

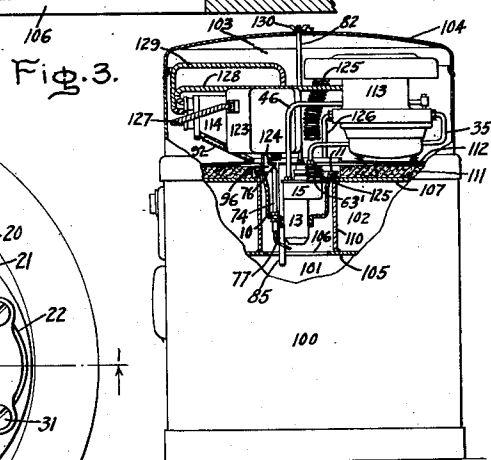
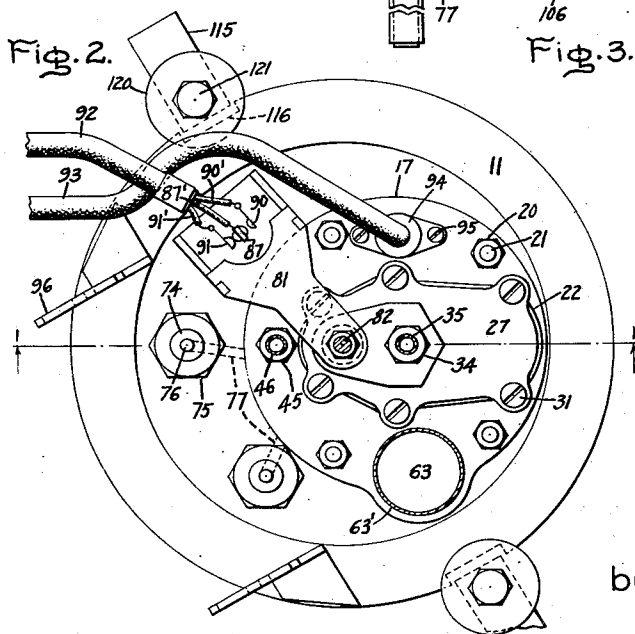
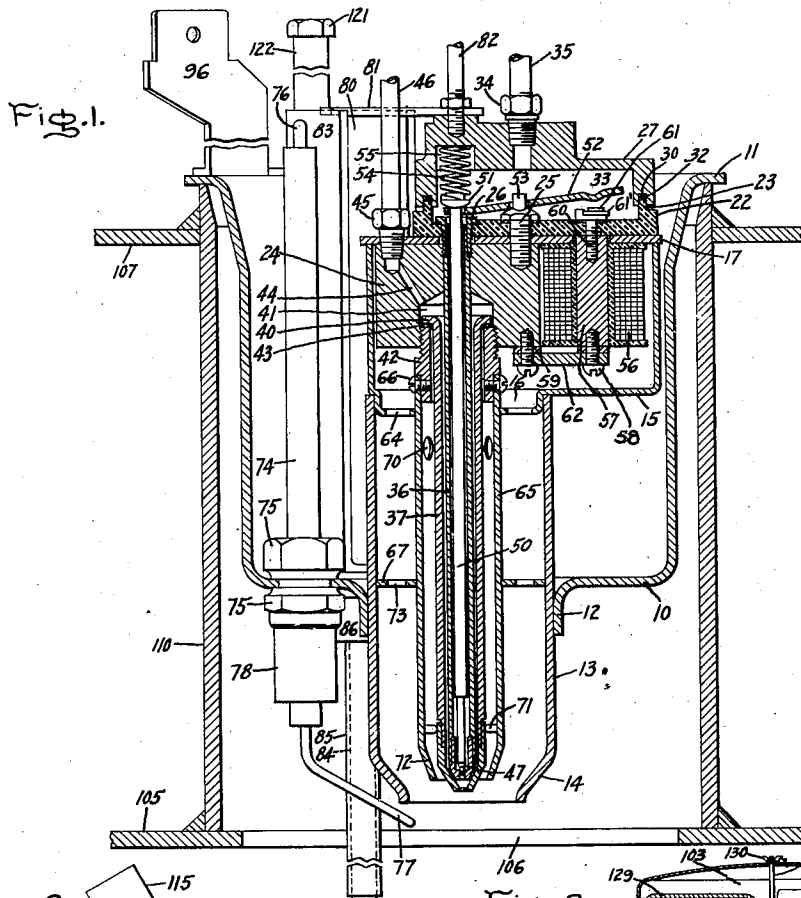
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FUEL BURNING APPARATUS

