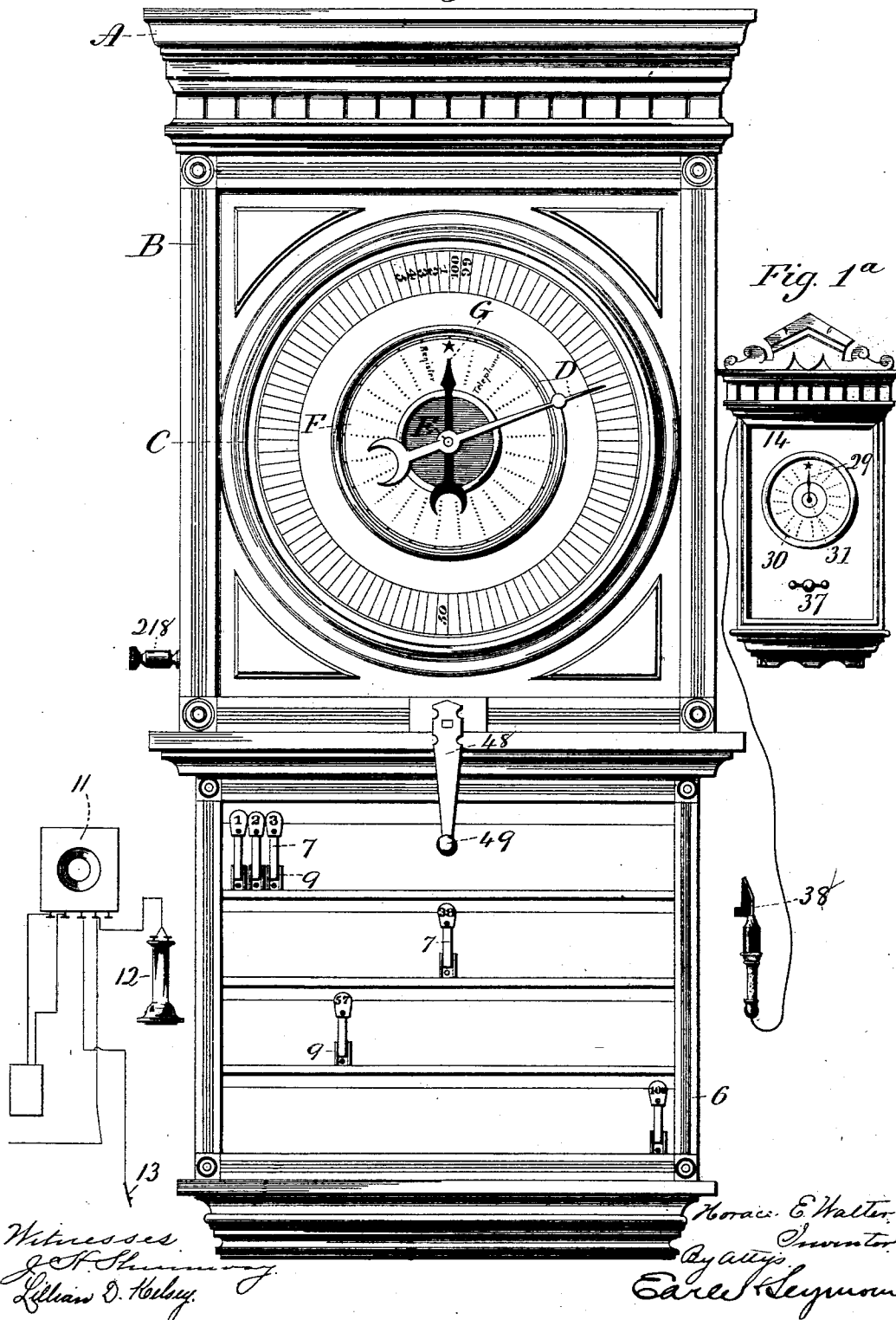


H. E. WALTER.
ELECTRIC ANNUNCIATING APPARATUS.

No. 520,127.

Patented May 22, 1894.

