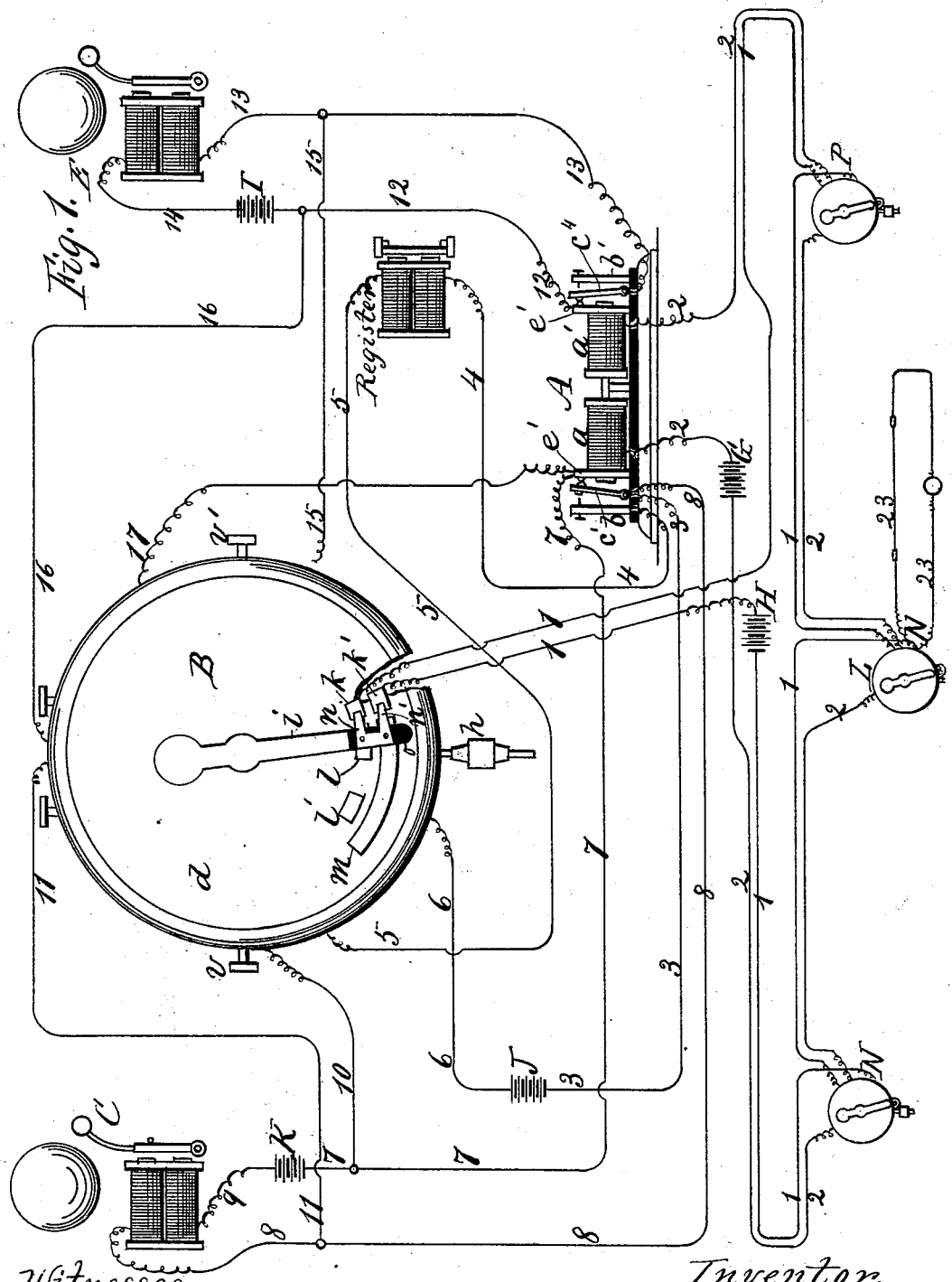
(No Model.) 3 Sheets—Sheet 1.

W. W. HIBBARD.

ELECTRIC SIGNAL BOX.

No. 523,123. Patented July 17, 1894.



Witnesses.
C. G. Crandell
Geo. B. Selden.

