Nov. 17, 1953

A. L. JUDSON

2,659,428

OIL BURNER ELECTRIC IGNITER

Filed July 17, 1950

4 Sheets-Sheet 1

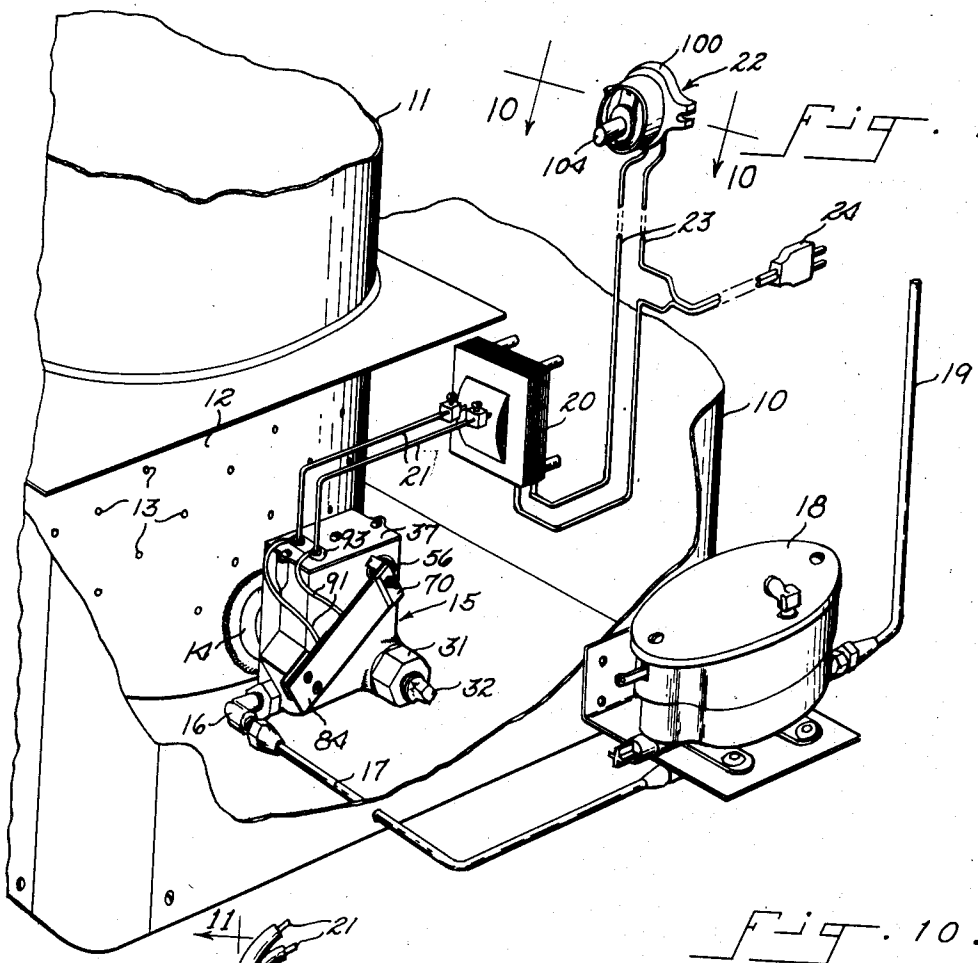


Fig. 1.

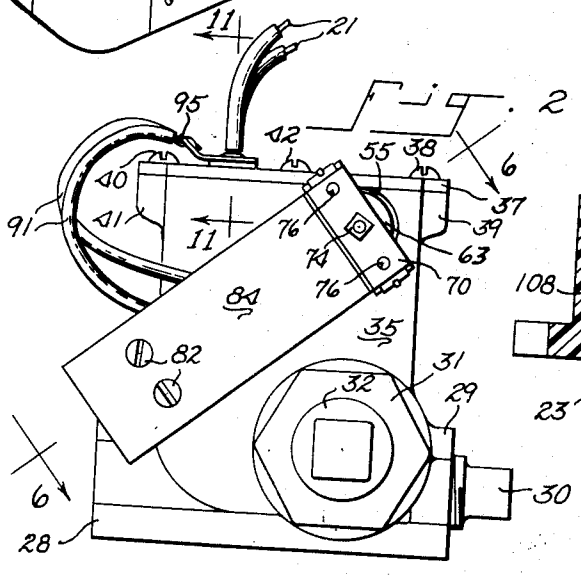


Fig. 2.

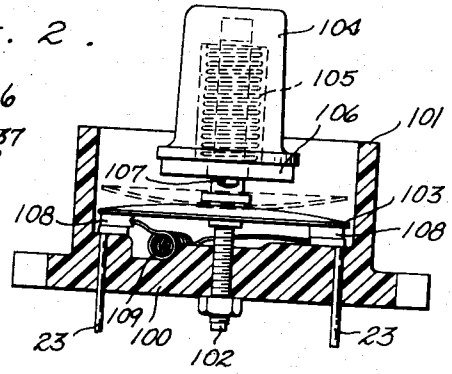


Fig. 10.

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4 Sheets-Sheet 2

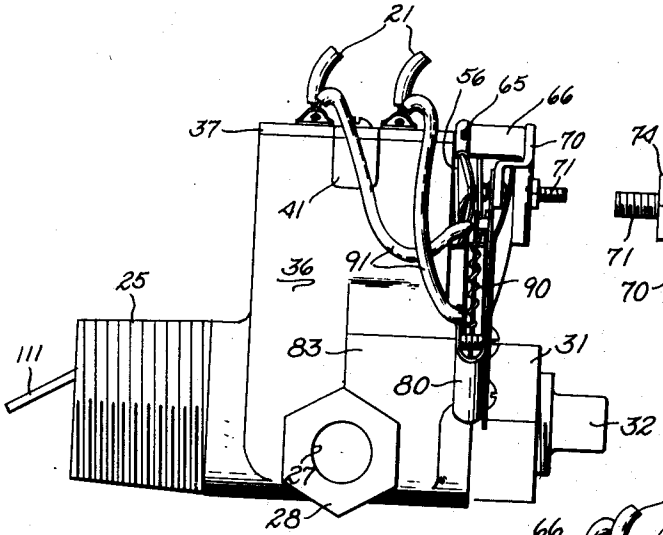


Fig. 3.

