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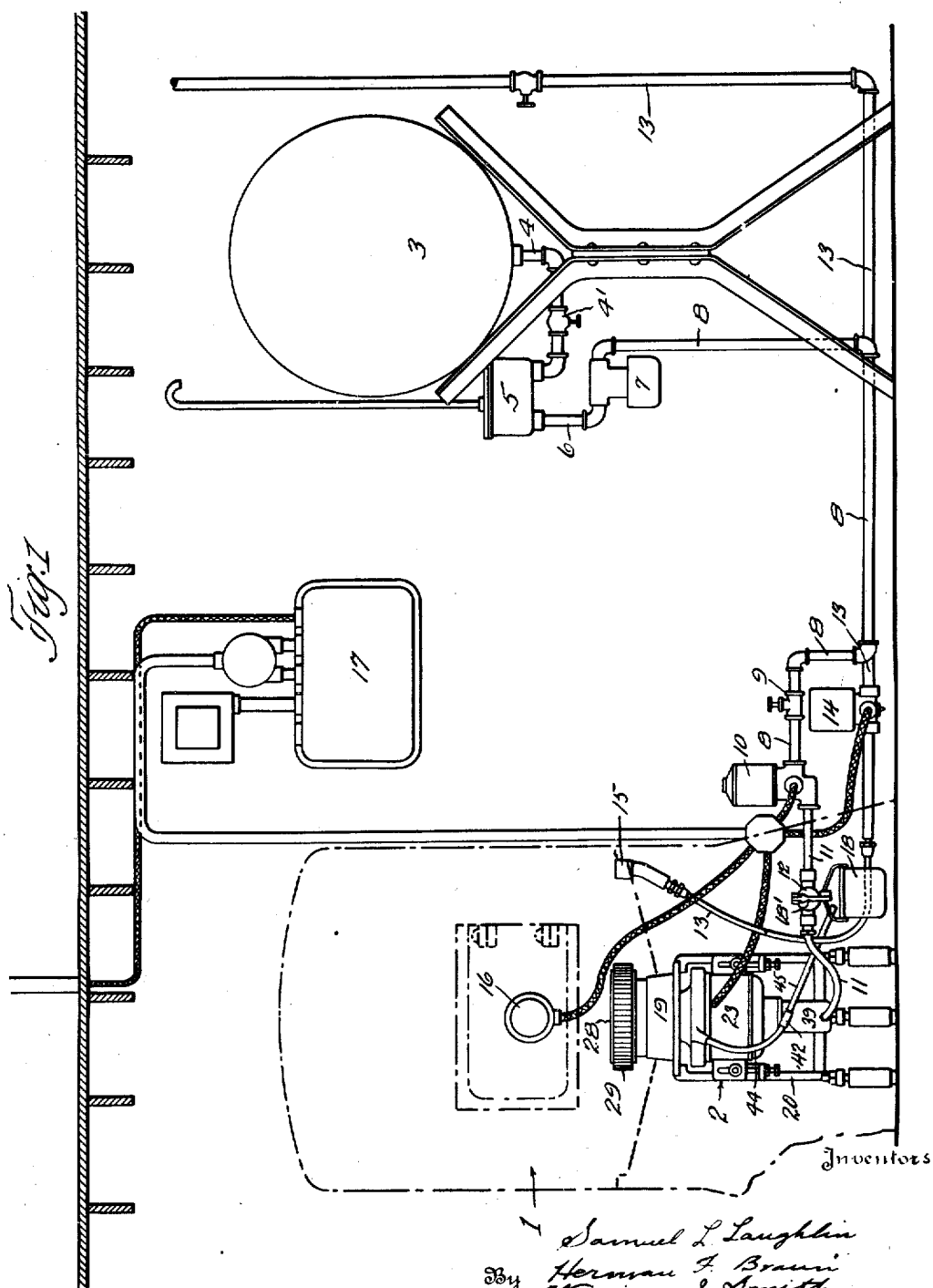
1,655,016

