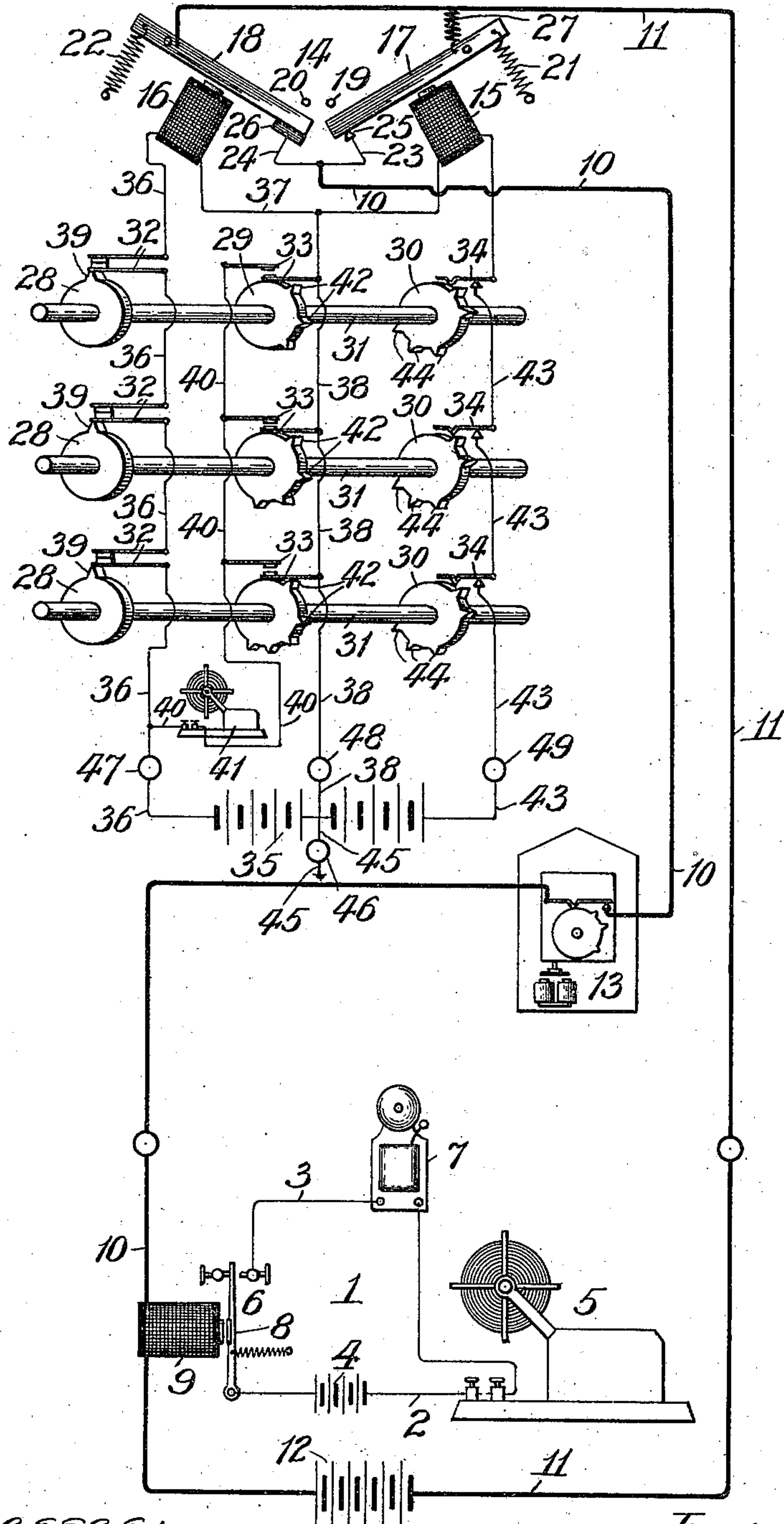


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FIRE ALARM SYSTEM.
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FIRE-ALARM SYSTEM.

