

A. C. BELL.
 SIGNALING SYSTEM.
 APPLICATION FILED OCT. 9, 1909.

1,042,385.

Patented Oct. 29, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

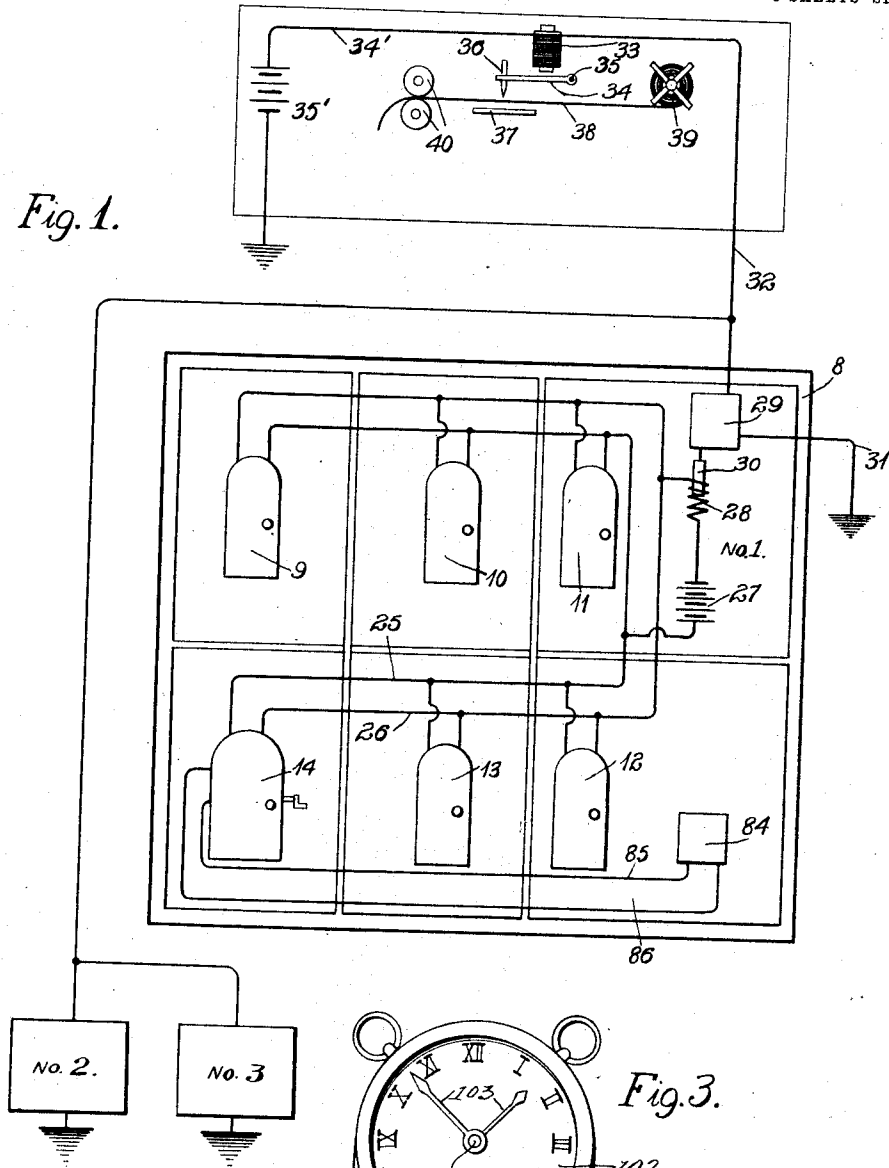


Fig. 3.

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3 SHEETS-SHEET 2.

