March 22, 1927. 1,622,044

J. T. MILLER ET AL

CIRCUIT CONTROLLER

Filed Sept. 28, 1925 2 Sheets-Sheet 1

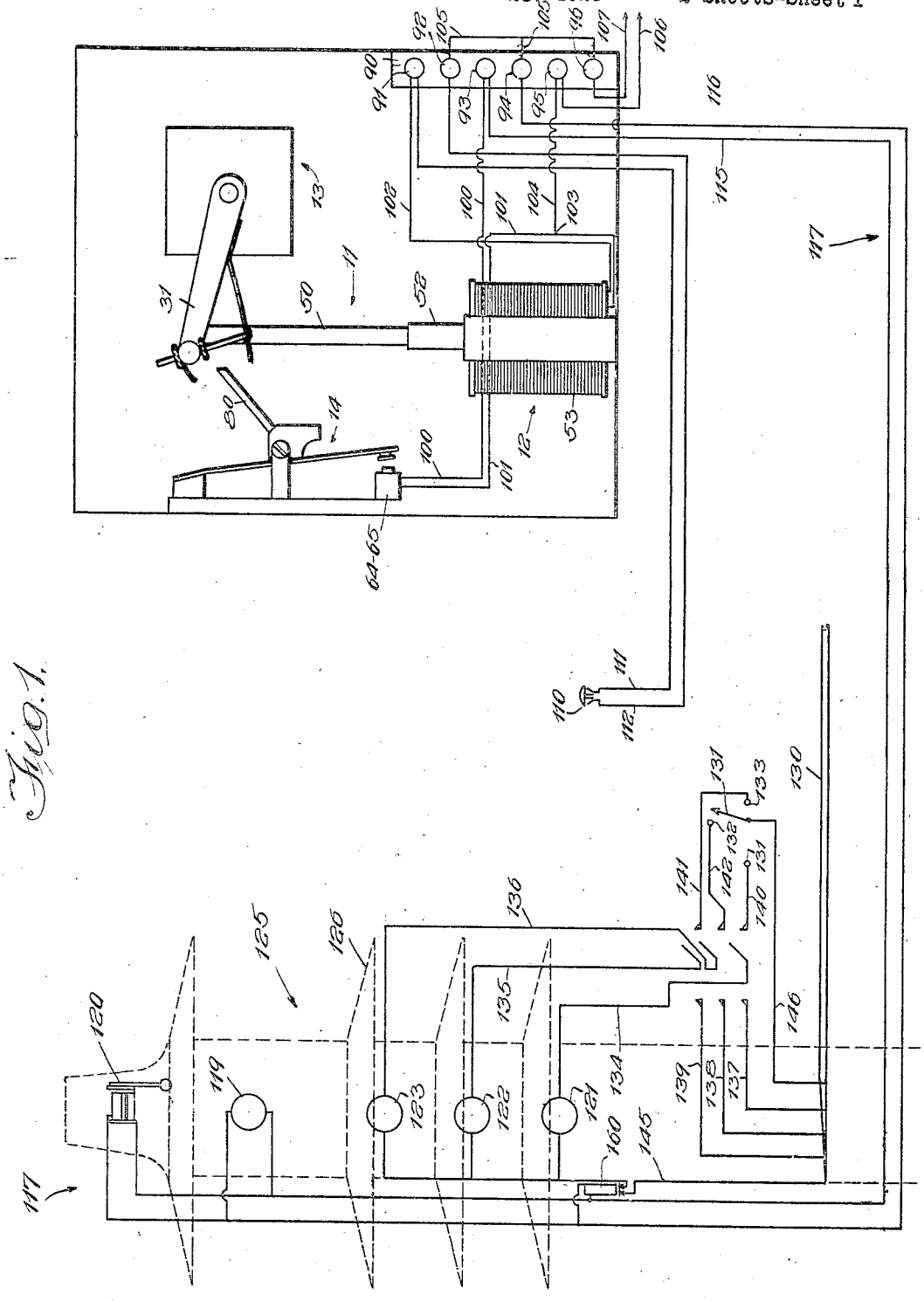


Fig. 1.

