

(No Model.)

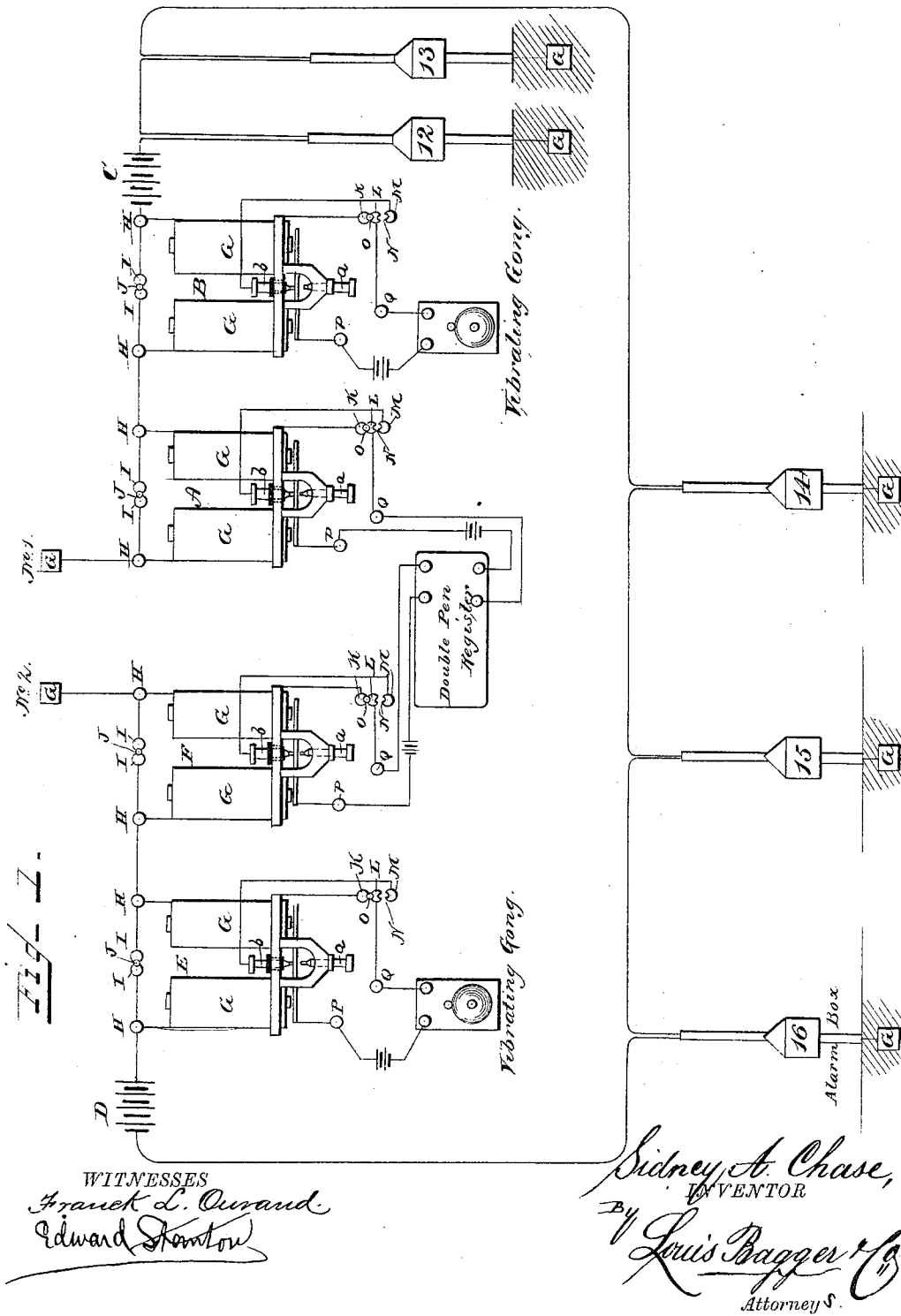
3 Sheets—Sheet 1.

S. A. CHASE.

FIRE ALARM TELEGRAPH SYSTEM.

No. 350,804.

Patented Oct. 12, 1886.



(No Model.)