964,086.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM CARROLL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Fire-Alarm Systems, of which the following is a specification.

My invention relates to the class of fire-alarm systems in which a signal indicating a fire in a particular locality is transmitted to a central receiving station, either by the manual operation of a fire-alarm box or the automatic operation of a suitable signal-communicating device.

One of my objects is to provide an improved fire-alarm system by which operation of a signal-communicating box in any room of a building will cause an alarm of fire to be communicated to the central receiving station to apprise it of the building in which the fire is located, and cause a suitable indicating-device located in or near the building, and accessible to the firemen, to indicate the particular room in which the fire is located.

A further object is to provide a system by which impairment of a building circuit, as by the breaking, short-circuiting or grounding of its wires, or in other words "trouble" on the building circuit, will not operate to communicate to the central station a false alarm of fire.

In the accompanying drawing, I have illustrated my invention, by diagrammatic representation, as embodied in a fire-alarm system employing manually-operated electrical means for transmitting the fire-alarm signals.

The central station for receiving the fire-alarm signals is represented at 1, this station, as is common in systems now generally employed, comprising an electrical circuit, the wires of which are represented at 2 and 3 through which current is supplied as by the battery 4; and an indicating-device shown in the form of an electrically-operated ticker 5 of well-known construction, a relay 6 and a sounding-device 7, shown as an electric bell, all interposed in series in this circuit. In the particular arrangement illustrated, the armature 8 of the relay 6 is shown as attracted to its electro-magnet 9 to maintain the central-station circuit open, whereby operation of the relay will cause the current to traverse this circuit intermittently and thus actuate the ticker 5 and the sounding-device 7, for the usual purpose.

The magnet 9 of the relay 6 is interposed in the main-line circuit which contains the devices for operating the relay. The wires of the main-line circuit are represented at 10 and 11 and the source of current supply at 12, the latter being in the form of battery. The magnet 9 and a street alarm-box 13, of a well-known construction, are illustrated as interposed in the wire 10 in series with each other, it being understood that as many street-boxes may be interposed in the main-line circuit as is found desirable.

At 14 I have diagrammatically illustrated circuit-opening-and-closing mechanism, it being designed that this mechanism be located in or near the building to be protected. This mechanism comprises a pair of magnets 15 and 16, and spring-controlled armatures 17 and 18 coöperating, respectively, therewith, stops 19 and 20 being provided for preventing undue swinging of the armatures away from the magnets 15 and 16 when the latter are deenergized, under the influence of the armature-springs 21 and 22. The line-wire 10 adjacent to the armatures 17 and 18 is provided with branches 23 and 24, the wire 23 terminating in a contact-point 25, preferably of platinum, and the wire 24 terminating in a contact 26 of relatively large area, the contacts 25 and 26 coöperating with the armatures 17 and 18, respectively, in a manner hereinafter described. The armature 17 is connected with the wire 11 preferably through the medium of a resistance-coil 27, and the armature 18 direct to the wire 11 beyond the armature 17. By this arrangement, the greater portion of the current in the main-line circuit, which is normally closed, passes through the armature 18 and contact 26, and thus the relatively sensitive contact 25 is not liable to impairment in case of overcharge of the main line, as by the crossing of wires, or interference therewith by lightning.

It is designed that there be located in each of the rooms of a building to be protected mechanism for transmitting an alarm signal over the main-line to the receiving-station 1 to apprise the operator at such station of the building in which the fire is located and register on an indicating-device in or near the building and accessible to the firemen, the particular room in which the fire is occurring. Each of these last referred-to mechanisms, in its preferred embodiment, comprises a set of three wheels 28, 29 and

30 mounted on a shaft 31 to rotate therewith, which latter may be operated to rotate it by any suitable device, as for instance the well-known manually-operated pull devices (not shown) commonly employed in street fire-alarm boxes, it being designed that the shaft and wheel mechanism for each room be located in a box (not shown) which may be supported in any suitable location in a room of the building. The wheels 28 of each of the mechanisms for the several rooms operate in conjunction with any suitable contact-making-and-breaking devices, as for instance those usually employed in fire-alarm boxes and diagrammatically represented at 32; and each of the other wheels 29 and 30 of each set of mechanisms co-operate with contact-making-and-breaking devices 33 and 34, respectively.

