

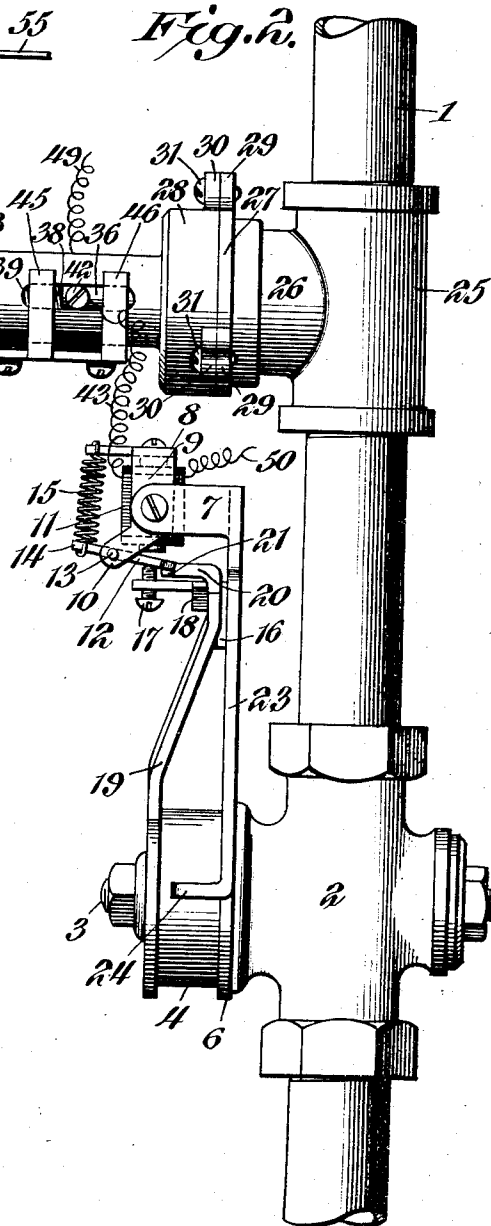
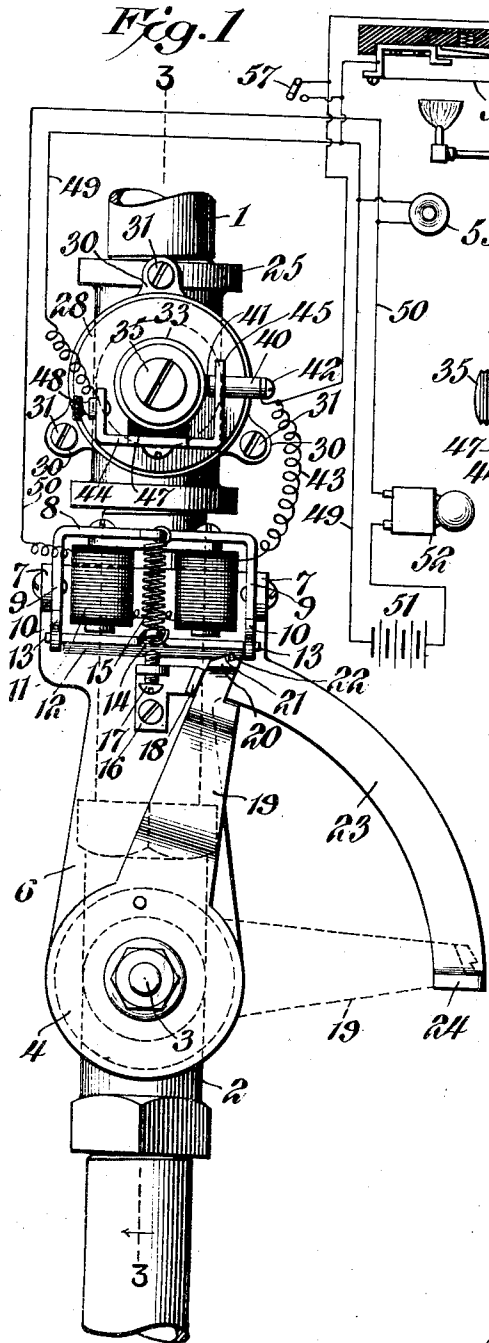
A. RUNNION.
GAS CUT-OFF.

