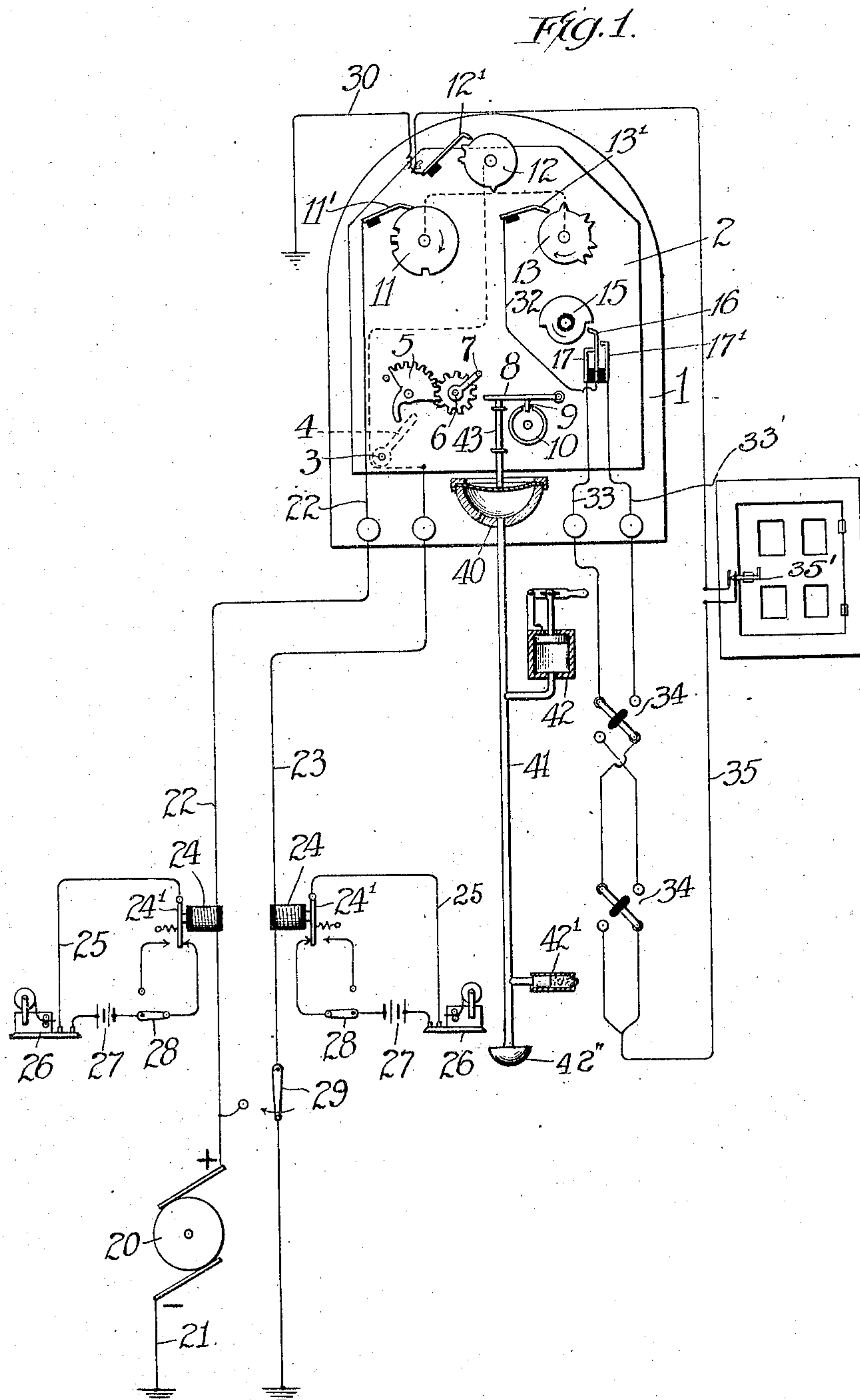


J. G. NOLEN & J. E. SHEPHERD.
ELECTRIC SIGNALING SYSTEM.
APPLICATION FILED MAY 2, 1908.

998,299.

Patented July 18, 1911.

