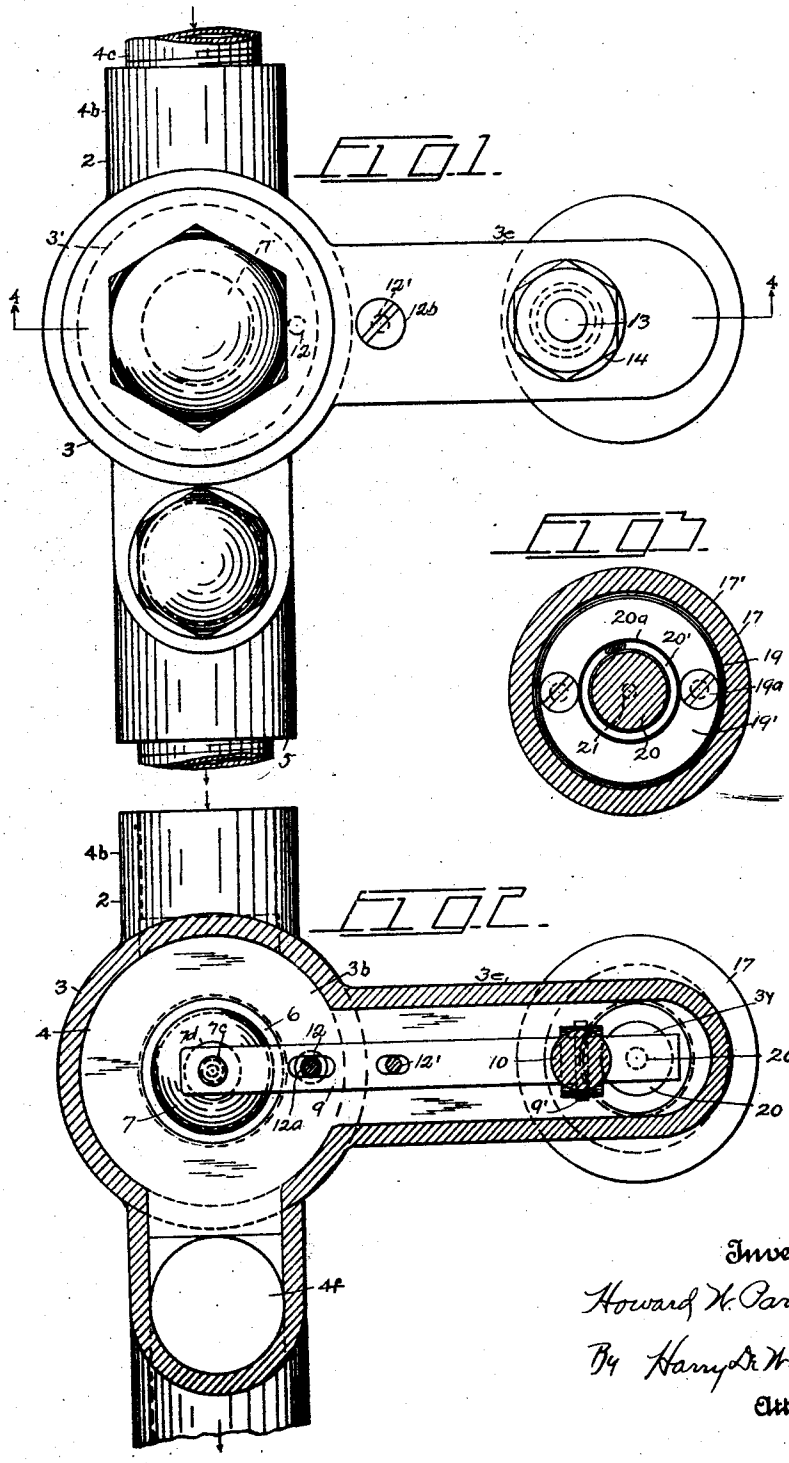
Aug. 10, 1926. 1,595,242

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HEAT CONTROL

Filed Feb. 23, 1926 2 Sheets-Sheet 1



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Filed Feb. 23, 1926 2 Sheets-Sheet 2

FIG 4.

