O. C. MOON.

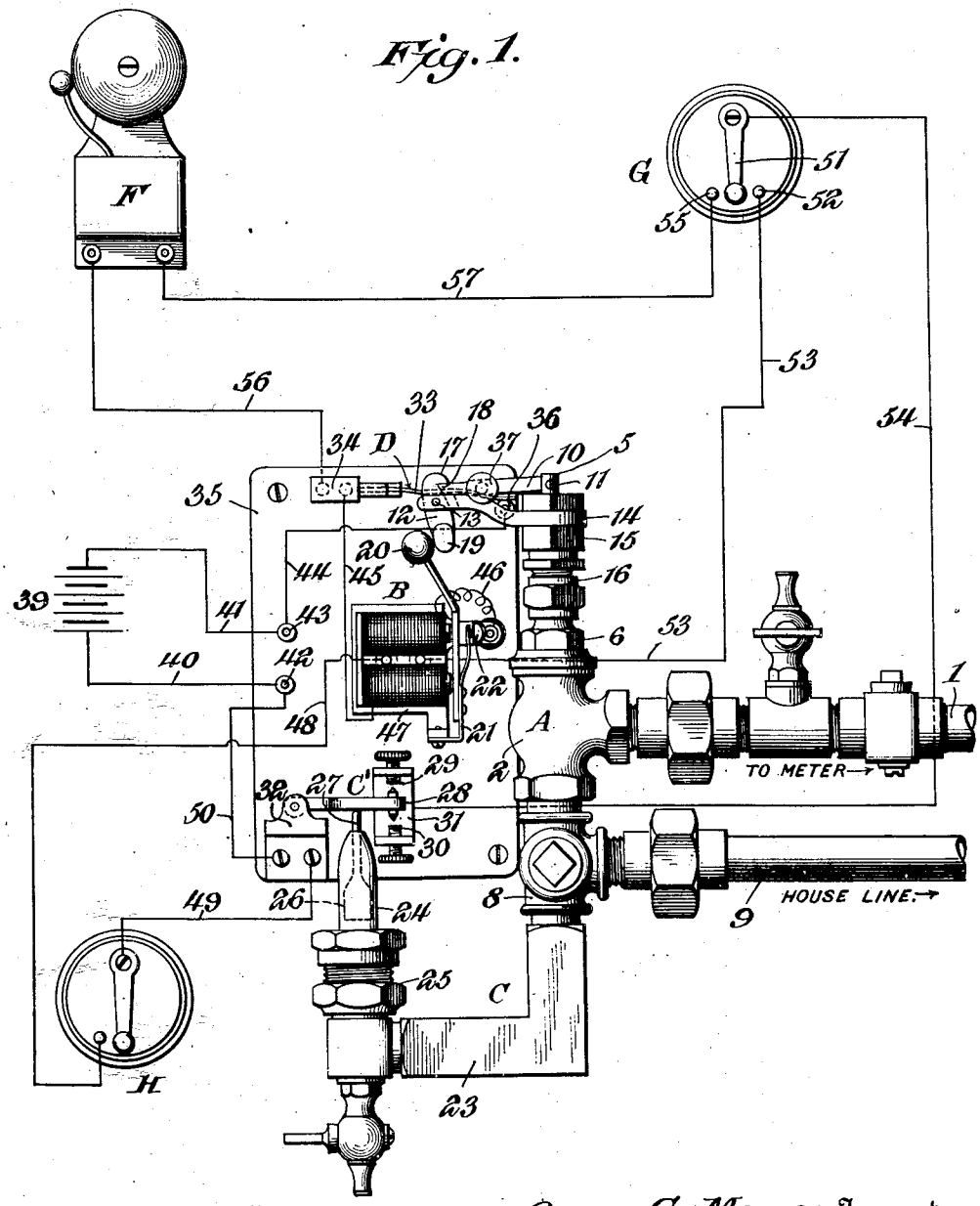
AUTOMATIC ALARM AND GAS PRESSURE CUT-OFF DEVICE.

APPLICATION FILED MAY 24, 1909.

960,569. Patented June 7, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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2 SHEETS—SHEET 2.

