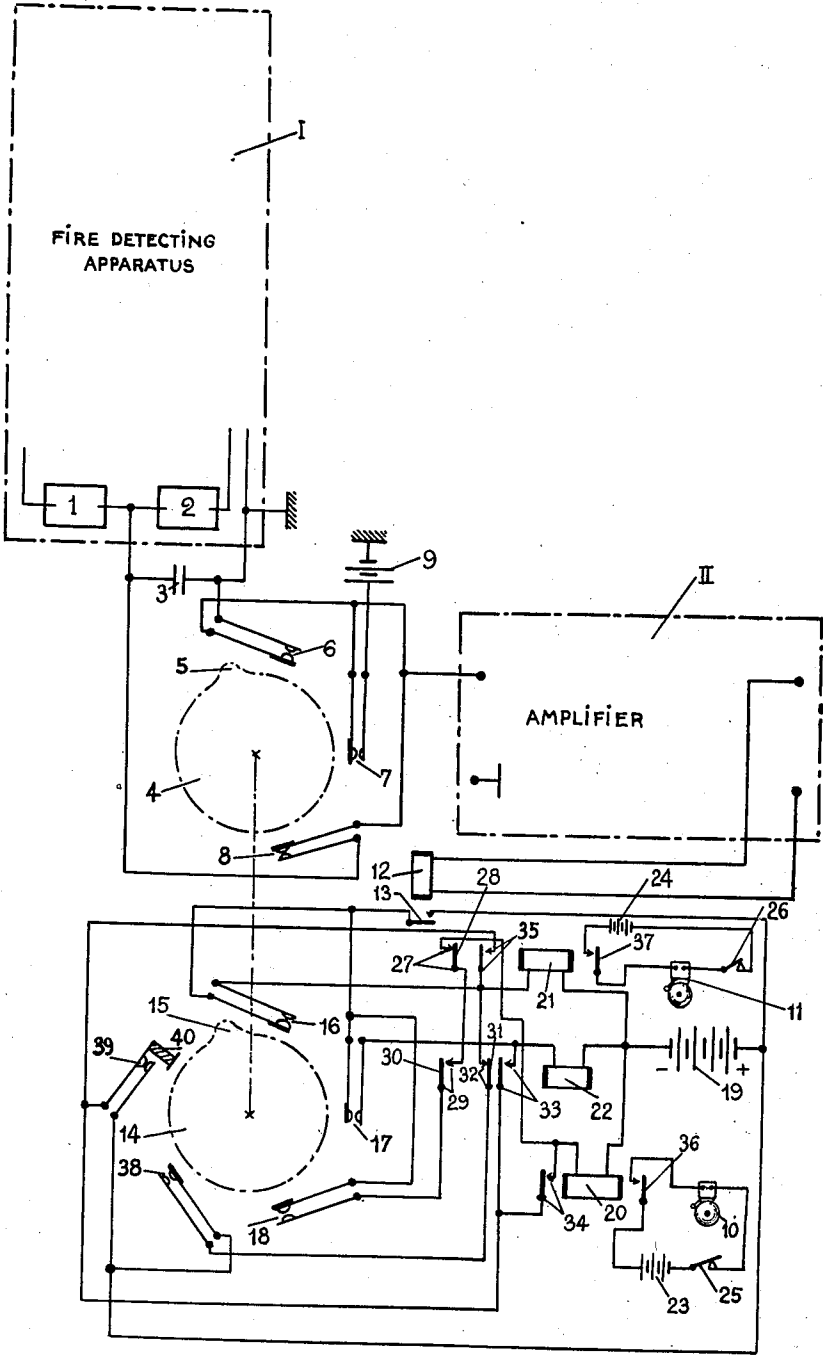


June 14, 1949.