S. L. LAUGHLIN ET AL

OIL BURNER UNIT

Filed Jan. 25, 1927

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

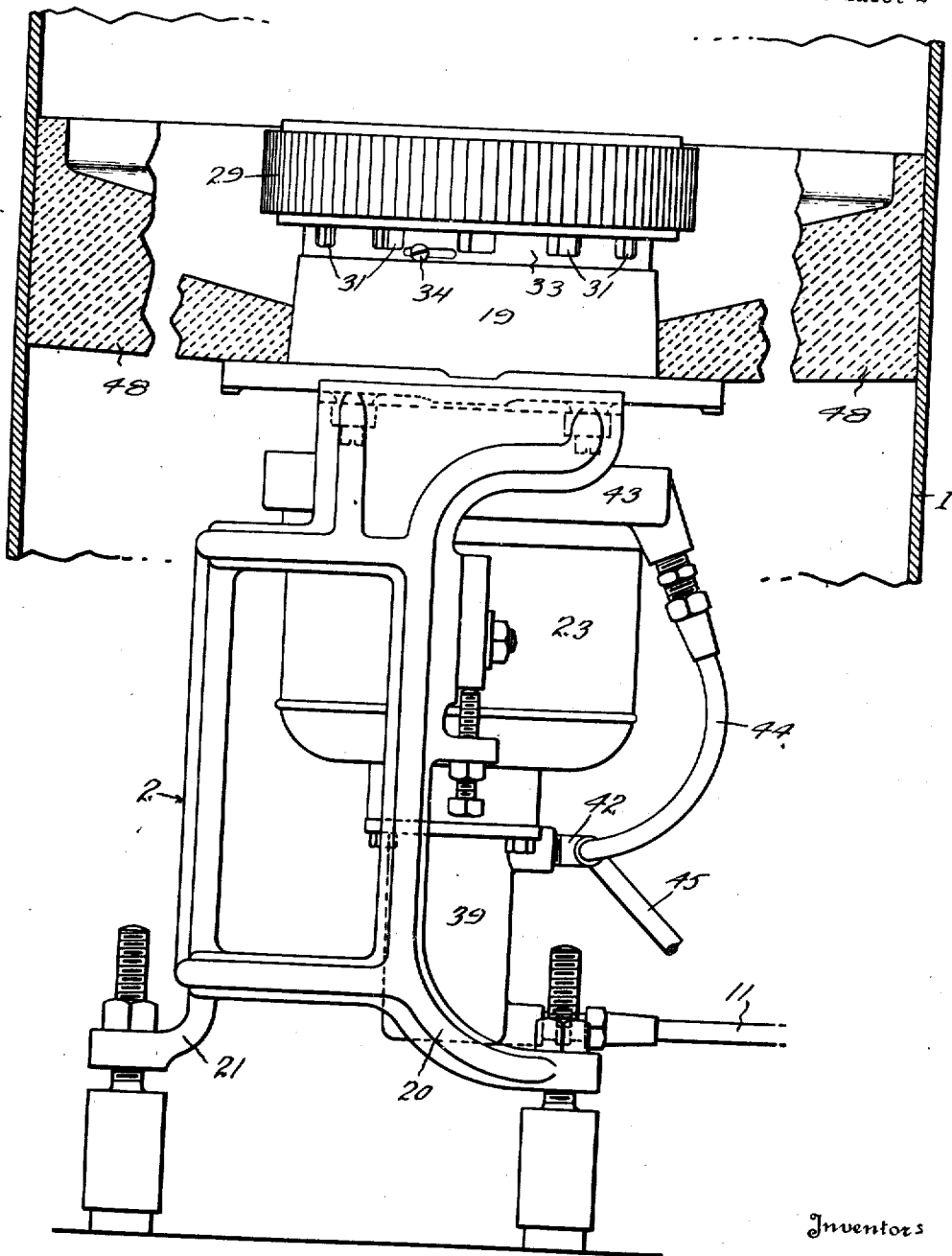


Fig. 2

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4 Sheets-Sheet 3

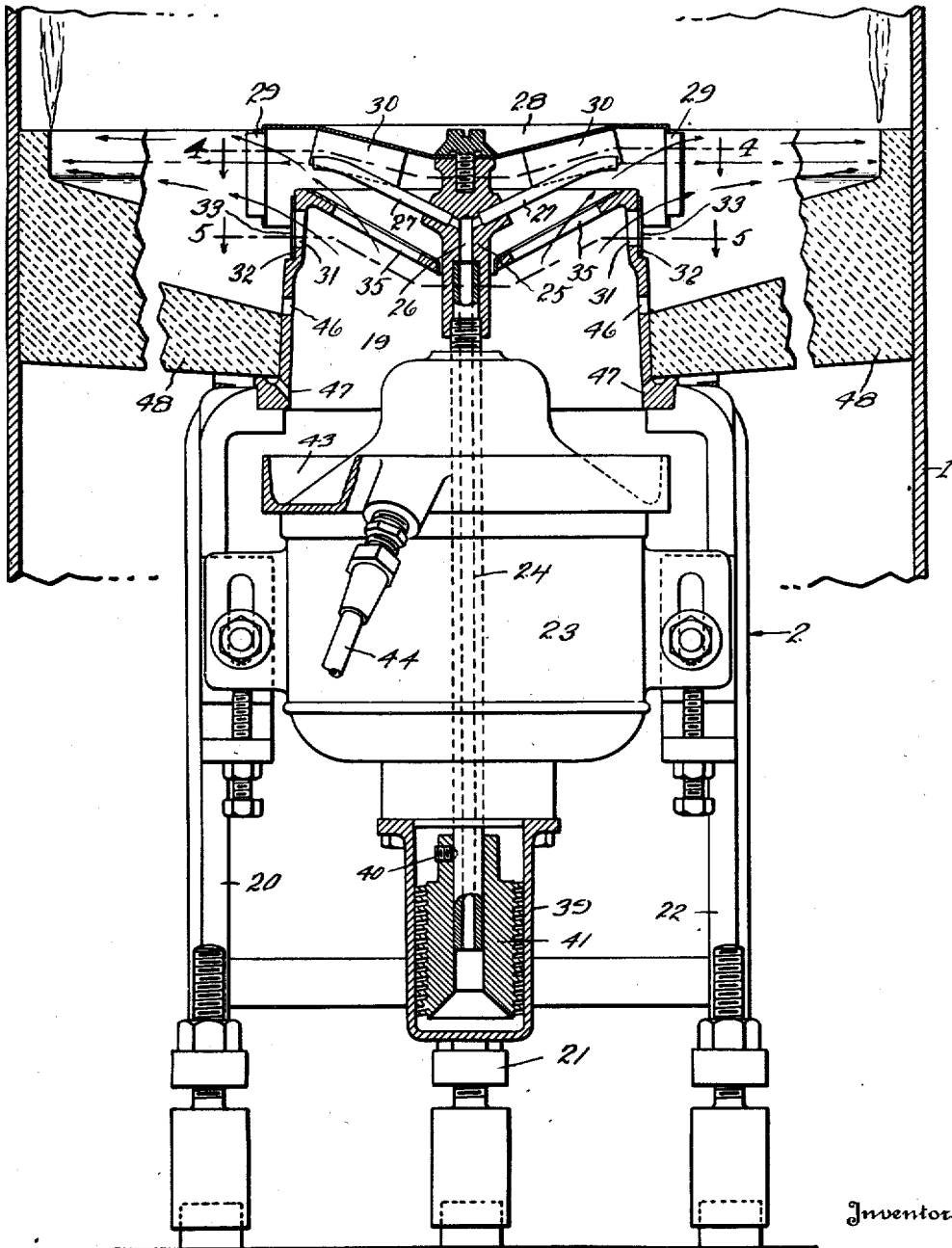


Fig. 3

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4 Sheets-Sheet 4

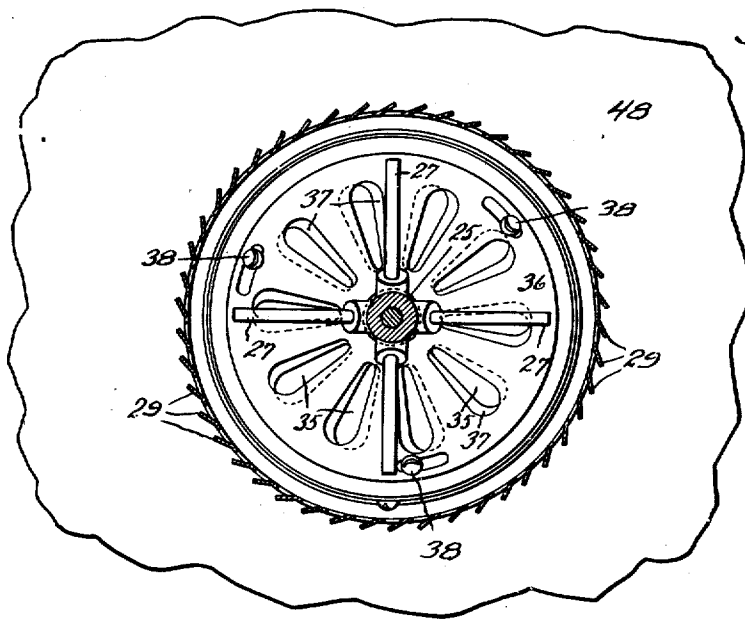
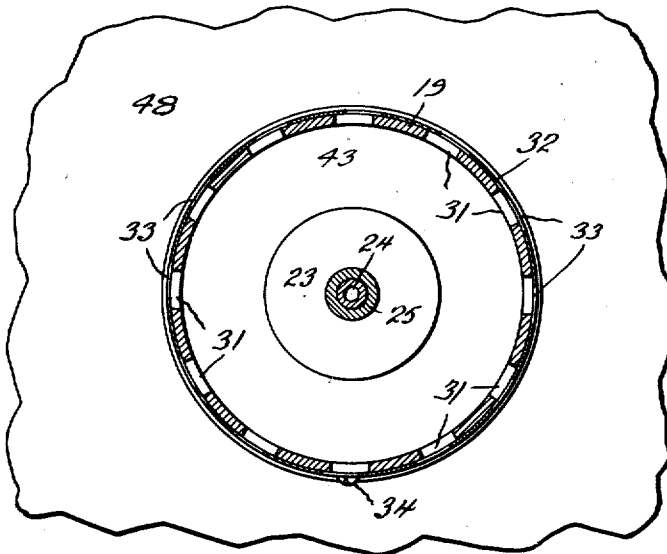


Fig. 4



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Fig. 5

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UNITED STATES PATENT OFFICE.

SAMUEL L. LAUGHLIN, HERMAN F. BRAUN, AND WILLIAM J. SMITH, OF CLEVELAND, OHIO.

OIL-BURNER UNIT.

Application filed January 25, 1927. Serial No. 163,352.

This invention relates to oil burners and is directed more particularly to oil burning units which are designed for use in connection with household furnaces.

5 The main object of the invention is to provide a burner unit of the character described which may be easily and quickly installed in the average household furnace and which shall be capable of effectively replacing the use of coal, gas or other fuels commonly used for heating purposes.

