No. 667,186. Patented Feb. 5, 1901.

V. E. CAMPBELL.

AUTOMATIC GAS CUT-OFF.

(Application filed Aug. 3, 1898.)

(No Model.) 2 Sheets—Sheet 1.

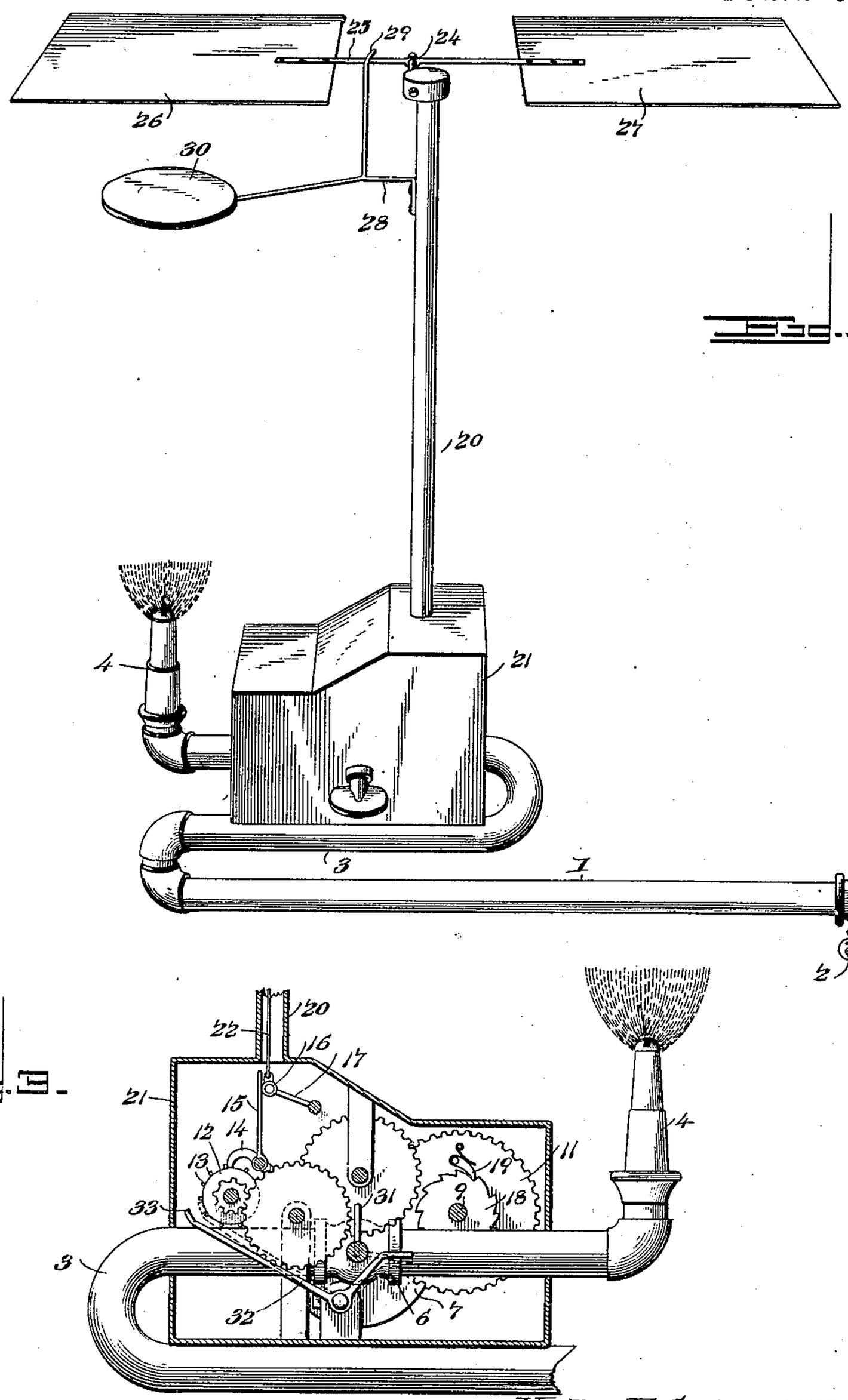

Fig. 1.

