F. HARDINGE.

SIGNALING SYSTEM.

APPLICATION FILED JUNE 4, 1909.

1,046,182.

Patented Dec. 3, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

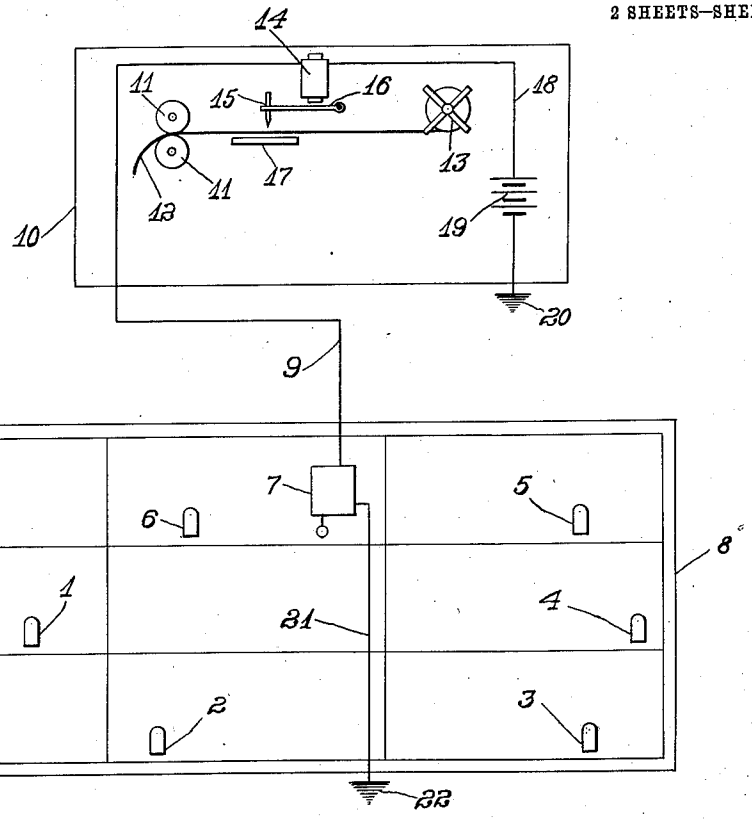
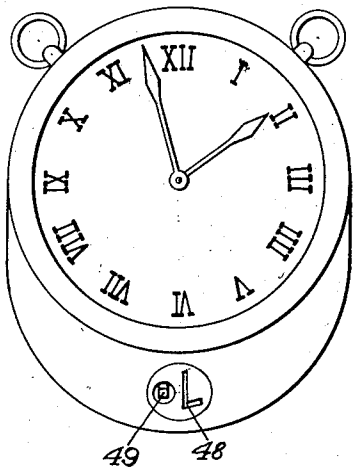


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 2.

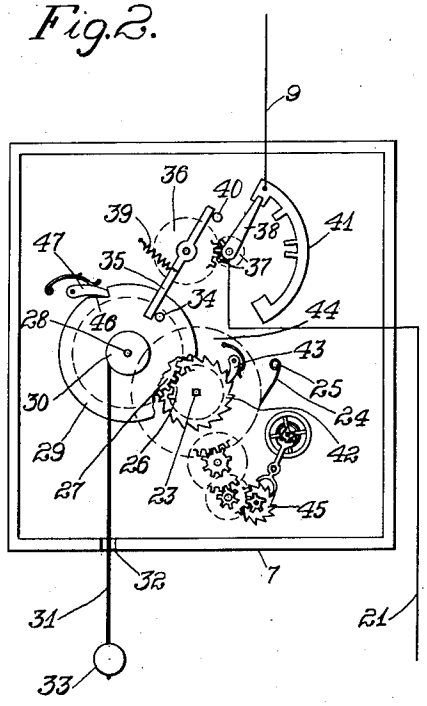
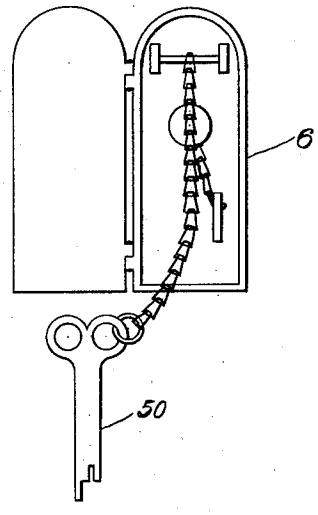


Fig. 4.



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FRANKLIN HARDINGE, OF CHICAGO, ILLINOIS.

