E. L. HOLMES.

GAS GOVERNOR.

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1,085,339.

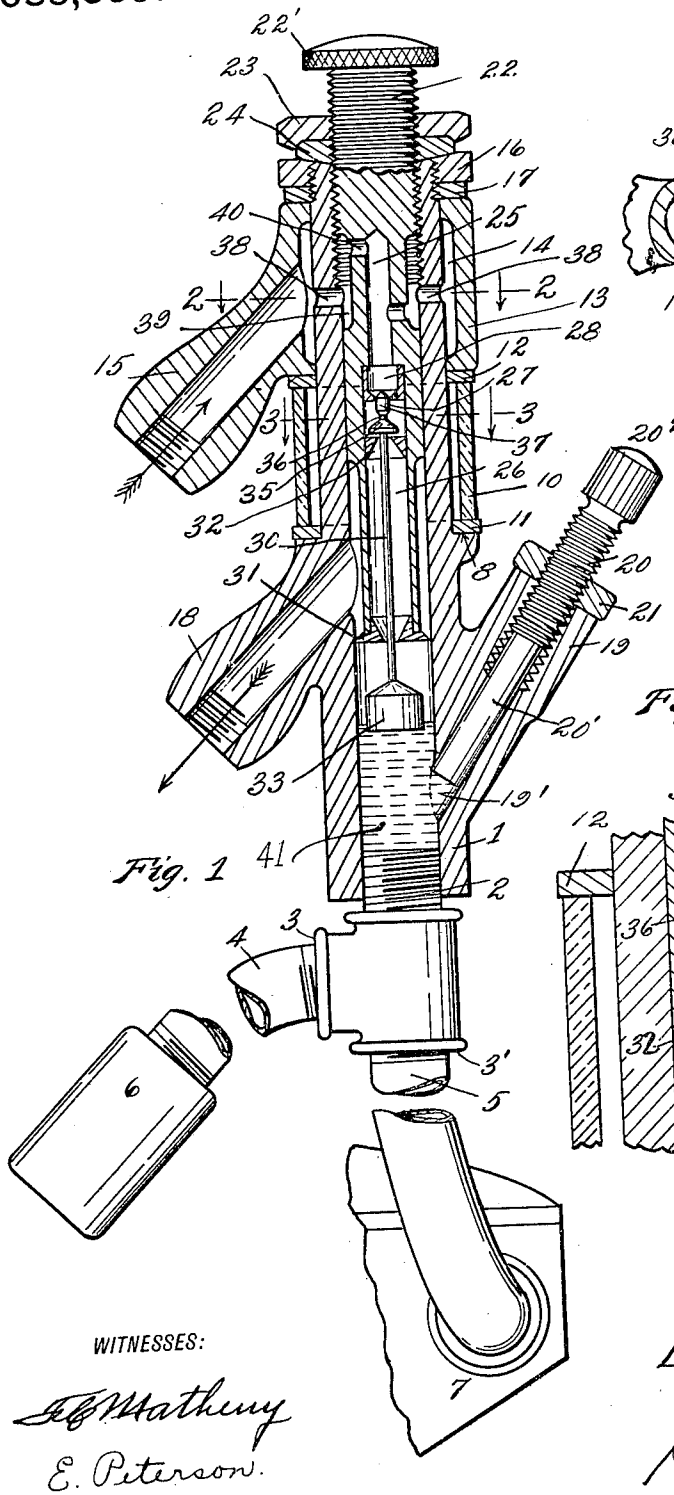



Fig. 1

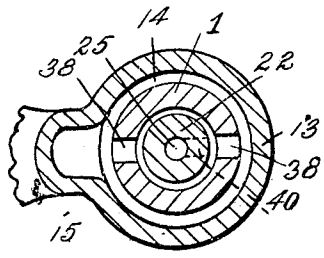



Fig. 2

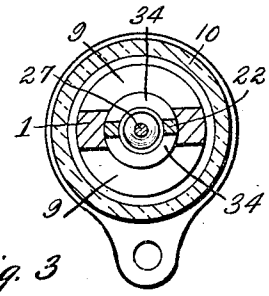



Fig. 3

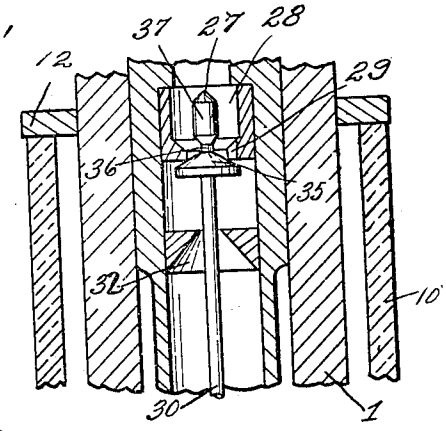



Fig. 4

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# UNITED STATES PATENT OFFICE.

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## GAS-GOVERNOR.

1,085,339 Specification of Letters Patent. Patented Jan. 27, 1914.