3 Sheets—Sheet 2.

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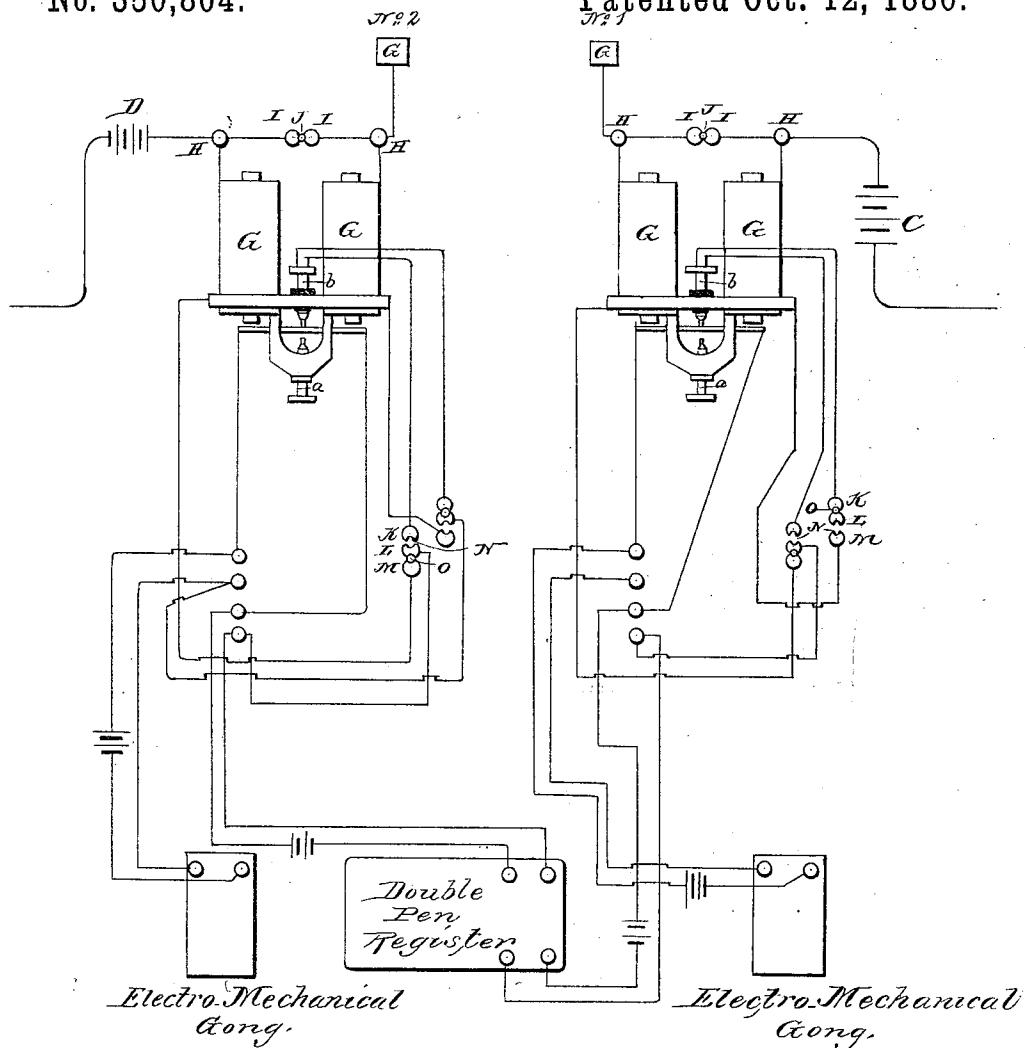


Fig. 2.

WITNESSES
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(No Model.)

