

No. 886,879.

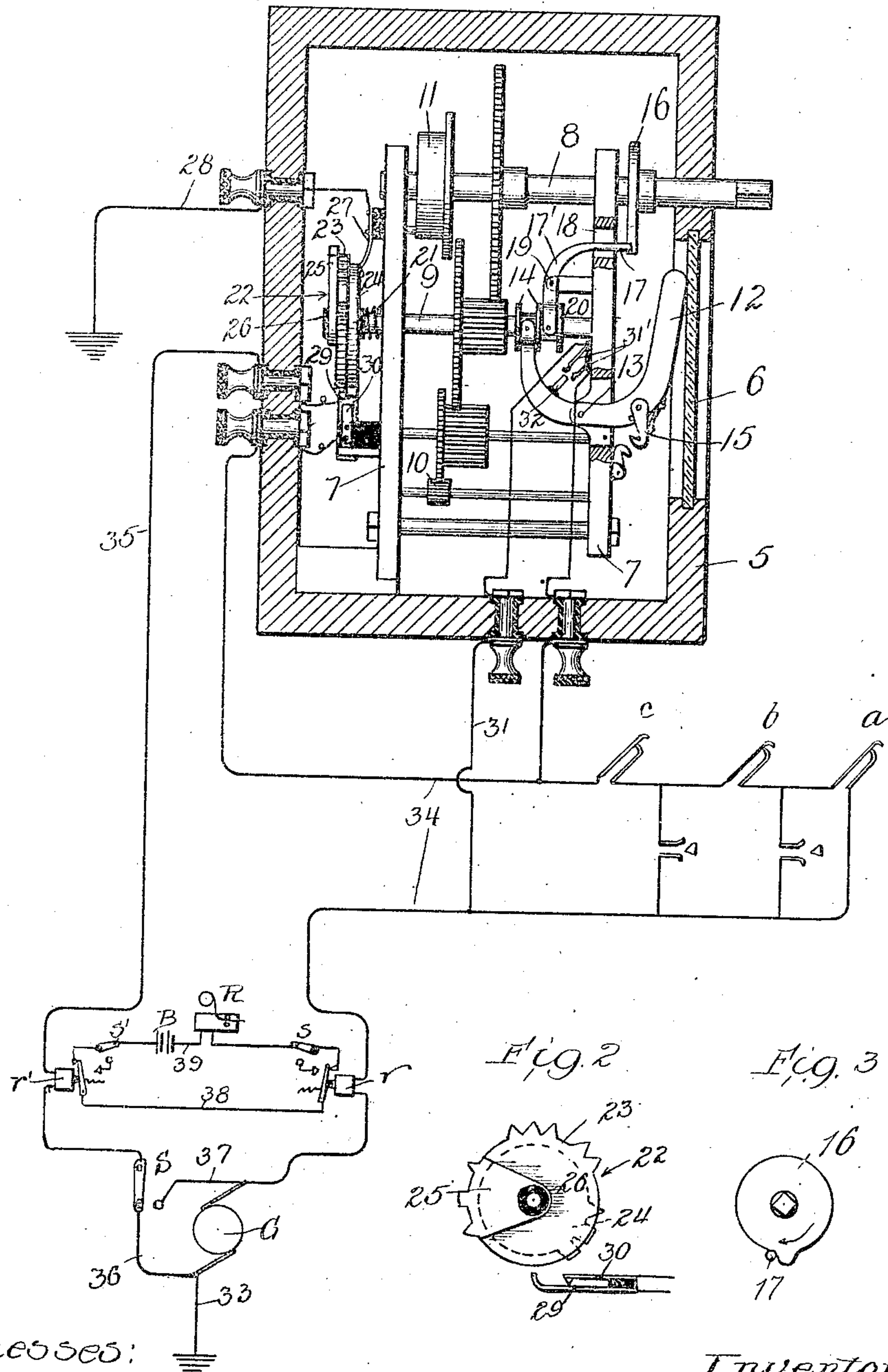
PATENTED MAY 5, 1908.