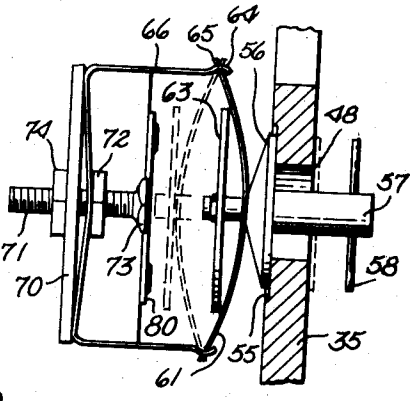


Fig. 9.

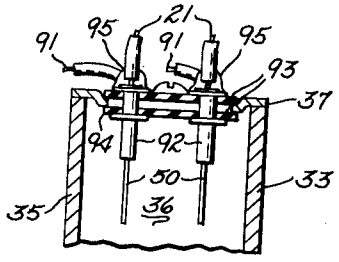


Fig. 11.

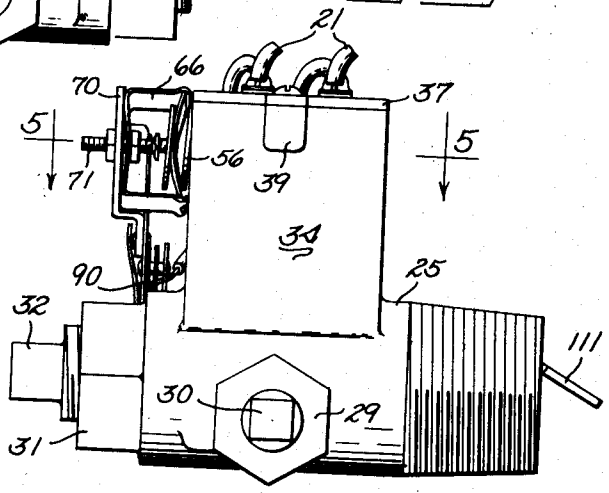


Fig. 4.

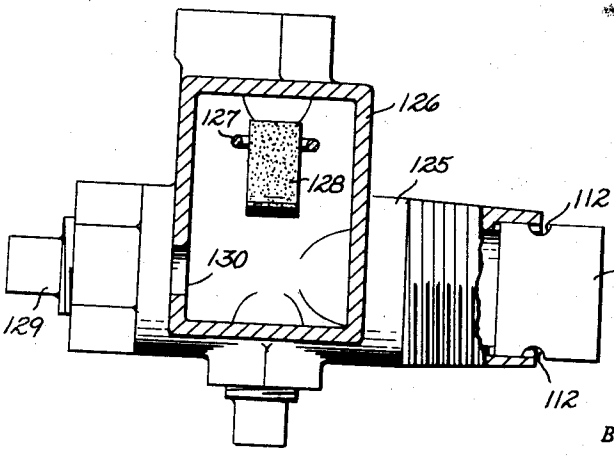


Fig. 12.

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4 Sheets-Sheet 3

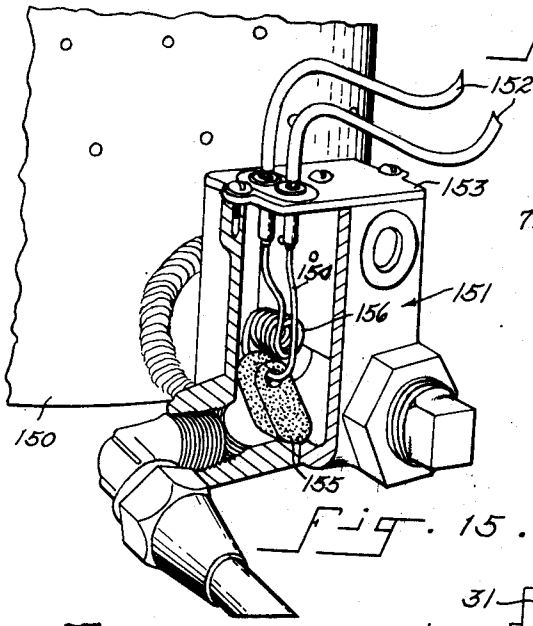


Fig. 15.

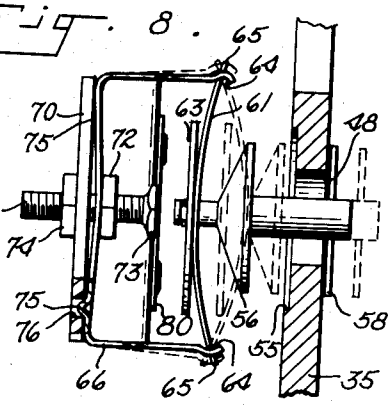


Fig. 8.

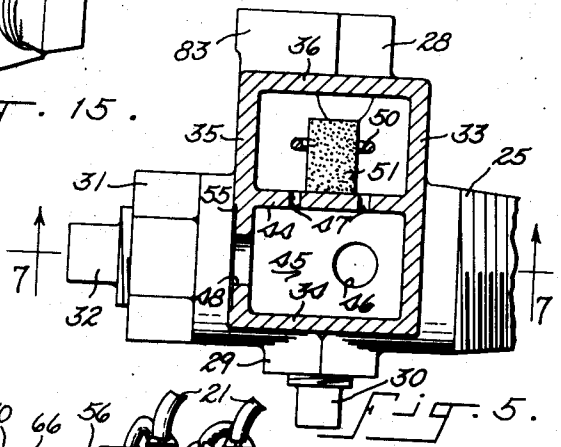


Fig. 5.