Fig. 2.

Witnesses
E. F. Stewart,
[illegible]

Victor E. Campbell, Inventor
By his Attorneys,
Church & Co.

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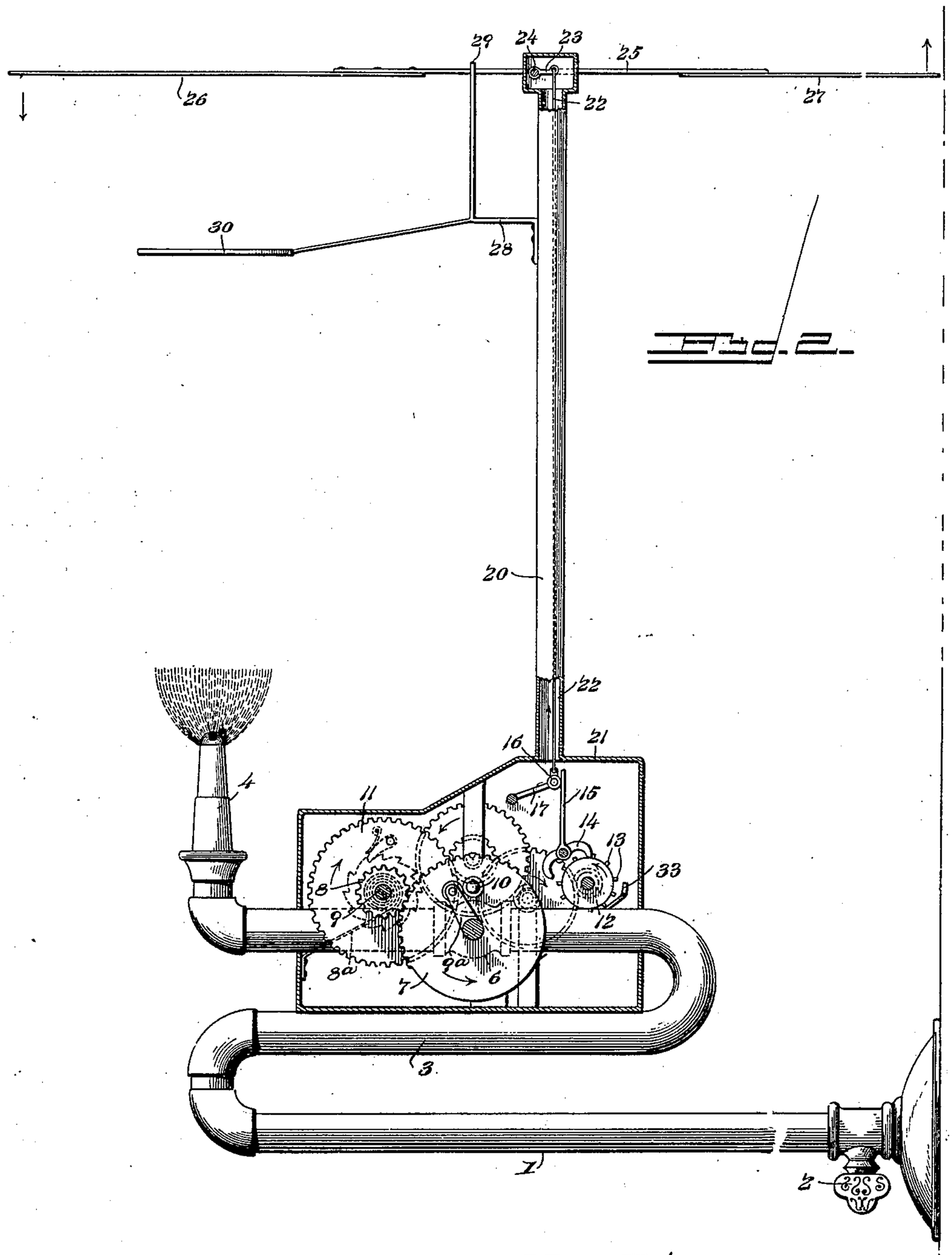

Fig. 2.