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FUEL BURNING APPARATUS

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14 Claims. (Cl. 158—73)

Our invention relates to apparatus for burning fuel, such as oil, and particularly to an improved apparatus for more efficiently delivering and regulating a fuel supply and for insuring proper ignition thereof, with special provision for protecting the elements of the apparatus against the excessive heat encountered in operation.

More particularly our invention relates to an improved construction of a burner head wherein a fuel nozzle with its associated fuel valve operating mechanism is mounted in a supporting frame together with ignition electrodes and a flame responsive control switch with the elements in properly spaced relation to form a workable unit which may be set bodily into and in sealing relation to an opening in a furnace or similar structure where it is desired to produce combustion. Means are also provided in our improved burner head unit for mounting an ignition transformer so that its electrical contacts will directly engage connection studs on the ignition electrodes for making electrical connections therebetween without the use of high tension electrical leads.

One of the chief objects attained by our improved mode of correlating the various elements as above outlined is a compact and efficiently workable burner head unit which may be initially put together by the manufacturer with the elements in their proper cooperative relation to each other, and thereafter may be transported as a unit and installed in any desired location by unskilled labor without danger of error in assembly and adjustment.

In such a compact construction the problem of shielding the elements of the burner head unit from the heat of combustion, and of positively cooling various ones of the elements, is very important. Hence an object of our invention has been the provision of effective shielding means and cooling fluid conduits which form an integral part of the unit. In attaining this object multi-walled air insulated shielding casings have been mounted around the nozzle body and fuel valve operating mechanism and provision has been made for passing combustion air through these casings, previous to its discharge into the fuel spray, for positively cooling the shielded elements. An important feature of our invention is the formation of the previously mentioned supporting frame so that it will serve as one of the shielding casings for a portion of the elements of the burner head.

A more detailed understanding of the manner in which the above outlined objects are attained may be had from the following description taken in conjunction with the accompanying drawing in which:

Fig. 1 is a sectional elevation of a preferred embodiment of our improved burner head unit, taken along the line I—I of Fig. 2, showing the

details of construction thereof and the manner of mounting the unit in a vertical well in a boiler furnace structure;

Fig. 2 is a top plan view of the unit; and

Fig. 3 is an elevation of a boiler furnace partially cut away to show the burner head unit and control apparatus mounted therein.

We have seen fit to describe and illustrate a preferred embodiment of our improved burner head unit as utilized in conjunction with a boiler furnace structure of the type disclosed in the copending applications of Aldo Macchi, Serial No. 676,106 filed June 16, 1933, and H. S. Woodruff, Serial No. 676,651, filed June 20, 1933, wherein our improved burner head unit may be set in a vertical tubular well passing through the boiler structure in communication with the combustion chamber, and as embodying an oil nozzle of the type disclosed in the copending application of Aldo Macchi, Serial No. 679,885, filed July 11, 1933, all of which above referred to applications are assigned to the assignee of the present invention. However, it is to be understood that our invention may be applied with equal advantages to apparatus burning fuel other than oil and in any situation where it is desired to produce combustion by means of a burner apparatus which incorporates in a unitary structure all the elements essential for most efficient burning of a fuel supply. Hence directional terms hereinafter used are to be taken only as relative and are to be given their broadest interpretation.