APPLICATION FILED MAY 29, 1912.

1,055,803.

Patented Mar. 11, 1913.

2 SHEETS-SHEET 1.



WITNESSES

Howard D. Orr.
F. T. Chapman.

Alonzo Runnion, INVENTOR,

BY

E. J. Siggers.

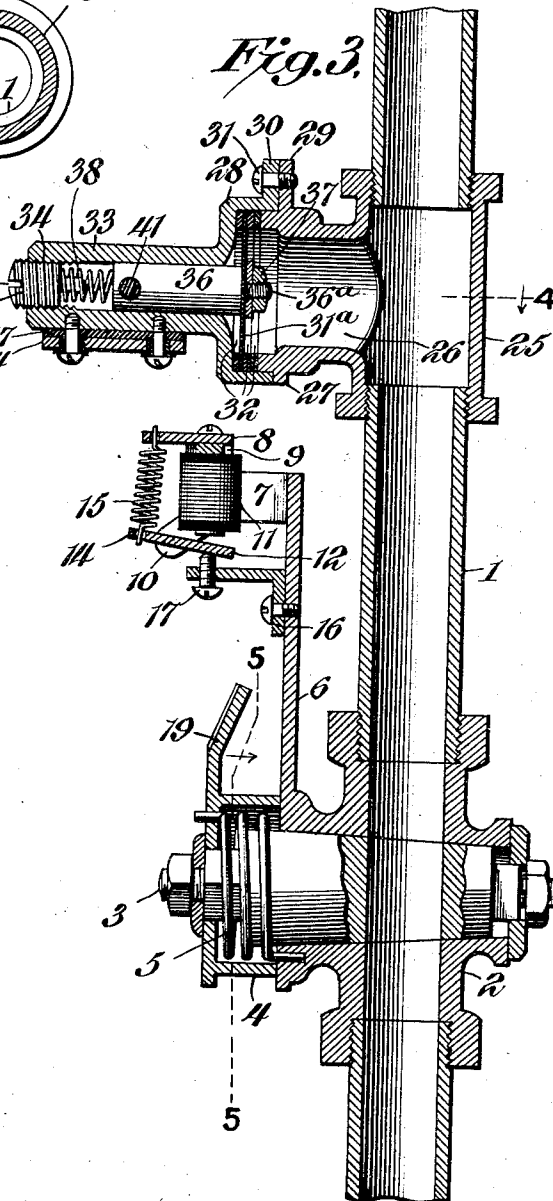
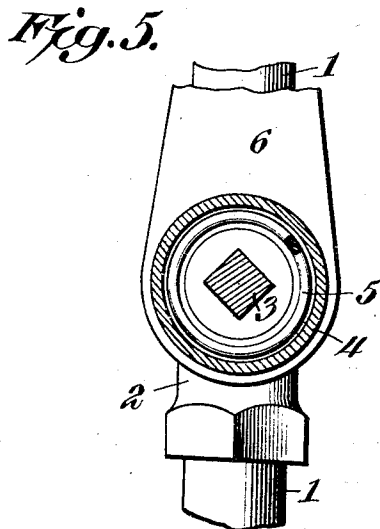
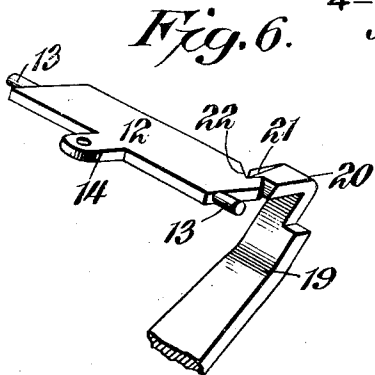
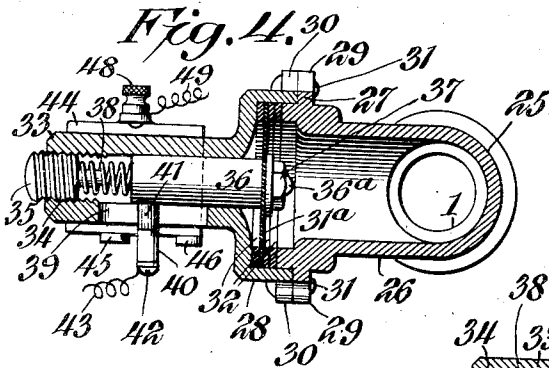
ATTORNEY

