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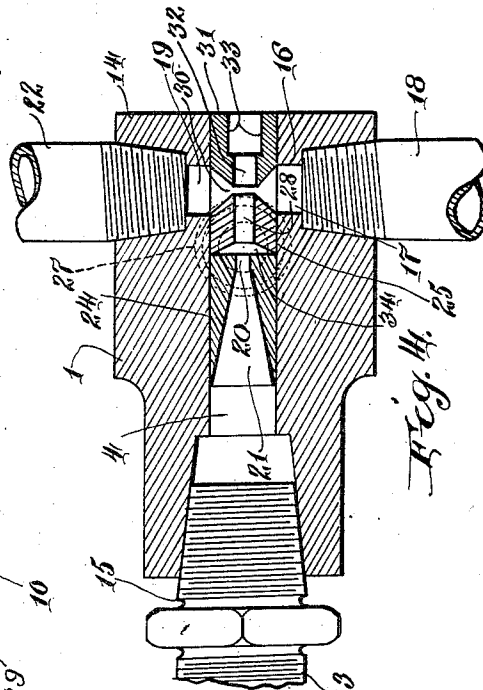
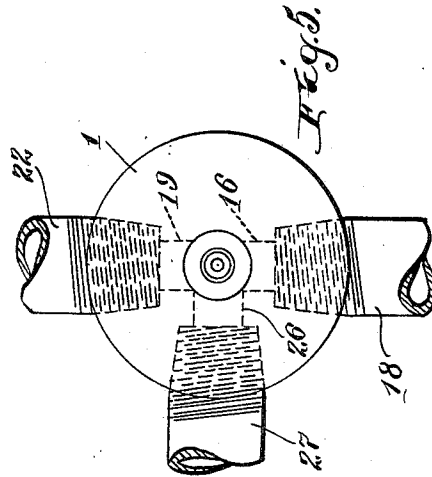
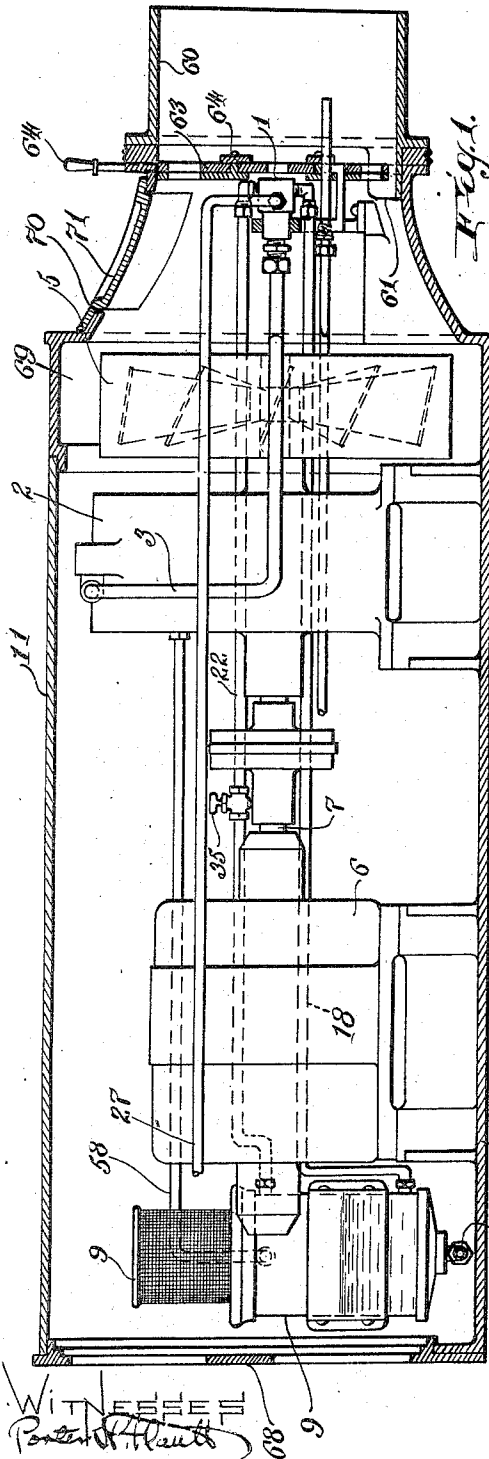
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LIQUID FUEL BURNER

Filed Sept. 17, 1926

3 Sheets-Sheet 1



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Nov. 22, 1927.