J. SHEPHERD.  
SIGNALING SYSTEM.

APPLICATION FILED SEPT. 17, 1906.

2 SHEETS—SHEET 1

Fig. 1



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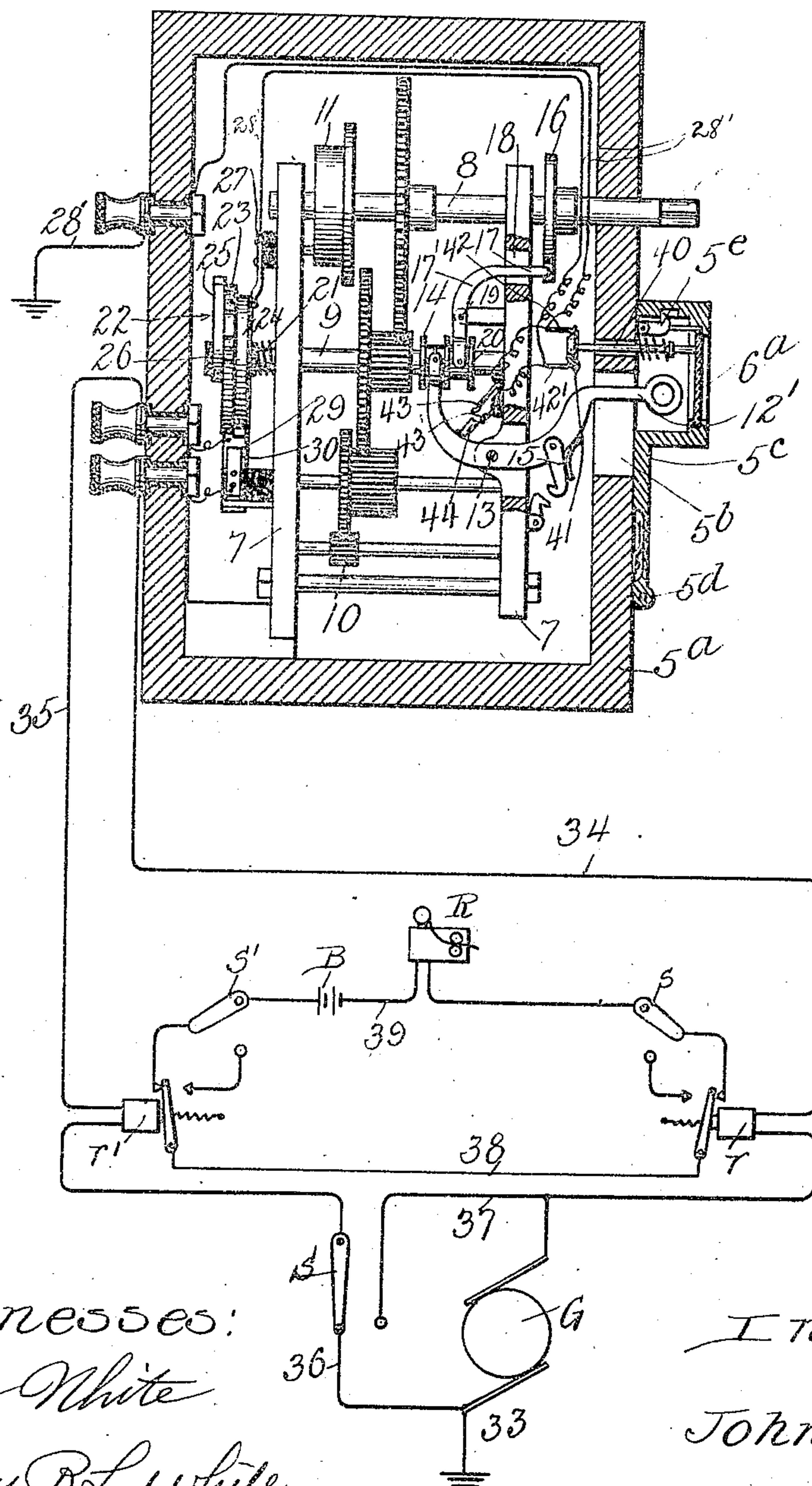
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2 SHEETS—SHEET 2.