Referring particularly to Fig. 1 of the drawing, 10 represents the burner head housing or main supporting frame which is in the form of a bowl for reasons to be hereinafter pointed out. This bowl is constructed with an outwardly projecting flange 11 on its open end and a flanged opening 12 centrally located in its closed end. Securely mounted in the opening 12 and in sealing relation to the rim of the opening is a tubular casing 13 having an inwardly tapered portion 14 at the end which protrudes from the bowl. Nested within the bowl 10 and mounted upon the end of the tubular casing 13 opposite the tapered end portion thereof is a second bowl 15 having a cylindrical dished portion 16 the outer wall of which is adapted to fit into and tightly engage the end of the tubular casing 13. A cover 17 is placed over the open end of the bowl 15 to seal the interior thereof from atmosphere, this cover being held in place by means of nuts 20 which engage bolts 21 secured in the bowl 15. Resting on the upper side of the cover 17 is an oblong plate 22 of electrical insulating material, such as bakelite, having an upturned rim 23, and depending from the lower side of the cover 17 into the interior of the bowl 15 is a nozzle connection head 24 which may be of magnetic material, the plate and the connection head being secured to the cover by means of

clamping screws 25 and an outwardly threaded bushing 26.

Mounted in inverted position on top of the plate 22 is an oblong cup-shaped cover 27 provided with a groove 30 which fits over the upturned rim 23 of the plate 22. This cover 27 is secured in place by means of screws 31 which engage holes in the cover 17. A gasket 32 is placed in the groove 30 to form a sealed junction between the plate 22 and the cover 27. The plate 22 and the cup-shaped cover 27 therefore cooperate to form a sealed oil pressure chamber 33. A connection bushing 34 is screwed into a passage drilled in the top of the cover 27 in communication with the interior of the chamber 33, and to this may be attached the high pressure oil supply pipe 35.

Depending from the nozzle connection head 24 is the nozzle body which consists of concentric tubes 36 and 37 which are mounted in the following manner: The inner or oil tube 36 extends through and fits tightly into the nozzle connection head and is attached to the bushing 26 so that it communicates with the interior of the oil chamber 33. The bushing 26 also forms a seal around the tube where it passes through the plate 22, thus preventing escape of oil from the chamber 33 except through the tube. The outer or atomizing air tube 37 has a flared head 40 which is mounted in a chamber 41 drilled into the lower face of the nozzle connection head 24 and is held in place by means of externally screw-threaded bushing 42. A soft metal gasket 43 disposed between the flared head of the tube 37 and the end of the bushing 42 seals the air pressure chamber 41 to prevent the escape of air therefrom. This air pressure chamber 41 is in communication, through a passage 44 drilled in the nozzle connection head 24, with a connection bushing 45 to which may be attached a high pressure atomizing air supply pipe 46.

The inner nozzle tube 36 is adapted to receive oil under pressure from the supply pipe 35 and the oil pressure chamber 33 through the screw threaded bushing 26 and then to discharge the oil through an orifice at its lower end. A detailed description of the operation of the nozzle including the manner in which the oil is atomized may be found in the aforementioned copending application of Aldo Macchi, Serial No. 679,885.

The discharge of oil from the nozzle is controlled by a plunger type valve 47, having a valve stem 50 which extends up through the inner nozzle tube to terminate in an enlarged head 51 located in the oil pressure chamber 33. Electromagnetic means are provided for operating the valve 47. In the chamber 33 is a movable magnetic armature 52 pivotally mounted on projections 53 on the ends of the clamping screws 25. One end of the armature engages the enlarged head 51 of the valve stem 50 and the other end extends into operative relation with a magnet coil 56, which, however, is located outside of the chamber 33. This coil 56 is wound around the magnetic core 57 and is mounted in the sealed interior of the bowl 15, the core being supported on the lower side of the cover 17 by means of the screw 60, the head 61 of which is provided with a shading coil 61' and protrudes into the chamber 33 to serve as a pole piece for the magnet.