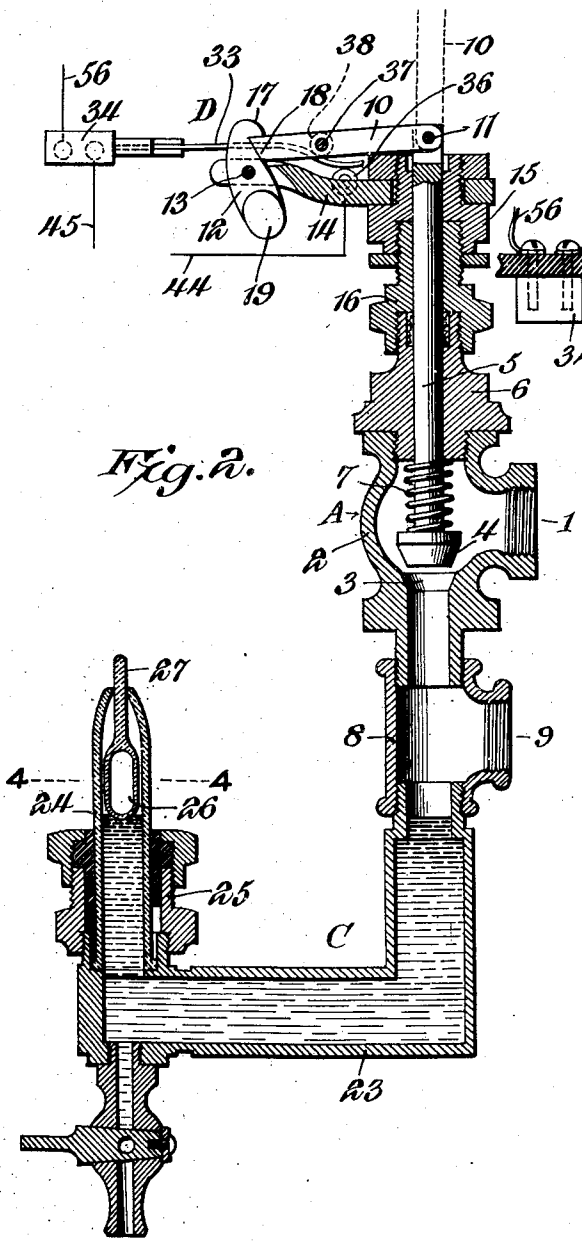

Fig. 2.

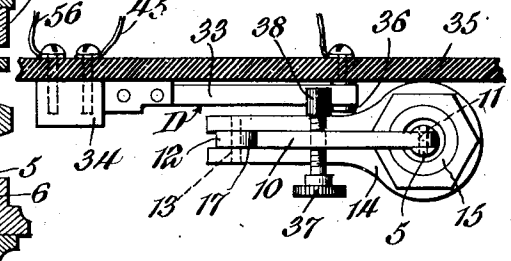

Fig. 3.

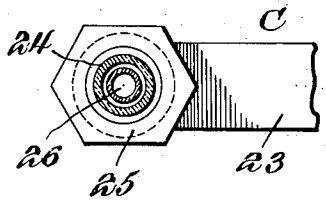

Fig. 4.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC ALARM AND GAS-PRESSURE CUT-OFF DEVICE.

960,569. Specification of Letters Patent. Patented June 7, 1910.

Application filed May 24, 1909. Serial No. 497,962.

To all whom it may concern:

Be it known that I, OSCAR C. MOON, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Automatic Alarm and Gas-Pressure Cut-Off Device, of which the following is a specification.

This invention relates to an emergency controlling apparatus adapted for use especially in connection with gas service pipes, whereby the supply can be cut off under abnormal conditions, either automatically or manually, to thereby insure safety to the occupants of the building from suffocation or to prevent a conflagration.

The invention has for one of its objects to provide a novel assemblage of electrical devices, instrumentalities and circuits for permitting abnormal variations in the pressure of the gas or other fluid to automatically close a cut-off valve, there being manual means whereby the controlling means for the cut-off valve can be operated independently of the pressure-controlled means for cutting off the supply of gas in case of fire in any part of the building.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention, Figure 1 is a side view of the apparatus, together with a diagram of the circuit connections. Fig. 2 is an enlarged vertical section of the cut-off valve and operating means. Fig. 3 is a detail view of the latch device for holding the cut-off valve open, and of the cut-out switch for the battery circuit. Fig. 4 is a horizontal section on line 4—4, Fig. 2. Similar reference characters are employed to designate corresponding parts throughout the views.

