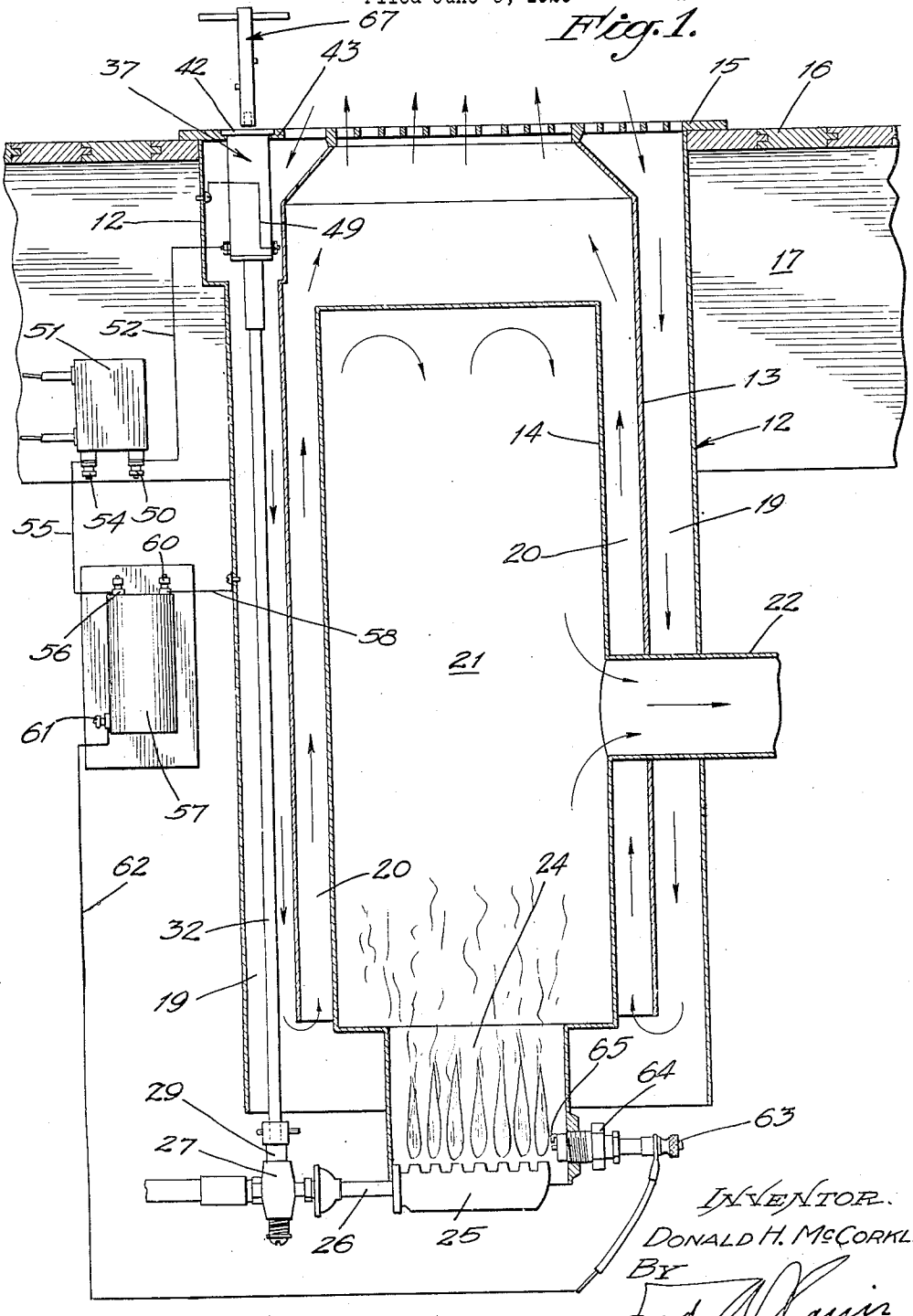
May 8, 1928. 1,668,859

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FURNACE IGNITION DEVICE

Filed June 8, 1925 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

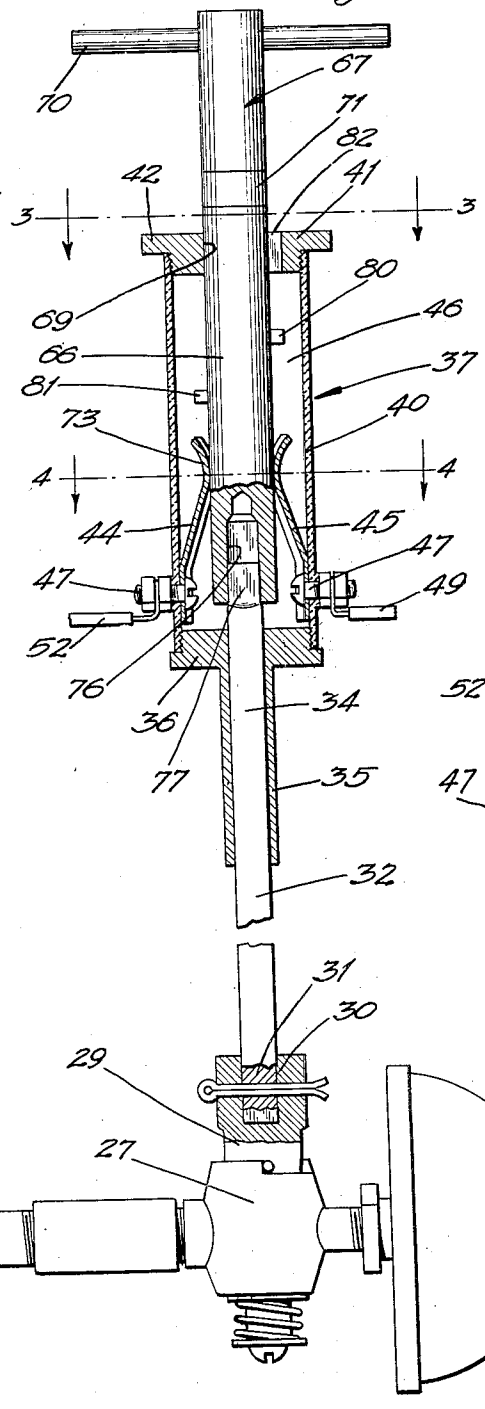


Fig. 3.

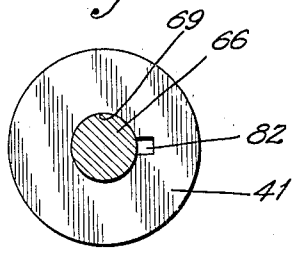
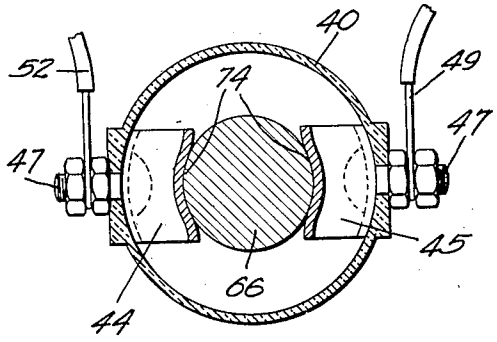


Fig. 4.



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UNITED STATES PATENT OFFICE.

DONALD H. McCORKLE, OF BERKELEY, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO G. W. ANDERSON, OF CHULA VISTA, CALIFORNIA.

FURNACE-IGNITION DEVICE.

Application filed June 8, 1925. Serial No. 35,609.

This invention relates to furnaces, and particularly to a furnace ignition device.

In a floor furnace and like furnaces, it is common practice to provide an ignition device for igniting the gas egressing from a burner in the combustion chamber. Such a device is commonly provided in the form of means for providing a jump spark in a combustion chamber, this means being connected to an induction coil and a source of energy such as batteries or a small transformer. Numerous devices have been designed which provide an arrangement for closing the spark circuit when the valve controlling the supply of fuel to the burner is opened. Such devices are constructed so that the spark circuit is not closed until the valve is entirely or partly open. If the valve is opened slowly or is allowed to remain in partially open position, gas will accumulate in the combustion chamber, and when the valve is finally opened to a position where a spark is created will cause an explosion. It is obvious that such an arrangement is very dangerous.

