

F. W. COLE.
WATCHMAN'S SIGNAL SYSTEM.
APPLICATION FILED APR. 15, 1910.

1,058,727.

Patented Apr. 15, 1913
5 SHEETS—SHEET 1.

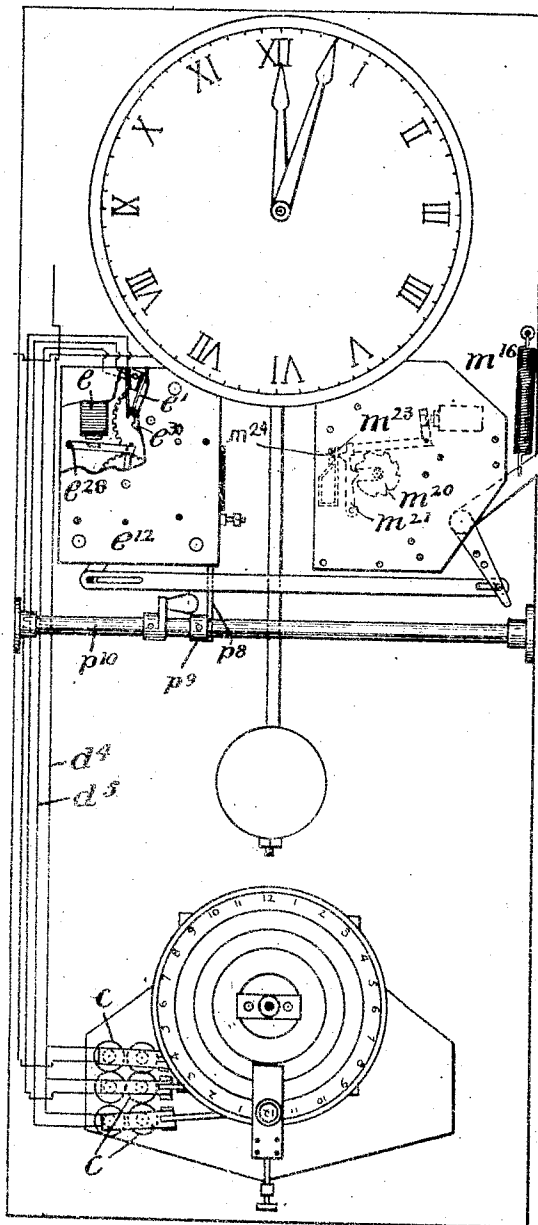


Fig. 1

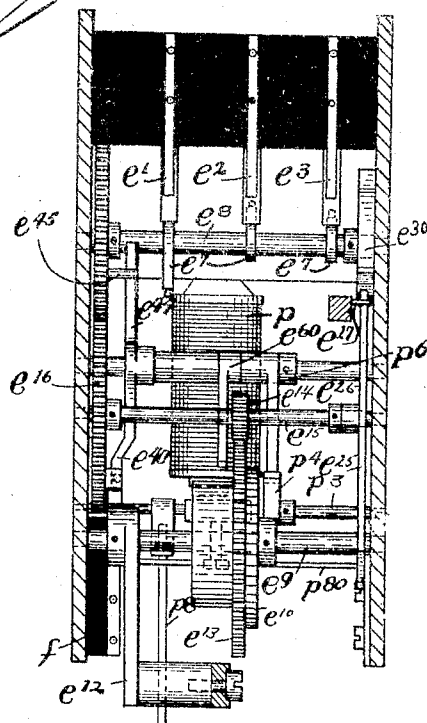


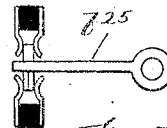
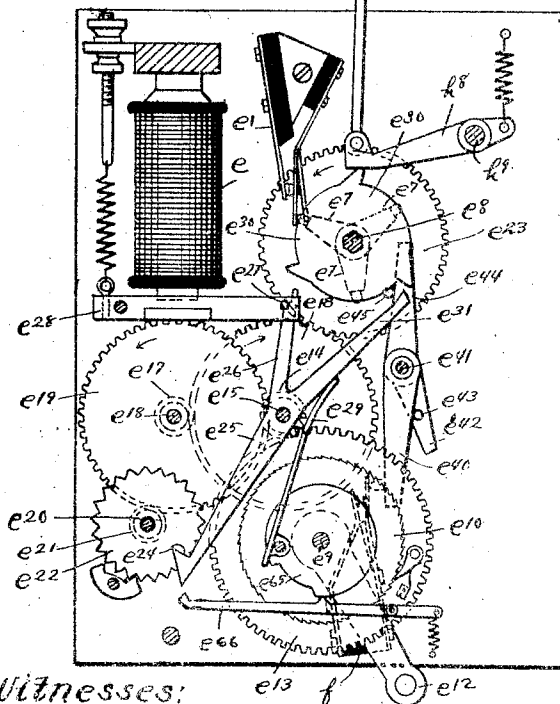
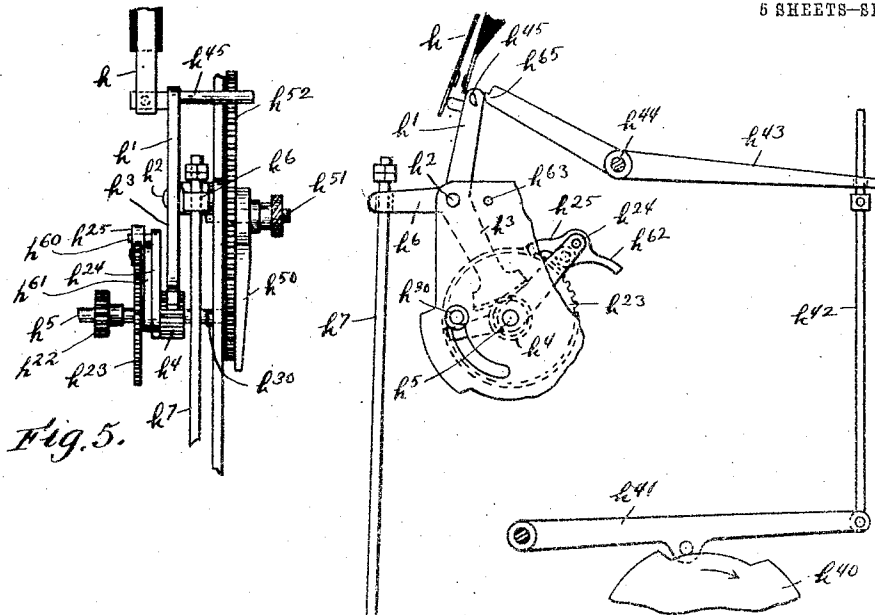
Fig. 3

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1,058,727.

5 SHEETS—SHEET 2.



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Fig. 2.

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5 SHEETS-SHEET 3.

