Aug. 13, 1929. V. A. BOKER 1,724,252

GAS GOVERNOR FOR TYPE CASTING MACHINES

Original Filed May 25, 1925 2 Sheets-Sheet 1

Fig. 1

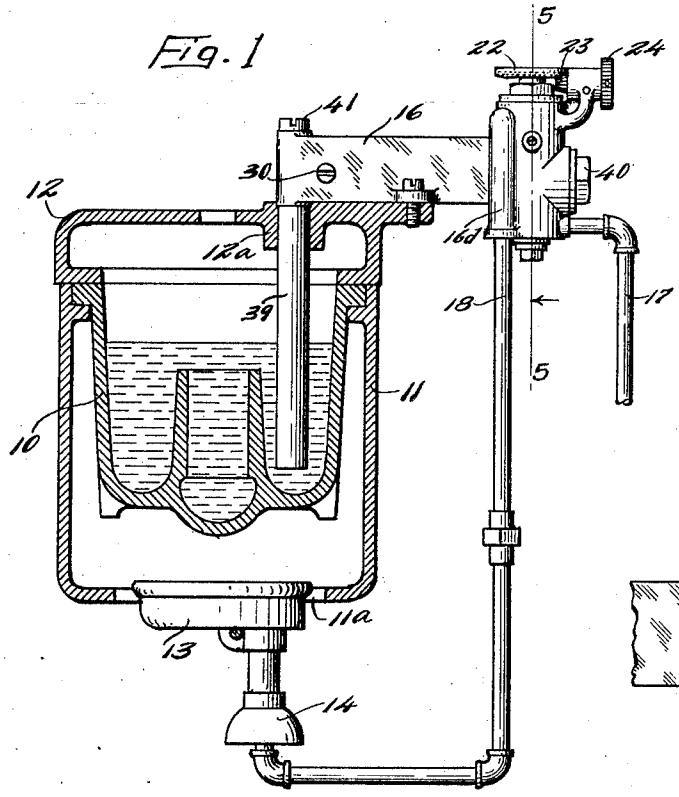


Fig. 7

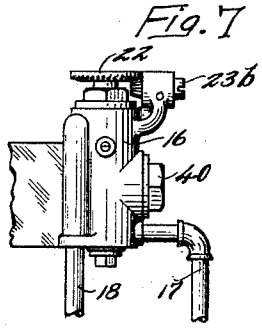


Fig. 5

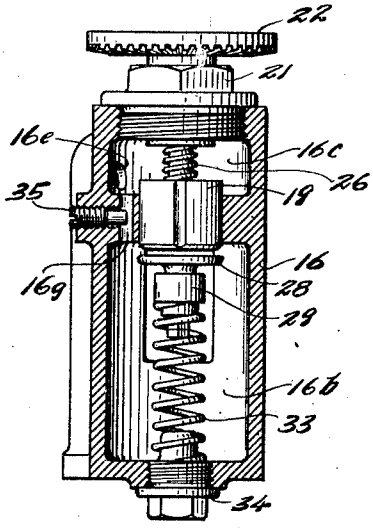
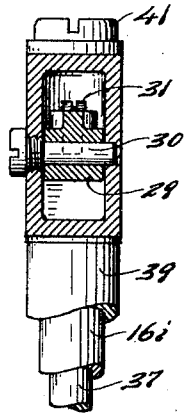


