



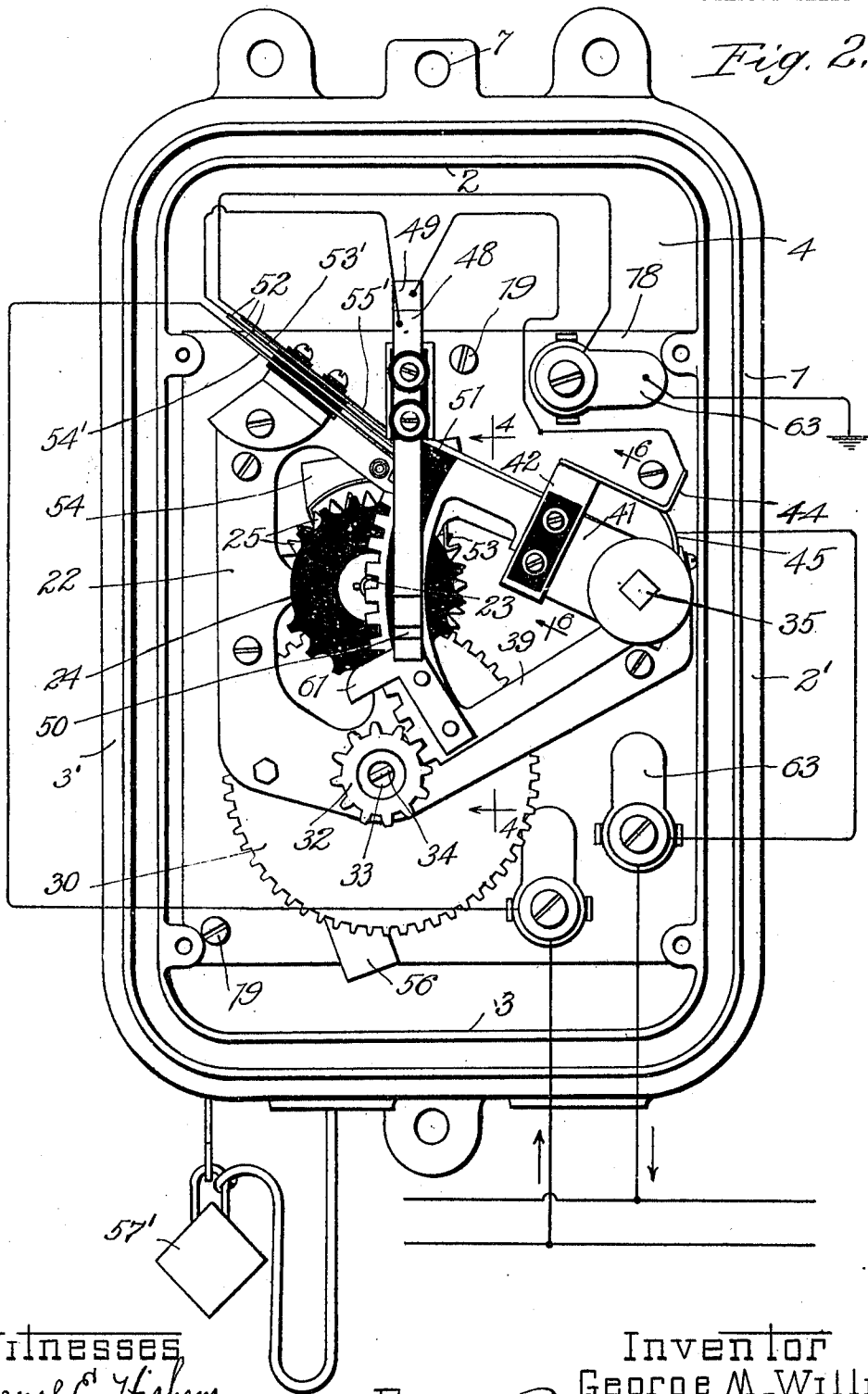
G. M. WILLIS.  
WATCHMAN'S SIGNALING AND FIRE ALARM SYSTEM.  
APPLICATION FILED NOV. 16, 1907.

955,929.

Patented Apr. 26, 1910.

5 SHEETS—SHEET 2.

Fig. 2.



