March 27, 1934. H. W. PARTLOW 1,952,332

GOVERNOR FOR GAS BURNING HEATERS

Filed March 19, 1931 2 Sheets-Sheet 1

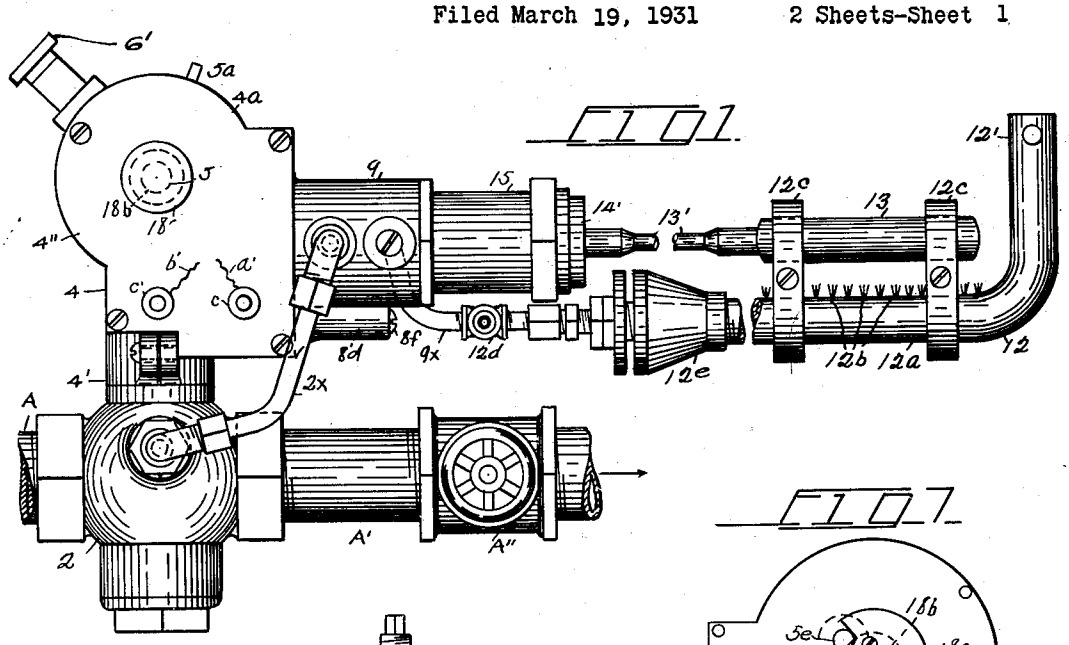


FIG. 1.

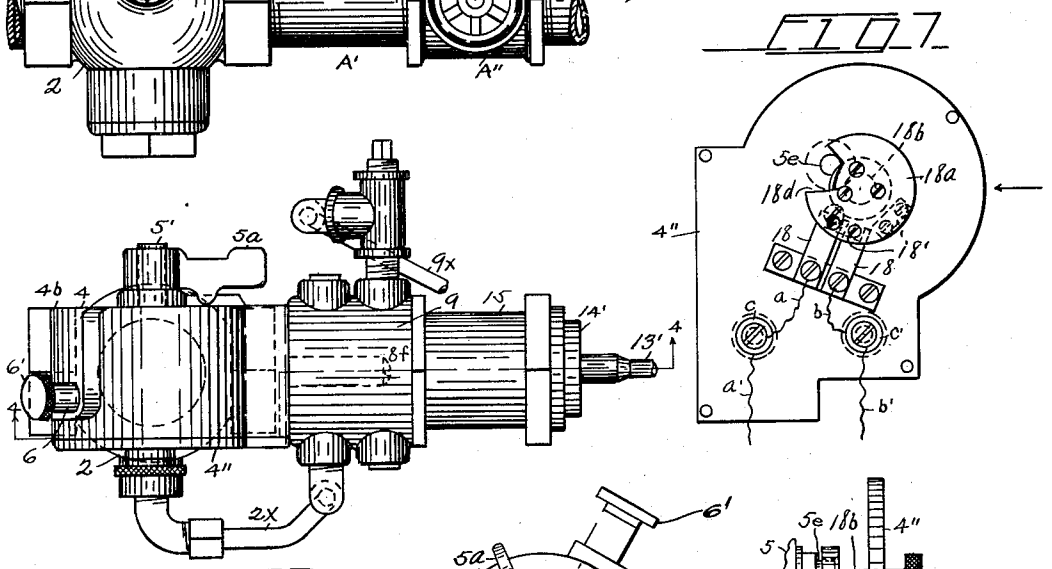


FIG. 2.

