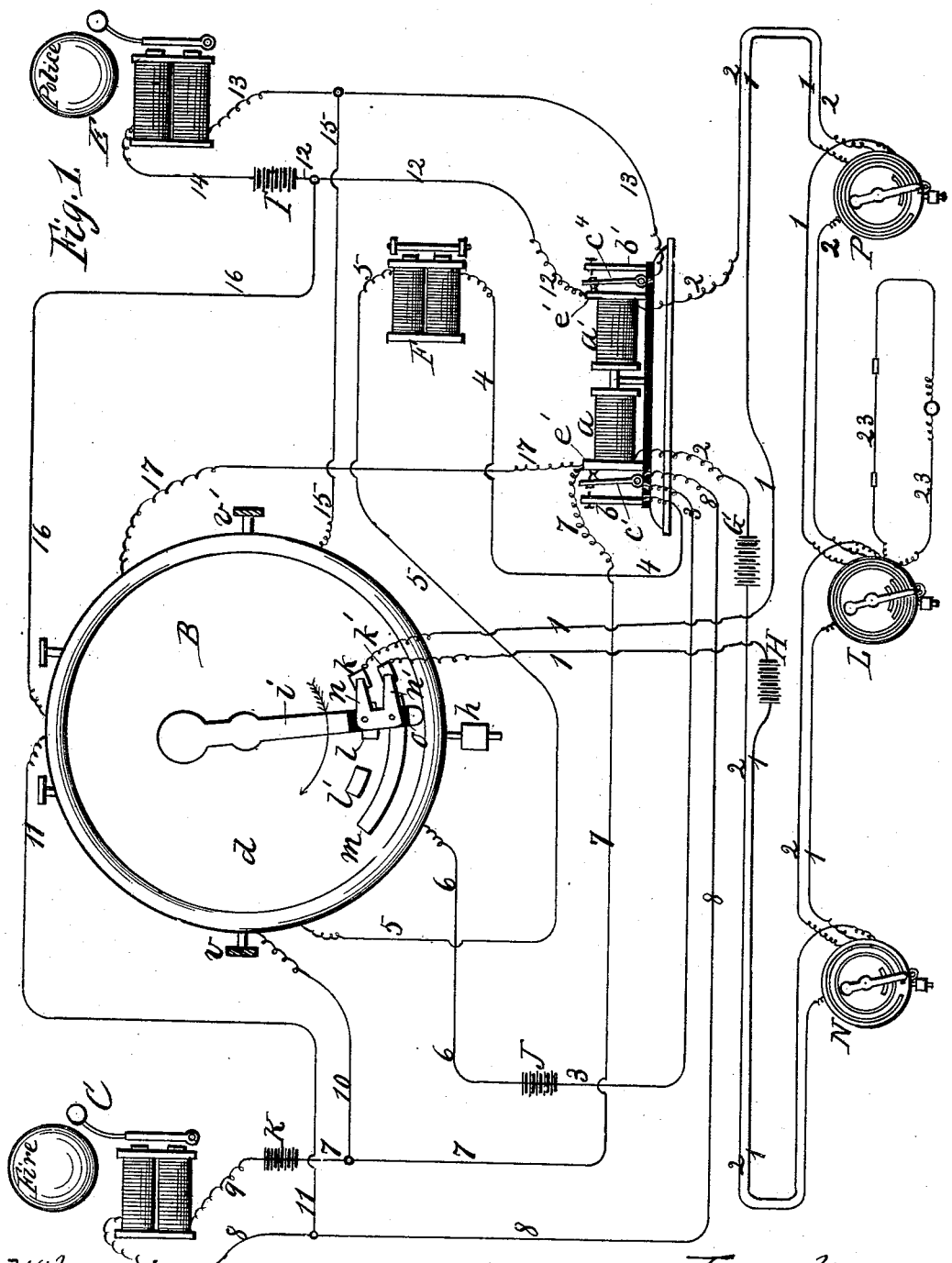
(No Model.) 4 Sheets—Sheet 1.

W. W. HIBBARD.

ELECTRIC SIGNALING APPARATUS.

No. 523,121. Patented July 17, 1894.

Fig. 1.



Witnesses.
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(No Model.) 4 Sheets—Sheet 2.

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Fig. 3.

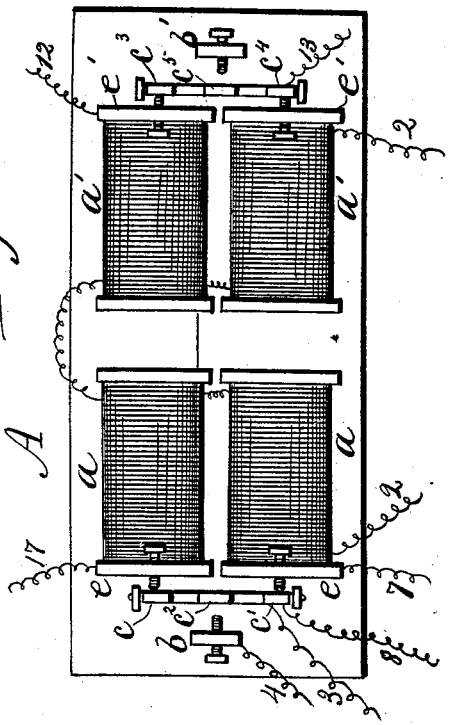

Fig. 4.