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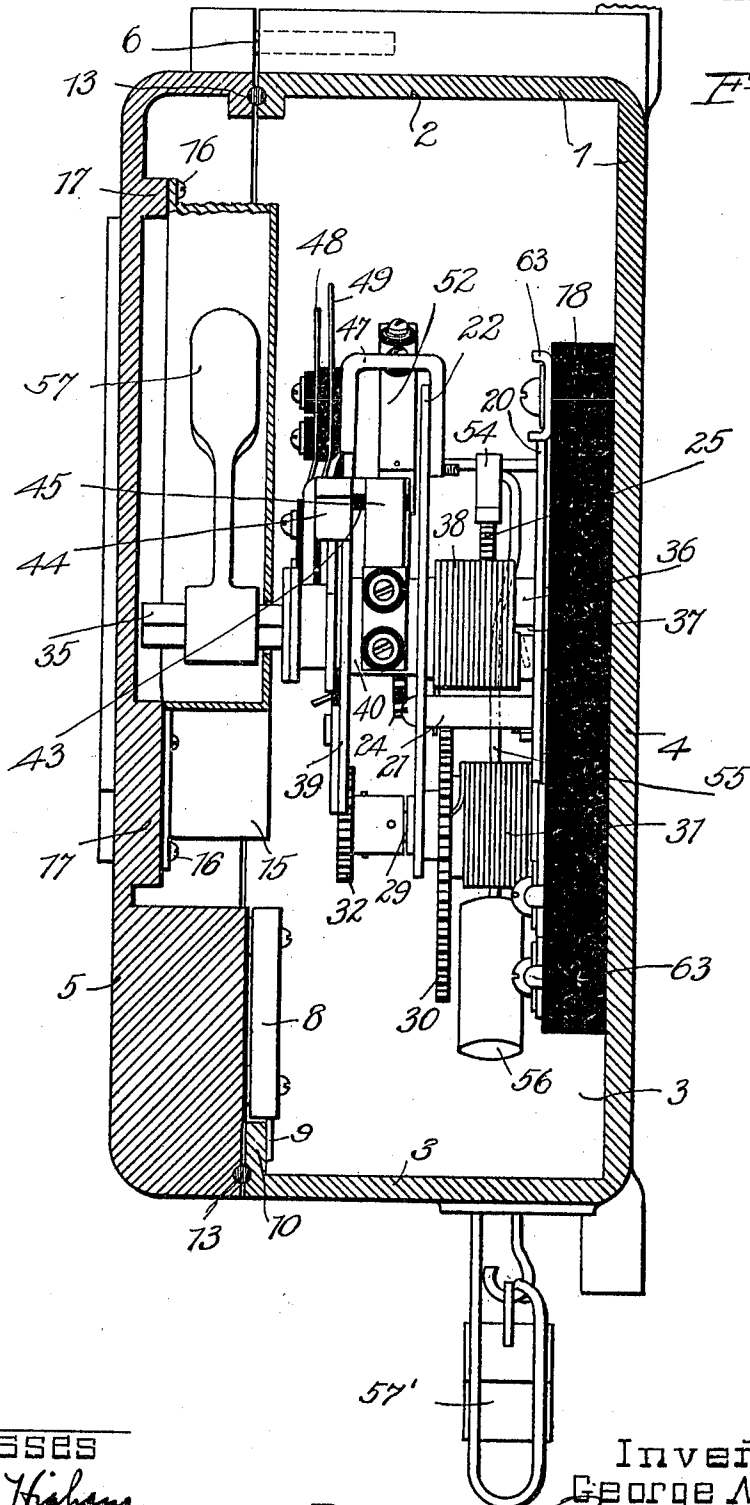


Fig. 3.