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Fig. 2.

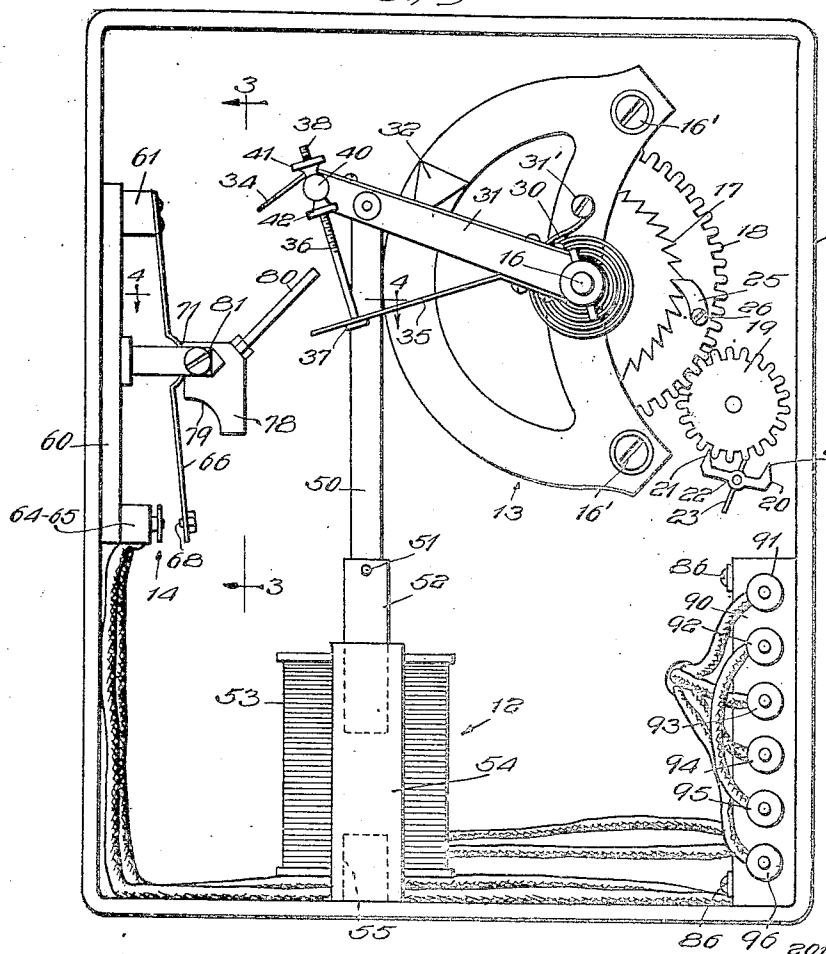


Fig. 6.

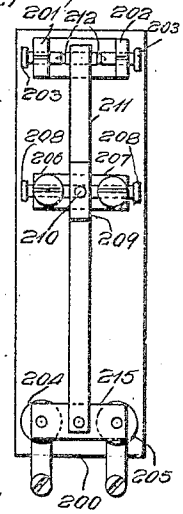


Fig. 3.

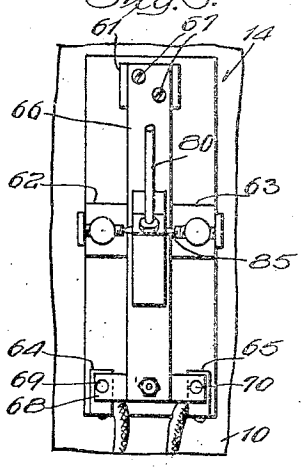


Fig. 4.