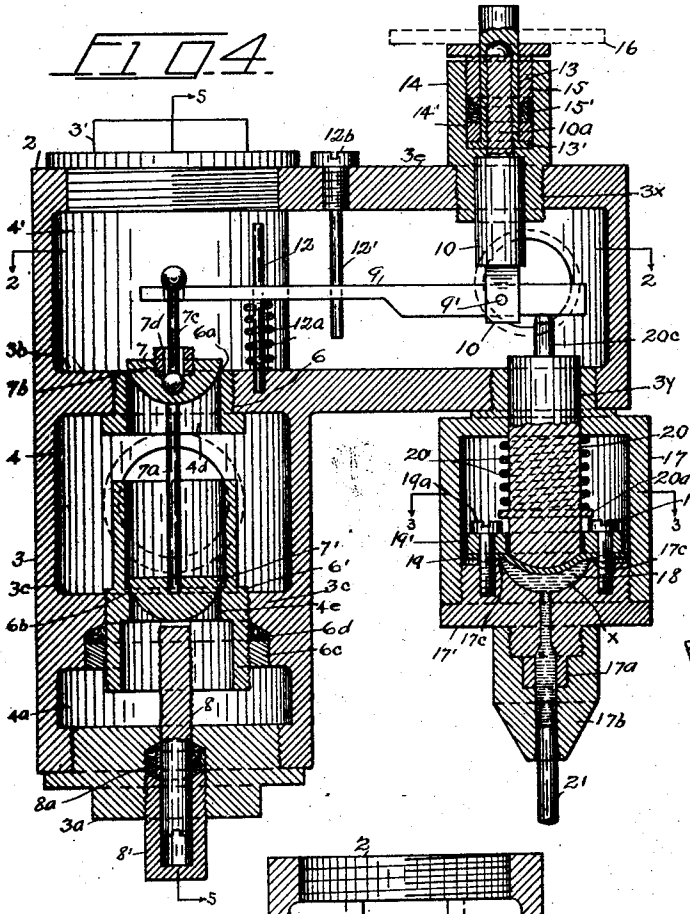


FIG 6.

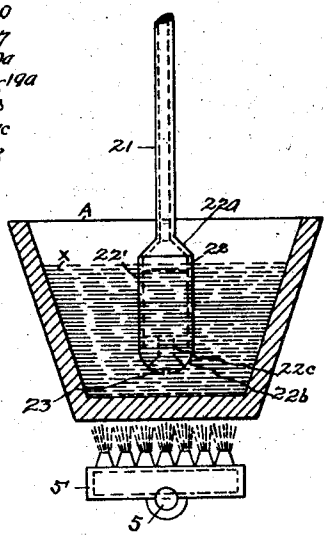
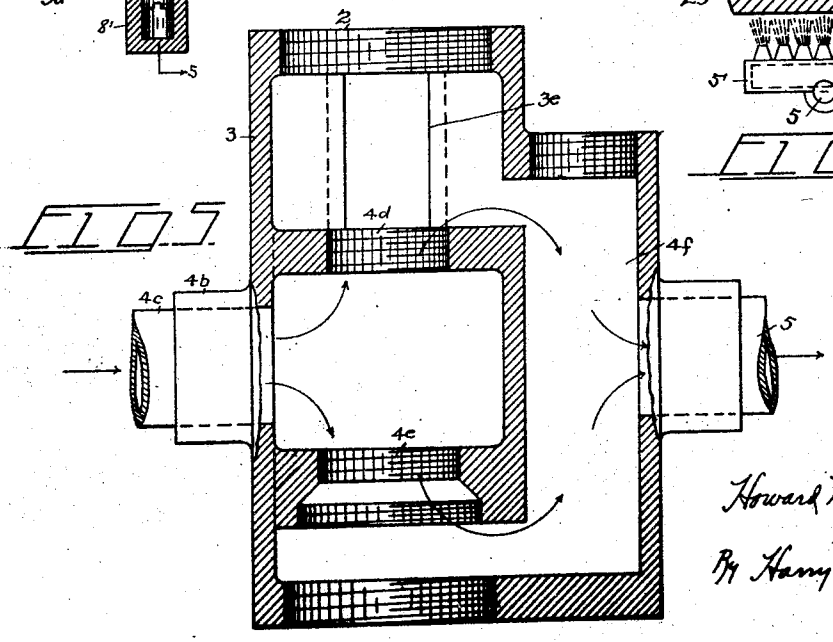


FIG 5.



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UNITED STATES PATENT OFFICE.

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HEAT CONTROL.