A. RUNNION.
GAS CUT-OFF.
APPLICATION FILED MAY 29, 1912.

1,055,803.

Patented Mar. 11, 1913.

2 SHEETS-SHEET 2.



WITNESSES

Howard D. Orr.
F. J. Chapman.

Alonzo Runnion, INVENTOR,

BY

C. G. Siggers.

ATTORNEY

UNITED STATES PATENT OFFICE.

ALONZO RUNNION, OF SPENCER, WEST VIRGINIA, ASSIGNOR TO O. J. CHAMBERS AND
LEWIS S. GOFF, BOTH OF SPENCER, WEST VIRGINIA.

GAS CUT-OFF.

1,055,803.

Specification of Letters Patent.

Patented Mar. 11, 1913.

Application filed May 29, 1912. Serial No. 700,502.

To all whom it may concern:

Be it known that I, ALONZO RUNNION, a citizen of the United States, residing at Spencer, in the county of Roane and State of West Virginia, have invented a new and useful Gas Cut-Off, of which the following is a specification.

This invention has reference to improvements in gas cut-offs, and its object is to provide an automatically operating means whereby abnormal changes in the gas pressure in service mains, especially those entering houses, shall cause the cutting off of the gas supply at a predetermined location, so that dangerous or undesirable conditions may not arise from either a temporary increase of the gas pressure beyond safe limits, or the cutting off of the gas.

It sometimes happens that the gas supply to a house is cut off maliciously outside the house at the street connections and then turned on again, so that should the gas be burning at any jet or jets within the house the flame will be extinguished and the gas will then be permitted to flow unignited to asphyxiate the occupants of the house, this practice being sometimes followed by burglars. Sometimes excessive pressure may cause conditions at lighted burners which will produce dangerous fires, and various other undesirable or dangerous conditions may arise from either excessive pressure in the mains or the cutting off of the gas flow while the gas is aflame at jets or outlets, and since the valves of the outlets are not cut off the gas will continue to escape, when the pressure is again restored, without the gas being aflame. To avoid such conditions there is provided according to the present invention a cut off valve constantly constrained toward the cut off position and a latch mechanism is provided for holding the valve in the open position. In conjunction with the latch mechanism there are provided electric means for operating the latch to move it to the unlatched position to permit the valve to travel to the cut off position under the action of its constraining means, while connected with the gas supply pipe there is a movable electric terminal electrically connected to the electric operating means for the latch mechanism, and this electric terminal is under the control of the gas within the gas main to move between two spaced electric terminals so related to

the movable terminal that contact is made when the gas pressure exceeds a predetermined maximum or falls below a predetermined minimum. The movable terminal sensitive to gas pressure is further under the control of adjusting means whereby its response to gas pressure may be varied.

The electric latch operating means is included in a normally open charged circuit so that no current flows except when the circuit is completed at one or the other of the spaced terminals at the gas main, or when the charged circuit is used for other purposes than the control of the latch mechanism, as, for instance, in a dwelling house the ordinary bell ringing circuit may be employed for the actuation of the latch mechanism without interference with its use for bell ringing, and the charged circuit may also be used for any other purpose.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, but the invention is not of necessity confined to any strict conformity with the showing of the drawings, since it is susceptible of various changes and modifications so long as the salient features of the invention are retained.