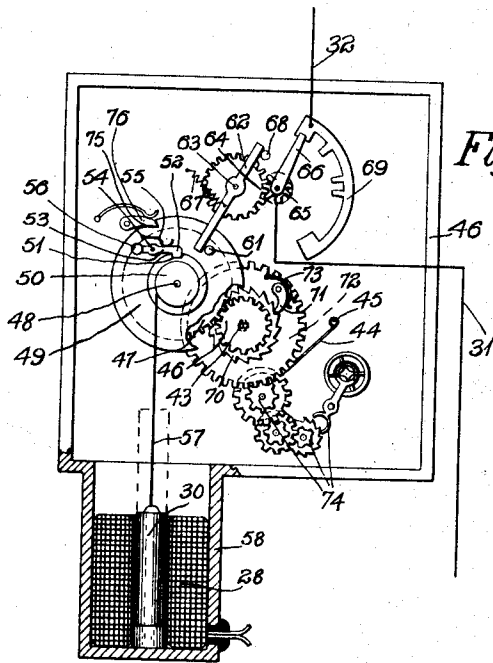


Fig. 2

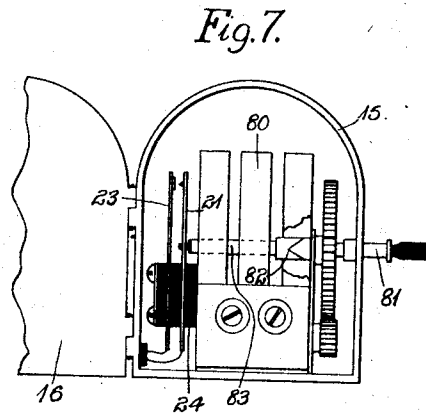


Fig. 7

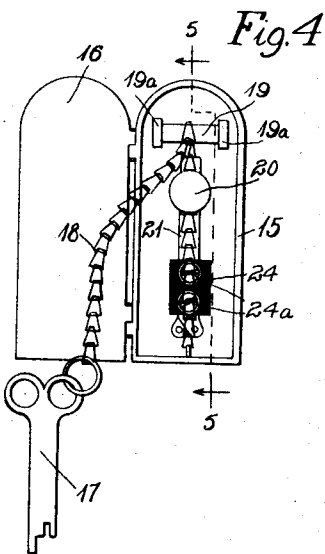


Fig. 4

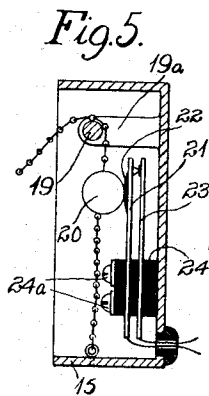


Fig. 5

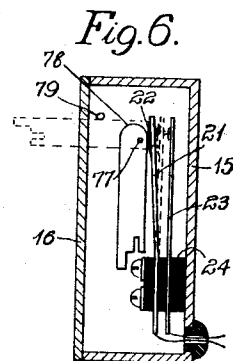


Fig. 6

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3 SHEETS—SHEET 3.

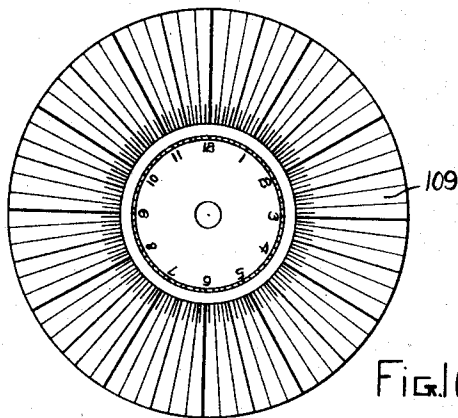


FIG. 10.

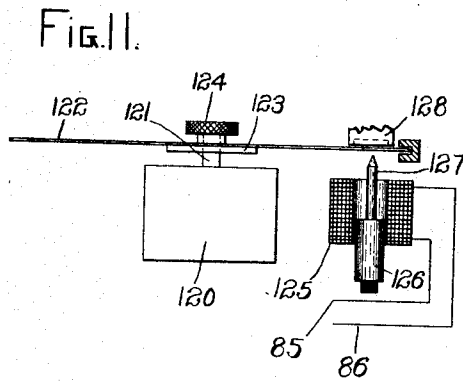


FIG. 11.

