G. M. BIERLY.

AUTOMATICALLY CONTROLLED GAS VALVE.

APPLICATION FILED JAN. 2, 1909.

933,153. Patented Sept. 7, 1909.

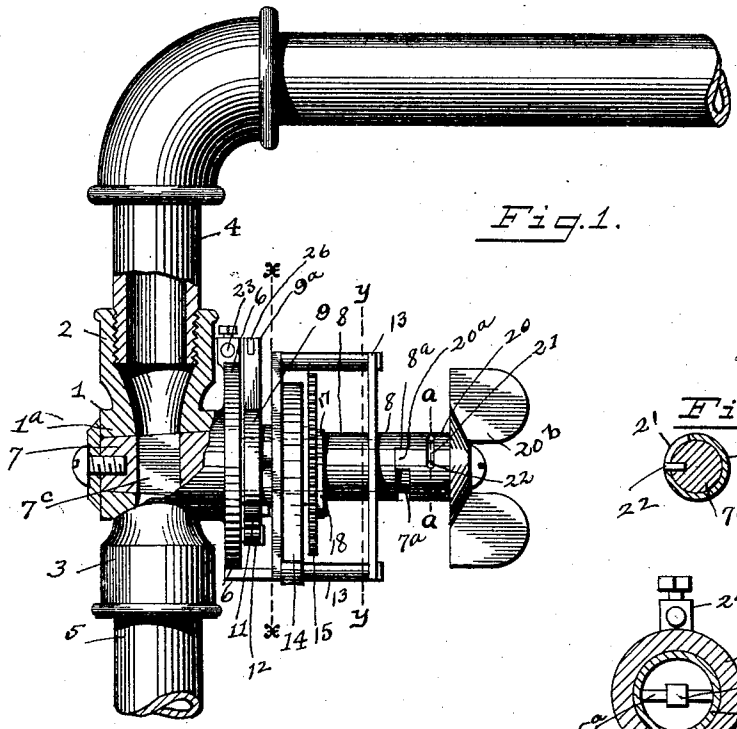

Fig. 1.

Fig. 4.

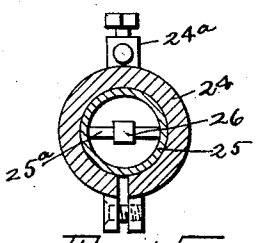

Fig. 5

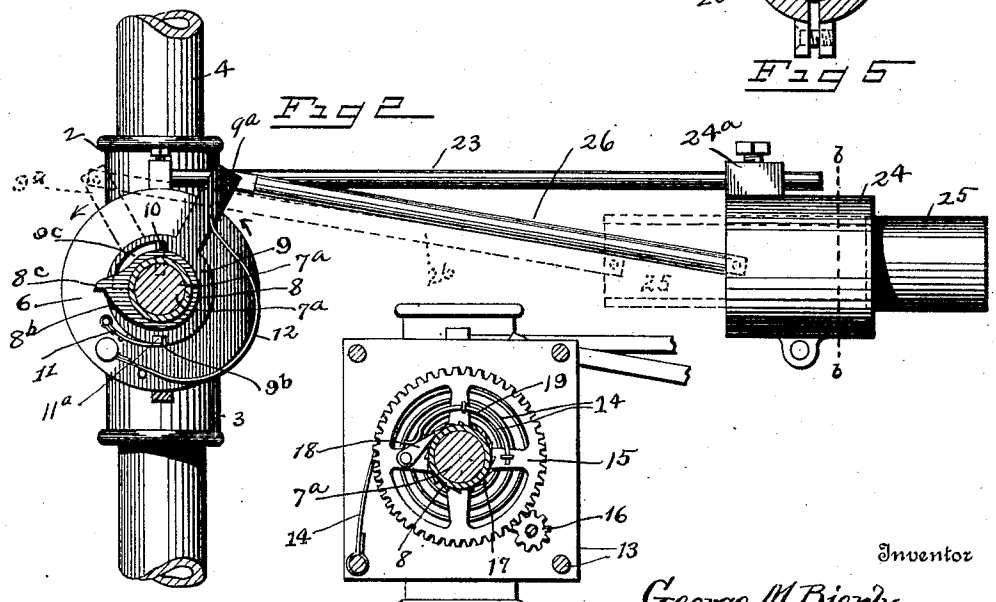

Fig. 2

Fig. 3

Witnesses

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AUTOMATICALLY-CONTROLLED GAS-VALVE.

933,153. Specification of Letters Patent. Patented Sept. 7, 1909.

Application filed January 2, 1909. Serial No. 470,460.

To all whom it may concern:

Be it known that I, GEORGE M. BIERLY, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Automatically-Controlled Gas-Valves, of which the following is a specification.

