

BEST AVAILABLE COPY.

G. P. McDONNELL.

FLUID ACTUATED CIRCUIT CONTROLLER.

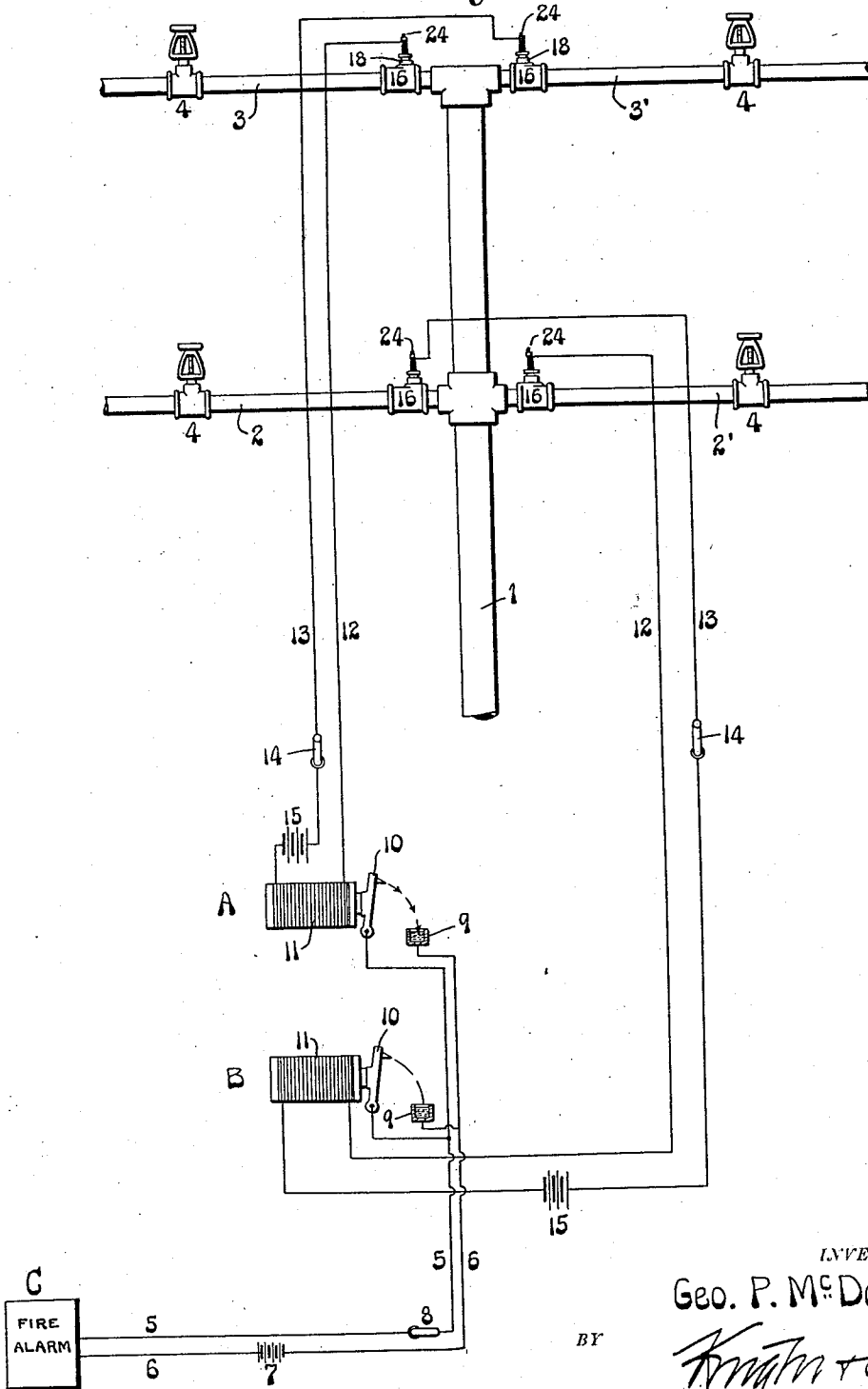
APPLICATION FILED OCT. 10, 1918.

