of the fan housing, the slot and the projection acting to limit the shutter in different positions according as it may be operated. The shutter may be operated either by hand or thermostatically for the purpose of regulating the supply of air into the fan housing.

The air duct or pipe 16 has a flanged collar 20, which is bolted or otherwise secured at 21 to an extension 22 of the air duct or pipe. In fact, the extension has an integral collar 23, to receive the bolts 21. It is possible to disassemble the air duct by removing the bolts, either for the purpose of repairs

or for the purpose of accommodating the burners to different types of furnaces.

The extension 22 of the air duct merges into a bowl 24, which may be of any size and shape, preferably as shown, and this bowl has a combustion chamber 25 with which the air and fuel duct communicates. The extension 22 of the air duct has a mixing chamber 26, and located in this chamber is an improved atomizer 27. The atomizer 27 comprises a pair of tubes 28 and 29, the former being located and spaced within the latter, the space between the two acting to permit of the passage of air therethrough, while a passage 31 formed through the tube 28 permits of the passage of the mixture of oil. In fact, a supply of oil is allowed to enter the passage through the pipe 32. The tube 28 has its exterior at one end tapered as at 32, while its opposite end terminates in a funnel shaped mouth 34. The opposite ends of the tube 29 are constructed funnel shaped as indicated at 35. The funnel 34 corresponds to and is located within one of the funnel ends 35 of the tube 29. The extension 22 has its wall provided with upper and lower slots 36, which are closed by the upper and lower plates 37 and 38, which are secured by screws or the like 39 to the extension 22. The pipe 32 passes through the lower plate 38, and is threaded into the wall of the inner tube 28 of the atomizer, the pipe 32 passing through the openings 36 in the wall of the extension 22. The wall of the tube 29 also has a slot 40 for the reception of the pipe 32, permitting the pipe to be connected to the inner tube 28. A retaining screw 41 provided with a hand-wheel 42 is threaded through the upper plate 37, and has a foot 43 at its lower end, bearing upon the wall of the tube 29, for the purpose of holding the tube in different positions. In other words, by adjusting the tube 29 in one direction, its funnel end 35 may be adjusted relative to the adjacent funnel end 34 to restrict the passage between such two funnel ends. By adjusting the tube 29 in the opposite direction, the passage or space between said funnel ends may be increased, allowing the greater quantity of air to pass between the two tubes. The oil enters the tube 28, and a supply of air also passes through the tube 28, and tends to lap or pick up the oil and atomize it through the extension 22, where it communicates with the combustion chamber 25 of the fire-pot or bowl 24. The air passing on between the two tubes will mix with the oil and air which passes through the tube 28, and tend to further volatilize the oil and thereby produce the proper mixture to enter the chamber 25.

A suitable gas line 44, from any source of supply is threaded into the wall of the fire pot or bowl 24, as at 45, there being a suitable lock nut 46 to hold the pipe in position. Rising from the bottom of the chamber 25 is a shield or deflector 47. The outlet 48 of the gas line or pipe 42 is in the form of a small orifice, to provide for a pilot light, and the shield constitutes a guard for the pilot. In fact, the mixture in passing into the combustion chamber 25 is deflected upwardly by the shield 47, thereby preventing the pilot from being extinguished.

The bowl or fire-pot of the burner has a supporting leg 49, which is secured by screws 50 to the wall of the bowl, and this leg comprises the two sections 51 and 52, the latter telescopically entering the former and may be held in different positions by the screw 53. The section 52 of this leg carries at its lower end a roller or wheel 54, so that the burner proper is portable from one place to another. In other words, the burner is capable of being placed in a combustion chamber where it will produce the best results according to the type or size of furnace in which the burner may be installed.

An automatic control for the oil is provided. This control is designed to operate to shut off the flow of oil to the atomizer and mixing chamber, through the medium of a flood of oil in the combustion chamber of the fire-pot or bowl of the burner. In other words, in case the fire or flame rising from the combustion chamber 25 extinguishes, the oil will flood the chamber 25, and will therefore back-flow through a pipe 56 into a float chamber 57 of the control, and thereby operate the control to shut off the supply of oil to the atomizer and mixing chamber.