In the drawings:—Figure 1 is an elevation of a gas main with the improvement attached and showing the electric circuits in diagram. Fig. 2 is an elevation as viewed from the right hand side of the structure as shown in Fig. 1. Fig. 3 is a section on the line 3—3 of Fig. 1. Fig. 4 is a section on the line 4—4 of Fig. 3. Fig. 5 is a section on the line 5—5 of Fig. 3. Fig. 6 is a perspective view of a portion of the latch mechanism and valve arm controlled thereby.

Referring to the drawings there is shown a gas main 1 which may for the purposes of this description be considered as leading from a street main into a house. Included in the main 1 is a cut off valve 2 provided with a valve stem 3, and as the invention is not limited to the employment of any particular cut off valve, the valve shown may be considered as typical of any suitable valve for the purpose. The valve stem 3 carries a casing 4 inclosing a spring 5, one end of which is made fast to the valve body and the other to the casing, and this spring is so arranged that it tends constantly to move the

valve to the closed position. Fast to the body of the valve is a plate 6 against which the casing 4 engages, and this plate is elongated in the direction of the length of the valve and at the end remote from the valve is formed with ears 7 outstanding from the plate in parallel relation one to the other, these ears serving to support a yoke 8 having terminal arms 9 in parallel relation one to the other and at the free ends these arms are formed with ears 10. Secured to the central portion of the yoke 7 is an electromagnet 11 which may be of the familiar horseshoe type, while pivoted in the ears 10 is an armature 12 which may be in the form of a plate with end pins 13 adapted to enter the ears 10, and this plate has on one side of its axis a finger 14 connected by a spring 15 to another finger 16 on the yoke 7, the spring 15 tending to hold the armature 12 away from the polar ends of the magnet 11. Fast to the plate 6 is an angle bracket 16 having one end outstanding from the plate and there provided with a screw 17 in the path of the armature 12 and constituting an adjustable back stop for the armature. The bracket 16 is also formed with an upstanding side arm 18 for a purpose which will presently appear.

The spring casing 4 is provided with an arm 19 bent toward the plate 6 and at the free end formed with an angle extension 20 terminating in a tooth 21 adapted to engage in a notch 22 in the edge of the armature 12 remote from the pivot pins 13. The arm 19 is so related to the extension 18 of the bracket 16 that this extension acts as a stop member for the arm 19 as the tooth 21 engages in the notch 22. The free end of the arm 19 moves over an arc-shaped extension 23 of the plate 6, this extension 23 being curved on an arc struck from the axis of the valve stem, and the free end of this arc-shaped extension 23 terminates in an angle portion 24 in the path of the end 20 of the arm 19, and determining the movement of the arm under the action of the spring 5.

Included in the gas main 1 on the street side of the valve 2 is a T 25 affording free passage of the gas to the valve 2. This T is formed with a neck 26 having near its outer end an exterior flange 27 on which is seated a cap 28 and the neck 26 and cap 28 have matching ears 29, 30, respectively, for the passage of screws 31 by means of which the cap is made fast to the neck 26. The cap 28 confines a disk 31^a to the outer end of the neck and in order that the joint may be gas tight, gaskets 32 may be included. The disk 31^a is made of any suitable yielding or flexible material, while the cap 28 has an axially extended neck 33 open at the free end and there provided with internal screw threads 34 adapted to receive a screw plug 35. Mounted within the neck 33 is a block 36

capable of moving longitudinally of said neck, and one end of this block is reduced and threaded, as shown at 36^a, where it is passed through the disk 31 and made fast thereto by a nut 37. Between the plug 35 and the block 36 there is confined a spring 38 tending to force the block 36 toward the body of the T, this movement being resisted by the disk or diaphragm 31. The neck 33 is provided with a longitudinal slot 39 along one side, and extending through this slot is a pin 40 having an insulating portion 41 adjacent the block, while the outer end of the pin 40 beyond the neck 33 is of conducting material and may carry a binding screw 42 at the outer end for the attachment of a conductor 43 leading to the magnet 15 or forming any other portion of an electric circuit to be referred to.