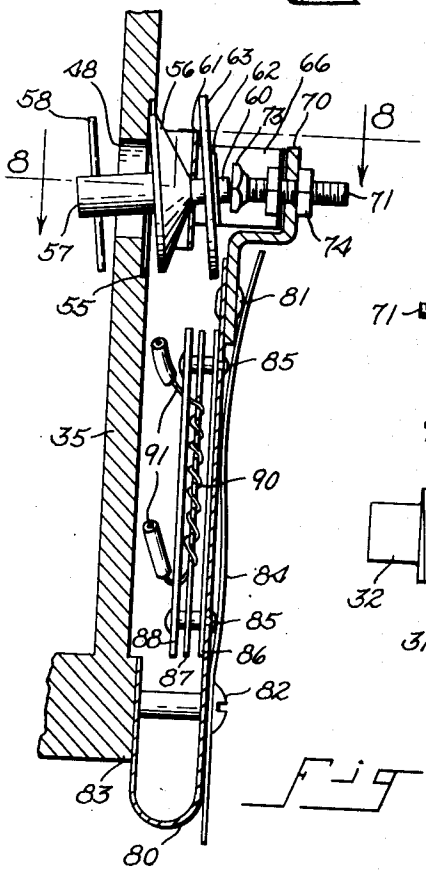


Fig. 6.

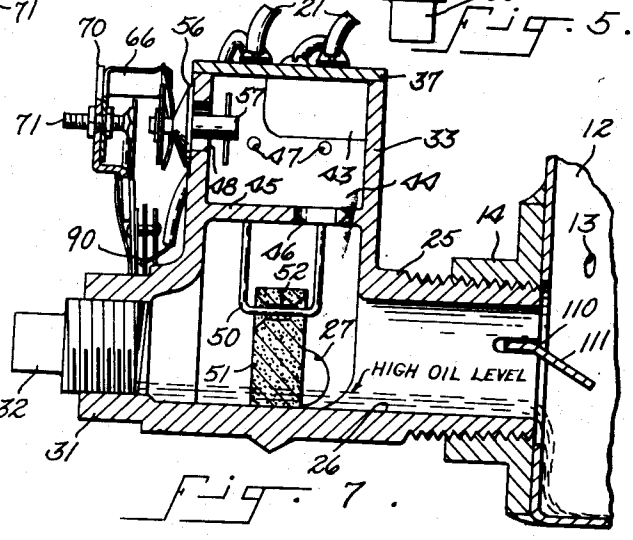


Fig. 7.

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Filed July 17, 1950

4 Sheets-Sheet 4

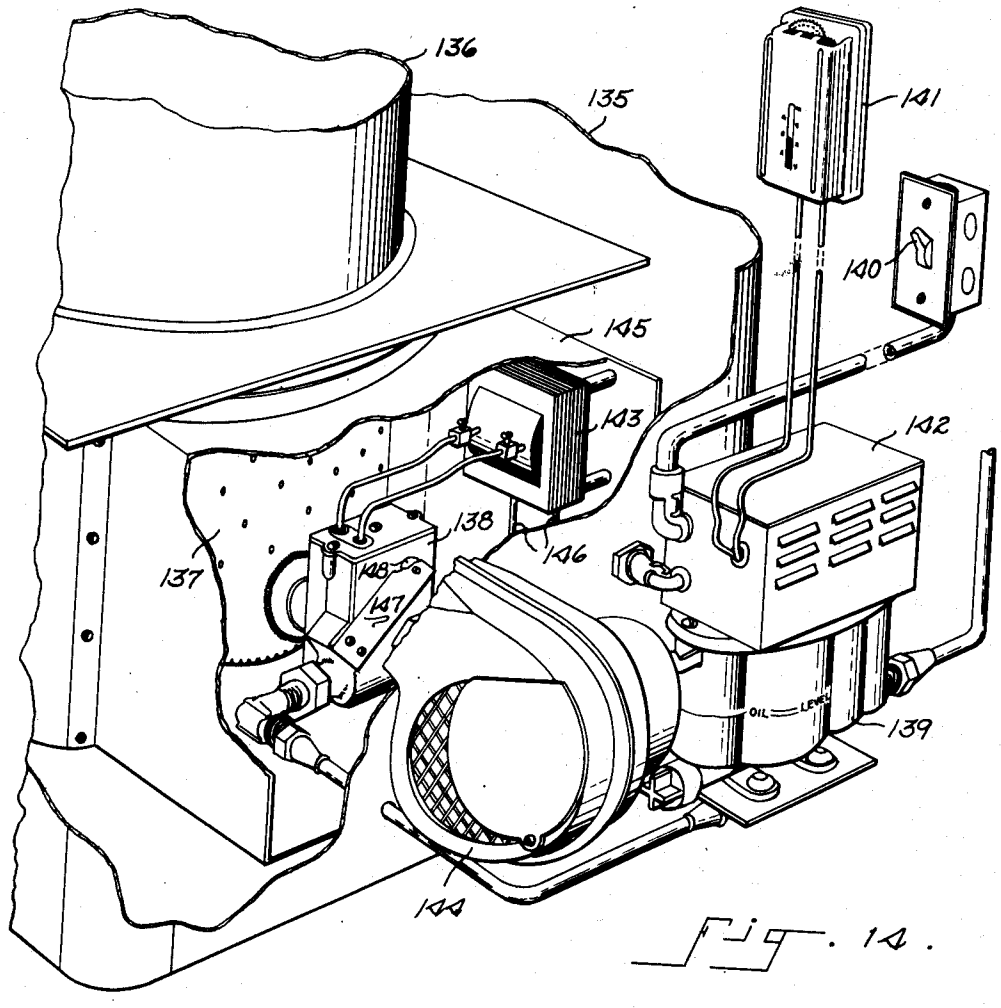


Fig. 14.