In the accompanying drawings, A designates the cut-off device which is connected in any suitable manner with the meter pipe 1, and this device comprises a casing 2 having a seat 3 with which a valve 4 is adapted to engage. This valve is mounted on a stem 5 which passes upwardly through a cap nut 6 on the valve casing and between the cap nut and valve is a spring 7 which tends to seat the valve. The lower end of the casing is connected by a coupling 8 with a house-line service pipe 9, the supply thereto from the meter being controlled by the valve 4. The valve is held open by a latch device which is adapted to be automatically released under emergency conditions. For this purpose, the upper end of the valve stem has fulcrumed thereon a swinging arm or lever 10 pivotally connected at 11 to the stem and arranged to be engaged by a latch 12 pivoted at 13 on a bracket 14. The bracket 14 is applied to a sleeve 15 connected by a coupling piece 16 with the cap 6 of the valve casing, and when the latch 12 engages the arm 10, the latter is disposed at approximate right angles to the valve stem and bears against the top of the bracket-carrying sleeve 15, and when the parts are set in this position, the spring 7 is under compression so as to be ready to close the valve upon the release of the arm 10. When the arm is released, it swings upwardly to the dotted line position to be in alinement with the valve stem for permitting the latter to have longitudinal movement under the expansion of the spring 7. The latch has a rounded nose 17, and the arm 10 is beveled at 18 so that the engagement of the latch with the arm can be readily effected, the latch having a weighted end 19 tending to hold the same in locking position. The latch is intended to be released by suitable means capable of being controlled from a more or less remote point, as for instance, in any room of the building. For this purpose, an electro-magnet B is employed which is provided with a hammer 20 carried by a spring 21 that forms a contact element disposed in coöperative relation with the fixed contact element 22. When the electro-magnet is energized, the hammer is drawn away from the latch and at the same time the circuit will be broken between the spring 21 and contact element 22 to permit the hammer to return and strike a blow upon the latch. As long as the circuit is closed, the hammer will be vibrated, and if the latch is not released upon the first blow, it will surely be released upon a repetition of the blows. The hammer 20 strikes the weighted or lower end of the latch so that the nose 17 thereof will be disengaged from the valve stem holding arm 10 and thereupon the valve can close automatically to cut off the supply of gas from the meter

pipe to the house-line. By arranging push buttons in various parts of the building and connecting them with the electro-magnet, the valve can be released at any point where a fire is discovered, so that the gas can be cut off in time to avoid unnecessary damage.

In order to control the latch-releasing mechanism automatically, a device C, responsive to variation in the gas pressure, is employed. To this end, a mercury container 23 is connected with the gas pipe and the house-line pipe, and the mercury will respond to variations in pressure and thereby control the circuit of the electro-magnet. The container in the present instance, is shown as an L-shaped structure connected with the pipe coupling 8 and having at one end an upstanding column 24 held in place by means of a packing box 25. In the upper end of the column 24 is a float 26 that rises and falls with the mercury in the column, and this float is provided with a stem 27 which engages a swinging contact arm 28 of the circuit closer C′ movable between high and low pressure circuit-closing contacts 29 and 30 mounted on a bracket 31. When the pressure rises, the swinging contact, which is itself mounted on a bracket 32, engages the upper contact 29 to thereby close the circuit of the electro-magnet B, and this circuit is also closed when the swinging contact 28 engages the fixed contact 30, as when the pressure of the gas falls below a predetermined minimum. The contacts 29 and 30 can be adjusted to vary the range of variation in the pressure.

Associated with the latch device for the valve is an automatic circuit breaker D which opens the battery circuit as soon as the latch device is operated, so as to avoid the waste of current. This circuit breaker consists of a spring contact 33 mounted on a bracket 34 which, together with the brackets 31 and 32 and the electro-magnet B, are mounted on a slate, fiber or other insulating base 35. The supporting base 35 carries a fixed contact 36 with which the spring contact 33 is engaged as long as the gas-controlling valve is open. On the arm 10 is a screw 37 that carries a block of insulation 38 located to engage the spring contact 33 so that when the arm 10 is moved into engagement with the latch 12, the spring contact 33 will be caused to engage the fixed contact 36. Obviously, as soon as the arm 10 is released to permit the valve to close, the spring 33 will move away from the contact 36 and thus cut the battery out of circuit in case the automatic circuit closer C′ remains closed or one of the manually-operated switches is carelessly left in closed position.

The current for operating the electro-magnet consists of a battery 39 or other source of current which is connected by wires 40 and 41 to binding posts 42 and 43, respectively, on the insulating base 35.

Any suitable signal device, such as an electric bell F, may be employed and two-way switches G will be located in any suitable part of the house, as for instance, the bedroom, office or other place where persons are likely to be, and push buttons or other switches H may also be arranged at different points whereby the valve can be closed at any time, irrespective of the pressure-controlled circuit closer C′, the said switches and bell being suitably connected in circuit with the electro-magnet, circuit closer and circuit breaker.