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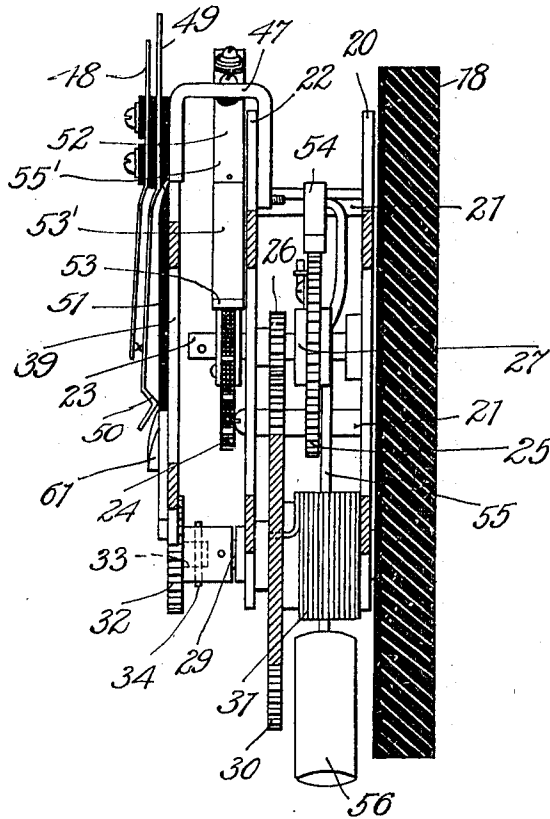
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5 SHEETS—SHEET 4.

Fig. 4.



Witnesses

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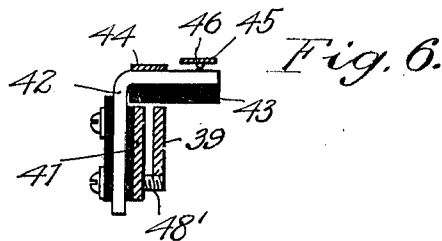
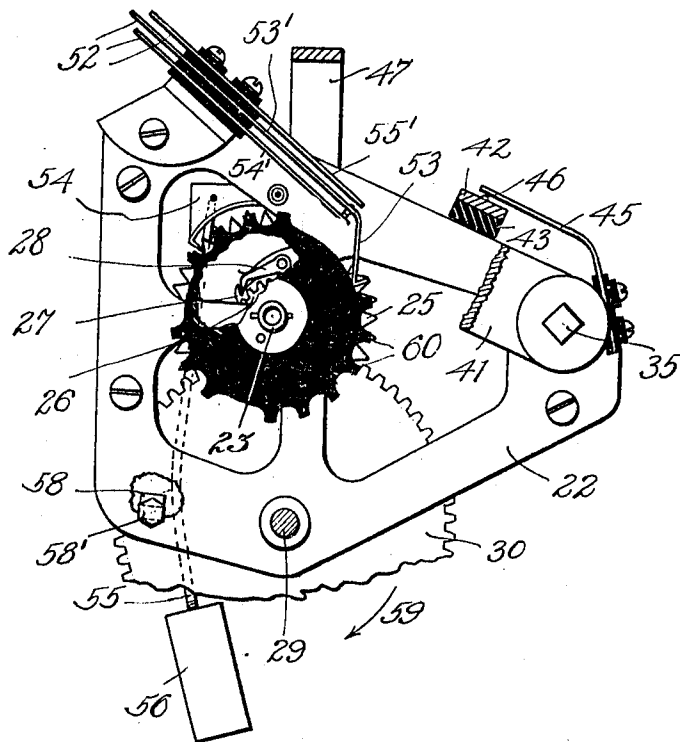
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5 SHEETS—SHEET 5.

Fig. 5.



Witnesses  
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# UNITED STATES PATENT OFFICE.

GEORGE M. WILLIS, OF CHICAGO, ILLINOIS.

WATCHMAN'S SIGNALING AND FIRE-ALARM SYSTEM.

955,929.

Specification of Letters Patent.

Patented Apr. 26, 1910.

Application filed November 16, 1907. Serial No. 402,512.

*To all whom it may concern:*

Be it known that I, GEORGE M. WILLIS, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Watchmen's Signaling and Fire-Alarm Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to watchmen's signaling and fire alarm systems, more particularly to substation apparatus adapted for connection with a line circuit leading to a central station, said apparatus to be used for controlling and interrupting the circuit to telegraph a predetermined code number upon tape used in the recording instruments at the central station.

The apparatus embodying my invention is particularly adaptable for sending in an alarm to a central station in case of a fire. It is also desirable in the employment of mechanism of this kind to construct such mechanism so that a watchman in making his rounds may operate the mechanism and thus make report of his beat.