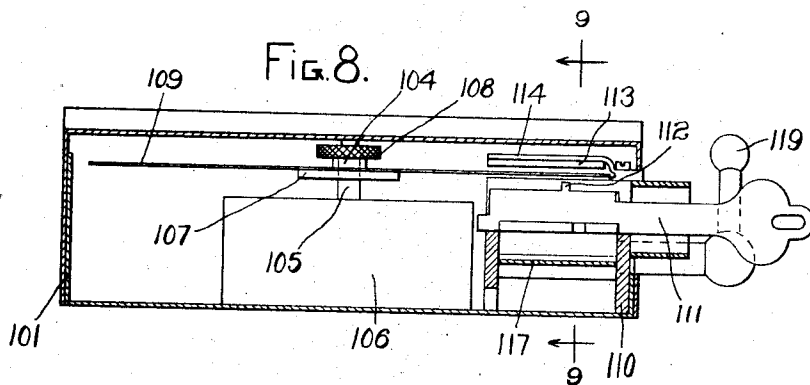
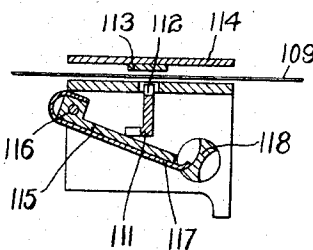


FIG. 8.

FIG. 9.



Witnesses

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UNITED STATES PATENT OFFICE.

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SIGNALING SYSTEM.

1,042,385.

Specification of Letters Patent.

Patented Oct. 29, 1912.

Application filed October 9, 1909. Serial No. 521,789.

To all whom it may concern:

Be it known that I, ALBERT C. BELL, a 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 Signaling 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 an improved signaling system designed particularly to be used by watchmen in connection with the patrolling of buildings or districts within their care.

The system of my invention is of that kind wherein a record of the registrations of the watchman is kept not only at a central station electrically connected with the district which is to be protected, but also in a portable timekeeping device which is carried by the watchman, these latter registrations being made by keys secured at various substations in the patrolled district.

My invention provides means whereby the registration in the portable timekeeping device automatically causes a proper operation of the mechanism controlling the central station, and, if desired, registration also at a local stationary registering device. It thus becomes the duty of the watchman to do no more in addition to his patrol duties than to make the registrations at the substations upon the portable time keeping device which he has with him. This system effectually eliminates the necessity, which has heretofore been present, of requiring the watchman to manually operate, in addition to registering in the portable device, a separate device for each operation of the mechanism of the central station system.

The system of my invention includes a sending device which is actuated periodically by the watchman to prevent a signal at the central station and not to cause a signal as in the prior art. By this arrangement the periodic visits of the watchman go to restore the mechanism to the beginning of a predetermined period of actuation, at the end of which, should the watchman be negligent, injured or forcibly detained, a signal is transmitted over the circuit to the central station. The sending device employed gives a signal only when attention from the central station is required, and each signal

sent over the line is, therefore, significant. In order that collusion between a watchman and a messenger directed from the central station may be avoided, the record in the portable clock which the watchman carries is resorted to as a check upon the registrations which have prevented the sending of a signal to the central station.

In accordance with my invention, I provide for each district or beat a sending device, as above outlined, which operates to transmit a signal only when it is not actuated regularly in predetermined periods. Each district thus provided has a number of stations at which the watchman is to make his registrations. These stations contain means whereby the watchman may make the record on his own device and, without any further actuation on his part, means whereby the common sending device may be automatically operated. To this end I provide an electric circuit connecting the substations of each patrolled district and including electrically operative means by which the signal transmitting device is actuated. Each of the substations is provided with contact springs which operate automatically, when the watchman properly employs the registering key, there provided, to close a circuit through a battery and a solenoid the core of which is the primary actuating member of the sending device. The sending device is so constructed as to necessitate, under normal conditions, actuation at definite periods and, as will hereinafter become clear, these periods separate the visits to the several stations on the circuit. In other words, if one station has been visited and the proper registration there made, the sending device will have a full period to run before it will send a signal. During this period the watchman is supposed to make his round to the next station and at this station he is to make his registration by actuating the sending device to restore it to the beginning of the period. Should he not visit the next station before this period has expired, the sending device will operate to send a signal over the line and, this signal being significant, the attendants at the substation will immediately despatch a messenger to the district under consideration to find the reason for the signal. Thus the registration at each station makes a record in the portable instrument and also

actuates the sending mechanism to prevent a signal at that time.