2 SHEETS-SHEET 1.



Witnessed
R. A. White.
Harry R. L. White

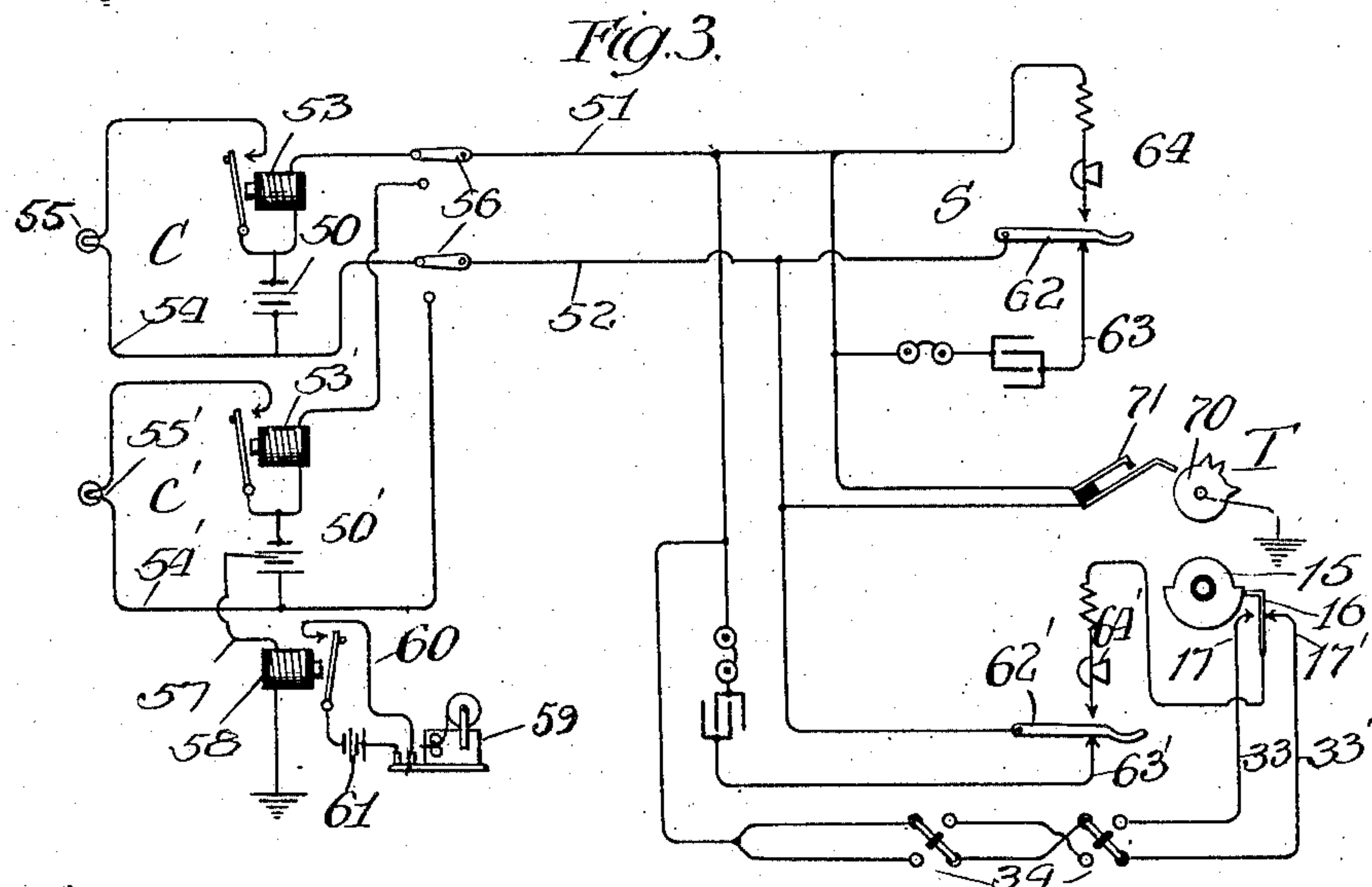
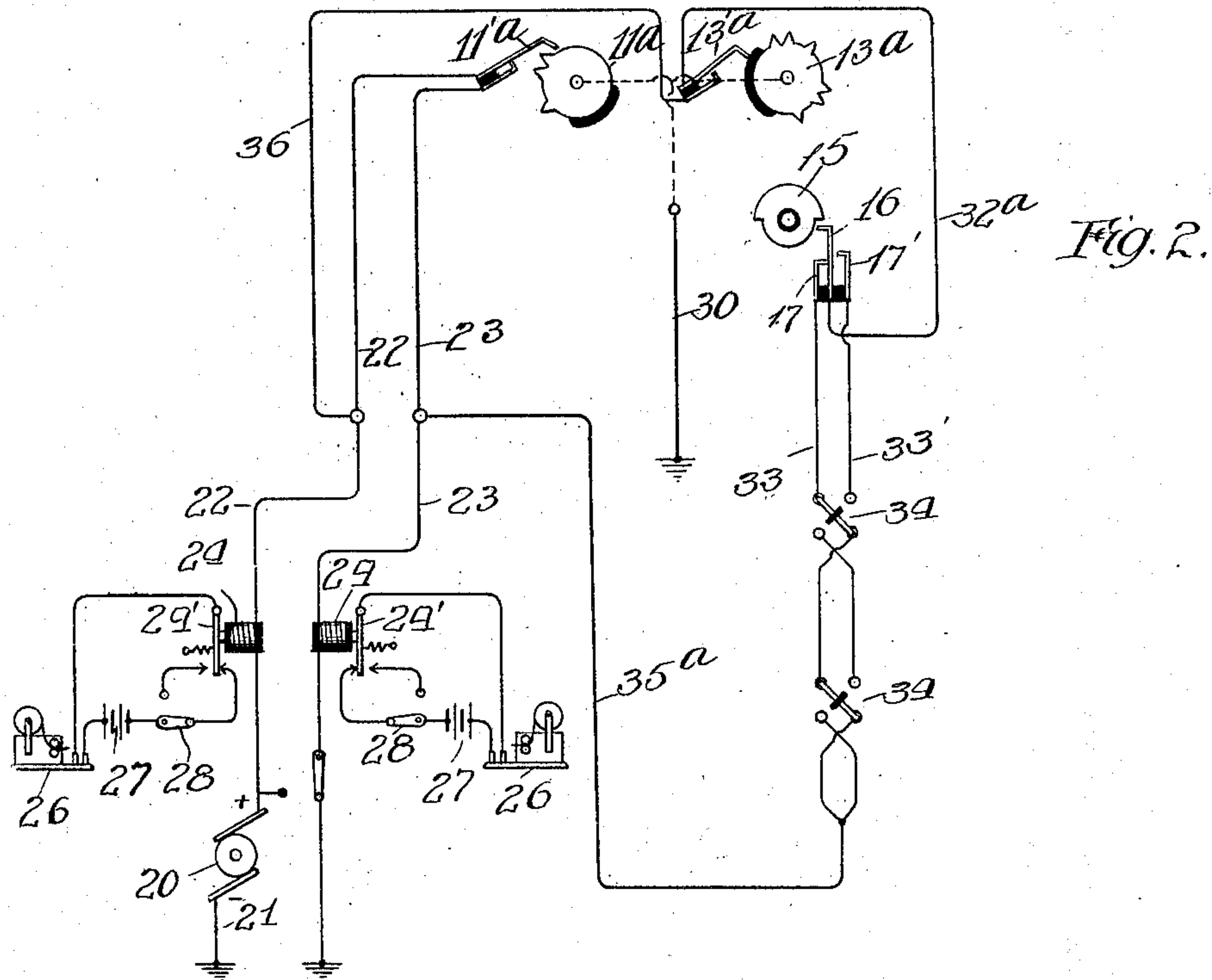
Inventors.
James G. Nolen
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By Horace Bain & Son, Attys

