

May 10, 1938.

M. F. KETAY

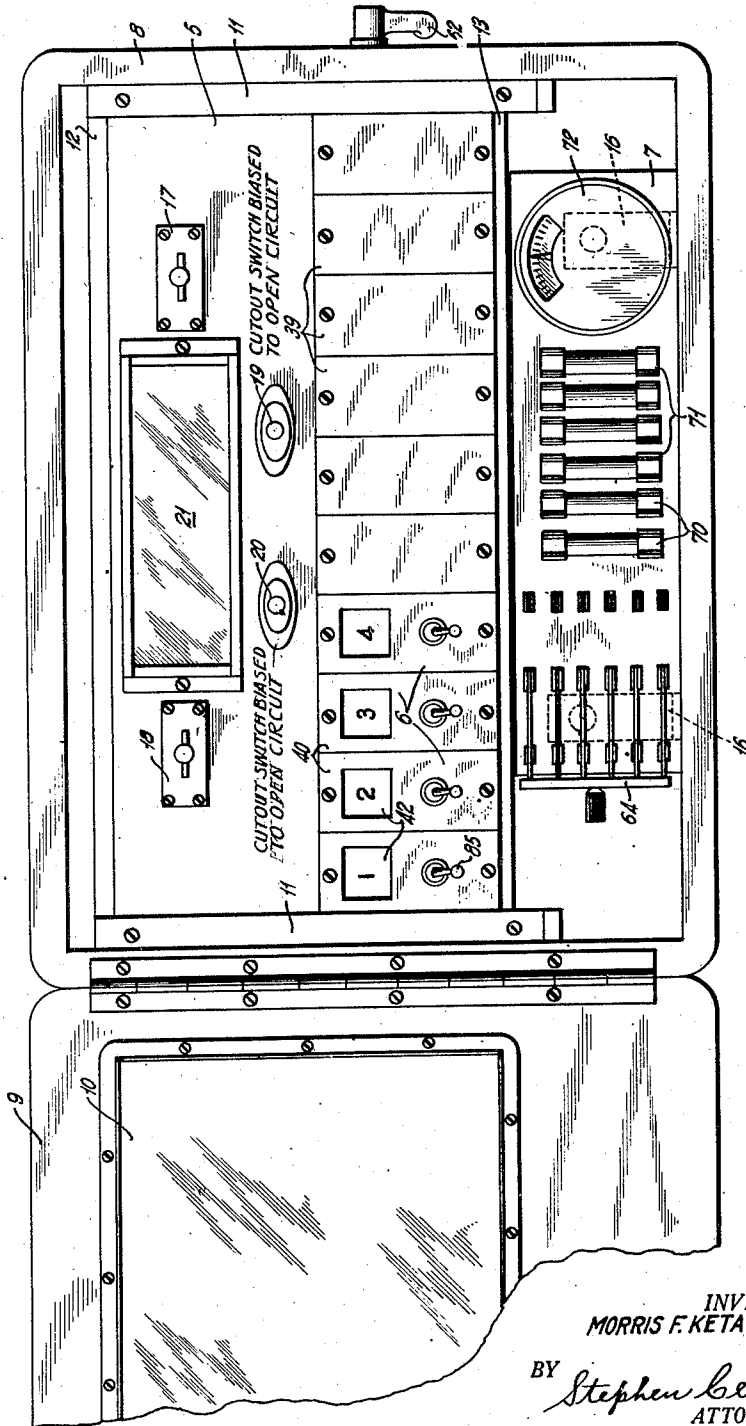
2,116,947

ANNUNCIATOR SYSTEM

Filed July 30, 1932

6 Sheets-Sheet 1

Fig 1



INVENTOR.
MORRIS F. KETAY.

BY *Stephen Gerstrik.*
ATTORNEY.

May 10, 1938.