A strip 62 of magnetic material is secured by means of non-magnetic screws 58 to the connection head 24 and the core 57 and is spaced therefrom by means of non-magnetic washers 59. This strip completes a magnetic path between the magnet core and the connection head with small

gaps inserted therein by means of the washers 59. It will be seen, therefore, that we have in our preferred embodiment included the nozzle connection head 24, of magnetic material, in the flux circuit of the electromagnet thus enabling us to secure added compactness and efficiency of design while maintaining the coil 56 entirely out of contact with the fuel. In addition we have found that our improved type of electromagnetic valve operating mechanism as herein described has great advantages over the common type of solenoid valve operating mechanism especially when it is desired to use alternating current excitation. We are able to completely seal off the magnet coil from the fuel passages in which the magnet armature is located and at the same time to prevent both the chattering and the sticking of the armature such as are frequently encountered when alternating current is used to excite the solenoid type of electromagnetic valve operating mechanism, and we have found that our pivoted type of armature requires much less energy for operation than the solenoid type of armature.

Energization of the electromagnet 56 will cause attraction of the associated end of the armature 52 which causes the armature to pivot about its fulcrum 53 to raise the valve stem 50 and valve 47 against the action of a spring 54 which is seated in a depression 55 in the cover 27 and this will permit fuel to flow from the oil pressure chamber 33 through the inner nozzle tube 36 to be discharged from the end thereof.

An opening 63 is provided in the cover 17, the outer edge of the opening being constructed in the form of a flange 63' for the connection of a conduit for the supply of low pressure combustion air (primary air) to the interior of the bowl 15. A plurality of holes 64 are punched in the dished portion 16 of the bowl 15 to permit the passage of the primary air from the interior of the bowl 15 into the interior of the tubular casing 13 from which a portion of the air is discharged through the inwardly deflecting end 14 of the casing in an annular sheet around and into the fuel discharged from the nozzle. Between the nozzle body and the tubular casing 13 and concentric therewith is placed an intermediate tubular casing 65 which is mounted on the lower reduced end portion of the bushing 42 by means of screws 66 and which is provided with a plurality of holes 70 adjacent the upper end thereof. Adjacent the lower end of the casing 65 are internally projecting fins 71 which serve to hold the casing in spaced relation with the nozzle body, and the discharge end of the casing is tapered inwardly as shown at 72 to direct a flow of air from the casing in an annular sheet around and into the fuel discharged from the nozzle. A disk 67, secured between the casings 65 and 13 at a point below the holes 70 in the casing 65 and approximately opposite the junction between the casing 13 and the bowl 15 to hold the casings rigidly in position with relation to each other, is provided with punched-out holes 73 of such number and area that the summation of the areas of these holes is less than the summation of the areas of the holes 64, thus restricting the flow of air between the casings 13 and 65 and causing a flow of a portion of the air through holes 70 into the interior of the casing 65 around the nozzle body.

Two ignition electrodes 74 are securely mounted in openings in the closed end of the bowl 15 and are sealed in place by means of clamping nuts 75. The upper or body portions of these electrodes extend up into the inside of the bowl

10 where they will be shielded from combustion heat, and are surmounted by connection studs 76, while the lower ends of the ignition electrodes extend externally of the bowl and are provided with spark points 77 projecting into operative relation with the discharge end of the nozzle to ignite the fuel discharged therefrom. A tubular shield 78 of heat resisting material is provided to shield the lower portions of the ignition electrodes from the heat of combustion. Thus the electrodes are so mounted that their body portions are out of the path of the fuel and protected from heat and that their spark points are also fixed out of the path of the fuel, the natural action of the nozzle discharge being depended upon in a well known manner to draw the arc between the electrodes into the fuel spray.