The contact-devices 32, in the particular system illustrated, are arranged in series in a circuit supplied with current from any suitable source, as from the batteries 35 and including the magnet 16, the wires of this circuit being diagrammatically represented at 36, 37 and 38. Each of the wheels 28 carries means for operating its respective contact-device, the means shown comprising a stud 39 on the periphery of each wheel 28 which normally holds the members of the respective contact-devices 32 in engagement, and thus normally maintains the circuit in which they are located in closed condition, and holds the armature 18 normally in engagement with the contact 26. The contact-devices 33 are arranged in parallel in a normally open circuit supplied with current from the battery 35, the main wires of this circuit being represented at 36, 38 and 40. An indicating-device which may be placed in any suitable location in or near the building and accessible to the firemen, is represented at 41 as being interposed in the wire 40 of this circuit, the indicating-device illustrated being of the well-known electrically-operated ticker-type.

Each of the wheels 29, which co-operates with its respective contact-device 33, is provided with means for producing intermittent actuation of the latter, the means illustrated comprising studs 42 which are so arranged on the periphery of each wheel as to cause the respective contact-devices 33 to be intermittently operated. The studs on all of the wheels 29 are so arranged as to produce in their co-operating contact-devices 33 a dissimilar intermittent motion, as, for example, in the arrangement illustrated, the studs are so disposed on the several wheels as to cause a different marking on the ticker 41 when different ones of the wheels 29 are operated. Thus when the uppermost one of the wheels 29 illustrated in the drawing is rotated, this ticker will be operated to record three dots, the last two close together and the first sepa-

rated sufficiently far from the last two as to indicate on the ticker the number 12, the wheel 29 below the uppermost one, 13, and the next lower wheel, 14. The contact-devices 34 are arranged in series in a circuit in which the magnet 15 is located, the wires of this circuit being represented at 38 and 43, shown as connected with the battery 35. This circuit, in the system illustrated, is a normally closed one for holding the armature 17 normally in engagement with the contact 25. Each wheel 30 is provided with means for producing intermittent actuation of its co-operating contact-device 34 for producing intermittent oscillation of the armature 17 under the influence of the magnet 15 and its spring 21. The means shown on the wheels 30 for producing the intermittent motion referred to comprise studs 44 adapted, when the wheel 30 is rotated, to intermittently break the circuit through its respective contact-device 34, the arrangement of the studs 44 on each wheel 30 being identical to cause the armature 17 to oscillate in such a way as to intermittently break the main-line circuit when the armature 18 is out of engagement with the contact 26, and indicate on the ticker 5 a particular number, by separated dots, as described in case of the wheels 29, irrespective of the particular one of the wheels 30 operated, the number thus indicated on the ticker 5 corresponding to the number identifying the building at the central office.

From the foregoing description, it will be understood that the main-line circuit, including the street alarm-box, or boxes, 13, as the case may be, and the mechanism 14; and the circuits containing the contact-making-and-breaking devices 32 and 34 are normally closed; that the circuit containing the contact devices 33 is normally open; and that the wheels 28, 29 and 30 of each set of mechanisms rotate simultaneously. Thus when a box containing the wheels referred to is operated, the stud 39 is immediately withdrawn from engagement with its co-operating contact-device 32, thereby breaking the circuit through the magnet 16 and releasing the armature 18 which swings out of engagement with the contact 26 and permits all of the current in the main-line circuit to pass through the armature 17 and its co-operating contact 25. Continued turning of the shaft 31 of the box "pulled", causes the wheels 29 and 30 thereon to engage at their studs with the respective contact-devices 33 and 34, with the result of intermittently opening and closing the circuits in which they are interposed, with the result of indicating on the tickers 41 and 5, respectively, numbers, by separated dots impressed upon the tapes of the tickers, corresponding to the room in which the box operated is located and the building in which the fire

exists. The ticker 41 thus indicating the room in which the fire is located affords means to which the firemen, upon reaching the building, may refer for ascertaining the exact location of the fire.