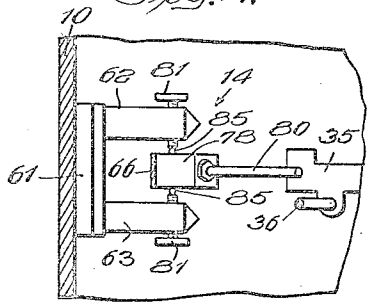
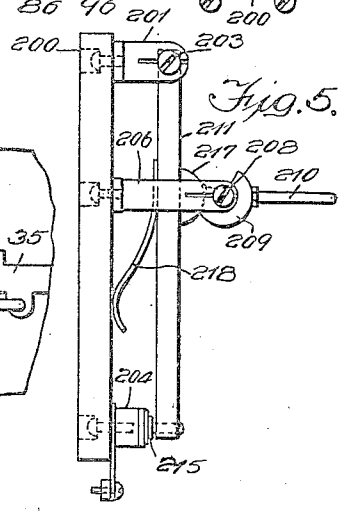


Fig. 5.



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UNITED STATES PATENT OFFICE.

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CIRCUIT CONTROLLER.

Application filed September 28, 1925. Serial No. 58,958.

The present invention, in general, relates to an electric circuit controlling mechanism and more particularly to circuit controllers adapted for use in conjunction with electric signals.

The operation of police and fire vehicles and the like, is hazardous and exposes the public to considerable injury. From studies made of this matter, it has been found that numerous accidents occur in the immediate vicinity of fire and police stations when such vehicles come dashing out onto the street in response to calls. In the furtherance of public safety, we set about devising some way of minimizing the hazards existing at such places. The present invention is the outcome of our work in that connection.

Now, obviously, one of the most practical, as well as simple ways of meeting the dangers lurking in the vicinity of these stations, is to warn the public by suitable signals whenever a vehicle is about to emerge therefrom. Such signals, however, entail the provision of suitable circuit controlling means for causing them to remain operative only for a period of time necessary for the vehicle to reach the road or street.

In many cities traffic signal systems have been installed. We have so designed our signalling mechanism that it may be successfully used in conjunction with such traffic signal systems. We desire it understood, however, that our invention is not to be limited by such use, but only in so far as defined by the accompanying claims.

An object of the present invention is to provide an improved signal system.

Another object of our invention is the provision of circuit controlling means particularly adapted for use in conjunction with signals.

In accordance with the general features of our invention we have provided a signaling system wherein a circuit controller causes the signal circuit to be closed for a given period of time, and upon the expiration of that time to be automatically broken. Means is also provided for not only causing the circuit to be closed substantially instantaneously, but for causing the circuit to be opened with a quick break after the elapse of the previously mentioned period of time.

Other objects and advantages of the present invention will more fully appear from the following detailed description, taken in connection with the accompanying drawings which illustrate one embodiment thereof, and in which—

Fig. 1 illustrates the circuit for our signaling means and the manner in which it may be associated with an ordinary traffic signal;

Fig. 2 is an enlarged view of our novel circuit controller for use in conjunction with the system illustrated in Fig. 1;

Fig. 3 is a view taken on the line 3—3 of Fig. 2 illustrating our novel switch;

Fig. 4 is a view partly in section, taken on the line 4—4 of Fig. 2;

Fig. 5 is a view of a modified form of switch or circuit breaker; and

Fig. 6 is a front view of the structure shown in Fig. 5.

Referring now to the drawings in detail, in which like reference numerals designate similar parts throughout the several views, 10 denotes a housing or casing preferably made of metallic material in which our novel circuit controlling mechanism is positioned.

Our novel circuit controlling mechanism is designated generally by the reference numeral 11 and comprises, in general, three constructions, namely, a solenoid arrangement 12, an escapement mechanism 13 and a switch device 14.

The escapement mechanism 13 may be of any usual construction, such, for example, as the escapement mechanism of a clock. In Fig. 2 we have disclosed an escapement mechanism comprising a frame member 15 attached to the casing 10 by bolts 16'. Journaled centrally in this member 15 is a shaft 16 to which is splined a gear 17. Loosely mounted on this shaft 16 is another gear 18 which meshes with a small escapement wheel 19 rotatably carried in the casing 10. Associated with the escapement wheel 19 is an anchor-shaped piece 20 equipped with two detent points 21 adapted to alternately engage teeth of the escapement wheel 19. The piece 20 may be pivotally mounted in any desired manner to the casing 10. Associated with the pivot 22 of piece 20 is a vane member 23 which serves to retard the oscillation of the anchor-shaped piece 20. Obviously, each time one of the detents 21 engages the teeth on the escapement wheel 19, the recoil of this wheel causes the detent 21 in mesh therewith to be moved out of engagement and for the other detent to be moved into engagement. Thus, the anchor-

shaped piece 20 is caused to oscillate in a manner well known to those skilled in this art.