In practice, the gas cut-off device A will be normally open, as shown in Fig. 2. In case it is desired to close the valve, it is merely necessary to close the switch or push-button H and current will then flow from the battery through the wires 41, 44, contacts 36 and 33, bracket 34, wire 45, windings of the electro-magnet, wire 46, contacts 22 and 21, the metal base 47 of the electro-magnet, wire 48 grounded on such metal base, contacts of the switch H, wire 49, bracket 32, wires 50 and 40, and battery 39. The electro-magnet is thus energized so that the latch will be released, and thereupon the valve will close and simultaneously the battery cut-out switch D will open by the spring 33 moving away from the fixed contact 36, so that there will be no waste of current should the switch H be left inadvertently closed. In order to connect in the automatic circuit closer C′ so as to permit the valve to be controlled by the variations in pressure in the gas supply, the arm 51 of the switch G is moved into contact with the point 52. When the circuit closer C′ is closed, by the gas reaching a predetermined high or low pressure, current will flow from the battery to the electro-magnet, through the path heretofore described, and from the base plate of the electro-magnet, the current passes through a wire 53, contact point 52, switch arm 51, wire 54, bracket 31 of the circuit closer C′, thence through either contact 29 or 30, arm 28, bracket 32, wires 50 and 40, and battery. The result will be that the latch device will be automatically released and the valve closed to cut off the gas supply, and when the gas supply is cut off, the battery circuit will be simultaneously opened by the circuit breaker D, and thus prevent the waste of current, even though the circuit closer C′ remains closed. By moving the switch 51 to the contact 55, the signal bell will be connected in circuit by the circuit closer C′, thus giving a warning when it is necessary to keep watch of the gas pressure, so that the burner cocks can be opened or closed without the necessity of operating the cut-off device, since the operation of the

latter necessitates a trip to the cellar for manually re-setting the latch. When the signal is sounded, current passes from the battery through the wires 41, 44, circuit breaker D, wire 56, bell F, wire 57, switch G, wire 54, circuit closer C', wires 50 and 40, and battery.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

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

1. In an apparatus of the class described, the combination of a casing, a valve therein, a stem connected with the valve, a lever hingedly connected with the stem and disposed in alinement therewith during the opening and closing of the valve and movable out of alinement with the stem for holding the valve open, a latch engaging the lever when in non-alined position, electrical means for releasing the latch, and a circuit closer responsive to the pressure of the fluid passing through the valve casing for closing the circuit of the said electrical means.

2. In an apparatus of the class described, the combination of a gas meter pipe, a service pipe, a valve at the point of connection of the pipes, means tending to close the valve, a device for holding the valve open in opposition to the said means, electrical means for actuating said device to permit the valve to close, a circuit closer in circuit with the electrical means, and a device for actuating the circuit closer including a container, a member extending out of the container to engage with the circuit closer, and a mobile medium in the container responsive to variations in the pressure in the said pipe to raise and lower the member for opening and closing the said closer.

3. In an apparatus of the class described, the combination of a conduit normally containing fluid under pressure, a normally-open valve tensioned to automatically close, electrically-released means for holding the valve open, a circuit closer in circuit with the said means, said closer including a movable element and a device separate from and operatively connected with the circuit closer for actuating the latter including a mobile medium responsive to variations in fluid pressure in the said pipe, and a member moved by the medium for imparting movement to the said element.

4. In an apparatus of the class described, the combination of a cut-off valve, a spring tending to close the valve, a latch arranged to hold the valve open, electrical means for releasing the latch, a circuit closer connected in circuit with the said means, said closer including a movable element, and a pressure-responsive device including a mobile medium and a float on which the element rests to move the latter as the float rises and falls with the medium.

5. In an apparatus of the class described, the combination of a conduit through which fluid under pressure flows, a cut-off valve therein, means for holding the cut-off valve open, an electrical device for disengaging the said means from the valve to permit the latter to close, a circuit for the said device, a closer in the said circuit, a container connected with the said conduit, a mobile medium in the container subjected to the pressure of the fluid in the conduit, and a float moved by the said medium and arranged in coöperative relation with the circuit closer for actuating the same, said medium and float forming together an actuator for the closer.