Inventor.
Wm. W. Hibbard,
per R. H. Osgood,
Atty.

(No Model.) 3 Sheets—Sheet 2.

W. W. HIBBARD.

ELECTRIC SIGNAL BOX.

No. 523,123. Patented July 17, 1894.

Fig. 3.

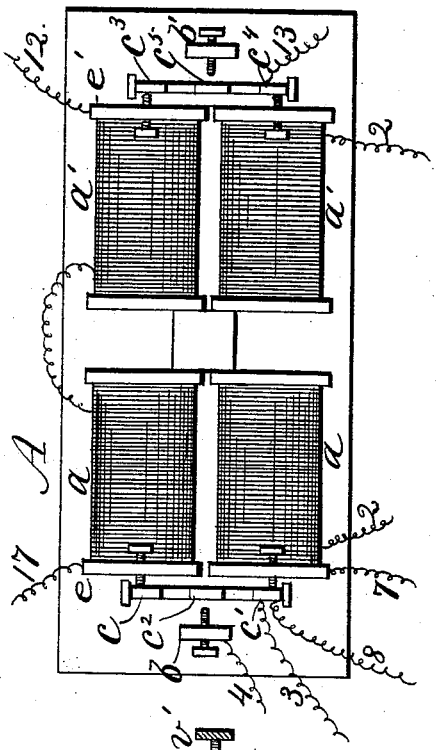


Fig. 4.

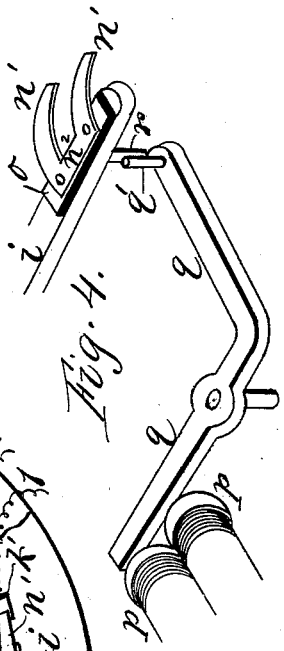
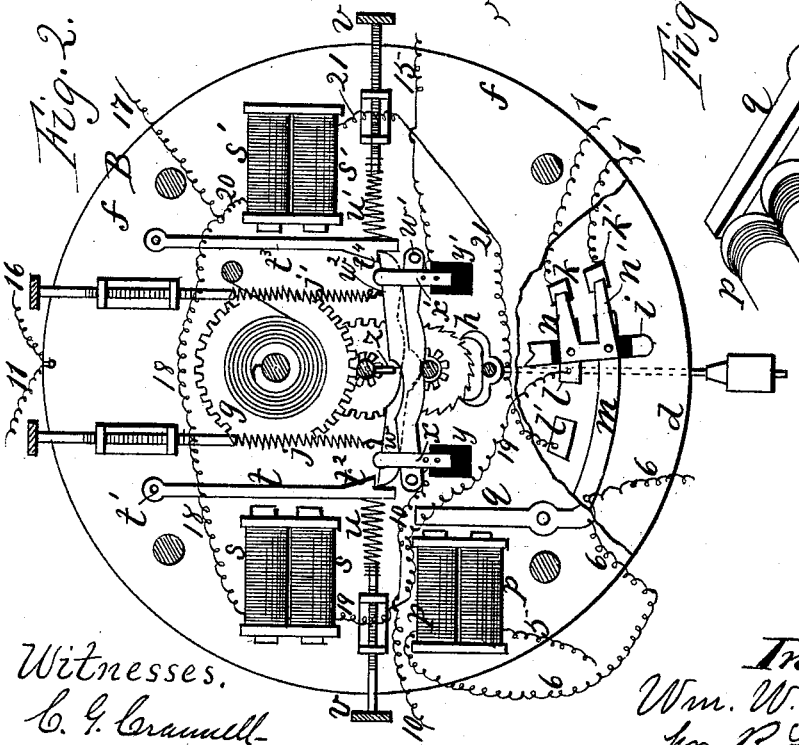


Fig. 2.



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C. G. Crannell
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(No Model.)

3 Sheets—Sheet 3.

W. W. HIBBARD.

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Fig. 5.