I have diagrammatically illustrated various mechanisms operating in conjunction with the various circuits of the system as they are constructed along lines well understood in the art. Thus it will be understood that the operating mechanism for the shafts 31 is such that it will cause the latter to be arrested in their rotation, when operated, to cause the wheels 28 carried thereby to occupy the normal positions represented in the drawing.

It is manifest that any suitable form of contact-making-and-breaking devices may be employed for coöperating with the wheels of the boxes in each room of the building, and that any other suitable means for intermittently actuating the contact-devices may be employed in lieu of those illustrated.

It is within my invention to include in the main-line circuit as many street-boxes as desired, and also to provide for the protection of a plurality of buildings, in which case the hereinbefore described mechanisms for each room of a building would be multiplied and the relay-devices 14 for opening and closing the main-line circuit would be multiplied and arranged in series in the main line, one for each building to be protected in the main-line circuit. In such case, each building would be identified at the central office by a different number, and the wheels 30 in the rooms of the respective buildings would be so constructed as to operate the armatures 17 for the different buildings in a manner to indicate on the ticker 5 the number of the building in which any particular wheel is operated.

It will be noted that in a fire-alarm system containing my invention, the transmission to the central office of a false alarm of fire by the breaking, grounding or short-circuiting of any of the wires in the buildings connected with the main-line circuit is impossible; and that an alarm can only be transmitted to the central station by the operation of any one of the devices provided for this purpose.

It will be observed that the diagram shows a ground-wire 45 leading from the battery 35 at a point which will complete a circuit through this wire in case of the grounding of any of the wires of the circuits in the building. In this wire 45 I interpose any suitable form of test-device, as for instance, the lamp illustrated diagrammatically at 46, that a signal may be flashed in case of the grounding of any of the wires in the building circuits. In addition to the testing-device 46, I provide three other testing-devices, which may be lamps, as illus-

trated at 47, 48 and 49, respectively, or any other suitable form of device either of the flashing, sounding, or otherwise indicating, variety, which are interposed in the wires 36, 38 and 43, respectively, and serve to give a signal in case of "trouble" on the lines in the building.

While I have illustrated and described the means for actuating the mechanism 14 and ticker 41 for effecting transmission of signals, as manually operated, I do not wish to be understood as limiting my invention to the particular form of manually operated mechanism illustrated, or, in fact, to manually operated mechanism, as it is manifest that it is within the spirit of my invention to operate them in any other suitable manner. It is also manifest that any other suitable form of indicating-device for receiving signals at the central station and indicating at an accessible place in or near the building the room in which the fire is located, may be provided in lieu of the ticker-type of devices illustrated.

While I prefer to provide the circuits containing the contact-devices 32 and 34 in normally closed condition, and the circuit containing the contact-device 33 and indicating-device 41 in open condition, it is manifest this condition may be varied as desired without departing from the spirit of my invention.

The batteries have been illustrated in the drawing as a source of electrical supply, but it will be readily understood that the operation of my fire-alarm system is not dependent in its operation upon this source of electrical energy, as any other form may be employed.

What I claim as new and desire to secure by Letters Patent, is—

1. In a fire-alarm system, the combination of a main-line electrical circuit, an indicating-device controlled by the opening and closing of said circuit, a circuit-opening and closing device in said circuit, a shunt in said main-line circuit, a circuit-opening-and-closing device for controlling the passage of current through said shunt, a second electrical circuit for controlling said first-named circuit-opening-and-closing-device, a third electrical circuit for controlling said second-named circuit-opening-and-closing device, means in said second circuit for opening and closing said second circuit, and means in said third circuit for opening and closing said third circuit, for the purpose set forth.

