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GOVERNOR FOR GAS BURNING HEATERS

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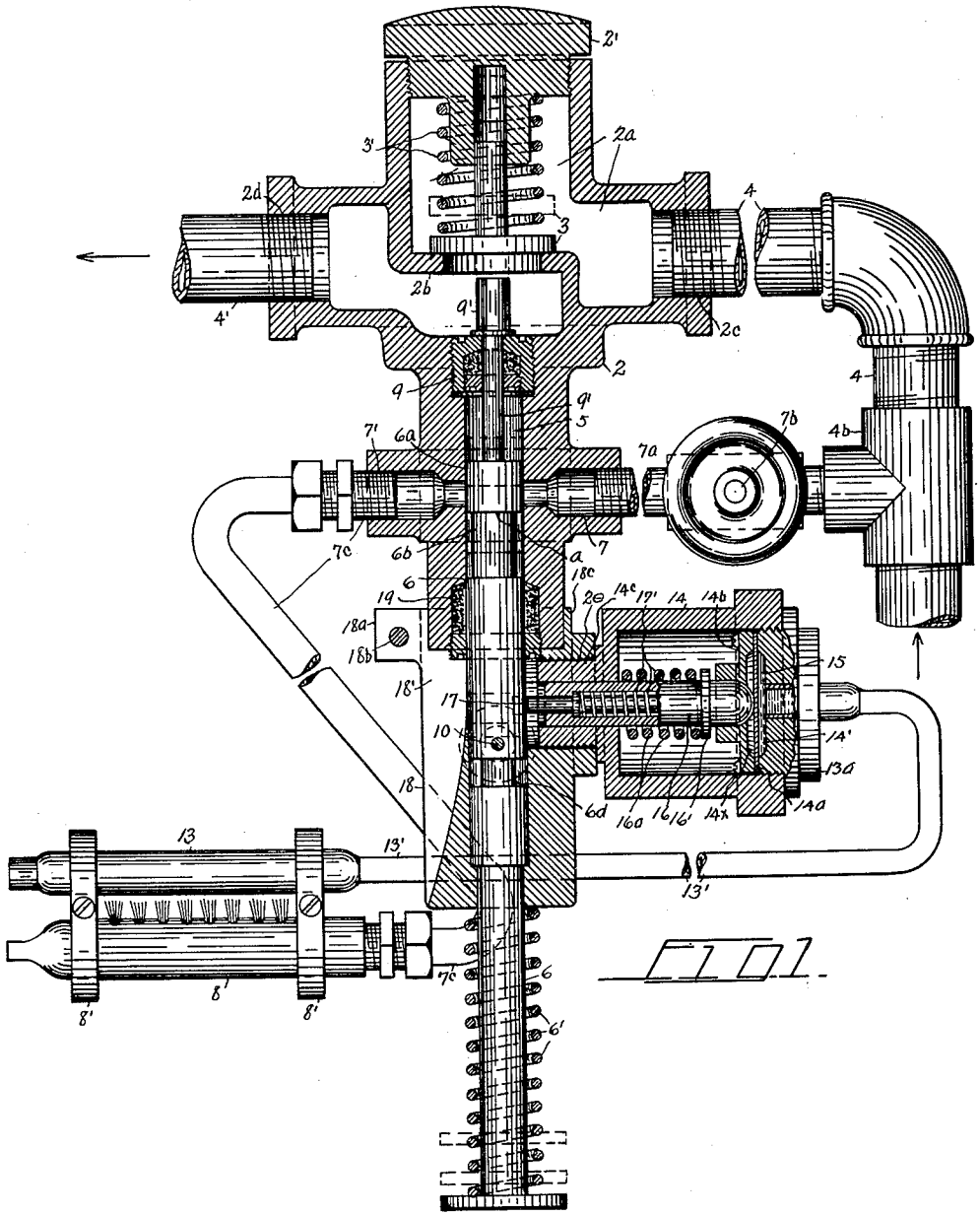


FIG. 1.