Fig. 6



INVENTOR
VITUS A. BOKER
BY HIS ATTORNEYS
Williamson Reis & Williamson

Aug. 13, 1929. V. A. BOKER 1,724,252

GAS GOVERNOR FOR TYPE CASTING MACHINES

Original Filed May 25, 1925 2 Sheets-Sheet 2

Fig. 2

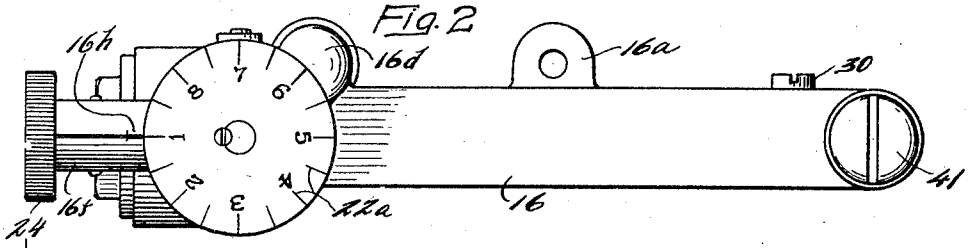


Fig. 3

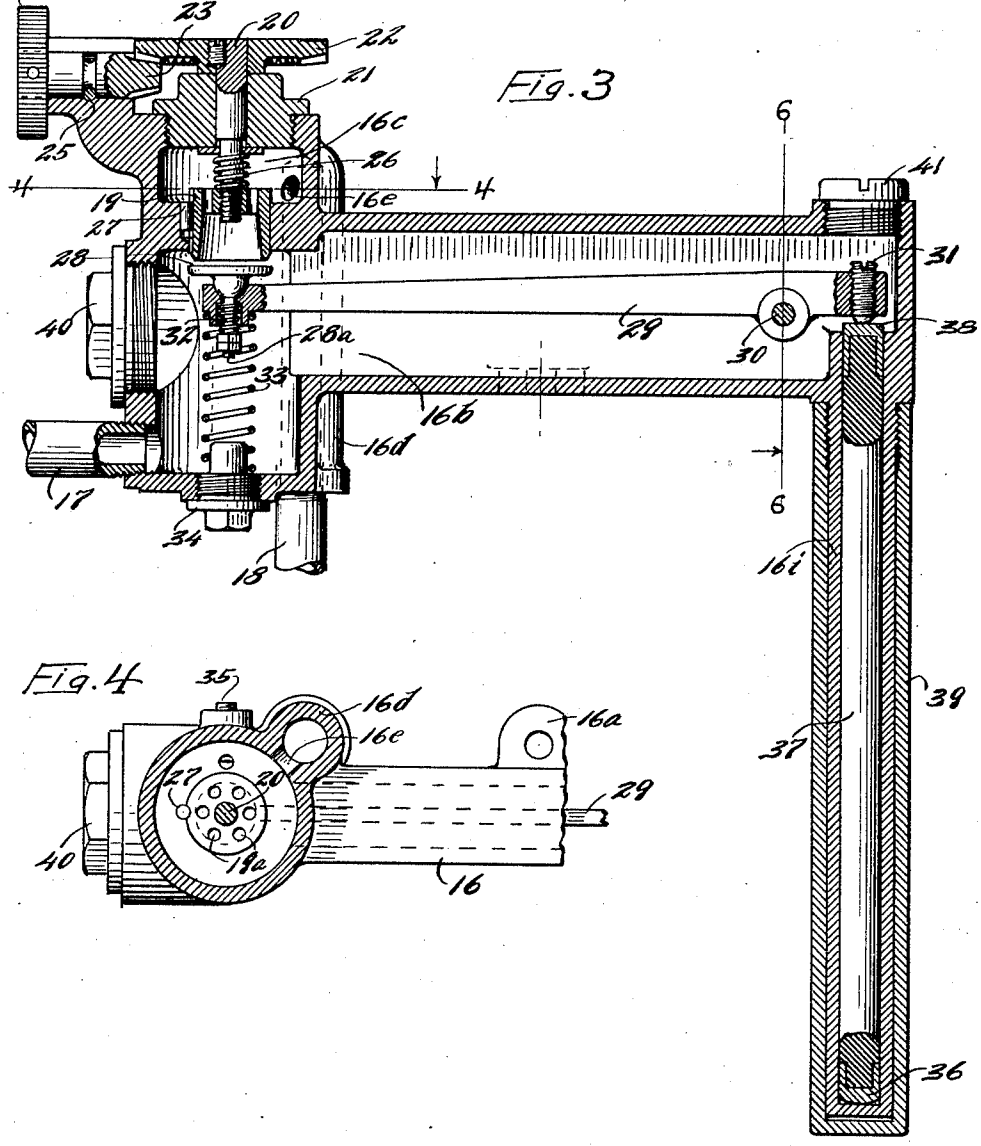


Fig. 4

INVENTOR
VITUS A. BOKER
BY HIS ATTORNEYS

Williamson Peifer & Williamson

Patented Aug. 13, 1929. 1,724,252

UNITED STATES PATENT OFFICE.