Fig. 4.



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# UNITED STATES PATENT OFFICE.

JOHN SHEPHERD, OF CHICAGO, ILLINOIS.

## SIGNALING SYSTEM.

No. 886,879.

Specification of Letters Patent.

Patented May 5, 1908.

Application filed September 17, 1906. Serial No. 334,987.

*To all whom it may concern:*

Be it known that I, JOHN SHEPHERD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Signaling Systems, of which the following is a specification.

My invention relates to improvements in signaling systems, and more particularly to combined fire alarm and watch service signal systems. In such systems it is customary to provide a metallic circuit wherein the break or switch devices of the various transmitters are included in series; to provide in each transmitter a constantly grounded break wheel, and, at the central station to arrange signal receiving apparatus, a grounded source of current supply, such as a generator, with the opposite terminals of which the two sides of the line are connected, and a switch for connecting both sides of the line in common with the ungrounded terminal of the generator.

Normally the signals of each transmitter are initiated by breaking the line connection through the break device of such transmitter, but in the event of a rupture of one of the line wires, the switch at central station, is thrown to connect both sides of the line in parallel with the common terminal of the generator, so that the operation of any transmitter upon the line grounds the line whenever the break wheel makes contact with the break devices, and so enables the box to perform its function of transmitting a signal to central in spite of the broken condition of the line.

It is manifestly important that the ground connection of each transmitter shall be maintained perfect at all times, and my invention has for its primary object to provide a means for testing the integrity of said ground connection each time the box is operated in transmitting watch service signals.

A further object of my invention is to provide a transmitter adapted for use as a combined watch box and fire alarm box, wherein the signal transmitted by the box to send a fire alarm is characteristically different from that transmitted when the box is operating to transmit watch service signals.

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

Figure 1 is a conventional, partly diagrammatic view of a transmitter in association

with a suitable circuit. Fig. 2 is a detail of the signal wheel structure; and, Fig. 3 is a detail of a stop wheel. Fig. 4 shows a modified arrangement of transmitter and circuit.

Throughout the figures like numerals of reference refer always to like parts.

Referring first to the transmitter structure shown in Fig. 1, 5 indicates an inclosing casing preferably provided at a suitable point with a glass plate 6.

7 indicates in general the frame of the transmitter mechanism, which is shown as involving a main spring or winding arbor 8 projecting through the casing 5, and squared at its projecting end to receive a watchman's key, a signal wheel arbor 9 and the usual escapement 10, the motor being arranged to be driven by a spring 11.

The signal wheel arbor 9 is axially movable by means of the lever 12, pivoted as at 13 in the frame 7, at its outer or handle end bearing against the glass plate 6 and at its inner end bifurcated to engage a collar 14 mounted on the arbor 9. Obviously when the glass plate 6 is fractured and the handle of lever 12 pulled downward the arbor 9 is shifted axially toward the front of the box by the lever. A latch 15 is provided for maintaining the parts in the position last described.

The motor spring 11 is normally held in partly wound condition by the engagement of a stop wheel 16 upon the winding shaft 8 with a stop pin 17, adapted to be moved out of the path of the wheel 16 when the arbor 9 is shifted axially to its forward position. To this end the pin 17 projects through an aperture 18 in the frame 7, and is secured to, or formed integral with, a lever 17' pivoted as at 19 and at its opposite extremity engaging a collar 20 carried by the arbor 9.

It will be understood that the parts are so proportioned and arranged that the winding arbor 8 may be rotated by a suitable key in an anti-clock-wise direction to increase the tension of the spring 11, such movement being sufficient to cause the motor to run back to its stopped position to rotate the signal wheel arbor 9 through one complete revolution. When the stop pin 17 is removed from the path of the wheel 16 the motor in completely running down rotates the arbor 9 one or more times, preferably a plurality of times. A spring 21 normally holds the arbor 9 in its retracted position.