One of the important objects to be attained in the employment of my invention is an improved construction of the apparatus whereby greater simplicity and durability are obtained.

In order to fully describe the construction and operation of my invention, reference is had to the accompanying drawings, in which—

Figure 1 is an elevation view of the substation apparatus embodying the principles of my invention; Fig. 2 is a similar view with the cover removed to clearly show the internal operating mechanism; Fig. 3 is a vertical sectional view taken on line 3—3 of Fig. 1; Fig. 4 is a sectional view taken on line 4—4 of Fig. 2; Fig. 5 is a front view illustrating part of the mechanism, portions being broken away to more clearly reveal the construction, and Fig. 6 is a sectional view taken on line 6—6 of Fig. 2.

The substation apparatus is inclosed in a metallic box or case 1, having top and bottom walls 2 and 3, respectively, and side walls 2' and 3' and rear wall 4. To the front of the case is secured a cover 5 having at its upper portion a stem 6 for engag-

ing in an opening 7 in the case, and at its lower end is secured well-known locking mechanism 8 from which extends a latch 9 which, when actuated by means of a key, is adapted to engage a tongue 10 extending upwardly from the wall 3. It will be apparent that the cover 5 is made removable in case of repairs by an authorized person, by means of a key 11 which is adapted to be inserted into the aperture 12 leading to the locking mechanism, and it is evident that this construction prevents others than the authorized officer from opening the box except for fire alarm purposes, which will be later described.

In order to form suitable protection for the mechanism inside the case, I have provided sealing material 13 which is suitably disposed between the contiguous surfaces of the case and cover. As clearly shown in Fig. 1, the cover is provided with a piece of glass 14 suitably secured and adapted to be broken when it is desired to send in a fire alarm to the central station. Immediately behind the glass a metallic member 15 is properly secured by means of screws 16, 16 to the enlarged portions 17 of the cover, this member forming a compartment, the purpose of which will be hereinafter described. One surface of this compartment also forms a surface upon which is placed the number of the substation.

Referring now to Figs. 2, 3, 4 and 5, I shall describe the apparatus for controlling the line circuit. Secured to the rear wall of the case is a piece of slate or other insulating material 18 which may be secured by means of the screws 19, 19 and to the front of this member a base plate 20 is mounted which has pillars 21, 21 extending therefrom and upon the ends of which is mounted the supporting plate 22. Pivottally mounted in the base and supporting plates is a main shaft 23 having at its forward end a break wheel 24 made of fiber or other insulating material and which is fastened to the shaft. Between the supporting and base plates a toothed wheel 25 is rigidly mounted upon said shaft, so that upon any movement of said wheel there will be a corresponding movement of the break wheel 24. Proximate to said toothed wheel and loosely mounted upon the shaft is a pinion 26 rigidly connected to a one-toothed ratchet wheel 27 with which a pawl 28, pivoted to the wheel

25, is adapted to engage. Meshing with the pinion 26 and secured to a shaft 29, there is provided a gear wheel 30 which, as shown in the drawings, is disposed between the supporting and base plates. Disposed preferably to the rear of the gear wheel 30, a helical spring 31 is mounted, one end of which may be suitably secured to the base plate 20 and the other end being fastened to the gear wheel, the function of this spring being to exert a torsional pressure upon said gear wheel to hold it in its normal position and after actuation of said wheel to exert pressure to return it to its normal position.

At the forward end of the shaft 29 is secured a pinion 32 having an opening 33 and in which is secured a cross-piece 34, the purpose of which will be described hereinafter. Pivotally mounted between the base and supporting plates is a shaft 35 which has an enlarged portion 36, there being a slot 37 cut therein and into which is inserted one end of a helical spring 38, the other end of this spring engaging about the pillar 21. In order to rotate the gear wheel 30 and consequently the break wheel 24, there is loosely mounted upon the shaft 35 a segmental gear 39 which has a hub portion 40 surrounding the shaft, and rigidly secured to this shaft and adjacent to the segmental gear is an arm 41 having at one end an L-shaped member 42, this member being insulated from the arm 41 and having one portion extending at right angles to said arm. A strip of insulating material 43 is suitably mounted on the member 42 and is adapted to engage the segmental gear upon rotation of the shaft 35 and consequently cause rotation of the gear wheel 30 by means of the segmental gear engaging the pinion 32. A connecting spring 44 is fastened to the member 42 and to this spring the appropriate circuit wire may be secured. Disposed upon the hub 40 but insulated therefrom is a spring 45 having at one end a connection 46 for inclusion in a circuit with the spring 44. Upon movement of the shaft 35 the connection between the member 42 and spring 45 is broken, thus interrupting the continuity of the circuit with which the apparatus is connected. Mounted upon the supporting plate 22 there is provided a U-shaped member 47 which has secured thereto and insulated therefrom the springs 48, 49, the purpose of which will be later described.