P. M. G. TOULON
SUPERVISORY SIGNALING DEVICE

2,473,314

Filed March 9, 1946



INVENTOR:
Pierre Marie Gabriel TOULON
by *Y. K. King*
Attorney

UNITED STATES PATENT OFFICE

2,473,314

SUPERVISORY SIGNALING DEVICE

Pierre Marie Gabriel Toulon, Neuilly sur Seine,
France, assignor to Compagnie Francaise du
Signum, Paris, France, a body corporate of
France

Application March 9, 1946, Serial No. 653,240
In France March 8, 1945

Section 1, Public Law 690, August 8, 1946
Patent expires March 8, 1965

5 Claims. (Cl. 177-311)

1

The present invention relates to a security device for amplifier circuits connecting, for example, a detecting instrument designed to reveal a physical event, especially the beginning of a fire outbreak, to a warning, recording or controlling apparatus.

The majority of detecting instruments supply an extremely feeble quantity of energy, this being in particular the case of photo-electric cells, thermo-couples, ionisation cells, etc.

It is necessary, therefore, to make use of a plurality of amplifying valves, which generally in a stepped-up arrangement, actuate eventually a relay. Thus formed circuits, as well as their feeding means, present numerous causes of faulty operation resulting in preventing the detecting instrument signals to reach the alarm device, or giving rise to untimely warnings.

The invention has for its object a new connecting device ensuring an amplification between the detecting instrument and the signalling device, and at the same time presenting a full security of operation, that is to say rendering any untimely working of the alarm device impossible, and which would furthermore signal any causes of faulty operation.

According to the invention, the amplifier which connects the detecting instrument to the calling alarm apparatus is provided with a device characterized by the fact that it comprises means for periodically sending control impulses into the amplifier, and a trouble signalling device actuated by said impulses in cases of misoperation of the amplifier, and means controlled by said impulses in cases of correct working of the amplifier in order to prepare the alarm device circuit to be actuated by the signal given out by the detecting instrument.

By way of an example, an embodiment of the invention as applied to a fire detector has been hereinafter described and represented on the accompanying drawing.

The device shown, as an example, on the drawing comprises a differential detector constituted by a main ionisation cell 1, and an auxiliary cell 2 having for its object to compensate the parasitic action of temperature variations, of atmospheric pressure variations, of changes in the feed tension, etc. This device is placed in spaces to be protected against fire, and is provided with a known feeding device, diagrammatically represented by the dash-and-dot line rectangle I. A condenser 3, one terminal of which is connected to the detector 1-2, and having the other terminal earthed, is charged by the detector 1-2,

2

when the latter is operated under the action of the phenomenon to be detected. A continually operating exploring device periodically branches the condenser 3 to the amplifier (shown by the rectangle II) which receives thus a discharge of the condenser 3, provided that the detector 1-2 has been in action in the meantime. This periodic connection is performed by means of a continuously revolving commutator switch 4, rotating, e. g. at a rate of 1 revolution per 5 secs., and the switch 4 is provided with a beak 5 acting as a cam, and successively closing the contacts 6, 7, 8, the mobile elements of which are actuated by the cam 5 and connected to the amplifier II, whereas the stationary elements of said switch are branched respectively to earth, to an auxiliary source 9 supplying a tension similar to that of the detector 1-2, and to the condenser 3.

The object of the amplifier II is to transmit after amplification the signal of the detector 1-2, to an alarm device 10; the security device according to the present invention has for its object a periodic verification of the amplifier, and the setting into action, in case of unsatisfactory working of the latter, a trouble device 11. For this purpose a relay 12 is mounted at the outlet of the amplifier, and controls by its armature 13 a circuit wherein are connected the alarm and trouble devices 10 and 11; this circuit is also controlled by a second turning switch 14 revolving in synchronism with the revolving switch 4, and provided with contacts 16, 17, 18 which are closed by a beak 15 at the same moment as the contacts 6, 7 and 8 are closed by the beak 5.