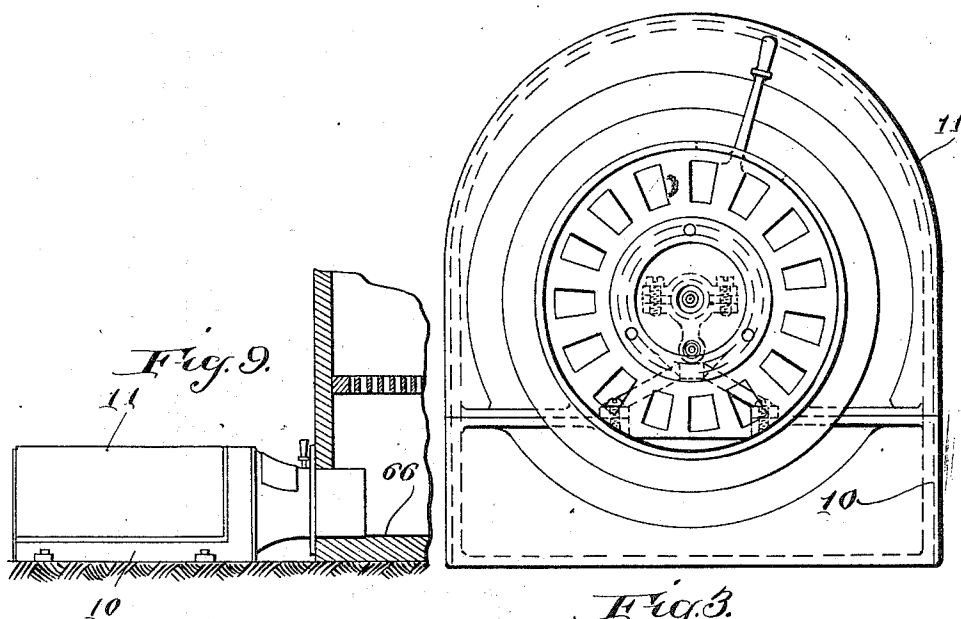
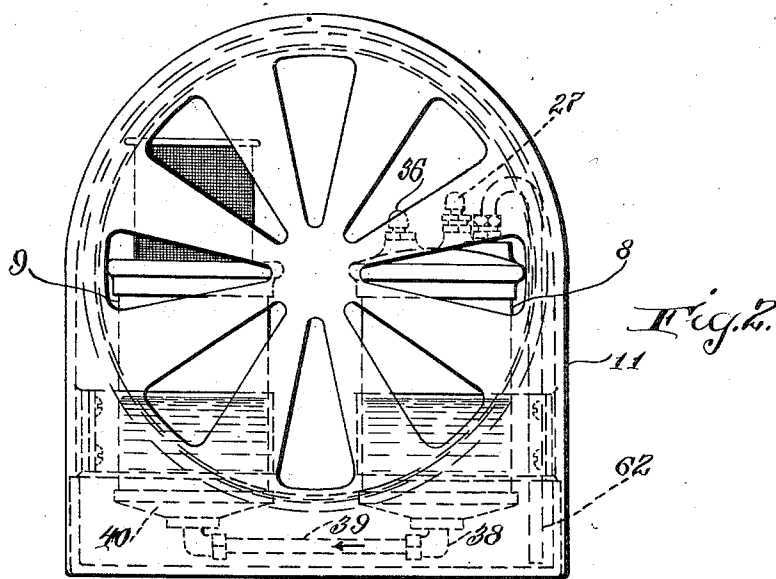
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3 Sheets-Sheet 2



WITNESSES
P. H. H. H. H. H.