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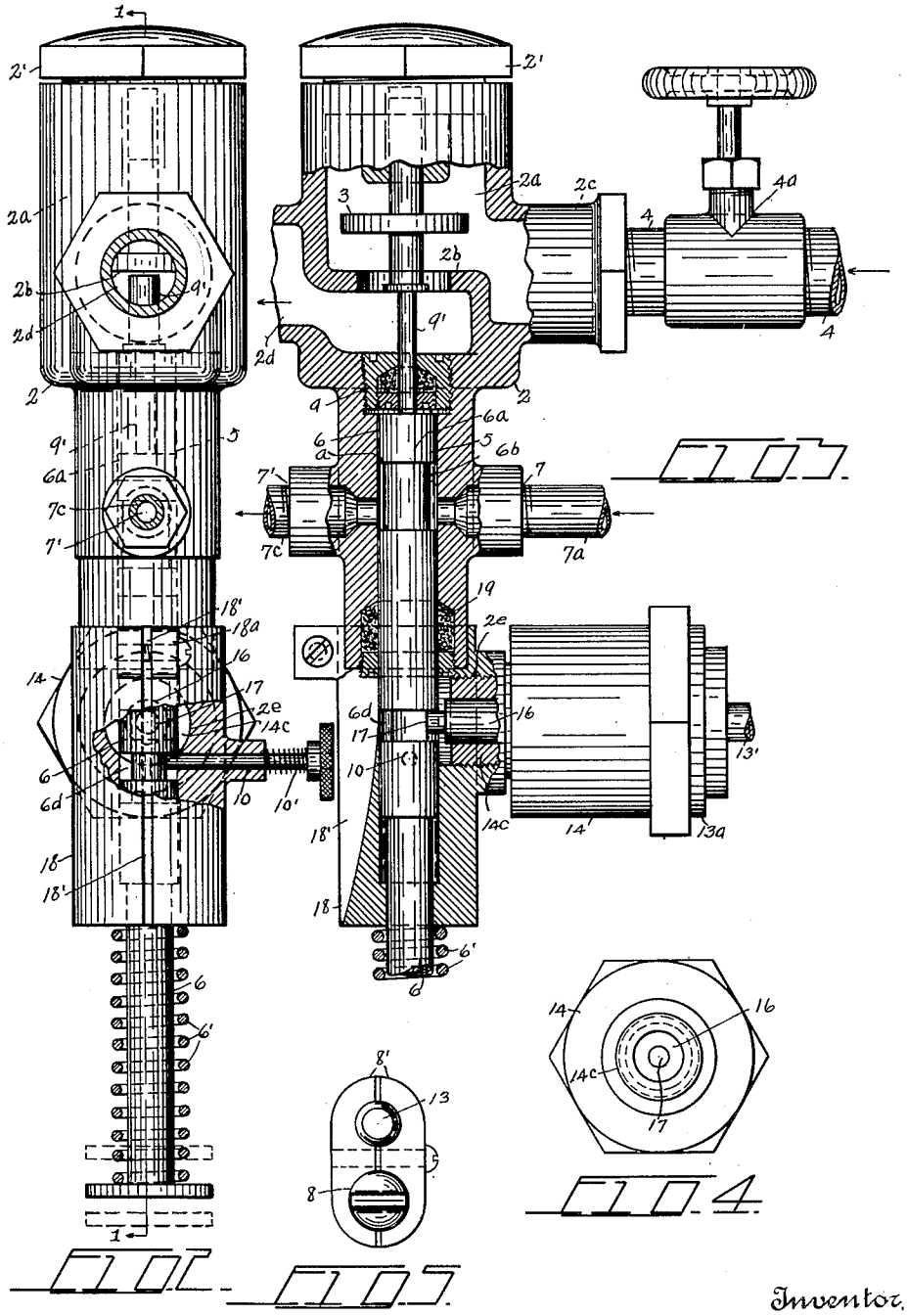


Fig. 1

Fig. 3

Fig. 2

Fig. 4

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UNITED STATES PATENT OFFICE

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GOVERNOR FOR GAS BURNING HEATERS

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This invention relates to improvements in thermally controlled fuel-gas governors, designed for use in connection with high and low pressure gas-heaters generally, and has for its object to provide novel construction and arrangement of valves for supplying the fuel to the main heater and also to an auxiliary burner that controls the thermostatic safety mechanism, and also performs the functions of an ordinary pilot light for igniting the burners of the heater.