FIG. 3.

FIG. 4.

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GOVERNOR FOR GAS BURNING HEATERS

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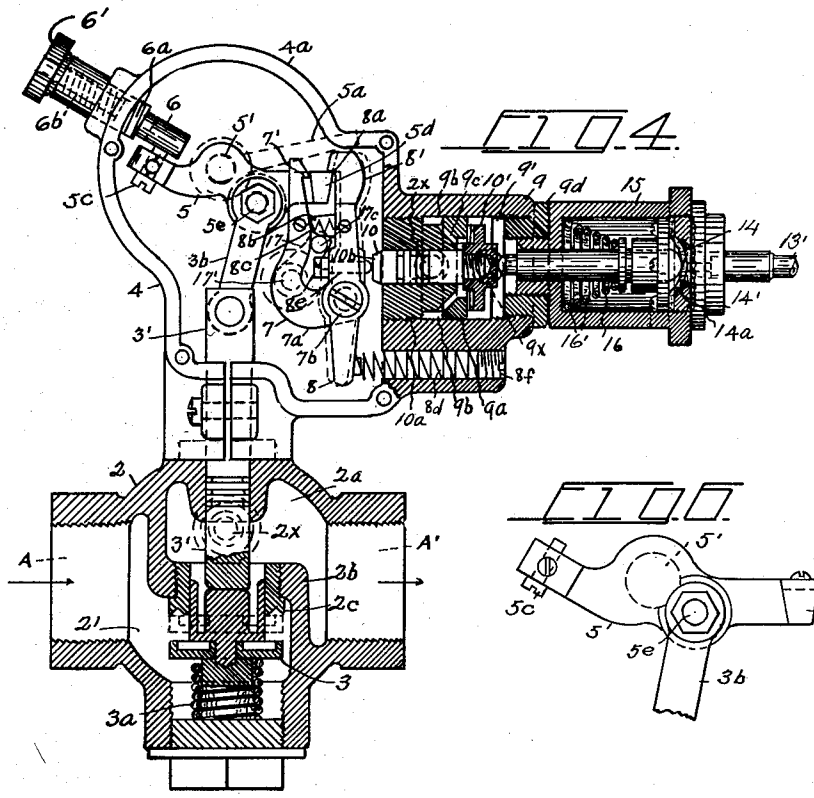


FIG 4.

FIG 6.

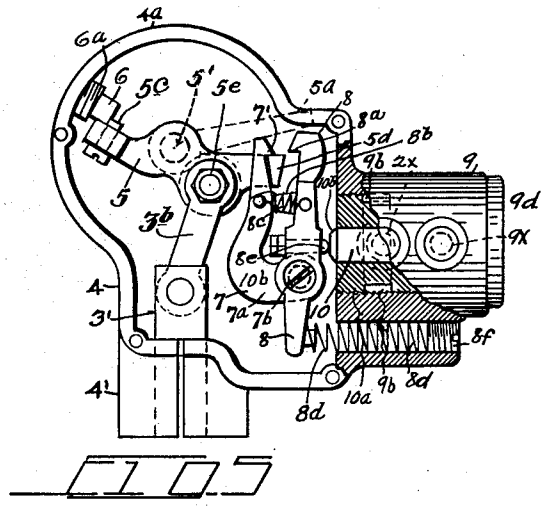


FIG 5.