Another object of the invention is to provide a burner unit wherein the fuel oil is atomized by a rotary atomizing nozzle and 15 which will effect an efficient mixture of air and atomized oil.

Another object of the invention is to provide a burner unit system of the character described which shall be entirely automatic 20 in its operation and which is well adapted for use in connection with standard makes of thermostatic controls which are now on the market.

Another object of the invention is to provide a burner unit of the character described which is provided with means for cutting off the supply of fuel and discontinuing the operation of the motor should the fire fail to ignite or go out.

30 A still further object of the invention is to provide a novel and simple form of burner unit which comprises comparatively few parts and which is easily assembled and disassembled and which is readily accessible 35 to permit cleaning or replacement of any desired part thereof and which by reason of its simplicity is inexpensive to manufacture and well adapted for quantity production at comparatively low cost.

40 With these objects in view and further objects which will appear as the description proceeds, the invention consists in the various features of construction and arrangement and combination of parts as will be more fully described hereinafter and pointed out in the appended claims.

In the drawings accompanying and forming a part of this specification, Fig. 1 is a view in front elevation of our improved 50 burner unit connected with the household furnace of the usual type; Fig. 2 is a view partly in vertical section and partly in front elevation of our improved burner and showing the upper end of the burner positioned

within the firebox of the furnace; Fig. 3 55 is a view partly in vertical section and partly in front elevation disclosing the fuel supply means and the manner of securing the several parts together; Fig. 4 is a horizontal sectional view on the line 4—4 of Fig. 3; 60 and Fig. 5 is a horizontal sectional view on the line 5—5 of Fig. 3.

