No. 674,976. Patented May 28, 1901.

T. C. MOORE.

AIR MIXER AND REGULATING VALVE.

(Application filed Mar. 17, 1900.)

(No Model.) 2 Sheets—Sheet 1.

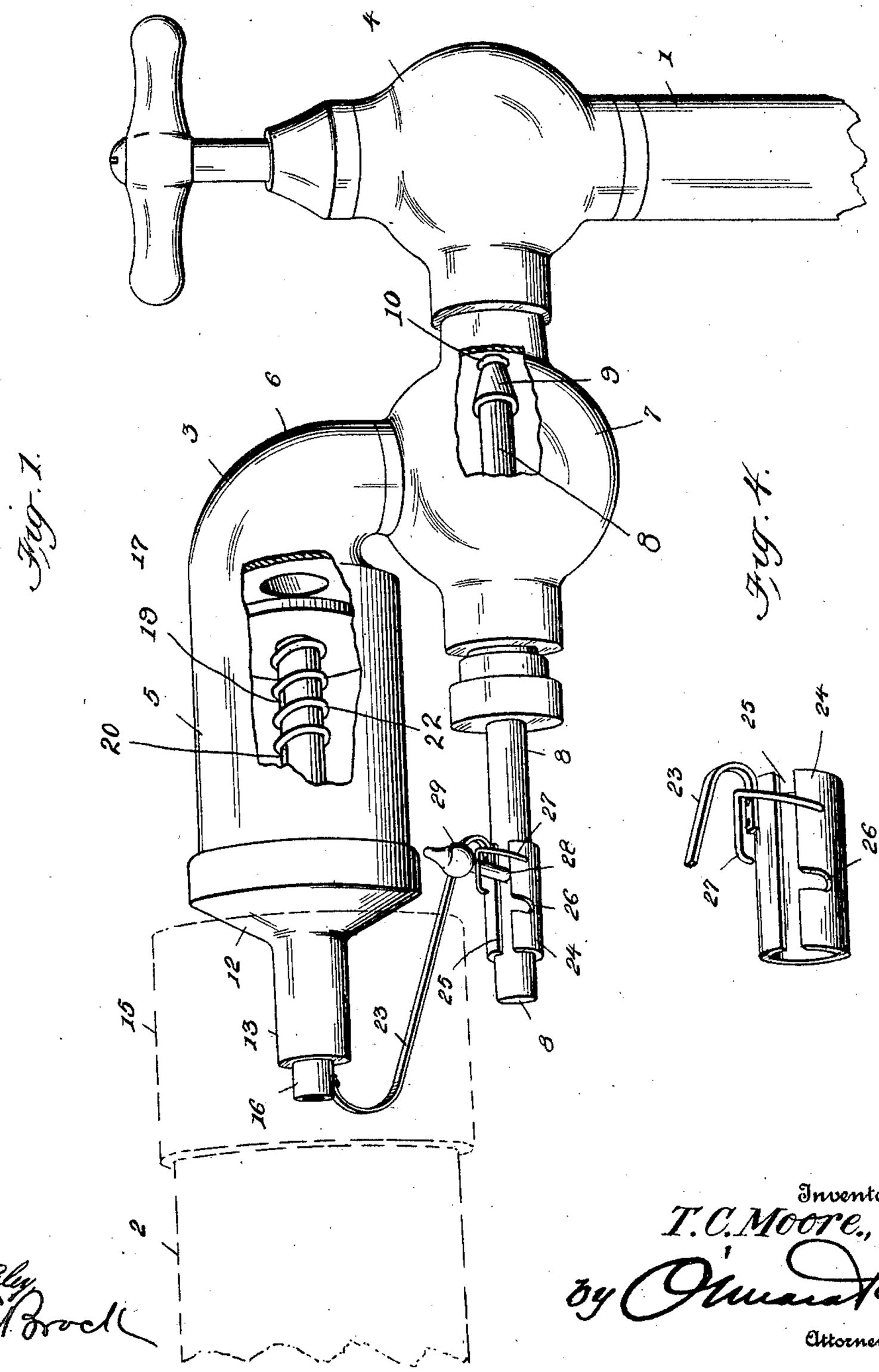

Fig. 1.

Fig. 4.

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Fig. 2.

