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G. D. FRANK

2,285,704

IGNITION ASSEMBLY

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FIG. 1.

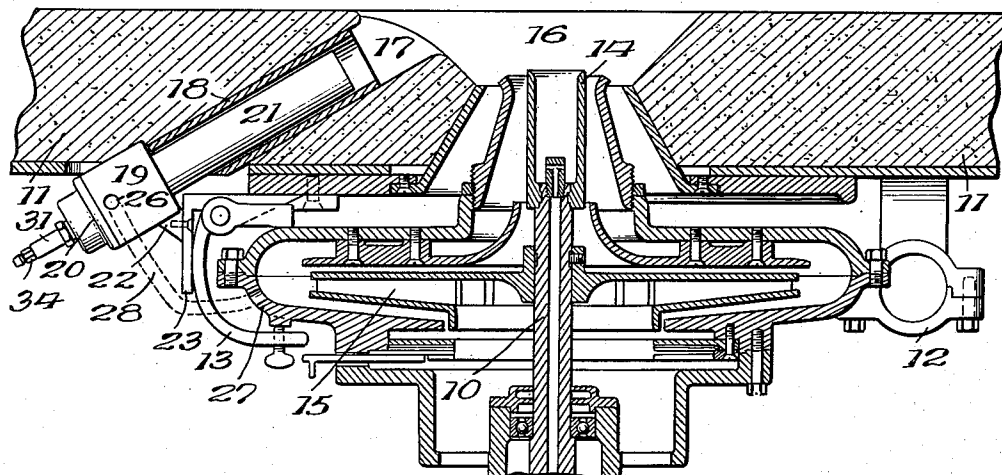


FIG. 2.

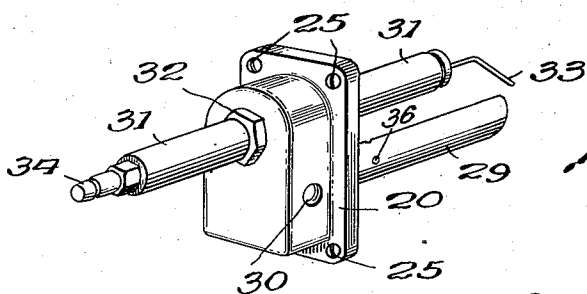
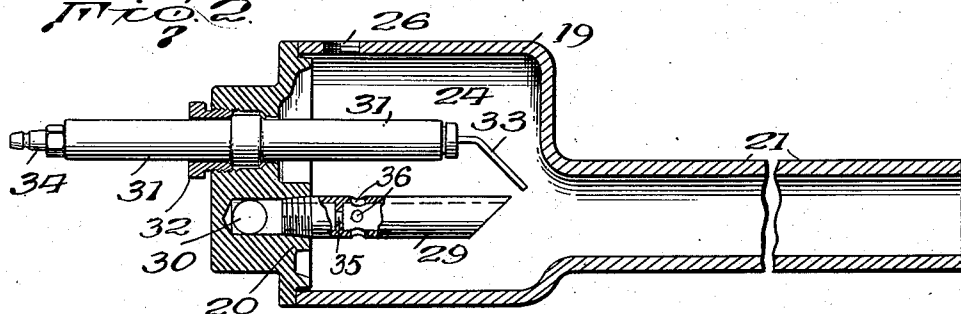


FIG. 3.

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## UNITED STATES PATENT OFFICE

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## IGNITION ASSEMBLY

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7 Claims. (Cl. 158—28)

This invention relates to ignition apparatus for liquid gaseous, or powdered fuel pressure burners, and more particularly to a gas-electric torch-type igniter especially suitable for horizontal rotary oil burners. Although the embodiment of the invention described herein is illustrated in connection with a particular form of oil burner, it is to be understood that the ignition apparatus is readily adaptable to cooperate with any form of pressure burner in any type of furnace construction.

It is an object of this invention to provide an igniter which is designed to direct a hot ignition flame against an atomized oil and air or other combustible mixture as the mixture is projected from burner apparatus into the combustion chamber of a furnace.