Referring now to Fig. 1 of the drawings, the numeral 1 designates a furnace in which is positioned our burner unit designated 65 generally by the reference character 2. Positioned preferably in close proximity to the furnace is a tank 3 adapted to contain the source of fuel supply. Leading from the tank 3 is a valve controlled fuel supply pipe 70 4 which is connected with an oil regulator 5 so positioned with respect to the burner as to provide a constant head for the fuel. Connected with the oil regulator 5 is a pipe 6 which leads to an oil strainer 7 which 75 removes foreign matter from the oil and connected with the opposite side of the oil strainer 7 is a pipe 8 having a needle valve 9 therein and also a solenoid valve 10 the purpose of which will hereinafter appear. 80 Leading from the oil valve 10 is a pipe 11, having a valve 12 therein which connects with the lower end of the burner in a manner to be hereinafter set forth. The numeral 13 designates a gas supply pipe which 85 is provided with a solenoid gas control valve 14 which is normally held in closed position and connects with a pilot burner 15. The valves 10 and 14 are adapted to be opened by any suitable means either electrical or 90 mechanical which automatically control the position of the valves. The valve 14 is never entirely cut off but always allows sufficient gas to flow to keep the pilot 95 burning. It will be noted that there are three valves in the oil supply line, namely: the needle valve 9, the automatic valve 10 and the valve 12. The valve 12 is in the nature of a safety valve and is automatically closed when the overflow or trip bucket 18 100 becomes sufficiently filled with oil to depress the pivotally mounted lever 18' to close the valve.

Referring now to Fig. 3 the burner unit proper comprises an annular casting 19 105 which is supported by means of a plurality of adjustable legs 20, 21 and 22 so that the height of the same may be adjusted. Car-

ried by the legs 20, 21 and 22 is an electric motor 23 having a hollow shaft 24 which projects upwardly through an opening in the casting 19. Detachably secured to the upper end of the hollow shaft 24 is a distributing head 25 having a bore 26 therein which is in open communication with a plurality of tubes 27. Secured to the upper end of the distributing head 25 is a fan member 28 which is preferably formed from a single piece of heat resisting sheet metal and provided with a plurality of blades 29 on the periphery thereof and a plurality of blades 30 on the bottom side thereof. The annular casting 19 is shaped in section as shown most clearly in Fig. 3 and around its periphery is provided with a plurality of ports 31 which serve as air inlets. Secured over the top of the annular casting 19 is an annular plate 32 which is provided with a plurality of ports 33. The annular member 32 may be adjusted with respect to the casting 19 to vary the size of the ports 31 and is secured in adjusted position by means of a set screw 34. The top of the casting 19 is somewhat funnel shaped and is provided with a plurality of openings 35. Fitting over the top of the casting 19 is a plate 36 provided with a plurality of openings 37 adapted to be brought into alignment with the openings 35. The plate 37 may be adjusted with respect to the top of the casting to vary the size of the inlet opening 35 and is secured in adjusted position by set screws 38.

Secured to the lower end of the motor is a hollow casting 39 forming a chamber to the lower end of which the fuel supply pipe 11 is connected (see Fig. 1). The shaft 24 projects downwardly into chamber 39 and secured to the lower end of the shaft by means of a set screw 40 is a threaded sleeve or rotor 41, the purpose of which will hereinafter appear. Connected with the upper end of the chamber 39 is a T 42 (see Fig. 1) and supported on the upper end of the motor 23 is an annular drip pan 43 which is adapted to receive any oil which may drip from the firebox. The pipe 43 is connected with the T 42 by means of a pipe 44 and also connected with the T 42 is a pipe 45 leading to the trip bucket 18, the purpose of which will also hereinafter appear. The casting 19 is also provided with a plurality of ports 46 which serve to deliver into the drip pan 43 any oil which may escape into the firebox. The casting 19 is also provided with a plurality of openings 47 which serve to deliver into the drip pan 43 any oil which may seep past the refractory material 48 around the casting 19.