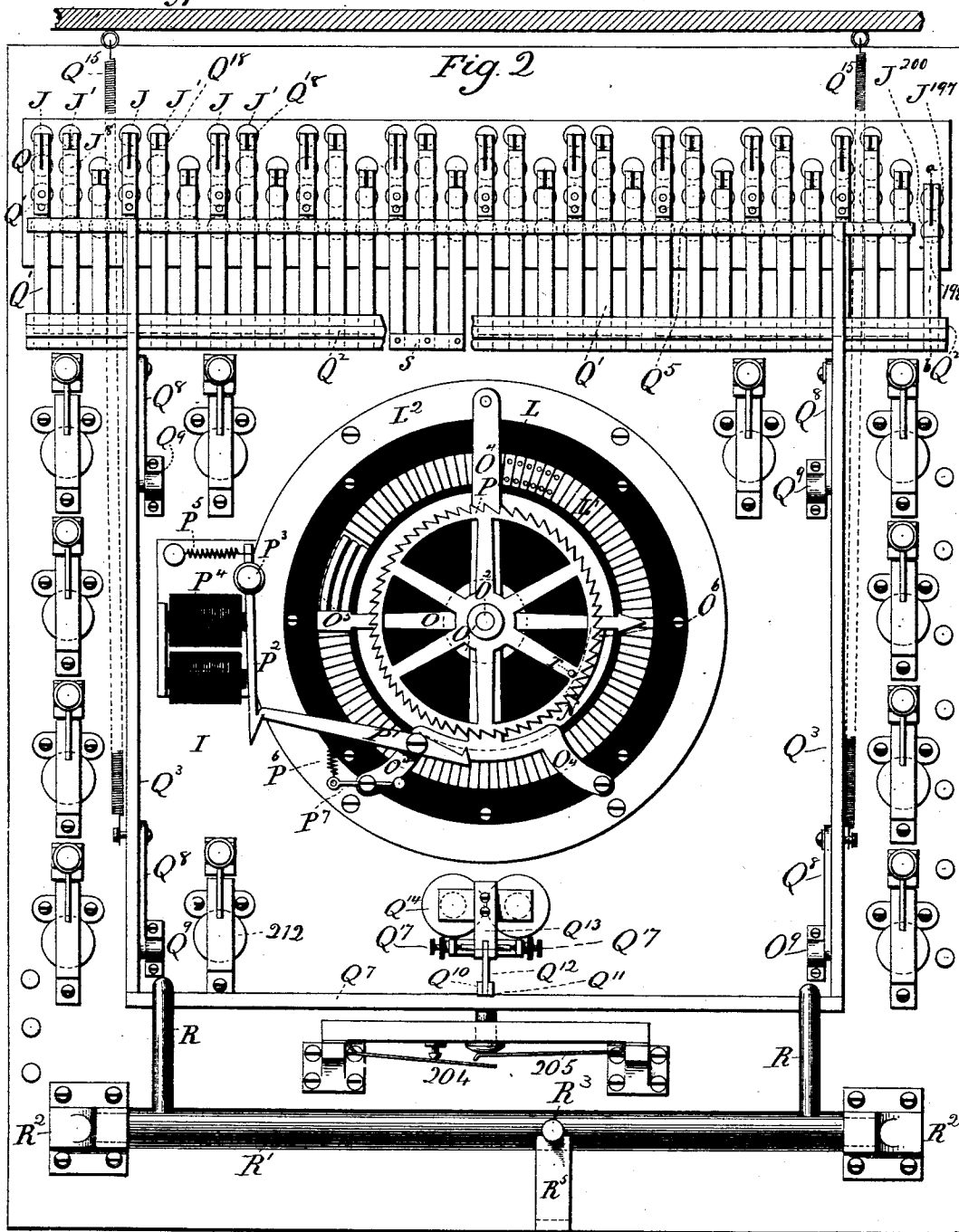
Fig 1



H. E. WALTER.
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No. 520,127.

Patented May 22, 1894.



Witnesses.
J. H. Shumway.
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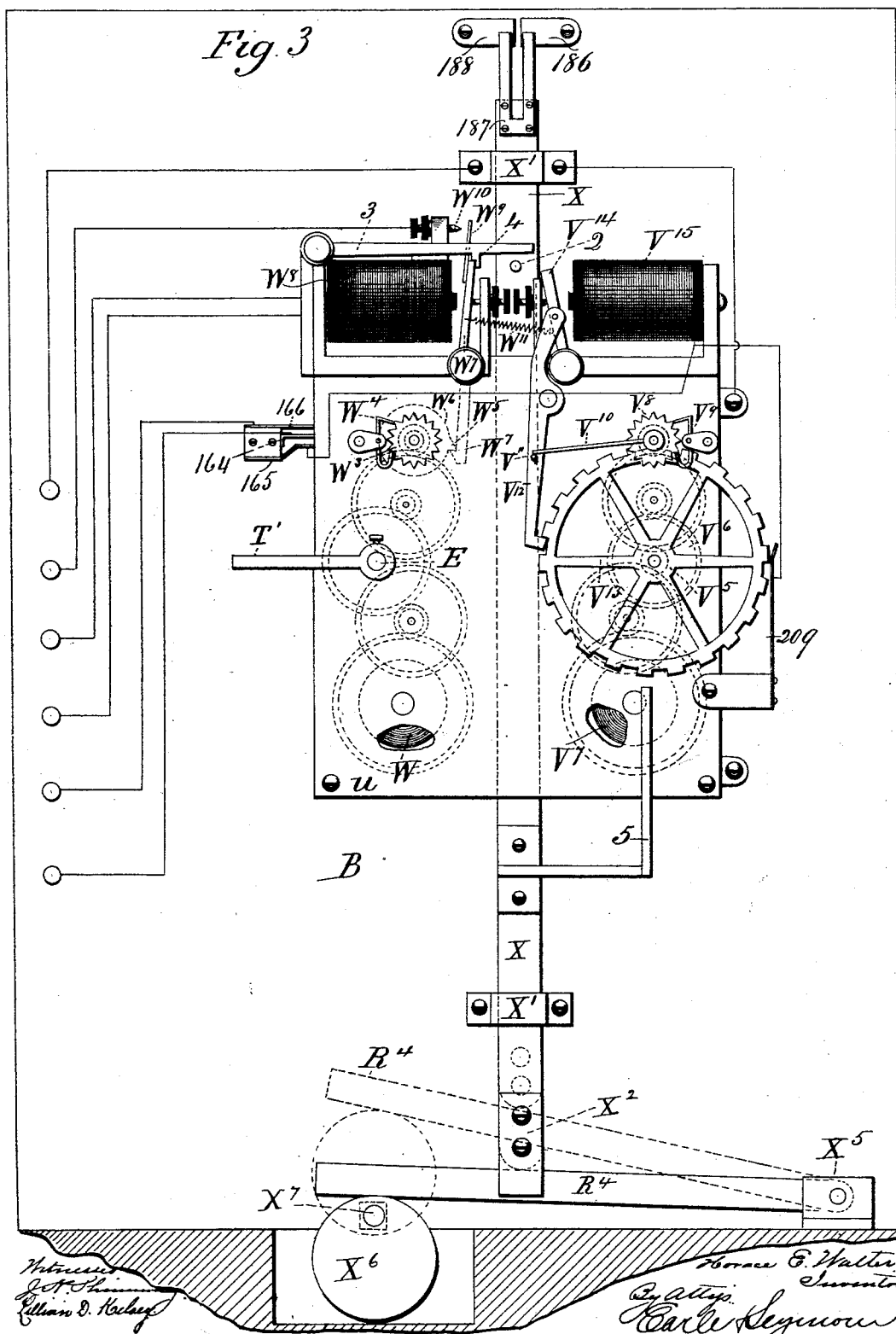
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H. E. WALTER.
ELECTRIC ANNUNCIATING APPARATUS.

No. 520,127.