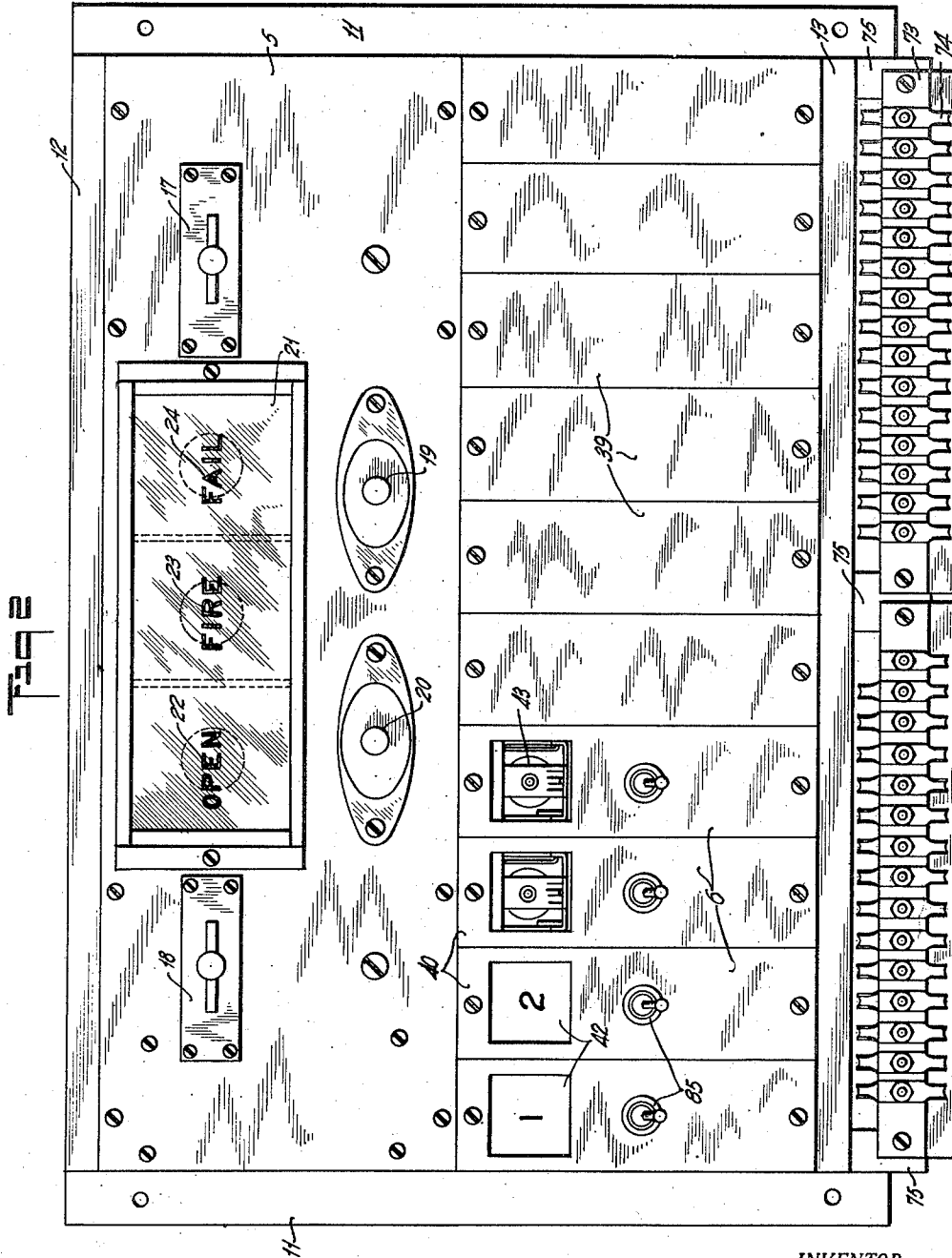
M. F. KETAY

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6 Sheets-Sheet 2



INVENTOR.
MORRIS F. KETAY.

BY *Stephen Gerstrik.*
ATTORNEY.

May 10, 1938.

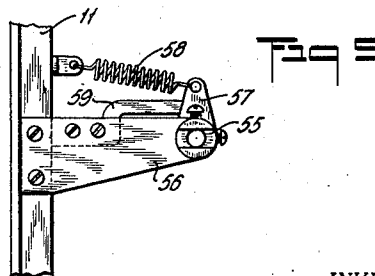
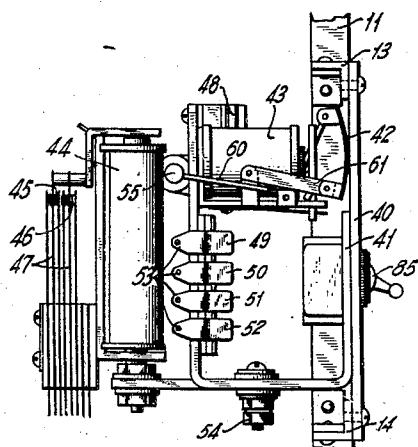
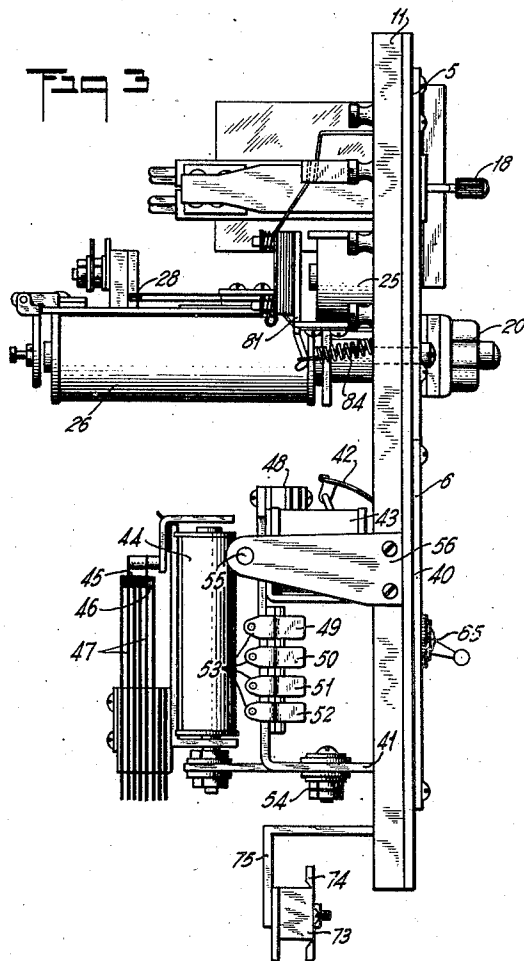
M. F. KETAY

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ANNUNCIATOR SYSTEM

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INVENTOR.
MORRIS F. KETAY.

BY *Stephen Gerstrik*
ATTORNEY.

May 10, 1938.

