No. 896,839. PATENTED AUG. 25, 1908.

J. M. LATIMER.

ALARM SYSTEM AND APPARATUS.

APPLICATION FILED SEPT. 18, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

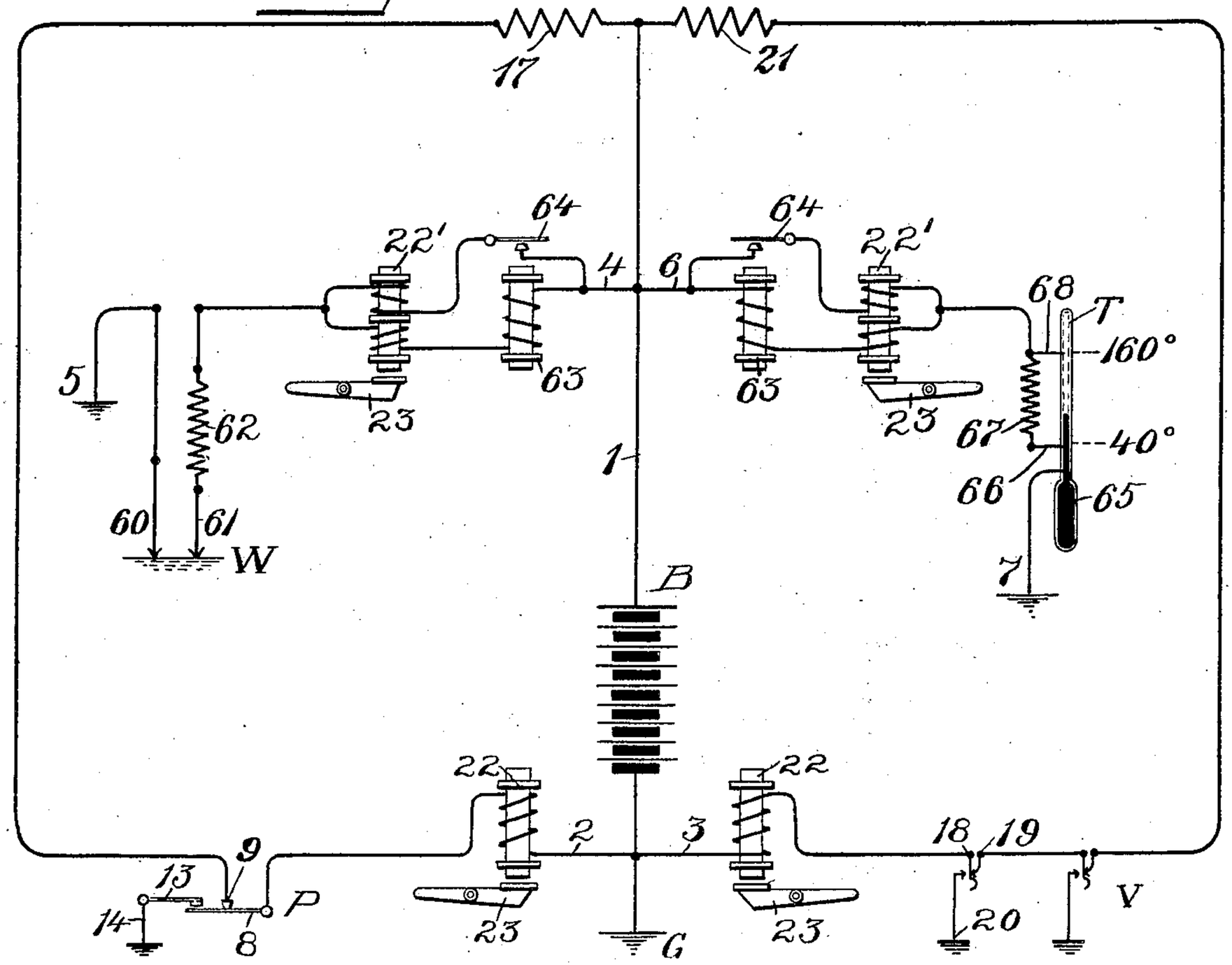
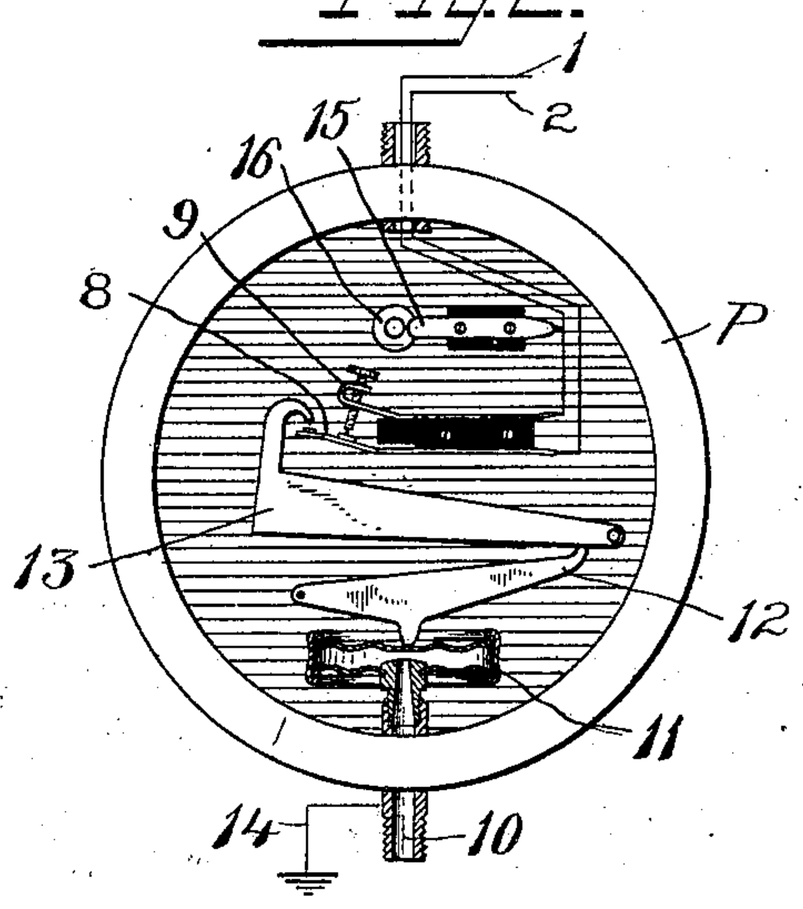