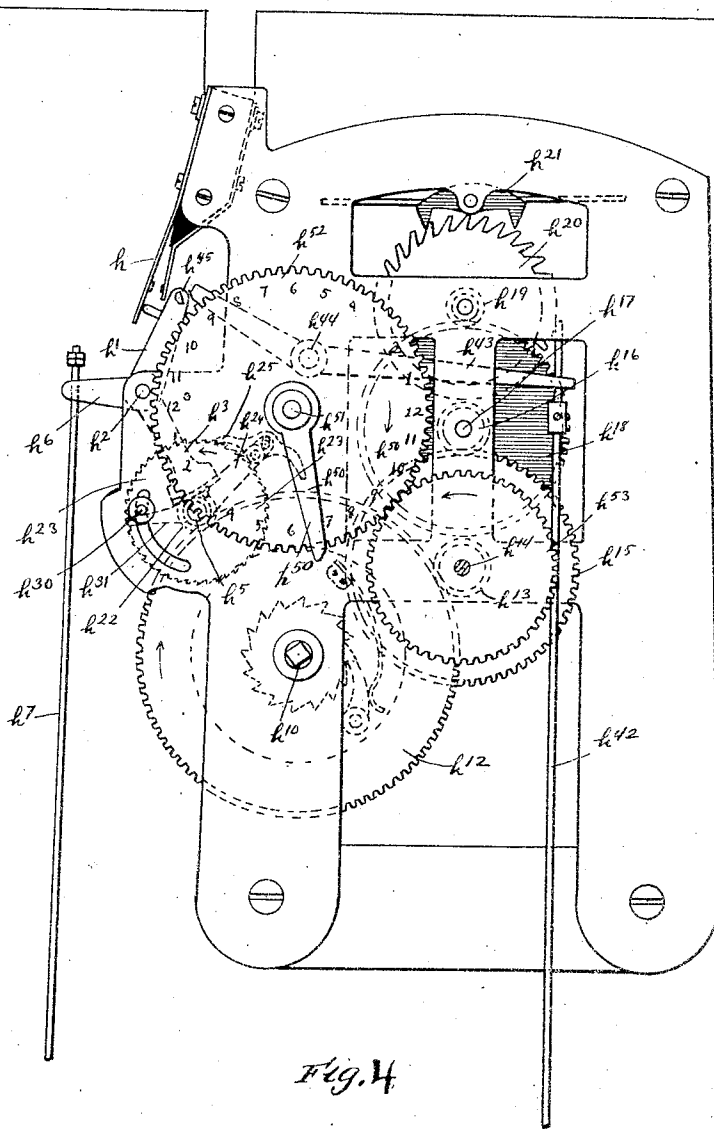


Fig. 4

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5 SHEETS—SHEET 4.

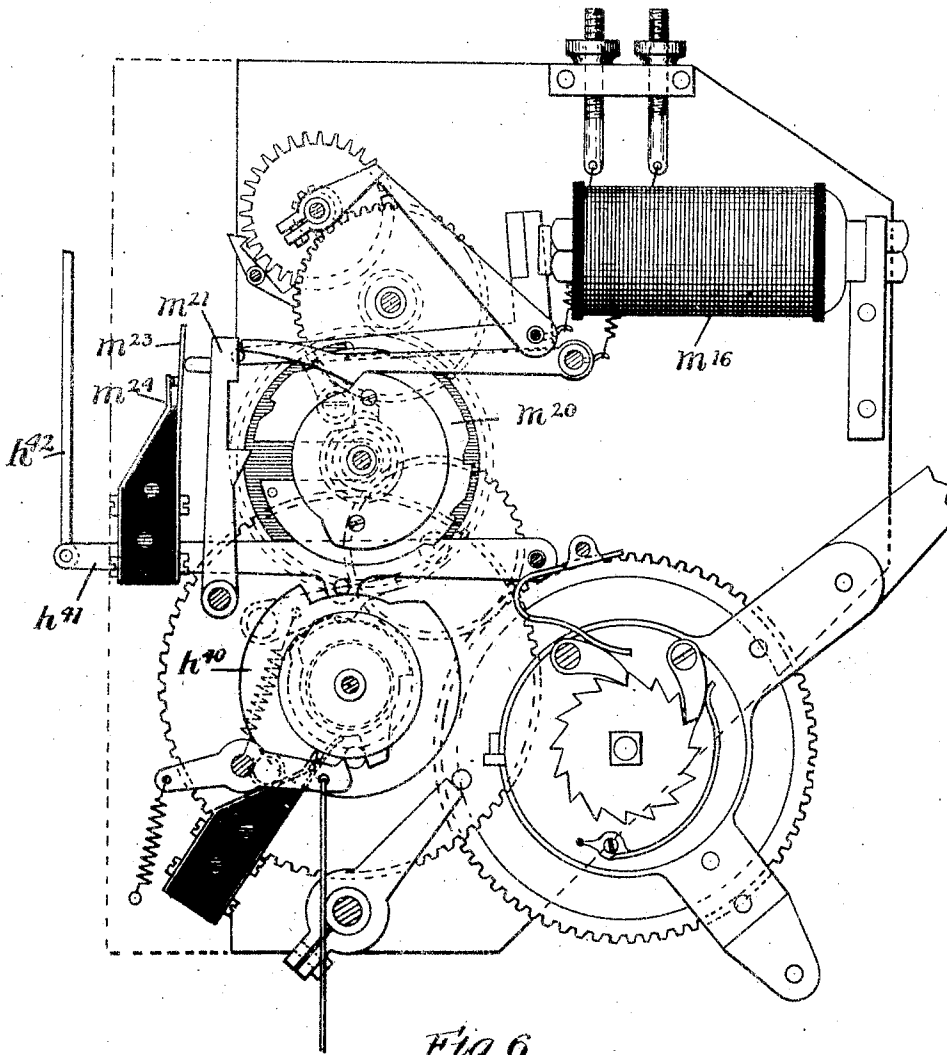


Fig. 6.

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5 SHEETS-SHEET 5.

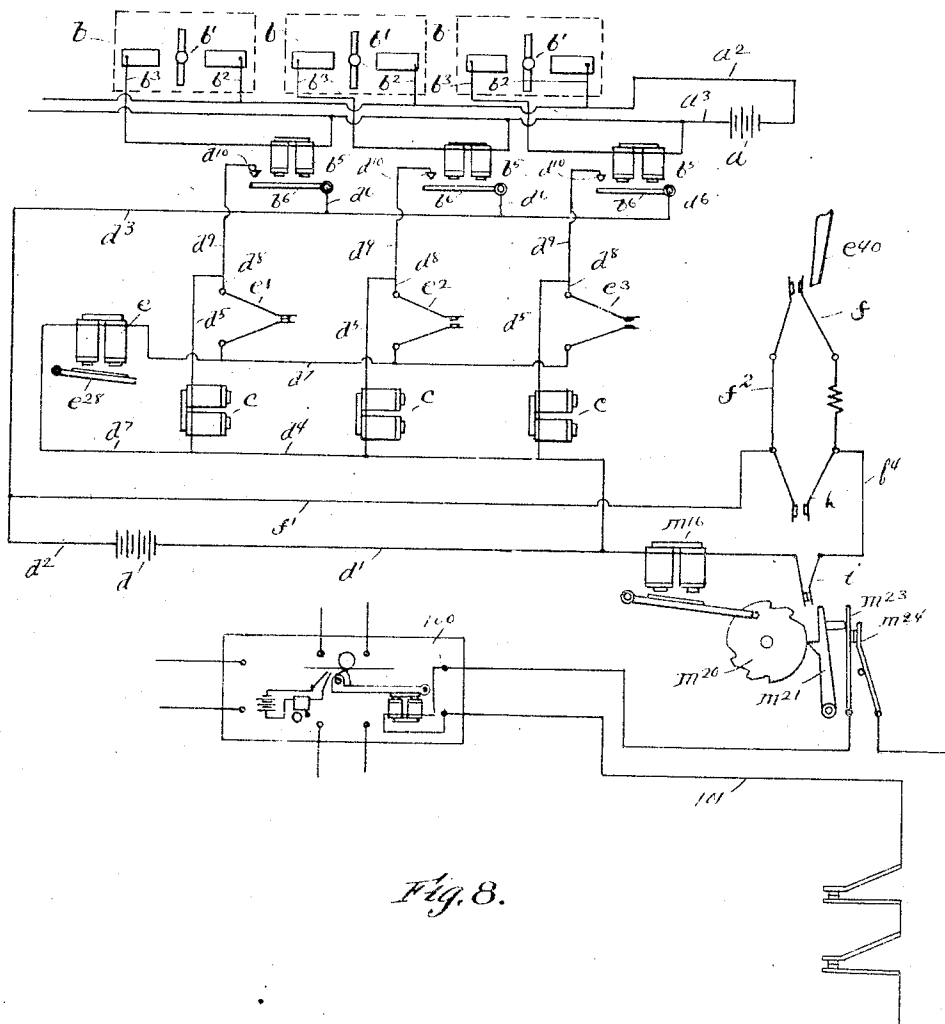


Fig. 8.