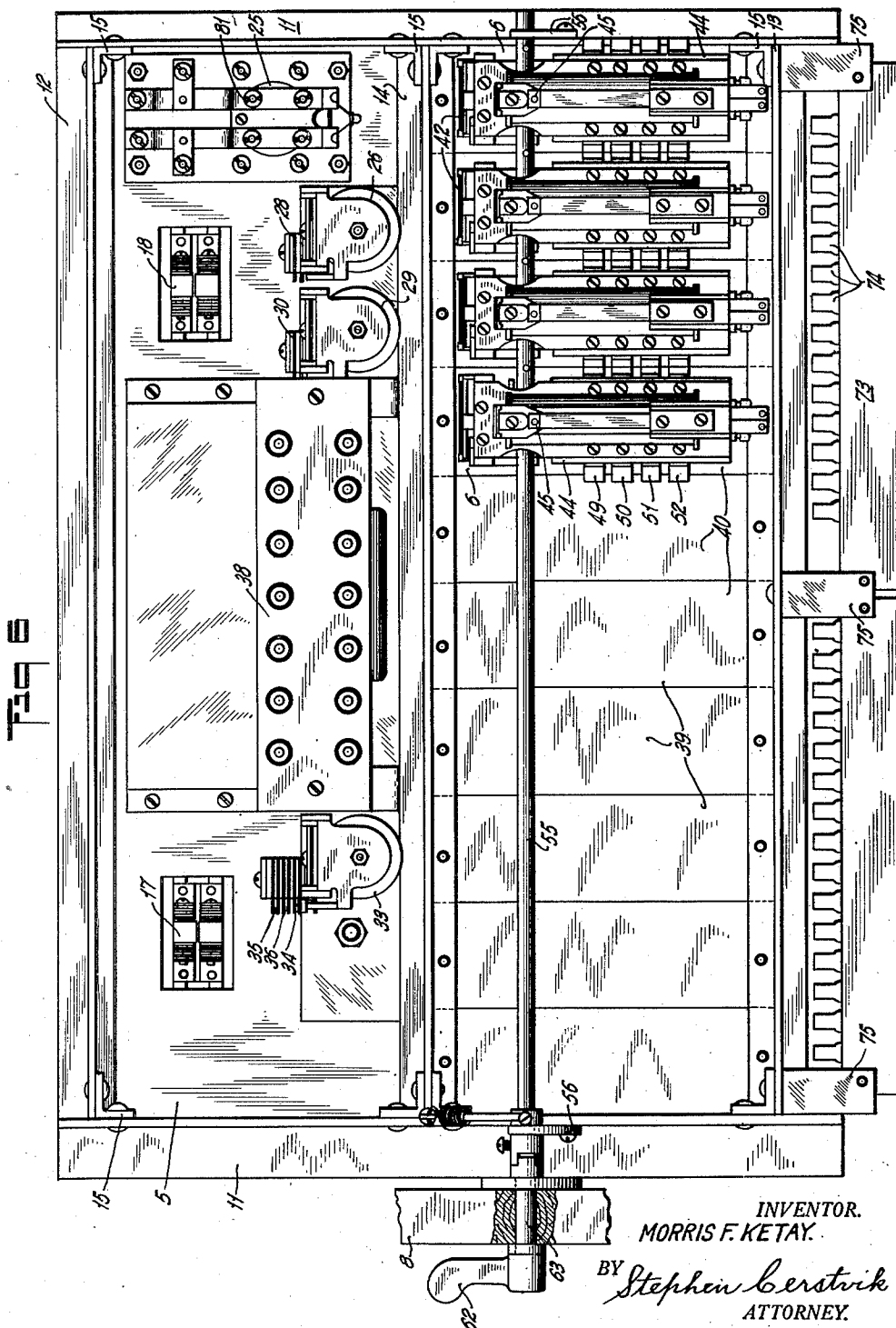
M. F. KETAY

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ANNUNCIATOR SYSTEM

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M. F. KETAY

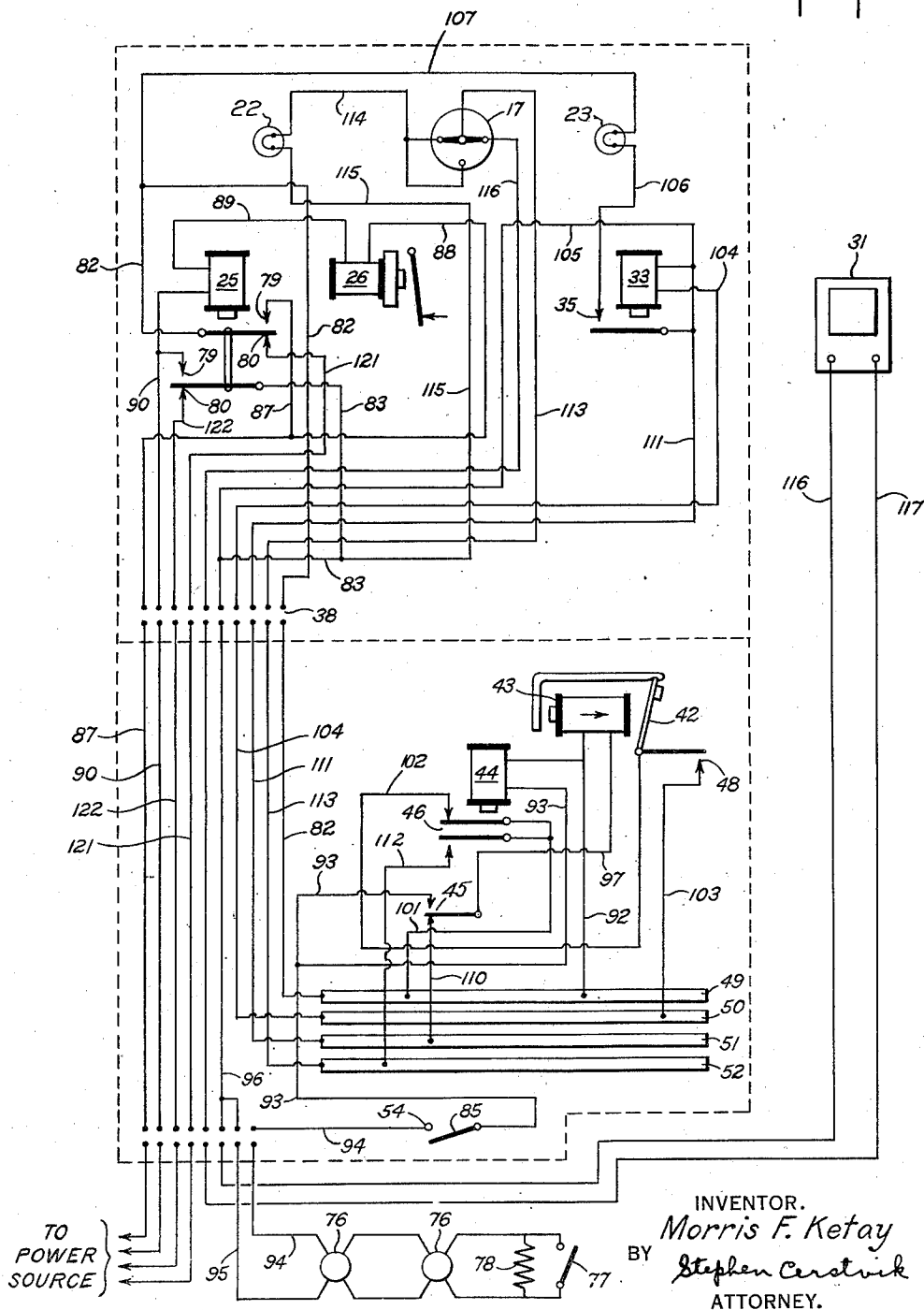
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ANNUNCIATOR SYSTEM