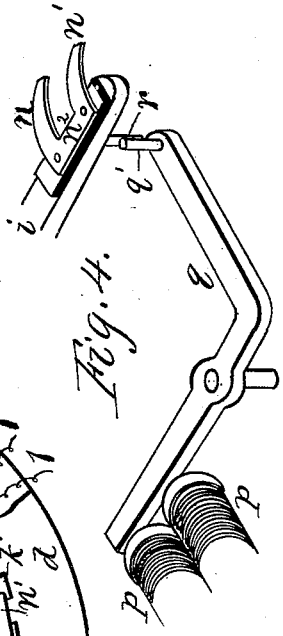

Fig. 2.

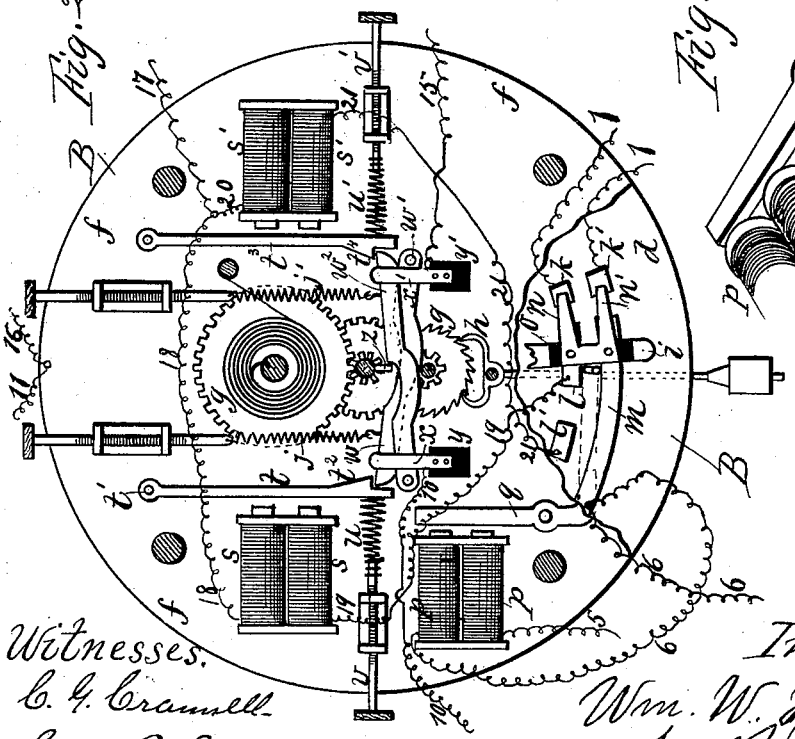

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Fig. 5.

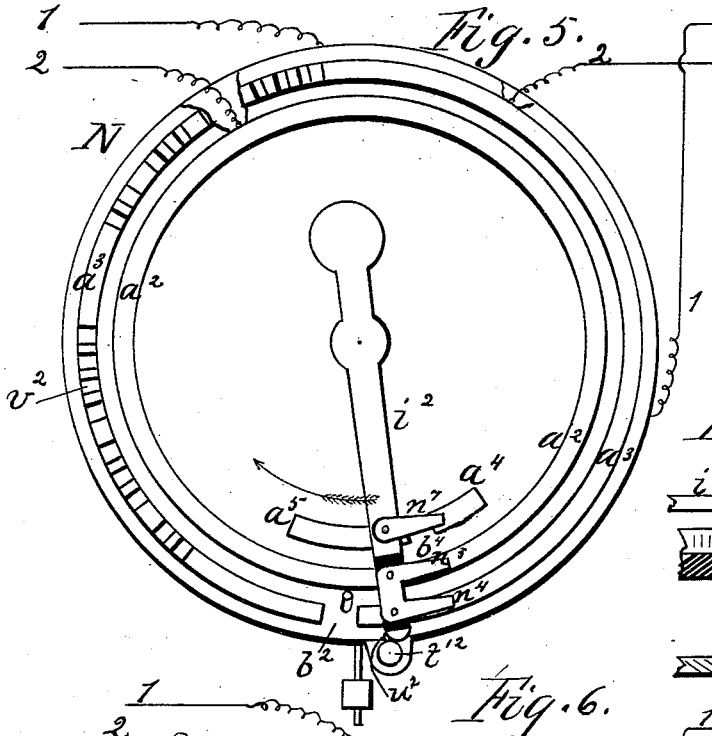


Fig. 7.

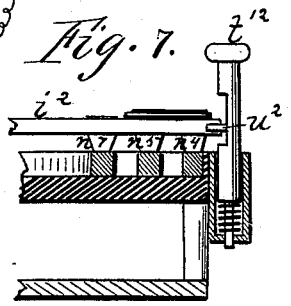
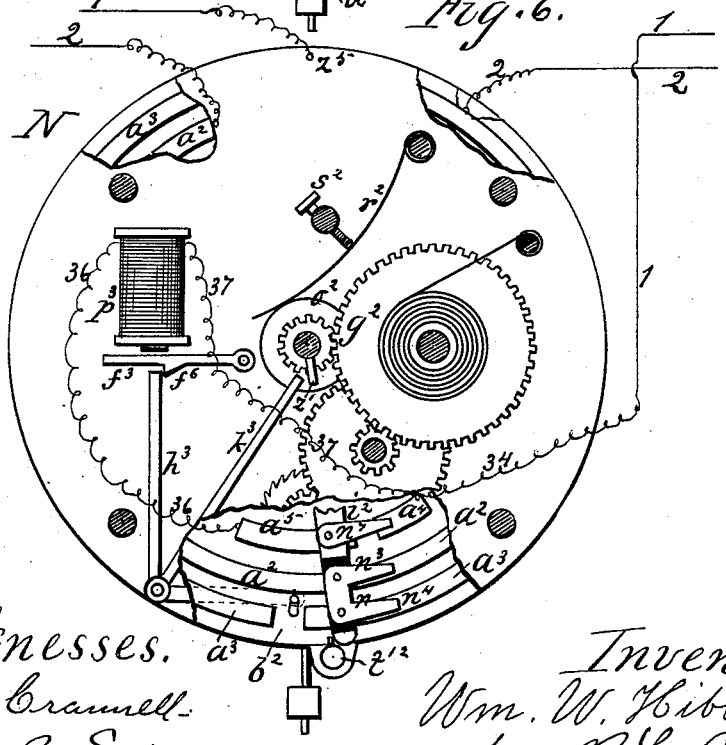