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2 SHEETS—SHEET 2.



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R. A. White.
Harry R. White.

Inventors
James G. Nolen,
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By Gordon & W. May, Attys

UNITED STATES PATENT OFFICE.

JAMES G. NOLEN AND JOHN ELDEN SHEPHERD, OF CHICAGO, ILLINOIS, ASSIGNORS,
BY DIRECT AND MESNE ASSIGNMENTS, TO AUTOMATIC FIRE PROTECTION COM-
PANY, OF NEW YORK, N. Y., A CORPORATION OF MAINE.

ELECTRIC SIGNALING SYSTEM.

998,299.

Specification of Letters Patent.

Patented July 18, 1911.

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To all whom it may concern:

Be it known that we, JAMES G. NOLEN and JOHN E. SHEPHERD, citizens of the United States, both residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Signaling Systems, of which the following is a specification.

This invention relates to improvements in electric signaling systems, and more particularly to watch service signal systems, or systems for both watch service and fire alarm signaling.

Heretofore it has been customary to provide watch signal systems with a watchman's transmission box at each registry station throughout his beat or round in the supervised building; and a salient object of our invention is to do away with the multiplicity of boxes thus heretofore required, and to enable a single signaling instrumentality, such as a telephone or telegraphic signal transmitter, to serve an entire building or beat within the building, in such manner that receipt of a perfect signal from the master instrumentality may indicate perfect performance by the watchman in his duties of inspection and registration at different stations. This reduction in the number of signaling boxes is beneficial beyond the obvious reduction of parts, in that it minimizes the number of signals transmitted to the central recording station and also reduces to a minimum the number of main lines required to serve a district. This last mentioned saving results from the necessary and customary practice of definitely limiting the number of boxes which may be connected in a single line circuit, and obviously the fewer boxes in each building the fewer lines will be necessary to serve a district.