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This invention relates to improvements in heat control designed particularly for use in connection with melting-pots of linotype and intertype machines, industrial and domestic ovens, and the like, and has for its object to provide a novel, simple and positive temperature indicator and regulator especially adapted for controlling temperatures produced by burning gas at relatively high pressure. A further object is to provide a valve for controlling the feed of the gas towards the burners, as well as novel means for preventing total extinguishment of the gas flame. A further object is to provide a valve lever which is adjustable by means of an indicating dial and related parts. A further object is to provide a novel thermostatice control for the valve, which comprises a flexible element adapted to be immersed in the molten metal of a melting-pot or which may be inserted in an oven, the said element being charged with mercury, by whose expansion and contraction the gas valve may be closed and opened, a portion of the mercury being disposed in a chamber that is in constant communication with said element, and being confined by and adapted to flex a diaphragm, by whose flexings the valve lever is rocked for opening and closing the gas valve. And a further object is to provide tension means for automatically opening the valve when the temperature of the melting-pot or oven falls, and similar means for exerting tension by which the diaphragm is maintained in constant contact with the mercury notwithstanding the status of the adjusting mechanisms, or the lowering of the temperature of the medium that is being heated.

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 top plan view of the complete device. Fig. 2 is a horizontal section, taken on line 2—2 of Fig. 4. Fig. 3 is a horizontal section, taken on line 3—3 of Fig. 4. Fig. 4 is a reduced vertical longitudinal section, taken on a line 4—4 on Fig. 1. Fig. 5 is a reduced transverse vertical section, taken on line 5—5 Fig. 4. And Fig. 6 is a vertical section through a melting pot showing the burner, and a portion of flexible thermostatic element partially submerged in the contents of the pot.

In the drawings, 2 represents a hollow body which supports and houses all of the working parts of the device. 3 represents the main vertical body portion, which is substantially cylindrical, the opposite ends thereof having threaded openings, which are closed by screw-plugs 3′ and 3^a. The body 3 is divided by horizontal walls 3^b and 3^c into three chambers, as 4—4′—4^a. The central compartment 4 comprises the valve-chamber, which receives the fuel gas through a threaded hub 4^b and an intake pipe 4^c, and discharges the gas simultaneously through ports 4^d—4^e into the upper and lower chamber 4′—4^a, from which the gas flows into a common vertical chamber 4^f, and thence by a pipe 5, to the burner 5′ that heats the melting-pot A (see Fig. 6). The ports 4^d—4^e are respectively fitted with threaded bushings 6—6′, having valve-seats 6^a—6^b, and the dispensing of the fuel-gas from chamber 4 is controlled by a valve comprising similar spaced member 7—7′, commonly known as a balanced-valve, the said members being movable as one part, by means of a connecting rod 7^a. The bushing 6′ preferably extends a considerable distance above the seat 6^b, for guiding, and for maintaining the valves substantially concentric to their seats. The bushing 6′ is partially supported by a gland-ring 6^c, which screws into a socket formed in the wall 3^c, and also by a packing 6^d, which prevents escape of the gas from chamber 4 into chamber 4^a. In order to prevent extinguishment of the gas flame, and thereby necessitating relighting of the burner following each closing of the valve 7—7′, the plug 3^d is fitted with a screw 8, by which the valve may be held slightly unseated. The screw 8 is partially supported and is concealed, by means of stuffing-box comprising a cup-shaped cap 8′ and a packing 8^a (see Fig. 4). The valve member 7 is formed with a threaded socket 7^b, in which is disposed the lower ball-end of a rod or link 7^c, the said link being movably held in said socket by means of a bushing 7^d. The link 7^c passes loosely through a perforation in one end of the valve lever 9, and its upper end is also fitted with a ball that rides upon said lever. The lever 9 ex-