6. In an apparatus of the class described, the combination of a conduit, a valve therein, a locking device for holding the valve open, electrical means for releasing the said device, a circuit closer connected in circuit with the said means and consisting of a movable element and spaced contacts with either of which the element engages when the pressure in the conduit is abnormally high or low, a container communicating with the conduit, a liquid in the container, and a float adapted to rise and fall with the variation in level of the liquid for moving the element of the circuit closer.

7. In an apparatus of the class described, the combination of a fluid-containing conduit, a cut-off valve therein, a valve stem connected with the valve and extending out of the conduit, a lever hingedly connected with the stem to be held in alinement therewith during the opening and closing of the valve and movable to a position out of alinement for holding the valve open, a locking device engaging the lever when in non-alined position, electrical means for releasing the said device, a container connected with the conduit, a body of liquid in the container, a float movable vertically by the liquid, and a circuit closer connected with the electrical means and actuated by the float to close the circuit when the pressure in the conduit rises or falls to a predetermined point.

8. In an apparatus of the class described, the combination of a cut-off valve, a lever hingedly connected therewith, a latch engag-

ing the lever for holding the valve open, a circuit breaker including a movable contact member, means on the lever to engage the member for holding the circuit breaker in closed circuit position as long as the valve is open, said means being a nonconductor, electrical means connected in circuit with the circuit breaker for releasing the latch, and means for closing the circuit to energize the said electrical means.

9. In an apparatus of the class described, the combination of a controlling valve, a lever connected with the valve, means tending to hold the valve in one position, a latch engaging the lever for holding the valve in a different position in opposition to the said means, an electro-magnet including an armature, a hammer carried by the armature and vibrated thereby for striking the latch to release the same, contacts engaged and disengaged by the movement of the armature for making and breaking the circuit through the electro-magnet, a source of current connected with the electro-magnet, means for closing the circuit to energize the electro-magnet, and a circuit breaker included in the said circuit and arranged to automatically open upon the release of the latch, said breaker consisting of a fixed contact and a spring contact insulated from and held in engagement with the fixed contact by the lever when the valve is locked open.

10. In an apparatus of the class described, the combination of a controlling valve provided with a stem, a lever connected with the stem, an abutment against which the lever bears to hold the valve in open position, a latch engaging the lever, electrical means for releasing the latch, a circuit for the said means including a source of current, a circuit breaker included in the said circuit and arranged to open upon the closing of the valve, said latch being arranged to act through the lever to normally hold the circuit breaker closed, and means for closing the said circuit to energize the said electrical means.

11. In an apparatus of the class described, the combination of a valve casing, a valve therein, means tending to close the valve, a lever connected with the valve, a bracket carried by the valve casing, a latch on the bracket for engaging the lever to hold the valve open, an electrical device including a vibratory hammer for releasing the latch, a circuit for the said device, means for closing the circuit to energize the electrical device, and an actuator for the said means consisting of a vertically movable member and a body of liquid for transmitting motion to the member.

12. In an apparatus of the class described, the combination of separate pipes, a casing between the pipes, a valve in the casing, a tubular member carried by the casing, a valve stem extending through the member, a bracket on the member, a lever connected with the valve stem and adapted to tilt laterally to a position transverse to the stem, a latch for engaging the lever to hold the valve open, a container connected with one of the pipes at the point below the valve, a body of mobile medium in the container, a circuit closer controlled by the said medium, and electrical means energized upon the closing of the circuit closer for releasing the said latch.

13. In an apparatus of the class described, the combination of separate pipes, a casing between the pipes, a valve in the casing, a tubular member carried by the casing, a valve stem extending through the member, a bracket on the member, a lever connected with the valve stem and adapted to tilt laterally to a position transverse to the stem, a latch for engaging the lever to hold the valve open, a container connected with one of the pipes at the point below the valve, a body of mobile medium in the container, a circuit closer controlled by the said medium, electrical means energized upon the closing of the circuit closer for releasing the said latch, and a circuit breaker automatically opened after the closing of the circuit closer and simultaneously with the release of the latch.

14. In an apparatus of the class described, the combination of a cut-off valve, a member connected therewith for holding the valve in open position, a latch arranged to engage the member, a circuit breaker including a fixed contact and a contact spring tensioned away from the contact, means on the member to bear on the spring for holding the latter in current conducting engagement with the contact while the latch is set, electrical means including a vibratory hammer for releasing the latch and simultaneously opening the circuit breaker, a circuit including a source of current connected with the said means and circuit breaker, and means for closing the circuit to energize the electrical means.

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

OSCAR CHAS. MOON.

Witnesses:

FRED WEBSTER FAWCETT,

S. E. GILKESON.