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UNITED STATES PATENT OFFICE.

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WATCHMAN'S SIGNAL SYSTEM.

1,058,727.

Specification of Letters Patent.

Patented Apr. 15, 1913.

Application filed April 15, 1910. Serial No. 555,604.

To all whom it may concern:

Be it known that I, FREDERICK W. COLE, of Newton, in the county of Middlesex and State of Massachusetts, have invented an
5 Improvement in Watchmen's Signal Systems, of which the following is a specification.

This invention relates to a supervisory-system for watchmen. In another applica-
10 tion filed by me April 15, 1910, Ser. No. 555,603, a supervisory signal-system is shown, having signaling-devices arranged at signal-stations throughout a building,
15 yard, or other property to be supervised, which are adapted to be operated by a watchman going his round, to send signals which are locally recorded, and means are provided whereby an "on-duty" signal is sent to a supervisory-station, when all of the
20 signaling-devices have been operated, which indicates that all of the signaling-stations have been visited by the watchman, and means are also provided whereby the watchman is required to visit the signal-stations in a prescribed order. In case he should not
25 visit the signal-stations, or should not visit them in a prescribed order, or if, for any reason, the signaling-devices or instruments operated by the signaling-devices should fail to operate, it is important that the supervisory-station be promptly advised, in
30 order that inspectors, who are in attendance at said supervisory-station, may be sent to the building under supervision and ascertain the cause and remedy the same.

This invention has for its object to provide the system shown in my said application, or any similar system, with automatic means for sending a signal to the supervisory-station in case of any failure, such as
40 above referred to, which signal is herein called an "off-duty" signal. Said automatic means is designed to be operated after a prolonged period of time, unless reset, and the re-setting means is arranged to be operated by the signaling-devices at the
45 signal-stations, so that, in case said signaling-devices are operated as they should be, said automatic means will be prevented from sending a signal.

For carrying out this invention code-signal transmitting means is employed for sending code identification signals to the supervisory-station, and said signal-transmitting means is designed to be started or

caused to operate and send its signal by automatic starting-means which is arranged to start said transmitting-means after a prolonged period of time, unless re-set. Such addition to the system provides for sending
60 both an "on-duty" and an "off-duty" signal, and greatly increases the efficiency of the system.

The invention also has for its object the provision of means whereby the mechanism
65 which is employed to control the movements of the watchman may be utilized for the purpose of re-setting the automatic starting-means of the code-signal transmitting-means, such means preventing the operation
70 of the re-setting device by the repeated operation of the signaling-device at any one signal-station.

The invention also has for its object the provision of means for controlling the operation of the automatic starting-means by
75 the code-signal transmitting means, whereby, as soon as the "off-duty" signal is transmitted, said automatic starting-means will be disabled in order that it will not immediately repeat its operation, yet it is still
80 in operative connection with the re-setting means, whereby it may be re-set in the regular way.

The code-signal transmitting means is designed to send both an "on-duty" signal
85 and an "off-duty" signal, and to send with the "off-duty" signal differentiating signal-impulses whereby an audible alarm will be sounded in connection with the "off-duty"
90 signals.

The automatic signaling-means is such that, when once put into service, it will send a signal before going out of service, and thus a daily test-signal will be given by it
95 to the supervisory-station when the watchman goes off duty, showing that the apparatus and circles are and have been in working condition during the time the watchman was on duty.

Automatic means are also provided for placing the automatic starting-means in condition to operate at any predetermined time, so that in case a watchman should not go on duty at the proper time, his negligence
105 will be reported; furthermore, such provision provides for a test-signal on Sundays and holidays.

Figure 1 is a front view of an apparatus embodying my invention, showing the mech- 110

anism controlled by the manual signaling-devices for starting the code signal-transmitter, the code signal-transmitter, and the local signal-recorder. Fig. 2 is an enlarged front view of the mechanism operated by the manual signaling-devices and automatic signaling-devices for controlling the code signal-transmitter. Fig. 3 is a side view of the mechanism operated by the manual signaling-devices for controlling the code signal-transmitter. Fig. 4 is a front view of the automatic starting means for the code signal-transmitter and the resetting means for said automatic starting means. Fig. 5 is a side view of a portion of the automatic starting means shown in Fig. 2. Fig. 6 is a front view of a code signal-transmitter which may be employed. Fig. 7 is a detail of a key which may be employed by a watchman for manually operating the signaling-devices at the signal-stations. Fig. 8 is a diagram of a circuit which may be employed having the several devices connected therewith.

Throughout the building, yard, or other property to be protected, signal-stations b are arranged, see diagram, Fig. 8. At each signal-station a signaling-device, shown as a circuit-closer b' , of any suitable construction, is provided, adapted to be operated manually; as, for instance, by a watchman's key b^{25} , see Fig. 7, which will be carried by the watchman and which is constructed to engage and connect a pair of clips which are connected respectively with the circuit-wires b^2 , b^3 , to thereby connect the main circuit-wires a^2 , a^3 , at opposite sides of the battery a and close the circuit.

In the branch circuit-wires b^3 relays b^5 are included, there being one relay for each signaling-device b' , and, as the main circuit is normally open, the armatures b^6 of the relays are normally retracted. Said relays control the operation of a local signal-recorder, and also the apparatus which is employed for controlling the starting of the code-signal transmitting means to send a signal to the supervisory-station. It will be understood, however, that the employment of said relays is not important.

The local signal-recorder which I prefer to employ is here shown as a watch-clock, see Fig. 1, and as said clock is of well-known construction, a detailed description of the same is not deemed necessary.

c represents the operating-magnets of the local signal-recorder, which correspond in number to the number of signal-stations. They are included in branch circuit-wires d^5 of a local-circuit, and arranged to be operated by the armatures of the several relays b^5 . Said branch circuit-wires d^5 all lead from a circuit-wire d^4 , which is connected with a circuit-wire d' leading from one side of the battery d . A circuit-wire d^2 leads

from the other side of said battery to a circuit-wire d^3 , from which circuit-wires d^6 lead to the armatures b^6 of the relays. The armatures of the relays, when moved into attracted position, engage contact-points d^{10} , and said contact-points are respectively connected by circuit-wires d^9 with the circuit-wires d^5 . When the armature of any relay is moved into its attracted position, in response to the operation of the proper signal-device, the circuit is closed as follows: battery d , circuit-wires d' , d^4 , d^5 , d^6 , contact-point d^{10} , armature b^6 , circuit-wires d^9 , d^3 , d^2 ; and one of the operating-magnets c , which is included in the branch circuit-wire d^5 , which is at such time closed, is caused to operate, and a signal recorded on the dial of the watch-clock, and also the time of its reception, in the manner usual in watch-clocks.