Fig. 6.



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W. W. HIBBARD.

ELECTRIC SIGNALING APPARATUS.

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Fig. 8.

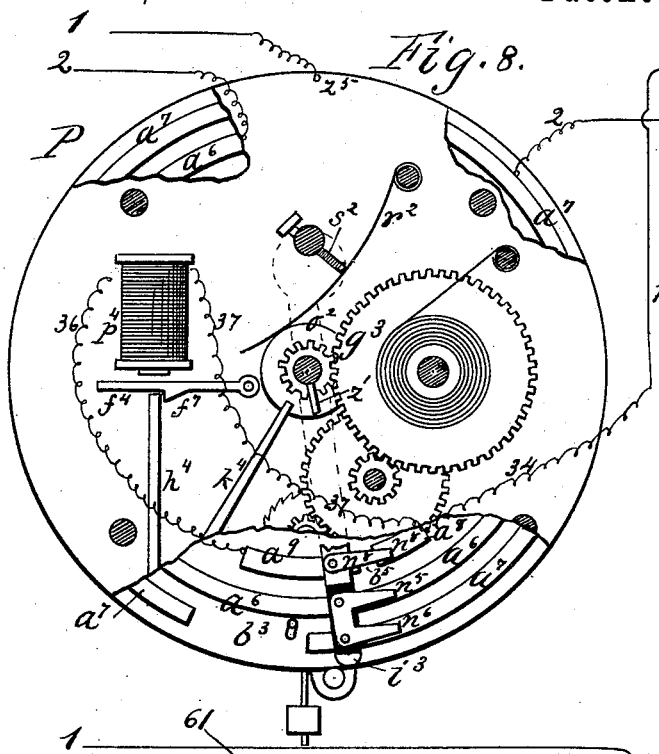


Fig. 10.

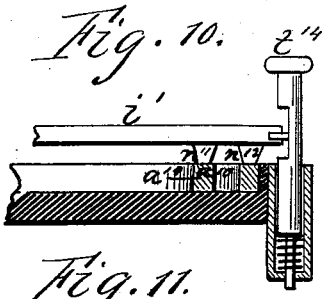


Fig. 11.

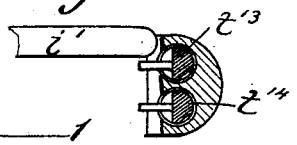
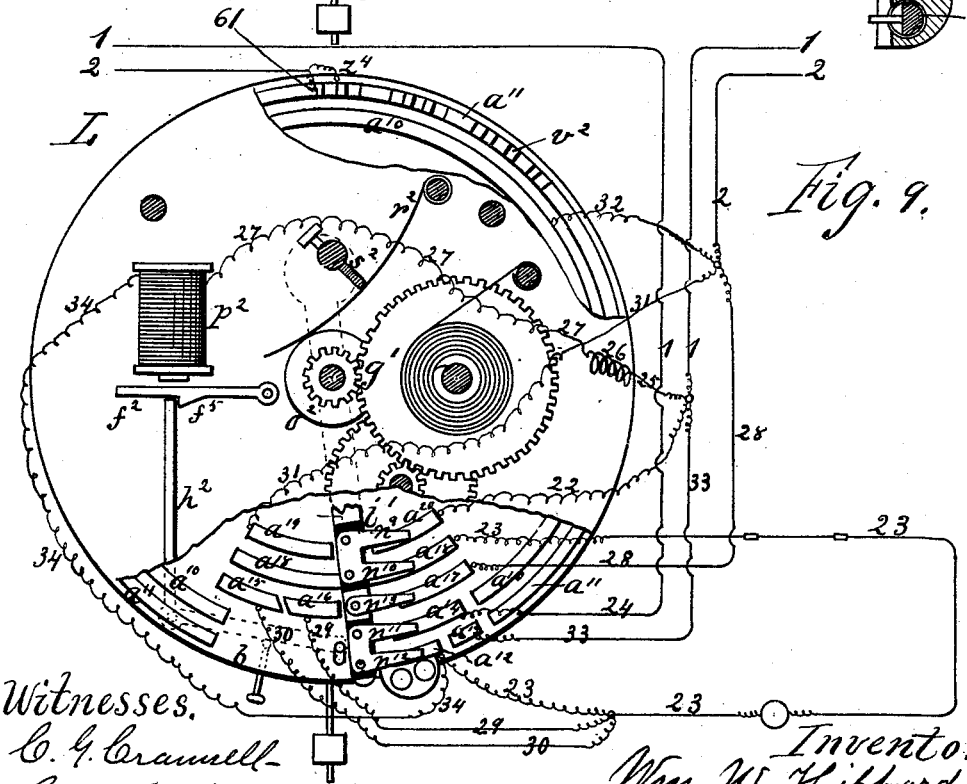


Fig. 9.