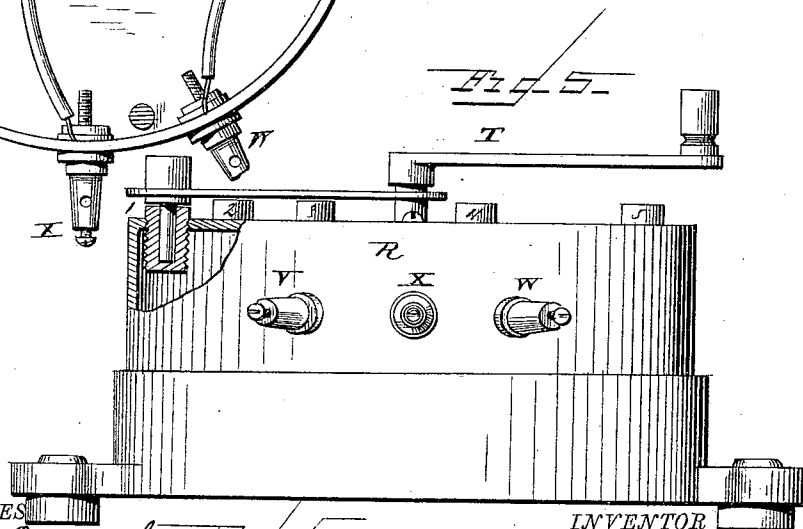
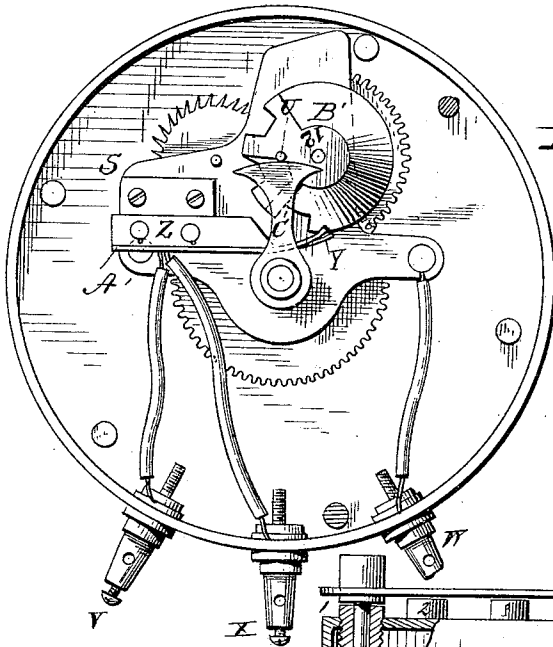
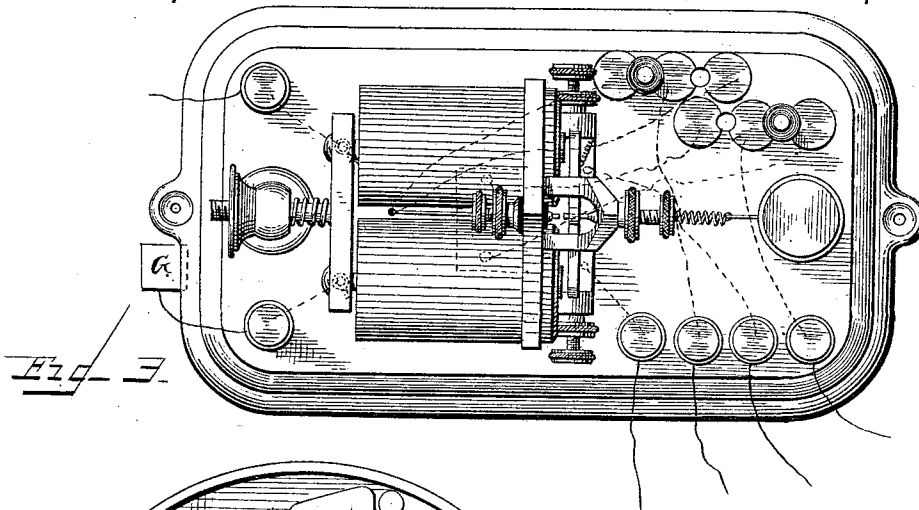
3 Sheets—Sheet 3.

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WITNESSES

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UNITED STATES PATENT OFFICE.

SIDNEY A. CHASE, OF EVART, MICHIGAN, ASSIGNOR OF ONE-HALF TO
WILLIAM R. MAPES, OF SAME PLACE.

FIRE-ALARM-TELEGRAPH SYSTEM.

SPECIFICATION forming part of Letters Patent No. 350,804, dated October 12, 1886.