It is the further object of this invention to provide a torch-type igniter which is completely closed to the outside atmosphere, thereby preventing all possibility of a flare or puff-back through the igniter from the combustion chamber to the outside of the furnace.

Another object of this invention is to provide an economical igniter of the gas-electric type for intermittent operation on manufactured, natural, bottled or any other gas supply, and which requires no continuously burning pilot light.

It is a further object of this invention to provide a torch-type igniter apparatus which will be continually purged by a current of fresh air during the operation of the main burner to prevent fouling and/or overheating of the igniter parts by the combustion gases prevailing in the furnace chamber.

It is a further object of the invention to provide an igniter construction which may be easily disassembled for inspection and adjustment, and which has a minimum number of parts and is economical to manufacture and install.

Other objects and advantages of this invention will be apparent from the following description of the embodiment of the invention illustrated in the accompanying drawing in which:

Figure 1 is a plan view, partly in section, showing one method of installing my improved ignition apparatus in the front wall of a furnace adjacent a horizontal type rotary oil burner.

Figure 2 is a vertical section view of the igniter construction.

Figure 3 is a perspective view of the igniter elements removed from the igniter housing for inspection and/or adjustment.

Referring to Figure 1 of the drawings, a hori-

zontal rotary oil burner is indicated generally by the numeral 10. The burner is usually pivotally mounted on the front wall 11 of a furnace in a conventional manner by hinge 12 and clamp 13. The burner 10 is provided with a rotary oil cup 14 and a centrifugal fan 15 for projecting a combustible mixture of atomized oil and air into the entrance 16 of a furnace combustion chamber. The ignition apparatus is mounted partly within a passage 17 through or in the furnace wall 11, and a lining 18 may be provided for the walls of passage 17. The ignition apparatus comprises a housing 19 having a closure or end plate 20 outside of the furnace wall and adjacent the oil burner 10 and may include a tubular portion 21 extending into the passage 17. The housing 19 is conveniently supported by a bracket 22 secured to an angle plate 23 on the front wall of the furnace.

The ignition housing 19, shown in section in Figure 2, is provided with a tubular or nozzle-like portion 21 to be directed toward the entrance to the combustion chamber of the furnace. An appropriate relationship of ignition and burner is illustrated in Figure 1. The tubular portion may extend into or to the combustion chamber, or it may terminate short of the combustion chamber entrance at any point in passage 17. Obviously, the nozzle portion 21, as well as the passage 17, may be of any desired cross-section, a circular cross-section being preferred. A somewhat enlarged chamber 24 is provided at the opposite or outer end of housing 19, and is closed by a removable end plate 20 secured to the housing 19 by screws 25 or the like. One wall of the chamber 21 is provided with an air inlet 26 which may be connected to any suitable source of air under pressure, but preferably is connected to the main burner fan casing 27 by a suitable conduit 28 (shown diagrammatically in dotted lines in Figure 1) for supplying air under pressure to the interior of the igniter assembly. A gaseous fuel inlet in the form of a nozzle 29 is carried by the end plate 20 and is connected through inlet 30 by conventional conduits and valves to any available supply of manufactured, natural or bottled gas. The end plate 20 also carries the high tension insulating bushing 31 held by nut 32 and supporting a spark gap electrode 33 adjacent the tip of the gase nozzle 29. The electrode 33 is intended to be connected through terminal 34 to a transformer or other suitable source of high potential electricity.

In installations utilizing natural gas of high B. t. u. content as igniter fuel, it is desirable to

provide nozzle 29 with an orifice 35 and air holes 36, as shown in section in Figure 2. In such construction, air is mixed with the gaseous fuel within the nozzle 29, and thus a readily ignitable mixture is delivered at the beveled tip of the nozzle.

As illustrated in Figure 3, the end and plate 20 is easily removable from the ignition housing for inspection, adjustment, or cleaning of the gas inlet nozzle 29 and the spark electrode 33.

