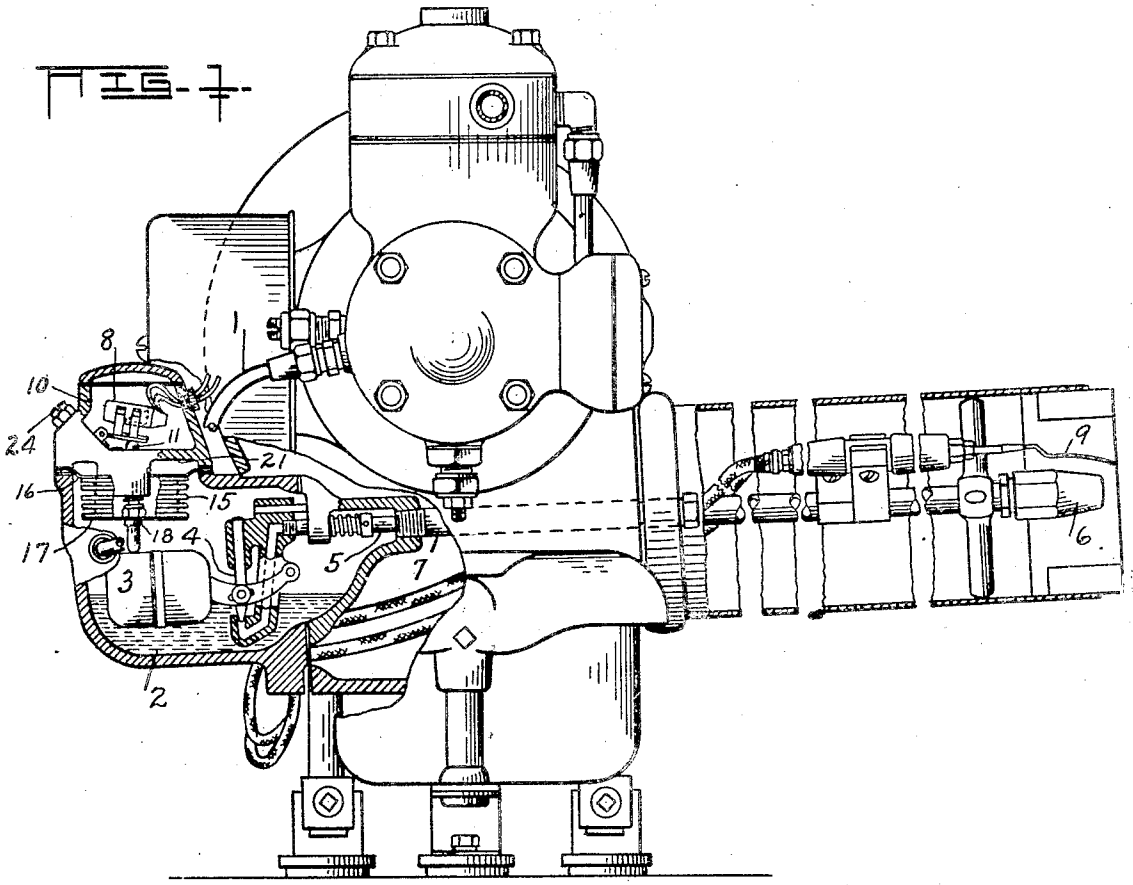
Dec. 18, 1934. W. W. WILLIAMS 1,984,670

ELECTRICALLY OPERATED AND CONTROLLED FLUID FUEL BURNING MECHANISM

Filed Aug. 14, 1933 2 Sheets-Sheet 1

FIG. 1.