Witnesses.
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Geo. B. Selden.

Inventor:
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UNITED STATES PATENT OFFICE.

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ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 523,121, dated July 17, 1894.

Application filed August 12, 1893. Serial No. 483,023. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. HIBBARD, of Rochester, in the county of Monroe and State of New York, have invented a certain new and useful Improvement in Electric Signaling Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the drawings accompanying this application.

This improvement relates to electric signals, more particularly fire alarm signals, and consists of a system embodying a main line provided with suitable signal boxes, said main line being normally closed, a relay with subcircuits connecting therewith, a differentiating instrument by which the currents through the several subcircuits are changed, and certain other connecting mechanism which will be more fully described.

In the drawings,—Figure 1 is a diagram showing a plan of the system. Fig. 2 is a face view of the differentiating instrument with the top removed to show the working parts. Fig. 3 is a plan view of the relay. Fig. 4 is a perspective view of the electrical stop apparatus of the differentiating instrument. Fig. 5 is a face view of one of the fire alarm boxes. Fig. 6 is a similar view with a portion of the top broken away to show the interior mechanism. Fig. 7 is a vertical section through one edge of Figs. 5 and 6 showing the finger knob for starting the signal apparatus of the fire alarm box. Fig. 8 is a face view of one of the police boxes with the top partially broken away. Fig. 9 is a face view of one of the auxiliary or substation boxes with the top partially broken away. Fig. 10 is a section through one edge of the auxiliary boxes showing the finger knobs for starting the apparatus. Fig. 11 is a horizontal cross section of Fig. 10.

In this system a central station or office is employed, where are located all the working parts including the batteries, the main line and sub-lines extending therefrom as will be more fully described.

In the drawings A indicates the relay, B the differentiating instrument, C an engine-house or fire-department station, E a police or other station with which the system is connected, and F a magnet for operating a register at the central station, whereon is recorded the number of the box where the alarm is given.

The relay A is made double where connection is made by the sub-circuits to two different points, say the fire department and the police station, and is so shown in the drawings, the same consisting of two pairs of electro magnets $a\ a$ and $a'\ a'$, two sets of uprights $e\ e$ and $e'\ e'$, two sets of swinging armatures, one set at each end of the relay, and two upright contact posts b and b'. The armature at one end of the relay consists of three arms $c\ c'\ c^2$ attached to a common pivoted bar, the two outside ones $c\ c'$ coming in contact with the uprights $e\ e$ when the magnets are energized, and the middle one c^2 in contact with the upright post b in the opposite position. The armature at the opposite end of the relay is of the same construction, consisting of the three upright arms $c^3\ c^4$ and c^5, and operate in the same manner.

The object of the differentiating apparatus B is to change the current from one circuit to another by the rotation of an arm which comes successively in contact with different conducting points on an insulated surface of the box. It consists of a circular case provided with an exterior face d of rubber or other insulating material, and a metallic base plate f which acts as a conductor.

g is a time-movement or clock-work of any suitable construction located in the case, and h an escapement connected therewith.

i is an arm forming a circuit breaker attached to the time-movement the shaft of said arm extending from the base out through the insulated face of the instrument, and the arm resting across the same but not in contact therewith. The time movement when released gives motion to the arm and causes it to traverse over the face of the instrument.

$k\ k'\ l\ l'$ and m are contact blocks forming electrodes set into the insulated face of the instrument, and $n\ n'$ are two spring tongues forming contact points attached to the rotating arm i, and connected with each other by a conducting web n^2, said tongues and their connection being insulated from the arm by a rubber block o. As the arm rotates the spring tongues come in successive contact

with the several conducting blocks $k\ k'\ l\ l'$ and m and change the currents, as will be more fully described.

$p\ p$ is an electro-magnet within the instrument, and q is a pivoted crank forming an armature operating in connection therewith. On the outer end of this crank is a pin q' which passes out through a slot in the face of the instrument and intercepts a corresponding pin r on the under side of the arm i, thereby holding said arm against rotation. When magnet $p\ p$ is charged the armature is drawn back removing pin q' from the path of pin r and allowing the swinging arm to rotate by means of the time-movement before described.

$s\ s$ is another electro-magnet in the instrument, and t an armature pivoted at t' and provided with an inclined lug t^2. The armature t is pressed forward by a spring u tightened by a screw v. When the magnet is charged it overcomes the force of the spring and draws the armature back.

w is an arm pivoted at w' connected with the base, its free end engaging with the inclined lug t^2 of the armature t. When in this position the arm w rests in contact with a spring x attached to an insulated block y. When the armature is drawn back by the magnet the arm w frees from contact with the spring and opens the circuit passing therethrough, and remains open till arm w is struck by a pin z on the shaft of the swinging arm i, which restores it to place by pressing it under the lug t^2. The arm w is drawn from contact with spring x by means of a coiled spring j.

The above described arrangement is for communication with the fire deparment, as will presently be explained.

The same arrangement is duplicated on the opposite side of the differentiating instrument B, consisting of the magnets $s'\ s'$, the armature t^3 provided with inclined lug t^4, spring u', screw v', arm w^2, contact spring x' attached to insulated block y', and coiled spring j', the whole operating to establish communication with the police department, or other station than the fire department, as will be more fully described.