Fig. 2.



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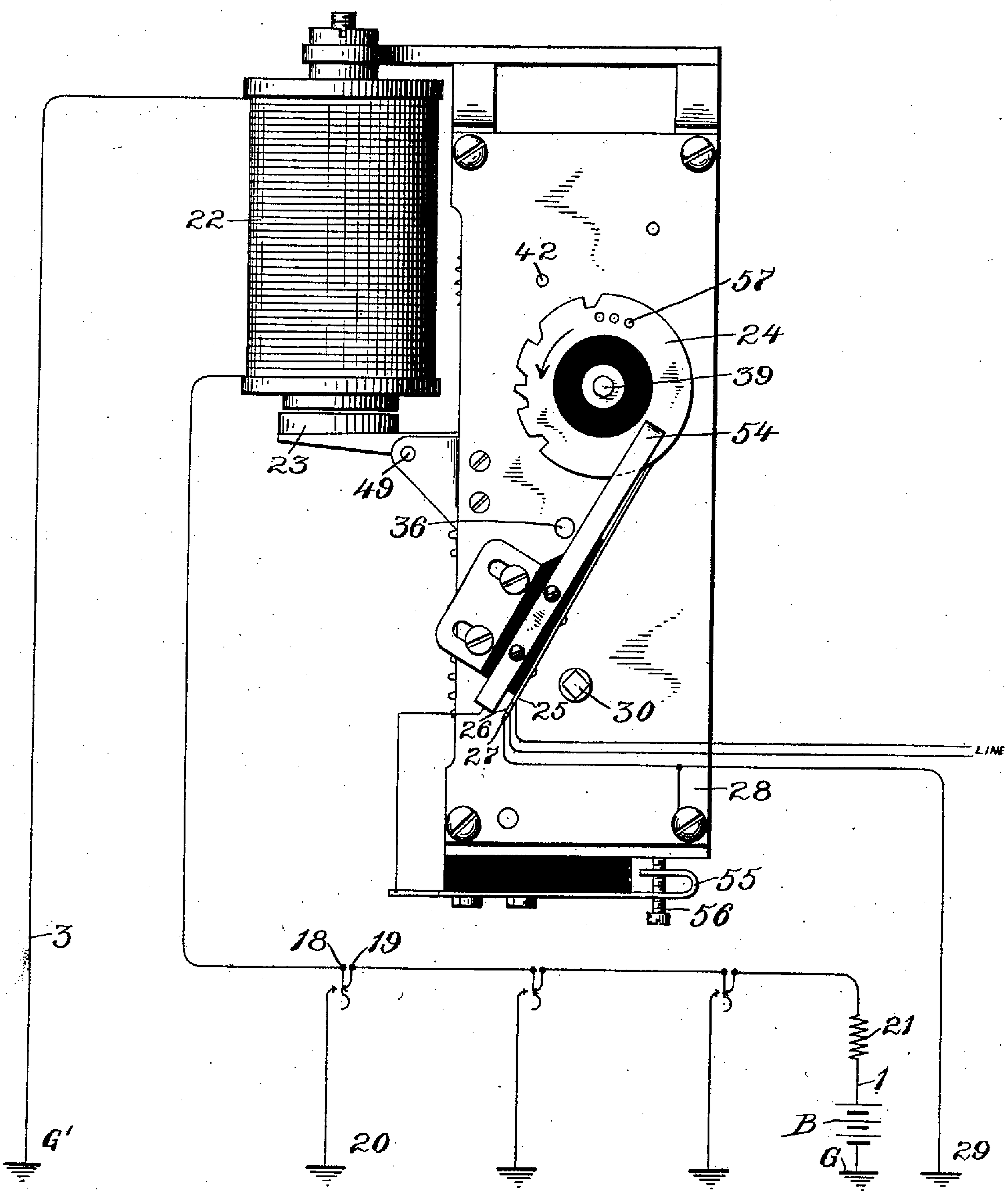
3 SHEETS—SHEET 2.

Fig. 3.



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ALARM SYSTEM AND APPARATUS.

APPLICATION FILED SEPT. 18, 1905.

3 SHEETS—SHEET 3.

Fig. 5.

Fig. 4.

LINE

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UNITED STATES PATENT OFFICE.

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ALARM SYSTEM AND APPARATUS.

No. 896,839. Specification of Letters Patent. Patented Aug. 25, 1908.

Application filed September 18, 1905. Serial No. 278,883.

To all whom it may concern:

Be it known that I, JOHN M. LATIMER, a citizen of the United States, residing at Flushing, county of Queens, New York, have invented certain new and useful Improvements in Alarm Systems and Apparatus, of which the following is a full, clear, and exact description.

My invention relates to improvements in alarm systems and apparatus, and particularly for the automatic supervision of sprinkler systems.

The object of the invention is to provide a simple and reliable system and apparatus for automatically affecting a main alarm circuit so as to notify a central station upon interference or disturbance of any kind in the sprinkler system.

It is particularly directed to an arrangement of local circuits and apparatus including an attachment for a pressure tank alarm and transmitting or signaling mechanism for pressure tanks, gravity tanks, gate valves and thermometer attachment alarms.

The invention consists in improvements, the principles of which are illustrated in the accompanying three sheets of drawings.