Also mounted within the interior of the bowl 10 and shielded from the heat of combustion is a control switch mechanism 80 held in place by the clamping plate 81 mounted on the upper surface of the cover 27 by means of the screw stud 82. Clamping plate 81 is braced in position by means of a supporting member 83. Associated with this control switch mechanism is a flame responsive device which extends through an opening in the closed end of the bowl 10 into such proximity with the discharge end of the nozzle that it does not come in contact with the fuel but will be quickly responsive to the presence or absence of a flame at the nozzle tip.

The flame responsive device consists of a low expansion rod 84 enclosed in a corrosion resisting metal tube 85 which is mounted in an opening in the closed end of the bowl 10 and held in place by nut 86 which seals the opening. The metal tube responds to temperature changes to a much greater extent than does the rod, the resulting relative motion between the two being used to actuate a contact arm 87 of the control switch mechanism when the tube is subjected to heat from the flame resulting from combustion of the mixture discharged from the nozzle. Movement of the arm 87 causes it to engage either contact 90 or contact 91, either one of which contacts may be designated the cold contact and the other the hot contact in a burner control circuit of the type disclosed in the copending application of Chester I. Hall, Serial No. 439,497, filed February 20, 1930, which is assigned to the assignee of the present invention. The contacts 87, 90 and 91 are connected by means of lead wires 87', 90' and 91' respectively through cable 92 to a master control unit hereinafter referred to.

Electrical energy is supplied from the master control unit to the electromagnetic valve operating means 56 by means of cable 93 which passes through an opening in the cover 17 sealed by means of the packing plate 94 which is secured in place on the cover by screws 95.

Two angle-shaped supporting arms 96 are mounted on the rim 11 of the bowl 10 and serve to support an ignition transformer in proximity to the connection studs on the ignition electrodes.

The following constitutes a description of the manner in which our improved burner head unit may be incorporated in a boiler furnace of the type described in the previously referred to copending applications of Aldo Macchi and H. S. Woodruff. Referring particularly to Fig. 3 of the accompanying drawing, 100 represents a boiler furnace unit having a combustion chamber 101 and a boiler chamber 102. Above the furnace proper is a control chamber 103 formed by the dome 104. The boiler furnace proper is made

up of an inner boiler shell 105 having an aperture 106 in the top thereof and an outer boiler shell 107 having an aperture therein in alignment with the aperture 106. Securely mounted in the aperture in the shell 107 and resting on the rim of the opening 106 in the shell 105 is a tubular well 110 which communicates with the combustion chamber and which provides a seat for the burner head unit. The space between the inner shell 105 and the outer shell 107 is partially or wholly filled with water which thereby forms a partial or complete water backing for the tubular well 110 resulting in high efficiency of heat transfer from the combustion chamber to the boiler chamber.

Over the top of the boiler furnace proper and resting upon the shell 107 is placed a layer of insulation material 111 and a sheet metal drain plate 112. Internally of the dome and mounted upon the drain plate are a combined air blower and pressure air and oil pump 113 having an air intake opening in the top thereof, and a master controller unit 114.

The burner head unit is set bodily into the well 110 with the discharge end of the nozzle directed into the combustion chamber 101 and the rim 11 of the burner head housing 10 resting upon the rim of the tubular well 110 to seal the opening into the furnace. Clamping bars 115 are provided on the outer surface of the outer shell 107 to engage cut-out portions 116 in the rim of the bowl 10 and the burner head unit is secured in place by means of clamping washers 120 and bolts 121 with sleeves 122 disposed between the heads of the bolts and the washers.

Detachably mounted on the supporting arms 96 on the rim of the bowl 10 is an ignition transformer 123 having on the bottom side thereof spring contacts 124 which are adapted to directly engage the studs 76 on the upper ends of the ignition electrodes 74 when the ignition transformer is mounted in place. This provides a short and convenient connection between the ignition transformer and the ignition electrodes and makes it possible to dispense with dangerous high tension leads therebetween. The transformer may be positively grounded in a well known manner through the supporting arms and bowl structure.