As shown in the drawings, particularly in Fig. 4, one end of this U-shaped member forms an abutment for the segmental gear, thus determining the extent of travel of said gear. In order to have the spring 38 hold the segmental gear in its normal position against the abutment, the arm 41 may be provided with a screw 48' for engaging the gear 39 and thus hold it in its normal position, as clearly shown in Fig. 6. The

springs 48 and 49, as shown in Fig. 4, are held in contact when the portion 50 of the spring 49 engages the strip of insulating material 51 which is secured upon the segmental gear, this strip of material being preferably concentric with the shaft 35.

As clearly shown in Figs. 2 and 5, contact springs 52 are disposed upon and insulated from the supporting plate, one of said springs being provided with an arm 53 which is adapted to engage the break wheel 24.

As clearly shown in Fig. 5, the spring 53' is normally in contact with the spring 54' when the break wheel is in its rest position. This spring, however, is adapted to alternately make and break contact with the springs 54' and 55', the spring 55' being connected to ground, the purpose of which will be later described. Pivotally mounted between the base and supporting plates there is shown escapement mechanism 54 which engages the toothed wheel 25 and an arm 55 extends from said escapement mechanism, to the end of which is adjustably secured a weight 56, this construction, it is evident, permitting the proper adjustment to secure the desired operation of the escapement mechanism.

As clearly shown in Fig. 3, the shaft 35 extends into the compartment formed by the metallic member 15 and as shown has its forward end made square so as to permit the mounting thereon of the handle 57 which is adapted to be depressed into its dotted position when a fire alarm is sent in to the central station. In case of fire, when it is desired to signal the central station, the glass 15 is broken by striking the weight 57 against the glass, thereby breaking it and permitting the proper manipulation of the handle 57, this weight as clearly shown in Figs. 1 and 2, being supported from a hook on the box. It will appear evident that upon depression of said handle the insulating material 43 will be brought into engagement with the segmental gear 39 and upon complete depression of said handle the gear 30 will be actuated to make almost one entire revolution against the torsional pressure of the spring 31.

As shown in Fig. 5, means are provided upon the gear wheel 30 and supporting plate 22 for limiting the rotation of the gear wheel. To this end there is suitably fastened in the frame 22 a stop 58' extending inwardly, and a detent 58 is secured to the wheel and when the handle is depressed the wheel is rotated in the direction indicated by the arrow 59, so that the stop 58 will engage the opposite side of the stop 58' from that shown in Fig. 5. After the gear wheel has been actuated, it will slowly return to its normal position by means of the spring 31, and by virtue of the associated mechanism.

ism the escapement mechanism will also be actuated. It may be stated that all the substation apparatus on the line are connected in series through the springs 44, 45, 48, 49 and 53' and 54'.