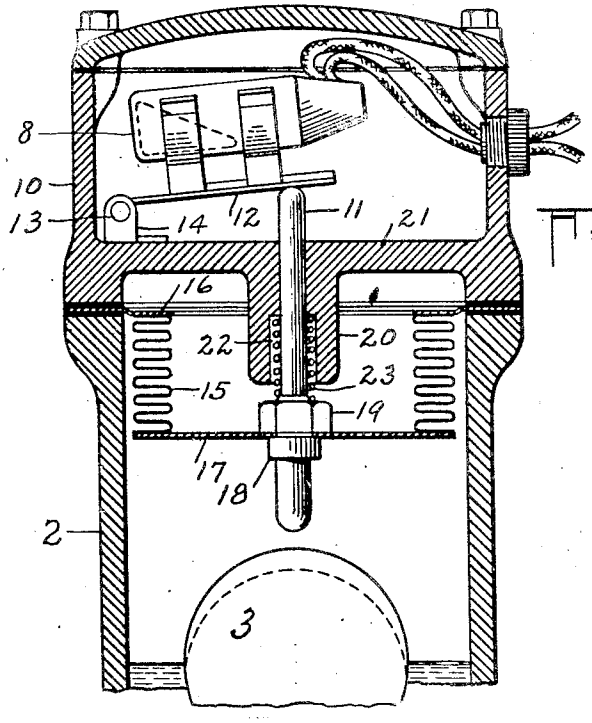


FIG. 2.

INVENTOR.
WALTER W. WILLIAMS
BY Langdon Moore
ATTORNEYS.

Dec. 18, 1934. W. W WILLIAMS 1,984,670

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FIG. 3.

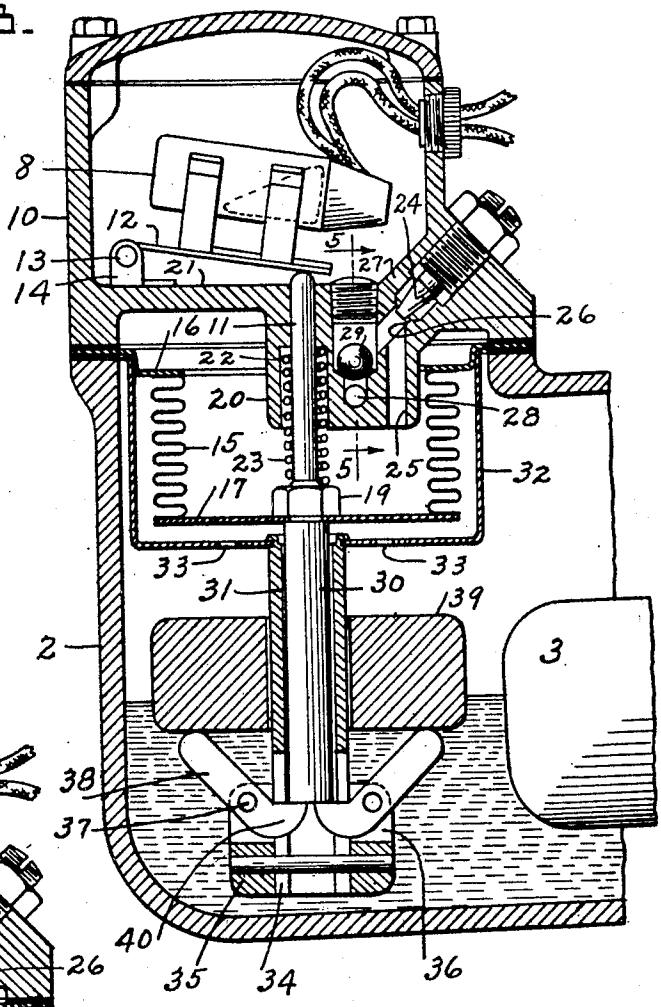


FIG. 5.