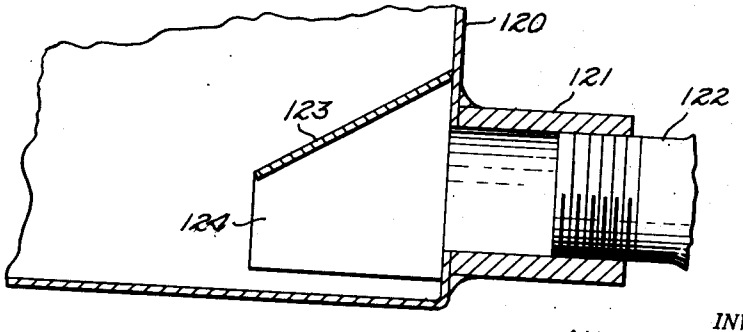


Fig. 13.

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Patented Nov. 17, 1953

2,659,428

UNITED STATES PATENT OFFICE

2,659,428

OIL BURNER ELECTRIC IGNITER

Albert L. Judson, Portland, Oreg., assignor to Iron Fireman Manufacturing Company, Portland, Oreg., a corporation of Oregon

Application July 17, 1950, Serial No. 174,265

8 Claims. (Cl. 158—91)

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My present invention comprises a combined oil inlet and igniter for a vaporizing oil burner of the type comprising an open receptacle having means for admitting oil and combustion-supporting air thereinto.

A principal object of the present invention is to provide an oil inlet and electrical igniter in which an air valve is provided under control of thermostatic means, the valve being so operated as to be open at all times except when it is desired to snuff out the pilot flame after ignition should have occurred in the burner receptacle.

A further object of the present invention is to provide a device of the character described embodying a wick element associated with a resistance igniter, in which the resistance igniter and associated wick are located in one side of a well rising from the oil inlet body in order to permit the use of a cleaning tool which sometimes must be used to dislodge carbon deposits within the burner adjacent the oil inlet opening.

A further object of the present invention is to provide an oil inlet and igniter of the character described adapted for use with means to prevent operation of the igniter when the burner receptacle is too hot safely to receive a fresh supply of fuel oil.

A further object of the present invention is to provide an oil inlet and igniter in which means are incorporated to admit pilot flame combustion-supporting air when a pilot flame is being kindled, temporarily to arrest the admission of air after the pilot flame has burned a short while whereby to snuff out the pilot flame, and thereafter to readmit air to the interior of the oil inlet and igniter to assure the scouring of combustion products from the region of the igniter during normal operation of the burner.

A further object of the present invention is to provide an oil inlet and igniter of the character described in which a thermostatic element for operating the air valve is associated with electrical resistance heating means for assuring rapid, positive action of the valve.

A further object of the present invention is to provide a combined oil burner and igniter therefor in which means are provided to direct a pilot flame against the portion of the burner receptacle onto which the oil flows whereby to expedite ignition in the receptacle.

A further object of the present invention is to provide a construction of the foregoing character in which a minimum number of inexpensive, simplified and sturdy parts are incorporated.

The foregoing and other objects and advantages of the present invention will be more readily ascertained by inspection of the following specification taken in connection with the accompanying drawing wherein like numerals refer to like parts throughout, while the features of novelty will be more distinctly pointed out in the appended claims.

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In the drawing, Fig. 1 is a view in perspective, with parts broken away, illustrating a form of the present invention associated with a typical oil burner appliance and control means therefor;

Fig. 2 is a front elevation of the form of the invention illustrated in Fig. 1;

Fig. 3 is a left side elevation of Fig. 2;

Fig. 4 is a right side elevation of Fig. 2;

Fig. 5 is a horizontal section taken substantially along line 5—5 of Fig. 4;

Fig. 6 is a section, on an enlarged scale, taken substantially along line 6—6 of Fig. 2;

Fig. 7 is a vertical section taken substantially along line 7—7 of Fig. 5;

Fig. 8 is a section taken substantially along line 8—8 of Fig. 6, with the parts illustrated in a different phase of operation;

Fig. 9 is a view similar to Fig. 8, with the parts illustrated in a different phase of operation;

Fig. 10 is a section through a form of control element of utility with the present invention, taken substantially along line 10—10 of Fig. 1;

Fig. 11 is a vertical section taken substantially along line 11—11 of Fig. 2;

Fig. 12 is a view similar to Fig. 5 of a modified form of oil inlet and igniter body;

Fig. 13 is a partial section through a burner receptacle and a portion of a modified form of oil inlet body associated therewith;

Fig. 14 is a view in perspective, with parts broken away, of an appliance having an automatic control circuit associated therewith and a modified form of air valve operating mechanism associated with the oil inlet and igniter; and

Fig. 15 is a view in perspective, with parts broken away, illustrating a modified form of igniter resistance element.

Referring to Figs. 1 to 11 inclusive, the invention is illustrated in association with an oil burning appliance including a jacket 10 having a heat exchanger 11 mounted therein, the lower end of the heat exchanger being associated in the usual manner with a typical vaporizing burner receptacle 12 having a plurality of air inlet openings 13 in the vertical walls thereof. An internally threaded collar 14 is welded to the side wall of the burner receptacle surrounding an oil

inlet opening therein to provide means for association with the burner of a combined oil inlet and igniter 15 comprising the present invention. As herein illustrated, oil is admitted to the interior of the member 15 through an elbow 16 and an associated oil supply conduit 17 leading from a float valve device 18 of conventional type, the float valve device being supplied with oil from any suitable source of supply through a supply conduit 19. The oil float valve may be any of a number of commercially available types which permit the flow of a regulated quantity of oil therefrom when opened, and which may be closed to prevent further supply of oil when desired, the float device in accordance with usual practice preventing the admission of oil into the receptacle to the level of the lowermost row of air inlet openings 13. In Fig. 1 it is seen that a transformer 20 may be suitably mounted on the appliance, the transformer being connected by wires 21 to the resistance element of the igniter, to be described later, and to a manual starter button indicated at 22 by means of a pair of wires 23, one of which may be broken to provide means for connecting the appliance to a source of current as by means of a plug-in connector 24.

