

Oct. 16, 1934.

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1,977,015

AUTOMATIC VALVE CONTROLLING DEVICE

Filed June 24, 1932

2 Sheets-Sheet 1

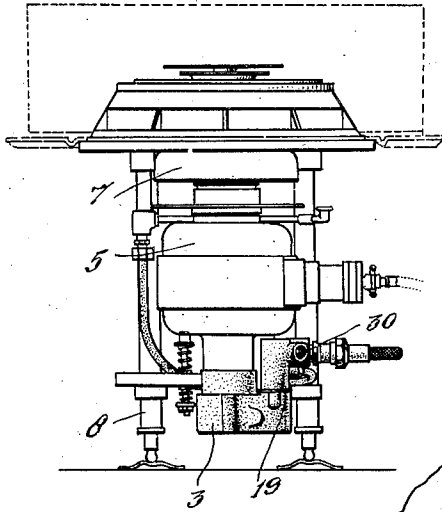


Fig. 1

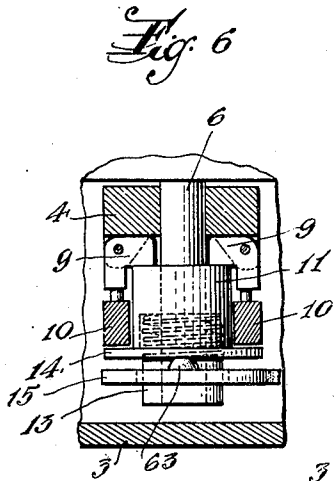


Fig. 6

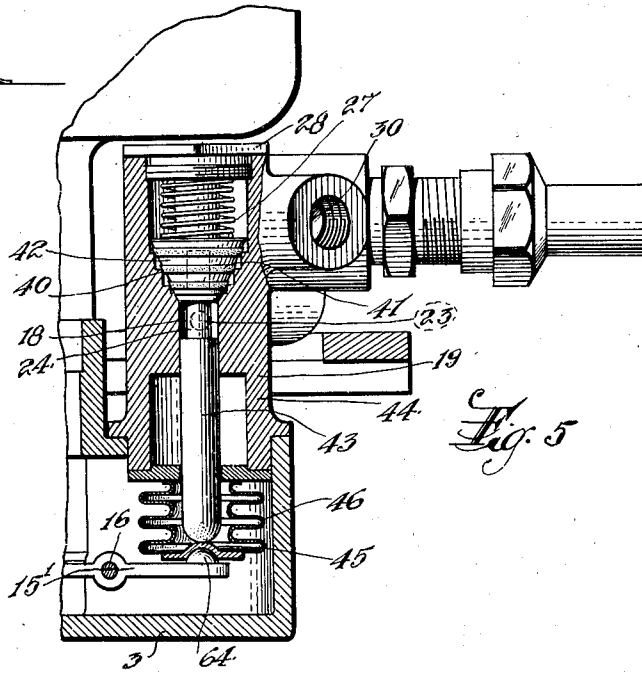


Fig. 5

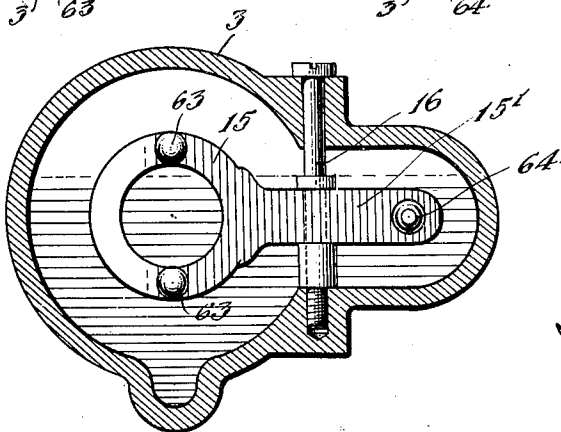


Fig. 4

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Fig. 2

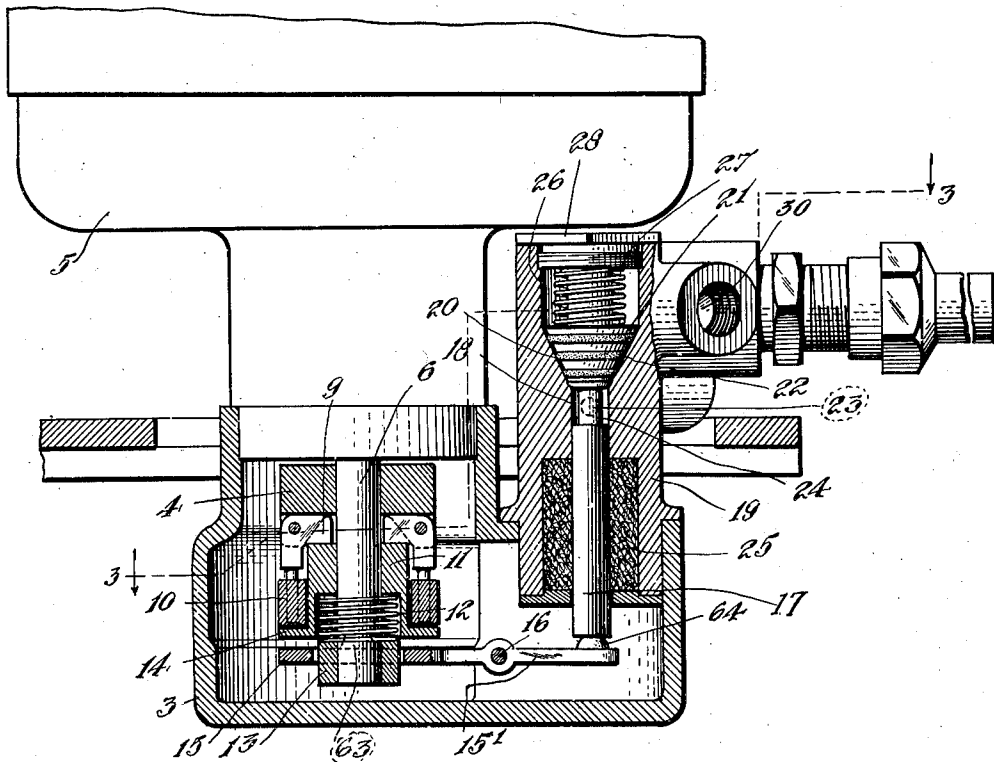
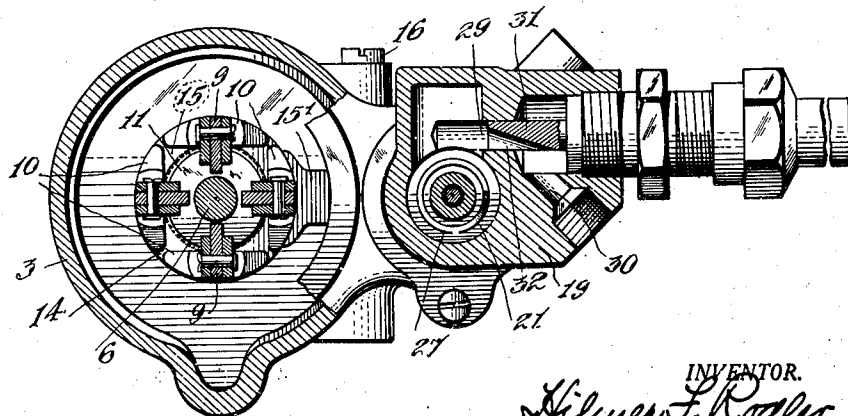


Fig. 3



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UNITED STATES PATENT OFFICE

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AUTOMATIC VALVE CONTROLLING DEVICE

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Application June 24, 1932, Serial No. 619,130

1 Claim. (Cl. 137—140)

This invention relates to the automatic control of valves, and more particularly to means for automatically controlling valves for supplying fuel to oil burning apparatus and the like.

5 It is the general practice to control oil burning apparatus for household heating purposes and the like by means of thermostats, which automatically cause the closing of a fuel supply valve and the stopping of an electric motor when a prede-
10 termined maximum temperature is reached, and automatically cause the valve to open and the motor to operate when a predetermined minimum temperature is reached. Heretofore, the valve has been magnetically controlled, that is, its
15 opening or closing has depended upon the energization of a solenoid; and the operation of the valve has been independent of the operation or speed of the motor. Such a method of control is objectionable in that should the motor fail
20 to operate when the minimum temperature has been reached, and the valve is independently opened, the fuel oil will continue to flow through the valve into the oil burning apparatus without being atomized or gasified by apparatus associ-
25 ed with and dependent upon the operation of the motor, resulting in an undesired accumulation of oil in a liquid state.

The independent control of the motor and the fuel supply valve is also objectionable in that the
30 oil begins to flow freely through the valve before the motor has attained sufficient speed to cause apparatus associated therewith to properly atomize or gasify the oil, resulting in an excess
35 fuel in the burner at the time of ignition, which causes a noisy explosion. Inasmuch as these explosions occur at each ignition of the fuel, which is frequent, damaging strains are placed on the apparatus, causing the parts to become loose
40 and the general operation of the apparatus to be faulty, and noisy.