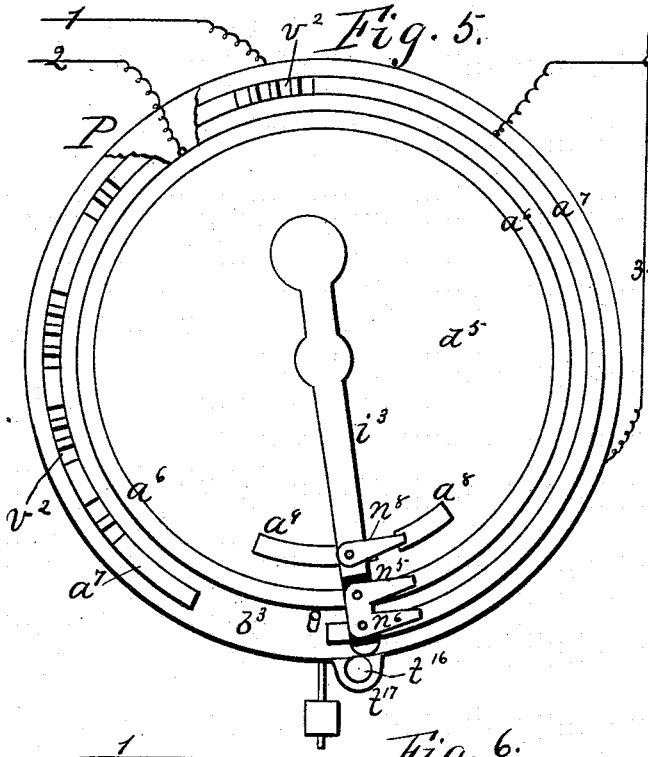


Fig. 7.

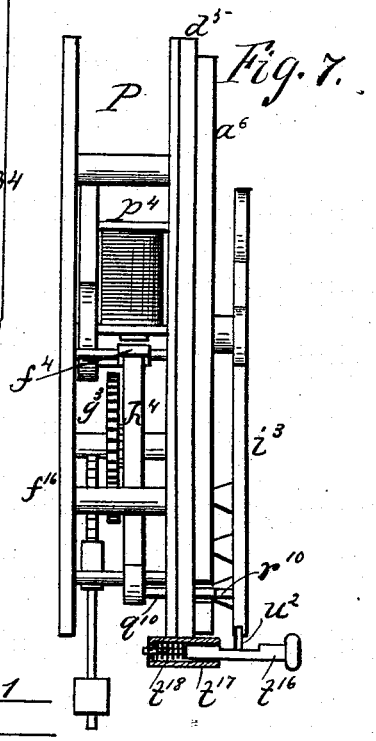


Fig. 6.

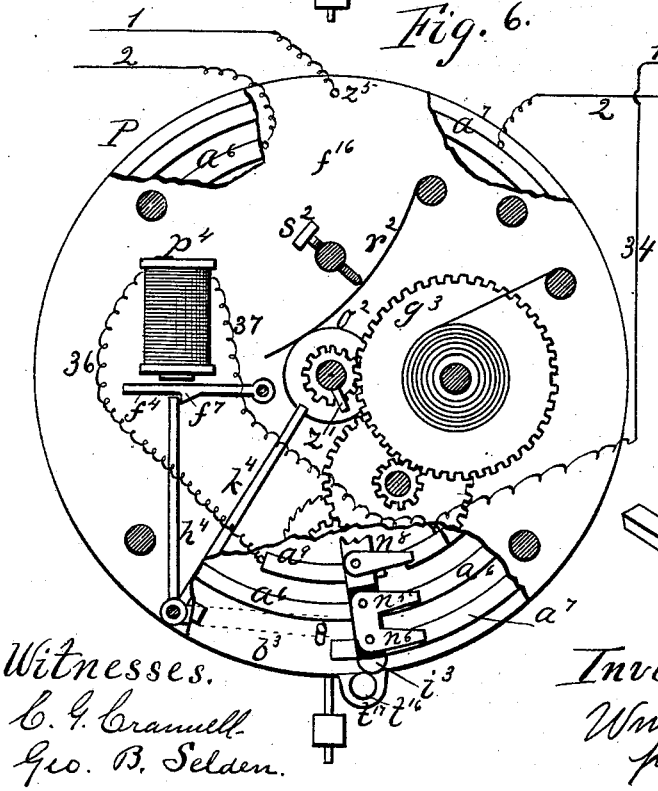
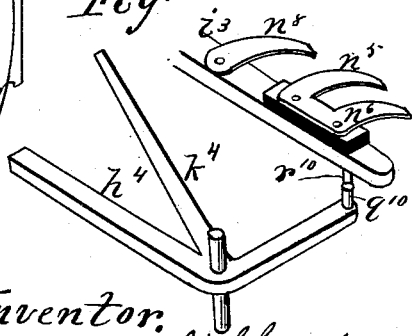