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6 Sheets-Sheet 5

Fig 8



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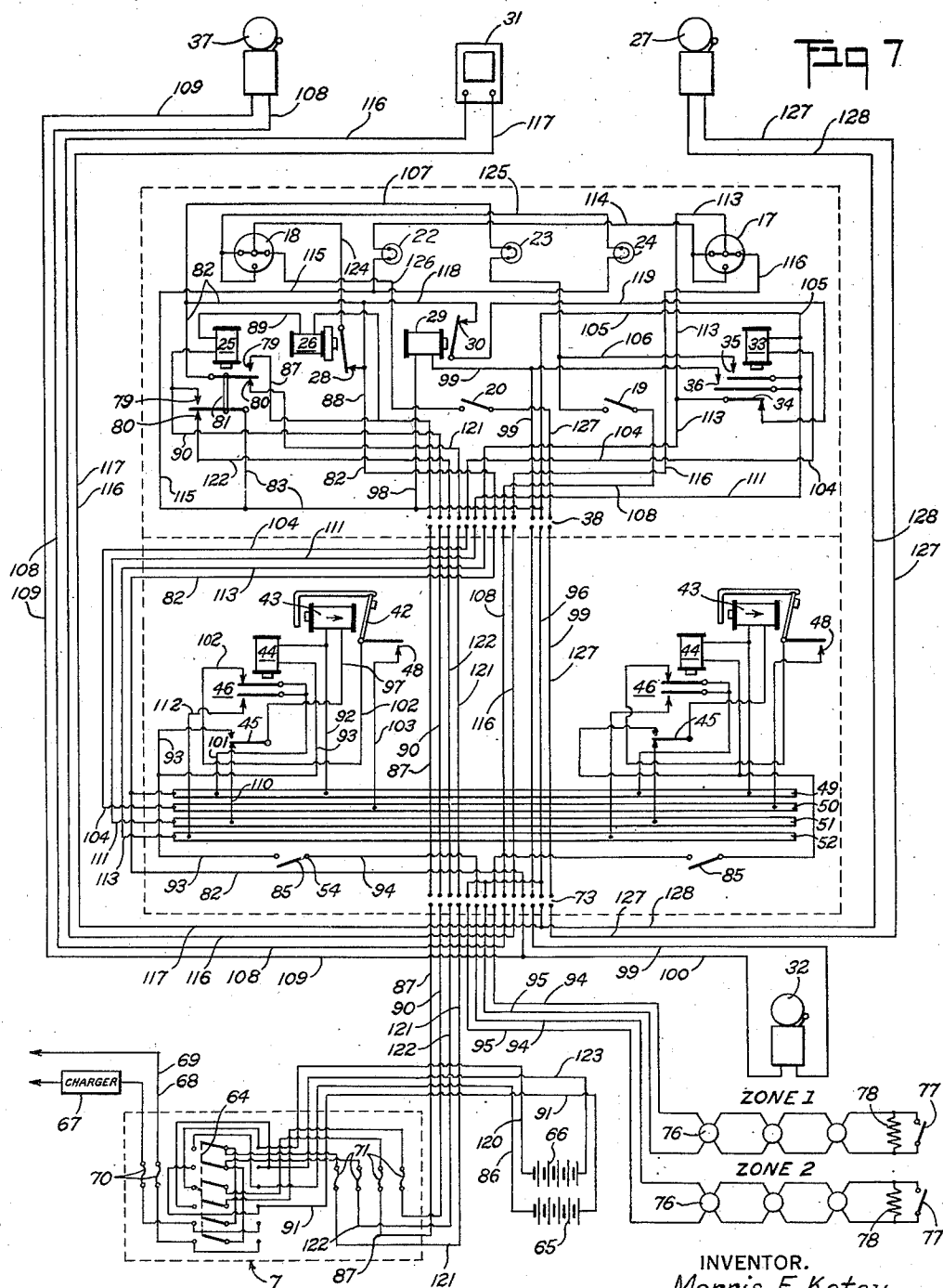
M. F. KETAY

2,116,947

ANNUNCIATOR SYSTEM

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6 Sheets-Sheet 6



INVENTOR.
Morris F. Ketay
BY Stephen Cerstnik
ATTORNEY.

UNITED STATES PATENT OFFICE

2,116,947

ANNUNCIATOR SYSTEM

Morris F. Ketay, Brooklyn, N. Y., assignor to
Bendix Aviation Corporation, South Bend, Ind.,
a corporation of Delaware

Application July 30, 1932, Serial No. 627,006

3 Claims. (Cl. 177—311)

This invention relates to annunciators, and more particularly to an annunciator system of the electrically-operated type and a control panel therefor.