The control 55 comprises a casing 58 consisting of two sections 59 and 60, bolted together as at 61. The section 59 has the float chamber 57, there being a suitable drain cock 62 connected to the bottom of the chamber, for draining off the excessive back-flow of the oil.

A disk or plate 64 is clamped between the two sections 58 and 59, there being suitable packing 65, to insure a tight joint. Rising from the plate is an upstanding tube 66 provided with a cap 67 at its upper end, and a sleeve 68 at its lower end. The sleeve 68 is threaded into the base of the tube 66, which constitutes a guide for the valve stem 69, which carries a valve 70 at its upper end and a float 71 at its lower end. The valve 70 is of conical form, and its under conical face 71′ engages with the valve seat 72 formed on the cap 67, while the exterior conical face 73 cooperates with a valve seat 74 formed on one end of an elbow 75. The end of the elbow having the valve seat 74 is threaded into the upper end of the section 58 of the control 55. A suitable packing 76 is interposed between the elbow end face and the section 58 of the control. An oil feed pipe 77 from any suitable supply tank (not

shown) is connected to the elbow 75 for the purpose of supplying oil to the chamber 78 of the control. The valve 70 normally engages with the seat 72, that is as long as the oil is properly feeding, and the fire or flame rising from the combustion chamber 25 has not extinguished. A suitable air relief pipe 79 is threaded into the wall of the section 59 of the control 55. This air relief pipe is designed to be connected to the supply tank (not shown) at a point above the oil level. The oil feed pipe 77 has a suitable manually controlled valve 80, for controlling the supply of oil to the control 55.

In the operation of this improved fuel oil burner, observation will show that oil from any suitable source of supply, preferably a tank, will enter the control 55 through the pipe 77, as indicated by the arrow in Fig. 5. The oil will flow into the chamber 78 and then through the pipe 32 to a level substantially flush with the bottom of the interior surface of the inner tube 28 of the atomizer. This level should correspond to the level of the oil in the chamber 78, the valve 80 being set to assist in preventing the oil exceeding such level. Some suitable automatic control (not shown) may be employed to insure regularity of such level. The oil will flow slowly into the inner tube 28 and spread in a thin sheet over the lower surface of the passage 31. The atomizer having been adjusted as required, the air through the air duct 16 will pass through the atomizer and atomize or spray the oil into the combustion chamber 25, where it is ignited through the medium of the pilot.

As the fire-pot or bowl 24 heats up, the extension 22 and a portion of the air duct are likewise heated, tending to vaporize the oil and thereby create a proper combustible fuel.

In case the fire or flame in the fire-pot 25 extinguishes, and the combustion chamber 25 floods, the oil will enter the pipe 56 and then into the float chamber 57. When the level of oil in the chamber 57 reaches a height sufficient to move the float 71 to close the valve 70 against its seat 74, the oil in its flow into the chamber 78 will be shut off. The drain cock 62 may be opened to drain off the oil from the float chamber 57. This drain may continue until the level of oil in the chamber 57 reaches a proper level corresponding to the level of oil in the pipe 32 adjacent the lower inner surface of the passage 31 of the atomizer.

Where the pipe 56 communicates with the bottom of the combustion chamber 25, a shallow oil pit 81 is provided, where a small quantity of oil may be deposited, when first starting the burner.

While it is the purpose to utilize the air direct from the fan 12, as in Figures 1 to 7, inclusive, it is very essential in connection with this invention to provide means for preheating the air before it enters the combustion chamber 25, thereby producing a superior combustion of fuel and hence creating greater heat for the furnace.