The main circuit consists of two wires 1 and 2 laid through the streets or other locality where the line is to be established, said wires being provided with batteries G and H, respectively, at the central station. The terminals of wire 1 connect with the two contact blocks $k\ k'$ also forming electrodes of the differentiating instrument, and the terminals of wire 2 with the two sets of magnets $a\ a'$ of the relay, as shown in the diagram Fig. 1. All signal boxes and lateral circuits entering buildings are connected with these main wires. Under normal conditions the circuit through the main line is closed, the magnets of the relay are charged, and the armatures of the relay are drawn back as shown in Figs. 1 and 3. But any opening of the main circuit releases the armatures and allows them to be drawn in the opposite direction against the posts $b\ b'$, and allows the circuit connected with the central station to come into operation at the proper time. The circuits are as follows: A circuit extends from battery J through wire 3 to armature c', thence, (when the main circuit has been broken and said armature is in contact with the upright post b,) through post b, thence through wire 4, through the register magnet F, charging same and causing it to operate the registering apparatus, thence through wire 5 to and through magnet $p\ p$ charging same, and thence through wire 6, (touching the conducting block m,) back to battery J, thus completing the circuit. The energizing of magnets $p\ p$ draws back armature q, removes pin q' from the path of pin r, and thereby releases the swinging arm i and allows it to revolve by means of the time-mechanism before described. Prior to this time the spring tongues $n\ n'$ have remained in contact with the blocks $k\ k'$. They now leave said blocks and pass to l and m. It should be noted that the circuit J just described is normally open, and is closed only by the opening of the main circuit, and when the main circuit is again closed, as is done by operating a signal box, the circuit J is again opened and rendered non-operative by reason of the charging of the relay magnets $a\ a$. Another circuit extends from battery K at the central station to the fire department. This circuit is from battery K through wire 7, upright e, armature c', wire 8, the magnet at the fire station, and wire 9 back to battery K. Auxiliary to circuit K is another circuit thus:—from battery K through wire 7, wire 10, spring x, arm w, the pivot w' of said arm w to the metallic base of the differentiating instrument, through said base, through wire 11, wire 8, the magnet at the fire department, wire 9, and back to battery K.

I is a circuit extending from the central station to the police or other station independent of the fire department. From battery I the circuit is through wire 12, upright e' armature c^3, wire 13, the magnet at the police station, wire 14, back to battery I. Auxiliary to this circuit is a circuit from battery I through wire 14, the magnet at the police station, wire 13, wire 15, spring x', arm w^3, the pivot w^3 of said arm, through the metallic base of the differentiating instrument, wire 16, and wire 12, back to battery I.

The circuit K and its auxiliary circuit just described are duplicates of the circuit I and its auxiliary before described, one circuit and its auxiliary connecting with the police department and the other circuit and its auxiliary with the fire department.

In the main line circuits 1, 2 are located the various boxes for giving signals; and from said main line also extend loops into buildings and other localities to be guarded, said loops forming sub-circuits and provided with thermostats and manual boxes as required. The first action in opening and then

closing the main circuit is to temporarily close the local circuit J and thus start the differentiating instrument as before described, also operating the register F at the central station, and later recording the number of the box from which the signal is sent, said recording being done by punching holes in a slip of paper or by other means. The movement of the arm i now causes the springs n n' to leave the blocks k k', which breaks the circuit through wire 1, and to come in contact with the blocks l m, thereby forming a new circuit. This circuit is from battery J through wire 3, armature c' (then in contact with the upright of the relay magnet), wire 17, wire 18, magnets s s, wire 19 to contact block l, thence through the tongues n n' to contact block m, through wire 6, back to battery J. The result of thus charging magnets s s is to draw armature t back and release the spring arm w, allowing the latter to separate from spring x, thus breaking the shunt circuit that previously existed by contact of the arm with the spring and extending through the base of the instrument to wire 11. The further progress of swinging arm i causes spring n to leave block l, breaking the circuit just described, and brings the springs n n' in contact with blocks l' m and closes a new circuit from battery J as follows:—from battery J through wire 3, armature c', upright e, wire 17, wire 20, magnets s' s', (energizing the same,) wire 21, contact block l', springs n n', contact block m, wire 6, back to battery J. The energizing of magnets s' s' draws back armature t^3, releases the pivoted arm w^2 from spring x' in the same manner as on the opposite side of the differentiating instrument, thereby breaking the shunt circuit that previously existed leading from battery I through the base of the instrument to wire 16. This shunt circuit, together with its companion on the opposite side leading out from the base of the instrument through wires 11 and 16, will not be reestablished again till arms w and w^2 are forced into engagement with the armatures t and t^3 by the pin z near the end of the rotation of swinging arm i. The condition at this juncture is this: Both of the shunt circuits, one leading to the fire department, the other to the police station, are open during the remainder of the rotation of the swinging arm i after leaving the contact blocks l' m, and until the pin r of the swinging arm strikes the pin q' of armature q, bringing the arm to a stop again. Under such conditions the circuit through the fire department is from battery K through wire 7, upright e, armature c c', (then drawn back by the magnets a a and subject to any action of the relay,) wire 8, through the magnet at the fire station, and thence through wire 9 back to battery K. At the same time the circuit through the police station is from battery I through wire 12, upright e', armature c^3 c^4, wire 13, through the magnet at the police station, and wire 14 back to battery I. It will be seen that at this juncture the register F, the fire station C, and the police station E, are each, through the armature at the relay, rendered susceptible to the operation of the relay. Any signal transmitted over the main line will thus, by closing the circuits at the relay, be transmitted to the central-station register, the fire station and the police station. But while it is desirable to transmit all signals coming in from all signaling devices on the main line to the central station, the fire station and the police station, it is also desirable that no signals, other than those relating to fire alarms, should be repeated to the fire department. To secure this result the various signal boxes interposed in the main line are of peculiar construction as will be more fully described.