When the burner head unit is in place in the well 110 simple connections may be made thereto to put the burner in operative condition. A flexible metal conduit 125 is provided to conduct low pressure or primary air from the blower to the interior of the bowl 10, the flexible conduit being secured at its lower end to the flanged rim 63' of the opening 63 in the cover 17. 126 represents a flexible copper tube for supplying fuel from a reservoir not shown to the combined fuel and air pump 113, and 35 and 46 represent similar copper tubes for respectively conveying fuel and atomizing air under pressure from the pump to the burner head. 129 represents a lead for conveying electrical energy from any suitable source not shown to the master controller unit; and 92, 127 and 128 represent leads for conveying electrical energy from the master control unit to the flame responsive control switch, ignition transformer and blower motor respectively. As has previously been pointed out provision is made for quickly and easily attaching the various electrical leads and air and oil supply tubes to the burner head when the latter is in position in the boiler furnace structure. The dome 104 may be secured in place over the control apparatus on top of the furnace by means of the wing nut 130 which en-

gages the stud 82 previously mentioned as being mounted upon the cover 27.

From the foregoing description it will be seen that we derive pronounced advantages from our improved manner of enclosing the various essential burner elements in a correlated relation in an enclosing structure as set forth herein. The nozzle body is doubly protected by the concentric tubular casings 13 and 65 and in addition the passage of the primary air through these casings will carry the heat away from the nozzle and the casings and prevent to a large extent the transfer of heat from the outer casing to the inner casing and from the inner casing to the nozzle. Due to the cooling effect of the primary air and shielding of the nozzle, the nozzle is maintained at a temperature well below the carbonizing point of the oil.

Bowls 10 and 15 also provide a double walled shield for the electromagnetic valve operating mechanism. Since the bowls are spaced apart and the outer bowl 10 is open to atmosphere, an insulating body of air is provided between the bowls which will largely prevent the transfer of heat from the outer bowl to the inner bowl. In addition the outer bowl is in contact with the rim of the well 110 so that heat will be conducted from the bowl to the wall of the well and thence to the liquid within the boiler chamber. Further cooling of the magnet coil and upper nozzle structure is secured by the passing of the primary air through the inner bowl over the coil and nozzle connection head whereby heat is conducted away from these elements and transfer of heat to them from the inner bowl is also prevented. In passing through the bowl and the tubular casings the primary air becomes preheated from the heat given off by the various elements and the discharge of such preheated air into the fuel spray delivered from the nozzle further adds to the efficiency of the operation of the burner head unit.

It is to be noted that the outer bowl also serves as a protecting shield for the flame responsive control switch mechanism and for the body portions of the ignition electrodes.

It is contemplated that various modifications may be made in the preferred form of our improved burner head unit herein described without departing from our invention and it is intended that these shall be included within the scope of the following claims in which we set forth those features which we believe to be new in the art.

What we claim as new and desire to secure by Letters Patent of the United States, is:

1. A fluid fuel burner head unit for a furnace including in combination a bowl adapted to close an opening in the furnace, a fuel delivery nozzle mounted in the bowl and extending through the end wall thereof for discharging fuel externally of the bowl, ignition electrodes mounted in the bowl and extending through the end wall thereof into operative spaced relation with the discharge end of the nozzle for igniting the fuel discharged therefrom, and means including a flame responsive element mounted on said bowl and extending through the end wall thereof into position to be responsive to a flame at the discharge end of the nozzle for controlling the operation of said fuel igniting means.