One of the objects of the present invention is to provide a novel annunciator system, such as, for example, a fire alarm system, which is adapted to indicate the existence of a predetermined condition by either visual or audible signals or both.

Another object of this invention is to provide a signaling system embodying novel means for maintaining the same under constant electrical supervision.

Still another object is to provide a novel annunciator system wherein the number of signaling stations may be increased or decreased with utmost facility without disturbing the wiring of the remainder of the system or interrupting the electrical supervision of the same.

A further object is to provide a novel annunciator panel for efficiently supervising and controlling a fire alarm system consisting of any desired number of signaling stations wherein all fire and trouble signals are common to all of said stations.

A still further object is to provide an annunciator system employing a novel electric circuit for supervising and operating the same.

Another object is to provide a novel annunciator system wherein a common source of electric energy is employed for supervising both signaling and signal circuits and for energizing non-supervised signal circuits.

A still further object is to provide a novel annunciator system which conforms with the Steamboat Inspection Service requirements for fire alarm annunciators.

The above and further objects and novel features of the invention will more fully appear from the following detailed description when taken in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and are not designed as a definition of the limits of the invention, reference being had primarily to the appended claims for this purpose.

In the drawings wherein like reference characters refer to like parts throughout the several views:

Fig. 1 is a front elevation of the novel control panel comprehended by the present invention, said panel being shown installed in a cabinet with the door thereof swung open and partly broken away;

Fig. 2 is an enlarged front elevation of the control panel of Fig. 1 with certain parts removed and with certain signals in operation;

Fig. 3 is a side view of the control panel showing certain of the control elements mounted on the rear thereof;

Fig. 4 is a detail view of an annunciator drop employed in carrying out this invention and showing resetting means therefor;

Fig. 5 is a detail view of supporting and operating means for the annunciator drop resetting rod;

Fig. 6 is a rear view of the control panel;

Fig. 7 is a schematic circuit diagram of the complete annunciator system comprehended by this invention; and

Fig. 8 is a simplified circuit diagram illustrating the principal parts of one circuit only.

One embodiment of the present invention is illustrated in the accompanying drawings, by way of example, in the form of a novel fire alarm system wherein the alarm is originated either by thermostatic means or manual switch means whereupon a visual signal indicating the vicinity or zone in which the fire exists is given at a central control panel as well as light and bell signals at local and remote points. The system illustrated also provides signals which indicate the presence and location of a break in the system circuit or any fault therein and means for indicating a failure of the source of power.

A novel control panel adapted to control an annunciator system comprising a plurality of signaling stations is provided and, in the form shown, such panel consists of three separate and distinct sections, i. e., a master panel 5 (Fig. 1), a plurality of line panels 6 and a charging panel 7. The entire unit is mounted in a cabinet 8, the front of which is normally covered by a hinged door 9 having a glass portion 10 through which master panel 5 and line panels 6 may be viewed. The frame work on which said panels are mounted consists of a pair of angle bars 11 secured in a vertical position to the sides of casing 8. Angle bars 12 and 13 (Fig. 6) are attached across the upper and lower ends of bars 11 while a T-shaped bar 14 is attached across the mid-portion thereof by means of angle irons 15. Charging panel 7 is supported by suitable brackets 16 which are secured to the bottom of cabinet 8.

Master panel 5 which is preferably constituted by a brass plate is secured to bars 12 and 14 and has mounted thereon only signal and control apparatus which is common to all signaling stations incorporated in the system. Appearing on the

face of master panel 5 (Fig. 1), there is a trouble signal selector switch 17, a power failure signal selector switch 18, said selector switches being provided for closing circuits to both audible and visual signals or merely to visual signals as will hereinafter appear, a fire gong cut-out switch 19, a power failure bell cut-out switch 20 and a darkened glass or screen 21 through which light signals, such as trouble light 22, fire light 23 and power failure light 24, may be seen when the same are lighted. The audible signal cutout switches 19 and 20 have buttons projecting from the face of said panel and are biased to open circuit but are adapted to be closed against spring biasing pressure by door 9 when the latter is in closed position. Said switches are opened automatically by said spring pressure when said door is opened.

Control apparatus mounted on the rear of master panel 5 (Fig. 6) consists of selector switches 17 and 18, an automatic throw-over relay 25 which, in case of a failure of power supply, is adapted to transfer the system to a reserve source of power, a power failure signal relay and shunt resistor, 26, connected in series with said throw-over relay for controlling power failure signal circuits, to power failure light 24 and a power failure bell 27 (Fig. 7) through contacts 28, an engine room bell supervisory relay 29 adapted to actuate contacts 30 in a trouble signal circuit including trouble light 22 and trouble buzzer 31 for indicating a break in the leads to an engine room bell 32, and a fire signal relay 33 provided with three sets of contacts 34, 35 and 36, the two latter sets being adapted to open and close fire signal circuits including fire light 23, bell 32 and a fire gong 37, whereas contacts 34 are provided for opening the trouble circuit for engine room bell 32 when a fire alarm is being sent out. For reasons which will hereinafter appear, contacts 28, 30 and 34 are adapted to be held in open position and contacts 35 and 36 in closed position when the respective relays controlling the same are energized. Resilient means are provided in each case which tend to hold said contacts in the opposite positions when their respective relays are de-energized. A local terminal bar 38, to which all incoming leads are connected, is also provided on master panel 5 thereby making it possible to remove the latter without disturbing the permanent wiring connections between the apparatus mounted thereon, or to readily insert a spare panel in case trouble occurs on the one in service.