The code-signal transmitting means is arranged to send signals over a supervisory-circuit 101, from the building under supervision to the supervisory-station 100. Said circuit 101, while here shown as a separate circuit, may be constructed as branches of the aforesaid circuit or circuits in a manner well known to electricians, so that all of the circuits of the system might be charged from the same source of energy. In such case the circuits would be separate, so far as their operation is concerned and would be considered as the equivalent of the separate circuits herein referred to. The code-signal transmitting means may be of any suitable construction, so far as my present invention is concerned, although the code-signal transmitting apparatus shown in my application for Letters Patent Ser. No. 555,605, filed April 15, 1910, is especially applicable for the reason that it is designed to be released by an electro-magnet and also to transmit more than one signal, and also to cause differentiating-impulses to be sent with some signals whereby an audible alarm is caused to respond. Referring to Fig. 6, showing said signal-transmitting apparatus, m^{20} represents the signal-wheel which is adapted to operate a signal-key m^{21} , to in turn operate a pair of contact-pens m^{23} , m^{24} , and control the supervisory-circuit 101, and send over said circuit to the supervisory-station a code-signal, such, for instance, as the identification number of the building one or more times sent. The identification number transmitted once constitutes an "off-duty" signal, and indicates that all of the signal-stations have been properly visited, and, the identification number transmitted twice, with a differentiating-impulse, constitutes an "off-duty" signal. Said code-signal transmitting means is adapted to be electrically started and controlled, and, for such purpose, a starting magnet m^{25} is provided for releasing or

otherwise operating it, and for also controlling its operation to cause the different signals to be sent. Said starting-magnet m^{16} is included in a branch circuit-wire f^4 , leading from the circuit-wire d' , and a circuit-controlling device f is connected in said branch circuit-wire for controlling the circuit of said starting-magnet, and a circuit-wire f^2 leads from said circuit-controlling device f to the circuit-wire f' , which is connected to the circuit-wire d^2 . The circuit of the starting-magnet is therefore as follows: battery d , circuit-wire d' , starting-magnet m^{16} , circuit-wire f^4 , circuit-controlling device f , circuit-wires f^2 , f' , d^2 , to battery. The circuit-controlling device f is normally open, and, when closed, the starting-magnet m^{16} is operated.

For the transmission of the "on-duty" signal the means shown in my application Ser. No. 555,603, aforesaid and illustrated in Figs. 2 and 3 is employed for the reason that it is especially applicable to operate in connection with the "off-duty" signaling-mechanism to be hereafter described, but, in lieu thereof other "on-duty" signaling-mechanisms may be employed, adapted to control the operation of the "off-duty" signaling-mechanism in substantially the manner hereafter described.

Referring to Figs. 2 and 3, the circuit-controlling device f of the "on-duty" signaling-mechanism is designed to be operated momentarily, and is adapted to be operated when, but not until, the signaling-devices b' of all the signal-stations have been operated, preferably in a prescribed order. e represents the controlling-magnet for the "on-duty" signaling-mechanism, and e' , e^2 , e^3 , a series of switches corresponding in number to the number of watch-signal stations and herein referred to as route-switches. Said switches are arranged in separate branches of a local-circuit controlled respectively by the signaling devices b' at the several watch signal-stations, and the controlling-magnet is arranged in a branch common to all said branches, whereby it may be arranged in series with any one of said switches. The several switches are included in branch-circuits d^8 , d^9 , leading from a branch-circuit d' , which is common to all said branch-circuits d^8 , and contains the controlling-magnet e . Said branch-circuits d^8 , d^9 , respectively extend to the contacts d^{10} , with which the armatures b^6 of relays b^5 are adapted to cooperate. Some one of the switches of the group is normally closed and the others are normally open, and the controlling-magnet e is arranged in series with the closed switch, to respond to the operation of the particular signaling-device which controls the branch-circuit containing the closed switch; and the switches are adapted to be successively operated by means controlled by the con-

trolling-magnet, to place said controlling-magnet successively under the control of the several signaling-devices, and to thereby require the watchmen to visit the several signal-stations in a prescribed order; that is to say, as the closed switch is opened, the next succeeding switch will be closed, and so on throughout the entire group, and the controlling-magnet is, therefore, successively arranged in series with the switches, which are closed, being thereby placed successively under the control of the several signal-stations. For the purpose of operating the several switches *seriatim*, as above described, a series of fingers e^7 , one for each switch, extend radially in different directions, from a shaft e^8 , and said fingers are arranged to engage the switches as the shaft revolves. Said shaft is revolved intermittingly to cause the fingers to successively engage the switches. Said shaft is normally at rest with one of its fingers in engagement with one of the switches, to thereby hold one of the switches closed, and, as the shaft is moved, said finger disengages said switch, and the next finger engages its switch, and so on during the entire revolution of the shaft. A normally wound train is employed for revolving the shaft intermittingly, which is adapted to be released by the controlling-magnet e , each time said magnet is energized. Said magnet, however, can only be energized by the operation of a signaling device which controls the branch-circuit wire containing the closed switch, in series with which said controlling-magnet is arranged.

The switch-operating train comprises a winding-shaft e^9 , bearing a ratchet-wheel e^{10} , and a winding-arm e^{12} for turning it, a spur-gear e^{13} bearing a pawl, which is engaged by said ratchet-wheel, whereby said gear is driven by the revolving ratchet-wheel, a pinion e^{14} engaged by said gear e^{13} secured to a shaft e^{15} , bearing a spur-gear e^{16} , which engages a pinion e^{17} , secured to a shaft e^{18} , bearing a spur-gear e^{19} , which engages a pinion e^{20} , secured to a shaft e^{21} , bearing an escape-wheel e^{22} , which is engaged by a suitable regulating pallet. The spur-gear e^{16} also engages a like spur-gear e^{23} , secured to the shaft e^8 . The escape-wheel has a pin e^{24} , projecting from its side, which is normally engaged by a detent-lever e^{25} , loosely mounted for convenience on the shaft e^{15} , and said detent-lever has an upwardly-extended arm e^{26} , having a shouldered end which is in cooperative engagement with a pin e^{27} on the armature e^{28} of the controlling-magnet e . Whenever said armature is moved into its attracted position the pin e^{27} is raised to permit the detent-lever to be moved by a spring e^{29} to in turn release the train. The train having been released, the shaft e^8 is turned, and, as soon as one of the

fingers disengages the closed switch, the branch-circuit containing said switch and also the controlling-magnet e is opened, and the armature of the controlling-magnet is permitted to retract, preparatory to again engaging the detent-lever and stop the train. The detent-lever is subsequently restored by means controlled or operated by the train; as, for instance, a toothed-wheel e^{30} is fixed to the shaft e^8 , and an arm e^{31} is connected with the detent-lever, which, when said detent-lever is moved to release the train, is moved into the path of movement of the teeth of said wheel e^{30} , so that it will be struck by one of said teeth as the wheel revolves and thereby moved to in turn restore the detent-lever into position to be engaged by the retracted armature of the controlling-magnet and stop the train. The teeth on the wheel e^{30} correspond in number to the number of switches, and they are arranged at equal distances apart, and so disposed as to engage the arm e^{31} and restore the detent-lever when the shaft e^8 has moved one step; that is to say, after the shaft e^8 is revolved far enough to open the closed switch and close the next switch. As there are as many switches as signal-stations, and as they are all arranged so as to be successively operated by the several fingers e^7 as the shaft e^8 intermittingly revolves, and, as the controlling-magnet e can only respond when the signal-station operated corresponds to the switch then closed, and as the train only moves one step at each operation of a signaling-device, it will be seen that upon each complete revolution of said shaft e^8 , all of the switches will have been operated, in a prescribed order, by reason of all the signal-stations having been visited by the watchman. When all of the route-switches e' , etc., have been thus operated *seriatim*, the intermittingly movable route-switch mechanism will have completed a cycle of its operation, and, at such time, the circuit-controlling device f is designed to be operated. To accomplish this result an arm e^{40} , loosely mounted on a pivot-shaft e^{41} , is arranged to engage said circuit-controlling device f , and an arm e^{44} is connected with said arm e^{40} , and extends into the path of movement of a pin e^{45} , arranged on the gear-wheel e^{23} , or other movable part of the train, at such point thereon as to engage said arm e^{44} when the shaft e^8 is moved the last step of a complete revolution, which may be at the same time that the last switch of the series is opened, and the first switch of the series is closed. When the pin e^{45} engages and moves said arm e^{44} the circuit-controlling device f will be closed to cause energization of the starting-magnet m^{16} of the supervisory code signal-transmitter. The movement of the gear-wheel e^{23} bearing the pin e^{45} , in making one step, is sufficient for