2. In a fire-alarm system, the combination of a main-line electrical circuit, an indicating-device controlled by the opening and closing of said circuit, a circuit-opening-and-closing device in said circuit, a shunt in said main-line circuit, a circuit-opening-and-closing device for controlling the passage of current from the main-line through

the shunt, a series of devices adapted to be independently operated for operating said main-line circuit-opening-and-closing device, an electrical circuit for controlling said second-named circuit-opening-and-closing device, and means in said last-named circuit for opening and closing said circuit, for the purpose set forth.

3. In a fire-alarm system, the combination of a main-line electrical circuit, an indicating-device controlled by the opening and closing of said circuit, a circuit-opening-and-closing device in said circuit, a shunt in said main-line circuit, a circuit-opening-and-closing device for controlling the passage of current from the main line through the shunt, a second electrical circuit containing a series of devices adapted to be independently operated for operating said main-line circuit-opening-and-closing device, a third electrical circuit for controlling said second-named circuit-opening-and-closing-device, and means in said last-named circuit for opening and closing said circuit, for the purpose set forth.

4. In a fire-alarm system, the combination of a main-line electrical circuit, an indicating-device controlled by the opening and closing of said circuit, a circuit-opening-and-closing device in said circuit, a series of devices adapted to be independently operated for operating said main-line circuit-opening-and-closing device to transmit a signal to said indicating-device, a second electrical circuit and an indicating-device interposed therein, and a series of circuit-opening-and-closing devices, each constructed and arranged, when actuated, to transmit to said second-named indicating-device a different signal, for the purpose set forth.

5. In a fire-alarm system, the combination of a main-line electrical circuit, an indicating-device controlled by the opening and closing of said circuit, a circuit-opening-and-closing device in said circuit, a second electrical circuit for controlling said circuit-opening-and-closing device, a series of devices interposed in said second circuit and adapted to be independently operated for operating said main-line opening-and-closing device to communicate a signal to said indicating-device, a third electrical circuit and an indicating-device interposed therein, and a series of devices interposed in said third circuit and each adapted to be operated independently of the others for transmitting to said third circuit indicating-device a different signal, for the purpose set forth.

6. In a fire-alarm system, the combination of a main-line electrical circuit, an indicating-device controlled by the opening and closing of said circuit, a circuit-opening-and-closing device in said circuit, a second electrical circuit for controlling said circuit-

opening-and-closing device, a series of devices adapted to be independently operated for operating said main-line circuit-opening-and-closing device to transmit a signal to said indicating-device, a shunt in said main-line circuit, a circuit-opening-and-closing device for controlling the passage of current from said main-line through said shunt, a third electrical circuit containing means adapted to be operated to actuate said shunt-opening-and-closing device, a fourth electrical circuit having an indicating-device interposed therein, and a series of devices in said fourth circuit each being adapted to be independently operated for transmitting a different signal to said second-named indicating-device, for the purpose set forth.

7. In a fire-alarm system, the combination of a main-line electrical circuit, an indicating-device controlled by the opening and closing of said circuit, a circuit-opening-and-closing device in said circuit comprising an electro-magnet and an armature cooperating therewith and serving, when in one position, to complete the main-line circuit and when moved from said position to break it, a second electrical circuit in which said magnet is interposed, a series of devices adapted to be independently operated for controlling the energizing of said magnet to transmit a signal to said indicating-device, a shunt in said main-line circuit, a circuit-opening-and-closing device for controlling the passage of current from said main-line through said shunt, a third electrical circuit containing means adapted to be operated to actuate said shunt-opening-and-closing device, a fourth electrical circuit having an indicating device interposed therein, and a series of devices in said fourth circuit each being adapted to be independently operated for transmitting a different signal to said second-named indicating-device, for the purpose set forth.