The governor comprises an elongated hollow body that houses the fuel dispensing valves, the valve for the auxiliary burner comprising a portion of a reciprocatable member or plunger that is partially enclosed by the body, and is movable manually for supplying the fuel to the auxiliary burner in advance of the lighting of the main heater, a second movement of said member being required for effecting the opening of the valve that dispenses the fuel to the heater, and said member being operable automatically by tension means for closing the fuel passages to the heater and thermostat by the extinguishment of the auxiliary burner.

A further object is to provide simple means for temporarily arresting and holding the reciprocatable member in the position for dispensing the gas alone to the pilot burner for initially heating and expanding the thermal element, which preferably comprises a column or body of mercury. After the mercury is expanded to a suitable extent and the reciprocatable member is finally operated manually for opening the main valve that feeds the fuel to the heater, means carried by the thermostat and operable by the force of the expansion of the mercury interlocks with the said member and prevents the closing, accidentally or otherwise, of the main and pilot valves, as long as the gas supply is normal and the pilot burner remains lighted. The contraction of the mercury following the shutting-off or failure of the gas supply, causes the release of the reciprocatable member, which effects the automatic and instantaneous closing of both of said valves. The arrangement of the thermostat is such that as long as the pilot or auxiliary burner remains lighted, tampering with the gas supply to the main and auxiliary burners while the said supply is otherwise normal, is rendered impossible. And a further object is to provide distant manually controlled means for shutting-off the entire gas supply to the governor mechanism, for facilitating installing, removing, or repairing the said mechanism.

I attain these objects by the means set forth in the detailed description which follows, and as illustrated by the accompanying drawings, in which—

Figure 1 is a central longitudinal section, taken on line 1—1 of Fig. 2, showing the pilot burner lighted and the main and pilot valves closed. Fig. 2 is a front side elevation of the governor, showing the plunger operated for opening the pilot valve, with parts broken away to show the means for holding said valve open. Fig. 3 is a partial end elevation and partial central vertical section, certain parts being omitted, showing the plunger operated for opening the oven valve without disturbing the flow of the gas to the pilot burner, also showing the thermally controlled means for holding said valves open. Fig. 4 is an end view of the mercury-controlled means for maintaining the open condition of the two valves. And Fig. 5 is an end elevation of the pilot burner and mercury bulb.

In the drawings, 2 represents the elongated hollow body of the governor, whose top end is closed by a screw-plug 2′. This end of the body is formed with an enlarged chamber 2*a*, and with a circular seat 2*b* for the main fuel valve, as 3, that supplies the gas to an oven or other heater (not shown). The opposite sides of the chamber 2*a* are formed respectively with inlet and outlet passages 2*c*—2*d*, to which are connected a gas supply pipe 4 and a gas discharge pipe 4′. The pipe 4 is preferably fitted with a hand-valve 4*a* for controlling the flow of the gas towards the governor. Below the chamber 2*a* the body is bored axially, as at 5, to receive a reciprocatable member or plunger, 6, whose lower end extends below the body and supports a coil spring 6′, which tends to normally hold the plunger extended, as shown in Fig. 1. The body is formed below the chamber 2*a*

with reduced alining inlet and outlet ports 7 and 7′, which communicate with the bore 5. The passage 7 is fitted with a pipe 7*a* which taps the main supply pipe 4 by means of a T 4*b*, the pipe 7*a* being provided with a hand-valve 7*b* for regulating the flow of the gas therethrough. The port 7′ is fitted with a pipe 7*c*, that conducts the gas to an auxiliary or pilot burner 8, which may be disposed in an oven for lighting its burners, or at any other convenient location. The top end of the way 5 is preferably counter-bored and threaded to receive a stuffing-box 9, which supports a reciprocatable bolt 9′ and prevents leakage of the gas from chamber 2*a* to the way 5. The bolt 9′ is normally in engagement with the top end 6*a* of the plunger 6, and is preferably shorter than the space between the valve 3 and the end of the plunger 6, to enable the plunger to be moved axially a short distance, as shown in Fig. 2, for effecting the feeding of the gas to the pilot burner 8, without opening or disturbing the valve 3. The top portion 6*a* of the plunger substantially fills the bore 5, and this portion together with an adjacent reduced portion 6*b* constitute the auxiliary fuel valve *a* that controls the flow of the gas to the burner 8. Fig. 1 shows the enlarged portion 6*a* of the plunger 6 so disposed as to close the passage 7—7′, while the valve 3 is shown resiliently held in closed position by a spring 3′. By this arrangement, no gas may flow to either the oven or auxiliary burner.