Pivotally mounted on one face of the gear wheel 18 is a pawl 25 having a pivot 26. This pawl is at all times urged into engagement with the teeth of the gear 17. It is of such a construction that when the gear wheel 17 is turned in a clockwise direction in Fig. 2, the wheel 18 is caused to rotate therewith. On the other hand, when the wheel 17 is revolved in the opposite direction, the pawl merely rides on the teeth of that wheel and the gear wheel 18 does not revolve with it. Any suitable resilient means, such as the spring (not shown) may be employed for urging the pawl 25 into engagement with the gear wheel 17.

Surrounding an end of the shaft 16 is a coiled clock spring 30 connected at one end 31′ to the frame 15 and at its other end to the shaft 16. This coiled band spring is disposed around the end of the shaft 16 intermediate a face of the frame 15 and an arm 31 fastened at one end to the shaft 16. The arm 31 may be detachably mounted on the shaft 16 in any desired manner. The arm 31 is at all times urged upwardly by the coil spring 30. Its upward movement, however, is limited by a stop 32 attached to the frame member 15. In Fig. 2 we have shown the arm 31 in its uppermost position.

The lever arm 31 is equipped with a pair of tripping springs 34 and 35 suitably attached thereto. The springs 34 and 35 are spaced from each other by an adjusting stud 36. The head 37 of this stud rests against the lower face of the tripping spring 35 and the other end of the stud 36 is threaded, as indicated by the reference numeral 38. The threaded end of the stud passes through a small boss on the free end of the lever arm 31. This boss is indicated, generally, by the reference numeral 40. Threaded onto the stud 36 are a pair of adjusting screws 41 and 42, one on each side of the boss 40. It is apparent that by turning the adjusting screws 41 and 42 the distance between the ends of the tripping springs 34 and 35 may be varied; that is to say, the spring 35 may be moved with respect to the spring 34, thus causing the time at which it performs its tripping function in the operation of our device, to be varied.

The lever arm 31 is connected by a link 50 to our solenoid arrangement 12. The upper end of the link 50 is pivotally attached to the arm 31 and the lower end of the link is attached at 51 to an armature-like member 52 adapted to reciprocate in the inside of a coil of wire 53. Surrounding the coil 53 is a metallic frame 54 which serves as a guide for the plunger armature-like member 52. Also disposed in the bore of the coil of wire 53 is a stop member 55 for limiting the downward movement of the plunger or armature member 52. Upon the energizing of the coil of wire 53, as will be more fully explained hereinafter, the plunger 52 is drawn downwardly into the coil of wire or solenoid 53, pulling with it the lever arm 31, and causing our novel escapement mechanism 13 to be set into operation.

The purpose of the tripping springs 34 and 35 is to open and close the switch 14, which we shall now describe in detail. This switch comprises a fiber base 60 having fastened thereto a rubber block 61 (Figs. 2 and 3). Also fastened to this face 60 are a pair of trunnions 62 and 63 spaced a predetermined distance from each other. Suitably attached to the face 60 are a pair of contact blocks 64 and 65. As clearly shown in Fig. 3, the trunnions 62 and 63 are disposed intermediate the rubber block 61 and the contact terminals 64 and 65. A spring 66 is fastened at one end to the block 61 by screws 67. The free end of the spring 66 has attached thereto a contact piece 68 equipped with two contact points 69 and 70 adapted to engage with terminals 64 and 65, respectively. The contact piece 68 may be insulated from the spring 66 in any desired manner. The middle part of the spring 66 is provided with a hump or corrugation 71 which is located intermediate the two trunnions 62 and 63 (Fig. 4). Engaging this hump or corrugation 71 is a cam member 78 having a cam surface 79 for engaging the corrugation or hump 71 on the spring 66. This cam member 78 is equipped with a projection 80 disposed intermediate the tripping springs 34 and 35 and adapted to be alternately engaged by these springs. Passing through each of the trunnions 62 and 63 is a set screw 81. The two set screws 81 pivotally carry the cam member 78 intermediate the trunnions 62 and 63. That is to say, the cam member 78 has a pair of pointed members 85 (Figs. 3 and 4) which fit into the end of the set screws 81 permitting the cam to be turned.