said pin to not only engage and move said arm, but also to pass by said arm and thereby disengage it, permitting said arm to resume its normal position, and, as the arm thus resumes its normal position, the circuit-controlling device f will be again opened before the mechanism stops. Said circuit-controlling device f is thus closed momentarily, so that the circuit of the starting-magnet m^{16} will be closed momentarily, to merely release the signal-transmitter, to permit it to operate and send its "on-duty" signal. In case the watchman did not follow the prescribed order, or in case the route-switch mechanism or the switches themselves should fail to operate, the signals sent by the watchman would still be recorded on the local signal-recorder, so that errors or troubles could be determined and located.

Referring now to the "off-duty" signaling-mechanism, h represents a local circuit-controlling device, which is shown as normally open, and, when closed, operates to close the branches of a local-circuit to operate the starting-magnet m^{16} of the supervisory signal-transmitter and cause said signal-transmitter to transmit the "off-duty" signal. Said local-circuit is as follows, see Fig. 8: battery d , circuit-wire d' , starting-magnet m^{16} , circuit-wire f^2 , circuit-controlling device h , circuit-wires f' and d^2 , to battery.

Automatic means is provided for operating the local circuit-controlling device h , to close the local-circuit, if allowed to do so, at the end of or after a prolonged period of time, and said automatic means is arranged to be repeatedly re-set or set back to starting-point on each operation of a watch-signal-device b' , and, as here shown, on the operation of the route-switch mechanism, although any suitable mechanism responsive to the proper operation of signaling-devices at the watch-signal stations may be employed, in lieu thereof. As the watch signaling-devices are operated at frequent intervals, to properly operate the route-switches e' , etc., and finally send the "on-duty" signal, said automatic means will be repeatedly re-set and hence will not operate said circuit-controlling device h ; but if more than the allotted time expires during which a watch signaling-device should have been operated, then sufficient time will elapse for said automatic means to operate to cause the circuit-controlling device h to close the circuit of the starting-magnet m^{16} , and cause the supervisory signal-transmitter to send the "off-duty" signal to the supervisory-station.

The local circuit-controlling device h may comprise a pair of contact-pens, which are normally separated, but one of which is movable into engagement with the other to close the circuit by its own spring action.

when permitted to act. An arm h' , pivoted at h^2 , is provided for normally holding said local circuit-controlling device h open, by engaging the spring-acting contact-pen.

5 Said arm is moved in one direction, or advanced by the pressure of the spring-acting contact-pen upon it, but such movement is controlled or retarded by a continuously-operating timing-mechanism, such as a clock-
 10 train, and said arm is moved in the opposite direction or set back to starting point or thereabout by means controlled by the controlling-magnet e for the route-switch mechanism of the "on-duty" signaling-device.

15 The clock or timing-mechanism for timing or retarding the forward motion of the arm h' may be of any suitable construction such for instance as shown in Figs. 4 and 5. Said train engages a
 20 pinion h^{22} , see Fig. 5, secured to a shaft h^5 , to thereby positively rotate said shaft, and a ratchet-toothed wheel h^{23} is secured to said shaft h^5 , which is driven continuously by it. A pinion h^4 is mounted
 25 loosely on said shaft h^5 , which is engaged by a toothed sector formed on the end of a lever h^3 , which is rigidly connected with the arm h' . Said loose pinion h^4 is connected to an arm h^{24} , having a pin h^{60} , which engages
 30 a pawl h^{25} , pivotally supported on another arm h^{61} , mounted loosely on said shaft h^5 . The pin h^{60} enters or extends through a slot in the pawl, which is arranged at the side of its pivot, so that the pawl is movable on its
 35 pivot into and out of engagement with the ratchet-wheel h^{23} by a movement of the arm h^{24} , to thereby connect the arm h' with and disconnect it from the continuously-moving ratchet-wheel. While the pawl is in engage-
 40 ment with the continuously but slowly moving ratchet-wheel, the arm h^{24} and pinion h^4 connected with it are moved slowly in a direction to permit forward movement of the arm h' , and, if said arm h' is not re-set for a
 45 prolonged period of time, it will move forward far enough to permit the spring-acting contact-pen to engage the other pen and thereby close the circuit. Means are provided for disengaging the pawl from the
 50 ratchet-wheel at or about the end of the allotted period of time, whereby the arm h' is thereafter unrestrained. To accomplish this result the pawl is provided with an extension or tail h^{62} , which at the proper time en-
 55 gages a fixed pin h^{63} on the frame and by said pin is turned on its pivot to disengage the ratchet-wheel, and said extension is made long enough to continue in engagement with said pin h^{63} while the pawl is
 60 thereafter moved forward farther, and also while it remains in such forward position.

When the circuit-controlling device h closes the circuit of the starting-magnet m^{16} , said magnet will release or cause the super-
 65 visory signal-transmitter to operate to send the "off-duty" signal. When transmitting this signal, the signal-transmitter will continue to operate until the circuit of the starting-magnet m^{16} is opened. As here shown, this result is accomplished by means con-
 70 trolled by the signal-transmitter, as, for instance, it may be accomplished mechanically by a cam-wheel h^{40} driven by the transmitting mechanism, which operates when the identification number has been twice sent,
 75 to raise a pivoted lever h^{41} , which is connected by a rod h^{42} with one end of a lever h^{43} pivoted at h^{44} . The other or outer end of said lever h^{43} is beveled at one side and adapted, when depressed, to engage a pin
 80 h^{45} on the arm h' to move said arm backward a short distance, far enough to open the circuit-controlling device h . The arm h' is then partially restored to normal position, or partially re-set. The lever h^{43} has
 85 a shoulder h^{65} at its outer end, which passes by and slips under the pin h^{45} , when moved as above described, and by engagement with said pin both said lever and the arm h' are locked relatively to each other. The lever
 90 is at such time prevented from returning to normal position and the arm h' is held with the circuit-controlling device h open. The lever h^{43} has a loose sliding connection with its actuating-rod h^{42} , so that, when moved
 95 by said rod to open the circuit-controlling device h , it may remain in such abnormal position until subsequently released, yet the rod h^{42} is permitted to return to its normal position independently thereof. As the arm
 100 h' is thus moved backward a short distance the arm h^3 is correspondingly moved and the pinion revolved and the arm h^{24} moved backward, carrying with it the pawl and
 105 pawl-carrying arm, but the pawl is still held disengaged from the ratchet-wheel, and not until the arm h^{24} has been restored to normal, and is beginning its forward movement, will said pawl again engage the
 110 ratchet-wheel. The automatic starting-means of the signal-transmitter is thus temporarily disabled, or thrown out of action.