The inlet and igniter 15 comprises an elongated, hollow body portion 25 having a threaded inner end adapted to be screwed into the inlet collar 14. The body 25 provides an oil conduit 26 leading from the oil supply tube to the interior of the burner receptacle. Oil is admitted to the interior of the body through a lateral opening 27 extending outwardly through a hexagonal boss 28 on the side of the body, the interior of the boss being threaded for reception of the elbow 16. For convenience the opposite side of the body may be provided with a similar hexagonal boss 29 in order that the oil inlet conduit may be connected to either side, the unused opening to be closed as by means of a removable plug 30. The front of the body is provided with a hexagonal boss 31 in which is mounted a plug 32, the plug being in line with the collar 14 so that a rod may be driven through the body to remove carbon deposits which may accumulate in the burner adjacent the inlet. The conduit 26 is of such size that the oil remains at a low level therein, there being a constantly open flame passage provided by the upper portion of the conduit.

The intermediate portion of the burner body comprises an open well extending upwardly from the cylindrical body portion 25, the well preferably being rectangular in cross-section and comprising a rear wall 33, a right side wall 34, a front wall 35, and a left side wall 36. The walls terminate at a common level and are machined so that a closure plate 37 may provide an airtight cover for the well. The plate is attached by means of a screw 38 threaded into a boss 39 on the side wall 34, a second screw 40 threaded into a boss 41 on the side wall 36, and a third screw 42 threaded into a boss 43 on a central, vertical portion of a partition 44. The partition 44 extends from the lower surface of the closure plate 37 downward to an intermediate level and is there joined by a horizontal portion 45 extending to the right side wall 34, the partition closing off an upper portion of the well to provide an air inlet chamber. An air outlet opening 46 is provided in the portion 45, preferably near the rear wall 33, so that air passing through the opening 46 sweeps around the corner between the rear wall 33 and the cylindrical portion 25 in passing into the burner receptacle, thereby

leaving the major portion of the lower part of the well in relatively quiescent condition. A pair of small openings 47 are provided about midway of the vertical portion of the partition 44 so that a small supply of air, insufficient for complete combustion of the vaporized fuel may be drawn into the left portion of the well whenever the air inlet opening 48 in the front wall 35 is open. The opening 48 is open, as will presently appear, whenever a resistance element 50 is energized to ignite a pilot flame.

The resistance element is in the form of a bail upon which is supported a porous, capillary wick member 51 preferably made of sintered metal as described and claimed in application Serial No. 717,671, now Patent No. 2,520,159, issued August 29, 1950. In the present invention the ends of the passage 52 in the wick through which the resistance element extends are enlarged, the passage comprising a restricted central portion of larger diameter than the diameter of the resistance wire 50, and the outer ends of the passage being countersunk to provide widely flaring mouths whereby a large amount of combustion-supporting air may reach the ends of the relatively quiescent zone provided by the restricted area of the passage in which the resistance element contacts the wick member. The wick member is longer than the distance between the supporting bail of resistance wire and the bottom of the well so as to insure contact of the wick member by the first oil to enter the device. The bottom of the wick member is preferably rounded and the inner surface of the lower portion of the side wall 36 is preferably rounded toward the central portion of the well so that when the wick is being lowered into position it will be caused to swing laterally and permit assembly of the closure plate. The lower end of the wick member is directly in front of the inlet opening 27 so that oil flowing into the body 25 rapidly contacts the porous wick. Some of the oil is bypassed or diverted by the capillary passages of the wick and caused to travel upwardly into proximity with the resistance element by which it is vaporized and ignited whereby an oil rich pilot flame is initiated, the flame first occurring in the relatively quiescent passage 52, then spreading from both ends thereof across the surface of the wick and vaporizing and igniting some of the oil flowing through the passage 26. The pilot flame is swept into the burner receptacle along the surface of the inwardly flowing oil in a blowtorch fashion by the stream of air passing through the openings 46 and 48. It is to be appreciated that the amount of oil which will flow through the passage 26 would not fill the passage 26 beyond a small fraction of its internal height so that there is always free space for the passage of pilot flame supporting air through the upper portion of the passage 26. When the air inlet opening 48 is closed air cannot reach the interior of the well and the passage 26 so that the pilot flame will be snuffed out. Thereafter if the opening 48 is again opened a stream of scouring air will pass through the opening 46 to prevent flame from creeping back into the passage 26, to prevent corrosive products of combustion from reaching the wick or the resistance element, and to prevent the deposit of soot by backdrafts into the passage 26. The openings 47 likewise function to scour products of combustion from the left portion of the well.

The opening 48 is surrounded at its outer end by a concentric countersink 55, the bottom of

the countersunk area providing a valve seat for reception of a valve 56 having a flat inner surface and a conical outer surface, the valve being mounted on a coaxial valve stem 57 extending through the opening 48 and of much smaller diameter than the opening 48. A crossbar 58 is mounted in the inner end of the stem 57 at such a distance from the valve 56 that considerable longitudinal movement of the stem is permitted. The stem extends through the valve 56 to provide a mounting portion 60 passing through a central opening in a mounting spring 61, the opening being of larger diameter than the portion 60 so that the valve is loosely mounted on the mounting spring and may cant to considerable extent due to the excessive weight of the stem 57, as illustrated in Fig. 6. The outer end of the mounting portion 60 is provided with an annular groove into which is slipped a hairpin retainer 62 which holds a loosely mounted disc 63 on the portion 60 between the mounting spring 61 and the outer end of the mounting portion. The mounting spring is in the form of an elongated plate having squared ends which are retained in the transversely hooked ends 64 of a U-shaped tensioning spring 66, the ends of the mounting spring 61 having central tongues 65 passing through central openings in the portions 64. The bight of the tensioning spring 66 is normally flexed inwardly from a plane surface but may be stressed toward a plane surface so as to adjust the inward pressure of the portions 64 whereby to regulate the force tending to bow the mounting spring 61. The tensioning spring 66 is mounted upon a bracket plate 70 by a limiting screw 71 passing through a central opening in the spring and a threaded opening in the center of the mounting bracket 70, and the tension thereof may be regulated by a nut 72. The limiting screw 71 has a flat head 73 projecting toward the outer end of the reduced portion 60 of the valve stem, the position of the head 73 being adjustable to limit the extent to which the valve stem may be moved outwardly by the mounting spring 61 when the spring passes over-center in one direction. The adjusted position of the screw 71 may be fixed by a lock nut 74 bearing against the outer surface of the mounting bracket 70. In order to retain the tensioning spring 66 in proper position it is provided with a pair of dimples 75 which project into locating openings 76 in the mounting bracket 70.