During the period when the handle 57 is being depressed the continuity of the circuit is broken through the contact 46, this resulting in a long dash being recorded on the tape in the recording instrument at the central station, thus indicating to the attendant that a fire alarm is turned in. The contact at 46 being broken immediately upon the initiation of such a downward stroke, it is clear that even though a person sending in an alarm did not pull the handle all the way down, a long dash would result, thus indicating that it is a fire alarm and not a watchman's signal. Upon the return stroke, even though the break wheel made but one revolution, the particular station would be identified. Just before the handle is given complete depression, the springs 48, 49 are brought out of engagement with the insulating material 51, thus opening the circuit through these springs. Thus, if a person sending in an alarm depresses the handle so quickly that the contact at 46 is open for but a short time and consequently so that the resulting dash at the central station might resemble one of the characters of the regular make and break code, the open circuit at 48, 49 provides for a dash of material length. The return stroke being under the control of the escapement mechanism, the circuit is therefore open during at least the length of time required for one revolution of the break wheel, and, in addition, the length of time required in the particular instance to pull down the operating handle. Immediately upon release of the handle the arm 41 will make a slight rotation, when the circuit will again be closed through the springs 44 and 45. The segmental gear will rotate due to the actions of the helical springs 31 and 38 to actuate the break wheel, which will make one complete revolution before the portion 50 of the spring 49 engages the insulating material on the gear, engagement of which closes the circuit through the springs 48 and 49, and the break wheel will continue to rotate until four revolutions have been completed, during which the projections 60 engage the arm 53 of the spring 53'. Thus, this arm will alternately make and break contact with the springs 54' and 55'. As stated heretofore, the spring 55' is connected to ground, so that if the line accidentally opens, ground relays in central station may be used to obtain signals from all the boxes on the circuit and in this manner producing the necessary operations of the recording instrument to indicate to the attendant the number of the substation from which an alarm has been sent in. As the break wheel

makes four revolutions, after proper connection is established, the number of the substation will be recorded three times at the central station.

The watchman or officer who is to make the reports of his beat by operating the substation apparatus, is provided with a key, which may be of such shape and size that it may be inserted into the opening 62, which registers with the opening 33 of the shaft 29, and the key is preferably constructed so as to engage the cross-piece 34. It is apparent that a clockwise rotation of the key will actuate the gear wheel 30 until the stop 61 upon the segmental gear engages with the shank of the key. The ratchet 27 and pawl 28 allow for this action, one complete revolution being clearly effective in resetting these parts in their initial position. The key is thereupon withdrawn, thus leaving the gear wheel 30 to be actuated by the spring 31, when further rotation of said gear wheel is prevented, the effect being to secure just one complete revolution of the break wheel 24 through the associated mechanism, and thus send in to the central station the signal of the watchman or officer, thus clearly indicating to the attendant that a watchman's signal has been sent in.

As most clearly shown in Fig. 2, the terminal clips 63 are provided so as to establish connection to the line circuit.

It will be apparent that the construction and operation of the apparatus embodying my invention is of such nature as to be simple in operation and which will need but very little repair, and while I do not wish to be limited to the exact construction as shown, I claim as new and desire to secure by Letters Patent:

1. In a device of the class described, the combination of a break wheel, of contact mechanism operated by said break wheel, gear mechanism for operating said break wheel, spring mechanism for actuating said gear mechanism, a segmental gear for meshing with said gear mechanism, said gear being loosely mounted upon a shaft, an arm rigidly mounted upon said shaft, spring means for normally holding said arm in one position, a contact member mounted upon said arm, a contact member mounted on said segment, rotation of said shaft in one direction causing disconnection of said contact members and a consequent opening of a circuit, and rotation of said shaft in the opposite direction causing engagement of said members and closure of a circuit.

2. In a device of the class described, the combination of a break wheel, of gear mechanism for operating said break wheel, of spring mechanism for operating said gear mechanism, a segmental gear for meshing with said gear mechanism, said segmental gear being loosely mounted upon a shaft,

spring means associated with said shaft, an arm rigidly mounted upon said shaft and carrying a contact member, a contact spring secured to said segmental gear for coöperation with said contact member, rotation of said gear winding the spring mechanism associated with the gear mechanism, release of said gear causing a plurality of revolutions of said break wheel and contact springs adapted to be operated by said break wheel whereby the circuit may be opened and closed.

3. In a device of the class described, the combination of a break wheel, spring mechanism for operating said break wheel, gear mechanism associated with said spring mechanism, a segmental gear meshing with said gear mechanism, contact springs associated with said segmental gear, contact springs adapted to be operated by said break wheel, means associated with said gear to cause a plurality of revolutions of said break wheel, rotation of said gear in one direction causing opening of the circuit and rotation of said gear in the opposite direction causing a closure of the circuit, additional contact springs controlled by said segmental gear, rotation of said gear in one direction causing said springs to break contact and open the circuit when said gear is at the end of its actuated position, and rotation of said gear in the opposite direction causing closure of the circuit through said springs.