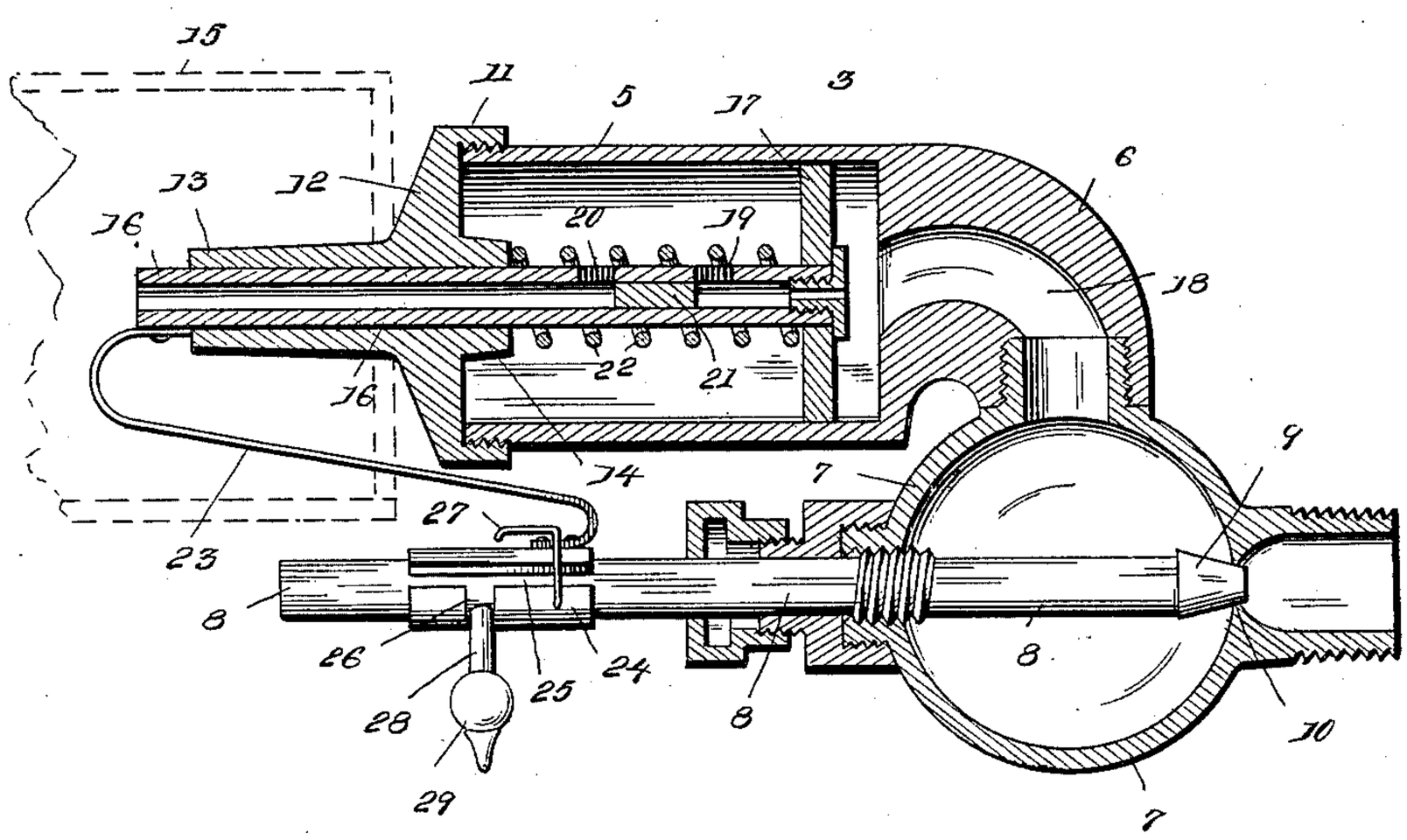
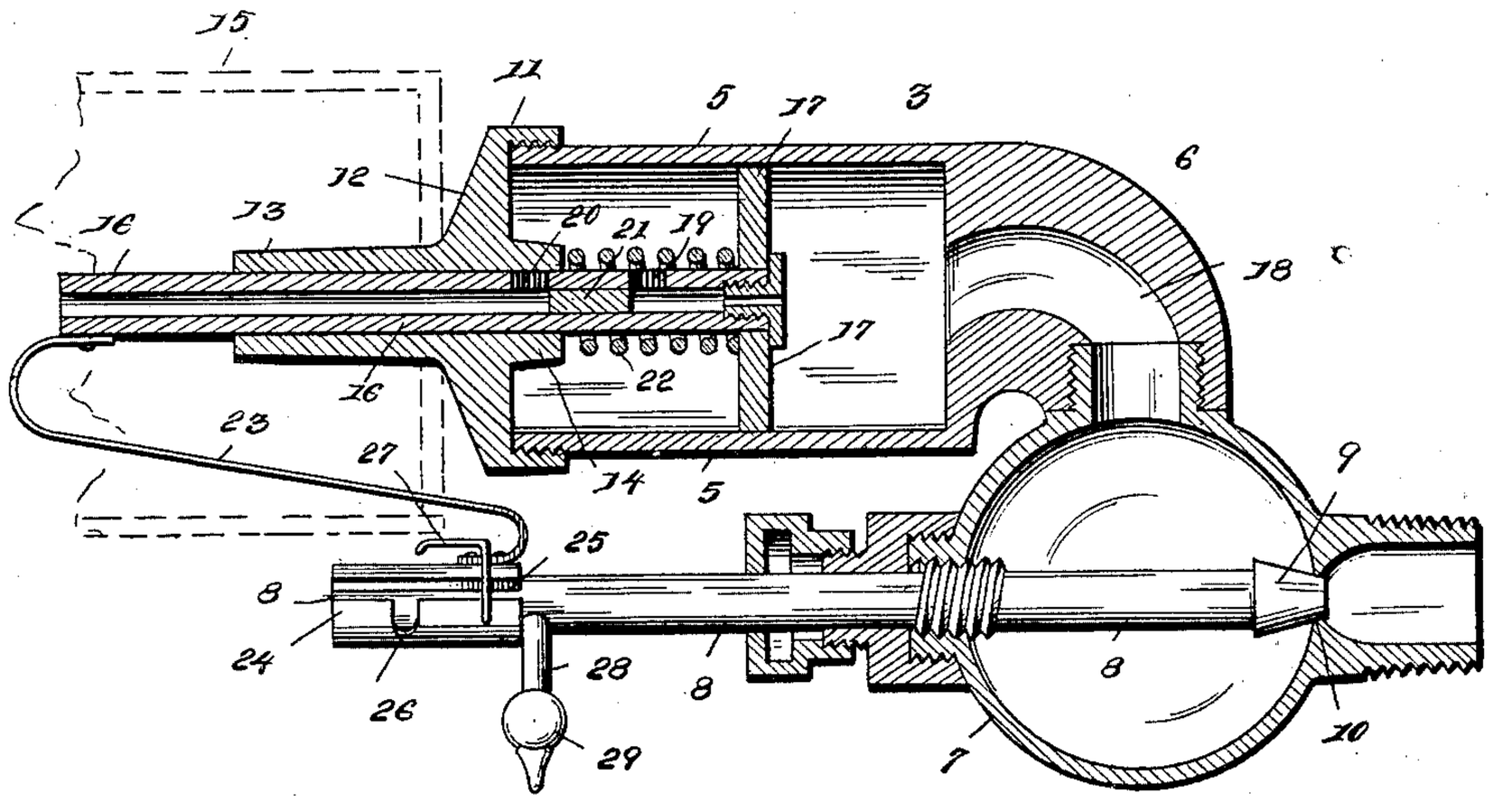