VITUS A. BOKER, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO ROY E. HOLLAND, OF MINNEAPOLIS, MINNESOTA.

GAS GOVERNOR FOR TYPE-CASTING MACHINES.

Application filed May 25, 1925, Serial No. 32,722. Renewed April 13, 1929.

This invention relates to a gas governor for regulating the flow of gas to a burner, said governor being thermostatically controlled. While this invention is applicable to various burners and locations, it particularly is designed for use as a gas governor for the burner used for heating the melting pot of a type casting machine. As is well known, the metal used for casting the type is maintained in a molten condition in a pot, and it is quite necessary that this molten metal be kept within certain narrow limits in order to have the best results.

It is an object of this invention to provide a simple, efficient and very accurate governor for controlling the passage of gas to a burner.

It is a further object of the invention to provide a governor for controlling the passage of gas to a burner which is controlled by a thermostatic element disposed in the material heated by the burner, said thermostatic element controlling the lever that carries the valve plate cooperating with an adjustable member through which the gas passes.

It is more specifically an object of the invention to provide a gas governor comprising two chambers, a vertically adjustable member having a passage therethrough for the gas, a plate cooperating with the lower edge of said member to limit or shut off the supply of gas, which plate is swiveled on the end of the long arm of a lever of the first class, the short arm of said lever having means engaged by an expansible and contractible member housed in an extension of the governor casing, which extension is disposed in the heated material.

These and other objects and advantages of the invention are fully set forth in the following description made in connection with the accompanying drawings and in which like reference characters refer to the same parts throughout the different views, and in which—

Fig. 1 is a view in side elevation of the governor showing the burner and melting pot with which the governor is used, the melting pot being shown in vertical section;

Fig. 2 is a top plan view of the governor;

Fig. 3 is a central vertical longitudinal section of the governor;

Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 3 as indicated by the arrow;

Fig. 5 is a vertical section taken on the line 5—5 of Fig. 1, as indicated by the arrow, and shown on an enlarged scale;

Fig. 6 is a vertical section taken on the line 6—6 of Fig. 3, as indicated by the arrow; and

Fig. 7 is a view similar to Fig. 1 showing a modification.

Referring to the drawings, particularly Fig. 1, the melting pot of a type casting machine is shown as 10, surrounded and carried in casing 11 provided with the top 12. The casing 11 has an opening 11^a in its bottom, in which is disposed a gas burner 13, having the usual air regulating portion 14, and which burner is supplied with gas by the pipe 18.

The governor proper comprises a casing 16 having the lug 16^a at one side thereof, which as shown in Fig. 1, is secured to a flange on top 12 by a suitable screw and said top also has an apertured hub 12^a, through which a portion of the governor passes to be disposed in the pot 10.

The casing 16 comprises a pair of chambers 16^b and 16^c. The gas is supplied to chamber 16^b through a pipe 17 and the proper amount of gas necessary is conveyed to the burner through pipe 18 communicating with chamber 16^c, as clearly shown in Figs. 3 and 5. The pipe 18 communicates with the lower end of a boss 16^d, forming a continuation of pipe 18 and which has an opening 16^e into chamber 16^c. The chambers 16^b and 16^c are separated by a web having a central opening, in which is disposed a vertically movable tube or sleeve 19. The member 19 has a plurality of openings or passages 19^a therethrough for the passage of gas and has a threaded central top portion engaged by the lower threaded end of a stem or screw 20. The screw 20 extends through and is journaled in a closing plug or cap 21 threaded into the top of the casing 16, and said screw has secured to its upper end a beveled gear 22 having teeth on its lower surface and having a flat plane top. The gear 22 is adapted to be turned by pinion 23 forming a shaft extending through a split bearing 16^f carried by casing 16, and has a regulating knurled wheel 24 at its outer end. The shaft carrying pinion 23 has an annular groove therein and a pin 25 extends into bearing 16^f and into said groove and pre-

vents longitudinal movement of said shaft and pinion. The top of gear 22 is provided with radial graduations 22^a shown as numbered from 1 to 8, said graduations being adapted to cooperate with a mark 16^h on the hub 16^f. Split bearing 16^f is clamped about said shaft to form a tight fit.