My invention will be more readily understood by reference to the accompanying drawings in which—

Figure 1 illustrates diagrammatically a building which is to be protected, the circuits therein, and a central station to which the circuit extends and at which a signal may be recorded. Fig. 2 illustrates more or less diagrammatically the signal sending mechanism. Fig. 3 illustrates in perspective the portable clock register which is carried by the watchman. Fig. 4 illustrates one of the substation devices. Fig. 5 is a sectional view taken on the plane 5—5 of Fig. 4. Fig. 6 is a sectional view similar to Fig. 5, but illustrating a modified form of substation instrument. Fig. 7 is an elevation view showing still another modification of the substation device. Fig. 8 is a side elevational view of the portable clock register shown in Fig. 3, the lower part thereof being shown in section to disclose the parts which will be more particularly described. Fig. 9 is a sectional view taken on the plane indicated by the line 9, 9 of Fig. 8, looking in the direction indicated by the arrows. Fig. 10 is a view showing the form of register sheet which may be employed in the register; and Fig. 11 is a more or less diagrammatic view illustrating a local stationary register mechanism which will be referred to.

Referring to Fig. 1, a plurality of protected areas, #1, #2 and #3, are illustrated. These protected areas may be buildings, as illustrated diagrammatically at 8 at #1, and each is provided with a series of substation instruments, as illustrated at 9, 10, 11, 12 13 and 14, at #1, a sending device being located in each area and being connected with the substation instruments as at #1, and as will hereinafter be described in detail.

Referring to Figs. 4 and 5 wherein one type of these substation instruments is shown, it will be seen that the casing 15 is provided with the cover 16, which is opened by the watchman so that he may have access to a key 17 at the end of a chain 18 which is attached at a suitable point inside of the casing after passing over a cross-bar 19, suitably supported by arms 19^a, as indicated in the drawings. At a proper point in this chain a weight in the form of a ball 20 is secured. The point of attachment and the cross arm 19 are so located that this weight, when the chain is taut, that is, when the watchman removes the key to actuate his clock as will be hereinafter pointed out, forces an actuating spring 21, by engaging the layer of insulation 22, into contact with the contact spring 23, both of these springs being mounted normally apart, in a suitable insulating block 24, suitably secured upon

the inside of the casing by screws 24^a. These springs are electrically connected in bridge of a local circuit and it is apparent that the complete and proper withdrawal of the key 17 will close these two springs together to close a bridge across the circuit conductors. This local circuit I have diagrammatically shown in Fig. 1 as comprising the conductors 25 and 26 which pass to all the substations in the particular district. This circuit is normally open and can be closed only by the closure of the two contact springs at one of the substations.

In permanent bridge of the line is a battery 27 in series with a solenoid winding 28 and it is apparent that, should any of the substation instruments be actuated, as above described, a circuit through the solenoid and battery is closed. In Fig. 1, I have illustrated the signal sending device diagrammatically at 29, the solenoid core 30, extending therefrom, being that member which must be actuated periodically to prevent the sending of a signal over the line to the central station. In the description of this particular figure it will suffice to say a switch is controlled in this device 29, this switch being normally closed and being adapted to be opened intermittently in accordance with a predetermined code upon failure of the watchman to actuate one of the substation instruments at the proper time. One of the contacts of this switch is grounded by conductor 31, while the other is connected by conductor 32 with the central station, more specifically, with one terminal of an electromagnet 33, the other terminal of which is connected with ground by way of a conductor 34' through a battery 35'. The electromagnet 33 is the actuating element in a signal recording device. The armature 34 of this electromagnet is pivoted at 35 and is provided at its end with a recording pencil or pointer 36 between which and a platen 37 a tape 38, unwinding from the feed roll 39, is adapted to pass, this tape then passing between the revolving rollers 40 to draw the tape precisely as in any telegraphic printing apparatus.