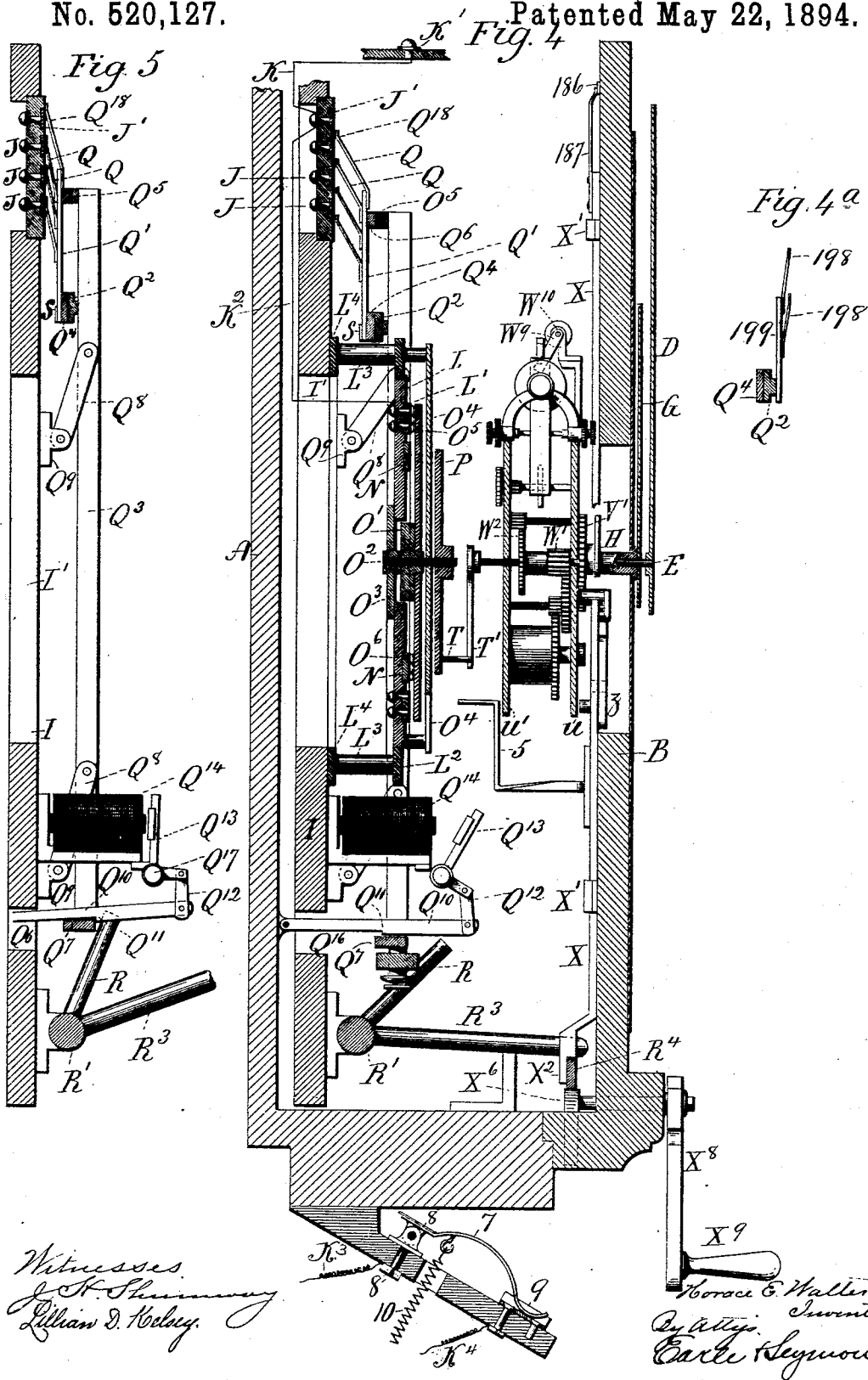
Patented May 22, 1894.



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Patented May 22, 1894.



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Patented May 22, 1894.

Fig 6

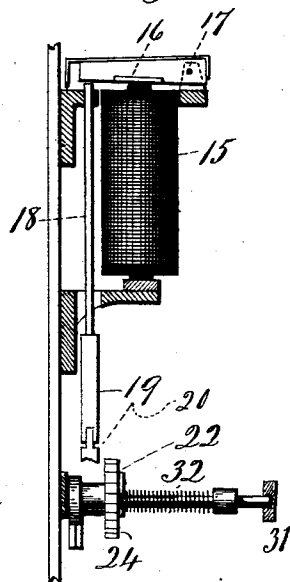
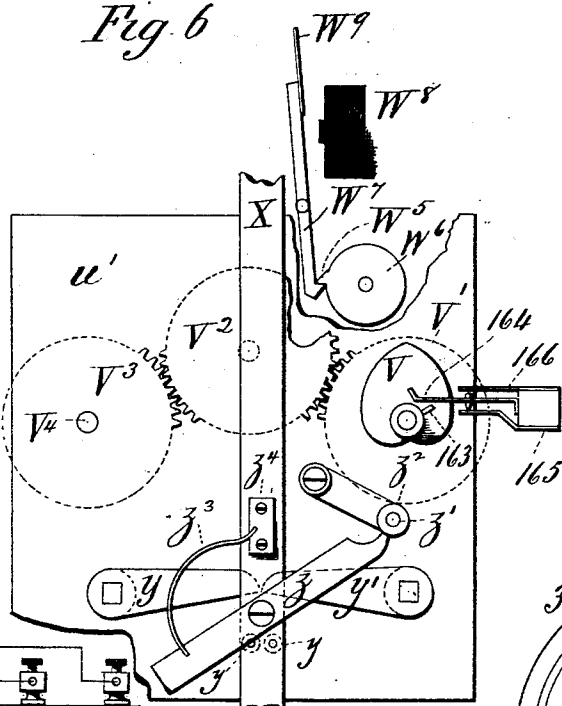


Fig 9

Fig 7

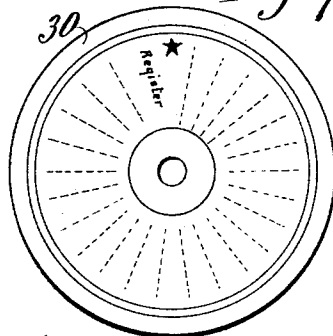
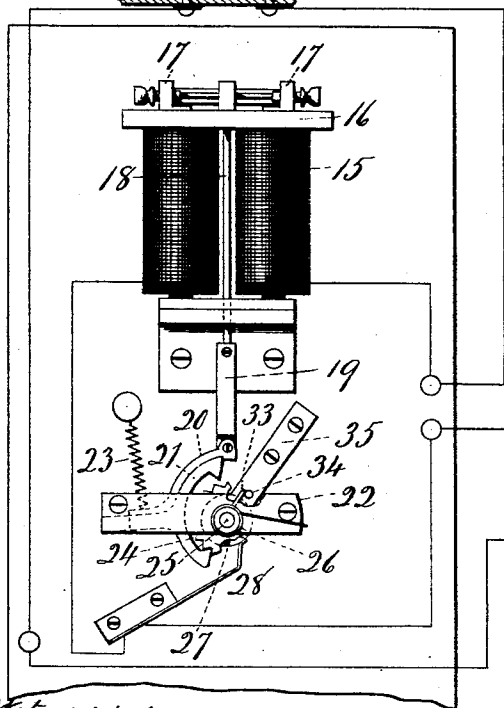
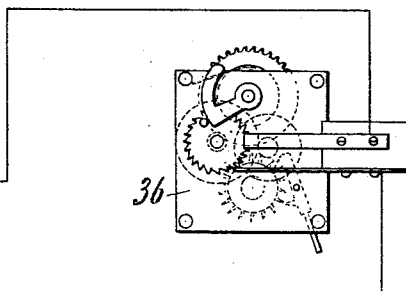