Patented Sept. 12, 1922.

2 SHEETS—SHEET 1.

1,428,645.

Fig.I.



INVENTOR.

Geo. P. Mc'Donnell

BY

Knight & Cook

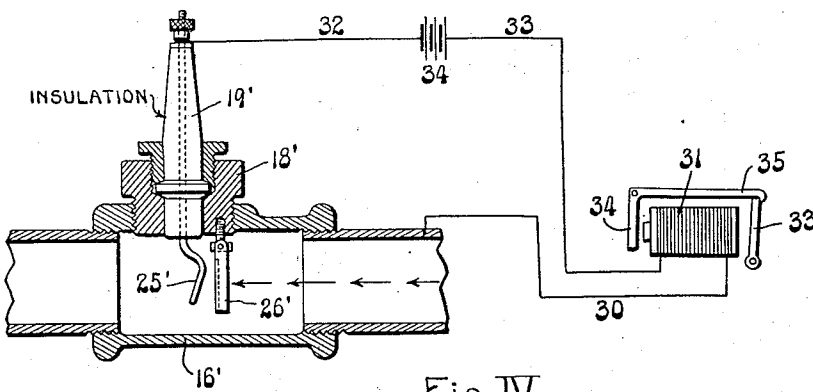
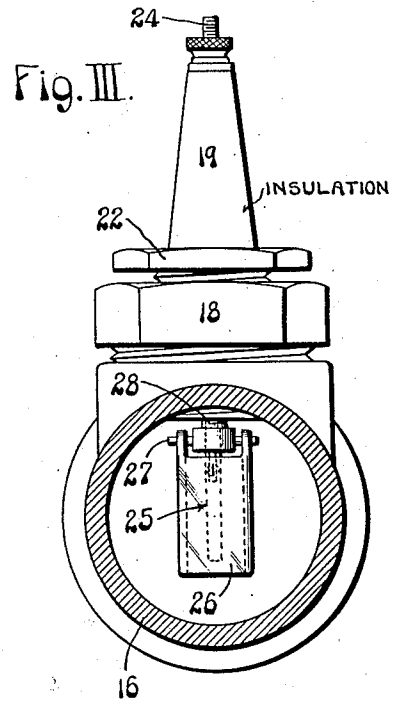
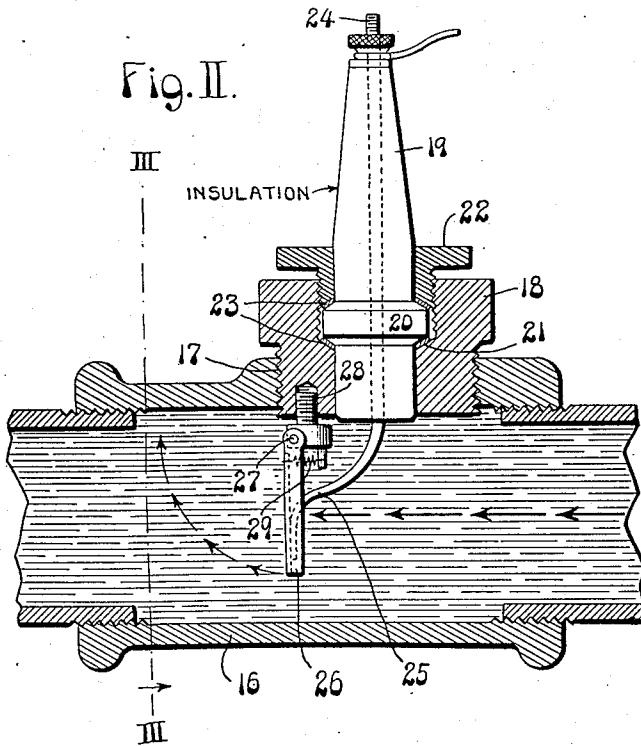
ATTORNEYS.

G. P. McDONNELL. BEST AVAILABLE COPY.
 FLUID ACTUATED CIRCUIT CONTROLLER.
 APPLICATION FILED OCT. 10, 1918.

1,428,645.