Witnesses
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C. E. Hoyt

Victor E. Campbell, Inventor
By Wis Attorneys,
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UNITED STATES PATENT OFFICE.

VICTOR E. CAMPBELL, OF WINNEMUCCA, NEVADA.

AUTOMATIC GAS CUT-OFF.

SPECIFICATION forming part of Letters Patent No. 667,186, dated February 5, 1901.

Application filed August 3, 1898. Serial No. 687,614. (No model.)

To all whom it may concern:

Be it known that I, VICTOR E. CAMPBELL, a citizen of the United States, residing at Winnemucca, in the county of Humboldt and State of Nevada, have invented a new and useful Automatic Gas Cut-Off, of which the following is a specification.

My invention relates to automatic gas cut-offs, and has for one object to provide a simple, efficient, and durable construction and combination of parts whereby gas is automatically cut off after the light has been extinguished to avoid the dangers of asphyxiation and other accidents due to an accumulation of gas in an apartment.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a perspective view of a cut-off mechanism constructed in accordance with my invention. Fig. 2 is a vertical longitudinal sectional view of the same, showing the gearing in side elevation. Fig. 3 is a view of the controlling mechanism, showing the opposite side from that illustrated in Fig. 2.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

To an ordinary gas-jet 1, having the usual gas-cock 2, I apply a gooseneck or return pipe 3, of which the free end is located above and adjacent to the extremity of the ordinary or main jet-pipe 1, said gooseneck or return pipe being applied to the end of the main pipe after the removal of the usual burner 4, which is then mounted in the end of the gooseneck-pipe, as clearly shown in Figs. 1 and 2. In the upper arm of the gooseneck or return pipe is arranged a regulating or cut-off cock 6.

Loosely mounted upon the spindle of the regulating gas-cock 6 is a disk 7, which in the construction illustrated constitutes a gear having peripheral teeth which mesh with a pinion 8, keyed on a spring-arbor 9. A connection between the gas-cock spindle and said disk provides for communicating motion from the spindle to the disk during the opening movement of the gas-cock to wind the spring 8^a, which is attached to said arbor. In the construction illustrated the means for communicating motion from the spindle to the concentric loose disk consists of an arm 9^a, fixed to the spindle, and a stud or projection 10 on the disk for engagement by the arm, said stud or projection being in the path of the arm, whereby when the gas-cock is opened it turns the disk to the limit of its movement, but leaves the gas-cock spindle free to rotate in the opposite direction (or that which is necessary to close off the gas) independently of the disk. This provides for turning on the gas in the usual way (and thereby winding the cut-off spring) and the subsequent turning off of the gas in the ordinary way or manually by a reverse or closing movement of the gas-cock. Also carried by the spring-arbor is a gear 11, connected by intermediate gearing involving any desired number of speed-multiplying elements, with an escapement-wheel 12, preferably provided with peripheral projections or teeth 13, the periphery of said escapement-wheel being arranged in the path of a main escapement-lever 14, of which the spindle is provided with a controlling-arm 15. Arranged in the path of vibration of this controlling-arm is a movable stop 16, carried by a stop-lever 17, the parts being arranged relatively, so that when the stop is depressed the controlling-arm is held from vibration, and hence the escapement-wheel is locked to maintain the spring under tension as wound by the opening of the regulating gas-cock. Obviously a ratchet-clutch, consisting of a ratchet-wheel 18 and a pawl 19, must be interposed between the gear 11 and the spring-arbor 9, whereby the arbor may be turned to wind the spring without communicating motion to the gear and whereby the reverse motion of the arbor due to the tension of the spring (when the escapement-wheel is released) communicates motion to the gear.