Fig. 3.



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UNITED STATES PATENT OFFICE.

THOMAS C. MOORE, OF DUBLIN, INDIANA, ASSIGNOR OF TWO-THIRDS TO A. G. PAXTON AND W. E. FLOYD, OF SAME PLACE.

AIR-MIXER AND REGULATING-VALVE.

SPECIFICATION forming part of Letters Patent No. 674,976, dated May 28, 1901.

Application filed March 17, 1900. Serial No. 9,095. (No model.)

To all whom it may concern:

Be it known that I, THOMAS C. MOORE, a citizen of the United States, residing at Dublin, in the county of Wayne and State of Indiana, have invented a new and useful Air-Mixer and Regulating-Valve, of which the following is a specification.

This invention relates to improvements in gas-mixers adapted for use with gas-consuming apparatus, and is more especially designed as an improvement in that class of devices adapted for use with stoves and furnaces.

The object of the present invention is to provide a device of the character mentioned which is simple in construction and adapted for automatic operation, whereby the same will cut off the flow of gas when the pressure has become abnormal or arisen to a point wherein the same is too great for consumption in the stove or furnace; and the invention is also designed to cut off the flow of gas when the pressure has fallen to such an extent as to cause the extinguishment of the flame at the burner, and thereby prevent the subsequent flow of the gas after such extinguishment has taken place.