Fig. 3.
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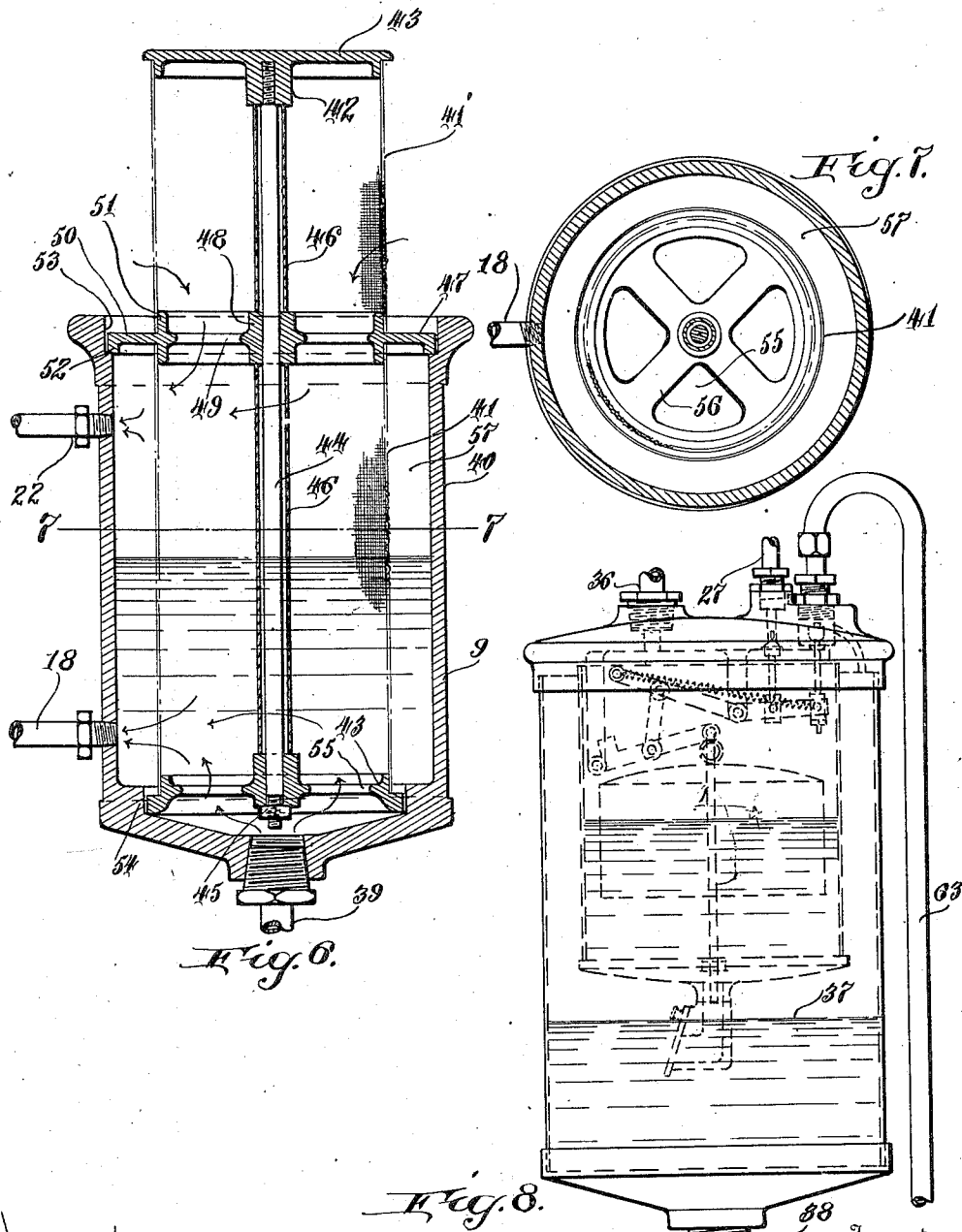
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LIQUID FUEL BURNER

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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LIQUID-FUEL BURNER.