Patented Sept. 12, 1922.

2 SHEETS—SHEET 2.



INVENTOR.
 Geo. P. McDonnell

BY

Knight & Cook

ATTORNEYS.

Patented Sept. 12, 1922.

1,428,645

UNITED STATES PATENT OFFICE.

GEORGE P. McDONNELL, OF ST. LOUIS, MISSOURI.

FLUID-ACTUATED CIRCUIT CONTROLLER.

Application filed October 10, 1918. Serial No. 257,616.

To all whom it may concern:

Be it known that I, GEORGE P. McDONNELL, a citizen of the United States of America, a resident of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Fluid-Actuated Circuit Controllers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to alarms for automatic sprinkler systems, and more particularly to an electric alarm-controlling device adapted to control either an electric or a mechanical alarm. By the term "alarm" as herein used, I mean to include a signaling device or indicator of any kind serving as a warning in case of flowage of water due to an open sprinkler head, and, if desired, the "alarm" may indicate the approximate location of the open sprinkler head.

Another of the objects of the invention is to provide a very simple and inexpensive means for controlling the alarm or indicator. A further object is to produce a device of this kind in the form of a simple attachment adapted to be easily applied to a sprinkler system.

Another object is to provide a positive and reliable alarm controlling device not affected by a change of pressure in the system and not liable to give a false alarm in response to a slight flowage of the water.

Further objects are to avoid the necessity of frequent tests by using a closed electric circuit for the control of the alarm, and to automatically reset the controlling switch upon stoppage of the flow of water.

With the foregoing and other objects in view the invention comprises novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawings wherein is shown the preferred embodiment of the invention; however, it is to be understood that the invention comprehends changes, variations and modifications which come within the scope of the claims hereunto appended.

Fig. I is a diagrammatical view of a system embodying features of this invention.

Fig. II is an enlarged section illustrating one of the controlling switches mounted in a fluid conductor.

Fig. III is a vertical section on the line III—III, Fig. II.

Fig. IV is a view similar to Fig. II, illustrating a modification, and also showing the indicator under the control of the switch.

The sprinkler system shown diagrammatically in Fig. I comprises a riser 1 provided with branches 2, 2', 3 and 3'. 4 designates automatic sprinkler heads located in the branches. The devices forming the subject matter of the present invention may be used in either a dry pipe system or a wet pipe system, and the system illustrated by Figs. I, II and III may be considered as a wet pipe system wherein the riser and its horizontal branches are constantly filled with water under pressure. The branches 2 and 3 lie in different horizontal planes and they may be installed in different floors of a building. When a flow of water is started, due to an open sprinkler head, a fire alarm will be actuated, and an indicator will be operated to indicate the floor on which the open sprinkler head is located.

A designates a combined indicator and switch controlling device associated with the branch pipes 3 and 3', and B designates a similar device associated with the branch pipes 2 and 2'. Before describing the details of the automatic switches in the fluid conducting pipes, I will describe the devices controlled by said switches. The fire alarm C (Fig. I) may be located at a point remote from the sprinkler system, for example, at a central station, or at the headquarters of a fire department, and this alarm is actuated through the medium of a normally open electric circuit including conductors 5 and 6, the conductor 6 being provided with a battery 7, or other suitable source of electrical energy, and the conductor 5 being provided with a normally closed manually operated switch 8. Each of the devices A and B includes a mercury cup 9 electrically connected to the conductor 6, and a combined indicator and switch member 10 electrically connected to the conductor 5. Each of the members 10 may be considered as the shutter of a drop-annunciator, and it is normally held in the position shown by means of an electro-magnet 11. Each member 10 is pivotally supported at its lower edge, and when the adjacent electro-magnet is deenergized, the member 10 will drop as indicated by arrows so as to contact with the mercury in one of the cups 9, thereby completing the fire alarm circuit. If the alarm results from an open sprinkler head in

branch pipe 3 or 3', the device A will be actuated, thus indicating the approximate location of the open sprinkler head, and at the same time closing the fire alarm circuit.