For the purpose of setting back the arm h' to starting point by means controlled by the switch-controlling magnet e at any time
 115 during its forward movement, to prevent the circuit-controlling device h from closing the circuit, and also after it has permitted the circuit-controlling device to close the circuit and has subsequently opened said
 120 circuit-controlling device, an arm h^6 is rigidly connected with said arm h' , and is loosely connected by a rod h^7 with a spring-actuated arm h^8 , pivoted at h^9 , and arranged to normally rest upon and be held in ele-
 125 vated position by any one of the teeth of the intermittingly revoluble toothed wheel e^{80} connected with the route-switch mechanism. When said toothed wheel e^{80} is revolved one step the tooth on which said arm
 130

h^8 rests passes from beneath the arm, permitting the arm to be moved by its actuating-spring into the interdental space adjacent said tooth, and such movement of the arm will cause the rod h^7 to draw down the arm h^6 and move the arm h^7 toward the left and thereby re-set it. Before the toothed wheel e^{30} is arrested, the next tooth thereon will engage and lift the arm h^8 and rod h^7 , but during such movement said rod will slide freely in the hole in the arm h^6 through which it passes. When the arm h^7 is thus re-set the sector-lever is re-set by it, also the loose pinion h^4 and arm connected with it, and the pawl is caused to pass over but free from the teeth of the ratchet-wheel during such re-setting movement, but said pawl is moved immediately into engagement with the ratchet-wheel at the beginning of the forward movement of the arm h^{24} . The extent of backward movement of the arm h^{24} and parts connected with it by and during the re-setting operation, and, consequently, the time required for it to operate to close the circuit-controlling device h , is greater than the length of the periods of time during which the watch-signal stations must be successively visited by the watchman, and such movement and prolonged period of time may be adjusted by a stop h^{30} , arranged on the frame against which the arm h^3 strikes.

When the watchman goes off duty, say in the morning, the "off-duty" signal is soon sent automatically by reason of the watch signaling-devices not having been operated during a prolonged period of time, but the automatic starting-means will not be re-set by him until he returns at night.

It is quite important to know whether or not the watchman returns to duty on time, and means are herein provided for automatically re-setting the starting-means at a predetermined time, as, for instance, a short time after the watchman is due to return to duty, so that, in case he should not return to duty on time, an "off-duty" signal will be sent. For the purpose of accomplishing this result an arm h^{50} is adjustably secured to a shaft of the timing-mechanism, as, for instance, to the shaft h^{51} , and a toothed-wheel h^{52} is secured to the said shaft, back of said arm, which is arranged to make a complete revolution every twenty-four hours, and is preferably indexed to indicate the hours. Said arm h^{50} may be set to occupy different positions on its shaft, which positions may be determined by the indexed wheel. Said wheel h^{52} is driven by a toothed-wheel h^{53} secured to the shaft h^{54} of the train and the arm h^{50} is moved by it. This arm is made long enough to engage the pin h^{55} when the latter is in locking engagement with the restoring lever h^{43} , but will pass by said pin without engaging it when said pin is in its

re-set position. In case the arm h^{50} engages the pin while said pin is in locking engagement with the restoring-lever h^{43} , it acts to move said pin out of engagement with the shoulder on the restoring-lever, thereby releasing said restoring-lever, allowing it to resume its normal position, and, as soon as it passes by said pin, the arm h^7 is free and will be immediately moved by the pressure of the spring-acting contact-pen thereupon to permit the circuit-controlling device h to again close and cause the supervisory-signal-transmitter to send an "off-duty" signal. If the watchman has returned to duty on time and has visited his first station, then the arm h^7 will have been re-set by the means controlled by the switch-controlling magnet c , and hence the pin h^{45} will be removed from the path of movement of said arm h^{50} . In case a watchman fails to wind the trains at the designated times, means are provided on the "on-duty" signaling-train, see Fig. 2, for sending an "off-duty" signal to the supervisory-station, and, for the accomplishment of this result, as here shown a cam e^{66} is secured to the winding-shaft or other member of the train, having a notch, and a spring-pressed lever e^{69} is pivoted to the frame, which has a projection which engages said cam and is adapted to enter the notch thereof when the cam is moved to bring its notch into position to receive said projection, as it will be when the train is run down more than the amount necessary to cause it to be operated from all the watch signal-stations. Said lever e^{69} is arranged so that when moved by its projection entering the notch in the cam, its end-portion will be moved into the path of movement of the locking-lever e^{25} , and thereby prevent said lever from moving far enough to release the train, and, as a result, the arm h^7 of the "off-duty" circuit-controlling device h can not be set back to starting-point, and hence will soon cause said circuit-controlling device h to close and thereby cause the supervisory signal-transmitter to send an "off-duty" signal in the manner heretofore described. An "off-duty" signaling-mechanism is thus provided which gives a most efficient and valuable service under many different conditions. It is adapted to be brought into service when required, both manually and automatically, and remains in service as long as required, including Sundays and holidays, and the watchman and the property are both under the same protection and supervision during Sundays and holidays as during the nights when the watchman is on duty.

When not required, the "off-duty" signal is automatically sent to indicate that the "off-duty" signaling-mechanism is temporarily disabled or thrown out of action, but is in readiness to immediately resume operation at the proper time, either by manually

operating the re-setting device, or by automatically rendering it operative.

I claim:—

1. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means involving a reciprocating actuating-member, operating to start said transmitter after a prolonged period of time, unless re-set, a circuit having signaling-devices at signal-stations and electro-magnetically operated means responsive to the operations of said signaling-devices for resetting said automatic starting-means, substantially as described.

2. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, having a starting-device, controlling-means for said starting-device, automatic means involving a reciprocating actuating-member, adapted to operate said controlling-means after a prolonged period of time, unless re-set, electro-magnetically operated resetting means for said automatic operating-means, a circuit having signaling-devices at signal-stations and means operated by said signaling-devices for operating said re-setting means, substantially as described.

3. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, having a starting-magnet, a local-circuit for said starting-magnet, a local circuit-controlling device for said local-circuit, automatic means involving a reciprocating actuating-member, adapted to operate said local circuit-controlling device after a prolonged period of time, unless re-set, electro-magnetically operated means for re-setting said automatic operating-means, and a circuit having signaling-devices at signal-stations and means operated by said signaling-devices for operating said re-setting means, substantially as described.

4. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, re-setting means for said starting-means, relays, and means controlled by the armatures of said relays for operating said re-setting means, and signaling-devices at signal-stations for controlling the operation of the said relays, substantially as described.

5. In a supervisory signal-system, the combination of a supervisory-signaling-circuit

connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means involving a reciprocating actuating-member, operating to start said transmitter after a prolonged period of time, unless re-set, re-setting means for said starting-means, an intermittingly-movable actuator therefor, a magnet controlling the operation of said actuator, and a circuit having signaling-devices at signal-stations for controlling the circuit to operate said magnet, substantially as described.

6. In a supervisory signal-system, the combination of a supervisory-signaling circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means involving a reciprocating actuating-member, operating to start said transmitter after a prolonged period of time, unless re-set, a re-setting device for said automatic starting-means, a rotatable member having means for operating said re-setting device, a magnet controlling the operation of said rotatable-member, and a circuit having signaling-devices at signal-stations for controlling the circuit to operate said magnet, substantially as described.

7. In a supervisory signal-system, the combination of a supervisory-signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, a re-setting device for said automatic starting-means, a rotatable toothed wheel for operating said re-setting device, a train for rotating said wheel, a releasing-magnet for said train, and signaling-devices at signal-stations for controlling the operation of said releasing magnet, substantially as described.