The mounting bracket 70 is retained at the free end of a bimetallic valve actuator 80 by rivets 81. The relatively fixed end of the bimetallic element is bent reversely and a pair of mounting screws 82 are passed through both arms thereof and screwed into a boss 83 on the lower portion of the side wall 36. The bimetallic actuator 80 is arranged so that the long actuating arm thereof is normally stressed toward the front wall 35, the effective portion of the bimetallic element 80 extending diagonally upward across the front of the well and being thereby shielded from heat radiating from the burner receptacle. A sheet 84 of fibrous insulating material is retained against the outer surface of the bimetallic element by the screws 82 and shields the bimetallic element against the effect of heat radiated from the jacket wall or circulating air.

A plurality of spacer rivets 85 mount a plurality of dielectric sheets upon the inner surface of the effective portion of the bimetallic element 80, there being a first sheet 86 mounted

against the inner surface of the bimetallic element, a second sheet 87 mounted on the intermediate portions of the rivets, and a third sheet 88 at the ends of the rivets. The intermediate sheet 87 has its longitudinal edges notched or serrated to provide means to hold the turns of a coil of resistance wire 90 wrapped about the intermediate portion of the sheet 87 from short-circuiting with each other, and the two other sheets 86 and 88 provide a sandwich insulating shield to prevent contact of the resistance coil with metallic elements of the combination. A pair of insulated conductor wires 91 connect the ends of the coil 90 in parallel with the ends of the resistance element 50 so that whenever the igniter resistance element is energized the heater coil 90 is likewise energized.

The wires 21 and the ends of the igniter resistance element 50 are connected to a pair of conductor rivets 92, which extend through a spaced pair of insulator plates 93 closing an opening 94 in the closure plate 37, the lip of the opening 94 being depressed so as to provide a countersink in which the outer insulator plate 93 is firmly seated. The outer ends of the conductor rivets 92 are provided with ears 95 to which the conductor wires 91 are attached.

In Figs. 1 and 10 there is illustrated a manual starter button representative of a type of device of desirable utility in connection with the present invention, the same comprising an insulator base 100 adapted to be mounted upon a supporting surface and having an outwardly opening, cylindrical flange 101 providing a socket. A screw 102 is threadedly mounted in the base and extends axially outward through the socket, the screw having a spaced pair of abutments at an intermediate portion providing a seat for a coaxial bimetallic snap disc 103. The outer end of the screw provides a stem for a slidably mounted manual button 104 normally urged outwardly by an enclosed spring 105. The button supports a bar 106 at its inner extremity which is provided with a pair of inwardly projecting abutments 107 adapted to contact the surface of the snap disc when it has been flexed outwardly by heat, whereby the disc may be snapped inwardly by depressing the button 104. The snap disc 103 carries a pair of contacts 108 adapted to engage a fixed pair of contacts constituting the terminals of the wires 23. A small heater coil 109 is mounted beneath the disc 103 with one terminal attached to one of the wires 23 and its other terminal attached to one of the contacts 108, so that whenever the bimetallic element is flexed inwardly the heater coil 109 is energized. After a short period of time, depending upon the characteristics of the heater coil and of the snap disc, the disc will snap outwardly to the position shown in dash outline, thus breaking the circuit to the igniter. It may be preferred to have the socket relatively open so that a major portion of the outer surface of the bimetallic disc may be exposed to heat radiating from the heat exchanger 11 or to warm air circulating about the heat exchanger 11, under such circumstances being prevented from flexing to contact-making position so as to prevent energization of the igniter resistance element when the appliance is hot. Thus means are provided to prevent energization of the igniter under an undesirable condition and it is to be appreciated that this means could be incorporated in a circuit for controlling the operation of the oil valve so as to prevent reignition until the burner cools.

Operation

When oil is caused to flow through the inlet a portion thereof is diverted upwardly through the capillarities of the wick into proximity with the resistance element **50**. At this time the igniter is cold and the bimetallic element **80** is flexed toward the wall **35** so that the extremities of the stressing spring **66** rest against the outer surface of the wall **35**. In reaching this position the inner surface of the valve **56** has engaged the bottom of the countersink **55** and the outer conical surface thereof has forced the mounting spring **61** to travel beyond center and bow itself outwardly to the extent that the end of the portion **60** engages the limiting head **73** of the screw **71**. In this condition the valve **56** is spaced from the valve seat and the weight of the stem **57** causes it to cant to the position illustrated in Fig. 6, thereby opening the air inlet **48** and permitting the entry of pilot flame combustion supporting air. As soon as the manual button **104** is depressed to snap the disc **103** into contact-making position the resistance element **50** becomes hot, and in a few seconds will ignite some of the oil, whereupon a flame will commence and will flow with the oil into the interior of the burner receptacle. At the same time the heater coils **90** and **109** are energized, the heater coil **90** causing the bimetallic element **80** to curl outwardly until the disc **63** forces the mounting spring **61** to snap inwardly from the position shown in full outline in Fig. 8 to the position shown in dotted outline in Fig. 8, this being due to the crossbar **58** engaging the inner surface of the wall **35**. At this point the valve **56** is still spaced from the bottom of the countersink due to engagement of the edge of disc **63** with the spring **61** and thereby limiting the amount of flexing of the spring so that combustion-supporting air continues to flow through the igniter body to support the pilot flame therein. When the heater coil **109** has sufficiently heated the snap disc **103** to cause it to spring outwardly the circuit is opened, thereby de-energizing the resistance element **50** and the heater coils **90** and **109**. The bimetallic element **80** thereupon moves inwardly from the position illustrated in Fig. 8 to the position illustrated in Fig. 9, the inwardly bowed mounting spring **61** engaging the outer surface of the valve **56** to force it flat against the valve seat and close the air inlet **48**, thereby extinguishing the pilot flame. The bimetallic element **80** thereupon cools to cause the valve mechanism to return to the position illustrated in Fig. 6, thus recocking the mounting spring **61** and opening the air inlet opening **48** to permit air to scour the interior of the igniter body.