SIGNALING SYSTEM.

1,046,182. Specification of Letters Patent. Patented Dec. 3, 1912.

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To all whom it may concern:

Be it known that I, FRANKLIN HARDINGE, 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 in their care.

In the past, it has been the practice to employ a signaling system, usually electric, by which a watchman is required at regular intervals during his rounds to actuate sending mechanism located in a position readily accessible to him during his rounds. One of his duties has consisted in operating this mechanism once, or if desired, a greater number of times during each complete trip of the premises for the safety of which he is responsible. Such operation of the signaling mechanism by the watchman has commonly resulted in the actuation of signal receiving mechanism at a central station, which signals as received there have afforded a means for checking the work of the watchmen whose duty it is to operate the signaling mechanisms connected with the central station. Such system is open to the serious objection that all of the calls sent in by the various watchmen must be kept track of, in order that the operator at the central station may discover an omission of his duty by one of the watchmen, which is indicated by the failure to receive a signal at the central station over the corresponding line. A further difficulty in connection with such systems has been that a number of different sending stations have usually been connected to the same signaling circuit, as a result of which frequently two or more signals sent over the circuit at the same time have so combined as to produce an unintelligible record at the central station, the cause of which, as well as the possible omission on the part of one of the watchmen, could not be determined without investigating each of the stations on the particular circuit in question.

By my invention, I eliminate the difficulties mentioned by providing signaling mechanism at each of the sending stations so constructed that the operation of this mechanism by the watchman prevents the sending of a signal to the central station for a certain time interval, at the end of which, unless the signaling mechanism is again operated, the signal corresponding to the sending station will be sent over the circuit and received at the central station. As a result, as long as the watchmen whose territory is connected to a signaling circuit perform their duty, no signal is sent over the circuit from any of the sending stations, but whenever one of such watchmen omits to operate his sending mechanism, such mechanism operates to send a corresponding signal, thus advising the operator at the central station that the watchman is either injured or negligent. In this way, the number of signals sent from the various stations to the central station is reduced to a minimum, and each signal received at the central station is significant and must be attended to. The care of the central station is, therefore, a much simpler matter, and can be attended to by fewer employees for the same territory than has been possible in the past.

To prevent the possibility of collusion between the watchmen and a messenger sent from the central station to determine the cause of a delinquency, I employ a local recording system for use in the watchman's territory, which, while it may consist in any improved apparatus, is preferably of a form in which clock mechanism is carried by the watchman and keys adapted to operate the clock mechanism are distributed at various points throughout the territory under his care. Each insertion of a key into the clock mechanism makes a record of the station and the time of the operation. As a result, each morning the proprietor of the premises has a basis for checking the work of his watchman independently of the operation of the sending mechanism connected with the central station. If preferred, the local recording system may consist in clock mechanism permanently located, as in the office of the building or at some point not under the control of the watchman, which clock mechanism drives a chart of some improved form, adapted to receive impressions as a result of the operation by the watchman of suitable apparatus disposed at various stations on his beat.

The several drawings illustrating my invention are as follows:

Figure 1 is a diagrammatic view, showing a building adapted to be protected by my signaling system; Fig. 2 is a detail view of the sending mechanism employed to transmit a signal characteristic of the building protected to the central station shown in Fig. 1; Fig. 3 illustrates a form of portable watchman's clock that may be employed by the watchman to record his trips around the premises; Fig. 4 illustrates a form of key and containing case that may be provided at the various stations on the watchman's beat.

Referring to Fig. 1, the building under the care of a watchman is diagrammatically represented at 8. At various points throughout the building, local stations 1 to 6, inclusive, are indicated, while at 7 there is diagrammatically indicated sending apparatus adapted, when moved to a proper position, to send electric impulses through the wire 9 connecting the building 8 with the central station 10. The circuit illustrated is of the type that is normally closed, and depends for its operation at the receiving station 10 upon being broken by the sending apparatus 7 in such a manner as to make a characteristic record or indication at the receiving station 10. Receiving apparatus is diagrammatically indicated at the station 10, consisting in a pair of rolls 11, one of which may be driven by means of clockwork, not shown, to feed between such rolls from a supply roll 13 a paper tape 12. Located between the rolls 11 and the supply roll 13 is an electromagnet 14, in such position that a pencil or marking point 15 carried by the armature 16 of the electromagnet is normally lifted away from the tape 12 when the electromagnet 14 is energized. A plate 17 is provided immediately below the marking point 15 and the tape 12 to afford a support for the tape when a record is made. One terminal of the electromagnet 14 is connected to the wire 9, the other terminal of such magnet being connected by wire 18 to battery 19, and thence to ground 20.