- 5 In a similar manner, the device B may be actuated to give the fire alarm and to indicate that the fire is on the floor wherein the branch pipes 2 and 2' are installed.

- 10 Each of the normally energized electro-magnets 11 is in a normally closed electric circuit including a conductor 12 and a conductor 13 provided with a testing switch 14 and a battery 15. When one of these circuits is opened, the combined switch and indicating member 10 associated therewith will drop from the electro-magnet and co-
15 operate with a mercury cup 9 to close the fire alarm circuit. To accomplish the desired result, each of the normally closed alarm-controlling circuits also includes at least one automatic switch controlled by the flow of fluid, and it preferably includes two of the automatic switches connected together in series, as will be hereinafter described.

- 25 To provide for the installation of the automatic switches, the branch conductors may be provided with pipe couplings 16, each of said couplings being threaded, as shown at 17 in Fig. II, to receive a metal
30 plug 18. Each of the automatic switches is secured to one of the metal plugs 18, and it can be applied to the system by merely screwing the plug 18 into a coupling 16. Each metal plug 18 (Figs. II and III) is
35 provided with an insulating core 19 having a collar 20 which lies directly above a shoulder 21 formed in the plug. To secure the insulating core, a bushing 22 is screwed into the plug, and the collar 20 lies directly
40 between the inner end of this bushing and the shoulder 21. To form a fluid tight seal around the core, gaskets 23 are preferably arranged on opposite sides of the collar 20, as shown in Fig. II. Obviously, the bush-
45 ing 22 can be easily tightened to firmly secure the core in the plug, and it can be easily removed to permit the removal of the core. Each of the automatic switches includes a conductor 24 passing through the insulat-
50 ing core 19 and terminating in a contact member 25 which lies within the coupling 16 through which the water or other fluid is conducted. A movable contact wing 26 normally engages the contact member 25,
55 said wing 26 being pivotally supported by a pin 27 extending from the head of a metal screw 28, the latter being mounted in the metal plug 18. The contact wing 26 is thus mechanically and electrically connected to
60 the metal plug 18, and the latter is electrically connected to the metal pipes through which the liquid is conducted. A retaining spring 29 (Fig. II) forms an electrical connection between the contact wing
65 26 and the screw 28, and this spring yield-

ingly retains the contact wing in engagement with the fixed contact member 25. The contact members of the automatic switch are thus maintained in engagement with each other so as to positively establish an elec- 70 trical connection at the contact faces.

By referring to Fig. II, it will be observed that the automatic switch members are arranged within the system and exposed directly to the fluid therein, and that the 75 pivoted contact member 26 will move to its open position in response to the flow of the fluid. Under normal conditions, the spring 29 retains the pivoted contact member in engagement with the fixed contact member, 80 thereby serving as a retarding element to prevent the switch from being opened in response to a slight movement of the fluid in the system. However, when a sprinkler head is open, the fluid rushes quickly in the 85 direction indicated by the straight arrows in Fig. II, thereby overcoming the spring 29 and moving the contact member 26 to its open position, as indicated by the curved arrows. The switch is thus opened, and the 90 pivoted contact member 26 is displaced to an approximately horizontal position, wherein it does not materially obstruct the fluid flowing to the open sprinkler head. When the flow ceases, the movable contact 95 member 29 will automatically return to the position shown in Fig. II, thereby resetting the automatic switch. It may also be observed that the pivoted contact member 26 does not completely close the fluid passage- 100 way, and that the fluid can move slowly around the switch without actuating said contact member.