A single master panel may be employed with an unlimited number of zone panels, the number of the latter depending on the number of signaling stations required. One zone panel is provided for each signaling station and is equipped with means for controlling the apparatus on the master panel together with visual signaling means for indicating the location or source from which a signal originates. In order to facilitate repairs and to provide for possible expansion of the system, each of said zone panels is permanently wired and so uniformly constructed that panels may be readily replaced, or added to or removed from the system as desired by making or breaking but one electrical connection for each zone panel added or removed, as will hereinafter appear. In the illustrated embodiment, a ten-zone capacity annunciator is shown as comprising four zone panels 6 and six blanks 39, each

of the latter being adapted to be replaced by an additional zone panel.

For carrying out the purposes above stated, each zone panel, in the form shown in Fig. 4, comprises a front plate 40 which is adapted to be secured to frame bars 13 and 14 and has a bracket 41 mounted thereon for supporting control and signal apparatus. Signal means mounted on said panel are constituted by an annunciator drop 42 which is adapted to be actuated by a solenoid 43 and which is visible when in the signaling position, as shown in Fig. 4, through an opening in plate 40. Drop 42 has a card mounted thereon for identifying the signaling station or zone from which the signal originates. The control means mounted on each zone panel comprises a supervisory relay 44 provided with two double sets of contacts 45 and 46, the latter being adapted to be held closed in one direction by said relay when the same is energized and closed in the other direction by suitable resilient means such as springs 47. A pair of normally open contacts 48 are adapted to be closed by drop 42 when the latter falls into signaling position (see Fig. 7).

Zone panels 6 are electrically connected to one another by means of a series of resilient U-shaped bus bars 49, 50, 51 and 52 attached to bracket 41 and extending from either side thereof for slidably contacting similar bus bars on adjacent panels as illustrated in Fig. 6. Contacts 53 are provided for making permanent local wiring connections to said bars. All electric connections from master panel 5 to zone panels 6 are made from local terminal bar 38 to the bus bars on one of said zone panels, said connections being automatically made, then, to each zone panel as it is inserted into the system. A single outgoing terminal 54 is provided for individually associating each zone panel with the signaling station or zone which the same represents and is the only point at which an actual connection need be made when a zone panel is being installed in the unit. The wiring on each zone panel is of a permanent nature and will be hereinafter described in detail.

Means are provided for returning annunciator drops 42 from signaling position to normal raised position as illustrated in Fig. 3 and, as shown, such means are constituted by a resetting rod 55 (Figs. 4 and 6) which extends the full length of the control unit and is rotatably mounted at each end in suitable brackets 56 that are rigidly secured to angle bars 11. A radially-extending arm 57 is secured to rod 55 near one end thereof and has a tension spring 58 attached thereto tending to hold said arm against a stop 59, thereby holding rod 55 normally in one position. A series of resetting arms 60 rigidly attached to rod 55 are adapted to contact supports 61 on drops 42 for raising the latter when said rod is turned in a counter-clockwise direction as seen in Fig. 4. A handle 62 (Fig. 6) attached to a short shaft 63 extending through cabinet 8 and having a flat end portion adapted to fit into a slot in the end of rod 55 is provided for manually turning the latter to raise drop 42 and open contacts 48.

Means are provided for controlling the source of electric energy supplying the annunciator system and, as shown, such means consists of a six-pole, double-throw switch 64 through which the system is connected to a suitable source of electric energy such as one of the storage batteries 65 (Fig. 7) and 66 and through which the one of

these batteries in reserve is at the same time connected to a charger 67 through charging lines 68 and 69. In order to protect the annunciator system against excess current, a pair of suitable fuses 70 are provided in the charging lines and four fuses 71 are provided in battery lines to the system. A charging ammeter 72 (see Fig. 1) is also provided for checking the charge on batteries 65 and 66.

In order to simplify the wiring and installation of the above annunciator unit, a main terminal bar 73 (see Fig. 2), to which all outgoing and incoming leads are connected, is provided. As shown, said bar has a plurality of contacts 74 mounted thereon and is supported on suitable brackets 75 which are secured to and extend downwardly from angle bar 13.

Any suitable means may be provided in each supervised zone for originating a fire alarm. Preferably, suitable manual switch means and mercurial thermostats, which when heated to a predetermined temperature are adapted to close an electric circuit, are used. As illustrated (diagrammatically in Fig. 7), three thermostats 76 and a manually operable switch 77 are provided in each fire zone. A resistance 78 is connected in each zone signaling circuit in parallel with thermostats 76 and switch 77 for a purpose to be more fully described hereinafter.

Novel means are provided for maintaining the signaling circuits of the above annunciator system under constant electrical supervision so that any trouble in these circuits may be immediately detected by the operation of suitable signals adapted to be actuated upon the failure of current in said circuits and, as shown, such means comprise two pairs of fixed contacts 79 and 80, the former pair of which is adapted to be electrically connected through switch 64 to either of the batteries 65 or 66, the one to which the same is connected being conveniently called the service battery, while contacts 80 are connected across the one of said batteries in reserve. Relay 25 is in circuit with said service battery and is provided with an armature 81 which carries the terminals of the system supply leads 82 and 83. When said relay is energized by the service battery, armature 81 is attracted upwardly, as seen in Fig. 7, thereby connecting system supply leads 82 and 83 across said service battery through contacts 79 and power leads 87 and 90. If the service battery fails to deliver power, relay 25 becomes de-energized and armature 81 is adapted to be drawn to the left as viewed in Fig. 3 by suitable resilient means such as spring 84 (Fig. 3), thereby connecting the system across the reserve battery. Supervised signaling circuits are provided and are connected to supply leads 82 and 83, each of said circuits passing through relays 43 and 44 on a zone panel 6 and being continuously closed through resistance 78 which limits the current to a value insufficient to operate relay 43 for initiating a signal.