2. A fluid fuel burner head unit for a furnace including in combination an enclosing bowl having a flanged rim for mounting the bowl to seal

an opening into the furnace, a fuel delivery nozzle mounted in the bowl and extending through the end wall thereof for delivering fuel to the furnace, electrically operated means operatively associated with the nozzle inside the bowl for controlling the delivery of the fuel, electrical ignition means mounted in the bowl and including electrodes extending through the end wall thereof into spaced operative relation with the delivery end of the nozzle for igniting the fuel, and means mounted inside the bowl including a flame responsive element extending through the end wall of the bowl to be responsive to flame at the delivery end of the nozzle for controlling said fuel delivery controlling and ignition means.

3. A fluid fuel burner head unit including in combination, a fuel delivery nozzle, a bowl adapted to close an opening in a furnace and having means for supporting the nozzle inside the bowl with the discharge end of the nozzle protruding through an opening in the end wall of the bowl, ignition electrodes mounted in the bowl with one end of each thereof extending through the end wall of the bowl into spaced operative relation with the discharge end of the nozzle, connection studs on the other ends of the electrodes, an ignition transformer provided with electrical contacts, and supporting means on the rim of the bowl for detachably mounting the transformer with its said electrical contacts directly engaging the connection studs of the ignition electrodes.

4. A fluid fuel burner head unit for a furnace having an opening in the wall thereof, including in combination, a bowl having a flanged rim for mounting the bowl to seal said furnace opening, a fuel delivery nozzle mounted in the bowl and extending through the end wall thereof for discharging fuel into the furnace, electrically operated valve means mounted inside the bowl and operatively associated with the nozzle for controlling the discharge of fuel therefrom, electric ignition electrodes supported by the bowl and extending into spaced operative relation with the discharge end of the nozzle for igniting the fuel, and means mounted in the bowl including a flame responsive element extending through the end wall of the bowl to be responsive to flame at the discharge end of the nozzle for controlling said fuel discharge controlling and igniting means.

5. A fluid fuel burner head unit including in combination, a fuel delivery nozzle having a valve for controlling the discharge of fuel therefrom, electromagnetic means mounted in proximity to the supply end of the nozzle and connected to operate the valve, and a plurality of bowls nested around the supply end of the nozzle and said means to form a multi-walled heat shield therefor with air spaces between the bowls, said bowls having apertures in the end walls thereof through which extends the discharge end of the nozzle.

6. A fluid fuel burner head unit including in combination, a fuel delivery nozzle, a bowl surrounding the inlet end of the nozzle and having an aperture in the end wall thereof through which extends the discharge end of the nozzle in spaced relation to the rim of the aperture, a cover for sealing the open end of the bowl and means for admitting air into the interior thereof, a hollow tubular casing mounted in registry with the aperture in the end wall of the bowl and extending outwardly therefrom in surrounding spaced relation to the discharge end of the nozzle to provide an air passage around

the nozzle in communication with the interior of the bowl, a second hollow tubular casing disposed between the nozzle and the first tubular casing and extending in concentric spaced relation thereto for dividing the flow of air through said air passage around the nozzle, and means at the outer ends of said tubular casings for directing the flow of air in an annular sheet around and into the fuel delivered from the discharge end of the nozzle.

7. A fluid fuel burner head unit including in combination, a fuel delivery nozzle having a valve for controlling the discharge of fuel therefrom, a connection head provided with means for supporting the inlet end of the nozzle and for conveying a supply of fuel thereto, electromagnetic means for operating said valve including a magnet coil supported by the connection head, telescoped spaced apart inner and outer bowls substantially surrounding the connection head and the magnet coil in spaced relation thereto to form a double walled air insulated shield therefor and provided with aligned apertures in the end walls thereof for the passage of said nozzle therethrough, and concentric spaced apart tubular casings extending through the aperture in the outer one of the bowls in surrounding spaced relation to the nozzle and in communication with the interior of the inner one of the bowls to provide a double walled air insulated shield for the nozzle.