Fastened to the casing 10 by bolts 86 is a terminal strip 90 having thereon terminals 91, 92, 93, 94, 95 and 96. Referring now to Fig. 1, we shall describe in detail the manner in which the terminal strip 90 is connected to the apparatus above described.

The terminal 65 of the switch 14 is connected by an electrical conductor 100 to the terminal 93 of the terminal strip 90. The terminal 64 is connected by an electrical conductor 101 to one end of the coil of wire 53, whose other end is connected by an electrical conductor 102 to the terminal 91. The electrical conductor 101 is connected at 103 to an electrical conductor 104 fastened to terminal 95 of the strip 90. The terminals 92, 94 and 96 are connected by strap wires 105.

The terminals 95 and 96 are connected to leads 106 and 107 which in turn are connected to any suitable source of power (not shown). In practice, we obtain the best results by using 110 volts D. C. A push button 110 is connected by leads 111 and 112 to terminals 91 and 92, respectively.

We shall now proceed to describe in detail the auxiliary signals operated by and controlled through our novel circuit controlling mechanism. We shall also describe briefly the circuit of an ordinary traffic signal in order to show the relation of our auxiliary signal thereto.

The terminals 93 and 94 are connected to leads or conductors 115 and 116, respectively, of an electrical circuit designated generally by the reference numeral 117. Arranged in parallel in the circuit 117 is a lamp 119 and a gong 120. The gong and the lamp are so arranged in the circuit that when current is flowing therein both of them will be in operation.

The gong 120 is preferably positioned in the top of a usual traffic signal tower and the lamp 119 is preferably disposed immediately therebelow. We desire it understood, however, that although we have disclosed our invention in conjunction with traffic signals, it is of course to be understood that it may be applied in other ways without deviating from the features of our invention and that the invention is to be limited only in so far as defined by the accompanying claims. We have indicated in dotted lines in Fig. 1, a traffic tower designated generally by the reference numeral 125. This tower 125 is equipped with the three usual lamp signals, preferably yellow, green and red in color. The red denotes "Stop"; the green denotes "Go" and the yellow denotes "Get ready". These designations are well known in the traffic signal art. We have indicated the three lamps by the reference numerals 121, 122 and 123. The tower 125 is equipped with the usual light shields 126, as shown in Fig. 1. The lamps 121, 122 and 123 are connected to conductors eminating from the common cable 130 which may connect a plurality of such traffic signals to a common source of power so that all of the signals are operated simultaneously. It is customary in connection with such traffic signals to provide means whereby they may be operated either automatically or manually. Such means usually consists of a switch disposed in the vicinity of each traffic signal for changing the circuit for the said signal from an automatically controlled one to a manually controlled one.

By the reference numeral 131', we have indicated a switch arm or dial for manually operating the lamps in sequence. That is to say, by revolving the dial 131' about its pivot, it may be caused to operate the lamps in a predetermined sequence through its contact with the three contact terminals 131, 132 and 133. The lamps 121, 122 and 123 are connected to leads 134, 135 and 136, respectively, which are adapted to be connected to the leads 137, 138 and 139 of the cable 130. By operating a suitable switch, the leads 134, 135 and 136 may be disconnected from the previously mentioned conductors of the cable 130 and connected to leads 140, 141 and 142, respectively, of the manually operated part of the system. Leads 140, 141 and 142 are in turn connected to the contact terminals 131, 132 and 133.