4. In a device of the class described, the combination of a break wheel, contact mechanism operated by said break wheel, gear mechanism for operating said break wheel, spring mechanism for actuating said gear mechanism, a segmental gear for meshing with said gear mechanism, said gear being loosely mounted upon a shaft, an arm rigidly secured upon said shaft, spring means for normally holding said arm in one position, a contact member mounted upon said arm, a contact member mounted on said segment, rotation of said shaft in one direction causing disconnection of said contact members and a consequent opening of the line circuit, and rotation of said shaft in the opposite direction causing engagement of said members and closure of the circuit, and additional contact springs controlled by said segmental gear and adapted to be moved out of contact to open the circuit a short period before said gear is at the end of its downward movement, said contact members closing together immediately upon upward movement and said contact springs then closing together after a definite period.

5. In a device of the class described, the combination of a break wheel, contact mechanism operated by said break wheel, gear mechanism for operating said break wheel, spring mechanism for actuating said gear mechanism, a segmental gear for meshing

with said gear mechanism, said gear being loosely mounted upon a shaft, an arm rigidly mounted upon said shaft, spring means for normally holding said arm in one position in contact with said gear, a contact member mounted upon said arm, a contact member mounted on said segment, rotation of said shaft in one direction causing disconnection of said contact members, and a consequent opening of a circuit, and rotation of said shaft in the opposite direction causing engagement of said members and closure of the circuit, additional contact springs controlled by said segmental gear, insulating means upon said gear for engaging said springs to hold said springs in contact, the connection of said springs being broken just before the end of the downward movement of said segmental gear, rotation of said gear in the opposite direction causing said springs to make contact and a consequent closure of the circuit therethrough.

6. In signaling mechanism, a break wheel, contact mechanism operated by said break wheel, actuating means for causing a number of revolutions of said break wheel, a pair of contact springs controlled by said actuating means so as to be open during part of the revolutions of said break wheel, and contact means controlled by said actuating means arranged to be open during movement of said actuating means in one direction and closed during movement thereof in the other direction, said contact mechanism, contact springs and contact means being electrically connected in series.

7. In signaling mechanism, a break wheel, contact mechanism operated by said break wheel, actuating means free to operate on its downward stroke and under the control of escapement mechanism on its upward stroke for causing a number of revolutions of said break wheel, a pair of contact springs controlled by said actuating means so as to be open during part of the revolutions of said break wheel, and contact means under the control of said actuating means arranged to be open during the downward stroke of said actuating means and closed during the upward stroke thereof, said contact mechanism, contact springs and contact means being electrically connected in series.

8. In a signaling mechanism, a break wheel, contact mechanism operated by said break wheel, actuating means free to move on its downward stroke and under the control of escapement mechanism on its upward stroke for driving said break wheel, a pair of contact springs controlled by said actuating means and arranged to be open during part of the operation of said break wheel, and contact means controlled by said actuating means arranged to be open during the downward stroke of said actuating means and closed during the upward stroke there-

of, and auxiliary means for causing rotation of said break wheel without movement of said actuating means.

9. In signaling mechanism, a break wheel, 5  
contact mechanism operated by said break wheel, actuating means for driving said break wheel, said actuating means being free to move on its downward stroke and under the control of escapement mechanism 10  
on its upward stroke, and a pair of contact springs controlled by said actuating means and arranged to be opened immediately upon the initiation of a downward stroke thereof and to be closed immediately upon the initiation of the upward stroke thereof. 15

10. In signaling mechanism, a break wheel, contact mechanism operated by said break wheel, actuating means free to move in one direction and under the control of 20  
escapement means in the other direction,

said actuating means driving said break wheel for a number of revolutions while under the control of said escapement mechanism, a pair of springs controlled by said actuating means and arranged to be opened 25  
immediately upon the initiation of the downward stroke and to be closed immediately upon the initiation of the upward stroke, and a second pair of contact springs controlled by said actuating means and arranged to be open during part of the movement of said actuating means while under the control of said escapement mechanism. 30

In witness whereof, I hereunto subscribe my name this 30th day of October A. D., 35  
1907.

GEORGE M. WILLIS.

Witnesses:

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CHARLES J. SCHMIDT.