The circuit containing the alarm and the trouble signalling device 10 and 11, comprises, moreover, a local source 19, a relay 20 controlling the alarm device 10, a relay 21 controlling the trouble device 11, and a control relay 22. Each of the two signalling devices is provided with a feeding source 23, 24 and with a switch 25, 26. The windings of the three relays 20, 21, 22 are connected, on the one hand, in parallel to a pole of the source 19, and, on the other hand, to the stationary elements of the contacts 18, 16 and 17; the mobile elements of these contacts actuated by a cam 15 are connected in parallel to the other pole of the source 19 by means of the working contacts of the armature 13 of the outlet relay 12 of the amplifier II. Nevertheless, the connection between the alarm relay 20 and the contact 18 is controlled firstly by means of the resting contact 27 of the armature 28 belonging to the trouble relay 21, and secondly by the working contact 29 of the armature 30 belonging

3

to the control relay 22, the latter comprises moreover a second armature 31 provided with a resting contact 32 and a working contact 33 the significance of which will be explained later on. The alarm and trouble relays 20 and 21 comprise furthermore stick circuit controlled by contacts 34 and 35 as well as a second armature 36, 37 controlling respectively the circuits of the signalling devices 10 and 11.

The second revolving switch 14 comprises a contact 38 connected, on the one hand, to the trouble relay 21 through the resting contact 32 of the armature 31 of the control relay 22, and, on the other hand, to the source 19, as well as a contact 39, which is normally closed and opened by the beak 15 when acting on the flexible contact element 40. Furthermore, the contact 39 is connected in series with the contacts of the stick circuit of each of the relays 21, 22 and 23 so that these circuits may be broken by the said second revolving switch for each of its complete revolution.

The device operates as follows:

When the cams 5 and 15 establish, on reaching 6 and 16, the contacts between the flexible and stationary elements, the contact 6 earths the amplifier circuit. In normal and satisfactory conditions, no impulse is created, and no current passes through the coil 12 at the outlet of the amplifier, consequently the contact 13 remains open. If, on the contrary, the circuit is not in normal state, as result, for example, of an insulation fault, an impulse is generated in the amplifier, the coil 12 is energized and the contact 13 closed. The current from the battery 19 passes through the elements 16, and through the trouble relay 21, which is self-fed through the contact 35. The circuit of the trouble device 11 is then completed through the contact 37, and the stick circuit of the relay 21 is broken when the beak 15 cooperates with the flexible contact element 40 to open the contact 39.

In the position, 7, 17, the amplifier receives a tension of the battery 9 of a magnitude approximately equal to that of the condenser 3, when the detector operates. The relay 12 becomes energized and closes the contact 13. The current of the battery 19 traverses the contact 13, the element 17 and the coil 22, which remains energized thanks to the contact 33 of the stick circuit which is controlled in the same manner as the stick circuit of the relay 21, by the contact 39. The contact 32 opens and the contact 29 shuts in such a manner as to prepare the alarm circuit for the next position 8, 18 of the revolving switches.

When the cams 5, 15 reach the elements 3 and 18, the condenser 3 becomes deenergized, the impulse is transmitted to the amplifier, the coil 12 is energized and the contact 13 closed. The current from the battery 19 passes through the contact 13, the element 18, the contacts 29, 27 and through the coil 20, which remains energized thanks to the contact 34 of its stick circuit. The alarm device 10 is then set into action by the contact 36 and operates in a continuous manner until the stick circuit of the relay 20 is broken by the opening of the contact 39 by means of the beak 15 cooperating with the flexible contact element 40.

If no discharge is given by the condenser, no effect is produced. When the cam reaches 39 the circuit energizing the relay 22 is broken and the initial state reestablished.

If, in result of a trouble, the relay 22 does not become energized when the cams pass over

4

the contacts 7, 17, the contacts 29 and 32 remain then in the position shown in the drawing. When the cams reach the positions 8 and 18, no result will be obtained, even if the condenser 3 operates, but when the cam 15 reaches to the position 38, the current from the battery 19 traverses the element 38, the contact 32 and the trouble relay 21 which will remain energized thanks to the contact 35. The signal "trouble" will then be maintained in a permanent manner, until the stick circuit of its relay is broken by the action of the beak 15 on the flexible element 40.