8. A fluid fuel burner head unit including in combination, a fuel delivery nozzle having valve means for controlling the discharge of fuel therefrom, electro-magnetic means for operating the valve means and including a magnet coil mounted on the supply end of the nozzle, and an air conduit surrounding the magnet coil and the nozzle for directing a flow of cooling air over the magnet coil and around the fuel discharged from the nozzle to promote the combustion thereof.

9. A fluid fuel burner head unit including in combination, a fuel delivery nozzle having valve means for controlling the discharge of fuel therefrom, electro-magnetic means for operating the valve means and including a magnet coil supported adjacent the nozzle, a conduit surrounding the nozzle for conducting combustion air into intimate contact with the fuel discharged from said nozzle, and means for cooling said coil including a casing surrounding the magnet coil for directing a flow of air thereover and connected to supply air to said combustion air conduit.

10. A fluid fuel burner head unit including in combination, a fuel delivery nozzle having a valve for controlling the discharge of fuel therefrom, electro-magnetic means for actuating the valve including an operating mechanism supported adjacent the inlet end of the nozzle, a pair of bowls in surrounding relation to said mechanism and said inlet end of the nozzle with an air space between the end walls of the bowls to form a double walled heat shield for said mechanism, said bowls having apertures in the end walls thereof through which extends the discharge end of the nozzle, and ignition electrodes mounted in the outer of the bowls and extending outwardly through the end wall thereof into spaced operative relation with the discharge end of the nozzle.

11. A fluid fuel burner head unit including in combination, a fuel delivery nozzle, a connection head of magnetic material surrounding the supply end of the nozzle and secured thereto, means pro-

viding a fluid-tight fuel storage chamber mounted on said connection head in communication with the nozzle, a valve for controlling the discharge of fuel from the nozzle, means for actuating said valve including a magnetic member operatively connected thereto and movably mounted within said chamber, means for actuating said magnetic member including a magnet coil disposed adjacent said connection head externally of said chamber and in operative relation to said magnetic member, and means including said connection head for completing the magnetic circuit for the flux produced by said magnet coil.

12. A fluid fuel burner head unit including in combination, a fuel delivery nozzle, a connection head of magnetic material surrounding the supply end of the nozzle and secured thereto, means providing a fluid-tight fuel storage chamber mounted on said connection head in communication with the nozzle, a valve for controlling the discharge of fuel from the nozzle, means for actuating said valve including a magnetic member operatively connected thereto and movably mounted within said chamber, means for actuating said magnetic member including a magnet coil disposed adjacent said connection head externally of said chamber and in operative relation to said magnetic member, means including said connection head for completing the magnetic circuit for the flux produced by said magnet coil, and heat protective means for said connection head and said magnet coil including a combustion air supply casing disposed therearound and provided with means for directing a stream of combustion air adjacent the discharge end of the nozzle.

13. A fluid fuel burner head unit including in combination, a fuel delivery nozzle having a fluid conducting passage and a valve operatively associated therewith for controlling the discharge of fuel therefrom, means providing a fluid-tight chamber adjacent the supply end of the nozzle and communicating with said passage, and electromagnetic means for operating said valve including a magnetic member pivotally mounted in said chamber with one end operatively connected to said valve and a cooperating magnetic structure having one portion thereof extending into said chamber adjacent the pivotal mounting of said magnetic member and having another portion with an energizing winding thereon mounted externally of said chamber in operative relation to the other end of said magnetic member.

14. A fluid fuel burner head unit including in combination, a fuel delivery nozzle and a valve operatively associated therewith for controlling the discharge of fuel therefrom, a connection head of magnetic material mounted in surrounding relation to the supply end of the nozzle, means providing a fluid-tight fuel storage chamber mounted on said connection head in communication with the nozzle, and means for operating said valve including an electromagnetic armature pivotally mounted within said chamber with one end connected to said valve and a magnetic energizing coil disposed outside of said chamber in operative relation to the free end of said armature, said connection head being arranged to form a portion of the magnetic flux circuit for said armature.

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