Fig 10



Witnesses
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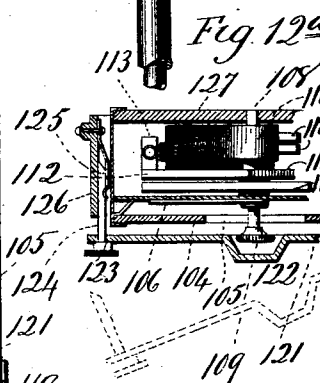
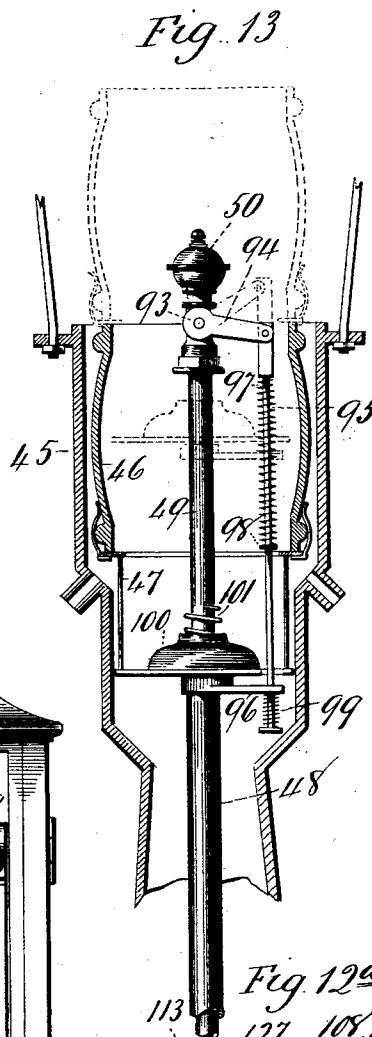
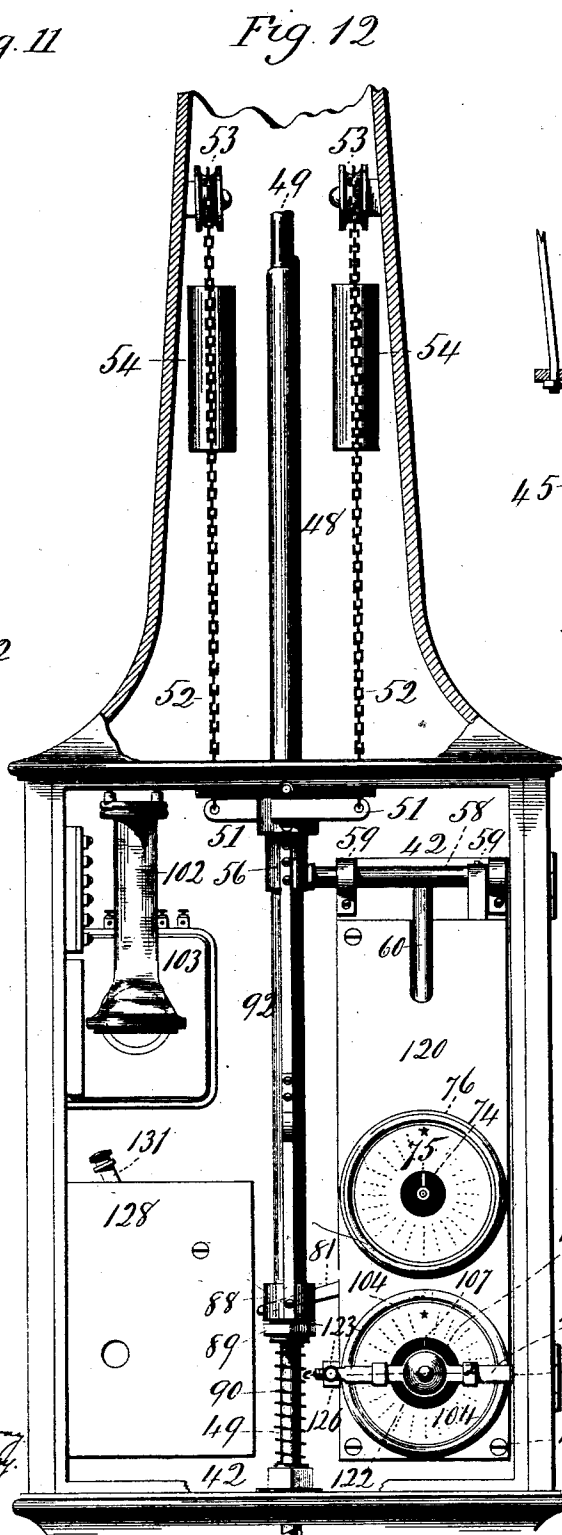
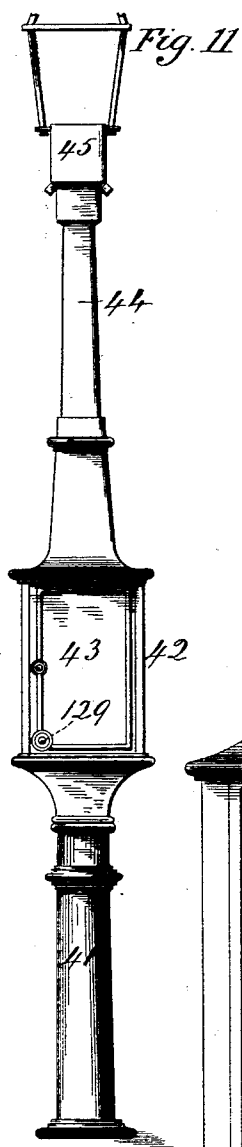
(No Model.)

10 Sheets—Sheet 6.

H. E. WALTER.
ELECTRIC ANNUNCIATING APPARATUS.

No. 520,127.

Patented May 22, 1894.