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GOVERNOR FOR GAS-BURNING HEATERS

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Application March 19, 1931, Serial No. 523,827

6 Claims. (Cl. 158—117.2)

This invention relates to improvements in fuel-gas governors, and has especial reference to the governing of valves that supply gas to the burners of ovens, furnaces, and the like, entirely by the thermal changes of an element heated by the gas.

The object of the invention is to provide a governor of this class, which enables the operator to initially open the main valve, to simultaneously supply gas to the oven burners, and also to one or more pilot burners, by which the oven burners may be lighted. A further object is to provide a thermostat comprising a bulb that contains mercury or other expansible fluid, the said bulb being heated by the pilot burner for expanding the mercury and maintaining the fuel valve in the open position, as long as the pilot burner remains lighted; the cooling and consequent contraction of the mercury due to the extinguishment of the pilot light, or the interruption or failure of the gas supply, alone effecting the closing of said valve. A further object is to provide an auxiliary mechanism including a reciprocable valve or member which intervenes the gas supply valve and the pilot burner, and being controlled by parts operable by the thermostat which dispose said member in position to hold the supply valve open, said auxiliary member being movable by tension controlled means to another position to enable the supply valve to close automatically; said auxiliary device including a chamber that forms a link in the gas line between the supply valve and the pilot burner and being arranged to receive from the supply valve only the portion of the gas required for the operation of the pilot light, which the said member throttles and discharges toward the pilot burner. A further object is to provide novel manually controlled means for opening and temporarily locking said supply valve in the open position until the thermostat becomes sufficiently heated to cause the reciprocable member and related parts to assume control of and steadily hold the supply valve open for the duration of a heating period, or until the pilot burner becomes extinguished, as explained. This manual opening of the main supply valve has the advantage of enabling the operator to light the pilot burner and start the heating operation immediately, instead of having to wait several minutes for the thermostat to become properly heated, in order that the supply valve may be opened, as heretofore practiced (see my pending application, Ser. No. 340,841).

The various features and parts of the invention will be understood from the detailed description which follows and by reference to the accompanying drawings, in which—

Figure 1 is a broken front side elevation of the complete governor, including the fuel valve and the pilot burner. Fig. 2 is a broken top plan view of the same. Fig. 3 is a broken rear side elevation, of the device shown in Fig. 2. Fig. 4 is an enlarged vertical longitudinal section taken substantially on line 4—4 of Fig. 2, showing the positions of the working parts when the governor assumes automatic control of the main gas valve following the manual opening thereof. Fig. 5 is a similar section and partial elevation showing the valve locking mechanism in released and operated positions, the main valve and certain other parts being omitted. Fig. 6 is an enlarged front side elevation of the crank that directly controls the fuel valve. Fig. 7 is a rear or inner face view of the cover, showing the switch that controls the electric or other alarm, the switch being closed. Fig. 8 is an edge view of the same taken in the direction of the arrow in Fig. 7.

In the drawings, 2 represents the main gas supply valve body, which is divided respectively into receiving and discharge chambers 2'—2*a* by a wall 2*b*, the said wall being formed with a circular opening in which is fitted an annular valve seat 2*c*. 3 represents the valve proper which is supported by a stem 3', the valve being normally held in the closed position by a compression spring 3*a*. The arrows in Figs. 1 and 4 show the direction of the flow of the gas through the valve, the inlet being via a pipe A, and the discharge to oven or other burners being via a pipe A'.

Upon the valve body 2, is mounted a hollow casing 4, having a split neck 4' that may be clamped to the top of the valve body (see Fig. 4). The front side of casing 4 is normally open and is closed by a cover 4''. The top portion of the casing 4 is part circular, as at 4*a*, and in this portion is axially mounted a crank 5, supported by a shaft 5' that journals in the back wall 4*b* of the casing, the outer end of said shaft being fitted with a handle 5*a*, which is swingable in opposite directions, in order to correspondingly rotate the crank, as may be understood by consulting Figs. 3, 4 and 5. The crank 5 is operatively connected with the valve stem 3' by means of a link 3*b*, whose upper end is pivoted to the crank 5 eccentric to the axis 5'. The movement of the crank, as from the full-line to the dotted position, shown in Figs. 4 and 5, depresses and opens valve 3 for dispensing the fuel gas. By this arrangement, the counter-clockwise swing of the crank 5 closing the valve is limited by the seating of the valve 3, while the clockwise movement of said crank opening the valve is limited by a stop pin 6, which pierces the casing 4*a* and is disposed radially, as shown. The stop pin is provided with a head 6' disposed outside of the casing, the pin reciprocating in a threaded sleeve 6*a* and being held extended inwardly in the plane or path of the crank 5, by a spring 6*b*, shown in Fig. 4, and therefore controls the extent of the movement of the crank 5. One end of crank 5 is fitted with