To attain the desired end this invention contemplates the provision of a signal transmitting instrumentality, a circuit therefor, including a number of circuit closers, at the different watch stations, each manually closable by the watchman, and when all closed conditioning the circuit for the transmission of the watchman's signal from the transmitter, and automatic means for operation after each signal transmission, to so disable

the circuit as to require resetting of the manual switches before another signal may be sent in. In effecting such a combination it is preferred that there be provided as alternative parts of the signaling circuit two circuit branches, or supervisory circuits, equipped with manual switches, which when all thrown one way close one circuit branch, and when thrown to another position close the other circuit branch, so that only one branch may be closed at a time, there being provided preferably in connection with the transmitter an automatic circuit changer, which after each action of the transmitter selects alternatively, first one and then the other of the two alternative paths to serve the transmitter for its next signal.

The specific constructions and arrangements by which this invention may be practiced are many and varied, but it is preferred that the signal transmitter be one suitable for both fire and watch signals, and an object of this invention in one aspect is to provide for the use of such a single box for both purposes.

Another object of the present invention is to provide for either ground or metallic signaling and to arrange for the transmission of watch signals over the emergency ground connections for the fire signaling wheels (used only under abnormal conditions) to impose frequent test upon the integrity of such ground connection.

Other and further objects of the invention will become apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a diagram of an advantageous embodiment of the invention; Fig. 2 is an embodiment thereof in modified form; Fig. 3 is an embodiment thereof in a telephone system.

In each embodiment shown of the invention we provide a signal transmitting instrumentality, such as a telegraph box or telephone transmitter, connected for signaling operation through two alternative supervisory circuits, or circuit parts, means for selecting either of said supervisory circuits to the exclusion of the other for temporarily serving the transmitting instrumentality, and a series of manually operable

switches controlling the two alternative supervisory circuits, each switch being arranged to break one of the two alternative circuits when it is in position for inclusion in the other of said circuits. The transmitter itself is preferably manually operable to transmit its signal and, preferably, the means for selecting the supervisory circuit to be employed in signaling is associated with the transmitter itself, or is otherwise arranged, so that it shifts the service of the transmitter from one of said two supervisory circuits to the other thereof upon each actuation of the transmitter. Thus it will be seen that after all of the manual switches have been positioned for inclusion in the selected supervisory circuit which is temporarily serving the transmitter, operation of the transmitter to send a signal showing such closure of the transmitter-serving circuit, transposes the circuit connections to bring the alternative circuit into transmitter-serving relation, so that in order that a second signal may be sent from the appropriate signal transmitter it is necessary that each switch be operated to throw it into inclusion in the new transmitter-serving circuit path thus provided, and thereby open the formerly-established circuit. And it will be apparent that if one of the switches common to the two alternative circuits be placed at each registration point of a watchman's round he must see that all of the switches are included in the circuit then serving the transmitter before he can send his periodical signal by operation of the transmitter, and then by virtue of the automatic transfer of the transmitter connection to the other one of the alternative circuits, he must, before turning in his next periodical signal, make the entire round of his beat and throw all of the switches into the circuit thus newly brought into service relation with the transmitter. Further, it is preferred to provide in the transmitter signaling mechanism which will operate independently of the condition of the supervisory circuits in order that each operation of the transmitter will send a partial signal in the event the watchman has failed to do his duty in making his round and reversing the connections of all of the supervisory switches. Preferably also the signaling mechanism which operates independently of the condition of the supervisory circuit, has both metallic and ground signaling connections, in accordance with approved practice, and preferably the ground connections of such mechanism are so related to the supervisory circuits that either alternate supervisory circuit switches shall be included with the ground connections in establishing the circuit for the transmission of the watchman's periodical signals.

Referring to the embodiment shown in

Fig. 1, 1 indicates in general a transmission box, comprising a clock-work motor, having a frame 2, and works, not shown, having associated with its various arbors, timed to operate in proper relation; as herein specified, the signaling wheels and controlling mechanisms, illustrated and to be described. In such arrangement 3 indicates a pin for receiving a suitable watchman's key, indicated in dotted lines at 4, arranged to engage a winding segment 5, which when partially rotated by the key sufficiently rotates a pinion 6 to wind the motor mechanism for a round or cycle of operation, and to bring the trip arm 7, carried by the same arbor, into position to elevate a stop lever 8, which carries a detent 9 engaging a notch in the periphery of the controlling wheel 10, mounted upon a part of the motor which rotates in unison with the rotation of the signaling wheels. For some of the purposes of this invention it is preferable that the clock-work transmitter be normally wound sufficiently to occasion a predetermined number of revolutions of the signaling wheels, and normally restrained against running down by the engagement of the stop lever detent 9, with the controlling wheel 10, in which event the rotation of pinion 6 by the segment 5 simply overwinds the clock-work to prepare it to send an additional round of signals. Under such conditions the lifting up the controlling lever 8 by trip-arm 7 frees the clock work for signaling transmission, but the clock movement in restoring the trip-arm 7 toward its initial position removes it from contact with lever 8 and permits the stop 9 to press against wheel 10, so that as soon as the wheel 10 has completed its single revolution it is stopped by reengagement of the part 9 with the wheel, and so in watch-service operations the clock is never released for the transmission of the plurality of rounds for which it is constantly wound.