8. In a fire-alarm system, the combination of a main-line electrical circuit, an indicating-device controlled by the opening and closing of said circuit, a circuit-opening-and-closing device in said circuit, a second electrical circuit for controlling said circuit-opening-and-closing device, a shunt interposed in said main-line circuit, a third electrical circuit containing means for controlling the passage of current from the main-line through said shunt, a fourth electrical circuit and an indicating-device interposed therein, sets of circuit-controlling devices each comprising means interposed in said second-named circuit for operating said main-line circuit-opening-and-closing device to transmit a signal to said first-named indicating-device, means in said third circuit for operating said shunt-controlling device, and a plurality of means in said fourth circuit for transmitting a signal to said second-

named indicating-device, each of the means in said fourth circuit being constructed and arranged to transmit to said second-named indicating-device a different signal, for the purpose set forth.

9. In a fire-alarm system, the combination of a main-line circuit, an indicating-device controlled by the opening and closing of said circuit, a circuit-opening-and-closing device in said circuit, a normally closed second circuit for controlling said circuit-opening-and-closing device, a shunt interposed in said main-line circuit, a third normally closed circuit containing means for controlling the passage of current from the main-line through said shunt, a fourth normally open electrical circuit and an indicating-device interposed therein, sets of circuit-controlling devices each comprising means interposed in said second-named circuit for operating said main-line circuit-opening-and-closing device to transmit a signal to said first-named indicating-device, means in said third circuit for operating said shunt-controlling device, and means in said fourth circuit for transmitting signals to said second-named indicating device, each of the means in said fourth circuit being constructed and arranged to transmit to said second-named indicating-device a different signal, for the purpose set forth.

10. In a fire-alarm system, the combination of a main-line electrical circuit, an indicating device controlled by the opening and closing of said circuit, a circuit-opening-and-closing device in said circuit, a second electrical circuit for controlling said circuit-opening-and-closing device, a shunt interposed in said main-line circuit, a third electrical circuit containing means for controlling the passage of current from the main-line through said shunt, a fourth electrical circuit and an indicating-device interposed therein, sets of circuit-controlling devices each comprising three contact-making-and-breaking devices with means operating in conjunction with each other for actuating said last referred-to devices, one of each of the contact-making-and-breaking devices of each set being interposed in said second-named circuit for operating said main-line circuit-opening-closing device, another of the contact-making-and-breaking devices of each set being interposed in said third circuit for operating said shunt-controlling device, and the other contact-making-and-breaking device of each of said sets being interposed in said fourth circuit, each of the

means for actuating the contact-making-and-breaking devices interposed in said fourth circuit being constructed and arranged to operate its cooperating contact-making-and-breaking device in a manner to cause a different signal to be transmitted to said second-named indicating-device, and the means for actuating the contact-making-and-breaking-devices in said second circuit being constructed and arranged to transmit to said first-named indicating-device a similar signal, for the purpose set forth.

11. In a fire-alarm system, the combination of a main-line electrical circuit, an indicating-device controlled by the opening and closing of said circuit, a circuit-opening-and-closing device in said circuit comprising an electro-magnet and a cooperating armature adapted to close the main-line circuit when in one position and to open it when moved from such position, a second electrical circuit in which said electro-magnet is interposed, a shunt in said main-line circuit beyond said electro-magnet and including an armature in circuit therewith adapted, when in one position, to cause the current in the main-line to pass through said shunt, a second electro-magnet for operating said last-named armature, a third electrical circuit in which said last-named magnet is interposed, a fourth electrical circuit and an indicating-device interposed in said circuit, sets of circuit-opening-and-closing mechanisms, each comprising three contact-making-and-breaking devices interposed, respectively in said second, third and fourth circuits, and three wheels constructed and arranged to be rotated simultaneously and engage with said last referred to contact-making-and-breaking devices, the wheels cooperating with the contact-making-and-breaking devices in said third circuit being constructed and arranged to cause the circuit through said shunt-magnet to first occur, and each of the wheels for controlling the circuit-opening-and-closing devices in said second and fourth circuits, respectively, being constructed and arranged to cause the current through said first-named electro-magnet to be intermittently broken to transmit a signal to said first-named indicating-device, and operate said second-named indicating-device to indicate thereon dissimilar signals, for the purpose set forth.

WILLIAM CARROLL.

In presence of—

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