Fig. 8.



Witnesses.
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Geo. B. Selden.

Inventor.
Wm. W. Hibbard.
per R. F. Osgood, Atty.

UNITED STATES PATENT OFFICE.

WILLIAM W. HIBBARD, OF ROCHESTER, NEW YORK, ASSIGNOR TO THE STANDARD ELECTRIC SIGNAL COMPANY, OF SAME PLACE.

ELECTRIC SIGNAL-BOX.

SPECIFICATION forming part of Letters Patent No. 523,123, dated July 17, 1894.

Application filed August 12, 1893. Serial No. 483,025. (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 Signal-Boxes; 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.

My improvement relates to electric signaling apparatus, and consists in the construction and arrangement of the signal boxes as hereinafter more fully described and embodied in the claims.

In the drawings—Figure 1 is a diagram showing a face view of the system with which the boxes are connected. Fig. 2 is a face view of the differentiating apparatus with a portion of its top broken away. Fig. 3 is a plan view of the relay. Fig. 4 is a perspective view of the electrical stop connected with the differentiating apparatus. Fig. 5 is a plan view of the signal box. Fig. 6 is a similar view with a portion of the top broken away. Fig. 7 is an edge elevation of same. Fig. 8 is a perspective view of the electrical stop connected therewith.

In this system a central station or office is used in which are located the working parts, except the signal boxes on the main line.

A indicates the relay, B the differentiating apparatus, C an engine house or fire department station, E a police or other station, and F an electro magnet for operating a register at the central station whereon is recorded the number of the box from which the signal is sent.

The relay A is made double where connection is made by circuits with two different departments, such as fire and police. It consists of two pairs of electro-magnets a a and a' a', two sets of swinging armatures c c' c^2 and c^3 c^4 c^5 located at opposite ends of the magnets, and two upright contact posts b and b'. The armatures play between the magnets and the posts in the usual way.

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 box provided with a conducting base plate f and an exterior face d, of rubber or other insulating material.

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

i is an arm forming a circuit breaker, which I denominate the swinging arm, attached to a shaft of the time movement, said shaft extending from the base out through the insulated face, and the arm resting across the face, 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 apparatus.

k k' l l' and m are contact blocks forming electrodes set into the insulated face, and n n' are spring tongues forming contact points, attached to the swinging arm i and connected together by a web n^3 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 electrodes and change the currents, as will be more fully described.

p p is an electro magnet, and q a pivoted crank forming an armature which operates in connection with said magnet. On the outer end of the crank is a pin q' which passes out through a slot of the face of the apparatus and intercepts a corresponding pin r, on the under side of the swinging arm i, thereby holding said arm against rotation. When the 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.

s s is another electro magnet connected with the apparatus, 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 spring and draws the armature back.

w is an arm provided with a pivot w' connected with the base, the free end of the arm engaging with the inclined lug t^2 of the armature. When in this position the arm w rests in contact with a spring x attached to an insulating 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 a coiled spring j.

The above described arrangement is for communication with the fire department only. The same arrangement is duplicated on the opposite side of the apparatus, consisting of magnets s' s', armatures t^3 provided with inclined lug t^4, spring w', screw v' pivoted arm w^2, contact spring x' attached to insulating block y', and coiled spring j', the whole operating to establish communication with the police department or other station than the fire department.