Application filed June 14, 1886. Serial No. 205,108. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY A. CHASE, a citizen of the United States, and a resident of Evart, in the county of Osceola and State of Michigan, have invented certain new and useful Improvements in Fire-Alarm-Telegraph Systems; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a diagrammatical representation of my improved fire-alarm system. Fig. 2 is a similar view showing a modified form of that part of the system used in the central office. Fig. 3 is a plan view, on an enlarged scale, of one of the relays used in the central office. Fig. 4 is an elevation of the signal-box mechanism. Fig. 5 is a partially-sectionized side elevation of a modification of said signal-box, and Fig. 6 shows a side view of the circuit-springs and a cross-section of the circuit-wheel.

Like letters of reference indicate corresponding parts throughout the several figures.

My invention has relation to fire-alarm-telegraph systems and apparatuses constructed and used in connection with relays, registers, and gongs located at the central offices; and it consists in the improved construction and combination of parts, as will be hereinafter fully described, and pointed out in the claims.

If in the systems of the class above referred to the line-wire should be severed, the stations beyond the point of rupture would be cut out or the entire system rendered inoperative until the break be located and repaired, thus causing a great deal of annoyance and loss of time.

The object of my invention is to provide a system and apparatus whereby such evils may be avoided, the arrangement being such that the occurrence of a break in the line will be instantly signaled at the central office by means of one or more electro-magnetic vibrating gongs, and immediately upon the sounding of such signal the entire system or circuit may be made as efficiently operative as if no break had occurred by simply shifting connec-

tions at the central office. No less than two simultaneous breaks—one on each side of a station—can cut such station out of communication with the central office, and even then the other stations of the system are unaffected. Also, as a part of the apparatus of the system, I provide a signal-box mechanism adapted to send different signals, according to a previously-arranged code of signals, through the medium of a crank which operates said mechanism, instead of by a tap-key, as is frequently used. I accomplish these objects by connecting the different stations of the system together in a circuit having its termini at the central office, making a closed earth-circuit, and at the same time giving to each station a normally-open ground-connection. These ground-connections, being normally open, provide for automatically signaling the central office upon the occurrence of a break, and a current will be set up through them as each box is operated during the continuation of the break. The circuit, being a closed ground-circuit before a break, becomes two separate circuits after the occurrence of a break, and to show the condition of the circuits after a break two electro-magnetic vibrating gongs are provided at the central office. By means of these gongs in my improved system it can be immediately known upon the occurrence of a break whether one, both, or neither end of the wire have fallen in a manner such as to ground them.

The alarm-boxes at the different stations are each provided with a device for simultaneously making and breaking connection with the main line and with the ground, whereby while the line is intact the current passes over the wire in both directions; but in the event of a break the return is through the ground, and a signal turned in at either one of the boxes adjacent to the break will be as readily transmitted to the central office over what has become a single open circuit as over the closed ground-circuit.

In the accompanying drawings, Figure 1 shows the wire connections from ground No. 1 to and through the electro-magnets of relays A and B, through battery C, thence traversing the signal-boxes of the territory to be protected, as 12, 13, 14, 15, and 16, then through

battery D, which coacts with battery C and relays E, and through F to the ground No. 2. G indicates the electro-magnets of said relays, the coils of which receive the main-line current through the binding posts H. The metallic disk I and the metallic plugs J are used for cutting out the relay-magnets, which is done by placing said plugs between and in contact with said disks, as shown.

K, L, and M represent metallic disks—three in each series—which have suitable apertures, N, formed between them, into which a circuit-closing plug, O, is adapted to fit.

The relays, with their uninsulated contact-screws *a* and insulated contact-screws *b*, together with the wire connections between the parts of said relays and the disks and binding-posts, are substantially the same as described in Letters Patent of the United States No. 342,576, granted to myself and William R. Mapes on May 25, 1886, to which patent reference is made for a clear and complete description of said parts and wire connections.

In the binding-posts P and Q of the relays B and E are secured, respectively, the wires of two open local circuits, each provided with an electro-magnetic vibrating gong and the necessary battery. In said binding-posts of relays A and F are respectively secured the wires of a double-pen register, on one of which wires is located the necessary battery.

The gongs and register may be of any construction best adapted to the requirements imposed by the use of various systems of signals.