For a highly advantageous embodiment of our invention three signaling wheels, 11, 12 and 13 are provided, arranged for rotation in unison, as by arrangement on a single shaft or shafts of equal speed of rotation, the wheel 11 being provided with a pen 11' normally in contact therewith, and wheels 12 and 13 being provided with respective pens 12' and 13', normally out of contact therewith. The wheel 11 in the embodiment shown, has its periphery notched to break contact with its pen for the transmission of a number signal, while wheel 12 is provided with teeth in the same relation as the notches of wheel 11, for making contact with pen 12' slightly before the breaking of contact between wheel 11 and pen 11'. These wheels correspond with the ordinary metallic and ground circuit wheels of standard fire alarm boxes. The wheel 13, peculiar

iar to the new service contemplated by this invention, is provided with teeth for some distinguishable number signal, arranged to come into contact with the pen 13' subsequently to the completion of the signaling operations of wheels 11 and 12.

For controlling the automatic circuit changing operation the box is preferably provided with a switch-controlling insulated cam 15, mounted upon an arbor which rotates only half way to each full rotation of wheels 11, 12 and 13, the cam 15 being arranged for cooperation with a selective switch pen 16, to cause it to contact with one anvil 17 exclusively at the end of one half revolution of wheel 15, and with a second anvil 17' exclusively during the next half revolution of the wheel.

The main line of the signaling circuit is shown in a form commonly employed in fire alarm signaling, the central station apparatus comprising a generator 20, having its terminal grounded by wire 21, and its positive terminal connected through wire 22 with the pen 11', the other leg 23 of the metallic circuit having connection from the frame 2 of the transmitter (with which all the wheels 11, 12 and 13 have electrical connection) to the ground at the central station. Each leg of circuit 22, 23, includes a relay 24, the armature 24' of which normally closes a circuit 25 including a signal register 26 and a source of current supply 27. A back contact is provided for the armature 24' and a switch 28 is arranged to throw the said back contact into the circuit 25 when necessary. It will, of course, be understood that the two relays may be associated in a single instrument as is common practice. At the central station there is also provided a switch 29 in the circuit leg 23, arranged to break the normal ground connection of said leg and throw it into connection with the positive terminal of the generator 20, such circuit arrangement being commonly known in the art and usually spoken of as a McCullough circuit. Also in accordance with customary practice the pen 12' has ground connection, as indicated at 30.

The circuit thus far described and wheels 11 and 12 operate in signaling in the usual manner, there being normally a constantly energized metallic circuit from the generator 20 by wire 22, pen 11' and wheel 11, frame 2, wire 23, switch 29 ground and wire 21 back to the generator, so that both relays 24 are normally energized, the wheel 11 being an interrupter for such metallic circuit. If an outside line 22 or 23 be broken the switch 29 is thrown to connect the wire 23 to the positive pole of the generator, and switches 28 are moved to connect with the back contact wires. Under such conditions the wheel 12 and ground connections 30 are relied

upon for signal transmission, the register in the unbroken leg of the line recording the signal.

The local watch service circuit may conveniently be run as follows: Pen 13' is connected by wire 32 with the circuit selecting switch pen 16, and from the alternatively co-acting anvils 17 and 17' extend supervisory circuit connections 33, 33' respectively, running throughout the area to be protected, and at each station for the watchman's registration provided with a switch 34 arranged to close either circuit branch 33 or 33' while opening the other. Beyond the last registry station, or switch 34, the parallel circuits 33, 33' are connected and wire 35 is run in suitable manner to establish a signaling circuit for wheel 13 and one or more of the central station registers, such connection in the installation under consideration being made to ground by connection thereof with the signaling pen 12'. If desired the fastenings on doors and windows may have circuit closers included in the wire 35, as shown at 35'.