It has already been stated that the main line consists of two wires 1 and 2, the first connected with the contact blocks k k' of the differentiating instrument, and the other with the relay A at the central station. On this main line are signal boxes of different construction and for different purposes. First, the auxiliary or sub-station boxes L, with lateral loops or circuits 23 extending from the main line into and through buildings to be guarded, and there provided with thermostats and manual boxes, either or both. Second, street signal boxes N for sounding fire alarms from the streets; and third, police or other signal boxes P for sounding alarms from the streets to the police office or such other place as may be desired. These various boxes have many parts in common with each other and the differentiating instrument before described. They have, respectively, the swinging arms i' i^2 i^3 and the clock works g' g^2 g^3, the same as in the differentiating instrument. The street boxes N and police boxes P have respectively contact rims and blocks a^2 a^3 a^4 a^5 and a^6 a^7 a^8 a^9 set into the insulated faces of the boxes, the outer rims a^3 and a^7 having breaks b^2 and b^3 just in advance of the starting point of the swinging arms, and the inner blocks a^4 a^5 and a^8 a^9 having breaks b^4 and b^5, as shown in Figs. 5 and 8, which are face views of said boxes. The auxiliary or sub-station boxes L have also contact rims and blocks a^{10} a^{11} a^{12} a^{13} a^{14} a^{15} a^{16} a^{17} a^{18} a^{19} a^{20} arranged in five concentric rings on the insulated face of the instrument, and having various breaks between them, as shown in the face view, Fig. 9. The electric connections are made with these contact rims and blocks in each box as will presently be described. Each of the swinging arms i^2 and i^3 of the street boxes N P, has two outer spring tongues n^3 n^4 and n^5 n^6 connected together and insulated from the swinging arm, and an inner separate spring tongue n^7 and n^8 in electrical contact with the swinging arm. These three spring tongues on the arm of each box rest in line with the three concentric rims of the contact blocks so as to sweep over them. In like manner the swinging arm i' of boxes L has two pairs of spring tongues n^9 n^{10} and n^{11} n^{12}, the springs of each pair con-

nected together and insulated from the arm, and a single intermediate spring n^{13} electrically connected with the arm. These several spring tongues rest over and come in contact with the five sets of conducting rims and blocks set into the face of boxes L. The boxes L, N and P have, respectively, electro-magnets p^2 p^3 p^4 similar to the magnets p p of the differentiating instrument B; also pivoted armatures f^2 f^3 f^4 provided with inclined lugs f^5 f^6 f^7, also pivoted crank arms h^2 h^3 h^4 similar to the crank arm q in the differentiating instrument, and carrying stop pins at their outer ends for restraining the swinging arms. The energizing of said magnets removes the stop pins and releases the swinging arms in the same manner as in the differentiating instrument. In addition to these features the crank arms h^3 h^4 have intermediate arms k^3 k^4 which project inward in such position as to be struck by the pin z', on the shaft of the swinging arm, shortly after starting, to re-set the crank arm with the armature. Each of the boxes is also provided with a wheel o^2 on the shaft of the swinging arm, against the periphery of which wheel bears a spring r^2 pressed up by a screw s^2, the object of which is to apply sufficient friction to the gearing of the clock work to prevent back action of the same. The exterior rims of the boxes also have circuit breaking notches v^2 v^2 arranged in two series in order to indicate numbers for sounding alarms over the main line. In addition to these devices the boxes are started in operation manually by pressing the finger on a knob t^{12} (Fig. 7) which removes a pin u^2 from contact with the end of the swinging arm and releases the latter. The finger-knob stands a little in the rear of the stop-pin on the crank arm h^3 or h^4, so that when once released by the pressing of the knob the swinging arm has a small degree of rotary movement and then is stopped by striking the pin on the crank-arm. The auxiliary or sub-station boxes L are provided with two finger knobs t^{13} t^{14} similar to the knobs on the street boxes, by which means the swinging arm has two-stops before reaching the restraining pin on the armature, the object of which will be hereinafter described.