Application filed October 21, 1912. Serial No. 726,879.

*To all whom it may concern:*

Be it known that I, EDWARD L. HOLMES, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Gas-Governors, of which the following is a specification.

This invention relates to automatic temperature regulators for gas heaters and is intended more particularly for use with linotype machines for regulating the temperature of the melting pot thereof by an increase or a diminution of the gas which is supplied to the burner, but it may be used in other places where an automatically heat-controlled valve is desirable.

It relates, further, to regulators of the type comprising an upright tubular casing within which is arranged a gas inlet tube, a gas outlet connected to the tubular casing, and a valve controlling communication between the inlet and outlet and adapted to be actuated by an expansible fluid through the medium of a float.

According to the present invention the regulator comprises an upright tubular casing, the lower end of which forms a float chamber, a gas inlet tube arranged within said casing and provided at its lower end with means for closing the upper end of the float chamber, a valve actuated by a float in the float chamber and adapted to control the inlet tube, and a space below said valve communicating with a gas outlet.

It relates further to devices for automatically adjusting the inflow of gas when the melting pot is cold to supply a reduced supply of gas for a relatively prolonged period so that the contents of the pot may become gradually melted where contacting with the pot and is loosened from its connection therewith before the maximum amount of gas is utilized and relatively high temperatures maintained in the pot.

Figure 1 is a vertical cross sectional view of devices embodying my invention. Figs. 2 and 3 are horizontal sections taken on lines 2—2 and 3—3, respectively, of Fig. 1. Fig. 4 is an enlarged fragmentary sectional view of the valve mechanism in a different position to that shown in Fig. 1.

In carrying out my invention, I employ an upright tubular casing 1 which is open at both the top and bottom ends, the latter end being provided with internal screw-threads and the former with external screw-threads. Into the bottom end is screwed a nipple 2 to which is secured a T-fitting having branches 3 and $3^1$ into which are respectively screwed pipes 4 and 5 each making communicative connection with closed vessels 6 and 7, respectively. The former of said vessels may be plunged into the interior of the metal pot while the latter is inserted in a chamber provided therefor in the mouth-piece of the casting mechanism.

Intermediate the length of said casing it is provided with an annular shoulder 8 and thereabove the casing is formed to be of less diameter than the part below. Above said shoulder and upon diametrically opposite sides the casing is cut away to afford sight openings 9, as shown in Figs. 1 and 3. Surrounding the casing about said openings is a glass tube 10 with a packing gasket 11 between the glass tube and said shoulder and another gasket 12 above; and seated upon the latter is a sleeve 13. This sleeve is internally recessed to provide an annular cavity 14 between the sleeve and the casing. A branch 15 is formed upon said sleeve and is desirably arranged to have its axis inclined from the axis of the sleeve to best accommodate the pipe connection with the gas supply pipe.

A nut 16 engages the aforesaid external screw thread at the upper end of the casing for retaining the sleeve in adjusted position and to make a non-leakable joint between the nut and the sleeve a gasket 17 is introduced between these members.

A branch 18 is provided upon the casing to make communication with the interior of the casing at a short distance below the plane of the shoulder 8. This branch is for the gas connection with the burner (not shown) which serves to furnish the heat to operate said melting pot. A branch 19 is provided in the casing to open thereinto near the bottom and is screw threaded at its outer end for engaging the threaded portion of a bolt 20 whose inner end $20^1$ is cylindrical and fitted within the bore $19^1$ of this branch. A head $20^2$ is provided upon said bolt for adjustably screwing the same in or out, and a jum-nut 21 is provided for securing the bolt in adjusted positions.

Extended axially within the casing is a cylindrical member 22 which is provided in proximity to its top with screw threads to adjustably engage the member with the internal screw threads at the top of the casing

5 and is provided with a head $22^1$ for adjustment purposes and through the offices of a jam-nut 23 the member is locked in adjusted positions. A gasket 24 may advantageously be used between this nut and the top end of the casing to make a gas-tight joint between the two. The member 22 is axially bored, as at 25, from its lower end to within a short distance of its top and is likewise counterbored, as at 26, for the reception of a valve 27. At the upper end of said counterbore is provided a seat for said valve which may consist of an inserted cup 28 having an axial passage therethrough contracted at its lower end to form said seat and provided with a small slot 29 in its edge to afford an unobstructed passage for a relatively small flow of gas even when the valve is in close contact with its seat. Said valve 27 is fixedly connected to the upper end of a stem 30 which extends through guide-blocks 31 and 32 inserted in the member and having at the lower end of the stem a body 33.

Just below the valve seat the member 22 is cut away to provide diametrically opposite openings 34 wherethrough the action of the valve may be observed through the glass tube 10 and the openings 9 of the casing. The openings 34 likewise afford a passage by the valve for the flow of the gas to the underside of the same. Said valve is formed with a conoidal face 35 adapted to seat in the contracted opening of the cup 28 to close the bore 25; above said conical portion the valve is formed with a neck 36 and a head 37 of smaller diameter than said contracted opening.