In the operation of the system as described, assuming the parts to stand in the relation shown in Fig. 1, the selective-switch controlling cam 15 stands in such position that the circuit 33 is serving the signal wheel 13, and the watchman in his round has thrown all of the switches 34 for inclusion in said circuit 33. Now when the watchman inserts his key 4 in the box and turns the key to rotate the segment 5, the box is overwound, as before described, and trip-arm 7 lifts the stop-lever 8 releasing the box to run until it is again stopped by the lever 8 at the end of a round. In the common revolution of the wheels 11, 12 and 13, wheels 11 and 12 respectively break and ground the circuit, each causing a number signal as indicated by their teeth, for record on the registers 26, and then the teeth of wheel 13 successively close a signaling circuit from generator by wire 22, closed contacts 11' and 11, frame 2, wheel 13, pen 13', wire 32, selective switch pens 16 and 17, supervisory circuit 33 including the switches 34 and wires 35 and 30 to ground for return by wire 21 to the generator, shunting out relay 24 in wire 23. Consequently the number signal of wheel 13 is received on the relay in main circuit wire 23 and the central station operators are notified that the watchman's switches have all been thrown to proper position. Immediately before the stopping of the box the half rotation of selective switch-controlling cam 15 throws over the selective switch pen 16 to bring the supervisory circuit 33' into relation to serve wheel 13, and such circuit branch is obviously open at all of the switches 34. Now before his next periodic operation of the box the watchman must make his round

to all the switches 34 and throw each over for inclusion in circuit 33' to condition said circuit for current flow. In the event that the watchman fails to throw any one of the switches 34 to proper position, it will be apparent that there will be one or more breaks in the supervisory circuit 33 or 33', which has been brought into transmitter-serving relation by the action of the automatic circuit changing mechanism, and consequently upon the periodic operation of the box, while the signals are received at central from wheels 11 and 12, the supplemental signal from wheel 13 is not received and the central office is thereby apprised of the fact that the watchman has missed one or more stations in his group. It will be obvious furthermore that the supplemental signals received from the wheel 13 are transmitted over the ground wire 30 from the wheel 12, so that the transmission of every signal from wheel 13 tests the wire 30, and rupture thereof causes a failure of transmission of the signal wheel 13 which puts the central office upon inquiry, and if upon inspection it is found that the watchman's switches 34 and 35' are all properly positioned, it follows that there is a break in the circuit wires. When an outside line is broken and switch 29 is thrown to connect both lines to the positive side of the generator, the results are as follows: If line 22 be broken, the working of the transmitter wheel 12 sends a signal over circuit 20, 29, 23, 2, 12, 12', 30, ground 21, 20, followed by signal from wheel 13 over circuit 20, 29, 23, 2, 13, 13', 32, 16, 17, 33, 35, 30, ground 21, 20. If line 23 be broken the wheel 12 signals over circuit 20, 22, 11', 11, 2, 12, 12', 30, 21, 20 followed by signal from wheel 13 over circuit 20, 22, 11', 11, 2, 13, 13', 32, 16, 17, 33, 35, 30, ground 21, 20.

In connection with the transmitter heretofore described, means are provided, preferably operable from any watchman's station, for releasing the transmitter for its full run-down, or complete operation, to transmit its number signal many times repeated, as a distinguishing true fire alarm, and to this end there may be employed, as indicated in Fig. 1, a pneumatic release system conveniently embodying a pressure responsive device 40, located in the transmitter casing and having connection with the motor restraining lever 8, said pressure responsive device having piping connections 41 with pressure creating devices 42 and 42' located at the several watchman's stations. In the specific construction illustratively shown, the pressure responsive device 40 is a chamber closed on one side by an inwardly buckled diaphragm, which has connected therewith a stem 43, arranged when the diaphragm is buckled outwardly to elevate the

lever 8, and hold it elevated so that the motor may completely run down.

The pressure creating devices may be of any desired character, those herein shown for illustrative purposes being a small air pump 42 and an explosive cartridge 42' both operatively associated with the piping system 41. Obviously when pressure is created in the piping system 41 by the manual actuation of a pressure creating device, it flexes the diaphragm outwardly and releases the clock. The pipe 41 may also be equipped with thermostatic heads 42'' filled with a heat expansive fluid, or other automatic pressure devices.

In Fig. 2 is shown a modified embodiment of the invention in which the watch signals are transmitted over a metallic circuit rather than a ground connection. In such embodiment two wheels 11^a and 13^a are provided each having an insulated segment on its periphery. The wheel 11^a has a set of teeth in position corresponding with the insulated segment of wheel 13^a, and wheel 13^a has two sets of teeth, one corresponding in position with the insulated segment of wheel 11^a and the other corresponding with a stripped portion of wheel 11^a. The pen 11'^a, in wire 22, makes normal contact with its anvil, which is connected with wire 23. The pen 13'^a for wheel 13 is normally raised from its anvil by the insulation segment of such wheel. Both wheels are grounded as at 30. The cam 15 and switches 16, 17, 17', circuits 33 and 33' and switches 34 are provided as described, but the supervisory wiring is as follows: Pen 16 is connected by wire 32^a to pen 13'^a, the anvil whereof is connected by wire 36 to wire 22, and the terminals of supervisory branches 33, 33' are wired as at 35^a to wire 23.