8. In a supervisory signal-system, the combination of a supervisory-signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, means for re-setting said starting-means, signaling-devices at signal-stations for controlling the operation of said re-setting means, and means operated by said transmitter for disabling said automatic starting-means when said starting-means is operated to start said transmitter, substantially as described.

9. In a supervisory signal-system, the combination of a supervisory-signal-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, means for re-setting said starting-means, signaling-de-

vices at signal-stations for controlling the operation of said re-setting means, means operated by said transmitter for disabling said automatic starting-means when said starting-means is operated to start said transmitter, yet maintaining its operative connection with the re-setting means, substantially as described.

10. In a supervisory signal-system, the combination of a supervisory-signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, means for re-setting said starting-means, signaling-devices at signal-stations for controlling the operation of said re-setting means, means operated by the transmitter for disabling and locking said automatic starting-means when said starting-means is operated to start said transmitter, yet maintaining its operative connection with the re-setting means, substantially as described.

11. In a supervisory signal-system, the combination of a supervisory-signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, means for re-setting said starting-means, signaling-devices at signal-stations for controlling the operation of said re-setting means, means operated by the transmitter for disabling said automatic starting-means when said starting-means is operated to start said transmitter, yet maintaining its operative connection with the re-setting means, and other automatic means for rendering operative the aforesaid automatic starting-means, when disabled, at a predetermined time, substantially as described.

12. In a supervisory signal-system, the combination of a supervisory-signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, means for re-setting said starting-means, signaling-devices at signal-stations for controlling the operation of said re-setting means, means operated by the transmitter for disabling and locking said automatic starting-means when said starting-means has operated to start said transmitter, yet maintaining its operative connection with the re-setting means, and other automatic means for unlocking the aforesaid automatic starting-means at a predetermined period of time, substantially as described.

13. In a supervisory signal-system, the combination of a supervisory-signaling-circuit connected with a supervisory-station,

a code-signal-transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, means for re-setting said starting-means, signaling-devices at signal-stations for controlling the operation of said re-setting means, means operated by the transmitter for disabling and locking said automatic starting-means when said starting-means has operated to start said transmitter, yet maintaining its operative connection with the re-setting means, and other automatic means for unlocking the aforesaid automatic starting-means at a predetermined period of time, which is adjustable as to the time of its operation, substantially as described.

14. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal-transmitter arranged to send signals over said circuit, having a starting-magnet, a local-circuit for the starting-magnet of said transmitter, a local-circuit controlling device for said local-circuit, a reciprocating closing-member for said local circuit-controlling device, timing mechanism for advancing it, a re-setting device for moving said closing-member back to normal, and a circuit having signaling-devices at signal-stations for controlling the circuit to operate said re-setting device, substantially as described.

15. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal-transmitter arranged to send signals over said circuit, having a starting-magnet, a local-circuit for the starting-magnet of said transmitter, a local circuit-controlling device for said local-circuit, a reciprocating closing-member for said local circuit-controlling device, a clock-train for advancing it, means connected with said closing-member, which is movable into and out of engagement with said clock-train, a re-setting device for said closing-member, and a circuit having signaling-devices at signal-stations for controlling the circuit to operate said re-setting device, substantially as described.

16. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal-transmitter arranged to send signals over said circuit, having a starting-magnet, a local-circuit for the starting-magnet of said transmitter, a local circuit-controlling device for said local-circuit, a closing-member for said local-circuit-controlling device, timing mechanism for advancing it, a re-setting device for moving said closing-member back to normal, means for limiting the re-setting movement of said closing-member, and a circuit having sig-

nalizing-devices at signal-stations for controlling the circuit to operate said re-setting device, substantially as described.

17. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal-transmitter arranged to send signals over said circuit, having a starting-magnet, a local-circuit for said starting-magnet, a local circuit-controlling device for said local-circuit, a closing-member for said local-circuit-controlling device, means for advancing it, a re-setting device for said closing-member, means, operated by the transmitter, for moving said closing-member to open said local-circuit-controlling device after said local circuit-controlling device has been closed to start the transmitter, yet maintaining its operative connection with said re-setting device, and signaling-devices at signal-stations for controlling the operation of said re-setting device, substantially as described.

18. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, having a starting-magnet, a local-circuit for said starting-magnet, a local circuit-controlling device for said local-circuit, a closing-member for said local-circuit-controlling device, means for advancing it, a re-setting device for said closing-member, means operated by the transmitter for moving said closing-member to open said local circuit-controlling device after it has been closed to start the transmitter, and to lock said closing-member at such time, yet maintaining its operative connection with said re-setting device, and signaling devices at signal-stations for controlling the operation of said re-setting-device, substantially as described.

19. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, having a starting-magnet, a local-circuit for said starting-magnet, a local circuit-controlling device for said local circuit, a closing-member for said local circuit-controlling device, means for advancing it, a re-setting device for said closing-member, means operated by the transmitter for moving said closing-member to open said local-circuit-controlling device after it has been closed to start the transmitter, and to lock said closing-member at such time, yet maintaining its operative connection with said re-setting device, other means for unlocking said closing-member, restoring it to operative condition at a predetermined time, and signaling-devices at signal-stations for controlling the operation

of said re-setting-device, substantially as described.

20. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal-transmitting means arranged to send signals over said circuit, automatic means operating to start said signal-transmitting means after a prolonged period of time, unless re-set, means for re-setting said automatic starting-means, other starting-means for said signal-transmitting means, and a circuit having signaling-devices at signal-stations and means operated by said signaling-devices for operating both said re-setting means and said last named starting-means, substantially as described.

21. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal-transmitting means arranged to send signals over said circuit, automatic means operating to start said transmitting means after a prolonged period of time, unless re-set, means for re-setting said automatic starting-means, other starting-means for said transmitting means, signaling-devices at signal-stations, each adapted to operate said re-setting means, and means adapted to be operated by each signaling-device for operating said last named starting-means when all of said signaling-devices have been operated, substantially as described.

22. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal-transmitting means arranged to send signals over said circuit, automatic means operating to start said transmitting means after a prolonged period of time, unless re-set, means for re-setting said automatic starting-means, other starting-means for said transmitting-means, controlling-means for said last named starting-means, a circuit having signaling-devices at signal-stations, each adapted to operate said re-setting means, and means controlled by each signaling-device for operating said controlling-means when all of said signaling-devices have been operated, substantially as described.

23. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal transmitting means arranged to send signals over said circuit, having a starting-device, controlling-means for said starting-device, automatic means adapted to operate said controlling-means after a prolonged period of time, unless re-set, re-setting means for said automatic operating-means, other controlling-means for said starting-device, a circuit having signaling-

devices at signal-stations, each adapted to operate said re-setting means, and means controlled by each signaling-device for operating said last-named controlling means when all of said signaling-devices have been operated, substantially as described.

24. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal-transmitting means arranged to send signals over said circuit, having a starting-magnet, a local-circuit for said starting-magnet, a local circuit-controlling device for said local-circuit, automatic means adapted to operate said local circuit-controlling device after a prolonged period of time, unless re-set, re-setting means for said automatic operating-means, another local circuit-controlling device for said local-circuit, a circuit having signaling-devices at signal-stations, each adapted to operate said re-setting means, and means also controlled by each signaling-device for operating said last-named local circuit-controlling device when all of said signaling-devices have been operated, substantially as described.

25. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal-transmitting means arranged to send signals over said circuit, automatic means operating to start said transmitting means after a prolonged period of time, unless re-set, re-setting means for said starting-means, an intermittently-movable member controlling the operation of said starting-means, and a circuit having signaling-devices at signal-stations, each adapted to operate said intermittently-movable actuator and said intermittently-movable member, substantially as described.

26. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal transmitting-means arranged to send signals over said circuit, automatic means operating to start said transmitting-means after a prolonged period of time, unless re-set, a re-setting device for said automatic starting-means, other starting-means for said transmitting-means, a magnet controlling the operation of said re-setting device and said last named starting-means, and a circuit having signaling-devices at signal-stations for controlling the operation of said magnet, substantially as described.

27. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal transmitting-means arranged to send signals over said circuit, automatic means operating to start said transmitting-means after a prolonged period of time, unless re-set, a re-setting device for said auto-

matic starting-means, other starting-means for said transmitting-means, a magnet controlling the operation of said re-setting device and said last named starting-means, a circuit having signaling-devices at signal-stations, and relays corresponding to said signaling-devices and controlled thereby, the armatures of all of which control the circuit of said magnet, substantially as described.

28. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal transmitting means arranged to send signals over said circuit, automatic means operating to start said transmitting means after a prolonged period of time, unless re-set, a re-setting device for said automatic starting-means, other starting-means for said transmitting-means, a rotatable member having means for operating said re-setting device, and having means for operating said last named starting-means on each complete cycle of its operation, a magnet controlling the operation of said rotatable-member, and a circuit having signaling-devices at signal-stations for controlling said magnet, substantially as described.

29. In a supervisory signal-system, the combination of a supervisory-signaling-circuit connected with a supervisory-station, code-signal-transmitting means arranged to send signals over said circuit, automatic means operating to start said transmitting means after a prolonged period of time, unless re-set, a re-setting device for said automatic starting-means, other starting-means for said transmitting means, a rotatable-member having means for operating said re-setting device, and having means for operating said last named starting-means on each complete cycle of its operation, a magnet controlling the operation of said rotatable-member, a circuit having signaling-devices at signal-stations for controlling said magnet, and means operated by said rotatable-member for placing said magnet successively under the control of the several signaling-devices, substantially as described.

30. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal transmitting means arranged to send signals over said circuit, automatic means operating to start said transmitting means after a prolonged period of time, unless re-set, a re-setting device for said automatic starting-means, other starting-means for said transmitting means, an intermittently-rotatable member having means for operating said re-setting device and having means for operating said starting-means, a normally-wound train for rotating said member, having a detent-lever for arresting it, a magnet for operating said detent-lever

to release the train, a circuit having signaling-devices at signal-stations for controlling said magnet, and means operated by said rotatable-member for successively placing said magnet under the control of the several signaling-devices, substantially as described.

31. In a supervisory signal system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a multiple code-signal transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, means for re-setting said automatic starting-means, other starting-means for said transmitter, and a circuit having signaling-devices at signal-stations for controlling the operations of both said re-setting means and said last named starting-means, substantially as described.

32. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a multiple code-signal transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, means for re-setting said automatic starting-means, other starting-means for said transmitter, a circuit having signaling-devices at signal-stations, each adapted to operate said re-setting means, and means arranged to be operated by each signaling-device for operating said last named starting-means when all of said signaling-devices have been operated, substantially as described.

33. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a multiple code-signal transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, means for re-setting said automatic means, other starting-means for said transmitter, controlling-means for said last named starting-means, a circuit having signaling-devices at signal-stations, each adapted to operate said re-setting means, and means controlled by each signaling-device for operating said controlling-devices when all of said signaling-means have been operated, substantially as described.

34. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a multiple code-signal transmitter arranged to send signals over said circuit, having a starting-device, controlling means for said starting-device, automatic means adapted to operate said controlling-means after a prolonged period of time, unless re-set, re-setting means for said automatic operating-means, other controlling-means for said

starting-device, a circuit having signaling-devices at signal-stations, each adapted to operate said re-setting means, and means controlled by each signaling-device for operating said last-named controlling-means when all of said signaling-devices have been operated, substantially as described.

35. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a multiple code-signal transmitter arranged to send signals over said circuit, having a starting-magnet, a local-circuit for said starting-magnet, a local-circuit-controlling device for said local-circuit, automatic means adapted to operate said local-circuit-controlling device after a prolonged period of time, unless re-set, re-setting-means for said automatic operating-means, another local-circuit-controlling device for said local-circuit, a circuit having signaling-devices at signal-stations, each adapted to operate said re-setting means, and means controlled by each signaling-device for operating said last-named local-circuit-controlling device when all of the signaling-devices have been operated, substantially as described.

36. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a multiple code-signal transmitter arranged to send signals over said circuit, having means for sending a differentiating signal-impulse with some of said signals and not others, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, and to cause said transmitter to send its signal with the differentiating signal-impulse, means for re-setting said automatic starting-means, other starting-means for said transmitter operating to start said transmitter and cause it to send its signal without the differentiating signal-impulse, and a circuit having signaling-devices at signal-stations for controlling the circuit to operate said re-setting means and said last named starting-means, substantially as described.

37. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means involving a reciprocating actuating-member, operating to start said transmitter after a prolonged period of time, unless re-set, means for re-setting said automatic starting-means, a circuit having signaling-devices at signal-stations for controlling the circuit to operate said re-setting means, and a local signal-recorder, operated by said signaling-devices, which records the re-setting of said automatic starting-means, substantially as described.

38. In a supervisory signal-system, the

combination of a supervisory signaling-circuit connected with a supervisory-station, a code-signal transmitter arranged to send signals over said circuit, automatic means involving a reciprocating actuating-member, operating to start said transmitter after a prolonged period to time, unless re-set, re-setting means for said starting-means, relays, means controlled by the armatures of said relays for operating said re-setting means, a local signal-recorder also controlled by the armatures of said relays, and a circuit having signaling-devices at signal-stations for controlling the circuit to operate said relays, substantially as described.

39. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal transmitting means arranged to send signals over said circuit, automatic means involving a reciprocating actuating-member, operating to start said signal transmitting-means after a prolonged period of time, unless re-set, means for re-setting said automatic starting-means, other starting-means for said signal-transmitting means, a circuit having signaling-devices at signal-stations for controlling the circuit to operate both said re-setting means and said last named starting-means, and a local signal-recorder responsive to the operations of said signaling-devices, substantially as described.

40. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-station, code-signal transmitting-means arranged to send signals over said circuit, automatic means operating to start said transmitting-means after a prolonged period of time, unless re-set, a re-setting device for said automatic starting-means, other starting-means for said transmitting-means, a magnet controlling the operation of said re-setting device and said last named starting-means, a circuit having signaling-devices at signal-

stations, and relays corresponding to said signaling-devices and controlled thereby, the armatures of all of which control the circuit of said magnet, and a local signal-recorder having operating-magnets corresponding to said relays and responsive to the operations thereof, substantially as described.

41. In a supervisory signal-system, a code-signal transmitter arranged to send signals over a supervisory-circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, a re-setting device, a train for operating it, electro-magnetically operated means for said train, and means moved by the train to prevent the operation of the re-setting device when the train is run down, to thereby permit the automatic starting-means to start the transmitter and send a signal, substantially as described.

42. In a supervisory signal-system, the combination of a supervisory signaling-circuit connected with a supervisory-circuit, a code-signal transmitter arranged to send signals over said circuit, automatic means operating to start said transmitter after a prolonged period of time, unless re-set, a re-setting device for said automatic starting-means, a train for operating it, having a winding-device, a releasing-device for said train, and means, moved by the train when run down, to engage said releasing-device and hold it from releasing the train, thereby permitting the automatic means to start the transmitter, and signaling-devices at signal-stations for controlling said releasing-means, substantially as described.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

FREDERICK W. COLE.

Witnesses:

B. J. NOYES,
H. B. DAVIS.