The timekeeping recording device, which the watchman carries with him, is illustrated in Figs. 3, 8, 9 and 10. It will be seen that this device comprises a casing 101 which discloses, at its top, a clock face 102, having hands 103 mounted upon a main spindle 104. This main spindle operatively connects with the main shaft 105 which extends from the clockwork, indicated at 106. The shaft 105 is provided with a collar 107 upon which is held, by means of a thumb nut 108, a paper disk 109, shown in plan in Fig. 10. As there indicated, the paper is divided radially into sections corresponding to divisions of time in any suitable manner. Within the casing at one side of the clockwork a

key supporting member 110 is secured, in this particular instance being in the form of a U-shaped bar properly slotted at the sides and top for the reception of a key 111, which carries a type 112. The paper disk 109 is arranged to pass over the key support, and, as indicated in Fig. 9, over the type 112. The key is adapted to be moved so that the type carried thereby may make an impression upon the disk by cooperation with a platen 113 carried by a supporting member 114 in any suitable manner. In order to move the key into contact with the paper disk when it has been inserted in the device, a lever plate 115 is pivoted at 116 to the supporting member. A spring 117 is carried by this lever plate and engages a cam 118, which is adapted to be rotated by the watchman by manipulation of the handle 119. It is to be understood that the keys 111 are distributed at the various stations and are the same as the keys shown less in detail at 17. A key slot 42 is provided for the reception of the key and a winding stem 41 is also provided for the purpose of winding the clockwork. The key of each of the substations has a character of its own and it is clear that the impression thereof on the disk 109 will indicate at which station the impression was made. The disk being properly graduated and rotated by the clockwork, it is furthermore clear that the time at which the impression was made will also be recorded. The watchman has no access to this dial and the proper records can be made only by proper attention to his duties. It will be found that not only does this device form a check upon the other arrangements which have been and will be described, but it will be seen that it is quite necessary in order that a watchman may be held to his duties in the best possible manner.

The signal sending device which I illustrate diagrammatically at 29 in Fig. 1, is illustrated in detail in Fig. 2. This device consists in a main driving spindle 43 to which one end of a spring 44 is secured, the other end of said spring being anchored at 45 to the casing 46 in any suitable manner. The spindle 43 has rigidly secured thereto a gear 46 which meshes with a gear 47 rigidly mounted upon a spindle 48. The gear 47 has secured thereto a disk 49 and also upon the spindle 48 a drum 50 is rotatably mounted. One of the sides of this drum is larger than the other, as shown, and is provided with a notch 51 in which a detent 52 of a detent lever 53, pivoted to the disk 49 at 54, is held by a spring 55 suitably secured to the disk referred to. A handle 56 is provided for this detent lever so that the detent may be raised out of the notch 51 to release the drum, if desired, as will hereinafter be pointed out. The drum 50 has wound there-

on a cord 57 which extends downward into a reduced part 58 of the casing and terminates in the solenoid core 30, this core being associated with the winding 28 disposed in the reduced part of the casing as shown in the figure. The disk 49 has projecting from its face a pin 61 initially located to the right of a lever arm 62 pivoted at 63 and secured to a concentric gear 64 which meshes with a pinion 65 carrying a contact arm 66. A spring 67 is provided to normally maintain the lever 62, gear 64, pinion 65 and contact arm 66 in the position indicated in the drawings. Motion beyond this position is prevented by the engagement of the upward extension of the lever 62 with a pin 68 extending from the casing of the sending apparatus. The contact arm 66 is arranged to pass over a notched segment 69, the notches in such segment being so disposed and so conformed that when the contact arm is moved around to the right, engagement between the arm and the segment is interrupted for longer or shorter intervals in accordance with a predetermined code to identify the particular place at which the transmitting device is located. To this end conductor 31 is connected with the switch arm 66, and conductor 32 is connected with the segment as shown in the drawings.