It is the design that should a signal be in the act of transmission from an auxiliary or sub-station box L to the central station, and should a street station box be operated while said auxiliary or sub-station box is in operation, the first signal given from the auxiliary box will not be interfered with, but at the end of the operation of the said auxiliary box, then the street-box which has in the meantime remained in suspension, will complete its operation automatically. It is also the design that should a street box be in operation and a manual box or a thermostat in a building be operated, such operation will not start the auxiliary or sub-station box; but when the street box has completed its operation then an additional operation of a manual box or thermostat will operate the auxiliary or sub-station box. It is also the design that should a manual box or a thermostat in the circuit leading to the buildings protected by the auxiliary box be operated, no other manual box or thermostat in the same circuit will affect the operation of the auxiliary box started by the first manual box or thermostat. Another function of the auxiliary or sub-station box L is that, immediately after its time movement begins to operate, it closes a circuit and charges the magnet of the building gong and causes said gong to ring till its time movement has run down, thus alarming the inmates of the building. Immediately upon the operation of any one of the signal boxes the circuit on wire 1 is immediately destroyed and is not restored again under any circumstances till said signal box has ceased to operate and has performed its function, at which time the current through wire 1 is restored again and remains in that condition while the system is normal. The condition of the auxiliary or sub-station box L being normal the current is from battery H through wire 1, wire 22, contact block a^{20}, tongues n^9 n^{10}, contact block a^{18}, wire 23 forming the circuit through the building, block a^{12}, tongues n^{12} n^{11}, block a^{14} wire 24, and wire 1 back to battery H. To complete the circuit the tongues n n' of the differentiating instrument must be in contact with the blocks k k'. If, from any reason, wire 23 is broken, the current of wire 1 being shut out of the building will seek another escape and will pass by a shunt circuit as follows: from battery H to wire 1, wire 25, resistance coil 26, wire 27, electro magnet p^2, wire 34, contact block a^{12}, tongues n^{12} n^{11}, contact block a^{14}, wire 24, and wire 1 back to battery.

The current through wire 2 is from battery G to the base of the instrument at z^4, thence through the swinging arm i' tongue n^{13}, contact block a^{17}, wire 28, and wire 2 back to battery G.

In case wire 23 of the building line is broken the electro-magnet p^2 is energized, as before described, thus attracting the armature, withdrawing the stop-pin that restrains the swinging arm, and the swinging arm then commences to traverse the instrument.

For a short period after the commencement of the movement of the swinging arm the currents in both wires 1 and 2 are absolutely broken, and remain so until the swinging arm in its progress brings tongue n^{13} in contact with block a^{16}, tongue n^9 in contact with block a^{19}, and tongue n^{10} in contact with block a^{18}. At this point it is to be determined whether the circuit in the building wire 23 has been broken and immediately restored, as by a thermostat or manual signal, or whether, on the other hand, it has been permanently destroyed as in the case of a broken wire. In case it has been broken and immediately restored the current through wire 2 is as follows:—from battery G through wire 2 to base

of the instrument at z^4, swinging arm i', tongue n^{13} block a^{16} with which the tongue is then in contact, wire 29, wire 23, contact block a^{18}, tongues n^{10}, n^9, contact block a^{19}, wire 31, wire 2, back to battery. In case wire 23 in the building is permanently broken there is no current until the further progress of the swinging arm has brought tongues n^{11} n^{12} in contact with the rings a^{10} and a^{11}. In the case of the immediate restoring of wire 23 the further progress of the swinging arm brings tongue n^{13} in contact with block a^{15}. The current is then from battery G, wire 2 to base of the instrument at z^4, swinging arm i', tongue n^{13}, block a^{15}, wire 30, wire 23, block a^{18}, tongues n^{10} and n^9, block a^{19}, (with which n^9 is then in contact,) wire 31, wire 2, back to battery. This current will energize any electro receptive devices placed in wire 30. The further progress of the swinging arm i' brings tongues n^{11} n^{12} in contact with the rings a^{10} a^{11}. From this time on during the movement of the swinging arm the circuit in wire 2 is the same whether the wire 23 in the building has been broken permanently or has been broken and immediately restored. In either case the signal will be transmitted to the central station. But in case the circuit has been broken and immediately restored, as by a manual box or thermostat, the signal will be transmitted to the central station and the fire and police department, while if permanently broken it will be transmitted to the central station only, thus determining at once what is the difficulty and avoiding unnecessary alarms. The condition now is that the tongues n^{11} n^{12} are in contact with the rings a^{10} a^{11}, respectively, and progressing around the instrument. The circuit of wire 2 is now as follows:—from battery G through wire 2, branch wire 61, ring a^{11}, tongues n^{12} n^{11}, ring a^{10}, wire 32, and wire 2 back to battery. Ring a^{11} is notched on its face in two series with the numbers indicating the box, as shown at v^2 v^2. As the swinging arm progresses over the face of the instrument tongue n^{12} engages said notches and alternately opens and closes the circuit in a well known way, thus signaling the number of the box at the central station over wire 2. The further progress of the swinging arm brings tongues n^9 n^{10} in contact with blocks a^{20} a^{18}; tongue n^{13} in contact with block a^{17}; and tongue n^{12} in contact with block a^{13}. The circuit now in wire 1, which is restored, is from battery H to wire 1, wire 33, block a^{13}, tongues n^{12} n^{11}, block a^{14}, wire 24, wire 1, back to battery. The current through wire 2 which has been maintained, is from battery G through wire 2, base of the instrument at z^4, swinging arm i', tongue n^{13}, block a^{17}, wire 28, wire 2 back to battery. There the swinging arm is stopped by the first finger knob until the line man, having repaired the broken wire 23 through the building, puts the same in condition for further service. The finger knobs for stopping the swinging arm are simply to enable testing to be made without sounding an alarm at the central station. After such testing has been made the swinging arm is released from the knobs and allowed to move forward to the stop-pin on the end of the cranked arm, when it is ready to be released by the electrical action as before described.