In signaling under the conditions shown in Fig. 2, the wheels rotate in a clock-wise direction, so that while the shunt 36—32^a, 33, 35^a is broken at pen 13'^a the wheel 11^a grounds and breaks the main circuit; then while the main circuit is broken at 11^a the wheel 13^a grounds and breaks the metallic circuit 22, 36, 32^a, 33, 35^a, 23, and then after the main circuit has been reestablished during the last third of the revolution of the wheels, the wheel 13^a again grounds and breaks the shunt, momentarily shunting out the relay in line wire 23 as each tooth makes contact. If the watchman has failed to close all switches 34, obviously shunt 36, 32^a, 33 (or 33') 35^a is not closed, and while the insulated segment of wheel 11^a is passing its pen, the register in line wire 23 makes only a long dash or "run down". The register for line 22 may record on the grounds and breaks of wheel 13', under these conditions.

In Fig. 3 is shown a convenient adaptation of the invention to a telephone signaling cir-

cuit, and in such view C indicates a central station, C' an alarm central station, and S a subscriber's station. At the central station C, 50 indicates a battery bridged between subscriber's lines 51, 52, the former including line relay 53, the armature whereof may close the circuit 54 including line signal 55. At the alarm central C', a battery 50' is similarly connected with relay 53', circuit 54' and lamps 55', and a switch 56 is arranged to connect the subscriber's lines with either central switchboard. At the alarm switchboard the battery 50' conveniently has a middle ground connection 57 through a relay 58 controlling a register 59 in a local circuit 60 energized as by battery 61. At the subscriber's station a switchhook 62 connected with wire 52 controls through its lower contact a bridging bell circuit 63 and, through its upper contact, a transmitter 64 connected to the line wire 51. The normal central station C and subscriber's equipment described, are illustrated as typifying any desired or ordinary telephone apparatus. At the subscriber's station a separate signaling phone may be employed, the hook 62', transmitter 64' and bell circuit 63' being connected generally as would be another station on a two party line. In the wiring for supervisory service, however, a motor driven box T is employed, involving a grounded wheel 70 toothed for closing switch pens 71 bridged across the lines 51, 52; and involving also a cam wheel 15 controlling pens 16, 17, 17', the pen 16 being connected to telephone transmitter 64', and anvils 17, 17' having connections 33 and 33' respectively, controlled by switches 34 and connected together to line 51. By this arrangement the parallel supervisory wires 33 and 33' alternately serve the voice transmitter 64', so that to use it the watchman must have made his round and properly conditioned the appropriate circuit 33 or 33' of the supervisory service for current passage. When he turns in his report at the end of a round, transmitter T grounds the line, causing current to flow from battery 50' over either line wire, by switch 71 and wheel 70 to ground and back through the ground wire 57 including relay 58, so that his signal is recorded, but the watchman may be required to vocally O. K. his signal, so that if he has failed to properly position all switches 34 he can not transmit his vocal signal.

It will be seen that in each embodiment of the invention the arrangement is such that closure of all switches 34 is necessary to establish a signaling circuit for a suitable transmitter, and automatic means are provided for conditioning said circuit to require resetting of the switches to establish such circuit for each successive operation of

the transmitter, and further, that each embodiment is in a form providing alternative branches in such signaling circuit, either closable by the switches, and automatic selective switch devices for temporarily imposing the service of such transmitter upon first one and then the other of said circuits. It will be understood, however, that the several embodiments are shown, not with a view to indicating limits of the variations which may be made in practically applying the invention, but merely to indicate the adaptability of the invention to different conditions of service, and it will be understood by those skilled in the art that the invention may be embodied in circuits and apparatus differing widely from the forms shown and described.

Having thus described our invention, what we claim is:

1. In a signaling system, the combination of a line connecting a central station and a subscriber's station to be protected, a manually operable code-signal transmitter operatively associated with the line at the subscriber's station, a supervisory circuit connection for said transmitter local to the area to be protected, means at intervals throughout said supervisory circuit for manually closing the same, means operable by the transmitter for conditioning the supervisory circuit for the transmitter to require resetting of the closing means to establish a signaling circuit for the next operation of the transmitter, and at the central station an electro-responsive signal receiving device.

2. The combination of a manually operable circuit-breaking signal transmitter, a line, a signal receiving instrument in the line remote from the transmitter, a supervisory circuit local to the area to be supervised for inclusion with the line and signaling instruments in a signaling circuit, switches in the supervisory circuit manually operable to close breaks in the same, and means, automatically operable by the signal transmitting mechanism, for conditioning the supervisory circuit to require resetting of the switches to establish a signaling circuit for the next signaling operation of the transmitter.

3. A signaling system comprising in combination motor-driven electric-impulse signal transmitting means, alternative signaling circuits therefor including in common a line and an electro-responsive signal receiver remote from the transmitter, switches arranged for inclusion of either of said signaling circuits, and selective means operable by the transmitter, for connecting either circuit to serve the transmitter.