The valves 10 and 14 are normally closed and are opened by means of solenoids the circuits to which are controlled by the protecto-relay 17. The protecto-relay 17 is in

circuit with the protectostat 16 and also the room thermostat or thermostats and forms no part of this invention. Controls of this character may be purchased on the open market and are adapted for connection with any standard burner unit. Our device is also adapted for use with a mechanical control unit for controlling the motor and the oil and gas valves. Mechanical control units for burner units of this type may also be purchased on the open market.

Assuming that it is desired to start the furnace and deliver heat to the rooms to be heated, the fuel supply valve 4' is opened and a manually operated switch on the protecto-relay 17 is moved to close the circuit to the motor 23. The fuel now flows through the pipe 4, valve 4', oil regulator 5, pipe 6, strainer 7, pipe 8, valve 9, valve 10, which is held open by the relay, valve 12 which is now open, and thence through pipe 11 into the bottom of the chamber 39. The switch to the motor having been closed the same will be in operation and the shaft 23 will be rotating and with it necessarily the rotor 41. As the rotor 41 is rotating the fuel cannot flow past the threads in the same and will necessarily flow up the hollow shaft 24 and be delivered through the oil distributing head and tubes 27. When the motor is started the gas expanding valve 14 is automatically actuated to expand the pilot flame and the fuel delivered through the tubes 27 will be atomized and mixed with air and ignited by the coming in contact with expanded pilot flame. As soon as sufficient heat is generated within the firebox the protectostat 16 on the furnace door will be actuated to break a circuit to allow the valve 14 to return to its former position and the gas supply will be cut down and only sufficient gas will be admitted through the valve 14 to keep the pilot flame burning. The motor will continue running and the burner will be supplied with oil through the pipe 11 and the hollow shaft 24. When the temperature in the room to be heated reaches a predetermined point the thermostat therein will be actuated to cut off the supply of current to the motor and the valve 10 will be allowed to close to cut off the supply of fuel. When the temperature in the room to be heated falls to a predetermined point the protecto-relay 17 will again open the valve 10, close the circuit to the motor 23 and expand the pilot flame by opening the valve 14. The fuel will again become ignited and the burner continue in operation until the thermostat in the room to be heated is again actuated to repeat this cycle of operation. Should the fuel fail to ignite when the motor is started, the oil will flow down through the ports 46 into the pan 43 and thence through pipe 44, T 42, pipe 45 and fill the bucket 18 which will activate

lever 18' to close the valve 12 and cut off the supply of fuel. Should the motor 23 fail to start at the proper time or for some reason stop, the fuel will flow into the bottom of chamber 39 and past the screw threaded rotor 41 and fill the chamber 39 and overflow through the T 42 and pipe 45 and be delivered into the bucket 18 which will close valve 12 and cut off the supply of fuel.

One of the main features of our invention is the fan member 28 which is preferably formed from a single piece of heat resisting metal. From an inspection of Fig. 3 it will be seen that the fan blades 29 project downwardly below the delivery end of the distributor tubes 27 so that when the motor is running air for supporting combustion will be drawn in through the openings in the casting 19 as indicated by the arrows in Fig. 3. The result obtained is that there will be a layer of atomized fuel delivered between two layers of air. This construction provides for a very efficient mixture of air and atomized oil and results in an extremely hot flame disposed around the entire periphery of the firebox. The plates 33 and 36 may be adjusted to effect a proper mixture of air and atomized oil so that a very efficient flame is obtained. The simplicity of the burner unit and the ease with which it may be assembled and disassembled will adapt the same for the purpose for which it is intended.

It will now be clear that we have provided a burner unit which will operate under all conditions and which will automatically cut off the supply of oil should the burner fail to ignite or the motor fail to start for any reason. Various changes may be made in our construction without departing from the spirit of our invention and we wish our invention to be limited only in accordance with the scope of the appended claims.

Having thus described our invention, what we claim is:

1. A burner unit of the class described comprising a frame, a casting supported by said frame and adapted to be positioned beneath a firebox of a furnace, said casting having an annular depending portion having a plurality of openings therein and being provided with a plurality of openings in the top thereof, a motor carried by said frame and having a hollow shaft projecting into the top of said casting, a distributing head carried by said shaft and a fan carried by said distributing head, said distributing head having a plurality of tubes extending outwardly therefrom, the blades of said fan extending below the delivery end of said tubes and means for supplying liquid fuel to said distributing head.