Witnesses.
J. H. Shannon
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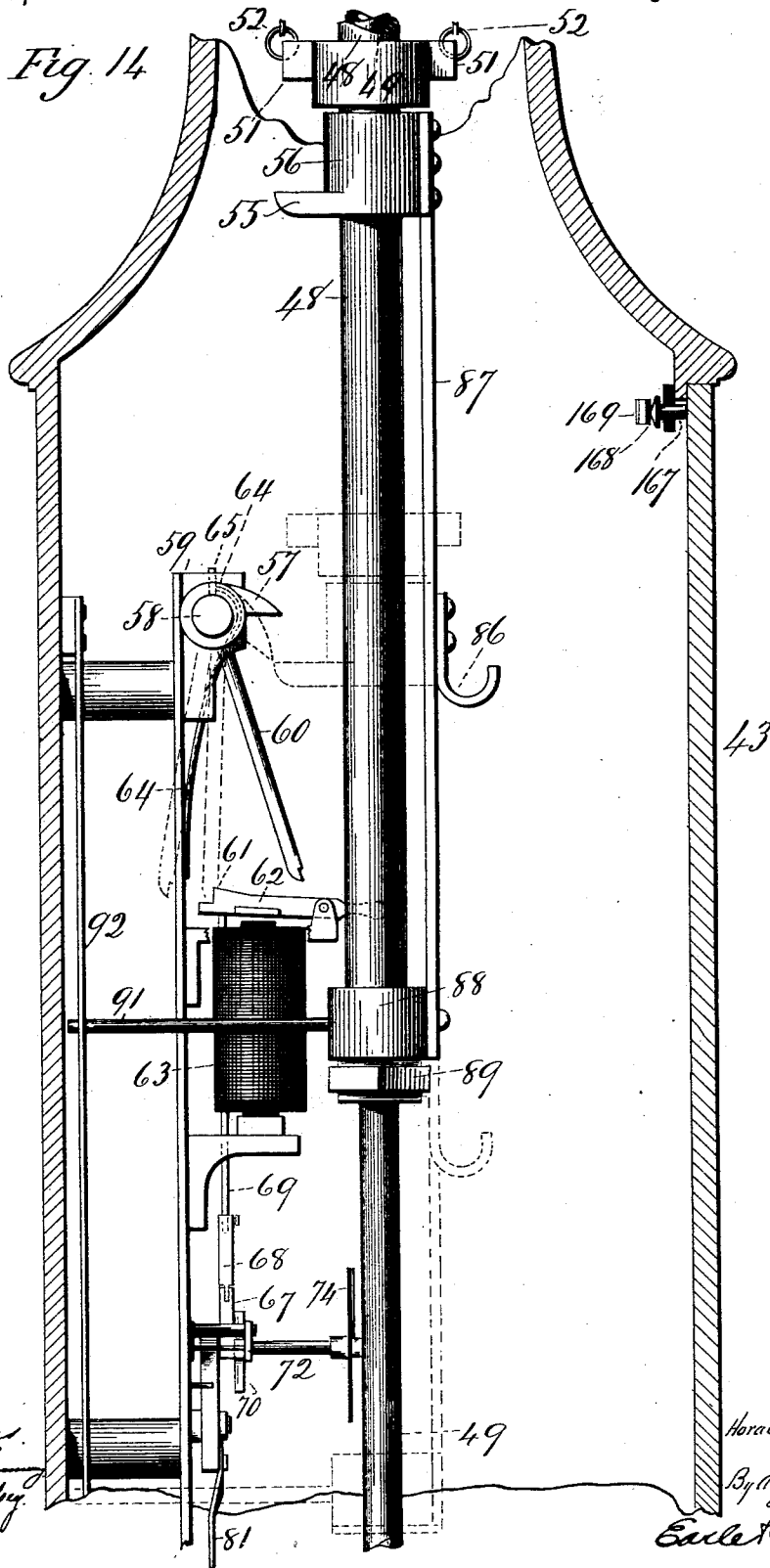
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10 Sheets—Sheet 7.

H. E. WALTER.
ELECTRIC ANNUNCIATING APPARATUS.

No. 520,127.

Patented May 22, 1894.



Witnesses.
J. H. Shumway
William D. Kellogg

Horace E. Walter
Inventor.
By Atty.
E. H. Seymour

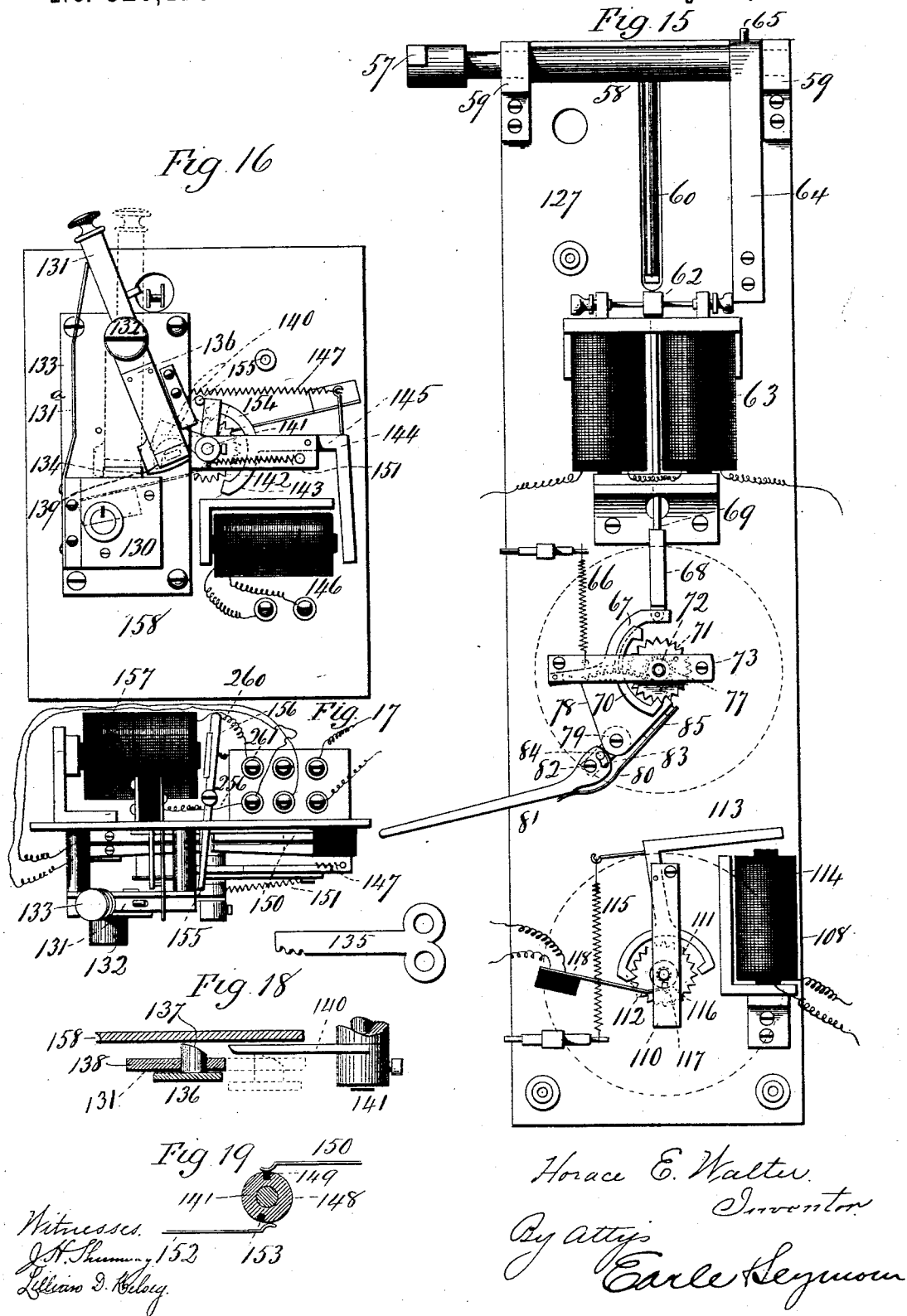
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10 Sheets—Sheet 8.