All of the lamps 121, 122 and 123 are connected to a common conductor 145 of the cable 130. The dial 131' is connected to a conductor 146 of the cable 130. From the foregoing, it is believed to be obvious that the leads 134, 135 and 136 may be connected to either the automatic part of the circuit or to the manually controlled part of the circuit. Since the operation of the traffic signal, per se, forms no part of our invention, it is believed that no further description of the same need be made at this time.

The circuit 117 has arranged therein a relay 160 which is adapted to connect and disconnect the two parts comprising the electrical conductor or lead 145 common to all three traffic lamps.

We shall now describe the operation of our novel circuit controlling mechanism.

Upon the depression of the button 110 to close the circuit, the solenoid 12 is energized, causing the link 50 through the plunger 52 to draw the lever arm 31 downwardly away from the stop 32. This results in energy being stored up in the spring 30. Upon releasing the button 110, the solenoid 12 is deenergized. Meantime, in the downward movement of the lever arm 31, the tripping spring 34 is brought into engagement with the projection 80 of the switch 14, causing the spring 66 through the contact piece 68 to connect the two terminals 64 and 65, closing the electrical circuit associated therewith.

It should be noted at this time that the same source of power is utilized for energizing the solenoid and for operating the auxiliary signal, as shall now be described.

Upon connecting the two terminals 64 and 65, current is caused to flow to the lamp 119 and the gong 120, setting both of them in operation. Also, the relay 160 in the circuit 117 is energized, disconnecting the two parts comprising the lead 145 of the traffic signal circuit, thereby rendering all three lamps 121, 122 and 123 inoperative.

As soon as the above takes place, all traffic, as well as pedestrians, in the immediate vicinity of the aforesaid traffic signal 125 are warned of the approach of the fire or police vehicles coming out of their respective stations. The traffic of necessity can

not proceed until the signal lights become operative again and the fire lamp and fire gong 119 and 120 become inoperative.

As is evident, the light 119 and the gong 120 must be operative for a period of time sufficient to enable the fire truck or police vehicle to get under way on the street or road in the immediate vicinity. Therefore, we have so arranged our mechanism that after a predetermined time has elapsed the signal and the gong are caused to become inoperative and the traffic signal then operative. This is accomplished through the novel escapement mechanism 13. That is to say, before the tripping spring 35 is brought into contact with the member 80 of the snap switch or circuit breaker 14, a certain period of time is caused to elapse. This period of time may be varied either by adjusting the escapement mechanism itself, or by turning the two studs or adjusting screws 41 and 42 on the adjusting stud 36. The two tripping springs 34 and 35 in reality constitute a lost motion connection between the arm 31 and the member or projection 80 of the switch 14. A very slight pressure on the projection 80 is necessary to operate the cams in either direction. In other words, the tripping springs 34 and 35 exert just enough pressure upon the projection 80 to cause it to snap the switch in either direction. The stop 32, as has been previously stated, limits the upward movement of the arm 31.

The lever arm 31 is caused to be returned slowly, due to the escapement wheel 19 and the anchor-shaped member 20. This escapement construction prevents the immediate dissipation of the energy stored in the spring 30 by the downward movement of the arm 31.

After the predetermined period of time has elapsed, the tripping spring 35 contacts the projection 80 causing the snap switch or circuit breaker to immediately become operative to break the circuit associated therewith causing the lamp 119 and the gong 120 to become ineffective and resulting in the traffic signal circuit again being effective.

In Figs. 5 and 6 we have disclosed a modified form of our snap switch or circuit breaker. It comprises a slate base 200 which is adapted to be fastened to the box or casing 10. Attached to the face of the base 200 are a pair of spaced trunnions 201 and 202 on each of which is disposed a set screw 203. Mounted on the other end of the base 200 are a pair of electric terminals 204 and 205. These terminals may be connected to the lead 100 and 101 in the same manner as our switch 14 disclosed in Fig. 1 and Fig. 2. Fastened to the face of the base 200 intermediate the trunnions 201 and 202 and the terminals 204 and 205 are another pair of trunnions 206 and 207 equipped with set screws 208. Disposed intermediate the trunnions 206 and 207 is a cam member 209 pivotally carried by the set screws 208 in the same manner as the cam 78 in our other form of circuit breaker.