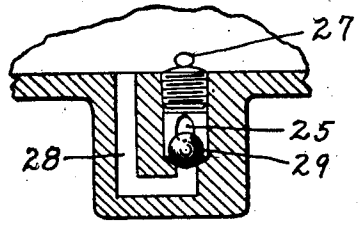
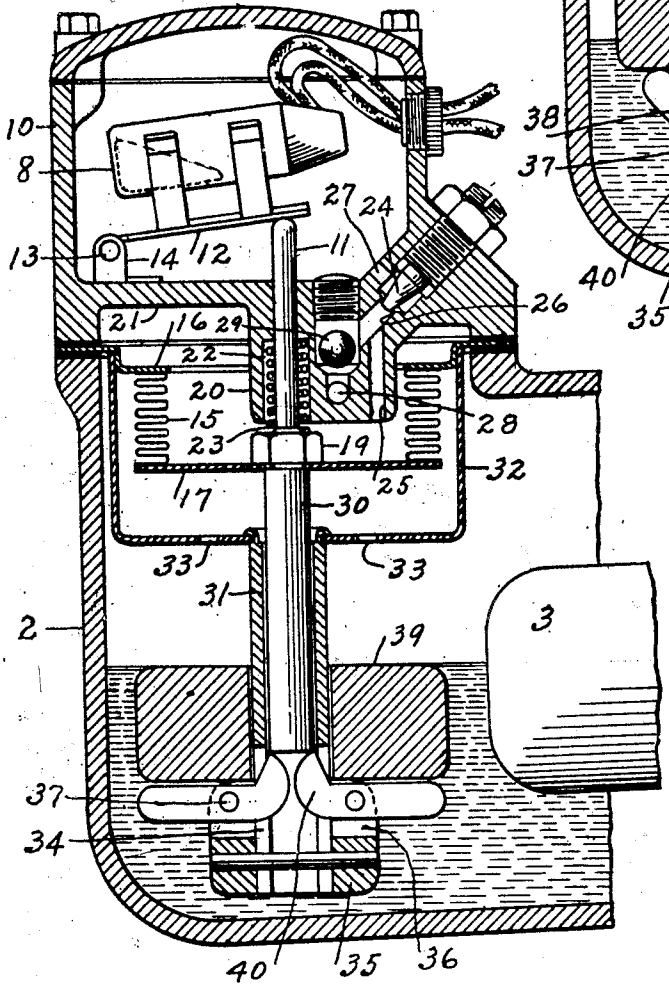


FIG. 4.



INVENTOR.
WALTER W. WILLIAMS
BY Lawyer Mann
ATTORNEYS.

Patented Dec. 18, 1934 1,984,670

UNITED STATES PATENT OFFICE

1,984,670

ELECTRICALLY OPERATED AND CONTROLLED FLUID FUEL-BURNING MECHANISM

Walter W. Williams, Bloomington, Ill.

Application August 14, 1933, Serial No. 685,021

2 Claims. (Cl. 158—28)

This invention relates to improvements in electrically operated and controlled fluid fuel-burning mechanism and more particularly to automatic means for controlling the ignition circuit thereof.

It is an object of this invention to provide means whereby fluid fuel and air are positively supplied to the burner nozzle which insures the operation of the ignition device when the fuel is delivered to the nozzle, and a predetermined time thereafter to discontinue the operation of the ignition device.

With these and other objects in view, reference is made to the accompanying sheets of drawings illustrating preferred forms of this invention with the understanding that detailed changes may be made without departing from the scope thereof.

Figure 1 is a view in end elevation with parts broken away and partly in section of a fluid fuel burner mechanism of same general type as disclosed in this applicant's prior Patent No. 1,831,277 of November 10, 1931, to which this invention has been applied.

Figure 2 is an enlarged detailed view in section showing a part of the float chamber and the ignition switch housing, illustrating the switch in the open position as a result of the contraction of the pressure bellows when the burning mechanism is in normal operation.

Figure 3 is an enlarged detailed view in section, showing a part of the float chamber and ignition switch housing, illustrating a modified means for operating the switch and showing the switch in closed position.

Figure 4 is a similar view illustrating the position of the parts when the burner mechanism is in normal operation and the ignition switch open.

Figure 5 is a detail view in section taken on the line 5—5 Figure 3 looking in the directions of the arrows.

The electrically operated fluid fuel burner mechanism illustrated in Figure 1 discharges fluid fuel and air through the pipe 1 to the float chamber 2. The float 3 controls the operation of the valve 4 to admit the fluid fuel to be discharged by the air under pressure thereabove through the fuel pipe 5 to the nozzle 6 while the air under pressure in the float chamber is discharged through the air pipe 7 surrounding and spaced apart from the fuel pipe 5 to be delivered under pressure to the nozzle 6, in the manner disclosed in said Patent No. 1,831,277.