A coil compression spring 26 surrounds the screw 20 and bears at one end against the member 19 and at its other end against a thin washer abutting the bottom of plate 21. Member 19 is kept from rotation by the pin 27 fitted in the web surrounding member 19 and disposed in a semi-circular groove in the side thereof.

From the above structure it will be seen that, upon turning of wheel 24, member 19 will be vertically adjusted.

The lower end of member 19 is formed with a smooth, sharp edge, which is disposed in one plane and a valve forming plate 28 is disposed beneath said edge, carried in the end of the long arm of a first class lever 29 pivoted on pivot 30, which pivot is in the form of a stud traversing casing 16, and the short arm of lever 29 beyond pivot 30, has a vertically adjustable screw 31 therein, the outer end of which is semi-spherical in shape. The end of lever 29, carrying plate 28, has a semi-spherical recess in its upper side, from the bottom of which extends downward through the lever, a cylindrical bore or recess. The plate 28 has a semi-spherical portion on its under side disposed in said semi-spherical recess and also has a stem 28^a extending downward from said semi-spherical portion through lever 29, said stem 28^a being surrounded by a compression wheel spring 32 disposed in the cylindrical recess of the lever and abutting the top of said cylindrical recess at its upper end, a nut threaded onto the end of stem 28^a at its lower end. A jamb nut is also shown below the nut against which spring 32 bears.

It will be noted that stem 28^a passes loosely through the bore or recess in lever 29 so that plate 28 can swivel freely about its semi-spherical portion. Lever 29 has a downwardly projecting cylindrical portion about spring 32, which portion is surrounded by the upper end of a larger coil compression spring 33, bearing against the under side of the lever 29 at its upper end, and bearing against plug 34 threaded into the bottom of casing 16 at its lower end. The plug 34 has an upwardly projecting stem about which spring 33 is disposed, for holding the latter in place.

A small passage 16^g connects chamber 16^b and 16^c at one side of member 19, as shown in Fig. 5, and the effective area of this passage is regulated by a screw 35 threaded into the side of casing 16.

The casing 16 has a downwardly extending portion 16^i shown as cylindrical in shape which is substantially co-axial with the screw 31. The extension of housing 16^i is closed at its bottom and said bottom is engaged by the rounded end of a hardened metal member or cap 36 fitted on the lower end of a rod 37 made of some material having a small co-efficient of expansion such as carbon, said rod being contained in said housing 16^i, and also having a hardened member or cap at its upper end against the top of which the rounded lower end of screw 31 contacts. The housing 16^i is surrounded by a shield 39 of suitable metal such as aluminum, which shield is threaded onto the upper end of said housing. The casing 16 is provided with an opening in one end of chamber 16^b to give access thereto, which opening is enclosed by a suitable plug 40. Casing 16 is provided with an opening in its top over the screw 31, for convenient adjustment of the latter, which opening is closed by threaded plug 41, having a slotted head thereon.

In operation, the burner 13 will be in operation and the molten type metal will be in the pot 10, as indicated in Fig. 1. Member 19 will be suitably adjusted in vertical position by means of gear 22 and gas will be supplied to burner 13, as stated, through pipe 17, the governor and pipe 18. The shield 39 and the sleeve 16^i are disposed in the pot 10. In practice, the casing 16 is made of some metal such as brass having a comparatively high co-efficient of expansion. When the temperature in pot 10 rises, sleeve or housing 16^i expands considerably more than rod 37. This lengthens housing 16^i and spring 33, acting through lever 29, forces the rod 37 downwardly somewhat to keep the same against the bottom of the housing. This movement of lever 29 moves the valve plate 28 nearer to the member 19 and the supply of gas to pipe 18 is diminished. The flame of the burner 13 is thus diminished and the temperature in pot 10 will be lowered. If the temperature in pot 10 falls below the desired point, the housing 16^i will contract and this will, in effect, raise the rod 37 and this rod will push upward on screw 31 and thus move the long hand of lever 29 downwardly, moving plate 28 farther away from member 19 and allowing the increased flow of gas to pass into pipe 18 and into the burner 13. The temperature of the pot will then be raised.