The signaling mechanism 7 is adapted normally to make contact between the wire 9 and the wire 21 leading from such mechanism to the ground 22. As a result, therefore, the electromagnet 14 is normally energized, and the marking point 15 is held away from the tape 12. When the signal sending apparatus 7 operates to break the circuit through the wire 9, the electromagnet 14 is correspondingly deënergized, as a result of which the marking point 15 makes a corresponding record upon the tape 12.

The sending apparatus 7 consists, as shown in Fig. 2, of a main driving spindle 23 to which one end of a spring 24 is secured, the other end of such spring being anchored at 25 to the case of the sending mechanism. The post 23 has rigidly secured thereto a gear 26 meshing with a gear 27 mounted upon a spindle 28. The gear 27 has secured thereto a disk 29 and a drum 30. The drum 30 has wound around it a cord 31, which extends downward through an opening 32 in the bottom of the instrument case, and terminates in a knob or ball 33. The disk 29 has projecting from its face a pin 34 located to the right of a lever arm 35 secured to a gear 36, which gear 36 meshes with a gear 37 carrying a contact arm 38. A spring 39 is provided to normally maintain the lever 35, gear 36, gear 37 and contact arm 38 in the position indicated in the drawings. Motion beyond this position is prevented by the upward extension of the lever 35 engaging a pin 40 secured to the casing of the sending apparatus. The contact arm 38 engages a notched segment 41, the notches in such segment being so disposed and so conformed that when the contact arm 38 is moved around to the right, contact between the arm 38 and the segment 41 will be interrupted for longer or shorter intervals, depending upon the conformation of the notches in the segment 41, and thus the circuit through the wires 9 and 21 connected respectively with the segment and the contact arm will be correspondingly interrupted.

The spindle or shaft 23 has rigidly secured thereto, besides the gear 26, a ratchet wheel 42 coöperating with a spring pawl 43 carried by a gear 44 loosely mounted on the spindle 23. The gear 44 engages an escapement train 45, by which a desired rate of motion is imparted to the spindle 23 and the parts carried thereby. The disk 29 is provided with a notch 46 in its periphery, which notch is engaged by a spring pawl 47 pivoted to the casing of the sending mechanism. The pawl 47 is adapted to prevent the disk 29 being moved around to the left beyond the position indicated in the drawings.

The operation of the sending mechanism described is as follows: When the spring 24 has been properly wound, the escapement train 45 operates in such a manner that the gear 26 and disk 29 driven thereby are operated at a desired rate, such disk being rotated around to the right, which motion gradually winds the cord 31 upon the drum 30. The escapement mechanism 45 may be designed so as to effect a complete rotation of the disk 29 in any desired period of time, as, for instance, a quarter of an hour, half an hour, or an hour, and at the end of this predetermined interval the pin 34 engages upon the left hand side the lower end of the lever 35, and continued motion of the disk 29 rotates the gear 36 to the left and the gear 37 to the right, such motion of the gear 37 serving to move the contact arm 38

around to the right on the notched segment 41. The engagement between the pin 34 and the lever 35 is such that the lever 35 is disengaged from the pin 34 when the contact arm 38 has reached the lower end of the segment 41 at which time the spring 39 serves to return the lever 35 and the contact arm 38 to their normal position. At the same time that the lever 35 is disengaged from the pin 34, the pawl 47 again engages the notch 46 to prevent motion to the left of the disk 29. In the normal operation of my mechanism, the watchman in whose care the premises are placed has instructions to make his rounds to the various stations 1 to 6 inclusive within a shorter period of time than is required for the disk 29 to make a complete rotation, and he therefore reaches station No. 6 before the lever 35 has been engaged by the pin 34. After operating his local registering mechanism, which may consist in a watchman's clock, as indicated in Fig. 3, by means of a key secured at station No. 6 as indicated in Fig. 4, the watchman must pull down the knob 33 as far as it will go, which operation serves to rotate the disk 29 to the left until the pawl 47 engages the notch 46, which occurs immediately before the pin 34 engages the right hand side of the lower end of the lever 35. This motion to the left of the disk 29 rotates the spindle 23 to the right, thus winding the spring 24 without interfering with the escapement mechanism 45 on account of the relation between the pawl 43 and ratchet wheel 42. The motion to the left of the disk 29 also serves to prolong the interval of time before the actuation of the circuit interrupting mechanism can be effected, and furthermore, for any particular condition of the signal sending apparatus, the mechanism can only be returned to a position corresponding to the beginning of the particular predetermined time interval during which the knob 33 is pulled down.