Application filed September 17, 1926. Serial No. 136,035.

One of the important difficulties incident to the operation of oil burners, particularly for domestic use where the necessity for attention constitutes an almost insurmountable 5 obstacle to commercial success, is that incident to the tendency to flood the furnace with oil when for any reason the flame is accidentally extinguished. Various gas pilots and automatic electric ignition devices 10 are in general use, the object of these being to avoid accidental extinction of the flame, but none of them are completely successful, and flooding of the furnace with oil with the consequent danger of explosion or conflagration is still of not infrequent occurrence even 15 with the best equipped oil burners.

An important object of the present invention is the provision of means whereby flooding of the burner when the flame is extinguished is absolutely prevented and eliminated as a possibility in the operation of the burner.

The invention further relates to a burner, the various elements of which are assembled 25 in a single casing which may be affixed as a unit to the fire door or ash pit door of the furnace, the installation being completed by the mere connection of the pipes to the necessary supply of fuel, source of electricity and, if desired, a source of gas for the pilot.

The invention also relates to an improved nozzle and connections whereby a vacuum tank is operated. The oil supply and rate of combustion controlled through and by 35 means of the vacuum created by the jet, i. e., the nozzle creates a vacuum which is communicated to the vacuum tank operating the latter. The vacuum of the burner further raises the oil from the tank, a vacuum tank being shown in this instance the oil level in which is preferably slightly below the burner, so that the oil feed may be made dependent on the maintenance of a jet of fluid under pressure through the nozzle.

In the preferred form of the invention the feed of oil is further controlled by means of a vacuum breaking passage, the opening through which admits fluid, preferably air, to the nozzle adjacent the delivery end of the 50 oil feed passage, the vacuum breaking pas-

sage is determined by a regulating means within the control of the operator whereby the proportion of oil in the mixture of oil and air consumed or rather supplied to the furnace, may be regulated and controlled 55 without obstructing the oil feed passage.

The preferred form of the invention, as shown, includes a strainer which strains the air supplied under pressure, which in the form illustrated is the jet forming fluid 60 which atomizes and propels the fuel, and creates the vacuum for the purposes described and the air which is admitted through the vacuum breaking passage. This strainer also, or it may be said primarily, 65 strains the oil which is to be fed to the burner, the straining of all the fluid, i. e., air and oil or any and all fluids fed to the burner in this way, eliminates the chance of stoppage of the burner due to the accumulation of dirt therein. This has been a source of repeated difficulty and annoyance in the operation of all, or practically all oil burners.

In accordance with certain of the principles of the invention, a receptacle is provided to catch and hold unconsumed oil from the jet. This is effective to prevent flooding of the furnace with oil, particularly in case the flame is accidentally extinguished. Preferably the burner is enclosed in a casing which is oil tight at the bottom, the casing or pan being so connected to the furnace as to cause any oil which may accumulate in the furnace to flow back into the casing or pan of the burner. As shown, the burner is fed by and through a vacuum tank of the usual type used in automobiles. Any constant level tank or other tank may be used. The vacuum tank with the other units is most conveniently placed inside the casing and the air vent of the vacuum tank through which air is admitted to displace the oil which flows from the vacuum tank to the burner is placed with its intake opening located so that accumulation of unconsumed oil from the jet closes the air inlet to the vent, immediately stopping the feeding of oil from the tank to the burner nozzle, as without the access of the outside air pressure or any 100

air pressure to the top of the tank above the oil there is nothing to overcome or balance the outside air pressure so that the feed of oil to the burner nozzle cannot continue.

5 In the accompanying drawings I have illustrated an oil burner embodying the features of my invention in the preferred form.

In the drawings:

10 Figure 1 is a longitudinal section through the burner casing on a vertical plane of the axis, the centrally placed elements being shown in elevation, likewise the strainer which is on the far side of the central plane.

Figure 2 is a rear elevation of the burner casing, i. e., looking from the left in Figure 1 showing the regulating shutter, the vacuum tank and strainer are also shown immediately beyond the shutter.