It is an object of my invention to provide an ignition device which will generate a spark before the valve is operated, which spark will continue until a time after the valve has been partially or completely opened. By such construction, a spark will be generated before fuel enters the combustion chamber and insures a continuous spark for a period of time after the valve is opened; therefore, the fuel will have sufficient time to enter the burner and reach the combustion chamber while there is a spark therein regardless of degree valve is opened. A device of this character is very safe, there being absolutely no danger of explosion due to an accumulation of fuel in the combustion chamber.

It is also an object of my invention to provide in an ignition device of this character a means for causing a sparking an appreciable length of time after the valve is opened.

Other objects and the particular advantages of my invention will be explained hereinafter.

Referring to the two sheets of drawings in which I illustrate a preferred form of my invention,

Fig. 1 is a sectioned view illustrating the utility of my invention.

Fig. 2 is an enlarged view partially sectioned and contracted, this view showing an ignition device of my invention and its association with a fuel control valve of a furnace.

Fig. 3 is a section taken on the line 3—3 of Fig. 2.

Fig. 4 is a section taken on the line 4—4 of Fig. 2, showing the contact arrangement of my invention.

In the drawings I show a floor furnace having an outer shell 12, an intermediate shell 13 and an inner drum 14. At the upper end of these members 12, 13 and 14 is a register 15 which is secured to a floor 16, the shells 12 and 13 and the drum 14 projecting downwardly from the floor 16 between joists 17. Between the outer and intermediate shells 12 and 13 is a cold air passage 19 and between the intermediate shell 13 and the drum 14 is a hot air passage 20. The drum 14 provides a heat chamber 21. Extending from the drum 14 is a flue 22 and provided at the lower part of the drum 14 is a combustion chamber 24 in the lower end of which there is situated a burner 25. The burner 25 is supplied with fuel through a pipe 26 having a fuel control valve 27 situated therein. A plug 29 of the valve 27 has a recess 30 of rectangular cross section into which the lower rectangular end 31 of a control rod 32 extends. This rod 32 extends upwardly from the valve 27 through the cold air passage 19.

As shown in Fig. 2, the upper end 34 of the control rod 32 extends through a sleeve 35 of an end member 36 of an ignition device 37 of my invention. The end member 36 is secured in the lower end of a tubular shell 40 which is made from insulation material. A head 41 is secured in the upper end of the shell 40, this head 41 having a flange 42 which rests in a recess 43 formed in the register 15, as clearly shown in Fig. 1. Contacts 44 and 45 are secured to the shell 40 in a chamber 46 provided between members 36 and 41 in diametrically opposed positions by bolts 47.

The contact 45 is grounded to the furnace

by a wire 49 which connects between the bolt 47 of the contact 45 and the outer shell 12. The contact 44 is connected to a terminal 50 of a transformer 51 by a wire 52 which extends thereto from the bolt 47 of the contact 44. Any other source of energy such as a battery may be substituted for the transformer 51, if desired.

From a terminal 54 of the transformer 51 a wire 55 extends to a terminal 56 of an induction coil 57. The induction coil 57 is grounded by a wire 58 which extends to the shell 12 of the furnace from a terminal 60. From a terminal 61 of the induction coil 57 there extends a wire 62 to a post 63 of an ignitor in the form of a spark plug 64 which is secured to the drum 14 so that points 65 thereof rest in the combustion chambers 24 adjacent to the burner 25.

A cylindrical bar 66 of a key 67 is extended into the chamber 46 through a cylindrical opening 69 formed in the head 41. The upper end of the cylindrical bar 66 has a cross pin 70 which serves as a handle by which the key 67 is rotated. The cylindrical bar 66 may be separated into two parts by an insulation spacer 71 to prevent electricity from traveling to the portions of the key 67 which may be contacted by a person's hand.

