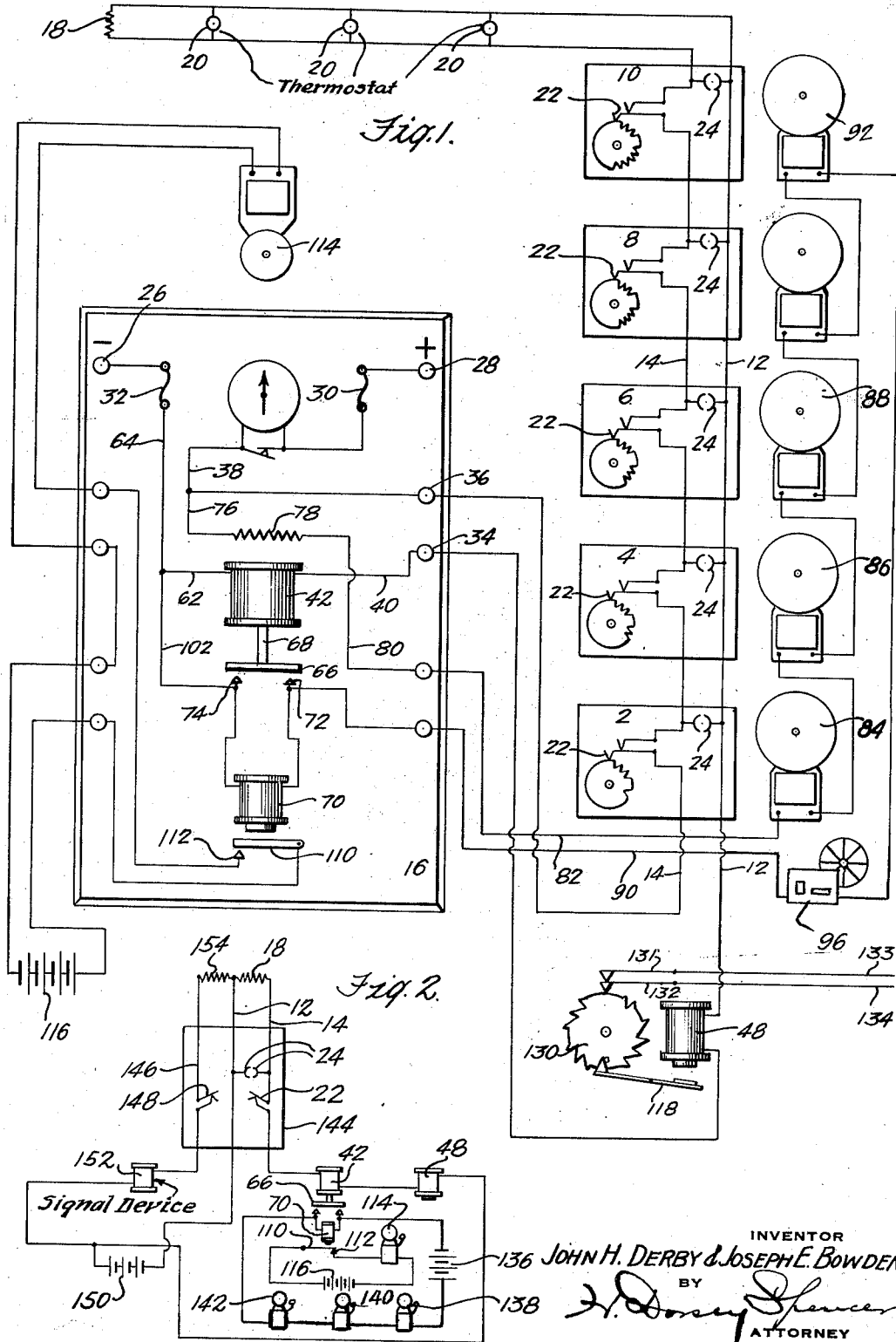


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ELECTRIC SIGNAL WIRING SYSTEM

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ELECTRIC-SIGNAL WIRING SYSTEM.