It is therefore an object of this invention to provide means for controlling a fuel supply valve, which means are dependent upon the operation and speed of a motor.

45 A further object is the provision in an oil burning apparatus of means for automatically opening a fuel supply valve only when parts of the apparatus have been placed in condition to properly atomize or gasify the oil flowing through the
50 valve.

A further object is the provision of means for automatically opening or closing a valve, said means depending upon the speed of a motor.

55 A further object is the provision of novel valve means for controlling the supply of fuel oil to

an oil burning apparatus for heating dwellings, and to enable quiet operation of the apparatus.

These and other advantageous objects, which will later appear are accomplished by the simple and practical construction and arrangement
60 of parts hereinafter described and exhibited in the accompanying drawings, forming part hereof, and in which:

Fig. 1 represents an elevational view of an oil burning apparatus embodying the invention,
65 Fig. 2 represents a sectional view of the valve and controlling means therefor,

Fig. 3 represents a sectional view taken on line 3—3 of Fig. 2,
Fig. 4 represents a plan view of a lever forming
70 an element of the valve control means,

Fig. 5 represents a sectional view of a modified valve structure, and
Fig. 6 is an elevational view showing in detail
75 the engagement between a governing device and a lever forming an element of the invention.

Referring to the drawings, in Figs. 1 and 2 is shown an oil burning apparatus, including a motor 5 having a shaft 6, which drives an atomizing and gasifying device generally indicated by the
80 numeral 7. The motor is mounted vertically on supports 8, the device 7 being arranged above the motor.

Attached to shaft 6, below the motor, is a governing device 4 comprising a plurality of piv-
85 otally mounted bell-cranks, each of which has a short arm 9 and long arm 10, the long arms 10 being weighted and arranged to fly outwardly from the centrifugal force created when the shaft has attained a predetermined speed.

Loosely mounted on the shaft 6 is a collar 11, which is at all times in engagement with the short arms 9, and is maintained in such a condition by a spring 12, the latter bearing against the collar
90 11 and the collar 13, which is fixed to the shaft 6, by means of a set-screw or the like.

The collar 11 has an annular flange 14 which is in constant engagement with hardened thrust bearings 63 on the arm 15 of a lever pivoted at 16
100 to a casing 3 for the structure above described, as shown in Figs. 1 and 2.

The other arm 15' of the lever has a hardened thrust bearing 64 which engages the valve stem 17 which is slidable in a passage 18 in the block
105 19, the upper end of the passage flaring outwardly to provide a conical seat 20, upon which rests a valve head 21, the latter being attached to the valve stem 17.

The valve head 21 is conical in shape to correspond to the shape of the valve seat 20, and the
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head 21 has fixed thereto several annular bands 22 of leather or a similar material, the bands being spaced apart. The bands 22 insure an oil-tight engagement of the seat 20 and the head 21 when the valve, which they comprise, is closed.

Slightly below the valve seat 20, the block has a passage 23 transverse to and communicating with the passage 18, the valve stem 17 being reduced at 24 so as to allow the flow of oil from the valve through passages 18 and 23 when the head 21 is raised from the seat 20. The lower end of the valve stem is provided with suitable packing 25 to prevent leakage of oil at that point.

The flared portion of the passage 18 opens into a cylindrical chamber 26 in which is positioned a compression spring 27, which bears upon the head 21 to normally force the head on to the seat 20 to close the valve. The spring 27 is held in place by a threaded cap 28 screwed into the block.

The chamber 26 communicates with the passage 29, in which is adjustably positioned a metering device. The passage 29 in turn communicates with the transverse passage 30, through which oil is introduced into the device from a supply source, (not shown).

The metering device includes a rod 31 having cut in its end a tapered, angular groove 32. By adjusting the position of the rod, the flow of oil from passage 30 through the angular groove 32 to the chamber 26 can be regulated.

In operation, the spring 27 normally maintains the head 21 seated to close the valve to prevent the flow of oil through passage 23 to the atomizing and gasifying device 7. When the motor is placed in operation and attains a speed sufficient for the proper operation of the atomizing and gasifying device 7, the weighted arms 10 of the governing device 4 are forced outwardly by the centrifugal force created, and this movement causes rotation of the bell crank levers; and arms 9 force the collar 11 downwardly against the action of spring 12.

The downward movement of the collar 11 and the flange 14 which is integral therewith forces the arm 15 of the lever downwardly, at the same time forcing the other arm 15' upwardly to move the valve stem 17 to raise the head 21 and open the valve, to allow the flow of oil through passage 23.