With these and other objects in view, which will appear as the nature of the improvements is better understood, the invention consists, substantially, in the novel construction, combination, and arrangement of parts, as will be hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the appended claims.

In the drawings, Figure 1 is a perspective view of the herein-described apparatus as connected to a supply-pipe and a pipe leading to a burner, a portion of the same being broken away to show the interior. Fig. 2 is a longitudinal sectional view, the valve being illustrated in closed position. Fig. 3 is a similar view and illustrating the position assumed by the parts after an abnormal flow of gas has taken place. Fig. 4 is a detail perspective view of the means for retaining the cut-off valve in open position.

Referring to the drawings, the numeral 1 designates a supply-pipe which is connected to a gas-main, and 2 a discharge-pipe leading to the burner. Interposed between the supply-pipe 1 and the discharge-pipe 2 is a pressure-chamber 3, a valve 4 being arranged between the chamber 3 and the pipe 1 for cutting off the flow of gas from said pipe to said chamber.

The chamber 3 comprises a cylindrical casing 5, which is provided at one of its ends with a curved elbow 6, and connected to said elbow is a cut-off valve 7, provided with a spindle 8, which spindle has at one of its ends a valve proper, 9, which coacts with a seat 10 in order to shut off the flow of gas from the valve 4 into the chamber 3. The valve 7 is of the ordinary construction and therefore needs no further description, and while the casing 5 is illustrated as removably connected to the valve 7 it is obvious that, if desired, these parts may be of an integral structure. The casing 5 is provided at the end opposite to the elbow 6 with a series of exterior screw-threads 11, and secured upon said end is a removable head 12, provided with an outwardly-extending nozzle 13 and with an inwardly-extending collar 14, and said nozzle 13 projects into and lies within a mixing-chamber 15, which may be of any approved construction. Slidably mounted within the nozzle 13 and extending from a point beyond the extreme outer end thereof into the casing 5 is a tubular stem 16, and mounted upon the inner end of the said stem 16 is a piston 17, which piston has a gas-tight connection with said casing. As clearly shown, the inner end of the stem 16 is open, and thereby communicates with a duct 18, extending through the elbow 6, and thus affording communication between the casing 5 and the valve 7, and it will also be noted that the stem 16 is provided with an inlet-port 19 and an outlet-port 20, a plug or division-block 21 being arranged between said ports. By reason of the ports 19 and 20 it will be seen that the gas may readily flow from the duct 18 into the casing 5, between the piston 17 and the head 12, and out of said casing into the tubular stem 16, and thence into the mixing-chamber 15 to be led away to the point of consumption.

A coil-spring 22 encircles the stem 16, and said spring is interposed between the piston 17 and the collar 14, the ends of said spring bearing against said parts, and suitably attached to the stem 16 at a point exterior to

the nozzle 13 is one end of a connecting-strap 23, the other end of said strap being attached to a supporting-sleeve 24, slidably mounted upon the outer end of the valve-spindle 8. The sleeve 24 is provided with a longitudinally-extending slot 25, which slot is open at the end adjacent to the valve 7 and communicates with a transversely-extending slot 26, arranged at a point midway between the ends of said sleeve, and suitably connected to the latter at one side of the slot 25 is a supporting-arm 27, the latter being formed, preferably, of wire. An actuating-arm 28 is carried by the spindle 8, which arm projects at right angles thereto, and the said arm 28 is provided with a weight 29, through the medium of which the same is caused to gravitate when pressure is removed therefrom, and thereby rotates the spindle 8 for a purpose which will presently appear. The arm 27 is designed to maintain the actuating-arm 28 in elevated position when moved in the proper relation thereto, and when in said elevated position the valve 9 is open in order that the gas may flow from the supply-pipe 1 into and through the chamber 3 and thence into the pipe leading to the burner.