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To all whom it may concern:

Be it known that we, JOHN H. DERBY and JOSEPH E. BOWDEN, citizens of the United States, residing at New York, N. Y., and Newark, New Jersey, respectively, have invented certain new and useful Improvements in Electric-Signal Wiring Systems, of which the following is a clear, full, and exact description.

10 This invention relates to electric wiring systems, and particularly to the wiring of electric signaling systems, and a general object of the invention is to reduce to a practicable minimum the labor, the material and the skill required to instal a signaling system in which a plurality of signaling devices are to be separately controlled from each of a series of signal transmitting stations.

20 The invention is shown as embodied in a fire alarm signaling system of the closed circuit, automatic trouble detector type, but it will be understood that the invention is not restricted to the illustrated embodiment and uses.

25 An important feature of the invention, as shown in the illustrated embodiment, is the utilization of two wires for connecting the series of signal transmitting stations, with make and break means at each station to send one class of signals and other means at each station for short-circuiting a resistance in the circuit, which is common to all of said stations, for sending another class of signals or controlling another signaling apparatus or another set of signaling apparatus.

30 Other objects, important features and advantages of the invention will appear from the following description and claims when considered in connection with the accompanying drawings, in which

35 Fig. 1 is a wiring diagram showing the invention embodied in a fire-alarm signaling system adapted for transmitting both a local alarm and an alarm to fire department headquarters; and

40 Fig. 2 is a diagram showing the invention embodied in a three-wire circuit, including both a fire-alarm circuit of the type shown in Fig. 1 and a watchman's circuit.

In the embodiment of the invention illus-

trated in Fig. 1, which shows the wiring of a fire-alarm system adapted to transmit either a local or an outside alarm at the will of the one who operates the box at the transmitting station, and which is particularly adapted for a building of several stories in height, such, for example, as an apartment building, the signal stations are shown at 2, 4, 6, 8, 10, and each comprises a signal transmitting box or other suitable structure through which pass two wires 12 and 14 of the two-wire transmitting circuit, having at its end remote from the local receiving station or board 16 a resistance 18 sufficient to cut down the normal current flowing through the circuit below that required to operate one class of signaling apparatus, for example, that which controls the transmission of the fire-alarm to fire department headquarters outside the building. It will be noted that the resistance 18 bridges the two sides of the circuit formed by the wires 12, 14, and is in parallel with thermostatically operated circuit-closers 20 adapted to short-circuit the resistance 18 when they are operated, these circuit-closers being between the resistance 18 and the source of current supply and likewise bridging the two sides 12 and 14 of the circuit.

45 At each of the signal boxes 2, 4, 6, 8 and 10 is provided make-and-break means 22 for sending a signal through the circuit, the make-and-break means 22 of the several stations being in series upon one side of the two-wire circuit 12 and 14, being shown in Fig. 1 in series in the side 14, and each of said means is normally in circuit-closing position. There is also provided at each of the stations 2, 4, 6, 8, 10, means 24 for bridging the two sides 12, 14 of the circuit and short-circuiting the resistance 18 to increase the current flow in the circuit. The means 24 may comprise any suitable circuit-closing mechanism of well-known construction, normally in open position in the box, or it may comprise spaced terminals adapted to be closed by a key not normally in the box.

50 The current normally flowing through the closed circuit may be from any suitable source, such as a direct current lighting cir-

cuit, and is shown as brought in upon the board 16 through the leads 26 and 28, and preferably passes through fuses 30 and 32. The normally closed circuit controlled by the signal transmitting means comes in upon the board 16 from said signal stations at 34 and 36. This circuit will now be traced, beginning with the lead 28 from the source of current supply. From the lead 28, the current passes through the fuse 30, through the wire 38, to the post 36 where the wire 14 from the signal stations 2, 4, 6, 8, 10 and from the thermostatic circuit closers 20 comes in upon the board 16. The current then passes through the wire 14 of the two-wire circuit and through the make-and-break signal transmitting devices 22, through the resistance 18 at the end of the two-wire line, back through the wire 12, trip box 48 controlling the sending of the signal to the fire department, punching register 96, to the post 34, upon the board 16, then through the wire 40, solenoid 42, wires 62, 64 and fuse 32 back to the other lead 26 from the source of current supply.