As before stated, conductor 31 is connected with the central station by way of ground and wire 32 is connected directly therewith. The arm 66 and segment 69 are normally in contact, and reference to Fig. 1 will show that the circuit through the electro-magnet 33 and the battery 35 is, therefore, normally closed. When the switch arm 66 is operated, as will hereinafter be pointed out, the circuit just referred to is broken intermittently so that the armature 34 at the central station is released to permit the pencil 36 to ride upon the recording tape. These releases will, of course, be in accordance with the conformation of the segment 69 and, since this segment is conformed to individualize the district, the attendant at the central station may, by reading the tape, know in which district something unusual has occurred. The spindle or shaft 43, has also rigidly secured thereon a ratchet wheel 70, which cooperates with a spring pawl 71, carried by a gear 72 loosely mounted on the shaft or spindle 43, and spring 73, also carried by the gear, is disposed to maintain the pawl 71 in contact with the ratchet 70. The gear 72 engages an escapement train 74 by which the spindle or shaft 43, and the parts mechanically connected therewith, are constrained to a desired rate of motion. The disk 49 is provided with a notch 75 in the periphery thereof, in which notch a spring pressed pawl 76 is arranged to engage, this pawl being suitably pivoted to the casing 46. This pawl prevents the movement of the

disk 49 to the left beyond the position indicated in the drawings.

From the foregoing description, it is apparent that each time the watchman visits a station in the patrolled district to make the registration in the device which he carries with him, a bridge across the limbs of the local circuit will be closed to complete the circuit through the solenoid winding 28 and the battery 27. This energizes the winding 28 and the core 30, which is then in its raised position, as indicated in dotted lines, Fig. 2, is drawn downwardly into the winding. This actuation places the transmitting device in such a position as to delay its operation to send a signal for another period. When the spring 44 has been properly wound, the gear 46, gear 47, and disk 49 will be driven, the disk rotating to the right, and being constrained through the medium of the various gears hereinbefore referred to, to a particular rate of motion, this rotation of the disk 49 gradually winds the cord 57 upon the drum 50. The escapement mechanism may be designed so as to effect a complete rotation of the disk 49 in any desired period of time, as, for instance, a quarter of an hour, half an hour, or an hour, in accordance with the reasonable length of time it is judged should elapse between visits to the various substations. At the end of this predetermined interval, the pin 61, which is initially on the right of the lever 62, as shown in Fig. 2, comes around and engages on the left hand side of this lever; continued motion of the disk 49 toward the right would move the lever, and consequently, would turn the gear 64 to the left, and the pinion 65 to the right, such motion serving to move the contact arm 66 down over the segment 69. The engagement between the pin 61 and the lever 62 is such that the lever is disengaged from the pin when the contact arm 66 has reached the lower end of the segment 69, at which time the spring 67 serves to return the lever and the contact arm to their normal positions. After the lever 62 is disengaged from the pin 61, the pawl 76 may drop back into the notch 75 in disk 49 to prevent motion thereof to the left. Under normal circumstances, the watchman in whose care the premises are placed makes his round from one station to another in a shorter period of time than is required for the disk 49 to make a complete rotation, and he, therefore, should reach each station before the lever 61 has been engaged by the pin 62. Having reached the station, he opens the box there provided, and, withdrawing the key to register in his own device, he automatically closes contact springs 21 and 23 together to close the circuit through the winding 28 and the battery. This energizes the winding 28, and the core 30 is drawn downwardly, thus

rotating the disk 49 to the left until the pawl 76 engages in the notch 75 which occurs immediately before the pin 61 engages the right hand side of the lower lever 62. This motion of the disk 49 to the left rotates spindle 43 to the right, thus winding the spring 44 instantly. This is made possible by reason of the pawl and ratchet arrangement mechanically connecting the gear 72 and the spindle or shaft upon which it is mounted. Thus, the entire mechanism has been returned to its initial position, a new period is begun, and there is no possibility of operation of the device to transmit a signal to the central station until the pin 61 again reaches the right hand side of the lever 62.