Briefly, the system comprises a battery having one terminal grounded and connected in series with four branches, each of which includes an alarm starting device, a resistance and a transmitter. The two branches for the low water and temperature attachments have their relays neutrally wound and provided with an additional magnet for cutting one section of the relay in circuit in case of a short circuit of the branch resistance. The low pressure attachment is arranged to ground its circuit in case the pressure in the tank falls below normal, and to open the branch in case the pressure continues to fall. The transmitting mechanism is arranged to be released when the current flowing through its branch is decreased, to stop after sending in three rounds of signals, to start again when normal conditions are restored, thus sending in an O. K., and to stop after one round, ready for operation in case of further trouble. When the driving spring of the transmitter has partially run down a distinctive signal is automatically transmitted. The transmitter for each branch may be provided to send distinctive signals so that the character of trouble will be indicated. The low pressure and gate valve branches are preferably of wire circuits, whereas the low water and temperature branches are grounded circuits.

Figure 1 is a diagrammatic view of a local system and apparatus embodying the improvements of my invention. Fig. 2 is a front view of an attachment for a tank for indicating low pressure, its parts being in the positions which they would occupy if held up by normal pressure. Fig. 3 is a front view of a transmitter, a relay and a local circuit of my invention, for gate valve alarms, showing the signal wheel and the terminals of the main line and ground. Fig. 4 is an interior view showing the relay, driving, releasing and stopping mechanism, the parts being shown with the armature of the relay released, a trouble alarm having been sent in and the mechanism stopped. Fig. 5 is a rear view of the same.

B is the battery, grounded at G.

The branch of the circuits for the low pressure alarm attachment P includes the leads 1 and 2. The branch of the circuit for the gate valve alarm attachment V includes the leads 1 and 3. The branch of the circuit for the low water alarm attachment W includes the leads 1 and 4, grounded at 5. The branch of the circuit for the temperature alarm attachment T includes the leads 1 and 6, grounded at 7.

The pressure tank is provided with an attachment P having the spring terminal 8 and the screw contact 9 connected to the leads 1 and 2 of the circuit.

10 is a nipple adapted to be connected to the tank so that the pressure in the tank is communicated to the chamber within the capsular member 11 which is formed of phosphor-bronze. The pivoted lever 12 rests against the upper wall of the pressure chamber. The pivoted arm 13 rests against the lever 12. The parts are so proportioned and weighted that an air pressure in the tank of 75 pounds is communicated to the chamber 11 and holds the parts in their normal position, as shown in Fig. 2, with the finger of the arm 13 clear of the contact spring 8. The case of the attachment and the arm 13 are grounded at 14. A decrease in air pressure permits the arm 13 to fall and thus grounds the lead 2. By further decrease of pressure the weight of the arm 13 opens the circuit between the contacts 8 and 9.

15 is a contact finger connected in lead 1.

16 is a button normally held out of engagement with the finger 15 by means of the cover of the casing (not shown). If the cover of the case should be removed the spring forces the button 16 into contact with finger 15 and grounds lead 1 through the casing.

17 is a resistance in the low pressure branch of the circuit.

The gate valves are provided with contacts 18 and 19 normally connected at ground 20, so that in case the valve is tampered with the circuit is broken or grounded. 21 is a resistance in this branch. By reason of the grounds at 14 and 20, the corresponding relays 22 are actuated whenever the water pressure or gate position is abnormal, even if some one has maliciously short-circuited the contacts that should be opened under such circumstances. The resistances 17 and 21 are so located that the grounds 14 and 20 are between them and the respective relays 22. This prevents a short-circuiting of the battery whenever a ground is established at 14 or 20, which ground would otherwise throw the entire system out of order.

The transmitter, as shown in Figs. 3, 4 and 5, is employed in each of the four branches, the transmitters for the low pressure and gate valve alarms having single windings, and the transmitters for the low water and temperature alarms having neutral double windings.

22 is a relay or magnet normally in circuit and energized so that it holds up its armature 23.

In Fig. 3 I have shown the lead 3 as grounded at G′, so that one connection to the battery is through ground, instead of metallic as shown in Fig. 1.

24 is the make and break or signal wheel.

25 and 26 are contact fingers of the main line circuit normally closed through the signal wheel. One side of the wheel 24 has a continuous low portion extending opposite projections 57 hereinafter referred to.