20 Figure 3 is an elevation looking from the right in Figure 1.

Figure 4 is a section through the nozzle on the same plane as that on which Figure 1 is taken, the nozzle being shown on an enlarged scale.

25 Figure 5 is an elevation looking from the right in Figure 4.

Figure 6 is a vertical section through the axis of the strainer.

30 Figure 7 is a horizontal section on the line 7-7, Figure 6.

Figure 8 is an elevation of the vacuum tank.

35 Figure 9 is an elevation of the burner installed, the furnace being shown in fragmentary vertical section.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts in the different figures, the apparatus as shown comprises a nozzle 1, 40 an air compressor 2, the delivery of which is connected by a pipe 3 to the nozzle passage or bore 4 creating a jet therethrough as hereinafter described, a fan 5 and an electric motor 6, the motor, air compressor and fan being on the same shaft 7. The apparatus 45 as shown also includes a vacuum feed tank 8 and a strainer 9, the entire apparatus being mounted in a pan 10 having a cover 11 secured to the pan in any suitable manner and shaped to accommodate and enclose the apparatus, the pan and cover comprising a casing in which the apparatus is enclosed as a single unit.

50 More particularly, the nozzle 1 as shown consists of a casting or body member 14 having a longitudinal central bore or passage 4, to which the air pressure pipe 3 is connected by a fitting 15, as already described, or in any suitable manner. The body member 14 is also pierced at right angles to the 55 bore 4 by a transverse bore 16 forming a fuel or oil passage 17, to which is connected an oil pipe or tube 18 and a regulating air passage 19 to which is connected a regulating air tube 22. The bore 4 of the nozzle is

provided with an initial taper 21 for forming the air jet. This, as shown, is formed in an insert plug or tip 24 in the main air passage, the small end 20 of the taper being 60 turned toward the discharge end of the nozzle and the large end toward the air pipe 3. The regulating air or vacuum breaking passage 19 and the oil feed passage 16 or the inner ends of the same enter a chamber 30 between a second insert or tip 25 65 which is placed in the main air passage 4 just forward of the first insert 24 and spaced slightly away from the latter and a third plug insert or tip 31 spaced forwardly of the member 25. The nozzle member 14 is 70 also provided with a bore or passage 26 entering the aperture or chamber 34 between the two rearmost inserts or tips 24 and 25 and having connected thereto a vacuum pipe 27 which leads to the top of 75 the vacuum tank. The second insert, 25 has a central bore 28 which may be slightly larger than the nozzle opening 20. The forward insert 31 is shown as centrally bored at 32 in registration with the opening 28 80 and immediately on the opposite side of the chamber 30 therefrom and this passage or opening 28 which is preferably slightly smaller than the bore 32 extends forwardly through the insert 31 though the forward 85 end of the passage may be of increased diameter indicated by reference character 33.

Compressed air entering the air passage 4 from the compressor by way of air pipe 3 is formed by the taper 21 into a jet issuing 90 from the reduced opening 20 and passing at high speed through the chamber or space 34 between the tip or insert 24 and the second tip or insert 25 which is connected by vacuum passage 26 to pipe 27, creating a vacuum in the chamber 34 which is trans- 95 mitted through pipe 27 to the vacuum tank 8. The jet also passes by way of passage 28 to and through the chamber 30 between the inserts 25 and 31 likewise creating a vacuum in this chamber. The vacuum in the 100 chamber raises the fuel through and by way of fuel passage 16 and fuel pipe 18.

The vacuum in the second chamber 30 is controlled by the vacuum breaking passage 19 to which a regulated quantity of air enters 105 by the pipe 22, the opening through which is controlled and regulated by air cock 35, see Figure 1, which by thus regulating the vacuum at this point controls the 110 supply of fuel to the burner and the rate of combustion.