H. E. WALTER.
ELECTRIC ANNUNCIATING APPARATUS.

No. 520,127.

Patented May 22, 1894.



H. E. WALTER.
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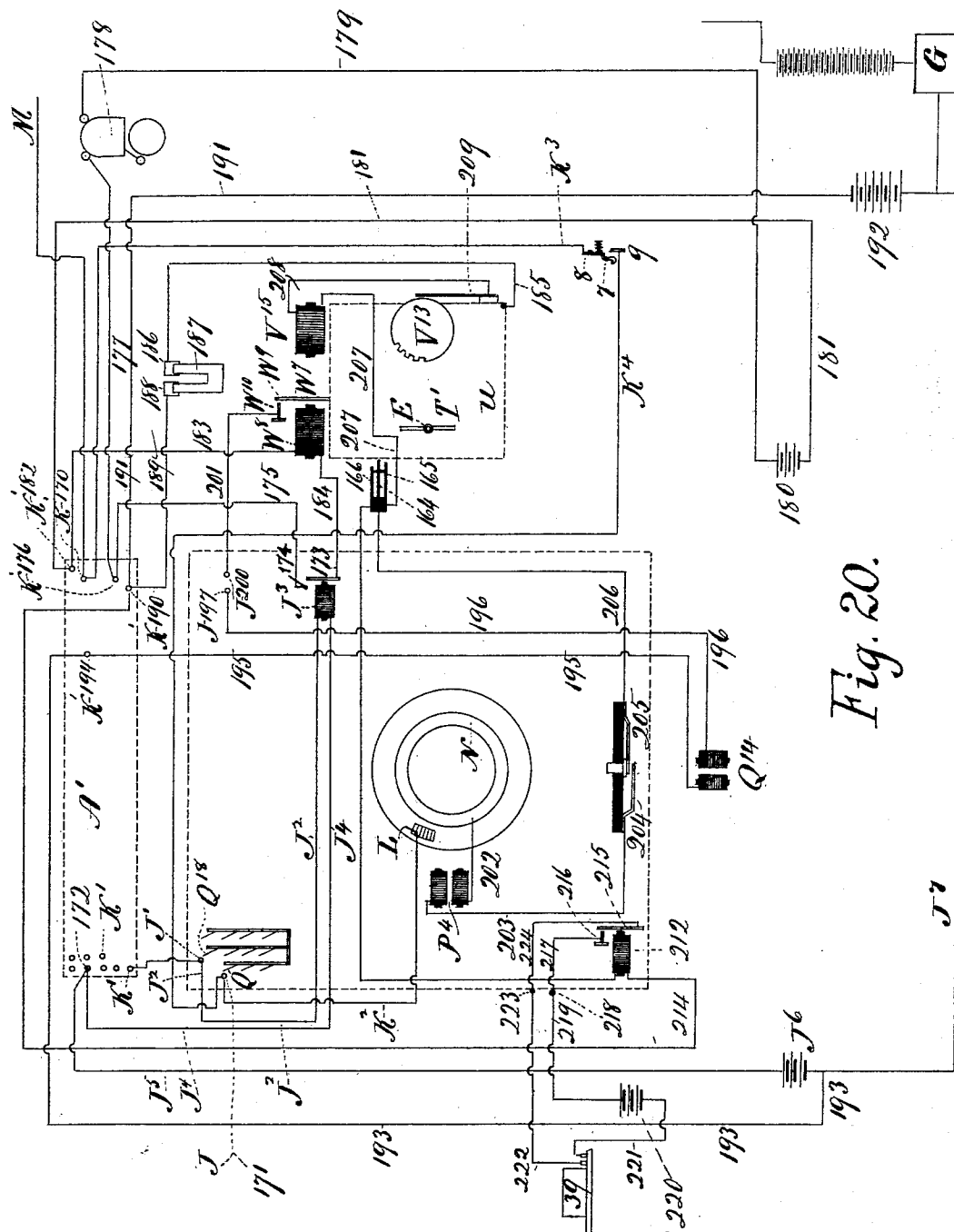


Fig. 20.

Witnesses.
J. H. Shumway.
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Horace E. Walter.
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Earle Heywood.

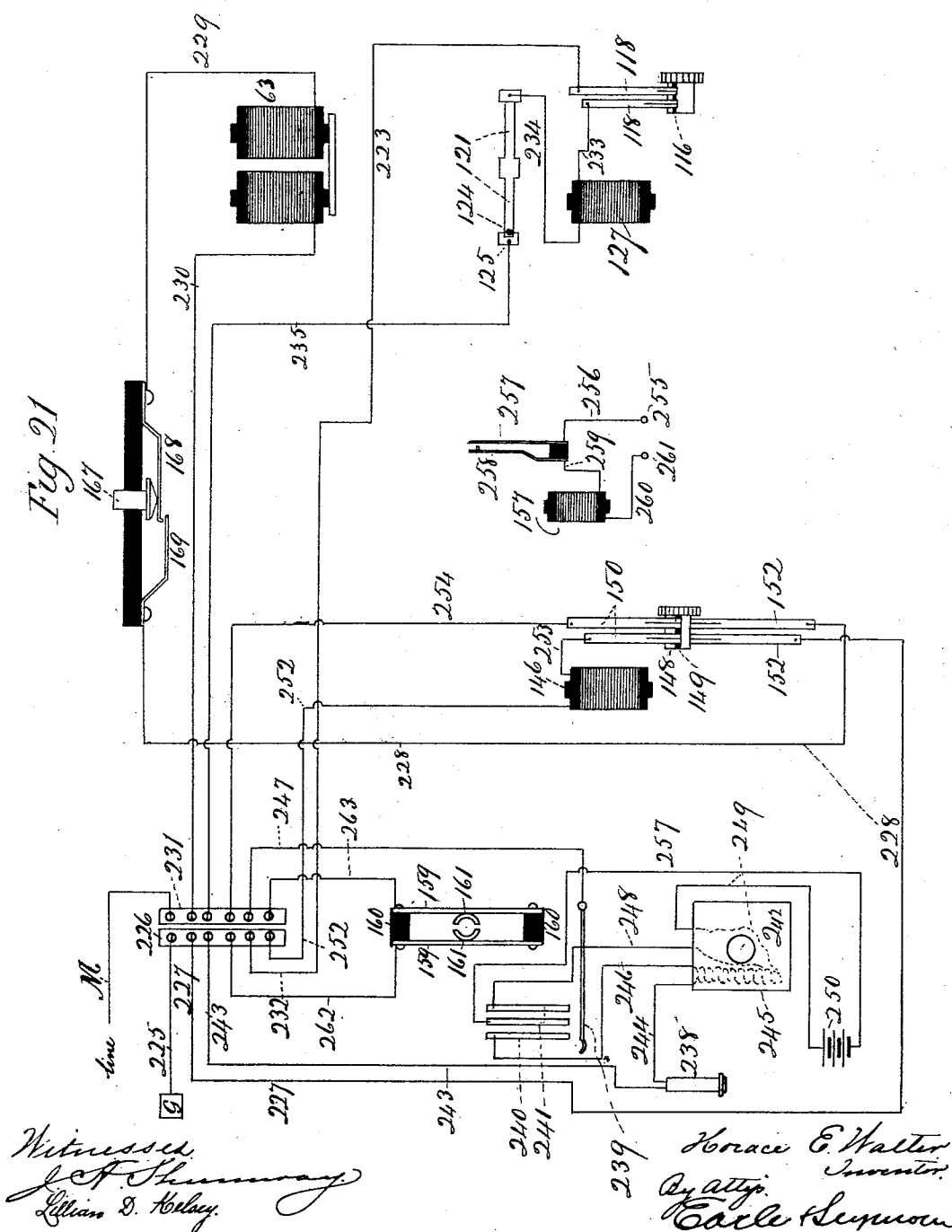
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10 Sheets—Sheet 10.