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, respectively, with batteries G H, or other sources of electricity. The terminals of wire 1 connect with the two contact blocks k k' on the face of the differentiating apparatus, and the terminals of wire 1 with the two sets of magnets a a' of the relay, as shown in the diagram Fig. 1. The main line is provided with suitable fire boxes N, police boxes P, and auxiliary boxes L, the latter connected with circuits extending through buildings and provided with thermostats and manuals, either or both. By means of these boxes signals are sent to the various destinations over the same main line.

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 in connection with the magnets. But any opening of the circuit of the main line releases the armatures which are then drawn toward the posts b b' and the circuits at the central station are then ready to come into operation.

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 post b,) through post b, wire 4, through the register magnet F, charging same and causing it to operate the registering apparatus, through wire 5, magnet p p, charging same, wire 6, (touching the conducting block m,) back to battery J, 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 rotate 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 block l and m.

Another circuit extends from battery K 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, through the metallic base of the differentiating apparatus, wire 11, wire 8, the magnet at the fire department, and wire 9 back to battery K.

Another circuit extends from the central station to the police or other department, from battery I 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, wires 13 and 15, spring x', arm w^2, the pivot w^3, of said arm, the base of the apparatus, wire 16, and wire 12 back to battery I.

The circuit K and its auxiliary 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.

The first action in opening and then closing the main circuit through wire 2 is to temporarily close the local circuit J, and thus release the time mechanism of the differentiating apparatus and allow the swinging arm i to rotate as before described. The movement of arm i now causes the tongues n n' to come in contact with the blocks l m, thereby forming a new circuit, from battery J through wire 3, armature c' (then in contact with the upright of the relay magnet), wires 17 and 18, magnet s s, wire 19, to contact block l, through tongue n n' to contact block m, through wire 6, back to battery J. The charging of magnets s s draws back armature t and releases the arm w' allowing it to separate from the spring x, thus breaking the shunt circuit that previously existed by the contact of the arm with the spring and extending through the base of the apparatus to wire 11.

The further progress of swinging arm i causes tongue n to leave block l, breaking the circuit just described, and brings tongues n n' in contact with blocks l' m, and forms a new circuit, from battery J through wire 3, armature c', upright e, wires 17 and 20, magnet s' s', wire 21, contact block l', tongues n n', block m, and 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 apparatus, thereby breaking the shunt circuit that previously existed leading from battery I through the base of the apparatus to wire 16. This shunt circuit, together with its companion on the opposite side, will not be re-established again until arms w and w^2 are forced into contact with the armatures t and t^2, by the pin z near the end of rotation of the swinging arm i.

Under such conditions, with both shunt circuits open, 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 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', armatures 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 the register F, the magnets at the fire station C and the police station E, are each, through the armatures at the relay, rendered susceptible to the operation of the relay, and that the circuits are changed to send the signal to one department or the other through the instrumentality of the differentiating apparatus before described. By the use of this differentiating apparatus all signals which come to the central station are recorded there and dispatched to the proper destination, such as the fire department or the police department, without one interfering with the other.

The box P, which forms the subject of my present invention, has a base plate, f^{16} and an insulated face d^5 similar to those of the differentiating apparatus. It also has a time mechanism g^3, and swinging arm i^3 forming a circuit breaker similar to those of said apparatus.

a^6 a^7 a^8 a^9 are electrodes attached to the insulated face, the outer ring, a^7, having a long break b^3 just in advance of the starting point of the swinging arm, as shown in the face view Fig. 5. The swinging arm has two outer spring tongues n^5 n^6 connected together and insulated from the arm, and a single tongue n^8 in electrical contact with the arm. These three spring tongues rest in line with the three concentric rims before described.

p^4 is an electro magnet similar to the magnet p of the differentiating apparatus, and f^4 is a pivoted armature provided with an inclined lug f^7.

h^4 is a crank arm carrying a stop pin q^{10} at its outer end which stands in the path of a corresponding pin r^{10} on the under side of the swinging arm. The energizing of p^4 attracts the armature, releases the crank arm, and removes the stop pin allowing the swinging arm to rotate. In addition to these features the crank arm h^4 has an intermediate arm k^4, which projects inward in such position as to be struck by a pin z' on the shaft of the swinging arm shortly after the latter has started to rotate, in order to re-set the crank arm with the armature.

o^2 is a small wheel on the shaft of the swinging arm, against the periphery of which bears a spring r^3 pressed up by a screw s^2, the object of which is to apply sufficient friction to prevent back action of the gearing of the clock work.

t^{16} is a plunger resting in a barrel t^{17} and forced up by a spring t^{18}. It has a projecting pin u^2, against which the end of the swinging arm strikes and is stopped thereby. By pressing on the knob the plunger is forced down, removing the pin and allowing the swinging arm to start. The plunger is located a little distance back from the stop pin q^{10} so that when the arm is released by the finger it comes to a second stop and is started again only by the electrical action.