To make ready to fire a furnace or other heater, the valve 7*b* should first be opened to admit the gas to the passage 7. This should be followed by the upward movement of the plunger 6 until the stop pin 10 carried by the body registers with an annular seat or groove 6*d* of the plunger. The stop 10 is next forced into said seat against the tension of a light coil spring 10′. The operator then holds the stop stationary and lets go the plunger which moves downwardly by the tension of spring 6′ sufficiently to effect the interlocking of the stop and plunger. This slight upward thrust of the plunger moves the reduced portion 6*b* into registry with the ports 7—7′ and enables the gas to flow via the pipe 7*c* towards the auxiliary burner 8, which may then be lighted, as shown in Fig. 1. The burner 8 is preferably disposed parallel to a bulb 13, the said parts being securely held by clamps 8′. 13′ represents a small caliber tube that communicates with the bulb 13. This tube may be of any suitable length and its farther end connects with a threaded plug or bushing 13*a*, that screws into one end of a cylindrical casing 14, the said plug being formed with a chamber 14′ in which is disposed a diaphragm 14*a*, the diaphragm being held in place by a cap 14*b*, which is formed with a coinciding chamber 14*x*, as shown in Fig. 1. The bulb 13, tube 13′ and chamber 14′ are preferably filled with mercury, as 15, which comprises the thermal element in the present governor. The opposite end of the casing 14 is bored axially and is formed with a reduced threaded hub 14*c*, which screws into a lateral opening 2*e* of the body 2. Within the casing 14 is axially disposed a cylindrical plunger 16, having a round end that normally bears against the diaphragm 14*a*. The other end of the plunger 16 extends partway into the hub 14*c* and is spaced from the member 6 sufficiently to enable the plunger to be freely reciprocated. The plunger 16 is formed with an annular flange 16′ that serves as a seat for a coil spring 16*a* which also engages the inner end of the casing (see Fig. 1). The spring 16*a* tends to hold the plunger against the diaphragm 14*a*, so that the flexing of the diaphragm by the expansion of the mercury 15 moves the plunger towards the member 6 against the tension of spring 16*a*. The plunger 16 is bored longitudinally to receive a bolt 17 and also a spring 17′, which tends to hold the bolt extended to engage the member 6. Fig. 1 shows the normal arrangement of the thermally controlled mechanism when the governor is in the inoperative condition. When the auxiliary burner 8 is first lighted, the heat produced by its flame expands the mercury 15 throughout the line 13—13′—14′. This expansion of the mercury flexes the diaphragm 14*a* and moves the plunger 16 bodily towards the member 6. The initial heating of the mercury alone is continued for several minutes, or until a relatively strong pressure is exerted by the bolt 17 against the member 6. At this juncture, the operator again moves the member 6 upwardly to bring the seat 6*d* into registry with the bolt 17. The bolt is then shot into the said seat by the tension of spring 17′, where it remains as long as the pilot burner is lighted and the expansion of the mercury is maintained, as explained. This last upward movement of the member 6 enables spring 10′ to withdraw the stop 10, and through the cooperation of the bolt 9′, moves the valve 3 away from its seat to provide a clear passage for the fuel to the oven or other burners. The cock 4*a* may be opened either before or immediately after the unseating of valve 3. When the gas dispensed by the valve 3 reaches the oven, the pilot burner 8 instantly ignites the gas to start the heating operation, in a well-known manner. Thereafter, the heating plant will continue to operate safely under the control of the governor, until the fuel supply is either shut-off by the closing of the cocks 4*a*—7*b*, or the supply of gas fails for any other reason.

My gas governor is extremely simple in construction and economical and reliable in operation. By its use all danger of fires, explosions, loss of service of a heater, injury to attendants, waste of fuel due to untimely or accidental shutting-off of the gas supply at

its source, or the extinguishment of the pilot burner by "back-draft" and the like, are entirely eliminated. The provision of the auxiliary burner 8, which in the present case performs the function of an ordinary pilot light, and at the same time controls the thermostat, not only greatly lessens the number of parts, thereby enabling me to install my governor within a relatively small space, but insures positive, reliable and safe governing of industrial ovens and other gas heaters.