Carried by the neck 33 is a plate 44 of conducting material, and this plate has two spaced extensions 45, 46, respectively, extending in traversing relation to the slot 39, but spaced therefrom and at all times in the path of the pin 40. The plate 44 is separated from the neck 33 by insulating material 47 and at an appropriate point the plate 44 carries a binding post 48 for the attachment of an electric conductor 49.

If it be assumed that the conductor 43 leads to one side of the magnet 15, the other side thereof is connected to a conductor 50. The conductors 49 and 50 are connected to the respective terminals of a battery 51 or other source of electric energy and one of these conductors, say the conductor 50, includes an electric bell 52, while at any appropriate point the conductors 49 and 50 have bridged between them a push button 53 or any other circuit controller, and this push button may be taken as typical of any means for completing and interrupting an electric circuit. Moreover, the bell 52 may be taken as typical of any suitable alarm means.

Let it be assumed that normal gas pressure is established within the main 1 while the valve 2 is closed. If, now, the arm 19 be grasped it may be moved against the action of the spring 5 until the tooth 21 is made to engage in the notch 22 of the armature 12, and this position is maintained by the spring 15, which tends at all times to maintain the armature in engagement with the back stop screw 17, in which position the tooth 21 engages in the notch 22. The normal gas pressure within the main 1 maintains the diaphragm 31 in an intermediate position, the spring 38 being correspondingly compressed, and the pin or contact terminal 40 is under these conditions at an intermediate point between the circuit terminals 45 and 46, the last named terminals being on the same side of the circuit.

So long as normal conditions prevail or

there is no excessive fluctuation in the gas pressure, the apparatus forming the subject-matter of the present invention remains quiescent and as the battery 51 is on open circuit because of the rupture of the circuit between the movable contact or terminal 40 and the stationary contacts or terminals 45 and 46, there is no waste of current. These conditions may be maintained indefinitely, but should there occur an abnormal fluctuation of gas pressure, then the pin or terminal 40 will be moved by the action of the diaphragm 31 yielding to increased gas pressure or by the action of the spring 38 moving the diaphragm in the other direction in response to reduced gas pressure until it comes into engagement with one of the contact terminals 45 or 46 in accordance with whether the pressure increases or decreases abnormally. As soon as the circuit is completed an impulse is sent through the electro-magnet and the armature 12 is attracted thereby, so that it is out of the path of the tooth 21 and the spring 5 is then free to act to turn the valve to the closed position, thus cutting off the gas from further flowing into the house. The gas will remain cut off until some person again restores the arm 19 to the latched position with relation to the armature 12, but the prevalence of the abnormal conditions will have no further effect so long as the gas is cut off.

Should it transpire that an attempt is made to restore the valve to the open condition before the abnormal conditions are relieved the valve will at once return to the closed position, since it cannot be latched in the open position due to the attraction of the armature 12 by the magnet 15.

When the invention is installed in a dwelling house the charged circuit designed to operate the electro-magnet 15 may be utilized for other purposes and the bell 52 which will give an alarm when abnormal conditions are established in the gas main causing the cutting off of the house supply by the valve 2 may be employed as an ordinary door bell, a push button 53 being appropriately located for the purpose, or this push button may be replaced by any suitable circuit controlling means, whereby the battery and bell may be employed usefully when the abnormal conditions within the gas main are not present. The bell 52 will give an alarm when the pressure abnormally increases or decreases sufficiently to cause the closing of the valve 2, and this alarm will continue so long as the abnormal conditions prevail, thus notifying the occupants of the house of the cause of the ringing of the bell, for when the bell is used as a door bell the ringing is usually but for a few seconds.

In most installations of the invention the source of current is a battery, but the bat-

teries sometimes fail from lack of attention and other causes, wherefore the use of the circuit in part as a door bell circuit operates as a check on the battery to indicate its condition without the necessity of occasionally testing, for when the door bell circuit shows signs of failure, it is time to renew the battery, while should the door bell feature be omitted various conditions might arise which would render the electric circuit inactive when needed either from failure of the battery or collection of dust on the bell contacts and either of these conditions would prevent the flow of current to cause the closing of the valve when needed.