When the key is inserted into the chamber 46, the bar 66 engages free ends 73 of the contacts 44 and 45. As clearly shown in Fig. 4, these ends 73 of the contacts 44 and 45 have arcuated faces 74 which agree with the cylindrical shape of the bar 66. The lower end of the bar 66 has a rectangular cavity 76 into which an upper rectangular end 77 of the control bar 32 extends when the key 67 is entirely inserted into the chamber 46.

Pins 80 and 81 extend from the bar 66 in diametrically opposite directions and in offset relationship, the pin 80 being placed higher on the bar than the pin 81. A slot 82 as clearly shown in Figs. 2 and 3, is provided in the head 41 through which the pins 80 and 81 must pass when the key 67 is inserted into the chamber 46. From the drawings it is obvious that the pin 81 must be aligned with the slot 82 and extended therethrough and then the key 67 must be rotated half a revolution so that the pin 80 will align with the slot 82 after which the key is free to be moved into an entirely inserted position.

The operation of my invention is substantially as follows:

When it is desired to light the furnace, the control valve 27 must be opened by means of the control rod 32 which is rotated by the key 67. The key 67 therefore must be inserted into the chamber 46. The lower end of the bar 67 is passed through the opening 69 and the pin 81 is aligned with the slot 82. After the pin 81 passes through the slot 82, the key 67 is rotated half a revolution in order to align the pin 80 with the slot 82. The key may then be inserted so that the rectangular formation 77 rests in the rectangular cavity 76. As clearly shown in Fig. 2, it will be seen that the lower end of the bar 66 engages the free ends 73 of the contacts 44 and 45 before the key is in entirely inserted position. When the contacts 44 and 45 are engaged by the bar 66, the circuit is completed and electricity is supplied to the ignitor 64, producing a spark in the combustion chamber 24 between the points 65. After the key 67 is in entirely inserted position, it is rotated in order to rotate the control rod 32 and the plug 29, thus supplying fuel through the pipe 26 to the burner 25. There is a continuous spark in the combustion chamber 24 which was started before the fuel enters, and, upon the entrance of the gas into the combustion chamber 24, it will be ignited.

After the valve 27 is opened, the key 67 may be removed from place. In order to entirely remove the key from the chamber 46, it is necessary first to align the upper pin 80 with the slot 82, and after the pin 80 has passed therethrough to rotate the key 67 and align the pin 81 with the slot 82. The key may then be completely withdrawn. This pin and slot construction is provided to prevent the key from being too quickly removed from engagement with the contacts 44 and 45. This maintains a supply of electricity to the ignitor 64 and maintains a spark in the combustion chamber 24 even after the valve has been operated. This is a desirable factor of safety. For example, if the valve was only opened a very slight amount, it would take a short time for the fuel to pass through the pipe 26 in the burner 25 and into the combustion chamber 24. If it were possible to remove the key 67 quickly from engagement with the contacts 44 and 45, it might occur that the spark in the combustion chamber 24 would cease before fuel released by the valve 27 reached the chamber. This would subsequently result in an accumulation of unignited fuel in the combustion chamber and in the heat chamber 21 which, as is obvious, would be very dangerous and might result in a disastrous explosion.

From Fig. 2 it will be seen that the pin 81 must be removed from the chamber 46 before the lower end of the bar 66 disengages the contact 44 and 45. The ignitor of my invention operates when the key 67 is inserted into the chamber 46. It is not necessary to actuate the valve 27 to obtain a spark in the combustion chamber 24. This feature of having a spark created by the inserting of the key and not by the operating of the valve is an important feature, due to the fact that a spark will be obtained whenever the key is inserted which must happen in order to open the valve 27.

I claim as my invention:

1. In combination: a burner; a pipe for supplying fuel to said burner; a valve in said pipe for controlling a passage of fuel therethrough to said burner; a key for removably engaging and opening said valve; an ignitor positioned near said burner; and means for actuating said ignitor, said means being operated by said key slightly before and during the time said valve is engaged by said key.

2. In combination: a burner; a pipe for supplying fuel to said burner; a valve in said pipe for controlling a passage of fuel therethrough to said burner; a key for removably engaging and opening said valve; an ignitor positioned near said burner; and means for actuating said ignitor, said means being operated by said key slightly before and during the time said valve is engaged by said key and slightly after said key disengages said valve.