My invention relates to the improvement of automatically controlled gas valves and the objects of my invention are to provide in conjunction with a gas valve, improved mechanism whereby the valve will be automatically turned to a closed position in case the flame at the burner is extinguished through low gas pressure or otherwise and to produce certain improvements in details of construction and operation which will be more fully pointed out hereinafter. These objects I accomplish in the manner illustrated in the accompanying drawing, in which:

Figure 1 is a side elevation of my improved mechanism showing for the sake of clearness, portions of the gas inlet pipe, valve and valve casing in section, Fig. 2 is a sectional view on line *x*—*x* of Fig. 1, Fig. 3 is a sectional view on line *y*—*y* of Fig. 1, Fig. 4 is a sectional view on line *a*—*a* of Fig. 1, and, Fig. 5 is a sectional view on line *b*—*b* of Fig. 2.

Similar numerals refer to similar parts throughout the several views.

1 represents a valve casing which is formed with the usual central tapering valve opening 1^a and which is also formed with internally threaded pipe receiving sockets 2 and 3 with which are connected respectively the gas supply pipe sections 4 and 5. With the horizontal body of the valve casing 1, I form a terminal flange 6.

7 represents a desirable form of valve which is rotatably mounted in the tapering opening 1^a of the casing 1. The valve 7 is provided with a steam extension 7^a on which is rotatably mounted a sleeve 8 which is shorter than the valve stem 7^a and which at its outer end is recessed to form a clutch shoulder 8^a. Loosely surrounding the valve stem adjacent to the outer side of the valve casing flange 6 is a circular collar 9 with the periphery of which is formed an upwardly extending arm 9^a. I also form in the periphery of the collar 9 at a point a distance from the arm 9^a, a notch or indentation 9^b. The central opening of the collar 9 is formed at one side of the arm 9^a with an enlargement or recess 9^c into which is adapted to project the outer end portion of a pin 10 which is secured in connection with the valve stem 7^a.

11 represents a curved spring pawl, one end of which is connected with the valve casing head or flange 6 and the remaining end of which is provided with a tooth-like projection or lug 11^a which is adapted to engage, as shown in Fig. 2 of the drawing, the notch 9^b of the collar 9. The collar arm 9^a is also connected with the flange 6 through the medium of an outwardly bowed spring 12, this spring being adapted to exert a pressure on said arm 9^a in the direction of the arrow in Fig. 2.

That end of the sleeve 8 which is adjacent to the collar 9 has formed therewith a curved cam-like projection 8^b from which projects outwardly a short finger or tooth 8^c. Mounted loosely about the sleeve 8 and supported from the valve casing is a fixed frame 13 in which is carried a desirable form of clock mechanism which comprises a coiled spring 14, one end of which is connected with the sleeve 8 and the other end of which is connected with the frame 13. This clock mechanism also comprises a main operating gear 15 which is loose on the sleeve 8 and which through the usual pinion 16 is connected with a suitable form of balance wheel and clock escapement not herein shown.

Upon the sleeve 8 is formed or carried a ratchet wheel 17, the teeth of which are adapted to be engaged by a pawl 18 which is pressed in the path of the teeth of said ratchet wheel, by means of a suitable spring 19. On the outer and otherwise unincased end of the valve stem 7^a, I provide a comparatively short tubular casing or collar 20 which has a short forwardly projecting arm 20^a which projects within the recess of the outer end of the sleeve 8 and is adapted to engage the shoulder 8^a thereof. The tubular member or key 20 is formed at its outer end with a suitable finger engaging head 20^b and through the wall of said tubular member 20 is formed circumferentially a short slotted opening 21, the latter receiving a pin 22 which projects from the periphery of the valve stem 7^a.

With a projection of the upper side of the valve casing flange 6, is rigidly connected one end of a rod 23, the remaining end of said rod being connected with a lug 24^a

which projects from a suitable cylindrical body 24. Within this cylindrical body, I provide a comparatively close fitting cylindrical thermostat member 25 formed of such metal or combination of metals as to insure its ready contraction and expansion from the influence of cold or heat. This thermostat member 25 is of such circumference as to move comparatively freely within the cylinder 24 when said thermostat member is in a cold or substantially cold condition. The thermostat member 25 is adapted to be located in such relative position with a gas burner of a furnace, stove or other heating device, as to be readily affected by the heat generated by the flame at the burner. With a fixed transverse rod 25^a of the thermostat member, I pivotally connect one end of a rod 26, the remaining end of which is pivotally connected with the outer end of the arm 9^a of the collar 9.