tends horizontally into a hollow arm 3^e which is preferably integral to the body 3, and its enlarged rear-end is pivotally supported by the forked lower end of a member 10, to which it is secured by a pin 9'. Between the valve 7 and the member 10 the lever 9 is slotted to receive pins 12—12', by which the lever is guided when rocked vertically. The guide-pin 12 is rigid in the wall 3^b and supports a cushion spring 12^a, by which the lever 9 is raised for unseating the valve, whenever the temperature of the melting-pot A falls below a predetermined stage. The guide-pin 12 depends from the top wall of the arm 3^e, through which it passes, the said pin having a slotted head 12^b, by which it may be applied and removed by a screw-driver. The member 10 is supported and controlled directly by a dial stud 13, the latter being hollow for a part of its length and being internally threaded for engaging the threaded upper portion 10^a of the member 10, and by means of which the said member may be raised and lowered for varying the temperature to be maintained in the melting pot A. The lower end of the stud 13 is formed with a flange 13', which seats in the bottom of a socket 14' of the bushing 14, the latter being screw-threaded into an opening 3^x of the arm 3^e. The stud 13 is held concentric to the said bushing, by means of a stuffing-box comprising a gland 15, a packing 15', and a ring 15^a. Above the flanged top end of gland 15 is mounted a dial or other part 16, by which the stud 13 is rotated. As indicating means similar to the dial 16, is common to thermostatic controls of the class to which the present device belongs, the details of its construction are not shown herein. Valve 7—7' when properly adjusted for providing a certain temperature by the parts 10 and 13, its operation thereafter is controlled entirely by a thermostatic mechanism, which will now be described:

17 represents a hollow cylindrical body hereinafter referred to as the diaphragm chamber, whose top end is reduced and threaded for screwing into an opening 3^y of the arm 3^e. The lower normally open end of chamber 17 is threaded and is closed by a screw-plug 17', the said plug having a depending threaded hub 17^a, to which a conical coupling 17^b is secured. Both the plug 17' and the coupling 17^b are bored out axially for providing a relatively small passage, which extends upwardly and communicates with a relatively large cavity or recess 18 which is formed in the top end of plug 17'. The cavity 18 is surrounded by a narrow raised portion 17^c, upon which is mounted a diaphragm 19 that preferably consists of a disc of soft, flexible and somewhat elastic material, such as leather, and upon the diaphragm is disposed a clamping ring 19', which with the diaphragm may be forced downwardly upon the ledge 17^c, for sealing the open top of the cavity 18, by means of screws 19^a, which are threaded into the plug 17' (see Figs. 3 and 4). Above the diaphragm 19 is disposed a plunger 20, which extends axially through the open top end of chamber 17, and by which said plunger is supported and guided. The lower end of the plunger is round, and is normally in engagement with the diaphragm 19, in which position it is held by a spring 20', the latter being disposed between a flange 20^a and the top wall of chamber 17. The top end of the plunger is reduced as at 20^c, and this portion is normally in engagement with the bottom edge of the lever 9. The arrows in Figs. 1, 2 and 5 show the direction of flow of the fuel-gas. 21 represents the flexible thermostatic element, which preferably comprises a relatively thin pliant steel tube of small calibre whose plain top end is inserted in the passage-way of the conical cap 17^b, and in free communication with the cavity 18, while its lower end connects with a steel bulb 22, which comprises a cylindrical body 22', and similar telescoping plugs 22^a—22^b. These plugs are preferably welded to the tubular body, and the plug 22^a is also preferably welded to the tube 21. The bulb 22 and the tube 21 are preferably filled with mercury x (see Fig. 4), and in order to facilitate the charging of said parts with the mercury, the plug 22^b is preferably formed with a threaded opening 22^c. To apply the mercury x, the tube 21 is bent until the bulb 22 is brought to a slightly higher plane than the cavity 18. The mercury is then poured into the bulb and allowed to gravitate toward the cavity until the latter is substantially filled. A screw 23 is then applied to the hole 22^c and is welded in place for preventing leakage of the mercury from the bulb and tube. During the filling of the element 21 the plunger 20 is preferably lifted sufficiently to allow the diaphragm 19 to be disposed horizontally across the ledge 17^c. When the pipe 21 is filled, as described, the plunger is forced downwardly for depressing the diaphragm into the cavity 18, as shown in Fig. 4. This displaces a small amount of the mercury from the cavity 18 which escapes between the ledge 17^c and the diaphragm. When the plunger and diaphragm have been adjusted properly according to the showing in Fig. 4, the screws 19^a are tightened up for clamping the diaphragm sufficiently to prevent any further escape or loss of the mercury. The thermostatic mechanism if left in the condition last described needs no further attention while the heat controlling device performs its work. Then follows the adjustment of the dial-plug and member 10, for predetermining the temperature of the melt-

ing pot A or other medium to be heated, as shown, for example, in Fig. 4, in which the thermostatic mechanism is holding the valve 7—7′ closed, which means that the temperature of melting pot A is right. When the temperature of pot A falls below the predetermined degree the mercury contracts, and allows the spring 12ª to open the valve for supplying the burner with fuel gas, and when the temperature of the pot A again reaches the proper degree the mercury will have expanded sufficiently to lift the plunger upwardly. This tilts the lever 9 in the direction for closing the valve 7—7′, and so on.