From the foregoing description it will be seen that when the parts are in the position shown in Fig. 2 the valve 9 is closed, and hence the flow of gas is shut off. When, however, it is desired to use the chamber, the valve 4 is first opened in order that an unlimited amount of gas may pass therefrom into the chamber 3, and when this has been done pressure is applied to the actuating-arm 28, so that the latter moves upwardly, and thereby rotates the spindle 8 approximately a quarter of a revolution. By reason of this the valve 9 is caused to recede from the seat 10, whereupon the gas rushes into the duct 6 and impinges against the piston 17, and as the gas continues thus to flow said piston 17 is caused to move forwardly and against the tension of the spring 22, whereby the latter is compressed. As the gas enters the casing 5 the same will also pass through the rear end of the stem 16, through the port 19, and into the casing 5, between the piston 17 and the head 12, thence out through the port 20 again into the stem 16, whence it issues into the mixer 15 and at this point is commingled with the air, and from said chamber the admixture thus formed is conveyed to the point of consumption by the pipe 2. The opening in the rear end of the stem 16 being of smaller diameter than the duct 18 it is obvious that the gas will begin to accumulate at the side of the piston 17 adjacent to said duct, and by reason of this accumulation the piston 17 is moved toward the head 12, and with this movement of the piston 17 the stem 16 is likewise moved through the nozzle 13, and thereby causes the sleeve 24 to be moved upon the spindle 8, which movement is sufficient to carry the supporting-arm 27 to such a point as will permit the actuating-arm 28 to rest thereagainst, and thus maintain said arm in elevated position. After the parts have reached the position just described and the flow of gas is normal said parts will remain in said position; but in the event that an abnormal flow of gas takes place the increased pressure incident thereto against the piston 17 will cause the latter to move nearer the head 12, and during the continued movement of the piston the port 20 passes into the collar 14, whereby the size of said port is diminished, with a resultant decrease in the flow of the gas through said port and with a corresponding increase in the compression of the spring 22. Should the pressure of gas continue to increase, the port 20 will be forced completely into the collar 14, and thereby entirely cut off the flow of the gas from the casing 5 into the stem 16, and should the increase in the pressure referred to be momentary the same will not result in an extinguishment of the flame at the burner, but simply a shutting off of the flow of gas therefrom for a short period, and as soon as the decrease in the pressure takes place the spring 22 will force the piston 17 away from the head 12, and hence expose the port 20, so that the gas may again flow therethrough into the stem 16. It is obvious, however, that with the movement of the stem 16 into the collar 14 the sleeve 24 will be correspondingly moved through the medium of the strap 23, and if such movement should be sufficient to cause the port 20 to move entirely within the collar 14 the supporting-arm 27 will be caused to move away from the actuating-arm 28. As the latter is thus without means for maintaining it in elevated position the weight 29 will cause it to gravitate, whereupon the spindle 8 is rotated and the valve 9 closed against the seat 10, which movement cuts off the flow of gas from the valve 4, and hence the flame at the burner is extinguished.

The operation just described is incident to an abnormal flow of gas, by means of which the stove or furnace would become overheated if such abnormal flow should continue and danger result therefrom; but should the pressure of gas in the main fall below normal and cause the extinguishment of the flame at the burner it is desirable that the flow should also be cut off. This is accomplished in the following manner: After the valve 4 has been opened, in order that the gas should flow into the casing 5, the initial compression of the spring 22 by reason of the movement of the piston 17 caused by the gas impinging against the same takes place, and so long as the normal conditions exist the gas will continue to flow to the mixing-chamber 15, as previously described; but immediately upon the fall in the pressure taking place the spring 22 begins to expand, and thereby causes movement of the piston 17 away from the head 12, and with this movement of the piston 17 a corresponding movement of the sleeve 24 also takes place, so that the supporting-

arm 27 is carried toward the valve 7 and away from the actuating-arm 28. As the latter is relieved of its means for being retained in elevated position the weight 29 causes the arm to gravitate, and said arm falls into the slot 26, the spindle 8 being rotated in the manner described and the flow of gas into the valve 7 cut off.

While the form of the invention herein shown and described is what I believe to be a preferable embodiment thereof, it will be understood that the same is susceptible of various changes, and right is therefore reserved to modify or vary the invention as falls within the spirit and scope thereof.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a safety appliance for gas-mixers, the combination, with a chamber provided with an inlet and an outlet, of a member within the chamber movable in two directions from the normal, a cut-off valve, and means for holding the valve open when the member is in its normal position, and for closing it and locking it closed when the member has moved a predetermined distance from the normal in either direction, substantially as described.

2. In a safety appliance for gas-mixers, the combination, with a chamber provided with an inlet and an outlet, of a spring-actuated piston therein, movable in two directions from the normal, a cut-off valve, and means for holding the valve open when the piston is in its normal position, and for closing it and locking it closed when the piston has been moved a predetermined distance in either direction from the normal, substantially as described.