H. E. WALTER.
ELECTRIC ANNUNCIATING APPARATUS.

No. 520,127.

Patented May 22, 1894.



UNITED STATES PATENT OFFICE.

HORACE E. WALTER, OF RICHFIELD SPRINGS, NEW YORK, ASSIGNOR, BY
MESNE ASSIGNMENTS, TO THE NATIONAL ELECTRICAL MANUFACTUR-
ING COMPANY, OF MILFORD, CONNECTICUT.

ELECTRIC ANNUNCIATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 520,127, dated May 22, 1894.

Application filed July 23, 1891. Serial No. 400,484. (No model.)

To all whom it may concern:

Be it known that I, HORACE E. WALTER, of Richfield Springs, in the county of Otsego and State of New York, have invented a new Improvement in Electric Annunciating Apparatus; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters and figures of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a view in front elevation of the combined main-receiver and switch-board of the central-station apparatus, this view also showing a telephone. Fig. 1^a, is a similar view showing the variable-signal transmitter of the central-station apparatus, together with the plug which is used in connection with the switch-board of the preceding figure, the case of the said transmitter containing also the rheotome which co-operates with it. Fig. 2, is a broken view in inside elevation of the main-receiver, and principally showing the gang-switch, the circular series of terminals and the revolving circuit-closer thereof. Fig. 3 is a similar view principally showing the locating and the signal-trains and the restoring-lever of the said main-receiver. Fig. 4, is a broken view of the main-receiver in vertical central section with its door closed. Fig. 4^a, is a small vertical section on the line *a—b* of Fig. 2, of the right hand end of the gang-switch. Fig. 5, is a simplified vertical section of the main-receiver, and designed to show the gang-switch freed from the other elements thereof. Fig. 6, is a broken view in front elevation of the movement of the main-receiver and particularly showing the heart-shaped cam of the want-train, and the winding mechanism for winding the springs of both the locating and want trains. Fig. 7, is a broken view in front elevation of the mechanism of the variable signal-transmitter located at the central-station. Fig. 8, is a broken view in vertical central section of the mechanism shown in the preceding figure. Fig. 9, is a detached view of the dial of the said transmitter. Fig. 10,

is a detached view of the rheotome which is located in the lower portion of the case inclosing the said transmitter with which it is in circuit as shown. Fig. 11, is a view in elevation of a specialized lamp-post such as may be used to constitute a sub-station and to contain the several elements thereof. Fig. 12, is a view partly in section and partly in elevation showing the interior of the box of the said post and the several instrumentalities therein contained. Fig. 12^a is an enlarged view in central horizontal section through the variable-signal transmitter of the sub-station on the line *c—d* of Fig. 12. Fig. 13, is a view partly in elevation and partly in vertical section of the upper section of the lamp-post showing the visual-signal and the mechanism for turning the gas on and off. Fig. 14, is another and larger view of the box of the lamp-post and particularly showing the devices for tripping the visual signal so as to permit it to be displayed. Fig. 15, is a view showing the variable-signal receiver and transmitter of the sub-station, together with elements of the visual-signal tripping mechanism, the case normally covering all of the said parts having been removed. Fig. 16, is a view in elevation of the mechanism of the citizens' transmitter located at the sub-station. Fig. 17, is a plan view of the said mechanism. Fig. 18, is a detailed plan view showing the handle-lever and its spring-mounted beveled pin in its relation to the fingered end of the operating-lever with which the said pin co-operates. Fig. 19, is a sectional view of the hub of this instrument and the cut out fingers which engage it. Fig. 20 is a diagrammatic view of the circuits at the central-station together with some of the parts thereat. Fig. 21, is a diagrammatic view of the circuits at a sub-station, together with some of the parts thereat.

This invention relates to an improved electric annunciating apparatus, of that class in which a series of variable-signal transmitters located at sub-stations are connected with a main receiver located at a central-station and arranged to locate the sub-stations and reproduce the signals to which the instruments at the same are set, the apparatus herein shown

being adapted for police service, but containing many features available for use in hotel-annunciators.

The objects of the present invention are as follows, viz:—To provide for avoiding the accidental starting of the main-receiver at the central-station owing to a too great reduction in the resistance of the resistances placed in the line, by arranging the sub-stations and hence the resistance magnets, in groups composed so that their location on the same line will not reduce the resistance therein, sufficiently to permit the starting-magnet of the main-receiver to be operated. To provide for restoring the variable-signal transmitters to their normal adjustments by automatic mechanism controlled by the current, instead of relying upon the current itself to do the work. To provide for the central-station a gang-switch adapted to simultaneously cut in and cut out all of the sub-stations. To provide a simple, compact and safe citizen's-transmitter having its key and circuit-changing mechanisms isolated, and furnishing it with a supplemental private wire attachment. To provide for automatically turning the gas off and on at the sub-stations simultaneously with the exposure and retirement of the visual-signal thereat, and to increase the efficiency of the class of apparatus to which the invention belongs, and to reduce the expense of construction and of attention, maintenance and repair.

With these ends in view, my invention consists in certain details of construction and combinations of parts as will be hereinafter described and pointed out in the claims.