27 is a third finger electrically connected to the frame of the mechanism at 28 and grounded at 29 for sending in the alarm through ground in case one of the main line wires is broken. By reason of the low portion of the signal wheel, it makes contact only during the normal signal sending period.

30 is the main winding shaft. One end of the spring 31 is attached to the shaft and the other end to the frame.

32 is a ratchet carried by the shaft.

33 is a gear mounted on the shaft 30 and carrying a spring-pressed pawl 34 which engages the teeth of the ratchet 32, so that the spring may be re-wound without rotating the rest of the train.

35 is a pinion in mesh with gear 33 and carried on shaft 36, which also carries gear 37. Pinion 38 meshes with gear 37 and is carried by the shaft 39 which also carries the gear 40. Pinion 41 is in mesh with gear 40 and is carried by the shaft 42, which also carries the escapement wheel 43.

44 is a double arm pawl carried by the shaft 45, which also carries the pallet tail 46. The clutch carried by the pallet tail has projections 47 and 48 spaced apart, as shown in Fig. 4. The armature lever is pivoted at 49 and carries a pin 50, adapted to stand in the path of movement of one projection 47 or the other 48 when the armature is down or up respectively, and to stand opposite the space between the projections when guided in a groove in the cam 51.

52 is a recess in the inner wall of the groove adapted when the parts are in their normal position to permit the pin 53 to fall when the relay is energized, so as to bring the pin 50 opposite the projection 48 and stop the train. In the position shown in Fig. 4 the relay has been deënergized and the cam 51 rotated in the direction of the arrow until the pin 53 has risen in a recess in the outer wall of the groove so that the pin 50 stands in the path of movement of the projection 47. When the condition of the local circuit is restored and the relay energized, the armature will be drawn up, throwing the pin 53 into the groove of the cam and permitting the train to operate and send in a signal. As soon as the recess 52 in the cam comes beneath the pin 53, the pull of the magnet will force the pin into the recess, bring the pin 50 into the path of movement of the projection 48 and stop the train in its normal position, ready to send in another alarm.

54 is a spring contact finger electrically connected to the spring support 55 for the contact screw 56. The contact 56 is insulated from the frame and located adjacent the spring 31, which is electrically connected to the grounded frame 28.

57 indicates the projection or projections carried by the signal wheel 24 which pass beneath the tip of the contact 54 just after the completion of an alarm. When the driving spring has partially run down it contacts with the screw 56. After the next alarm is sent in and while the signal wheel is still moving, the finger 27 being out of action because not in contact, a circuit will be closed through ground from one of the line wires through the signal wheel 24, projection 57, contact 54, support 55, screw 56, spring 31, frame 28 and ground 29, thus sending in a distinctive signal indicating that the instrument needs re-winding. I have shown three projections 57, so that the distinctive signal will consist of three short dots.

The low water alarm attachment is provided with contacts 60 and 61 which are connected when the water level of the gravity tank is normal.

62 is a resistance.

The relay 22′ is provided with two opposite windings.

63 is a magnet.

64 is a switch operated by the armature of the magnet. When the circuit between contacts 60 and 61 is broken, the relay is deënergized and its armature falls, starting the transmitter, the operation of which is as before described. When the water level is restored, contacts 60 and 61 are connected and the transmitter sends in the O. K. signal. In case of a short circuit of the attachment the resistance 62 is cut out and the current increased in the circuit, so that the magnet 63 attracts its armature and completes the circuit through the upper winding of the relay 22′, thus neutralizing the lower winding and allowing the armature 23 to fall and the alarm to be sent in as before.

The temperature attachment is provided with a thermometer in which the mercury 65 normally forms a part of the circuit. The wire 66 is sealed into the tube of the thermometer at about the height of the 40° mark.

67 is a resistance.