The operation of the above-described ignition apparatus is as follows: When it is desired to operate the main burner 10, the burner motor is started either manually or thermostatically by conventional controls. Operation of the main burner fan 15 supplies air to the combustion chamber and also conveniently supplies air to the ignition housing through any suitable conduit 28. The igniter is also manually or automatically started by admitting gas to the nozzle 29 and electric current to produce a spark between the electrode 33 and the tip of the nozzle. The gas is ignited at the tip of the nozzle 29, and the flame is carried or blown to the combustion chamber end of passage 17 by means of the air current flowing through the igniter housing. The igniter produces a hot blow-torch flame at the combustion chamber end of passage 17. The main oil supply is then turned on and the combustible mixture of oil and air, or the like, projected by the burner into the combustion chamber is at once ignited by the hot intense flame supplied by the igniter. The supply of gas and electricity to the igniter may then be discontinued and the igniter thereby extinguished. However, a current of air under pressure is continuously supplied to and passes through the igniter housing during operation of the main burner.

Since the housing 19 including enlarged chamber 24 is closed by end plate 20, there is no possibility of puff-back or flare-back from the combustion chamber through the igniter housing to the outside of the furnace. The continual current of fresh air passing through the igniter chamber and housing during operation of the main burner purges and cools the igniter and maintains at all times in readiness for relighting. The air current also serves to prevent combustion gases from entering the igniter housing from the furnace combustion chamber, and thereby eliminates overheating, burning, or fouling of the igniter parts. Since gas is supplied to igniter nozzle 29 only during the main burner starting operation, there is no continuously burning pilot flame, and hence gas consumption is minimized. In the event of failure of the main burner fan to operate when the burner is started, the igniter gas supply will be lighted, but it will burn with only a small flame at the tip of gas nozzle 29, and hence not effective to cause ignition in the furnace combustion chamber until the main burner fan operates satisfactorily. A further advantage of the above-described igniter construction is the fact that the spark gap being in a closed chamber is adequately protected from mechanical injury as well as from heat and corrosion.

Other advantages of my improved apparatus will be readily apparent from the above description of an embodiment thereof. Obviously, variations in the nature and arrangement of the elements described will be evident to those skilled in this art, and this invention contemplates any

equivalent structure within the scope of the following claims.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. In ignition apparatus for blowing an igniting flame against a combustible mixture within a furnace combustion chamber, the combination comprising a furnace having a combustion chamber and a burner for supplying a combustible mixture thereto, a housing closed to the atmosphere outside of the furnace and supported adjacent the said burner, said housing communicating through an elongated passage with the combustion chamber; a gaseous fuel nozzle within the housing and having its discharge end remote from the combustion chamber end of the said passage, a spark electrode within said housing and having its sparking end located adjacent the discharge end of said gaseous fuel nozzle, and means for supplying air under pressure above atmospheric pressure to the said housing whereby at starting the ignited gaseous flame is blown through the elongated passage and is projected as a blow-torch flame against the combustible mixture within the combustion chamber.

2. In ignition apparatus for blowing an igniting flame against a combustible mixture within a furnace combustion chamber, the combination comprising a furnace having a combustion chamber and a burner for supplying a combustible mixture thereto, a housing closed to the atmosphere outside of the furnace and supported adjacent the said burner, said housing communicating through a passage with the combustion chamber and having an inlet for the admission of gaseous fuel at a point remote from the combustion chamber end of said passage and aligned with said passage, a spark electrode within said housing adjacent the gaseous fuel inlet for the ignition of gaseous fuel at said inlet, and means for supplying air under pressure above atmospheric pressure into said housing whereby the ignited gaseous fuel flame and fresh gaseous fuel are blown through said passage and projected at the end thereof as a blow-torch flame against said combustible mixture.