Supervised signal circuits may also be provided such as the circuit to engine room bell 32. This circuit, as shown, includes relay 29 in series with bell 32 and is connected across supply leads 82 and 83 in such a manner that the normal current flowing therein is insufficient to actuate said bell but is sufficient to hold contacts 30 open.

Means are provided for quickly and easily testing the various signal and control circuits and, as shown, such means consist of a test switch 85 inserted in each zone signaling circuit, and the switch 77 connected across resistance 78. Said

switches are so arranged that, when the switch 77 is closed, the same conditions will exist in the system as when one of the thermostats 76 is heated, thus providing means for testing the fire signal circuits and control apparatus. By actuating the switch 85, the circuit in which the same is inserted may be broken, whereby trouble signal circuits and apparatus are tested.

Under normal operating conditions with switch 64 closed to the right (Fig. 7) battery 65 feeds through leads 86, 87 and 88, power failure signal relay and shunt resistor 26, lead 89, throw-over relay coil 25 through leads 90, 91 back to battery. Relay coil 25 being thus energized draws armature 81 upwardly from the position as shown in Fig. 7 to engage contacts 79, thereby connecting lines 87 and 90 with the system supply power supply lines 82 and 83, respectively. Relay coil 26 being in series with relay 25 is also energized thereby holding contacts 28 in open position. With the armature 81 of coil 25 in this position, supervised signaling circuits, (only one of which (zone 2) will be traced since each of said circuits is a duplicate of the other), are closed from line 87 through lead 82, bus bar 49, lead 92, supervisory relay 44, lead 93, switch 85, zone panel outlet 54, lead 94, resistance 78, leads 95, 96, and 83 through a contact 79 to main battery line 90. The coil of relay 44 is energized by this normally closed circuit and holds its contact 45 upwardly in Fig. 7, thus connecting coil 43 in parallel with coil 44 through lead 93, contact 45 and lead 97 and closes contact 46 upwardly. Resistance 78 so limits the current continuously flowing in coil 43 that the latter is not sufficiently energized to attract its armature for operating drop 42. The signal circuit, including engine room bell 32, is also normally closed from line 90 through leads 83, 98, coil 29, lead 99, coils of bell 32, leads 100, 82, to line 87. Relay 29 is thus sufficiently energized to hold contacts 30 open but the current is too small to operate bell 32.

The operation of the system is as follows:

If a fire should occur, say in zone 2, resistance 78 would be shorted out by a connection of much smaller resistance which would be thrown across leads 94 and 95 either by thermostats 76 when the same are sufficiently heated or by manual switch 77, thus permitting a larger current to flow in the zone 2 circuit. Coil 43 will be sufficiently energized by this increased flow of current to operate annunciator drop 42 thus causing the zone 2 identification card to be visible as shown in Fig. 2. As drop 42 falls into signaling position, it closes contacts 48 (see Fig. 7) thereby closing (tracing backwards) a control circuit from line 87 through lead 82, bus bar 49, lead 101, contacts 46, lead 102, to said upper contact 48, and then to lead 103, bus bar 50, lead 104, fire signal relay coil 33, leads 105, 83, lower contact of relay 25 back to battery line 90. Relay coil 33 being thus energized is effective to actuate contacts 35 to close a circuit (tracing backwards) from line 90 through leads 83, and 105 to said contacts 35 and then to lead 106, fire light 23, leads 107, 82, top contact of relay 25 to line 87. A second circuit is closed from line 90 through leads 83, 105, contacts 36, lead 99, bell 32, leads 100, terminal bar 73, lead 82, top contact of relay 25 to line 87, thus causing said bell to ring. A third circuit is closed from line 90 through leads 83, 105, contacts 35, lead 106, the normally closed fire gong cutout switch 19, lead 108, gong 37, leads 109, 82, terminal bar 73, lead 82, top contact of relay 25 back to line 87. The gong 37 may be silenced by merely

opening switch 19 which may be accomplished, as pointed out above, by opening door 9 about three inches. Thus, when a fire occurs, a visual signal indicating the zone in which the fire is located, a visual lamp signal marked "Fire", a remote bell signal and a local bell signal are given. When normal conditions have been restored in the affected zone, the system may be restored to normal operation by resetting annunciator drop 42 by manually turning handle 62. Contacts 48 are adapted to spring open when drop 42 is raised, (see Fig. 7) thus opening the control circuit to fire alarm relay 33. Upon the de-energization of said latter relay, contacts 35 and 36 resume a normal open position thereby breaking the signal circuits to bell 32, gong 37 and light 23.

If, at any time, a break should occur in one of the leads feeding a signaling circuit, for example in lead 94 of zone 2, or if any fault should occur therein, current would cease to flow in coil 44, allowing contacts 45 and 46 to close downwardly. Upon the closure of contact 45 downwardly, coil 43 is placed in a circuit connected directly across battery 65 through line 87, top contact of relay 25, lead 82, bus bar 49, lead 92, to said coil 43, then to lead 97, contact 45 lead 110, bus bar 51, leads 111, 105, lead 83, lower contact of relay 25 to battery line 90. Coil 43 will now be sufficiently energized to actuate drop 42 thereby giving a visual indication of the zone line in which the trouble exists. Another circuit is closed through lower contact 46 which goes from line 87 top contact of relay 25 through lead 82, bus bar 49, lead 101, lower contact 46, lead 113, bus bar 52, lead 112, to selector switch 17. From the latter, the light current may go to trouble light 22 through lead 114 and back to line 90 through leads 115, 83, or it may split between light 22 and a buzzer 31 depending upon the position of said switch, the flow of current to said buzzer being through lead 116 and back to line 90 through leads 117, terminal bar 73, 96, 83. Thus, when there is trouble, such as an open circuit in one of the signaling circuits, a visual signal indicating the affected circuit, a trouble light or a trouble light and a buzzer indicate this fact. As soon as the existing trouble is corrected, the system may be restored to normal operation by manually resetting handle 62.