It is desirable to have a small flame on the burner at all times, and for this purpose the passage 16^g is provided so that a small portion of gas may always be supplied to the burner and form, in effect, a pilot light. The amount of adjustment of member 19 and the position thereof, can be readily seen from the graduations 22^a. It will be seen that plate 28 is swiveled freely on the end of

lever 29 and when moved into contact with the lower sharpened edge of member 19, will close the passage between chambers 16^b and 16^c.

In practice, in the embodiment of the invention used, the caps 36 and 38, as well as the screw 31, have been made of hardened high-speed tool steel. These members must be made of such material or some other heat resisting material that will not soften under comparatively high temperatures, as these parts become quite hot from the molten material.

In some places it is desirable not to have a controlling hand wheel 24 for the reason that unauthorized persons are apt to tamper with the adjustment of the governor. Instead of a wheel, therefore, a grooved head 23^b is formed on the end of the shaft carrying pinion 23, as shown in Fig. 7. The structure in Fig. 7 is, in all other respects, the same as the other figures.

From the above description, it is seen that applicant has provided a very simple and efficient form of governor. The parts of the device are comparatively few and easily made and assembled. The governor has been amply demonstrated in actual practice and found to be very successful and efficient. With the governor of the present invention the movement of one-thousandth of an inch vertically on valve 28 is caused by each degree F. variation in temperature. The regulation with the governor is so fine and accurate that the flame on burner 13 will be quickly regulated if one cold slug is dropped into the melting pot 10.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of parts without departing from the scope of applicant's invention, which, generally stated, consists in a device capable of carrying out the objects above set forth and in the novel parts and combination of parts disclosed and defined in the appended claims.

What is claimed is:

1. A gas governor having in combination, a casing comprising upper and lower chambers, a vertically adjustable member having an opening therethrough for the passage of gas from one chamber to another, and having a lower sharp edge in one plane, a plate beneath and adapted to co-operate with said edge to limit or shut off the passage of gas, a lever having a long arm with a semi-spherical recess therein and a passage extending from the bottom of said recess therethrough, said plate having a semi-spherical portion disposed in said recess with a stem extending loosely through said passage, a spring surrounding said stem and urging the same downwardly to hold said plate in position, a resilient means contacting the lower side of said lever and urging the same upwardly and a thermostatically operating means to the other end of said lever.

2. A gas governor having in combination, a casing comprising upper and lower chambers, a vertically adjustable member having an opening therethrough for the passage of gas from one chamber to another, and having a lower sharp edge in one plane, a plate beneath and adapted to co-operate with said edge to limit or shut off the passage of gas, a lever of the first class having a long arm with a semi-spherical recess in its upper side adjacent its end and a passage extending downwardly from the bottom of said recess therethrough, said plate having a semi-spherical portion disposed in said recess with a stem extending downwardly loosely through said passage, a spring surrounding said stem, nuts threaded on said stem engaged by said spring to urge said stem downwardly and hold said plate in position, a compression spring engaging the lower side of said lever at said end and engaging the bottom of said lower chamber, normally urging said lever upwardly and a thermostatically operating means engaging the other end of said lever.

3. A gas governor having in combination, a casing having spaced chambers, a vertically movable member having a passage therethrough for gas affording communication between said chambers, a plate beneath and co-operating with said member to limit or shut off the passage of gas therethrough, a screw extending through the top of said casing and threaded into said member, a spring surrounding said screw abutting said member and the top of said casing, means for turning said screw, the last mentioned means comprising a beveled gear secured to said screw, a pinion meshing with said gear, means for turning said pinion, the top of said gears being provided with radial graduations and a mark on said casing co-operating with said graduations.

4. A gas governor having in combination, a casing comprising upper and lower chambers, there being an opening between said chambers for the passage of gas from one chamber to another, a plate in one of said chambers beneath and adapted to co-operate with said opening to limit or shut off the passage of gas, a lever having an arm with a semi-spherical recess therein and a passage extending from the bottom of said recess therethrough, said plate having a semi-spherical portion disposed in said recess with a stem extending loosely through said passage, a spring surrounding said stem and urging the same downwardly to hold said plate in position, a resilient means contacting the lower side of said lever and urging the same upwardly and thermostatic means operative on said lever when heated to move said arm downwardly.

In testimony whereof I affix my signature.

VITUS A. BOKER.