Extending through a tubular standard 20, which rises from the casing 21, in which the gear mechanism above described is inclosed, is a connecting rod or wire 22, attached at its lower end to said stop-lever and at its upper end to a crank-arm 23 on the spindle 24 of a balanced heat-controlled or diaphragm lever 25, said lever being fulcrumed at an inter-

mediate point upon said standard by means of said spindle 24 and being provided on the arm directly over the gas-jet with a flat disk or diaphragm 26, of mica or similar light and preferably transparent material. This lever should be balanced, so that normally the diaphragm is depressed, but is adapted to be raised by the heat rising from a flame at the burner, due to the combustion of the gas escaping therefrom; but in practice I prefer that the counterbalancing-weight 27 should consist of a flat disk, as shown, equal in area with the diaphragm, whereby an accumulation of dust upon the diaphragm will be counterbalanced by an equal accumulation upon the counterbalancing-weight to prevent the disarrangement of the adjustment and interference with the desired operation of the parts. A bracket-arm 28, projecting from the standard, terminates in a stop 29, arranged in the path of the diaphragm-supporting arm of the diaphragm-lever to limit the upward movement of the diaphragm when influenced by heat rising from the burner, and also supported by this bracket-arm in the construction illustrated is a shield or guard 30, preferably of less area than the diaphragm, to receive any accumulations of soot due to the flame and prevent such accumulations upon the surface of the diaphragm without causing the column of heated air to be deflected beyond the periphery of the diaphragm.

With the parts constructed as described the opening of the gas-cock 6 winds the cut-off spring, and if the gas at the burner is lighted immediately the heat rising therefrom will raise the diaphragm and depress the stop end of the stop-lever into contact with the controlling-arm of the escapement-lever, thus locking the escapement-lever and holding the escapement-wheel from rotation. As long as heat rises from the burner or as long as the flame continues the parts will maintain the positions described. If the light should be extinguished without reversing the position of the gas-cock, the slight additional weight of the diaphragm over its counterbalancing-weight will cause the former to descend, thereby drawing upwardly upon the connecting-rod, raising the stop out of engagement with the controlling-arm of the escapement-lever, and releasing the escapement, whereupon the spring will reverse the direction of movement of the disk 7, as shown by the arrow in Fig. 2, and by bringing the projection thereof into contact with the arm on the cut-off spindle will turn the latter and cut off the gas.

In order to obviate the necessity of winding the regulating-spring each time that the gas is turned on, I preferably provide the spindle of the gas-cock with a trip-arm 31, in the path of which is arranged one end of a brake-lever 32, fulcrumed at an intermediate point and having a terminal brake-shoe 33, which is arranged in operative relation with the escapement-wheel or other revoluble part of the mechanism, which is so constructed as to perform the functions of a brake-wheel. This brake-lever is yieldingly held with its shoe out of engagement with the wheel with which it is desired to coöperate, and in the construction illustrated the brake-shoe end of the lever is of sufficient weight to depress the shoe when the lever is released. Therefore when the gas-cock is turned to allow a flow of gas to the jet and after the gas has burned for the desired length of time the gas-cock is turned to cut off the supply of gas, and the trip-arm on the spindle of the gas-cock coming in contact with the arm of the brake-lever will throw the brake-shoe 33 into engagement with the brake-wheel, (consisting in the construction illustrated of the escapement-wheel,) thus preventing the unwinding of the spring. Hence when the gas-cock is turned to allow a flow of gas it turns freely and independently of the gearing to the fully-open position or to any position desired by the operator, while the automatic cut-off mechanism is controlled if the gas is lighted by the heat rising from the flame, as above indicated.

From the above description it will be seen that the construction is simple and the operation positive and that in manipulating the cut-off or regulating gas-cock no difference is apparent to the operator other than the increased resistance due to the winding of the cut-off spring, and not even this difference when the spring has been wound and held under tension by the previous manual reverse movement of the gas-cock. On the other hand, in case of accident or the extinguishment of the flame by a draft or through ignorance of the occupant of the room the automatic cut-off mechanism will be brought into operation and will reverse the movement of the gas-cock and check the flow of gas.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

1. The combination with a gas-cock having an exposed key, and a gas-cock-closing spring for turning the said gas-cock to a closed position when released, said cock being movable independently of the spring, of controlling devices provided with means for automatically locking the gas-cock in its open position, said means including a movable diaphragm arranged in the path of heated air rising from a flame at the gas-jet, substantially as specified.