In the drawing, I have shown the gas valve in an open position, that is, with the valve opening 7^c in communication with the pipe socket members 2 and 3, in which position the gas from a supply pipe may readily pass to the burner which may be connected with the pipe 5 in any desired manner. In order to explain the operation of my device, however, I will assume that the valve is turned at right angles with the position shown in the drawing, thereby cutting off the flow of gas to the burner; that the valve stem pin 22 is in the opposite end of the slot 21 from that shown in the drawing; that the collar arm 9^a and rod 26 are in the positions indicated in dotted lines in Fig. 2 of the drawing; that the pawl termination 11^a is out of engagement with the notch 9^b and bearing against the periphery of the collar 9 and that the finger or tooth-like projection 8^c of the sleeve cam 8^b is in contact with said pawl termination 11^a. The parts being in this position, the turning of the finger engaging projection 20^b of the tubular member 20, will result through the engagement of the projection 20^a with the shoulder 8^a, in rotating the sleeve 8 and thereby winding or placing under tension the coiled spring 14 of the clock mechanism, this spring being held against too rapid reversal by the pawl 18. The operation of turning the member 20 being continued the contact of the pin 22 with the opposite end of the slot 21, will result in a turning of the valve stem and the valve until the same is in the open position indicated in Fig. 1, in which position the gas may pass freely to the burner, where it may be ignited. The movement imparted to the sleeve 8, also results in its cam termination being turned to the position indicated in Fig. 2 of the drawing and the movement of the valve stem results through the engagement of the valve stem pin 10 and the end of the recess 9^c, in the collar arm 9^a being moved to the position indicated in full lines in Fig. 2, thereby overcoming the pressure of the spring 12 and in the rod 26 and thermostat member 25 being moved to the positions shown in full lines. Under the influence of the heat generated by the flame at the burner, the thermostat member 25 expands until it becomes fixed in connection with the cylinder 24, thereby holding the parts in the open positions described. Owing to the fact that the clock spring is slowly unwinding through the usual operation of the clock mechanism, it is obvious that the sleeve 8 will be turned until its curved cam projection 8^b by contact with the terminal member 11^a of the spring pawl 11, will operate to force said terminal member out of engagement with the notch 9^b and further operation of the clock will be discontinued by the engagement of the cam projection 8^c with said spring pawl terminal member. This operation of releasing the collar 9, however, will not occur until the binding action of the thermostat 25 and cylinder 24 is such as to overcome any tendency of the spring 12 acting to move the arm 9^a to a closed position. Assuming now that the gas has been temporarily cut off at its main supply point, or the pressure has become so weakened as to cause the flame to be extinguished at the burner, it will be understood that as soon as the thermostat member 25 has cooled and contracted sufficiently to permit a free movement of the thermostat member, the spring 12 will act to move the arm 9^a, to the position shown in dotted lines in Fig. 2 and through such action the valve stem will be turned until the valve is again closed, thereby preventing a flow of gas to the burner. It is obvious that the gas may be turned off by hand by rotating the key or tubular member 20 until the valve stem is turned by pressure of the pin 22 against the opposite end of the slot 21.

Where gas burners are employed in furnaces, stoves, beneath boilers and other places, serious results have followed the temporary cutting off of the gas, as a result of accidents to gas supply pipes or otherwise. By my construction and operation, however, it will readily be understood that a comparatively simple, inexpensive and positive operating mechanism is produced, by means of which the gas valve will be automatically closed so as to prevent the escape of gas at the burner after the flame has been extinguished and the supply again turned on.

It will be understood that my improved mechanism is designed for use in connection with any of the ordinary gas burners.

What I claim, is:

1. In a device of the character described, the combination with a valve casing, a rotary valve therein having a stem, a sleeve on said

stem, and a clock mechanism comprising a spring, one end of which is affixed to said sleeve, of a slidable thermostat member formed of readily expansible metal, means for turning said valve stem and its sleeve by hand, connections between said thermostat member and the valve stem, means for holding the thermostat member rigid when expanded, means for locking the valve stem in an open position until the thermostat member is expanded, and means connected with the valve stem sleeve for releasing said valve stem after the thermostat member is expanded by operation of the clock mechanism.

2. In a device of the character described, the combination with a valve casing, of a rotary valve therein having a stem, a sleeve on said stem, a clock mechanism comprising a spring normally tending to turn said sleeve in one direction, a fixed member supported from the valve casing, a tubular thermostat member slidable in said fixed member when unexpanded, means for turning the valve stem and its sleeve by hand, connections between said thermostat member and the valve stem, means for locking the valve stem in an open position until the thermostat member is expanded and means connected with the valve stem for releasing said valve stem after the thermostat is expanded.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE M. BIERLY.

Witnesses:
A. L. PHELPS,
L. CARL STOUGHTON.