2. A burner unit of the class described comprising a frame, a casting supported by

said frame and adapted to be positioned within an opening in a firebox, a plurality of air inlet openings in said casting, a motor carried by said frame and having a hollow shaft projecting upwardly through said casting, a distributing head rigidly secured to said hollow shaft and having a plurality of discharge tubes disposed in open communication with the said hollow shaft, and a fan member rigidly secured to said distributing head and having a plurality of fan blades formed thereon and extending downwardly below the delivery end of said distributing tubes, means for varying the size of said air inlet openings, a chamber connected with the lower end of said motor and in which the lower end of said hollow shaft is disposed, a supply pipe for delivering liquid fuel to the lower end of said chamber, said chamber having an overflow opening therein, means secured to said hollow shaft and disposed within said chamber for directing the flow of fuel into said hollow shaft when the same is being rotated.

3. A burner unit of the class described comprising a frame, a casting supported above said frame and adapted to be positioned within an opening in a firebox, a hollow shaft projecting upwardly into said casting, a distributing head secured to said hollow shaft and having a plurality of delivery tubes disposed in open communication with said hollow shaft, a casing surrounding the lower end of said shaft and having an overflow opening therein, a liquid fuel supply pipe connected with said casing, a member disposed within said casing and non-rotatably secured to said shaft, said member closely fitting within said casing and having a bore therein connecting the interior of said casing with the interior of said hollow shaft, the periphery of said member being threaded and the pitch of the threads being such that when said shaft is rotated in one direction the fuel will be forced into said hollow shaft.

4. A burner unit of the class described comprising a frame, a casting supported above said frame and adapted to be positioned within an opening in a firebox, a hollow shaft projecting upwardly into said casting, a distributing head secured to said hollow shaft and having a plurality of delivery tubes disposed in open communication with said hollow shaft, a casing surrounding the lower end of said shaft and having an overflow opening therein, a liquid fuel supply pipe connected with said casing, a rotor arranged within said casing and non-rotatably secured to said shaft and adapted to deliver the fuel into the lower end of said hollow shaft when said shaft is rotated in one direction, said rotor engaging the walls of said casing and having one or more passageways therein adapted to permit the fuel

to flow through said casing when the shaft and rotor are at rest.

5. A burner unit of the class described comprising a frame, a casting supported by said frame and adapted to be positioned within an opening in a firebox, a hollow shaft projecting upwardly through said casting, a distributing head rigidly secured to the upper end of said hollow shaft and having a plurality of distributing tubes disposed in open communication with said hollow shaft and leading outwardly toward the periphery thereof, a fan member rigidly secured to said distributing head and having a plurality of fan blades thereon extending downwardly below the delivery end of said distributing tubes, a casing surrounding the lower end of said hollow shaft, a screw non-rotatably secured to said shaft and engaging the walls of said casing, a liquid fuel supply pipe connected with said casing, an overflow connection leading from said casing, the pitch of said screw being such that when said shaft is rotated in one direction the fuel will be directed into said hollow shaft.

6. A burner unit of the class described comprising a frame, a casting supported by said frame and adapted to be positioned within an opening in a firebox, a plurality of air inlet openings in said casting, a hollow shaft projecting upwardly through said casting, a distributing head rigidly secured to said hollow shaft and having a plurality of discharge tubes disposed in open communication with the said hollow shaft, and a fan member rigidly secured to said distributing head and having a plurality of fan blades formed thereon and extending downwardly below the delivery end of said distributing tubes, means for varying the size of said air inlet openings, a chamber connected with the lower end of said motor and in which the lower end of said hollow shaft is disposed, a supply pipe for delivering liquid fuel to the lower end of said chamber, said chamber having an overflow opening therein, a member non-rotatably connected with said hollow shaft and closely fitting within said chamber for directing the flow of fuel into said hollow shaft when the same is being rotated.