It is now apparent that if each round from one station on the beat to another is made in less time than the predetermined interval, and so long as the watchman makes his local registrations properly each time, the transmitting mechanism will not be actuated, and no signal will be given at the central station. If, for any reason, the watchman fails to register at a station within the proper time, the disk 49 will continue toward the right and will actuate the lever 62, and consequently, the transmitting mechanism. The operator at the central station upon receiving a signal at once sends a messenger to the district to determine the reason for the watchman's failure to register. If the watchman has really been delinquent in his duty and conspires with the messenger to cover his negligence, detection is inevitable because of the clock which he himself is carrying. This clock has a paper dial or other registering means upon which characters are impressed by means of the keys at the substations. These keys are individualized by different characters, the dial being graduated so as to indicate the time at which each character was impressed. In checking results, the watchman returns the clock to an inspector when he leaves his post, and the inspector removes the dial and examines the same to satisfy himself that the watchman has properly performed his work. Disk 49 may be provided with a number of notches in its periphery, if desired, and a corresponding number of pins 61, which may be arranged at equal distances from each other, or not, as desired, as a result of which successive predetermined intervals of operation of any desired length may be secured. Should it occur that a signal is given, and the disk 49 has continued to rotate past the lever 62 to the right, the detent 52 may be raised out of the notch 51 in the drum 50, which is loose upon its shaft, to permit the core to drop so that another period may be properly begun. The end of the spindle 43 is square, as indicated in dotted lines, in order that the spring 44 may be wound by means of a key, if sending

mechanism is driven sufficiently to operate the contact mechanism. In practice, the sending mechanism is entirely inclosed in the casing and the adjustment and re-winding after abnormal operation is taken care of by means of a messenger from the central station. The gear 47 and the drum 50 may be made secure upon the shaft 48, and the disk 49 be loosely mounted thereon except for its mechanical connection by way of the detent 52. By this arrangement, if the detent is raised out of the notch, the core may be dropped of its own weight, or, if necessary, may be pulled down manually to re-wind the spring 44 after it has been excessively unwound by abnormal operation, as hereinbefore pointed out.

In Fig. 6 I have illustrated a modified form of substation instrument, and have similarly characterized the parts analogous to parts of the form shown in Figs. 4 and 5. In this modification the key is not on a chain, but is pivoted at 77 in a suitable manner to the casing 15. The inner end of the key is provided with the cam surface 78, which is circular and eccentric relative to the pivot 77; normally the key is in the position shown in full lines in Fig. 6 with the actuating spring 21 resting thereagainst, as indicated, the insulating disk 22 being interposed. When the cover 16 is open, the key is sprung upwardly against a stop 79 and the cam surface throws the actuating spring 21 into contact with the spring 23 for the same purpose as has been above described with reference to the springs so numbered. In Fig. 7 I have shown still another form of substation instrument. Here the casing incloses the magneto machine 80, which is actuated by a handle 81, extending outside the casing. At the opposite side of the machine are the springs 21 and 23, mounted in the insulating block 24, suitably secured to the machine proper. The construction is such that actuation of the handle closes these two springs together to close the circuit in bridge of the local circuit above described. This may be accomplished in various ways. In Fig. 7 I have shown diagrammatically a divided and spring connected shaft having a V-shaped connection, as indicated at 82. Actuation of the handle 81 thrusts the left hand side 83 of the shaft to close the springs 21 and 23 together. This form is particularly desirable where a local stationary recording device is used. In Fig. 1 I have illustrated such a device diagrammatically at 84, this device being an electrically operative structure. The local recording device 84 is connected with the magneto 80, which I have conveniently designated at 14 by means of the conductors 85 and 86, which lead directly from the armature of the magneto. The nature of this local recording device 84 is more fully shown in Fig. 11,

where a clockwork 120 is shown as being provided with a central spindle 121, upon which a paper disk 122, similar to the paper disk 109, may be clamped against a collar 123 by means of a thumb nut 124. A solenoid 125 is provided, this solenoid having a core 126 which carries a punch 127, arranged to coöperate with a platen 128 to mark the dial as it is rotated by the clock. The solenoid 125 is connected with the leads of the magneto 80 by means of the conductors 85 and 86, as pointed out. When the solenoid 125 is energized the core 126 is raised and the punch is thrust into the dial to mark it quite as described relative to the type member of the portable clock carried by the watchman. It is clear that if one of these local recording devices is provided for each substation, all that the watchman need do is to turn the crank of the magneto and a record will be made as to just what time he visited the associated station. In this way, if desired, the portable time-recorders may be dispensed with or they may be employed as an additional check.