Such is the general arrangement of the system and location of the apparatus.

To illustrate the operation of the same, supposing a break to occur, notice will immediately be given thereof at the central office by the starting of the register and the vibrating gongs. Should a permanent ground be thrown on at each side of the break in consequence of both ends of the wire falling and forming contact with the earth, the circuit would be wholly unimpaired. Should the end at one side of the break not form a ground, the gong on that side would denote the same by continual ringing, which would be stopped, and the same gong and register placed in condition to record the signal on the open circuit, whenever one might be turned in, by shifting the plugs in the two relays corresponding to that side from between the disks K and L to between the disks L and M; and should both ends of the break fail to form a ground both gongs would continue to ring till all four plugs were changed in the same manner, for the same purpose as above stated. This use of the gongs to instantly and automatically show the condition of both circuits after a break relative to either ends grounding avoids the use and moving of a switch.

In Fig. 2 are represented the paraphernalia of a central office using single-stroke electro-mechanical gongs, each of which is connected in its respective closed local circuit with the relay, and is provided with the necessary bat-

tery. Other closed local circuits—one from each relay—connect their respective relays with a double-pen register, and each of these circuits is provided with the necessary battery.

The action of the relays and the two local circuits connected with each will be readily understood when considered in connection with the above description and the Patent No. 342,576, before cited.

The signal-box mechanism used at the several stations is secured in the upper side of a metallic box, R, adapted to be placed for protection from the weather in an outer box of the ordinary form. Said mechanism comprises the usual frame, S, train of gearing, escape-wheel, crank T, and stop U. It is furnished with binding-screws V and W for the main-line wire, and X for the ground-wire. The binding-screw W has wire connection to the frame S, the binding-screw V a wire connection to the circuit-spring Y on the insulating-block Z, and the binding-screw X has a wire connection to the circuit-spring A', located on said block immediately back of spring Y. The circuit-wheel B', instead of being provided with the ordinary short notches, has long ones, to provide sufficient lapse of time between the make and break of the circuit to allow the electro-magnetic vibrating gong at the central office to vibrate a number of times at each make and break. The circuit-wheel has a certain number of long notches in its periphery, adapting it to send at each revolution the number corresponding to the number of the signal-box. The edge of said circuit-wheel is beveled, so that the circuit-spring A', which is adapted to make and break circuit simultaneously with the spring Y, connected to the main line, does not touch its periphery, except when the circuit-wheel is revolved to make circuit.

In operation, as the crank is turned, the arm C' passes clear of the pin U, and the spring is wound to turn the circuit-wheel, sending the signal to the central office. As long as the line is intact the signals are transmitted over it, the circuit-spring Y breaking and making the main-line circuit as the circuit-wheel is revolved; and in consequence of the grounds being normally on at the central office, and only thrown on at the boxes as each box is operated, a break in the main-line wire on either side of a box causes the current to enter the box by the unbroken wire connection, and to return through the ground by the second circuit-spring, A', as the box is operated. The internal features of these boxes are similar to those of the box for which Letters Patent of the United States No. 345,572 were granted to me July 13, 1886. The crank-shaft of the box mechanism projects up through a closely-fitting aperture in the box-cover, to which the crank is secured. A number of apertures are arranged in a circle around the center of the operating-crank. These apertures are made in lugs, and into them a plug is adapted to fit, which plug is provided with a shoulder