One or more openings 38 are provided in the casing to make communication from the chamber about the casing to an annular space 39 obtained by a recess in the peripheral surface of the member 22 whence communication is had with the interior of said member by holes 40 opening into the bore 25 above the valve seat.

The operation of the invention may be described as follows: A liquid, indicated by the numeral 41, desirably mercury, is introduced into the casing to fill the vessels 6 and 7, the connecting pipes 4 and 5, and to a height in the casing sufficient to float the body 33 at such an elevation as to support the valve head 37 within the contracted opening of the valve seat, as shown in Fig. 1. This may be ascertained by an inspection of the position of the valve through the glass 10 and the openings 9 and 34 of the casing and member 22. After the device has been thus charged with the liquid the branch 19 is closed by the insertion of the bolt 20. Whereupon the gas for heating the melting-pot is allowed to flow into the apparatus through the branch 15 and thence by the valve and through the outlet 18 to the burner.

The annular space for the flow of gas between the valve-head 37 and the valve-seat is relatively reduced in area to permit of but a limited flow of gas at the outset when the metal in the pot may be cold and adherent to the pot crucible. If the full flow of gas was permitted at the beginning when the metal is cold, the difference in expansion of the metals would be liable to cause damage to the melting pot. Therefore a reduced quantity of gas is permitted to flow at first which gradually heats the entire mass but melts the casting metal that is in contact with the pot first and thereafter the latter may expand and contract freely without damage. As the casting metal is heated the vessels 6 and 7 are influenced thereby to heat the contained liquid with a consequent expansion or increase in its volume which effects the raising of the surface of the same to elevate the valve 27 through the floatative properties of the body 33. Said head 37 is formed of the same diameter to supply an equal reduced amount of gas for a period of time that will insure the gradual heating of the melting pot; that is to say, that the length of said head is nearly equal to the rise in the height of mercury in the bore due to the heating of same, and that such rise is so gradual, about one hour and fifteen minutes, from the time the gas is lighted until an increased flow is instituted, that ample allowance is given for all conditions. As the mercury continues to rise, the neck 36 is presented to the contracted opening and a larger flow of gas is permitted, about twice the quantity flowing through the valve about said head. Upon the further rise of the mercury due to the increase in temperature of the melting pot the flow of gas is checked through the approach of the conical face 35 to said opening.

If the valve closes before the temperature of the molten metal in the pot P is at a desired degree, then the bolt 20 is retracted to afford more space to the occupancy of the liquid, and if the temperature of such metal ascends above that at which it is desired to maintain it then the bolt 20 is adjusted to extend further into the casing to reduce the space available to the liquid with a corresponding elevation of its surface and an earlier closing of the valve. Adjustment of the valve may also be obtained through manipulation of the member 22 to cause the same to protrude to a greater or less extent into the casing to compensate for the gradual loss of the liquid which may take place. When properly adjusted the valve will sensitively respond to slight variations of temperature occurring in the pot and thus serves to regulate such heat by supplying the requisite gas to the burner.

By the provision of the slot 29 in the valve it is evident that the gas will never be in-

terrupted to entirely extinguish a flame at the burner even when the valve is closed against its seat. The flow or quantity of gas delivered to the burner is, by this invention, regulated by a valve which is actuated through the offices of a heat expansible medium which is remote from the course taken by the gas in its passage through the apparatus. And furthermore, by having the guide-block flange 31 fitting snugly within the casing bore leakage of the mercury evaporations is prevented. This outflow of the gasified mercury, however, coming into contact with the relatively cold metallic surfaces of the guides and the interior of the member 22 therebetween serves to precipitate the mercury in a liquid state into the funnel cavity provided in the guide 31 whence it returns into the space below the latter. It may be stated that by thus conserving the mercury, the operation of the valve is caused to be more regular in operation and obviates overheating the type metal, warping the mold, the production of honeycombed slugs, "back-squirts", stuck slugs, or other faults hitherto prevalent.

It may also be mentioned that in the event that a leak or an oversight on the part of the operator should cause the column of mercury to fall below the level normally required for the floatation of the body 33 it would not cause an undue flow of gas to the burner as the conoidal portion 35 of the valve will rest upon the guide block 32 preventing further descent of the valve and the withdrawal of the head 37 from the gas passage.

What I claim as my invention, is—

In apparatus of the class described, the combination of an upright tubular casing provided at different elevations with inlet and outlet openings, a vessel communicatively connected with the casing and below the outlet opening thereof, a member extending interiorly of the casing and connected to the top of the latter and having its lower end terminate below the level of said outlet opening, said member being chambered and provided with communicative connections between such chamber and the inlet and outlet openings of the casing and having a valve-seat intermediate the connections, a guide block mounted in the lower end thereof and of a width to engage the casing, a valve for said seat, a stem depending from the valve and through said guide block, and a floatative body secured to the lower end of the stem.

Signed at Seattle, Wash., this 18th day of September, 1912.

EDWARD L. HOLMES.

Witnesses:

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