The present invention is designed particularly for use in connection with melting-pots that are relatively shallow, and also melting-pots that are arranged to be rotated or tilted when discharging their contents. In all such cases it is required that the heat control be supported by other means than the melting-pot as heretofore, and for this reason it is required that the thermostatic element 21, be of such length and of sufficient flexibility to permit the melting-pot to be shifted from one position to another, as explained. And in order to provide a safe and practical container for the mercury, it is preferred that the element 21 be made of light-gauge steel tubing, which affords the requisite flexibility, and is not liable to be corroded or otherwise attacked by the mercury.

The provision of the mercury, which takes the place of the all metal thermostats in common use, enables me to produce an extremely sensitive, positive and reliable heat control, that is not liable to deteriorate by long use, and which is not affected by extreme heat, which sooner or later renders any solid metal parts unreliable, and requires frequent replacing, thereby necessitating considerable expense, as well as loss of time and interruption of the thermal control.

Having thus described my invention, what I claim is—

1. In a heat control the combination with a melting-pot, and a gas filled casing, a valve for dispensing the gas for heating a medium, a lever for operating said valve, a plunger for operating said lever, a melting-pot, a diaphragm chamber in which said plunger reciprocates, a flexible tube extending from said chamber towards the melting-pot and having a bulb adapted to be immersed in the contents of said pot, the bottom of said chamber being formed with a cavity, said tube, and said bulb adapted to be filled with mercury, a diaphragm closing said cavity and supporting said plunger, said diaphragm being bulged downwardly into the cavity and being in constant contact with the mercury, said diaphragm and said plunger adapted to be raised by the expansion of the mercury for shutting off the gas to the melting-pot, tension means for opening the valve, and tension means for depressing said diaphragm when the mercury contracts by the cooling of the contents of said pot.

2. The combination with a source of fuel gas supply, a valve for controlling the gas, and a melting-pot adapted to be heated by the gas, of a thermostatic element for opening and closing said valve comprising a flexible tube having a bulb at one end adapted to be immersed in the contents of the melting-pot, a hollow body having a passage formed in its bottom adapted to receive the plain end of said tube, said body having a cavity communicating with said passage, said tube, said bulb, and said cavity adapted to be filled with mercury, a non-metallic diaphragm in said body overlying said bottom and closing the open top of said cavity, the central portion of said diaphragm being bulged into the cavity, a plunger above said diaphragm having a round end conforming to the bulge of the diaphragm, a spring for maintaining the bulge of the diaphragm, a lever for operating said valve in constant engagement with said plunger, and means for adjusting said lever for predetermining the temperature of the melting-pot.

3. In a heat control the combination with a melting-pot, a casing adapted to be charged with gas for heating said pot, and a valve in said casing for dispensing the gas, of a hollow body supported by said casing, said body having a concentric passage and a cavity above and communicating with said passage, a diaphragm overlying and sealing said cavity, a plunger disposed above and its lower end in contact with the diaphragm, means for operatively connecting said plunger with the gas valve, a thermostatic element comprising a flexible tube one end of said tube adapted to be inserted in said passage, the other end of said tube comprising a bulb adapted to be immersed in the contents of the melting-pot, said tube, said bulb, and also said cavity being filled with mercury and adapted when the mercury contracts and expands to lower and raise said plunger for opening and closing said valve, and means for adjusting the connection between the plunger and the valve for predetermining the degree of heat to be maintained in said pot.

4. In a heat control the combination with a melting-pot, a casing adapted to be filled with fuel gas, and a valve for dispensing the gas, of a hollow body formed with an upwardly facing cavity, and a passage leading downwardly from said cavity, a flexible tube having a bulb at one end adapted to be immersed in the contents of the melting-pot said bulb, said tube, and said cavity adapted to be filled with mercury, a diaphragm sealing the open top of said cavity, the medial portion of said diaphragm being sunk below

the said open top, a rocking lever for operating said valve, a plunger mounted axially above the diaphragm its lower end being seated in the depression of the diaphragm and its top end projecting into said casing and frictionally engaging the remote end of said lever, adaped when raised and lowered by the expansion and contraction of the mercury to close and open said valve, and a spring for normally maintaining the depression of the diaphragm.

In testimony whereof I affix my signature.

HOWARD W. PARTLOW.