to bear against the ends of the lugs, one of the lugs being shorter than the others, so that the door of the box or casing may only be closed when the plug is in the short lug, and the door cannot be closed sufficiently to lock when the plug is in any of the other lugs. These lugs are preferably made screw-threaded and adapted to be secured in screw-threaded perforations in the box. Said lugs project down on the inside of the box a sufficient length to allow the apertures in the lugs to be made of the required depth without making an opening clear through them, which would permit dust and grit to accumulate in the box mechanism. (See Fig. 5.) The lugs are on the face of the box, and are numbered, respectively, 1, 2, 3, 4, and 5. These figures represent the number of times that the signal given at one rotation of the circuit-wheel will be repeated and transmitted to the central office when the crank is turned, respectively, to the figures or lugs. In the night or dark, when the number or lugs cannot be seen, the lugs will enable a person to turn the crank to the required point by sense of feeling. The short lug is preferably placed in the first perforation, although, if desired, it may be removed to any other number. The number of each lug corresponds to a previously-arranged code of signals—as 1, fire; 2, second fire-company; 3, third fire-company; 4, police; 5, test, &c. The different requirements or different meaning of the different signals will be understood at the central office by the number of times that the signal-box number is recorded on the register, and the location of the requirements by the number of the signal-box. The short lug being the one that indicates fire, and the door not being able to close except when the plug is inserted in the short lug, will insure the sending of the fire-alarm signal by simply turning the crank without removing said plug, the plug only to be removed by police or the chief of the fire-department. The plug may be used free and without any attachment to the signal-box, or it may be attached in any desired manner—as, for instance, the plug may be secured to the outer end of a crank, with the crank secured in any desired manner in the center of the signal-box cover or top, with a perforation through the crank for the free passage of the crank-shaft proper, as shown in Fig. 5.

The advantages of my system are apparent. If the line should break or be maliciously cut, the vibrating gongs will automatically show the condition of the break to the operator at the central office relative to either end of the broken wire grounding, and the operator can practically repair said break instantly without leaving the office.

My invention can be applied to any existing lines without requiring any expensive revolution in their construction, as the change would only be one of addition.

It is also obvious that many slight changes in the construction and arrangement of parts

might be resorted to without leaving the spirit and scope of my invention. Therefore I wish to have it understood that I do not restrict myself to the particular construction and arrangement of parts shown and set forth.

I am aware that it is not new to ground the several stations of a fire-alarm system as well as the central office—as, for instance, in the so-called “non-interfering fire-alarm-telegraph systems,” in which each box in being operated short-circuits through the ground to the office and cuts out the boxes beyond; but that has nothing to do with my invention, except as to the ground-circuit, which is old. Should a break occur in the wire of such a system, it would cut off the boxes beyond the break, and they would remain inoperative until the break was located and repaired, whereas by my invention a break can be instantly and practically repaired at the central office, and all the signals will be received at the central office as if no break had occurred. I am also aware that it is not new to construct a signal-box with a ground-connection from the binding-screw X, and connect the latter with a second circuit-spring, A', on the insulating-block Z, adapted to make and break circuit with a second circuit-wheel soldered to the face of the first circuit-wheel and concentric therewith, or to construct a circuit-wheel with one edge or corner beveled off, so that the circuit-spring A' will not touch its periphery, except when the said spring passes over the points of the teeth properly spaced to send the number of the signal-box. I do not, therefore, desire to claim such constructions, broadly; but,

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. As an improvement in fire alarm-telegraph systems, a closed earth-circuit connecting the fire-alarm signal-boxes with the central office in two directions, two relay electromagnets, and two separate coacting main-line batteries located upon and near each end of the main line at said office, the coils of said relays receiving the main-line current, each relay having a metallic yoke provided with an uninsulated contact-screw for the armature to bear against when released from the magnets, and an insulated contact-screw for the armature to bear against when attracted by the magnets, three metallic disks having, respectively, wire connections with the yoke and a binding-post and with the insulated contact-screw, a binding-post having wire connections to the armature, and a metallic plug for connecting either of the disks at the end of the series with the central disk, substantially as shown and described.

2. In a fire-alarm-telegraph system, the combination of a number of signal-boxes having suitable main-line wires connecting the signal-boxes in two directions to relays at the central office, each relay having a metallic yoke provided with an insulated contact-screw for the armature to bear against when attracted by

the magnets, a series of three disks at each relay, having apertures between them, and having, respectively, wire connections with the yoke and a binding-post and with the insulated contact-screw, a binding-post having wire connections to the armature, and a metallic plug for connecting either of the disks at the ends of the series with the central disk, two electro-magnetic vibrating gongs connected, one in an open local circuit of each of two relays, and one double-pen register connected in the open local circuits of the other two relays, each open local circuit provided with the necessary battery, substantially as and for the purpose set forth.