a screw 5c, by which relatively fine adjustments of the valve 3 and certain of its controlling means may be effected. In the present case, the initial opening of the valve 3 is effected manually, and once the valve is opened, the operator loses control of its closing, except in case of emergency, as will be explained later on. To open valve 3, the operator first pulls the stop 6 outwardly (see Figs. 1 and 4) and at the same time he may depress the handle 5a which correspondingly rocks the crank 5 to the horizontal position, shown in Figs. 4 and 5. The righthand end of the crank is shown formed with a mutilated V-tooth, as 5d, which frictionally engages the angular head of a tensioned latch or lever 7, the latter being formed with a hook 7' that snaps over the said tooth and holds the crank against manual or accidental release. This rotation of crank 5, through the link 3b, depresses and opens the valve 3, and the gas will then flow through the valve and into the conduit A' for supplying the fuel to an oven or other burner, (not shown). When the operator lets go the stop 6 and handle 5a, the stop remains in its withdrawn position, until said crank and related parts are later released by the automatic action of the safety mechanism. The stop 6, when withdrawn as explained, serves to visually indicate that the valve 3 is open, and under the control of the thermostat and related parts.

The latch 7, as shown, is shaped like an inverted question mark and its short arm 7a is pivoted by a screw 7b to a similar but longer and straighter latch or lever 8, which in turn, is pivoted to the rear wall of the casing 4 by the screw 7b. Both of these latches are disposed and rockable in a common plane, in which the tooth 5d is also movable. The top end of latch 8, comprises a head 8', which is formed with a hook 8a that faces but is preferably in slightly higher plane than the hook 7'. The latches 7 and 8 are normally spaced apart, as shown in Figs. 4 and 5, by a stud or arm 8b that is integral with latch 8, and their top ends are held resiliently in this normal spacing by a spring 8c which allows either or both of said latches to be moved away from each other. Obviously, both of said latches may also be moved as one part. The lower end of lever 8 is engaged by a spring 8d, which is disposed in a horizontal socket of a housing 9 that may be integral with the casing 4, as shown. The spring 8d normally tends to rock the upper end of the lever 8 towards the housing 9, unless it is restrained by the stem 10, of valve 10' which is reciprocable in a chamber 9' of the housing. The stem 10 extends through a bushing 10a into the casing 4 and its projecting end 10b engages an adjustable pin 8e carried by lever 8, and when force is exerted axially in the right direction, the stem 10 rocks and holds lever 8 and lever 7 away from housing 9, to disengage hook 7' and to enable hook 8a to engage the tooth 5d, as shown in Fig. 4. The interior of housing 9 is divided by an annular concentric nut 9a, which forms chamber 9' and a smaller annular chamber 9b that communicates with the chamber 9', by means of a conical shaped opening 9c, for the passage of gas or other fluid. The chamber 9b receives the fuel-gas from the main valve chamber 2a by means of pipe 2x, and the gas is dispensed by the chamber 9' through a similar pipe 9x. The outer end of housing 9 is closed by an externally and internally threaded bushing or plug 9d. The spring 8d is rendered adjustable by a screw 8f shown in Figs. 4 and 5.