4. In a signaling system, a line, electro-responsive signal-receiving means at one point in the line, and at a relatively remote

point in the line a transmitter to which said signal-receiving means is responsive; two supervisory circuit-branches for alternative inclusion in a signaling circuit with the line, the transmitter, and the signal-receiving means; and switches for inclusion in either supervisory circuit-branch to the exclusion of the other to complete said signaling circuit.

5. In a signaling system, the combination of a manually operable watchman's-signal transmitter, alternative signaling circuits therefor, a switch for localizing the signaling circuit of the transmitter to either circuit to the exclusion of the other, and automatic means, operable by the transmitter, for actuating said switch to change the signaling circuit after each transmitter actuation.

6. In a signaling system, a line, electro-responsive signal-receiving means in the line, and at a relatively remote point a circuit-breaking transmitter to which said signal-receiving means is responsive including a moving part, two supervisory circuit-branches for inclusion with the transmitter, line, and receiver in a signaling circuit, means operated by said movable part of the transmitter alternately to include one of said supervisory circuit-branches in the signal circuit to the exclusion of the other, and switches common to said supervisory circuit-branches to complete either supervisory circuit-branch and open the other.

7. In a signaling system, a line, electro-responsive means therein, switches the condition of which is to be recorded by said electro-responsive means, two supervisory circuits normally incomplete and alternatively completable by throwing all of said switches, and a switch associated with both said supervisory circuits alternately to connect one thereof to the line to the exclusion of the other.

8. In a signaling system, a line, electro-responsive signal-receiving means therein, switches condition of which is to be recorded by said electro-responsive means, two supervisory circuits normally incomplete and alternatively completable by throwing of all of said switches, a signal transmitter in said line, operable through a signaling circuit including a complete supervisory circuit to cause response of said signal-receiving means, and means operable upon actuation of the transmitter alternately to exclude the completed supervisory circuit from, and include the other supervisory circuit in, the line with the transmitter and receiver, whereby subsequent throwing of all the switches may complete a signaling circuit.

9. In a signaling system, a line, electro-responsive signaling means therein, switches throwing of which is to be recorded by said

electro-responsive means, two supervisory circuits normally incomplete and alternatively completable by similar throwing of all said switches, a signal transmitter in said line operable through a completed supervisory circuit to transmit a plural impulse signal, said transmitter having a rotating switch-operating cam, a switch actuated by said cam of the transmitter after each signaling operation alternately to exclude one supervisory circuit from, and include the other supervisory circuit in, a signaling circuit with said transmitter and signal-receiving means, whereby signal transmission after an actuation of said transmitter requires rethrowing of all of said switches.

10. In a signaling system, the combination of a central station signal-responsive device, line connections therefrom to a subscriber's station, a signal transmitting box at the subscriber's station providing two circuit-breakers and operating means therefor, supervisory circuit connections for completing a signaling circuit through one said circuit-breaker, switches in said supervisory circuit connections settable to close the said supervisory connections, means operable by the transmitter to necessitate resetting of said switches after each signaling operation, and connections to complete a signaling circuit for the other circuit breaker independently of said supervisory circuit connections.

11. In a signaling system, the combination of a central station receiving instrumentality, a subscriber's station transmitter comprising two circuit breakers and operating means therefor; connections, including a line, to establish a signaling circuit for one said circuit breaker, to the exclusion of the other; connections including supervisory circuit connections and said line for establishing a signaling circuit for the other circuit breaker, said supervisory circuit comprising two branches; means operable by the transmitter to connect said branches alternately to serve the appropriate circuit breaker; and switches alternatively operable to complete either supervisory circuit branch to the exclusion of the other branch.

12. In a signaling system, a transmitter having a plurality of signaling wheels, signaling circuits therefor, the signaling circuit for one wheel comprising two supervisory branches, and the circuit for another wheel excluding said supervisory branches, means for connecting either of said supervisory branches to serve said transmitter wheel to the exclusion of the other branch, and a plurality of switches for closing either branch and opening the other.

13. In a signaling system, a mechanical signal transmitting box, comprising a signal wheel, a switch operating means, and a motor arranged to drive said wheel and switch operating means, a signaling circuit

for a wheel comprising parallel branches, a
switch actuated by said operating means of
the transmitter for alternately connecting
said branches to serve the signal wheel, and
5 manual switches in said circuit branches,
each arranged to close a gap in either circuit
branch while opening a gap in the other
thereof.

In testimony whereof we hereunto set our
hands.

JAMES G. NOLEN.
JOHN ELDEN SHEPHERD.

In the presence of—
GEO. T. MAY, Jr.,
MARY F. ALLEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
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