In order to carry out this scheme the bowl 24^a in Figure 8 has its wall hollow, thereby affording an annular chamber 24^b. The bowl has an extension 24^c provided with ports 24^d and 24^e. The extension 22^a, which corresponds with the extension 22 in Figures 1 to 7, is bolted at 22^b to the air flue or pipe 16, Figure 8. This extension 22^a is in the form of a casting and is provided with a semicircular head 22^c provided with two semicircular passages 22^d and 22^e, the former of which communicates with the passage of the extension 22^a, so that air from the fan may enter the extension 22^a, pass through the passage 22^d and into the chamber 24^b. The air circulates around the annular chamber 24^b and then passes through the port 24^e, then through the passage 22^e and thence to the atomizer 27. The air in taking this course, that is, after leaving the fan, is preheated, consequently when it reaches the atomizer combustion of the fuel is facilitated. The head 22^c is bolted at 23^a to the extension 24^c, and also to a casing 23^b, as shown at 23^c. In the device shown in Figure 8 the casing 23^b plays the same part as the extension 22, in so far as providing for the construction and the application of the atomizer, and the adjustability of the tubes 28 and 29, which constitute the essential element of the atomizer.

The casing 23^b in Figure 8 is in the form of a casting, and is separably united to the lower portion of the bowl 24^a as shown at 25^a. The end of the casing 23^b constitutes the bottom or lower section of the bowl, and is hollow, hence being provided with an oil chamber 25^b with which an oil pipe 25^c from the control 55 may communicate. In this way the oil enters the chamber 25^b and is preheated prior to its flow to the atomizer through the medium of the pipe 32^a. This pipe in Figure 8 plays practically the same part as the pipe 32 in Figures 1 to 7, the only exception being that the pipe 32^a instead of connecting direct with the control 55, connects with the chamber 25^b, so that after the oil is preheated it may be conducted to the atomizer, which with the preheated air insures a superior mixture or combustible fuel, which is injected into the bottom of the fire-pot.

In Figure 8 the end portion (which has the chamber 25^b) of the casing 23^b is provided with an oil pit 81^a, and a shield 47^a, there being a gas line 44^a connecting with the bottom of the combustion chamber at a point adjacent the shield. Otherwise the

construction shown in Figure 8 functions the same as the construction in Figures 1 to 7, inclusive.

The invention having been set forth, what is claimed is:

1. In a burner device, a combustion bowl having a duct leading into the lower portion thereof, means for supplying air along said duct, a tubular member located within the duct and having both ends flaring outwardly, a second tubular member located within and spaced from the walls of said first named tubular member and having a flaring entrance end normally spaced from the adjacent flaring end of the first named tubular member, means for conducting fuel into said second named tubular member at the intermediate portion thereof, and means for adjusting the tubular members relatively.

2. In a burner device, a combustion bowl having a duct leading into the lower portion thereof, means for supplying air along said duct, a tubular member located within the duct and having both ends flaring outwardly, a second tubular member located within and spaced from the walls of said first named tubular member and having a flaring entrance end normally spaced from the adjacent flaring end of the first named tubular member, means for conducting fuel into said second named tubular member at the intermediate portion thereof, and means for adjusting said first named tubular member longitudinally of the first named tubular member to vary the space between the flaring end of the former with respect to the adjacent flaring end of the latter.

3. In a burner device, a combustion bowl, a duct leading thereinto near the lower portion thereof, means for producing a blast of air along said duct, an atomizing device located within the duct adjacent its point of communication with the bowl, a fuel feed pipe leading to said atomizing device, and a control mechanism interposed between a main fuel supply and said feed pipe and including a casing divided into upper and lower chambers each having an inlet pipe and an outlet pipe, a valve located within the upper chamber and adapted to close the discharge end of the inlet pipe thereto, and a float on said valve located within the lower chamber for controlling the position of the valve, a connection between the bottom of the bowl and the float chamber, whereby upon flooding of the bowl said valve will cut off the fuel supply to the control device, said duct having a portion extending peripherally about the bowl to effect preheating of the air conducted to the atomizing means.

In testimony whereof I affix my signature.

JAMES ADAMS OGILVY.