The pilot burner comprises an L-shaped tube 12, which is normally open at its free end 12' and is also diametrically perforated near said end to emit flames in opposite directions laterally, by which oven or other burners (not shown) may be lighted. The horizontal arm 12a of tube 12 is also provided with a number of miniature perforations or jets 12b for heating a bulb 13 that forms part of the thermostat, as best seen in Fig. 1. The burner 12 and bulb 13 are mutually held and suitably spaced by similar clamps 12c. The burner 12 receives the gas from a mixer 12e, which in turn receives the gas dispensed by the auxiliary valve 10' via pipe 9x. 12d represents a cock which is disposed in pipe 9x, by which the gas for the pilot burner 12 may be shut off at the will of the operator. A similar cock A'' in pipe A' shuts off the gas to the oven or other burners.

The thermostat mechanism comprises the bulb 13, which is preferably filled with mercury, and a conductor 13' that transmits the mercury to a chamber 14, which is formed in a screw plug 14', that closes the open end of a hollow cylinder 15, in which is disposed a plunger 16, whose reciprocation is controlled by the expansion and contraction of the mercury. To this end, a leather or other flexible disc-shaped diaphragm 14a closes the inner end of chamber 14 and against which one end of the plunger 16 is resiliently held by a spring 16'. The opposite end of the plunger 16 projects into chamber 9' of the housing 9 where it is in constant engagement with the valve 10' and controls the reciprocation of said valve. The valve 10', as shown in Fig. 4, is permanently held slightly spaced from its seat 10c, so as to enable the said valve to throttle and steadily deliver the least amount of gas to properly operate the pilot burner. Ordinarily, when the thermostat is "dead", by reason of the substantially complete contraction of the mercury, the valve 10' is forced by the spring 8d a considerable distance away from its seat 10c, so that when the main valve is opened manually, as described, there occurs a relatively strong inrush of gas into chambers 9' and 9b, that naturally causes a heavier than normal flow of the gas to the pilot burner which instantly responds and emits a larger flame to light the oven or other burners, and this excess supply of gas will gradually be diminished thereafter as the mercury expands and the plunger 16 operates to move the valve 10' towards its seat and enables the device to settle down to normal thermal control.

In order to provide suitably for the emergency closing of valve 3, immediately following its initial opening and before the thermostat has had time to effect the switching of levers 7 and 8 to render permanent the temporary locking of valve 3, I provide an arm 17 which is pivoted at 17' in the back wall of the casing 2 and is manipulatable by a knob 17a to swing lever 7 away from lever 8 for disengaging hook 7' from the tooth 5d, as described. This is accomplished by a pin or stud 17c carried by the free end of arm 17 and which moves in the plane of lever 7, as shown in Figs. 3 and 4.

It is desirable to automatically sound an alarm to give warning of the arbitrary closing of the main gas valve in case the pilot burner becomes extinguished during a heating interval. For this purpose, the rear side of cover 4'' is fitted with a switch comprising similar terminals 18 and a brush 18', adapted to bridge the said terminals, the brush being mounted upon a rotor 18a that is pivotally mounted in coincidence with axis 5'

of the crank 5, by the threaded stem 18*b* of a hand-knob 18*c*, which passes through the cover and screws into the barrel of the rotor. The rotor is cut away, as at 18*d*, to receive and afford play for a pin 5*e* carried by the crank 5 (see Figs. 4 and 5), the said pin being disposed eccentric to the axis 5' and being according to Figs. 7 and 8, in the position shown in Fig. 5, which indicates that the crank 5 has been released from hook 8' for closing the switch 18—18' to give notice that the valve 3 has been closed. The alarm may be stopped by rotating knob 18*c* in the proper direction. Wires *a*—*b* connect the terminals 18 with binding-posts *c*—*c'*, from which wires *a'*—*b'* may lead to a suitable battery and gong (not shown).

Having thus described my invention, what I claim, is—

1. A governor for gas-burning heaters having in combination with an automatic gas supply valve and a pilot burner controlled by said valve, a manually operable member operable to initially open the supply valve to enable the pilot burner to be lighted, a throttle valve to regulate the flow of gas to the pilot burner, thermal means responsive to the heat of the pilot burner, a latch to hold said member in said open position while said element is being initially heated, a second latch, said thermal means being operable upon expansion to release said first latch and to effect engagement of the second latch with said member to prevent the closing of said supply valve as long as the pilot burner remains lighted, and tension controlled means operable to disengage said second latch from said member and to enable the supply valve to close upon extinguishment of the pilot burner.