68 is a wire sealed into the tube of the thermometer at about the 160° mark. When the temperature drops below the minimum (in this case 40°) the circuit is broken and the transmitter operated. When the thermometer returns above the minimum the circuit is restored, the transmitter sends in its O. K. signal and the parts are left in their normal position. When the temperature rises to the maximum (in this case 160°) the resistance 67 is short circuited, the current increases, energizes the magnet 63, operates switch 64 and thus neutralizes the relay 22′ which drops its armature and starts the transmitter. A decrease in temperature opens the short circuit of the resistance 67, weakens the magnet 63 and allows the switch 64 to open, so that the relay 22′ is energized and draws up its armature and restores the transmitter to its normal position after sending in the O. K. The thermometer is immersed in the tank about three feet below the water level, so that the general average temperature of the water governs the instrument.

The system may be supplied with manually operable devices for short circuiting or opening any of the branches and operating the transmitters in the same way as the automatic alarm starting devices.

What I claim is:

1. A sprinkler supervision system comprising a battery normally grounded, a circuit connected to said battery including the relay of a transmitter and an attachment for opening and grounding the circuit upon interference with its normal condition, and a resistance in series with said circuit, the grounding being at a point between said relay and resistance.

2. An alarm system comprising a battery, a local circuit connected therewith grounded at the battery, a resistance in said circuit, a transmitter including a signal wheel for a main line alarm, a spring-driven train for rotating said signal wheel, and a magnet having an armature normally restraining said train, the winding of the magnet being in series in said circuit, a ground connection for said transmitter, and an attachment normally connected in said circuit adapted to interrupt and ground the circuit upon interference with its normal condition.

3. An alarm system comprising a battery, a local circuit having a plurality of branches, a resistance and a magnet in each branch, a transmitter controlled by each magnet, an alarm starting device for each branch, the different devices being for different characters of "trouble," and interrupting and grounding said circuits when conditions are abnormal.

4. In an alarm system, a transmitter including an electro-magnet having two opposed windings, a source of current for said windings; one of said windings being normally in circuit with said source and the other normally out of circuit therewith, and a relay permanently in series with one of said windings and controlling the connection of the other to said source.

5. In an alarm system, a transmitter including an electro magnet having two opposed windings, a source of current for said windings, one of said windings being normally in circuit with said source and the other normally out of circuit therewith, and a relay permanently in series with one of said windings and controlling the connection of the other to said source, said windings, when connected to said source, being in parallel.

6. In an alarm system, a transmitter including an electro magnet having two opposed windings, a source of current for said windings, one of said windings being normally in circuit with said source and the other normally out of circuit therewith, and a relay permanently in series with one of said windings and controlling the connection of the other to said source, said windings, when connected to said source, being in parallel, said other winding when in circuit shunting the winding which is normally in circuit and said relay in series therewith.

7. In an alarm system the combination of a battery, a transmitter relay, separable contacts and a resistance all in series in a circuit, and means for automatically opening said circuit at said separable contacts and connecting it to ground at a point between said resistance and said relay.

8. In an alarm system the combination of a battery, a resistance, a relay, a pair of

contacts all in series in a local circuit, a transmitter consisting of a spring actuated train and a signal wheel, a transmitting circuit controlled by said signal wheel, said relay normally restraining said train and means for interrupting and grounding said local circuit at a point between said relay and said resistance.

9. In an alarm system the combination of a battery, a resistance, a relay having opposing windings, one winding in circuit with said battery and the other adapted to be cut in and out of circuit, a second relay in series with said resistance, a circuit controller actuated by said second relay to cut in said second winding when the relation of said resistance to said circuit is modified.

10. In an alarm system the combination of a battery, a resistance, a relay having opposing windings, one winding in circuit with said battery and the other adapted to be cut in and out of circuit, a second relay in series with said resistance, a circuit controller actuated by said second relay to cut in said second winding when the relation of said resistance to said circuit is modified, and means for automatically cutting said resistance out.

11. In an alarm system the combination of a battery, a resistance, a transmitter relay having opposing windings, one winding in circuit with said battery and the other adapted to be cut in and out of circuit, a second relay in series with said resistance, a circuit controller actuated by said second relay to cut in said second winding when the relation of said resistance to said circuit is modified, and means for automatically cutting said resistance out upon a departure in one direction from normal conditions, and automatically breaking said transmitter relay circuit upon a departure in the other direction from normal conditions.

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