3. In combination: a burner; a pipe for supplying fuel to said burner; a valve in said pipe line for controlling a supply of fuel to said burner; an ignitor placed adjacent to said burner; a control rod through which said valve is operable; a key adapted to engage said control rod for operating said valve; and means for automatically operating said ignitor during an entire engagement of said control rod by said key.

4. In combination: a burner; a pipe for supplying fuel to said burner; a valve in said pipe line for controlling a supply of fuel to said burner; an ignitor placed adjacent to said burner; a control rod through which said valve is operable; a key adapted to engage said control rod for operating said valve; and means for operating said ignitor from an instant before said key engages said control rod until an instant after said key is in contact with said control rod.

5. In combination: a burner; a pipe for supplying fuel to said burner; a valve in said pipe line for controlling a supply of fuel to said burner; an ignitor placed adjacent to said burner; a control rod extending from said valve through which said valve is operated; a housing into which said control rod extends; a key adapted to be inserted into said housing and engage said control rod; and a pair of contacts in said housing, said contacts being placed in a circuit to said ignitor, and said contacts being engaged by said key when in said housing for operating said ignitor.

6. In combination: a burner; a pipe for supplying fuel to said burner; a valve in said pipe line for controlling a supply of fuel to said burner; an ignitor placed adjacent to said burner; a control rod extending from said valve through which said valve is operated; a housing into which said control rod extends; a key adapted to be inserted into said housing and engage said control rod; and a pair of contacts in said housing, said contacts being placed in a circuit to said ignitor, and said contacts being engaged by said key before said key engages said control rod and being disengaged after said key disengages said control rod.

7. In combination: a burner; a pipe for supplying fuel to said burner; a valve in said pipe line for controlling a supply of fuel to said burner; an ignitor placed adjacent to said burner; a control rod through which said valve is operable; a key adapted to engage said control rod for operating said valve; and contacts associated with said ignitor, said contacts being engaged and disengaged by said key before and after said key is in engagement with said control rod.

8. In combination: a burner; a pipe for supplying fuel to said burner; a valve in said pipe line for controlling a supply of fuel to said burner; an ignitor placed adjacent to said burner; a control rod extending from said valve through which said valve is operated; a housing into which said control rod extends; a key adapted to be inserted into said housing and engage said control rod; a pair of contacts in said housing, said contacts being placed in a circuit to said ignitor, and said contacts being engaged by said key when in said housing for operating said ignitor; and means for retarding the removal of said key from said housing.

9. In combination: a burner; a pipe for supplying fuel to said burner; a valve in said pipe line for controlling a supply of fuel to said burner; an ignitor placed adjacent to said burner; a control rod through which said valve is operable; a key adapted to engage said control rod for operating said valve; contacts associated with said ignitor, said contacts being engaged and disengaged by said key before and after said key is in engagement with said control rod; and means for preventing said key from being withdrawn quickly from engagement with said contacts.

10. In combination: a burner; a pipe for supplying fuel to said burner; a valve in said pipe for controlling a supply of fuel through said pipe to said burner; means for operating said valve; an ignitor for fuel issuing from said burner; means for starting and stopping the operation of said ignitor, said last mentioned means being automatically actuated by said valve operating means to start the operation of said ignitor before the opening of said valve and thereafter to maintain the ignitor in operation for a length of time sufficient to allow fuel to issue from said burner and be ignited by said ignitor.

11. In combination: a burner; a pipe for supplying fuel to said burner; a valve in

said pipe for controlling a supply of fuel through said pipe to said burner; means for operating said valve; an ignitor for fuel issuing from said burner; an electric circuit whereby said ignitor is operated when said circuit is closed; a switch in said circuit which is automatically actuated by said valve operating means to close said circuit before the opening of said valve, and maintain said circuit closed for a given minimum length of time after said valve has been opened.

In testimony whereof, I have hereunto set my hand at National City, California, this 28th day of May, 1925.

DONALD H. McCORKLE.