In addition to the nozzle as already pointed out, the apparatus includes a vacuum tank 8 of the usual construction well 115 known as a gasoline feeding device and widely used in connection with the internal combustion motors of automobiles and other motor vehicles. A vacuum is created at the 120 top of the tank communicated thereto from 130

the nozzle by way of and through the vacuum pipe 27 as described. The oil supply is led to the top of the tank by tank supply pipe 36, Figure 8, from any available source.

5 The vacuum tank is preferably so placed that the level of the oil supply therein at 37 is maintained below the level of the center of the oil burner, as shown, and the delivery outlet of the vacuum tank at 38 is connected
10 by an oil pipe 39 to and with the oil strainer 9, the oil pipe 39 in the form of the invention shown entering the strainer receptacle or cup 40 at the center of the bottom.

The oil strainer proper or screen as
15 shown consists of two cylinders 41 and 41' placed end to end and mounted on a suitable frame 42 having two disk-like ends 43 shouldered to fit inside the opposite ends of the strainer screen. The disks are held to-
20 gether by a bolt 44 which engages both said disk-like members at the center, being passed through one of said disks and having a nut 45 by which the disks are drawn together as
25 aforesaid, the disks being spaced by central tubes 46 through which the bolt is passed. The screen is further supported by an annular frame 47 having a hub 48 through which the bolt is passed, the hub being engaged on opposite sides by the tubes 46.
30 The frame 47 is provided with radiating legs 49 supporting a rim 50 which has oppositely projecting cylindrical flanges 51 which enter the adjacent ends of the screen portions 41 and 41' and a peripheral radial flange 52 which engages a seat 53 in the
35 top of the cup. The bottom disk 43 which enters a seat 54 in the bottom of the cup, is provided with apertures 55 between radial legs 56, which latter support the hub, the
40 apertures 55 permitting the oil to flow upwardly into the cup and through the strainer 41 from the oil passage 39 leading from the vacuum tank. The oil supply pipe 18 leads from the strainer cup outside the screen and
45 well below the oil level as indicated in Figures 1 and 6. The oil passing upwardly from the center of the cup seeps outward radially through the strainer to the outer periphery of the cup, being completely
50 strained without accumulation of dirt at any point of the strainer. This prevents clogging in ordinary operation, making the oil burner operative without attention for a considerable period of time.

55 The vacuum regulating pipe 22 leads from the screen cup well above the oil level and at the side, and the top of the cup outside the screen is completely closed by the frame or cover 47. The upper screen cylinder 41
60 projecting above the cup, air is admitted through the upper exposed portion of the screen and completely cleaned and strained by the operation of the screen, being passed downwardly inside the strainer cup and out-
65 wardly again passing through the screen

into the annular chamber 57 outside the screen from which it is drawn by the vacuum breaking or regulating pipe 22. The compressed air supplied to the burner nozzle by the compressor 2 is likewise strained, 70 the compressor intake passage or pipe 58 being connected to the side walls of the strainer cup as shown in Figure 1, whereby a portion of the air drawn in through the screen cylinder 41 at the top and passed 75 outwardly into the annular chamber 57 as aforesaid, is supplied to the compressor.

Certain important features of the invention reside in the location of the oil burning apparatus in a pan 10 which acts as a re- 80 ceptacle for the waste oil or the provision of a receptacle of any sort to collect the unconsumed oil from the jet in case of accidental extinction of the flame, the accumulated oil being utilized to cut off the oil 85 supply as hereinafter described.

The pan 10 and the cover 11 preferably terminate beyond the nozzle in a duct 60 which is provided with a projecting lip 61 which enters the pan or otherwise forms an 90 oil tight connection therewith, the duct being cemented into or otherwise closely connected with the furnace or fire box which is originally constructed, or for the purposes of this burner, made oil tight below the 95 burner connection preventing escape of oil from the furnace in case the atomized jet should fail to ignite or should become extinguished in any way during the continu- 100 ance of the oil supply. The oil tight floor or bottom wall of the furnace is shown at 66 in Figure 9. Under such circumstances the oil accumulates at the bottom of the furnace without escaping and flows backwardly into 105 the pan and in turn stops the oil supply from the vacuum feed.