The switch 8 is interposed in the ignition circuit, forming a part of the burner mechanism, the current of which, when the ignition circuit is established and the switch closed, flows through oppositely disposed electrodes 9, which electrodes are spaced apart in front of the burner nozzle so that a spark jumps from one to the other to ignite the combustible mixture formed at the nozzle. Figure 1 illustrates only one of these electrodes as the other is positioned directly behind.

The switch 8 is mounted in a housing 10 secured above the rear end of the float chamber 2 and centrally mounts a reciprocating shaft 11 entering the interior of said chamber. The switch 8 is mounted by clips upon a switch carrying plate 12 pivotally mounted at one end upon the pivot 13 mounted in bracket 14 in such a position that the opposite end will rest upon the upper end of the reciprocating shaft 11. A contractable and expansible metallic bellows 15 is secured at one end to an annular plate 16 which is secured between the top of the float chamber 2 and switch housing 10, the lower end of the bellows being secured to a closure plate 17, which is axially mounted upon the reciprocating shaft 11 in engagement with the shoulder 18 thereon and held in position by the nut 19. The shaft 11 reciprocates within a bearing 20 depending from the bottom closure 21 of the switch housing, which bearing is cut away upon the under side to form a housing 22 for the coil spring 23 exerting tension upon the upper side of the nut 19.

When the burner mechanism is idle, there is no pressure within the float chamber and the level of the fluid fuel remaining in the float chamber has closed the valve 4 and the float is in its lowermost position, as shown in Figure 1. The tension of the spring 23 about the reciprocating shaft 11 has caused the bellows 15 to expand to extend the shaft 11 into the float chamber until its lower end rests upon the top of the float 3, as shown. In this position the mercury tube switch 8 has been tilted to close the ignition circuit therethrough so that when the control mechanism has been actuated to start the burner mechanism in operation, the ignition circuit is closed while air and fluid fuel delivered under constant pressure and constant volume through pipe 1 enters the float chamber 2. The level of the fluid fuel will immediately rise within the float chamber to open the fuel valve 4 and at the same time the air above the

fluid fuel will be placed under increasing pressure until it equals that delivered through pipe 1. The increasing pressure of the air within the chamber 2 acts to contract the bellows, overcoming the tension of the spring 23, and causes the shaft 11 to move upward out of contact with the float 3 and its upper end gradually tilts the carrier plate 12 until the mercury switch 8 assumes the open position and breaks the ignition circuit.

When the burner mechanism is idle, as shown in Figure 1, the bellows 15 is expanded and the lower end of the shaft 11 prevents an upward movement of the float 3 to open the oil valve 4 until the pressure has exerted a contracting influence upon the bellows. When the fuel-burning mechanism is running normally, the pressure created within the float chamber 2 contracts the bellows 15 to its fullest extent and in so doing moves the shaft 11 to the end of its upward travel and the lower end of the shaft 11 has been retracted to clear the float 3, as shown in Figure 2.

As illustrated in Figures 3, 4, and 5, the switch housing 10 is provided with an adjustable relief valve 24 to act as a dash pot during the contracting of the bellows 5 and yet allow the same to expand rapidly when the exterior pressure has been removed. The same type of relief valve is preferably employed in the construction illustrated in Figures 1 and 2. As shown in Figure 3, the bearing member 20 depending from the bottom 21 of the switch housing 10 is elongated on one side and is provided with an air passage 25 leading through the valve seat 26 to communicate through port 27 in the bottom wall 21 with the interior of the switch housing, so that by regulating the position of the valve stem 24 in relation to the seat 26 the time required for any given pressure to contract the bellows 15 to open the ignition switch 8 may be determined. In order that the bellows may expand rapidly, a passage 28 is provided opening into the interior of the switch housing and communicating with the passageway 25, which passage 28 is provided with a ball check valve 29, as shown in Figure 5. Upon the contracting of the bellows, the ball 29 seats to close the passageway 28 and upon expansion of the bellows the ball will lift to allow air to be drawn from the housing through the passages 28 and 25 to the interior of the bellows.