It will be seen that the valve does not open at the same instant the motor is started, but opens only when the motor has attained a speed sufficient to cause proper atomization or gasification of the oil. Consequently when oil is introduced into the atomizing device 7, the latter is in proper position to perform its intended functions, and there is no excess oil to cause noisy explosions at the time of ignition.

On the other hand, it will be noted that as soon as the speed of the motor falls below the speed necessary for proper operation of the device 7, the arms 10 immediately fall into the position shown in Fig. 2 and the spring 12 moves the collar 11 upwardly to relieve the pressure of the lever on the valve stem 17, and spring 27 immediately forces the valve head 21 downwardly to close the valve.

It will be seen that if for any reason the motor should fail to function, my valve control device positively prevents the flow of oil as the opening of the valve and the flow of the oil is dependent entirely upon the speed of the motor.

In Fig. 5 a slightly modified form of valve is disclosed having a seat in the form of a plurality of annular terraces 40, the edges of which,

when the valve is closed, engage annular bands 41 which are fixed to the conical head 42 and project slightly therefrom. The bands 41 may be made of leather or a similar material. The head 42 is attached to a valve stem 43 movable in a block 44, the stem 43 resting upon the bottom 45 of a metallic bellows 46 which is attached to the block and prevents the leaking of oil therefrom. The bottom 45 of the bellows engages the arm 15' as above described in connection with Fig. 2.

It will be noted that when the motor attains a predetermined speed, the opening of the valve will be gradual since the outward movement of the weighted arms 10 is gradual and increases with the speed of the motor. When the motor has attained its maximum speed the valve will then be fully open. This mode of operation enables gradual feeding of oil to the atomizing and gasifying device so that there will be no abrupt and sudden supply of a considerable amount of oil to the device at the time of ignition. When the electrical circuit is broken through the motor, the motor will gradually decrease in speed, but, owing to the centrifugal force, the arms 10 still hold in an outward position until the spring 12 snaps up the collar, closing the arms to position as shown in Fig. 2. At this same time the spring 27, working in conjunction with spring 12, immediately snaps the valve head 21 downwardly to instantly close the valves. When the weights have fallen to the position shown in Fig. 2, the collar 11 will be snapped up to the position shown in Fig. 2, by the spring 12, allowing the spring 27 to snap the valve head 21 downwardly to instantly close the valve completely.

It will also be noted that a metering device is located on the inlet side of the valve and introduces oil under pressure above the head 21. The latter is therefore subjected to the pressure of the oil in addition to the pressure of spring 27, which is a more desirable arrangement than the introduction of oil to the valve from a point below the head 21, in which case the pressure of the oil would counteract the force exerted by spring 27.

The location of the metering device on the intake side of the valve also enables a uniform and steady supply of oil to the atomizing and gasifying device. This is of importance in the event that should there be a tendency of the valve to vibrate and the metering device be on the exhaust side of the valve, there would be an unsteady flow through the metering device and the oil would enter the atomizing device 7 in spurts.

The arrangement of the governing device 4, the collar 11 with the spring 12, has a thrust action on the shaft 6; and although the motor is vertically suspended the thrust action exerted by the parts above described counteracts tendencies of the shaft 6 to oscillate, and consequently, no thrust bearing is necessary. This arrangement is further desirable in that if necessary, the shaft may be extended through the casing 3 so that there may be a direct drive from the shaft 6 to operate other devices such as, for example, an oil pump or the like.

From the above description it will be seen that I have provided a novel and simple manner of controlling the flow of oil to an oil-burning apparatus for heating dwellings.

While my invention has been described with special reference to oil burning apparatus and the like, it is obvious to a person skilled in the art that it may be readily adapted for use in many

situations in which it is desired to synchronize the flow of a liquid or gas with the movement of another device.

5 The foregoing disclosure is to be regarded as descriptive and illustrative only, and not as restrictive or limitative of the invention, of which obviously an embodiment may be constructed including many modifications without departing from the general scope herein indicated and denoted in the appended claim.

10 Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:

15 In combination, a motor shaft, a governing device attached to the shaft, a collar rotatably and

slidably mounted on the shaft and engaging the governing device, said collar having one end recessed, a collar fixed to the shaft, a compression spring positioned in the recess in the slidable collar and surrounding the shaft, said spring engaging the fixed collar and the slidable collar to normally maintain the slidable collar in a predetermined position on the shaft, a valve stem, and a lever engaging the valve stem and having a forked extremity engaging the slidable collar, said governing device acting on the collar to cause the lever to force the stem to open a valve when the shaft attains a predetermined speed.

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