The control of the oil supply in this way, making the supply of oil to the burner dependent upon the continued consumption of the oil in the furnace, is accomplished by so 110 locating the vent pipe 62 which controls the flow of oil from the vacuum tank, see Figure 2, that the intake end of the same is at the bottom of the pan or other receptacle for unconsumed oil from the jet, so that it will 115 be immediately closed upon the accumulation of a supply of oil in this way. Closing of the vent stops immediately the flow of oil from the vacuum tank to the burner and, therefore, stops the further discharge 120 and accumulation of oil.

Referring again to the feed or nozzle end of the casing it will be noted that there is a damper 63 mounted on circularly arranged pins or studs 64 and operable by means of 125 a handle 65 to regulate and control the flow of air from the blower 5 through the duct 60 about the jet and into combination with the flame. The pan in the form shown is extended up over the fan 5 and nozzle at 69 130

and there is a hand hole 70 with a cover 71 over the nozzle to give access thereto. The cover 11 extends backwardly from the fan to the rear of the casing, and the rear end of the casing is closed by a grid 68.

I have thus described specifically and in detail a single embodiment of my oil burner apparatus in order that the nature and operation of the same may be clearly understood, however, the specific terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. An oil burner comprising a nozzle, means for supplying fluid under pressure maintaining a fluid jet through said nozzle and creating a vacuum at the sides of the jet, a vacuum tank, a vacuum pipe connecting the jet to the vacuum tank creating a vacuum in the tank, an oil supply pipe leading from the tank to the burner, a receptacle beneath the burner to catch unconsumed oil therefrom, the vacuum tank being provided with a vent pipe admitting air thereto to replace the oil fed from the tank to the burner, the vent pipe having its inlet opening in the receptacle and near the bottom thereof so that the accumulation of oil in the receptacle will close the vent and stop the flow of oil to the burner from the vacuum tank.
2. An oil burning apparatus comprising a burner nozzle, a motor, a compressor, a fan, a vacuum feed tank and a casing enclosing all said members as a single unit, said casing being adapted for connection to a furnace, and said furnace, the furnace being closed immediately below the casing so that oil accumulated therein flows into the casing and accumulates therein, the vacuum tank having a vent which has its intake near the bottom of the casing.
3. In an oil burning apparatus, a nozzle, an air compressor connected to the nozzle to set up a jet therethrough, an oil supply, a strainer comprising a cup and a screen cage in and projecting from the cup, an oil passage leading from the oil supply to the nozzle through the strainer, the latter having intake and outflow passages to and from said pipe one on each side of the screen, an air passage leading from the inside of the strainer cup to the compressor supplying air thereto, the cup being closed about the screen causing the air taken from the cup to be drawn in through the projecting portion of the screen and strained by the screen.
4. In an oil burning apparatus, a nozzle, an air compressor connected to the nozzle to set up a jet therethrough, an oil supply, a strainer comprising a cup and a screen cage in and projecting from the cup, an oil passage leading from the supply tank to the

nozzle through the strainer, the latter having intake and outflow oil passages to and from said pipe on opposite sides of the screen, an air passage leading from the inside of the strainer and cup to the compressor supplying air thereto, the cup being closed about the screen causing the air taken from the cup to be drawn in through the projecting portion of the screen and strained by the screen, a vacuum breaking passage leading to the nozzle adjacent the oil supply pipe to control the oil fed to the nozzle, said passage being connected to the strainer cup whereby the air thus supplied is likewise passed through the screen and strained.

5. The combination with an oil burner having a nozzle, means for supplying air and oil to the nozzle, means for straining both the oil and air comprising a cup, a strainer in the cup, a portion of the same being open to the outside air, the top of the cup being closed about the strainer, an air passage connected to the upper portion of the cup and leading from the cup to the nozzle whereby the air supplied to the nozzle is drawn in through the upper portion of the strainer and completely screened, an oil passage leading from the strainer to the nozzle and an oil passage entering the cup, said oil passages being on opposite sides of the screen whereby the oil supply to the nozzle is strained.