From the above, it is apparent, as each round of the watchman is made in less time than the predetermined interval required by the signaling mechanism to actuate its contact mechanism, that as long as the watchman properly performs his duties and operates the knob 33 at the time of visiting station No. 6, the contact mechanism will not be actuated, and that therefore the receiving mechanism at the central station will not be actuated. If for any reason the watchman fails to restore the signal sending mechanism by operating the knob 33 within the predetermined interval, a signal is sent by the actuation of the contact mechanism, and is received at the central station in the manner already described. The operator at the central station upon receiving the signal at once sends a messenger to investigate the cause of the failure of the watchman to properly perform his work. To provide against the contingency of the watchman being able to persuade the messenger that he has substantially performed his work, and that it was merely an accident that the sending mechanism 7 was not operated, the watchman's clock will afford a record against him in the morning, if he has really been delinquent in his duty.

The disk 29 may be provided with a number of notches in its periphery, if desired, and a corresponding number of pins 34, which may be arranged at equal distances from each other or not, as desired, as a result of which successive pre-determined intervals of operation of any desired length may be secured. The end of the spindle 23 is squared, as indicated, in order that the spring 24 may be wound by means of a key if the sending mechanism is driven sufficiently to operate the contact mechanism. In practice, the sending mechanism is entirely inclosed in a suitable casing, and the adjustment and re-winding after a watchman's delinquency will be taken care of by means of a workman from the central station.

The watchman's clock indicated in Fig. 3 of the drawings is of a well known portable type, in which clockwork mechanism is adapted to drive a paper disk upon which impressions may be made by the insertion of a key 50, as indicated in Fig. 4, into the keyhole 48. The clock may be wound by means of a spindle 49. The keys used at the different stations preferably have formed upon them characteristic indications by which the numbers of the stations are indicated upon the record made in the watchman's clock.

While I have shown my invention in the particular embodiment herein described, I do not, however, limit myself to this construction, but desire to claim any equivalent construction that will suggest itself to those skilled in the art.

What I claim is:

1. Signal sending means consisting in the combination of code contact mechanism, time-controlled driving mechanism, controlling mechanism for determining the rate of operation of the driving mechanism, gearing driven by the driving mechanism for actuating the contact mechanism after a predetermined interval of operation, manually operated mechanism for moving the gearing backward relatively to the controlling mechanism to wind the driving mechanism and prolong such interval, and a pawl for limiting such backward motion.

2. In a signaling system, the combination of a sending station, a receiving station, a circuit extending from one station to the other, contact mechanism in said circuit, an

operating disk, driving means for said disk, escapement mechanism controlling said driving means, a drum on said disk, a cord secured to said drum and wound therein, and mechanical connection between said disk and said contact mechanism, said mechanical connection being effective only during a part of the revolution of said disk.

3. In a signaling system, the combination of a sending station, a receiving station, a circuit extending from one station to the other, contact mechanism in said circuit, an operating disk, driving means for said disk, escapement mechanism controlling said driving means, a drum on said disk, a cord secured to said drum and wound therein, mechanical connection between said disk and said contact mechanism, said mechanical connection being effective only during a part of the revolution of said disk, and pawl mechanism for limiting the rotation of said disk by pulling said cord.

4. In a signaling system, the combination of a sending station, a receiving station, a circuit extending from one station to the other, contact mechanism in said circuit, an operating disk, driving means for said disk, escapement mechanism controlling said driving means, a drum on said disk, a cord secured to said drum and wound therein, mechanical connection between said disk and said contact mechanism, said mechanical connection being effective only during a part of the revolution of said disk, and ratchet mechanism between said disk and said driving means.

5. In a signaling device, a code segment, an arm mounted upon a spindle so as to pass over said segment, a pinion on said spindle, a gear meshing with said pinion, a lever arm carried with said gear, a disk, a pin on said disk arranged to engage said lever arm during part of the rotation of said disk, driving means for said disk, ratchet mechanism between said disk and said driving mechanism for controlling said driving mechanism, means for resetting said disk, and means for limiting the movement of said lever arm, said pin being adapted to engage one side of said lever arm so as to terminate the resetting movement and to engage the other side of said lever arm to operate the contact arm.

In witness whereof, I hereunto subscribe my name this 28th day of May, A. D. 1909.

FRANKLIN HARDINGE.

Witnesses:
ALBERT C. BELL,
LEONARD W. NOVANDER.