7. In a burner unit of the class described, the combination of a distributing head having a plurality of delivery tubes extending outwardly therefrom, a fan member carried by said head and extending over said delivery tubes, said fan member having a plurality of blades disposed about its periphery and extending downwardly below the delivery end of said tubes, a hollow shaft connected with said distributing head at its upper end, a casing surrounding the lower end of said hollow shaft and having an overflow opening therein, a liquid fuel supply pipe connected with said casing and an over-

flow pipe connected with the upper end of said casing, a rotor non-rotatably connected with the lower end of said shaft and closely fitting within said casing and adapted to deliver liquid fuel into the lower end of said shaft when the shaft is rotated in one direction and to permit fuel to flow through said casing and overflow pipe when said shaft and rotor are at rest.

8. In a burner unit of the class described, the combination of a distributing head, a hollow shaft connected with said distributing head and depending therefrom, a casing surrounding the lower end of said distributing head and having an overflow opening therein, a liquid fuel supply pipe leading into said distributing head, a member disposed within said casing and non-rotatably secured to said shaft, said member closely fitting within said casing and serving to force the liquid fuel into said hollow shaft when rotated in one direction and permitting the liquid fuel to flow through said casing and overflow opening when the shaft is at rest.

9. In a burner unit for furnaces of the class described, the combination of a combustion chamber having a centrally disposed opening therein, of a centrifugal fuel distributing unit arranged within said opening and consisting of a rotatable distributing head having a plurality of fan blades thereon for drawing air into the combustion chamber, of a hollow shaft depending from the distributing head and connected with the source of fuel supply, said distributing head having a plurality of radially disposed delivery tubes arranged in open communication with said hollow shaft, a casing surrounding the lower end of said hollow shaft and having an overflow opening therein, a liquid fuel supply pipe connected with said casing and an overflow pipe connected with said overflow opening, a rotor non-rotatably connected with the lower end of said shaft and closely fitting within said casing, said rotor having one or more openings therein adapted to permit the fuel to flow through said casing when the shaft and rotor are at rest and means for rotating said distributing head whereby a combustible mixture of fuel oil and air is distributed from a central point in the combustion chamber and burned in the form of a ring substantially against the wall of the combustion chamber, there being no combustible mixture between said distributing head and ring.

10. In a burner unit for furnaces of the class described, the combination of a combustion chamber having a centrally disposed opening therein, of a distributing head arranged within said combustible chamber and having a hollow shaft projecting through said opening, said distributing head having a plurality of discharge tubes disposed in open communication with said hollow shaft

and a fan member rigidly secured thereto
and having a plurality of fan blades formed
thereon for drawing air into the combustion
chamber, of means for rotating said distrib-
5 uting head, of a chamber surrounding the
lower end of said hollow shaft and having
an overflow opening therein, a supply pipe
for delivering liquid fuel to the lower end of
said chamber and a screw secured to said
10 hollow shaft and disposed within said cham-

ber for directing the flow of fuel into said
hollow shaft when the same is being rotated,
said screw engaging the walls of said cham-
ber and permitting the flow of fuel through
said casing when said shaft is at rest. 15

In testimony whereof, we hereunto affix
our signatures.

SAMUEL L. LAUGHLIN.
HERMAN F. BRAUN.
W. J. SMITH.

and a fan member rigidly secured thereto and having a plurality of fan blades formed thereon for drawing air into the combustion chamber, of means for rotating said distributing head, of a chamber surrounding the lower end of said hollow shaft and having an overflow opening therein, a supply pipe for delivering liquid fuel to the lower end of said chamber and a screw secured to said hollow shaft and disposed within said cham-

ber for directing the flow of fuel into said hollow shaft when the same is being rotated, said screw engaging the walls of said chamber and permitting the flow of fuel through said casing when said shaft is at rest.

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W. J. SMITH.

CERTIFICATE OF CORRECTION.

Patent No. 1,655,016.

Granted January 3, 1928, to

SAMUEL L. LAUGHLIN ET AL.

It is hereby certified that the above numbered patent was erroneously issued to the inventors, "Samuel L. Laughlin et al" as owners of said invention, whereas said Letters Patent should have been issued to "Cleveland Steel Products Corporation, of Cleveland, Ohio, a Corporation of Ohio", said corporation being assignee of the entire interest in said invention, as shown by the records of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of February, A. D. 1928.

Seal.

M. J. Moore,
Acting Commissioner of Patents.

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