Referring now to the street fire boxes N, in the normal condition the swinging arm i^2 is held in a stationary position by the finger knob t^{12}. By pressing on this knob the arm is released and moves forward till it strikes the stop-pin on the end of crank arm h^3, and is held there till the magnet p^3 is charged, drawing back the armature which holds it. In the normal condition tongue n^7 rests on block a^4, and tongues n^3 n^4 on the rings a^2 a^3. The current in wire 1 is as follows:—from battery H to the base of the instrument at z^5, through said base, swinging arm i^2, tongue n^7, block a^4, wire 34, wire 1, back to battery. The current through wire 2 is from battery G through ring a^2, tongues n^3 n^4, ring a^3, and wire 2 back to battery. The movement of the swinging arm from the finger knob to the holding pin removes tongue n^7 from block a^4 and brings it in contact with block a^5, which forms a new circuit in wire 1 as follows:—from battery H through wire 1, base of the instrument at z^5, swinging arm i^2 tongue n^7, block a^5, wire 36, magnet p^3, energizing same, wire 37, wire 34, and wire 1 back to battery. The current through wire 2 remains the same as before, since the tongues n^3 n^4 have not left the rings a^2 a^3. The charging of magnet p^3 attracts the armature f^3, releases crank arm h^3, removes the stop-pin in advance of the swinging arm and allows said arm to operate. The further progress of swinging arm i^2 brings tongue n^4 over the notch b^2 in the outer ring a^3, thereby breaking the circuit in wire 2 leading to the relay at the central station. This starts the differentiating instrument at the central station, as before described. The further progress of the swinging arm brings tongues n^3 and n^4 again in contact with rings a^2 a^3, restoring the circuit through wire 2. As the arm progresses the tongue n^4 passes over the series of notches v^2 v^2 in ring a^2, alternately opening and closing the circuit and signaling the number of the box at the central station, and through that to the fire department. Now while this particular box is in operation as described, should some other box on the main line be started by releasing its finger knob holding the swinging arm, said arm of the second box could advance no farther than the stop pin controlled by the electro-magnet, and the current through wire 1 being destroyed said electro-magnet would not be charged and no action could take place. It would so remain until the first box, having completed its signal and restored the current in wire 1, energized the magnet in the second box, when the stop pin in the second box would be withdrawn allowing the second box to give its signal following the other. This is done automatically.

The police boxes P are identically of the same construction and operation as the fire boxes above described, with the exception that the break b^3 in the outer ring a^7 is of greater length than the corresponding break b^2 in the fire boxes. This break b^3 is of such length that the current in wire 2 having been broken and the differentiating instrument at the central station having been started, the current in wire 2 will remain broken until such time as the swinging arm of the differentiating instrument shall have passed the point where the fire department circuit is placed in position to receive signals from wire 2. In such case the signals given at the police boxes are sent to the central station and from there to the police station without being sent into the fire department.

By the use of this invention all signals which come to the central station are recorded there and are dispatched to the proper destinations, such as the fire department or the police department, automatically and without one interfering with the other. The system also insures absolute non-interference of the boxes in sounding two or more alarms at the same time, and automatically causes the second box to give its signal when the first one has been completed. Furthermore it enables auxiliary or sub-station boxes to be used in connection with lateral loops or circuits through buildings, whereby any opening of a thermostat or manual box in said lateral loops will automatically start the auxiliary box and cause it to send the proper signal to the central station, and in case of fire also to the fire department.

Having described my invention I do not claim, in this application, the system consisting of the relay, differentiating apparatus circuits extending to side stations in connection with a main line consisting of a single wire, as embodied in my pending application, serially numbered 483,022. Neither do I claim the construction of the differentiating apparatus and the various signal boxes shown and described in my other pending applications, serially numbered respectively 483,024—483,025—and 483,026 all filed contemporaneously herewith.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a two wire main circuit, signal boxes attached thereto, a relay with which the terminals of one of the wires connect, a differentiating apparatus provided with electrodes with which the terminals of the other wire connect, and a circuit connected with the relay controlling the differentiating apparatus, for the purpose specified.

2. The combination of a main circuit composed of two wires provided with signal boxes, a differentiating apparatus having electrical connections with the main circuit, a signal box attached to said main circuit, and a lateral circuit extending therefrom provided with thermostats or manuals, either or both, for the purpose specified.

3. The combination of a main circuit composed of two wires, with signal boxes attached, a differentiating apparatus connected with the main circuit, capable when in operation of opening the circuit of one of the wires of the main circuit, thereby arresting the action of one box while another is transmitting a signal, for the purpose specified.

4. The combination of a main circuit composed of two wires, a differentiating apparatus having electrical connection with the main circuit, a signal box interposed in the main circuit connected with both wires, a normally closed lateral circuit connected with said box, provided with thermostats and manuals, either or both, so constructed that the opening of a thermostat or tripping of a manual will open the circuit and immediately close it again, thereby re-establishing the current through the lateral circuit and main circuit, for the purpose specified.

5. The combination of a main circuit composed of two wires, signal boxes of different kinds attached, a central office apparatus with which the terminals of one wire connect, a relay with which the terminals of the other wire connect, two circuits extending to side stations, and a circuit controlling the action of the central office instrument, so constructed that a box of either kind will transmit its signal to its proper station without interference with any other box, for the purpose specified.

6. The combination of a main circuit composed of two wires, with signal boxes attached, a central office apparatus with which the terminals of one of the wires connect, a relay with which the terminals of the other wire connect, a circuit controlling the action of said central office apparatus, and a circuit extending to a side station, so constructed that under one condition a signal will be transmitted from the main circuit over the station circuit and under another condition be arrested in the central office, for the purpose specified.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

W. W. HIBBARD.

Witnesses:
R. F. OSGOOD,
GEORGE A. BENTON.