The solenoid 42 controls a switch 66 carried by the solenoid core 68, which is adapted to short-circuit a trouble relay 70 in a normally closed circuit, now to be described, by bridging the terminals 72 and 74. The circuit in which the trouble relay 70 is situated also includes a number of local signaling devices adapted to be controlled by the make-and-break signal transmitting means at the respective signal transmitting stations. Starting from the lead 28, the circuit which includes the trouble relay 70 runs through the fuse 30, wire 38, wire 76, resistance 78, wires 80, 82, single-stroke gongs 84, 86, 88, wire 90, trouble relay 70, wire 102, wire 64 and fuse 32, back to lead 26. Through this circuit flows only a small current. This current, although insufficient to operate the gongs 84, 86, 88, 92, etc., is, however, sufficient to hold the armature 110 of the trouble relay in open circuit position with respect to the terminal 112 of a local trouble circuit, including a bell 114, this circuit being connected to a local battery 116.

The trip coil 48 is arranged to pull the armature 118 when the resistance 18 is short-circuited and the current flow increases, thus rocking the arm 126 out of engagement with the pin 129 on the signal transmitting wheel 130. This signal transmitting wheel may be of any well-known construction having depressions to permit the separation of the terminals 131 and 132 of the circuit wires 133 and 134 running to the fire department, thus transmitting a characteristic make-and-break signal to the fire department.

From the foregoing description, the operation of the fire-alarm system will be under-

stood. As shown in Fig. 1 of the drawings, the parts are all in the position in which the circuit is closed through all of the transmitting devices 22 and the resistance 18 has not been cut out. With the parts in the position shown in Fig. 1, the minimum or normal current is flowing through the circuit. This current is sufficient to maintain the switch 66 in the position shown in Fig. 1. The minimum current is also passing through the circuit, which includes the trouble relay 70 and the milli-ampere meter 106.

If it is desired to send a local signal by means of one of the make-and-break devices 22, it will be seen that when any one of these devices is operated to break the circuit which includes the wires 12 and 14 and the resistance 18, the current flowing through the solenoid 42, which has been sufficient to hold the switch 66 in the position shown in Fig. 1, will be interrupted and the switch 66 will engage the terminals 72 and 74 and short-circuit the trouble relay 70, thus de-energizing this relay and permitting its armature 110 to engage the terminal 112 and close the circuit through the trouble gong 114 and the battery 116. The gong 114 will therefore ring as long as the circuit through the wire 14 is broken. Short-circuiting of the trouble relay 70 also causes an increased flow of current through the circuit, which includes the gongs 84, 86, 88, 92 and the punching register 96. As hereinabove suggested, the gongs 84, 86, 88 and 92 are preferably single stroke gongs so that with the breaking of the circuit by any transmitter 22, each gong will give one signal.

As soon as the circuit through the wires 12, 14 and the signal transmitting devices 22 is again closed, the switch 66 will again be lifted, thus bringing the trouble relay 70 again into its circuit, thereby causing the circuit through the trouble gong 114 to be broken and again deenergizing the solenoids of the gongs 84, 86, 88 and 92 sufficiently so that they will not hold the strikers in bell-engaging position.

To maintain the current flow through the gongs 84, 86, 88 and 92 below operating level in the circuit which includes the trouble relay 70, the relay magnet 70 is wound for high resistance, thus cutting down the current flowing through this circuit until the magnet 70 is short-circuited by the dropping of the switch 66.

It will be understood, of course, that any suitable mechanism may be provided for repeating the make-and-break signal through the transmitting means 22 a number of times to make a characteristic signal for the box, such means being well known in the art. Furthermore, the signal may be recorded upon a tape by the punching register 96 of well known construction.

When it is desired to send a signal to fire department headquarters, the resistance 18 is short-circuited at any one of the transmitting stations 2, 4, 6, 8, and 10 through the bridging or short-circuiting means 24. The increase of current in the circuit caused by cutting out the resistance 18 operates the trip relay coil 48 to pull the armature 118 to release the signal transmitting wheel 130, which as it rotates permits the separation of the terminals 132, 131 in a well-known manner, thereby causing a characteristic make-and-break signal to be transmitted to the fire department. The mechanism is preferably so constructed that the parts must be reset by hand.