In the embodiment illustrated in Figures 3 and 4, a plunger 30 is secured to the reciprocating shaft 11 upon the under side of the bellows closure 17, which plunger is mounted to reciprocate in a guide 31 mounted below the closure 17 upon the bracket 32, the upper end of which is anchored between the switch housing 10 and float chamber 2. If desired, the guide support may be in the form of a cylindrical casing, as shown in these views of the drawings, and in that case the bottom of the casing is provided with a plurality of apertures 33 communicating with the interior of the float chamber 2. The guide 31 is provided with oppositely disposed slots 34 extending from the bottom of the guide to a point approximating the normal upward travel of the reciprocating shaft 11 and plunger 30. Brackets 35 are secured to the bottom of the guide 31 having slots 36 formed therein, registering with the slots 34 of the guide. The brackets 35 mount on pivot pins 37 levers 38 having portions extending exteriorly of said brackets and portions extending through the slots 34 in the guide adapted to engage under the lower end of the piston 30. An annular weight 39 is mounted to reciprocate upon the guide 31 and is adapted to engage the outwardly extending portions of the levers 38. The portions of the levers 38 entering through the slots 34 in guide 31 are provided with angular extensions 40 so formed that when the burner mechanism is idle and the bellows 15 has been expanded to its fullest extent by the spring 23, the bottom of the plunger 30 will engage the angular extensions 40 and cause the levers 38 to be rotated about their pivots 37 to lift the weight 39 and hold the same suspended with the majority of its body above the level of the fluid fuel within the float chamber 2, as shown in Figure 3. When the burner mechanism begins to operate and the pressure within the float chamber 2 contracts the bellows 15, the plunger 30 ascends, allowing the weight 39 to rotate the supporting levers until the weight is submerged in the fluid fuel, as shown in Figure 4. The submersion of the weight 39 upon the starting of the burner mechanism causes the level of the fluid fuel to immediately rise and insure prompt opening of the float valve and upon cessation of the burner mechanism the lifting of the weight 39 lowers the level of the liquid fuel immediately to insure a prompt closing of the float valve.

It has been stated, herein before, when the burner mechanism is idle, as shown in Figure 1, the bellows is expanded and the lower end of the shaft 11 engages the top of the float 3 whereby the oil valve is held in closed position until the fuel burning mechanism begins to operate. The pressure created within the float chamber 2 causes the bellows 15 to contract and in so doing allows the float to ascend as the level of the liquid fuel rises and opens the oil valve. This particular construction is readily adaptable as a means for maintaining the fuel valve closed whenever the burner mechanism is idle and could be employed without the application of the ignition switch.

What I claim is:

1. In an electrically operated and controlled fluid fuel-burning mechanism, including a float chamber, means actuated by the operation of said mechanism for delivering a constant supply of fluid fuel and air under pressure to said chamber, a burner nozzle, means connecting said chamber and nozzle for separately conducting fuel and air to the nozzle; a float control fuel valve within said chamber operable upon a sufficient rise of the fuel therein to open the fuel delivery means for delivering fuel under the pressure of the air in said chamber to the burner nozzle, an electrically operated ignition device for igniting the fuel at the nozzle, means to establish an electric circuit to said device, a switch in the ignition circuit mounted in a housing above said float chamber adapted to normally assume the closed position, a shaft mounted to reciprocate within the housing and chamber to open and close the switch, a contractible and expansible bellows depending into the chamber connected at its upper end between the float chamber and housing and provided with a closure at its lower end secured to said shaft, tension means between the housing and bellows closure to normally maintain the bellows expanded when the mechanism is idle, adapted to be overcome and allow the bellows to contract upon the creation of air pressure within the float chamber upon initiation of operation of the mechanism, a plunger carried on the under

side of the bellows closure adapted to reciprocate therewith, and means actuated by the plunger upon contraction of the bellows to raise the level of the fluid fuel in the float chamber.

2. The structure of claim 1 wherein a guide for the said piston is supported upon the float chamber, an annular body adapted to reciprocate upon the exterior of said guide, and means mounted upon said guide normally engaged by the end of the plunger when the bellows is expanded to support said body above the level of the fluid fuel in the chamber and upon the contraction of the bellows to allow said body to descend to a submerged position within the fluid fuel.

WALTER W. WILLIAMS.