I claim as new, and desire to secure as Letters Patent:

1. In a signaling system, the combination of a sending station, a receiving station, signaling mechanism at the sending station, such mechanism adapted to signal the receiving station unless periodically operated, and electromagnetic means for periodically operating said mechanism, a local circuit extending from said circuit station and including said electromagnetic means, a substation where said local circuit is controlled, a portable recording device, means at the substation for actuating said portable recording device, means whereby registration in said portable device automatically closes said local circuit to actuate said electromagnetic means.

2. In a signaling system, the combination of a receiving station, a sending station, a line circuit connecting said stations, a local circuit extending from said sending station, a substation where said local circuit is controlled, means at said substation for making a record in a portable device, and means whereby employment of said recording means closes said local circuit to operate said sending station.

3. In a signaling system, the combination of a signal sending device adapted to transmit a signal unless periodically operated, electromagnetic means the actuation of which prevents actuation of said sending device, a local circuit for setting electromagnetic means, a substation at which said local circuit is controlled, a key at said substation for making a record in a portable device, and means whereby employment of said key closes said local circuit to actuate said electromagnetic means.

4. In a signaling system, the combination of a signaling sending device operative to transmit a signal unless periodically actuated, and electromagnetic means for actuating said sending device to prevent the transmission of a signal, a local circuit including said electromagnetic means extending from said sending device, a substation, contact springs at said substation controlling said local circuit, a recording device at said substation for coaction with a portable device and means whereby employment of said recording device closes said springs together to close said local circuit to actuate said electromagnetic means.

5. In a signaling system, the combination of a receiving station, a plurality of signaling mechanisms adapted to signal the receiving station unless periodically operated, and mechanism local to the signaling mechanisms consisting in a time-controlled recorder and means at each signaling mechanism available to an operator for actuating the same, such actuation automatically causing the operation of such signaling mechanisms.

6. In a signaling system, the combination of a receiving station, a circuit extending from the station, a plurality of contact mechanisms included in and adapted to send electric impulses through the circuit, time-controlled driving means for actuating each of said contact mechanisms after a predetermined interval of operation, means operated during such interval for preventing the actuation of such contact mechanism by such driving means at the end of such interval, and mechanism local to the contact mechanisms consisting in a time-controlled recorder and means at each contact mechanism available to an operator for actuating the same, such actuation automatically causing the operation of said signaling mechanisms.

7. In a signaling system, the combination

of a receiving station, a circuit extending from the station, a plurality of contact mechanisms included in and adapted to send electric impulses through the circuit, time-controlled driving means for each of such contact mechanisms continuously operated to actuate the same after a predetermined interval of operation, means for each of said contact mechanisms adapted to be repeatedly operated to delay by each operation the actuation of such contact mechanism whereby its actuation may be prevented, and mechanism local to the contact mechanisms consisting in a time-controlled recorder and means at each contact mechanism available to an operator for actuating the same, such actuation automatically operating said delaying means.

8. In a signaling system, the combination of a receiving station, a circuit extending from the station, a plurality of contact mechanisms included in and adapted to send electric impulses through the circuit, time-controlled driving means for each of said contact mechanisms, a member operated by each of such driving means and adapted after a predetermined interval of operation to actuate the corresponding contact mechanism, means for setting each of such members back relatively to such driving means to delay the actuation of the corresponding contact mechanism, and mechanism local to the contact mechanisms consisting in a time-controlled recorder and means at each contact mechanism available to an operator for actuating the same, the employment of such means causing the actuation of said setting means.

In witness whereof, I hereunto subscribe my name this 29th day of September, A. D., 1909.

ALBERT C. BELL.

Witnesses:

ARTHUR H. BOETTCHER,
A. A. THOMAS.