The operation is as follows:—In the normal condition tongue n^8 rests on block a^8, and tongues n^5 n^6 on the rings a^6 a^7. The current in wire 1 is from battery H to the base of the instrument at z^5, through swinging arm i^3, tongue n^8, block a^8, wire 34, wire 1 back to battery. The current through wire 2 is from battery G through ring a^6, tongues n^5 n^6, ring a^7, and wire 2 back to battery. The first movement of the swinging arm from the finger hold to the electrical stop pin removes tongue n^8 from block a^8 and brings it in contact with block a^9, which forms a new circuit in wire 1, from battery H through wire 1, the base of the instrument at z^5, swinging arm i^3, tongue n^8, block a^9, wire 36, magnet p^4, wire 37, wire 34, and wire 1 back to battery. The current through wire 2 remains the same as before, since the tongues n^5 n^6 have not left the rings a^6 a^7. The charging of magnet p^4 attracts armature f^4, releases crank arm h^4, removes the stop pin in advance of the swinging arm, and allows said arm to rotate. The further progress of the swinging arm brings tongue n^6 over the long break b^3 in the outer ring, thereby breaking the circuit in wire 2 leading to the relay at the central station. This starts the differentiating apparatus as before described. The further progress of the swinging arm brings tongues n^5 n^6 again in connection with both rings a^6 a^7, restoring the circuit through wire 2. As the swinging arm progresses the tongue n^6 passes over a series of signal notches v^2 v^2 in ring a^7 alternately opening and closing the circuit and signaling the number of the box at the central station and through that to the police department. Now while this particular box is in operation as described, should some other box on the main line be started by pressing the plunger, the swinging 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 magnet would not be energized 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.

The break b^3 serves an important purpose. It is of such length that the current in wire 2 having been broken, and the differentiating apparatus having been started, the current in wire 2 will remain broken until such time as the swinging arm of the differentiating apparatus shall have passed the point when 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 to the fire department.

Having described my invention I do not claim in this application the single wire and double wire systems described in my pending applications, Serial Nos. 483,022 and 483,023; neither do I claim the differentiating apparatus described in my pending application, Serial No. 483,024; nor the signal box described in my pending application, Serial No. 483,026, all filed contemporaneously herewith.

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

1. The combination, with a main circuit composed of two wires, of a signal box attached thereto, a tripping device connected with one wire, and suitable electrical connections, the whole capable, when in action, of opening said wire, transmitting a signal over the other wire, and of closing the first wire again after transmitting the signal, as and for the purpose specified.

2. The combination, with a movable arm forming a circuit breaker, of an electro magnet electrically connected with the main circuit, an armature provided with a stop operating therewith, a crank arm engaging at one end with the stop on the armature and provided at the other with a pin that acts as a stop to the circuit breaker, an intermediate arm attached to the crank arm, and a pin attached to a shaft for operating the intermediate arm, as described.

3. The combination, with a movable arm forming a circuit breaker, of an electro magnet electrically connected with the main circuit, an armature provided with a stop connected therewith, a crank arm engaging with the stop of the armature and provided with a pin that forms a stop to the circuit breaker, an intermediate arm attached to the crank arm, a pin attached to a shaft for operating the intermediate arm, and a manual stop in advance of the electrical stop for holding the circuit breaker at a distance from the electrical stop, as and for the purpose specified.

4. The combination, with a main circuit consisting of two wires, of a signal box provided with an insulated face, the electrodes a^6 a^7 a^8 a^9 set thereon in three concentric circles, the circuit breaker i^3 resting over the box, the tongues n^5 n^6 and n^8 resting in line with the electrodes, and a magnet electrically connected with the main circuit for controlling the circuit breaker, as herein shown and described.

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.