Flame deflector

The inner end of the threaded portion of the body **25** is preferably provided with a pair of horizontally extending, internal grooves **110** in which is seated the inner end of a downwardly bent deflector plate **111** by which the pilot flame is spread laterally and deflected downwardly against the nearby bottom surface of the burner receptacle and caused to heat a localized area thereof in rapid order. Vaporization of oil and initiation of combustion in the burner receptacle is thereby greatly expedited. As seen more clearly in Fig. 12, the lateral edges of the plate **111** are preferably provided with a pair of notches **112** into which small portions of the igniter body may be displaced to retain the deflector plate in position.

A modification of the deflector is illustrated in Fig. 13 wherein it is seen that a burner receptacle **120**, provided with an inlet nipple **121** for mounting a combined inlet and igniter indicated partially at **122**, may be provided with a deflector hood having a downwardly inclined upper wall **123** in position to deflect the pilot flame downwardly against the bottom of the burner receptacle. The hood may be provided with side walls **124** to concentrate the heat, but the side walls should terminate above the bottom of the receptacle to permit lateral spreading of the oil and flame.

Modified well construction

In Fig. 12 there is illustrated portions of a modified igniter body comprising a cylindrical portion **125** and a well **126** as previously described, in which is mounted a resistance element **127** supporting a wick member **128**. The wick member and resistance element are mounted adjacent the inlet to the body so as to leave the cylindrical portion clear for passage of a cleaning tool when the plug **129** is removed. The upper portion of the front wall of the well is provided with an air inlet opening **130** with which may be associated a valve and valve actuator as previously described. In this form of the invention the internal partitions have been eliminated since in many appliances the draft through the well would not be strong enough to disturb the operation of the igniter.

Modified air valve actuator

In Fig. 14 there is illustrated an oil burning appliance comprising a jacket **135** housing a heat exchanger **136** and an associated oil burner receptacle **137** as previously described. A combined oil inlet and igniter **138** is associated with the burner receptacle and is connected to an automatic float valve **139** in accordance with standard practice. The igniter resistance element is controlled by a circuit including a manual switch **140**, a thermostat **141**, a controller **142**, and a transformer **143**. Combustion under forced draft is achieved by means of a blower **144** exhausting into a plenum chamber **145** in which the burner receptacle is mounted. Details of the control circuit are immaterial, this illustration being exemplary of automatic control circuits of many types with which burners of the type under consideration having igniters of the present invention associated therewith may be arranged. The point of illustrating the control means is to show that the igniter may be placed under control of a thermostat **141** connected to the transformer **143** through a pair of wires **146** extending from the control box **142** which embodies means to actuate the float valve and the blower. In such a circuit the igniter would not be energized when warm air at the thermostat or heat reaching some other portion of the control means would prevent reignition under dangerous conditions.

Fig. 14 also illustrates a modification wherein the actuator comprises a simple bimetallic strip **147** on which is mounted a valve **148** adapted to close an air inlet opening in the front wall of the well. The bimetallic strip is normally flexed to warp away from the ignited well so that the air inlet opening will be open when the pilot flame is ignited. As the pilot flame burns the wall of the well will become heated and radiate heat against the bimetallic strip, thereby causing it to warp toward the wall and close the air inlet opening, thus snuffing out the pilot flame. The wall will thereupon become cool, permitting the bimetallic strip to warp outwardly whereby

the air inlet opening is again uncovered to permit the passage of scouring air through the igniter. This form of air valve and air valve actuator is illustrated and claimed in the above-mentioned application Serial No. 98,322. Fig. 14 illustrates the application of this form of actuator to an igniter body in which the resistance element is mounted at one side and the bimetallic strip extends diagonally upward across the front wall of the igniter well.

Modified igniter resistance element

Fig. 15 illustrates a burner receptacle **150** having a combined inlet and igniter **151** associated therewith as previously described. A pair of wires **152** extend through the closure plate **153** and are connected at their inner extremities to a resistance element **154** having a lower transverse portion passing through the opening in the wick element **155**. One arm of the resistance element is coiled into a rigid, self-sustaining coil **156** extending horizontally above the upper extremity of the wick member, thereby providing a large source of radiant heat closely adjacent the upper surface of the wick member. Such a large heating element may be desirable in some cases, particularly in regions of extremely low temperatures or in some appliances where high draft conditions exist, the high draft resulting in lowering the temperature within the igniter body.

Having illustrated and described preferred embodiments of my invention, it should be apparent to those skilled in the art that the invention permits of modification in arrangement and detail. I claim as my invention all such modifications as come within the true spirit and scope of the appended claims.

I claim:

1. A combined oil inlet and igniter for a vaporizing oil burner of the type comprising an open receptacle having an interior portion onto which oil may flow to be evaporated by the heat of combustion, said receptacle also comprising air inlet means for continuously admitting air to mix with the evaporated oil and support combustion thereof, comprising a hollow member adapted to communicate with the interior of said receptacle, means for supplying oil to said receptacle through said member, electric igniting means mounted in said hollow member to ignite a pilot flame therein, said hollow member having an air inlet opening thereinto for the admission of combustion supporting air, a valve adapted to close said opening, a bimetallic actuator, a resistance heater mounted adjacent said bimetallic actuator, means simultaneously to energize said igniting means and said resistance heater and means connecting said valve to said actuator comprising a spring assembly movable to two overcenter positions whereby the relative position of said valve with respect to said bimetallic actuator may be changed and means to effect such movement upon heating and cooling of said actuator as a result of energization and deenergization of said heater whereby momentary closing of said valve is effected subsequent to deenergization of said heater.