In Fig. 2 of the drawings is shown a modification of the invention in which the normal signaling system shown in Fig. 1 is enlarged to include a local watchman's circuit by the addition of a single wire to the signal transmitting line, that is, by running through the signal boxes or stations three wires instead of two. In Fig. 2 the wires 12 and 14, resistance 18, the signal transmitting means 22, the short circuiting means or plug switch 24, the solenoid 42, the switch 66 and the trip coil 48 arranged to send a signal to fire department headquarters correspond to the like numbered parts in Fig. 1; also the trouble relay 70, battery 116, relay gong 114, the armature 110, and the terminal 112 correspond to the like numbered parts in the trouble circuit shown in Fig. 1. The local circuit corresponding to that through the gongs 84, 86 and 88 of Fig. 1 is shown in Fig. 2 as fed by a battery 136, although of course it may receive current in the same manner as the corresponding circuit in Fig. 1, and this circuit includes a series of single stroke gongs 138, 140, 142 corresponding to the gongs 84, 86 and 88.

Through each of the signal transmitting boxes, of which one is shown at 144, a third wire 146, in addition to the wires 12 and 14, is passed, in which is located preferably make-and-break signal transmitting means 148 for a local watchman's circuit. Both this circuit and the circuit which includes the resistance 18 are shown as fed by a battery 150, for which of course may be substituted direct current from the lighting means as shown in Fig. 1.

The watchman's circuit, which may include any suitable signaling apparatus 152, is in parallel with the circuit through the wires 12 and 14, the wire 12 constituting a common return wire for the two circuits and not including any of the signaling apparatus or any of the make-and-break signal transmitting means. It will be noted also that the watchman's circuit is shunted into the circuit through the wires 12 and 14 at a point between the resistance 18 and the source of current or battery 150. To main-

tain a balance in the normal current flow through the two circuits, a resistance 154 is included in the watchman's circuit.

From the foregoing description it will be seen that operation of the signal transmitting means 148 will have no effect upon the circuit through the wires 12 and 14, and that by the addition of a single wire, provision has been made at each of the signal transmitting stations for transmitting signals in a wholly independent signaling system.

By the invention hereinabove disclosed, there has been provided a most simple arrangement of wiring and of signal transmitting means in the signal transmitting circuit for controlling all of the different types of signals which it is now usual to instal in connection with signaling systems in buildings, particularly fire-alarm signaling systems, the signal transmitting circuit consisting essentially of only two wires passing through each signal station and requiring only the simplest of well known signal transmitting devices for controlling the sending of signals. There has thus been effected a very great saving in material and in labor, and there has also been produced a wiring system which requires very little technical skill to instal and to maintain in operative condition.

What we claim as new is:

1. In an electric signaling system, in combination, a closed circuit having therein apparatus operable on a predetermined increase of current in said closed circuit and also having therein apparatus operable by make and break of the normal current in said circuit, resistance in said circuit maintaining the current below operating level for said first-mentioned apparatus, normally closed make-and-break signal transmitters in series in said circuit, and means at the respective transmitter stations in parallel with said resistance for short-circuiting said resistance.

2. In an electric signaling system, in combination, a series of normally closed make-and-break signal transmitters, a closed circuit including signal apparatus operable by make and break of the normal current in said circuit and in which closed circuit said transmitters are arranged in series, said circuit comprising two wires passing through each transmitter station, and having a resistance bridge beyond said transmitters, means at the respective transmitter stations for bridging said circuit and short circuiting said resistance, and apparatus operable by the increased current flow in said circuit resulting from the short circuiting of said resistance.

3. In an electric signaling system, a local signal including electromagnetic operating means, a local code transmitter box having

normally closed contacts, a normally closed local circuit including said transmitter and said operating means, a central station circuit, a central station code transmitter comprising contacts in said central station circuit and also comprising means for releasing said transmitter including an electromagnet in said local circuit, and means including a portion of said local circuit for operatively energizing said magnet from said local circuit transmitter. 10

Signed at New York city, N. Y., this 19th day of May, 1919.

JOHN H. DERBY.
JOSEPH E. BOWDEN.