3. In ignition apparatus for blowing an igniting flame against a combustible mixture within a furnace combustion chamber, the combination comprising a furnace having a combustion chamber and a burner for supplying a combustible mixture thereto, a housing closed to the atmosphere outside of the furnace and supported adjacent a burner, said housing having an enlarged portion remote from said combustion chamber and in communication therewith through an elongated passage, a gaseous fuel nozzle within the enlarged portion of said housing, a spark electrode also within the enlarged portion of said housing and having its sparking end adjacent the discharge end of said gaseous fuel nozzle for the ignition of said gaseous fuel at the tip of said nozzle, and means for supplying air under pressure above atmospheric pressure into the enlarged portion of said housing whereby the ignited gaseous fuel and fresh gaseous fuel are blown through said elongated passage and projected at the end thereof as a blow-torch flame against said combustible mixture.

4. In ignition apparatus for blowing an igniting flame against a combustible mixture within a furnace combustion chamber, the combination comprising a furnace having a combustion chamber, a burner for supplying a combustible mixture thereto, and an elongated passage ex-

tending through the furnace wall adjacent the burner and opening into the said combustion chamber, means removably secured to said furnace for closing said passage to the atmosphere outside the furnace, a gaseous fuel nozzle carried by said means and having its discharge end in communication with said passage, a spark electrode carried by said means and having its sparking end located adjacent the discharge end of said gaseous fuel nozzle for the ignition of said gaseous fuel at the tip of said nozzle, and means for supplying air under pressure above atmospheric into said passage whereby at starting the ignited gaseous flame is blown through said passage and projected as a blow-torch flame against said combustible mixture.

5. In ignition apparatus for blowing an igniting flame against a combustible mixture within a furnace combustion chamber, the combination comprising a furnace having a combustion chamber and a burner for supplying a combustible mixture thereto, a housing supported adjacent the said burner and communicating through a passage with the combustion chamber, means removably secured to the end of said housing remote from said combustion chamber and closing said housing to the atmosphere outside of the furnace, a gaseous fuel nozzle within said housing and carried by said closure means, a spark electrode within said housing adjacent the discharge end of said nozzle and carried by said closure means for the ignition of said gaseous fuel at the tip of said nozzle, and means for supplying air under pressure above atmospheric into said housing whereby the ignited gaseous fuel and fresh gaseous fuel are blown through said passage and projected as a blow-torch flame against said combustible mixture.

6. Ignition apparatus for blowing an igniting flame against a combustible mixture within a furnace combustion chamber, comprising in combination a furnace having a combustion chamber and a burner for supplying a combustible mixture thereto, a housing supported adjacent the said burner, said housing consisting

of an enlarged portion remote from said combustion chamber, an elongated tubular portion providing communication between said enlarged portion and said combustion chamber, and a closure member removably secured to said enlarged portion for closing said housing to the atmosphere outside of the furnace, a gaseous fuel nozzle within the enlarged portion of said housing, said nozzle being carried by said closure member with its discharge end aligned with said tubular portion, a spark electrode within the enlarged portion of said housing, said electrode being carried by said closure member and having its sparking end adjacent said nozzle for the ignition of said gaseous fuel at the discharge end of the nozzle, and means for supplying air at pressure above atmospheric into the enlarged portion of said housing, whereby the ignited gaseous fuel is blown through said elongated tubular portion and projected as a blow-torch flame against said combustible mixture.

7. Apparatus for burning fuel in a furnace combustion chamber, comprising in combination a furnace having a combustion chamber, fuel supply means, a fan associated with said means supplying air under pressure for projecting a combustible mixture of fuel and air into said combustion chamber, a housing closed to the atmosphere outside of said furnace and supported adjacent said fuel supply means and said air fan, said housing communicating through a passage with the combustion chamber and having an inlet for the admission of gaseous fuel into the housing at a point remote from the combustion chamber end of said passage, a spark electrode within said housing adjacent the gaseous fuel inlet for the ignition of gaseous fuel at said inlet, and means for supplying air under pressure above atmospheric from said fan into said housing, whereby an ignited gaseous fuel flame within the housing is blown through said passage and projected as a blow-torch flame against said combustible mixture for igniting the same, within the combustion chamber.

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