The signal wheel structure 22 carried by the arbor 9 comprises peripheral parts of dif-



ferent toothed arrangement, laterally, or axially of the arbor, out of alinement, and while the structure may obviously be made in one piece, I will, for convenience of understanding, describe it as built up of several sections. The central portion 23 of the wheel structure has upon its periphery a toothed arrangement indicating the number of the box, in the present illustration the number 23. The section 24, in front of the section 23 (with reference to the axial movement of the arbor) has thereon a distinctive toothed arrangement, such for instance as two dashes and a dot, indicative, in the "Morse" code, of the letter "G". These teeth which I may term contact teeth, it will be observed, are lower than the teeth of the section 23. Preferably a third section 25 is placed on the opposite side of the section 23 and is provided with a distinct characteristic tooth arrangement, preferably a dot, a dash, and a dot, indicative in the "Morse" code of the letter "F" such teeth constituting what I may term a supplemental series. These series of teeth, it will be observed, are laterally (or axially of the arbor) out of alinement, and circumferentially are preferably arranged in the order shown in Fig. 2. The wheel structure 22 is insulated from the arbor 9 by a suitable bushing 26, and the various sections thereof make intimate contact with each other, so that they are electrically integral. A brush 27, arranged to constantly bear upon the structure 22, is grounded through a wire 28.

29 and 30 indicate the pen and anvil of a circuit breaking device associated with the structure 22. The pen 29 is of sufficient width for coaction with two of the sections of the wheel structure 22 and is arranged when the parts are in the normal position shown in the drawing to overlies the sections 23 and 24. When the handle 12 is pulled, however, to shift the arbor 9 forward, the wheel structure 22 is so moved that the pen 29 overlies the sections 23 and 25 of the structure 22 for coaction therewith. Further the arrangement is such that the teeth of the section 24 make contact with the pen 29 without lifting it from its anvil 30, while the teeth of the sections 23 and 25, when passing beneath the signaling pen 29 lift it from its anvil 30 to break connection between the circuit breaking parts. The circuit connections of the transmitter are of well known character, there being provided at the central station a generator G, having one terminal grounded as by wire 33, and its other terminal connected to line wire 34 wherein is included the coil of a relay  $r$  and the circuit breaking instrumentalities  $a$ ,  $b$ , and  $c$  of a plurality of transmitters, said side of the line 34 being shown and connected with the anvil 30. From the pen 29 the opposite line wire 35 extends back through relay  $r'$  at the cen-

tral station, to a switch S, the blade whereof is normally thrown for connection with the wire 36, connected with the grounded terminal of the generator. A connection 37 is made from the normally open contact of the switch S to the opposite, ungrounded terminal of the generator.

The armatures of the two relays  $r$   $r'$  may conveniently be tied together by wire 38, and their front contacts are connected through suitable switches  $s$   $s'$  with wire 9, which includes the local battery B and a recording instrument R. The back contacts of the relay armatures are arranged for connection with wire 39 by the switches  $s$   $s'$  when the latter are moved to disconnect the front contact from said wire. For convenience, further, a short circuit 31, for cutting out the boxes more remote from central may be provided, such short circuit being normally open at contacts 31', adapted to be closed when lever 12 is pulled down, by a blade 32 carried by said lever 12.

It will now be apparent that under normal conditions a closed circuit is established from the constantly running generator G through wire 34, the closed circuit breaking structures of the various transmitters, by wire 35, switch S and wire 36, to the opposite terminal of the generator, said closed metallic circuit including the relay coils  $r$   $r'$ , so that they are energized and their armatures are held in contact with their front contacts, closing the local circuit including wires 38 and 39, the battery B and the signal recording instrument R. If now the line be broken at any point the relay magnets  $r$   $r'$  are deenergized so that they drop back, opening the local circuit and causing the recorder R to register, by a mark upon its tape, the duration of the break.