6. The combination with an oil burner having a nozzle, means for supplying air and oil to the nozzle, means for straining both the oil and air comprising a cup, a strainer in the cup projecting above the cup, the top of the cup being closed about the strainer, an air passage connected to the upper portion of the cup and leading from the cup to the nozzle whereby the air supplied to the nozzle is drawn in through the upper portion of the strainer and completely screened, an oil passage leading from the strainer to the nozzle and an oil passage entering the cup, said oil passages being on opposite sides of the screen whereby the oil supply to the nozzle is completely screened, said screen being in the form of a closed chamber which fits inside the cup and the closure about the screen being in the form of a removable cover.

7. The combination with an oil burner having a nozzle, means for supplying air and oil to the nozzle, means for straining both the oil and air comprising a cup, a strainer, an air passage connected to the upper portion of the cup and leading to the nozzle, an oil passage leading from the strainer to the nozzle and an oil passage entering the cup, said oil passages being on opposite sides of the screen, said screen being in the form of two tubular members, the closure of the cup being a ring member which fits the cup as a cover and is located between the tubular members which are

placed in line, members closing the ends of the screen, a bolt connecting the end members and means spacing the end members.

8. An oil burning apparatus comprising a burner nozzle, a compressor supplying compressed air to the nozzle, a vacuum feed tank connected to the burner to feed oil thereto and operated by the vacuum of the nozzle, and a strainer and means for passing the oil and compressed air through the strainer before they enter the nozzle, and a casing enclosing all said members as a single unit, said casing being adapted for connection to a furnace.

9. An oil burning apparatus comprising an electric motor, an air compressor driven by the motor, a nozzle connected to the compressor whereby the compressor sets up a jet of compressed air through the nozzle creating a vacuum at the sides of the jet, a vacuum tank, means connecting the top of the vacuum tank to the jet whereby the vacuum created by the jet operates the vacuum tank, an oil pipe leading from the vacuum tank to the nozzle, a container for oil connected to the tank, a receptacle to receive and contain unconsumed oil dropped from the burner, the tank having a vent pipe the opening in which is near the bottom of the receptacle whereby an accumulation of unconsumed oil closes the vent and cuts off the flow of oil from the tank to the burner.

10. An oil burning apparatus comprising an electric motor, a fan and a compressor, the fan and compressor being driven by the motor, a nozzle connected to the compressor whereby the compressor sets up a jet of compressed air through the nozzle creating a vacuum at the sides of the jet, the fan sup-

plying air to support combustion, a vacuum tank, a pipe connecting the vacuum tank with the jet whereby the vacuum created by the jet is communicated to the tank, an oil pipe leading from the vacuum tank to the nozzle, the vacuum assisting the feed to the nozzle, means for maintaining a supply of oil below the level of the tank and an oil supply connection from the supply to the vacuum tank, a vacuum breaking passage leading to the nozzle and means for regulating the opening therethrough to determine the vacuum and the rate of fuel feed.

11. An oil burning apparatus comprising an electric motor, a fan and a compressor, the fan and compressor being driven by the motor, a nozzle connected to the compressor whereby the compressor sets up a jet of compressed air through the nozzle creating a vacuum at the sides of the jet, the fan supplying air to support combustion, a vacuum tank, a pipe connecting the vacuum tank with the jet whereby the vacuum created by the jet is communicated to the tank, an oil pipe leading from the vacuum tank to the nozzle and means for maintaining a supply of oil below the level of the tank and an oil supply connection from the supply to the vacuum tank, a receptacle beneath the nozzle to receive unconsumed oil from the nozzle, the vacuum tank having a vent with its intake opening in and near the bottom of the receptacle whereby an accumulation of unconsumed oil prevents operation of the tank and cuts off the oil supply to the burner.

Signed by me at Philadelphia, Pennsylvania, this 14th day of August, 1926.

HENRY H. WILLIAMS.