2. A governor for gas-burning heaters having in combination with an automatic gas supply valve and a pilot burner communicating therewith, a hollow upright casing supported by said valve and having a hollow cylindrical portion in communication with the supply valve, a throttle valve in said cylindrical portion to dispense the gas to the pilot burner, a crank in said casing operatively connected with the supply valve, means for manually rocking said crank for initially opening the supply valve, a reciprocable stop to limit the movements of said crank, means to temporarily lock the crank at the end of the manual operation, thermal means responsive to the heat of the pilot burner, said thermal means being operable upon expansion to actuate said throttle valve for releasing the temporary locking means, means for relocking said crank upon closing movement of the throttle valve, and means rendered operable by the contraction of said thermal means to effect the release of the crank and the closing of the supply valve to shut off the gas to said pilot burner.

3. A governor for gas-burning heaters having in combination with an automatic gas supply valve and a pilot light, a hollow casing mounted upon said valve, a rockable member mounted in said casing and operatively connected with the supply valve, and adapted to be manually rocked for opening the supply valve to enable the pilot burner to be lighted, thermal means responsive to the heat of the pilot burner, a valve operable to throttle gas supplied to the pilot burner while said thermal means is being heated, means to temporarily lock said member for holding the supply valve open during the initial heating of said thermal means, said throttle valve being controlled by said thermal means and operable to release said temporary locking means at the end of said initial heating, means to effect the relocking of said member to hold the supply valve open as long as the pilot burner remains lighted, and tension means rendered operable by the contraction of said thermal means to enable the supply valve to close automatically to extinguish the pilot light.

4. In combination with an automatic gas supply valve, a pilot burner and thermo-means responsive to the heat of the pilot burner, manual means for operating the supply valve to enable the pilot burner to be lighted, means operable by the thermo-means to control the flow of a portion of the gas from the supply valve to the burner, means to temporarily latch the valve operating means for holding the supply valve open during the initial heating of said thermo-responsive means, means actuated by the thermo-means to release the temporary latching means, means to relatch the valve operating means following release of the temporary latching means thereby to prevent closure of the supply valve while the pilot burner remains lighted, and means operable by the gas controlling means to effect release of the relatching means and thereby the valve operating means to enable the supply valve to automatically close following extinguishing of the pilot burner.

5. In combination with an automatic gas supply valve, a pilot burner and thermo-means responsive to the heat of the pilot burner, manual means for operating the supply valve to enable the pilot burner to be lighted, means to temporarily latch the valve operating means for holding the supply valve open during initial heating of said thermo-responsive means, means to relatch the valve operating means following release of the temporary latching means thereby to prevent closure of the supply valve while the pilot burner remains lighted, and combined means including said thermo means to control the flow of a portion of the gas from the supply valve to the burner and for releasing the temporary latching means and the relatching means whereby upon release of the latter to enable closing of the supply valve upon the burner being extinguished.

6. A governor for gas-burning heaters having in combination with an automatic gas supply valve, a pilot burner on the outlet side of the valve, and thermal means responsive to the heat of the pilot burner for controlling the valve, a rockable member operatively connected with the supply valve, means to manually operate said member for opening the supply valve to enable the pilot burner to be lighted, a normally open throttle valve to control the flow of a portion of the gas from the supply valve to the pilot burner, means to temporarily lock said member for holding the supply valve open during the initial heating of said thermal responsive means, connecting means between the throttle valve and the locking means, means actuated by the thermo means for operating the throttle valve upon initial heating to partially close said throttle valve and to release said temporary locking means, means operative to relock said member upon said closing movement of the throttle valve, and means to release said member following cooling of the thermo means to enable the supply valve to close automatically following the extinguishment of the pilot burner.

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