In the operation of my improved transmitter, as a watch box, the final winding of the transmitter is accomplished by a key, as usual, and the transmitter is allowed to partly run down, until stopped by the pin 17, whereupon the following action takes place: Before the teeth indicative of the box number coact with the pen 29, the short teeth of the section 24 pass beneath the pen making contact therewith without breaking the line circuit. Accordingly a ground circuit is established from the generator G through the line 34, anvil and pen 30 and 29, wheel structure section 24, brush 27, ground wire 28 and ground wire 33 back to the generator. As the relays  $r$   $r'$  are wound to a considerable resistance—for instance ohms—practically all of the current of the generator passes through the ground connections and the relay  $r'$  is deenergized, permitting its armature to fall back and open its local circuit each time a tooth of wheel section 24 makes contact with the pen. Thus, the tape of the recorder shows preliminarily



to recording the box number the Morse-code letter "G". As the receipt of such signal is dependent upon the integrity of the ground connection 28 it will be apparent that such ground connection is thereby tested each time a watchman transmits his watch signal for record. If the "G" does not appear on the tape, its absence indicates a failure of the ground connections. Following the completion of the test signal the box-number teeth of the section 23 cooperate with the pen, lifting it out of contact with its anvil 31 each time a tooth passes thereunder, so that the metallic connection is broken by each tooth and the box-signal is transmitted to central in the usual and well known manner.

In the event of fire the transmitter is actuated by breaking the glass 6 and depressing the handle 12 to position where it is latched by latch 15. As heretofore described such operation shifts the arbor 9 and the wheel structure 22 so that the wheel section 24 passes forward from beneath the pen 29 while section 25 is brought into operative relation thereto. Now the box operates in its usual manner save that to the box number signal to be transmitted there is added a succeeding or supplementary signal indicative, in the "Morse" code of the letter "F", which is interrupted at the central station to mean "fire". It will now be apparent that should the transmitter ever transmit a box number signal without any preceding or succeeding letter signal, the authorities at central station are immediately apprised that the ground connection of the said transmitter is broken and the said transmitter has been incapacitated to operate on the system when the switch S is thrown to connect both line wires to the same side of the generator.

Referring now to Fig. 4 it will be seen that the transmitter motor structure is the same as that heretofore described, but that the casing 5<sup>a</sup> is of a slightly different construction, involving an aperture 5<sup>b</sup> for the pull-down handle 12', there being provided a glass fronted cover, 5<sup>c</sup>, for the handle 12' and aperture 5<sup>b</sup>, hinged at 5<sup>d</sup> and maintained closed by a self-opening latch 5<sup>e</sup> held in latching position by a glass plate 6<sup>a</sup>. Bearing against the glass 6<sup>a</sup> is a spring-pressed rod 40, carrying a head 41 normally effecting electrical connection between two contacts 42, 42' which are included in a wire 28' leading from brush 27 to ground. Spring contacts 43—43', normally open, are arranged to be closed by a contact 44, carried by the lever arm 12', and are connected respectively to springs 42, 42'. By such an arrangement the soundness of the glass is tested. If the glass be broken, without the box lever 12' being pulled, the spring-pressed rod 40 moves outward breaking the ground connection at

contacts 42, 42', so that the next watchman's signal shows a broken ground, as heretofore described, and when the ground connection is sought to be repaired the broken glass is, of course, found, and replaced by a perfect glass. Should the box be "pulled" however by depression of lever 12', the ground connection broken at 42, 42' is restored by the parallel or bridging contacts 43—43', with which the contact 44, under such circumstances, coacts. Thus, if one line connection has been broken the transmitter may yet act to transmit its signal through its ground connection, as heretofore described.

While I have herein described in some detail an operative embodiment of my invention I do not desire to be understood as limiting myself to the specific details, as it will be apparent that numerous modifications in the specific construction and arrangement might be made without departure from the spirit and scope of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States, is:

1. The combination with a metallic circuit including a source of current supply, and signal receiving means responsive to a break in or ground on the circuit, of a transmitter including a line breaking mechanism, a ground connection for said line breaking mechanism, and means operable in predetermined relation to the line breaking mechanism for testing the integrity of the ground connection by transmitting thereover a signal, without breaking the line.