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

1. A governor for gas-heaters and the like comprising a hollow body containing a valve to supply gas to the heater and having a barrel formed with coinciding gas ports, a single reciprocatable member in said barrel formed to actuate said valve and control said gas ports, tension means to hold said member in release position, a thermostat comprising a column of mercury, a pilot burner to light the heater receiving gas from said ports, means to move said member to first open said ports to start the pilot burner for heating the mercury, and finally to open said valve to start the heater, and a bolt associated with said reciprocatable member and, operable by the expansion of the mercury to prevent movement of said member for closing said valve while the pilot burner remains lighted.

2. The combination with a gas governor including a hollow body formed with a barrel and a chamber containing a valve for dispensing gas to a heater or the like, of a pilot burner to light the burners of the heater, said barrel being formed with ports to feed gas to the pilot burner, a thermostat including an element responsive to the heat of the pilot burner, a single member reciprocatable in said barrel formed with a valve-portion to control said ports, said member operable to be moved manually first to open said ports to start the expansion of said element and finally to open the valve that controls the heater, means actuated by said thermostat to prevent the closing of said valve as long as the pilot burner remains lighted, and means to close said valve and said ports upon the contraction of said element.

3. In a gas governor for industrial ovens and the like, a hollow casing formed with a chamber and a barrel having coinciding ports, a valve in said chamber, a single plunger in said barrel to open said valve, said plunger being movable manually to open said ports in advance of the opening of said valve, a pilot burner, means including a column of mercury responsive to the heat of the pilot burner, means to hold the plunger stationary during the preliminary heating of the mercury, and means operable by the expansion of the mercury to engage the plunger to prevent closing of said valve while the pilot burner remains lighted.

4. A gas governor for industrial ovens comprising a body formed with a chamber containing a valve to dispense gas to the oven and having a barrel portion formed with an independent gas passage, a single plunger in the barrel operable to be moved sequentially first to open said passage and then to open said valve, means to enclose both the valve and passage automatically when the gas supply fails, a pilot burner to light the burners of the oven receiving gas from said passage, a thermostat including a body of mercury responsive to the heat of the pilot burner, and means operable by the expanded mercury to prevent release of the plunger and the automatic closing of said valve while the pilot burner remains lighted.

5. A governor for gas burners, or the like comprising a casing having inlet and outlet ports, a by-pass leading from said casing, a main burner connected to the outlet port, an auxiliary burner connected to the by-pass, a single movable member in said casing operable to successively open the by-pass and upon further movement to open the outlet port, latching means for the movable member to retain the outlet and by-pass open, a thermostatic element normally responsive to the heat of the auxiliary burner to actuate the latching means, means to release the latching means, and means to actuate the movable member and thereby to close the outlet and by-pass upon failure of the auxilary burner.

6. A governor for gas burners comprising a casing having valve controlled inlet and outlet ports, a bypass leading from said casing, a main burner connected to said outlet port, an auxiliary burner connected to said bypass, an integral plunger slidable in said casing and having a part thereof formed to control said bypass and which upon predetermined, limited sliding motion opens said bypass and upon further sliding motion actuates and opens said outlet port valve, latching means to retain said plunger in its first named position, other latching means to retain said plunger in its second named position, a thermostatic element responsive to the heat of the auxiliary burner to actuate said second named latching means, tension means to release each of said latching means, and tension means to actuate the plunger and thereby to close all of said ports upon failure of the auxiliary burner.

7. A governor for gas burners comprising a casing having valve controlled inlet and outlet ports, a bypass leading from said casing, a main burner connected to said outlet port, an auxiliary burner connected to said bypass, a single member movable in said casing having a portion thereof formed to control said bypass and which upon predetermined motion opens said bypass and upon further motion actuates and opens said outlet port valve, latching means to retain said

member in its first named position, other latching means to retain said plunger in its second named position, a thermostatic element responsive to the heat of the auxiliary burner to actuate said second named latching means, means to release each of said latching means and tension means to actuate said movable member and thereby to close all of said ports upon failure of the auxiliary burner.

In testimony whereof I affix my signature.

HOWARD W. PARTLOW.