3. In a safety appliance for gas-mixers, the combination with a chamber provided with an inlet and an outlet, of a piston therein, the stem of which projects through the outlet and is hollow at each end and perforated, the hollow of the inner end communicating with the chamber upon opposite sides of the piston, and the hollow of the outer end communicating with the chamber on the exit side of the piston, the stem being adapted to be moved longitudinally by a pressure of gas upon the front of the piston until the outer perforation is closed by the wall of the outlet-opening and the further escape of gas from the chamber through the stem is prevented, a spring between the piston and the outlet end of the chamber, the piston being movable away from its normal position in either direction, a cut-off valve, and means operatively connected to the piston for holding the valve open when the piston is in its normal position, and for closing it when the piston has been moved a predetermined distance in either direction from the normal, substantially as described.

4. In a safety appliance for gas-mixers, the combination, with a chamber provided with an inlet and an outlet, of a piston therein, a valve-casing communicating with the chamber and with the supply-pipe, a longitudinally-movable cut-off valve in the casing adapted to close the communication with the supply-pipe, means for moving the valve and means connected with the piston for preventing the movement of the valve until after the piston has been moved a predetermined distance in either direction, substantially as described.

5. In a safety appliance for gas-mixers, the combination, with a chamber provided with an inlet and an outlet, of a valve-casing communicating with the chamber and with the supply-pipe, a piston in the chamber, a spring for moving the piston in one direction, a longitudinally-movable rotary cut-off valve in the casing to close the communication with the supply-pipe, the stem of which is screw-threaded, a lock for holding the valve against rotation when open, and means for connecting the lock with the stem of the piston, substantially as described.

6. In a safety appliance for gas-mixers, the combination with a chamber provided with an inlet and an outlet, of a piston therein, a rotary cut-off valve, the stem of which is screw-threaded and provided with a weighted arm a notched slotted sleeve on the valve-stem in position to engage with the arm, and means for connecting the sleeve with the stem of the piston, substantially as described.

7. In a safety appliance for gas-mixers, the combination with a chamber provided with an inlet and an outlet, of a valve-casing communicating with the chamber and with the supply-pipe, a piston in the chamber, the stem of which projects through the outlet and is hollow at each end and perforated, the hollow in the inner end communicating with the chamber on both sides of the piston, and the hollow in the outer end communicating with the chamber on the exit side of the piston, the stem being adapted to be moved longitudinally by the pressure of gas upon the front of the piston until the outer perforation is closed by the wall of the outlet and the further escape of gas from the chamber through the stem is prevented, a rotary cut-off valve in the casing to close the communication with the supply-pipe, the stem of which is screw-threaded and provided with a weighted arm, a longitudinally-slotted sleeve on the stem provided with a notch and a supporting-arm, and a strap secured to the sleeve at one end and to the stem of the piston at the other, substantially as described.

8. In a device of the class described, the combination with a cut-off valve having its spindle provided with an actuating-arm, and means for maintaining said arm in elevated position, of means for automatically releasing said latter means for closing the cut-off valve when the normal flow of the gas is interrupted.

9. In a device of the class described, the combination with a cut-off valve having its spindle provided with a weighted actuating-

arm, and a sleeve slidably mounted upon said spindle and provided with means for supporting said arm in elevated position, of a casing arranged in proximity to said valve and communicating therewith, a piston arranged in said casing, a tubular stem also arranged in said casing and to which the piston is connected, said stem being provided with inlet and outlet ports, and suitable connections between the stem and said sleeve, whereby the latter is adapted to simultaneously move with the stem for freeing the supporting means carried by the sleeve from engagement with the actuating-arm when the normal flow of the gas is interrupted.

10. In a device of the class described, the combination with a cut-off valve having its spindle provided with a weighted actuating-arm, and a sleeve slidably mounted upon said spindle and provided with means for supporting the actuating-arm in elevated position, of a casing arranged adjacent to the cut-off valve and communicating therewith, a piston arranged in the said casing, a tubular stem also arranged in said casing and to which the piston is connected, said stem being provided with inlet and outlet ports and having a division plug or block interposed therebetween, a spring encircling the tubular stem and interposed between the piston and one end of the casing, and a strap connecting said stem to the sleeve carried by the valve-spindle, whereby the supporting means of said sleeve are adapted to be disengaged from the actuating-arm when the normal flow of the gas is interrupted.

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