The cam or trigger member 209 is equipped with a projection 210 adapted to have a lost motion connected with the arm 31 of our device in the same way as the projection 80 of the other form of switch. A flat member 211 is equipped with a pair of pointed studs 212 which are pivotally disposed in the set screws 203. The studs 212 and the set screws 203 constitute a pivotal mounting for one end of the strip 211. This member 211 may be made of brass or any other suitable material. The other end of this member carries a contact piece 215 insulated therefrom in any suitable manner. This contact piece is adapted to connect and disconnect the terminals 204 and 205. The member 211 intermediate its ends passes between the trunnions 206 and 207. Immediately below the cam or trigger-like member 209 the strip 211 is equipped with an arcuate-shaped projection 217 adapted to be engaged by the periphery of the trigger member 209. The member 211 is at all times urged upwardly about its pivot by a band spring 218 disposed intermediate it and the base 200.

Normally the spring 218 will force the member 211 upwardly, causing the contact piece 215 to be disconnected from the terminals 204 and 205. Upon movement of the previously discussed lever arm 31, the lost motion connection between it and the projection 210 operates the cam or trigger 209, depressing the member 211 and compressing the spring 218. This results in the terminals 204 and 205 being connected and the associated circuit closed.

This same switch may also be employed upon its closing movement to cut out a local alarm circuit which is now in common use to set the alarm into operation upon failure of the operator to receive the first and second sounds of the incoming call. If so employed, a bridge contact on the movable switch member closes such alarm circuit when the bar is in position to open the auxiliary signal circuit.

We claim:—

1. In combination, an electric switch comprising a plurality of electric terminals, a resilient element for connecting the said terminals normally urged away from the said terminals, means including a cam for overcoming the urging tendency of the said resilient element to move it into contact with the said terminals, a pull lever, means for pulling the lever from an upper position to a lower position, an element carried by the said lever for operating the said cam of the switch during the downward movement of the pull lever to cause the said switch to be

closed substantially instantaneously, means including a spring, a gear train, and an escapement mechanism for slowly returning the pull lever to its uppermost position, and a second element associated with the lever adapted upon the return movement of the lever to operate the cam of the switch after a predetermined period of time has elapsed to cause the said switch to be opened with a quick break.

2. In combination, an electric circuit including a switch, the said switch comprising a plurality of electric terminals, a resilient element for connecting the said terminals normally urged away from the said terminals, and means including a cam for overcoming the urging tendency of the said resilient element to move it into contact with the said terminals, a pull lever, means including a solenoid for pulling the lever downwardly from an uppermost position, an element carried by the said pull lever for operating the cam of the switch to cause the said switch to be closed substantially instantaneously, means including a clock spring and an escapement mechanism for slowly returning the pull lever to its uppermost position, an element carried by the said pull lever adapted during the upward movement of the lever after a predetermined period of time has elasped, to operate the switch cam, opening the switch with a quick break, and adjusting means for varying the time of effectiveness of the said last mentioned element.

3. In combination, an electrical switch including a plurality of electric terminals, a switch element for connecting said terminals, and an extension associated with said element adapted to be actuated to open and close said switch, a pull lever, means for pulling the lever from one position to another, an element carried by said lever for moving said extension in one direction during the movement of said pull lever to cause said switch to be closed substantially instantaneously, means including a spring, a gear train, and an escapement mechanism for slowly returning the said pull lever to its initial position, and a second element associated with the lever adapted upon the return movement of said lever to actuate the said extension of the switch after a predetermined period of time has elapsed to cause said switch to be opened with a quick break.

In witness whereof, we hereunto subscribe our names this 22nd day of September, 1925.

JOHN T. MILLER.
MICHAEL HANLEY.