For more security, the contact 27 broken by the relay 21, prevents in this case any untimely operation of the alarm relay 20.

What I claim is:

1. Security device for amplifiers ensuring the connection between a detecting instrument of a physical event and a signalling device, comprising a detecting apparatus giving rise to a main source of potential when detecting said physical event, an amplifier, an alarm device, a trouble device, an auxiliary source of potential, means creating at the output of said amplifier, periodically and successively, an impulse taking rise in the amplifier upon a faulty working of the latter, an impulse supplied by said auxiliary source of potential and an impulse supplied by said detecting apparatus when detecting a physical event, means actuating the trouble device by the impulse resulting from a faulty working of the amplifier, means controlled by the impulses supplied to the amplifier by said auxiliary source for completing the circuit of the alarm device and means controlled by the amplifier which is in turn controlled by the detecting apparatus for actuating the alarm device.

2. Security device according to claim 1 in which the auxiliary source of potential is the amplifier with a potential equivalent to that supplied by the detecting apparatus when detecting said physical event, in which the means supplying the output of said amplifier with impulses consists of a continuously revolving switch and in which the said detecting apparatus comprises an earth connection, the security device further comprising a relay supplied by the output of said amplifier so as to set the circuit of the alarm device ready to be actuated by the next position of said revolving switch and means associated with said relay for successively controlling the trouble and alarm device.

3. Security device for amplifiers ensuring the connection between a detecting instrument of a physical event and a signalling device, comprising a detecting apparatus detecting said physical event and giving rise to a signalling potential, an amplifier, an alarm device, a trouble device, an auxiliary source of potential supplying said amplifier with a potential equal to that furnished by the detecting apparatus, a first revolving switch comprising three pairs of contacts connected on the one hand to earth, to the auxiliary source and to the detecting apparatus respectively, and, on the other hand to said amplifier, so as to supply this latter with impulses, a first relay energized by the output of the latter, a second relay operating the trouble device, a third relay controlling the alarm device, a fourth relay operating the alarm device, a second source of potential, a second revolving switch moving in synchronism with said first switch and provided with corresponding pairs of contacts which are connected, on the one hand, to the last cited three relays, and, on the other

5

hand, to said second source through the armature of said first relay, means for controlling the alarm relay by the armatures of the said third relay controlling the alarm device and said second relay operating the trouble device in such a manner that the said alarm device is operated only when said third relay controlling the alarm device has alone been energized by the revolving switch at the moment of establishment of the connection between the amplifier and said first auxiliary source supplying the control impulses.

4. A device according to claim 3, wherein the trouble relay, the controlling relay and the alarm relay comprise self-feed circuits maintaining the relays closed once they have been energized by an impulse, and wherein the second revolving switch is provided with a pair of normally closed auxiliary contacts inserted in the self-feed circuit of the controlling relay, said revolving switch producing at the end of each revolution, the opening of the self-feed circuits of the controlling relay, the trouble relay and the alarm relay.

5. Device according to claim 3 wherein the controlling relay armature comprises a resting contact, wherein the trouble, the alarm and

6

the controlling relays comprise self-feed circuits maintaining them closed once they have been energized by an impulse, and wherein the second revolving switch is provided with a pair of normally closed auxiliary contacts inserted in the said self-feed circuits, for breaking the self-feed circuits at each revolution of said revolving switch, this latter further comprising a fifth pair of contacts disposed between the pair of contacts corresponding to the alarm relay and the said auxiliary contacts, and connected on the one hand to said second source of potential and, on the other hand, through said resting contact of the controlling relay armature, to the winding of the trouble relay in such a manner that the latter is actuated as a result of the non operation of the controlling relay.

PIERRE MARIE GABRIEL TOULON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,385,976	Evans et al.	Oct. 2, 1945