The signal circuit to bell 32 is also under constant electrical supervision so that a break in the leads to this bell will cause coil 29 to be de-energized and permit contacts 30 to become closed thus closing a signal circuit from line 87 through leads 82, 118, contacts 30, lead 119, contacts 34, up lead 113, to switch 17, thence to light 22 or to both light 22 and buzzer 31 depending upon the position of said switch. These signals are automatically removed when the trouble is eliminated.

In the event service battery 65 becomes exhausted, current ceases to flow through throw-over relay coil 25, so armature 81 is moved into engagement with contacts 80 by spring 84 whereupon the system is supervised by current from reserve battery 66 through lead 120, switch 64, lead 121 into the system through lead 82 and back through leads 83, 122, 123 to battery 66. Under these conditions, the power supply to power failure relay 26 is interrupted and the coil thereof is de-energized. Contacts 28 are then allowed to close completing a circuit from line 121 through leads 82 to contacts 28, lead 124 to selector switch 18, thence to lamp 24 through lead 125 and back to line 122 via leads 115, 83, or it may

split depending upon the position of said switch and go also to a power failure bell 27 by way of lead 126, cutout switch 20, lead 127 and back to line 122 through leads 128, 96 and 83. To remove these power failure signals and connect the exhausted service battery 65 across charging lines 68 and 69, it is only necessary to throw switch 64 to the left. Battery 66 will then discharge through line 120 to energize coils 25 and 26 whereby armature 81 is pulled to the left into engagement again with contacts 79, and contacts 28 are opened thereby opening the circuit to power failure light 24 and bell 27 and restoring the system to normal operating condition.

There is thus provided a novel annunciator system wherein novel means are employed for maintaining the same under constant electrical supervision and wherein a novel combination of electric circuits comprising a plurality of signaling, control and signal circuits, all of said circuits being adapted to be supplied by a common source of electrical energy. There is also thus provided a novel control panel which is small and inexpensive and which is so constructed that the system may be readily expanded or repairs readily effected.

Although only one embodiment of the invention has been illustrated and described, it is to be expressly understood that the same is not limited thereto but may be employed in various other forms. For example, the various types of signals employed may be interchanged or any other suitable signals may be substituted therefor. Any suitable source of electrical energy may be substituted for the storage batteries herein employed. It is also to be expressly understood that the annunciator provided is not limited to the illustrated use as a fire alarm system but that the same may be employed in various other capacities such as power house annunciators and so forth. Various changes may be made in the details and arrangements of the parts illustrated as will now be apparent to those skilled in the art. Reference will therefore be had, primarily, to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. An alarm annunciator system comprising a plurality of normally closed protection circuits in different zones, each of said circuits including means for maintaining a supervisory current therethrough and means for causing an increased current in the circuit in response to an alarm condition, a separate drop annunciator for each protection circuit having its current responsive drop operating means included in its circuit, the operating means for each annunciator being ineffective to operate its drop in response to the supervisory current flowing in its circuit but responsive to operate its drop due to the increased current in its circuit, audible alarm means, means operated by any one of the drops to operate the audible alarm means, other current responsive means one for each circuit and included therein, said other current responsive means for such circuit being normally operative by the supervisory current in its circuit and rendered inoperative by the cessation of current flow therein, means controlled by each of said other current responsive means when rendered inoperative for causing a supply of sufficient current to its corresponding drop operating means to thereby cause the drop to operate independently of the current in its protection circuit, other audible signalling means and means whereby it is operated by any one of

the other responsive means when this means is rendered inoperative, visual differentiating means for visually indicating whether the drop operation is due to the increase in current in the protection circuits or in response to the inoperative condition of the other responsive means, and means whereby said differentiating means is controlled by the combined conditions of the drops and the other current responsive means.

2. An alarm annunciator system comprising a plurality of normally closed protection circuits in different zones, means for maintaining current in said circuits, means for causing an increase of current in response to an alarm condition, a separate drop annunciator for each protection circuit having its current-responsive drop-operating means included in its circuit, said operating means being ineffective at said maintained current but effective to operate its drop upon said increase, means actuated upon actuation of said drop, means common to said circuits for indicating said alarm condition, a second current responsive means connected in each circuit, said second responsive means being effectively operated by the normal current in the circuit, means whereby the drop actuated means operates said alarm condition indicating means provided the second responsive means is effectively operated, means common to all the circuits for indicating a second condition, means whereby said second current responsive means operates the corresponding drop and said second condition indicating means upon failure of said maintained current, whereby each drop is operated upon ei-

ther increase or failure of the current in the corresponding protection circuit, the alarm condition indicating means is operated only upon an increase of current in any circuit and the second condition indicating means is operated only upon failure of current in any circuit.

3. An alarm annunciator system comprising a plurality of normally closed protection circuits in different zones, each of said circuits including means for maintaining a supervisory current therethrough and means for causing an increased current in the circuit in response to an alarm condition, a separate drop annunciator for each protection circuit having its current-responsive drop-operating means included in said protection circuit, said responsive means being ineffective to operate its drop in response to said supervisory current but effective in response to the increased current, a circuit partially closed upon actuation of said drop, a first alarm means and a second alarm means common to all of the circuits, a second current-responsive means in each of said circuits, said second responsive means completely closing said partially closed circuit to actuate said first alarm means upon energization thereof said second means opening said partially closed circuit to prevent actuation of said first alarm means and simultaneously closing circuits to cause actuation of said drop and said second alarm means upon de-energization thereof, whereby a fault in said protection circuit is indicated in contradistinction to said alarm indication.

MORRIS F. KETAY.