2. The combination with a spring-closed gas-cock, of controlling devices including a balanced lever provided on its arms, respectively, with a diaphragm and a counterbalancing-weight, said diaphragm and weight being of equal areas, and the diaphragm be-

ing arranged in the path of, for elevation by, heated air rising from a flame at the gas-jet, substantially as specified.

3. The combination with a spring-closed gas-cock, of controlling devices including a balanced lever provided on its arms, respectively with flat disks or diaphragms, of which one is arranged in the path of, for elevation by, heated air rising from a flame at the gas-jet, said disks being coextensive in plan, to avoid the destruction of the balance by the accumulation of dust to a greater extent upon one arm of the lever than upon the other, substantially as specified.

4. The combination with a spring-closed gas-cock, of controlling devices including a balanced lever provided on its arms with disks or diaphragms of equal areas, one of said disks or diaphragms being arranged in the path of, for elevation by, heated air rising from a flame at the gas-jet, and a soot shield or guard interposed between the gas-jet and that disk or diaphragm which is above the gas-jet, and being of less area than said disk or diaphragm, to receive a deposition of soot by the flame at the gas-jet and protect the superjacent disk or diaphragm therefrom, substantially as specified.

5. The combination with a gas-cock, a gas-cock-closing spring, and means for winding the spring by the opening of the gas-cock, of governing devices including an escapement-wheel, an escapement-lever in operative relation with the escapement-wheel, and having a controlling-arm, a movable stop arranged in the path of said controlling-arm, and heat-affected mechanism operatively connected with said stop, substantially as specified.

6. The combination with a gas-cock, a gas-cock-closing spring, and means for winding the spring by the opening of the gas-cock, of governing devices including an escapement-wheel, an escapement-lever arranged in operative relation with said escapement-wheel and having a controlling-arm, a stop-lever having a terminal stop for arrangement in the path of said controlling-arm, and heat-affected mechanism operatively connected with said stop, substantially as specified.

7. The combination with a spring-closed gas-cock, and connections for communicating motion from the gas-cock during the opening thereof to wind the closing-spring, of governing devices including a revoluble element, heat-affected controlling mechanism for maintaining said governing devices in a state of rest during the maintenance of a flame at the gas-jet, and braking devices actuated by the gas-cock, for checking the movement of the governing devices when the gas-cock reaches the limit of its reverse or cut-off movement, substantially as specified.

8. The combination with a spring-closed gas-cock, and connections for communicating motion from the gas-cock during the opening thereof to wind the closing-spring, of governing devices including a revoluble element, heat-affected controlling mechanism for maintaining said governing devices in a state of rest during the maintenance of a flame at the gas-jet, a brake-lever having a shoe for operative engagement with said revoluble element, and a trip-arm carried by the gas-cock for throwing the brake-lever into operation when the gas-cock reaches the limit of its reverse or closing movement, substantially as specified.

9. The combination with a spring-closed gas-cock, governing devices, heat-affected controlling mechanism, operatively connected with said governing devices for releasing the same, and including a vertically-movable diaphragm arranged in the path of, for elevation by, heated air rising from a flame at the gas-jet, and means for preventing the depression of the diaphragm by the accumulation of dust upon its upper surface, of a soot shield or guard located between the plane of said diaphragm and that of the gas-jet, and of less area than said diaphragm to allow an upward current of heated air around the periphery of the shield, while preventing contact of the flame with the diaphragm, substantially as specified.

10. The combination with a gas cock and burner, of a casing, a spring connected therewith and with the cock, a train of gearing operatively connected with the cock, and a thermostatic stop device associated with the burner and coacting with said train of gearing, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

VICTOR E. CAMPBELL.

Witnesses:

CHAS. DUNCAN,

CHARLES WUERTELL.