I have previously stated that each of the normally closed alarm controlling circuits 105 preferably includes a plurality of the automatic switches, connected together in series, so that the opening of any one of the switches will open the circuit, and thereby give the alarm. By comparing Figs. I and 110 II, it will be readily seen that each of the branch pipes 2, 2', 3 and 3' is provided with one of the switch containing couplings 16, and that each of the conductors 12-13 is connected to a conductor 24 which termi- 115 nates in a fixed contact member 25, forming part of an automatic switch. Each of the pivoted switch members 26 is electrically connected to the metal pipes through which the water is conducted. Therefore, the elec- 120 tric current flowing through the electro-magnet 11 of the device A (Fig. I) is conducted through the normally closed automatic switch in the branch 3, also through the metal piping whereby the branches 3 and 3' are con- 125 nected, and through the automatic switch in the branch 3'. The last mentioned switches are thus connected together in series, and if one of the switches is opened, the magnet 11 of the device A will be deenergized to release 130

the adjacent member 10, thereby indicating that the open sprinkler head lies in one of the branches 3-3', and at the same time closing the fire alarm circuit.

5 When the switch occupies its open position, both of the submerged switch members are exposed to the water in the system, and it may appear that the water would form an effective electrical connection between the
10 open switch members. However, the resistance of the water is so great, that only a very weak and ineffective current will flow across the water between the open switch members. This current will have no material effect on the electro-magnet in the
15 "open" circuit.

The modification shown in Fig. IV comprises a pivotally mounted switch member 26' located in a pipe coupling 16' through
20 which fluid is conducted, a fixed contact member 25' passing through an insulator 19', and a metal plug 18' to which the entire switch device is connected. The pivoted contact member 26' is electrically connected
25 to the metal pipes through which fluid is conducted, and the pipes are connected by means of a conductor 30 to an electro-magnet 31. The contact member 25' is connected to the electro-magnet through the
30 medium of conductors 32-33 and an electric battery 34. The electro-magnet 31 forms part of a drop annunciator including a pivoted shutter 33 and an armature 34 having an extension 35 which normally
35 holds the shutter 33 in its elevated position. When the armature 34 is attracted to the magnet 31, the shutter 33 drops by gravity, as is well understood in this art.

In this modification, the circuit is normally open, and it is closed by a flow of
40 fluid in the direction indicated by arrows in Fig. IV. The fluid forces contact member 26' into engagement with contact member 25', thus closing the automatic switch and
45 permitting the electric current to flow through the magnet 31.

I claim:

1. In a fluid actuated circuit controller, a
50 fluid conductor and a switch comprising contact members arranged within the fluid conductor and exposed to the fluid therein, one of said contact members being movable in response to the flow of the fluid to which
55 it is exposed, a metal plug to which the movable contact member is pivotally and elec-

trically connected, an insulator whereby the other contact member is insulated from said metal plug, said insulator being detachably mounted in said metal plug and said plug being detachably mounted in said fluid conductor, and a retarding spring whereby said
60 movable contact member is yieldingly retained in engagement with the other contact member so as to normally retain the alarm-controlling circuit in its closed condition. 65

2. In a fluid actuated circuit controller, a fluid conductor having a threaded opening in its wall, a removable closure in said opening, said closure comprising an externally threaded plug engageable with the internal
70 threads of the opening, a switch on said closure, said switch comprising a pair of contact members arranged within the conductor so as to lie in the body of fluid therein, one of said contact members being stationary, the other of said contact members being pivotally secured to said plug so as to be movable relative to said stationary contact member and actuated by the fluid flow-
75 ing through said fluid conductor, an insulator for insulating said stationary contact member from the threaded plug and conductor, said closure having an aperture through which said insulator extends, and means for securing said insulator in said
80 plug. 85

3. In combination a fluid conduit provided with an aperture and a closure for said aperture, said closure comprising an annular collar, a plate formed contact mem-
90 ber attached to said collar and free to be moved by the fluid, and another contact element coaxial of and insulated from said collar, said contacts being so disposed as to be immersed in the fluid when said closure is
95 applied to said aperture.

4. A fluid actuated circuit controller comprising an annular collar adapted to enter an aperture in a fluid conduit, a plate formed conductor pivotally mounted on said
100 collar, a core of insulating material positioned in said collar, and a conductor passing through said core and projecting therefrom to a position adjacent to the first conductor, said contacts being so disposed as to
105 be immersed in the fluid when said closure is applied to said aperture.

In testimony that I claim the foregoing I hereunto affix my signature.

GEORGE P. McDONNELL.