3. In a fire-alarm-telegraph system, the combination of four relay electro-magnets located in a closed earth-circuit at a central office, having the usual metallic yoke, the two contact-screws, one of which is in direct contact with the metallic yoke, while the other passes through an insulated aperture in said yoke, and the armature arranged to come in contact with the insulated contact-screw when attracted by the relay electro-magnet, and to come in contact with the uninsulated contact-screw when the main-line current is broken, two electro-magnetic vibrating gongs, and one double-pen register connected with the open local circuits of said relays and adapted to be operated by them, substantially as described and set forth.

4. In a fire-alarm-telegraph system, the combination of two relay electro-magnets upon the main-line circuit, having the usual metallic yoke, the two contact-screws, one of which is in direct contact with the metallic yoke, while the other passes through an insulated aperture in said yoke, and the armature arranged to come in contact with the insulated contact-screw when attracted by the relay electro-magnet, and to come in contact with the uninsulated contact-screw when the main-line circuit is broken, each relay having two series of three disks each, suitable apertures between the several disks of each series, metallic plugs, a disk at one end of each series having a wire leading to the uninsulated contact-screw, wires leading from the opposite end disks to the metallic yoke, wires leading from the central disks to two binding-posts, one of which receives the wire of one local circuit of one relay, while the other receives the wire of another local circuit of the same relay, and wires leading from the armature to two binding-posts, one of which receives the remaining wire of the first local circuit, while the other receives the remaining wire of the other local circuit, the former circuits each having an electro-mechanical gong connected therein, and the latter circuits each having, respectively, one side of a double-pen register con-

nected therein, substantially as and for the purpose set forth.

5. In a fire-alarm-telegraph system, the combination of two or more relay electro-magnets upon the main-line circuit, the coils of which receive the main-line current, two metallic disks, one of which has wire connection to one of the main-line binding-posts and the other has wire connection to the other one of the two binding-posts, a metallic plug adapted to fit between the disks and to cut out the coils of the relay electro-magnets, which have the usual metallic yoke, the two contact-screws, one of which is in direct contact with the metallic yoke, while the other passes through an insulated aperture in said yoke, and the armature arranged to come in contact with the insulated contact-screw when attracted by the magnets, and to come in contact with the uninsulated contact-screw when the main-line current is broken, each relay having two series of three disks each, metallic plugs to close circuit between said disks, a disk at one end of each series having a wire leading to said insulated contact-screw, wires leading from the opposite end disks of the series to the metallic yoke, wires leading from the central disks to two binding-posts, one of which posts receives the wire of a local circuit, while the other post receives the wire of another local circuit, and wires leading from the armature to two binding-posts, one of which receives the remaining wire of one local circuit, while the other receives the remaining wire of the other local circuit, substantially as and for the purpose described and set forth.

6. In combination with the crank of a fire-alarm signal-box, mechanism adapted to repeat the number of the signal box a different number of times, according to the point or lug upon the face of the box to which the crank is turned before releasing it, a shouldered plug fitting with its reduced end in the perforations of the lugs, and an outer casing or box having a door at a distance from the end of the lowest lug equal to the length of the shouldered portion of the plug, substantially as described and set forth.

7. In a fire-alarm signal-box, the combination, with a plain shouldered plug, of a series of externally-screw-threaded lugs, each provided with a smooth axial perforation extending partially therethrough, said lugs fitting into screw-threaded perforations in the top of said box, as and for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

SIDNEY A. CHASE.

Witnesses:

CHAS. E. DERMONT,
JOSEPH SAYLES.

It is hereby certified that in Letters Patent No. 350,804, granted October 12, 1886, upon the application of Sidney A. Chase, of Evart, Michigan, for an improvement in "Fire-Alarm-Telegraph Systems," errors appear in the printed specification and drawings requiring correction as follows: On page 2, line 68, the word "closed" should read *open*, and in Fig. 2 of the drawings, a line from the metallic disk L in the right hand portion of the figure to one of the binding posts of the circuit with the right hand electro-mechanical gong to represent a wire connection similar to that which is shown in the left hand portion of the figure for connecting the circuit of the left hand electro-mechanical gong should be inserted; and that the Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 4th day of January, A. D. 1887.

[SEAL.]

D. L. HAWKINS,
Acting Secretary of the Interior.

Countersigned:

R. B. VANCE,
Acting Commissioner of Patents.