2. The combination with a metallic circuit, a grounded source of current supply therefor, a signal receiving means responsive to a break in or ground on said circuit, of a transmitter comprising a line breaking switch, a break wheel structure normally non-contacting therewith, a normally closed ground connection for said wheel, and means for indicating the integrity of said ground connection comprising a signaling instrumentality arranged to connect the ground connection with the line circuit without breaking the line.

3. The combination with a metallic circuit, a grounded source of current supply therefor, and signal receiving means for said circuit responsive to a break in or ground on the circuit, of a transmitter comprising a line breaking switch, and a switch operating structure normally non-contacting therewith, and a normally closed ground connection for said structure, said structure comprising circuit breaking parts, and parts for contacting with the switch without breaking the circuit.

4. The combination with a metallic circuit, including a grounded source of current supply, a signal receiving means responsive to a break in, or ground on, the circuit, of a transmitter comprising a line breaking switch, a



signal wheel structure, means for shifting said signal wheel structure to position different parts thereof for coaction with the break device, one part of said signal wheel structure comprising means for connecting the break device with the ground wire without breaking the circuit, and the other part comprising means for breaking the line circuit.

5. The combination with a metallic circuit including a grounded current generator, and signal receiving means responsive to a break in or ground on the circuit; of a transmitter comprising a motor, a circuit breaking structure, a signal wheel structure, and means for laterally shifting one of said structures relative to the other; said wheel structure comprising a plurality of tooth-series out of lateral alinement for respective coaction with the circuit breaking structure when the circuit breaking and wheel structures are shifted to different positions, one of said tooth-series being of a height to contact with the circuit breaker without breaking the circuit, and being grounded, and another tooth series being of a height to break the circuit through the circuit breaking structure.

6. In combination, a circuit breaking switch and a signal wheel, one of said parts being shiftable laterally relative to the other, said signal wheel providing a plurality of series of teeth in different paths of rotation, one such tooth series being of suitable height to contact with the circuit breaker without breaking its circuit, and another such tooth series being of a height to break the circuit of said circuit breaker, means for rotating said wheel, and means for shifting the shiftable part to bring the first said tooth series into or out of position for coaction with the circuit breaker.

7. In combination, a circuit breaking switch, a shiftable signal wheel structure, having three series of teeth, consisting of a central "box-number" series of circuit breaking means, a series of contact teeth arranged to coact with the switch without breaking its circuit, and a supplemental series of cir-

cuit breaking teeth, circuits controlled by the contact teeth and circuit breaker respectively, signal receiving means associated with said circuits, and means for shifting said signal wheel structure to alternatively position the contact teeth and supplemental teeth for coaction with the switch without disturbing the association of the "box-number" teeth with said switch.

8. The combination with a metallic circuit having therein a grounded source of current supply, and signal receiving means responsive to a break in or ground on the line, of a signal transmitter comprising a normally partly-wound train, a movable stop for restraining the train against running down, a line circuit breaker, an axially movable signal wheel, arranged when rotated while in normal axial position to make a series of contacts with the circuit breaker without breaking the circuit, and also a series of circuit breaking contacts therewith, and when rotated while in another axial position to make a different series of circuit breaking contacts with the circuit breaker, a ground connection for the wheel and means for axially moving the wheel arranged to automatically remove the stop from position to restrain the train.

9. In combination with a signal transmitter having a body of frangible material arranged to prevent the transmitter from being operated to transmit a fire alarm while the said body is intact, and means for transmitting a watch signal without interference with said body of frangible material, of means normally maintained inoperative by the body of frangible material, and arranged for automatic operation upon the fracture of said body, for varying from normal the watch-signal.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

JOHN SHEPHERD.

In the presence of—

FORÉE BAIN,

MARY F. ALLEN.