The utility of the invention has been explained in connection with gas as the fluid to be controlled, but it will be understood that the invention may be used in connection with other fluids by suitable adjustments to answer the new conditions.

A highly important feature of the invention can best be explained with reference to a frequent source of fires, namely, those caused by gas flames when the gas bracket is moved too near a wall or to some other place where a fire may be started. To provide for this contingency there may be provided a normally open circuit closer 54 in such position to each gas fixture, typified at 55, that a fusible or other easily destroyed strand 56 holding the circuit closer 54 open will be destructively affected by the gas flame close to or actually touching it. By this means the gas may be cut off and an alarm given before a fire is started, or if started, before any material damage can result. In large buildings a suitable indicator provided, say, at the entrance will enable firemen and others to ascertain the location of the fire and so gain valuable time. Again, suppose the occupants of a house desire to leave for a time. To provide against any possibility of forgotten burning gas, or accumulation of gas because of leaks, a switch 57 is included in the system, or a plurality of such switches if desired, so that the circuit may be manually closed long enough to cause the operation of the main valve to the cut-off position, when the switch may be opened and the house may be left with the assurance of safety so far as the gas system is concerned.

What is claimed is:—

1. A means for automatically cutting off the flow of fluid under pressure through a conduit when the pressure rises or falls abnormally comprising a valve having a valve stem with an outstanding arm thereon terminating in a tooth, an electro-magnet, an armature controlled by the electro-magnet and provided with a notch to receive the tooth on the arm when the armature is in the unattracted position, and a circuit controller for the electro-magnet comprising a

member included in the conduit and carrying a diaphragm, a spring controlled member engaging the diaphragm, a contact carried by the spring controlled member and
5 movable with the diaphragm and member, and spaced contacts in the path of the contact carried by the spring controlled member and between which the contact carried by the spring controlled member is movable,
10 the contacts being includable in a charged circuit together with the electro-magnet to cause the energization of the magnet on the engagement of the movable contact with either of the other contacts.
15 2. A means for the control of fluids normally flowing under pressure through a conduit, comprising a valve in the conduit having a normal tendency to close, electro-magnetic latch means for normally holding
20 the valve in the open position and adapted to receive current from a charged circuit, and a controlling means for said circuit comprising a diaphragm and holder therefor communicating with the conduit, said
25 holder having a neck on the side of the diaphragm remote from the conduit, a slidable member in the neck made fast to the diaphragm, a spring in the neck engaging the slidable member, an adjustable plug in
30 the neck for varying the pressure of the spring on the slidable member, a contact pin carried by the slidable member and insulated therefrom, and spaced contact fingers electrically connected one to the other
35 and arranged on opposite sides of the contact pin and normally insulated therefrom, said contact fingers being within the range of movement of the contact pin to be en-

gaged thereby to close a circuit to the electro-magnetic latch means on the movement
40 of the contact pin to either extreme of its travel.

3. A means for the control of fluids normally flowing under pressure through a conduit, comprising a valve in the conduit
45 having a normal tendency to close, electro-magnetic latch means for normally holding the valve in the open position and adapted to receive current from a charged circuit, and a controlling means for said circuit
50 comprising a diaphragm and holder therefor communicating with the conduit, said holder having a neck on the side of the diaphragm remote from the conduit, a slidable member in the neck controlled by the
55 diaphragm, spaced contact fingers electrically connected one to the other and carried by the neck, a contact member carried by the slidable member and movable between the contact fingers, and means for resisting
60 the movement of the slidable member under the action of fluid pressure and adjustable to vary such resistance and thereby determine the fluid pressure under which the
65 slidable member will move the contact member carried thereby into engagement with one or the other of the spaced contact members carried by the neck.

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

ALONZO RUNNION.

Witnesses:

B. W. CHAMBERS,
W. A. CARPENTER.