2. A combined oil inlet and igniter for a vaporizing oil burner of the type comprising an open receptacle having an interior portion onto which oil may flow to be evaporated by the heat of combustion, said receptacle also comprising air inlet means for continuously admitting air to mix with the evaporated oil and support combustion thereof, comprising a hollow member adapted to communicate with the interior of said receptacle, means for supplying oil to said receptacle through said member, electric igniting means mounted on said hollow member to ignite a pilot flame therein, said hollow member having an air inlet opening thereinto for the admission of combustion supporting air, a valve adapted to close said opening, a bimetallic actuator, a resistance heater mounted adjacent said bimetallic actuator, means adapting said resistance heater to be energized simultaneously with said electric igniting means, and means connecting said valve to said actuator comprising a spring assembly movable to two overcenter positions whereby the relative position of said valve with respect to said bimetallic actuator may be changed and means to effect such movement upon heating and cooling of said actuator as a result of energization and deenergization of said heater whereby momentary closing of said valve is effected subsequent to deenergization of said heater.

3. An igniter for a vaporizing oil burner of the type comprising an open receptacle having an interior portion onto which oil may flow to be vaporized by the heat of combustion, said receptacle also comprising air inlet means for continuously admitting air to mix with the vaporized oil and support combustion thereof, comprising a hollow member adapted to communicate with said receptacle and having an air inlet opening thereinto, means to admit oil into said hollow member, an electric igniter mounted in said hollow member and adapted to ignite a pilot flame therein, a valve associated with said air inlet opening, a bimetallic element having a free end movable toward and away from said opening as said element warps under the influence of heat, means adapted to heat said bimetallic element when said electric igniter is energized, a mounting spring carried by the free end of said bimetallic element, said mounting spring having its center connected to said valve and being tensioned to snap over center in either direction, and means to limit movement of the center of said spring in either direction whereby to shift the relative position of said valve when said bimetallic element warps while being heated and while cooling whereby the valve remains open when the actuator is heated and momentarily closes when the actuator cools.

4. A first receptacle adapted for oil burning, a second receptacle adapted for oil burning, means adapted to supply oil for burning to said receptacles at a controlled rate, flame conduit means adapted to connect the interiors of said two receptacles, combustion air entrance means formed in a wall of said second receptacle, a combined vaporizing and electric ignition means within said second receptacle, partition means within said second receptacle adapted to direct one part of said combustion air toward said combined vaporizing and electric ignition means and another part of said combustion air toward said flame conduit means, said partition means being adapted to limit the amount of said one part of said combustion air to less than the air requirement for complete combustion of the oil vaporized by the operation of said combined vaporizing and electric ignition means, means adapted on a call for heat to supply oil to said two receptacles and to energize said electric ignition means and means adapted to supply combustion air to said second receptacle through said air entrance means, whereby on a call for heat oil will be supplied to both said receptacles, oil in said second re-

ceptacle will be vaporized by said vaporizing and ignition means, mixed with said one part of said combustion air and ignited and thereby generate heat to vaporize more of said oil to mix with the flame of said ignited mixture, then said oil rich flame will mix with said other part of said air to project said resulting flame through said conduit into said first receptacle and ignite said oil supplied to said first receptacle.

5. The apparatus of claim 4 including a temperature actuated means adapted to control the combustion air supply to said second receptacle comprising a valve for said combustion air entrance means and a bimetal operator for said valve.

6. The apparatus of claim 5 including an electric heating means for said operator and means adapting said electric heating means to be energized whenever said electric ignition means is energized.

7. The apparatus of claim 6 including a two position over center spring means interposed between said bimetallic operator and said valve whereby as said electric heating means is energized and said spring is in the first of its two positions said valve will open to a maximum position, then said spring will move to its other position and said valve will take a lesser position of opening, and as said heating means is deenergized said valve will first move to its closed position then said spring will move to its first position and said valve will stand partially open as said bimetallic operator approaches ambient temperature.

8. A first receptacle adapted for oil burning a second receptacle adapted for oil burning, means adapted to supply oil for burning to said receptacles at a controlled rate, flame conduit means adapted to connect the interiors of said two receptacles, means adapted to supply combustion air to said first receptacle, means adapted to supply combustion air to said second receptacle, a combined vaporizing and electric ignition means within said second receptacle, means adapted to direct towards said combined vaporizing and electric ignition means one part of said combustion air supplied to said second receptacle, said one part of said combustion air being limited to an amount less than the air requirement for complete combustion of the oil vaporized by the operation of said combined vaporizing and electric ignition means, means adapted to direct towards said flame conduit means another part of said combustion air supplied to said second receptacle, means adapted on a call for heat to operate said oil supply means to supply oil to said receptacles, and means adapted on a call for heat to initiate the operation of said combined vaporizing and electric ignition means, whereby on a call for heat oil will be supplied to both said receptacles, oil in said second receptacle will be vaporized by said combined vaporizing and electric ignition means and mixed with said one part of said combustion air and ignited and thereby generate heat to vaporize more of said oil to mix with the flame of said ignited mixture, then said oil rich flame will mix with said other part of said air to project said resulting flame through said conduit into said first receptacle and ignite said oil supplied to said first receptacle.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,257,972	McCollum	Oct. 7, 1941
2,263,999	McCollum	Nov. 25, 1941
2,309,319	Johnston	Jan. 26, 1943
2,353,880	Cooper	July 18, 1944
2,393,233	Breese	Jan. 22, 1946
2,438,823	Resek et al.	Mar. 30, 1948
2,481,631	Tramontini	Sept. 13, 1949
2,492,756	McCollum	Dec. 27, 1949
2,500,663	Cleveland	Mar. 14, 1950
2,520,159	Long	Aug. 29, 1950