In carrying out the invention, the central-station is provided with a main-receiver having independent electrical connection with each of the sub-stations, and adapted to be started therefrom, and to automatically locate them and reproduce signals sent in from them; a switch-board which, as shown in the accompanying drawings, is combined with the said main-receiver; a telephone outfit, a variable-signal transmitter, a rheotome connected with the magnet of the said transmitter, and as herein shown located in the same case therewith; a relay, and a register connected therewith. The particular construction and operation of the devices above mentioned, will be fully described later on.

In independent electric connection with a central-station equipped with the above mentioned apparatus, or equivalents thereof, is placed a series of sub-stations of approved construction, and distributed throughout the field under surveillance, in the beats of the several officers stationed therein. The said sub-stations may take a variety of forms, but preferably they will have the form of specialized lamp-posts, and are so shown herein. Each of these lamp-posts is provided with a visual-signal, adapted to be electrically displayed under the control of apparatus at the central-station, or mechanically from the post

itself. Each lamp-post also contains a variable-signal receiver, adapted to co-operate with the variable-signal transmitter of the central-station; a variable-signal transmitter adapted to co-operate with the main-receiver of the central-station; a citizens'-transmitter also adapted to co-operate with the said main-receiver; a telephone outfit; and a switch for use with a portable-transmitter, designed to be carried by a policeman in his pocket.

The particular construction and the operation of the devices above enumerated will also be described later on.

The main-receiver which is located at the central-station, is designed, as herein shown, for use in connection with one hundred sub-stations, and has a case A, provided with a door B, carrying upon its outer face a dial C, displaying a circular series of numbers extending from 1 to 100, running from right to left, and beginning at the center of its upper edge. The said numbers are specified by means of a locating-indicator D, arranged to sweep over them, and secured to a rotating spindle E, projecting centrally through the dial, the said indicator being normally at rest, and started and swept over the dial when the apparatus is set in motion, from any one of the sub-stations and then stopped against the number identifying the sub-station calling. Within the said series of numbers, signals or wants, chosen with special reference to the work which the apparatus is to do, are arranged in a circular series of compartments F, and specified by a signal-indicator G, normally at rest over the zero or uppermost compartment, and secured to a sleeve H, encircling the spindle E, aforesaid.

By opening the door B, of the case A, a flat frame I, removably secured to the back of the case is disclosed. This frame contains a contact-button J, for each of the whole number of sub-stations, each button being connected by an independent wire K, (see Fig. 4,) with binding-screws K', located in the top A' of the case, as shown by Figs. 4 and 20 of the drawings. Wires K², (see Fig. 20,) lead from the said buttons J, through an opening I' (see Fig. 4), in the frame I, to corresponding terminal plates L', arranged in a circle, and insulated each from the other in a flat rubber-disk L, secured to an annular metallic plate L², held off from the frame I, by means of pillars L³, secured to and projecting forward from a corresponding plate L⁴, rigidly secured to the frame I, and inclosing the opening I' therein. The said terminal plates L constitute in effect the terminals of the special or line wires M, (see Fig. 20) leading to the binding-screws K' of the respective sub-stations. A ring N, located in the circuit of the main-receiver, is arranged concentrically within the circular series of terminal-plates L, and insulated therefrom in the rubber disk L. A rotating circuit-closer designed to form electrical connection between the several terminal plates L', and the said concentric ring N, consists of

an arm O, secured midway of its length to a small disk O', (see Fig. 4,) of rubber, or equivalent insulating material, the said disk being mounted upon a short shaft O², having its inner end journaled in a bearing O³, and its outer end journaled in a three-armed frame O⁴, which has the ends of its arms secured to the circular metallic plate L², before mentioned. One end of the arm O, is provided with three spring-fingers O⁵, arranged to trail over the terminal plates L as the circuit-closer is rotated, the said springs being longitudinally bowed to conform to the circle in which the plates are arranged. Three springs are used so as to be sure of securing a good contact with the plates. The other end of the arm O, is provided in Fig. 4 with three spring fingers, and in Fig. 2 with one corresponding spring finger O⁶, arranged to engage with the concentric ring N, and longitudinally bowed to conform to the circle thereof. The extreme outer end of the shaft O² has rigidly secured to it a locking-wheel P, which is therefore permanently and positively coupled with the circuit-closer, whereby the integrity of the relations between the same and the locking-wheel is always preserved, and reliability of operation secured. The face teeth of the said wheel P, are engaged by the short arm of a locking-lever P', pivoted to the frame O⁴, at a point below the wheel, and having the free end of its long arm notched to adapt it to be engaged with a catch formed at the lower end of an armature P², hung from its upper end in bearings P³, and located in the presence of the poles of a magnet P⁴, secured to the frame I, as shown by Fig. 2 of the drawings. From the function that it performs, this magnet P⁴ will be hereinafter called the "locking-magnet" of the apparatus. A spring P⁵, attached to the upper end of the armature P², and adapted to be adjusted in tension, is provided for controlling the action of the same. A spring P⁶ attached at one end to the long arm of the lever P', and at its other end to a movable arm P⁷, connected with the frame O⁴, is provided for engaging the short arm of the said lever with the locking-wheel P the moment the long arm of the lever is released by the armature P². The contact-buttons J, are arranged in parallel vertical rows in the upper portion of the frame I, and are normally engaged by circuit-closers in the form of bifurcated contact-springs Q, attached to the inner faces of perpendicular bars Q', arranged side by side, and secured to the inner face of a long, heavy horizontal metal bar Q² attached to the upper ends of two heavy upright bars Q³ Q³, and insulated therefrom by a rubber strip Q⁴. A metal bar Q⁵ and an insulating strip Q⁶ interposed between the extreme upper ends of the upright bars Q³ and the upper ends of the strips Q', prevent the same from springing outward, and insure the contact of the springs Q with their proper buttons J. The lower ends of the upright bars

Q³ are rigidly connected together by means of a cross-bar Q⁷, which together with the bars Q³ and the cross-bars Q⁴ and Q⁵, form the rigid frame of the "gang-switch," the term that I have chosen to designate the feature or device now being described. The said rigid frame is connected to the frame I by means of four links Q⁸ pivotally attached to its upright bars Q³, and also pivotally connected with small blocks Q⁹ attached to the said frame as shown by Figs. 2, 4, and 5 of the drawings. Under the described construction the rigid frame carrying the contact springs Q, is suspended from the frame A, and will, when moved up or down, travel in a circular path, owing to the character of its connection through the links Q⁸ with the said frame. Normally, the springs Q are held in engagement with their proper buttons by locking the frame in its lifted or closed position by means of a notched tripping-lever Q¹⁰, (see Fig. 4) provided with a shoulder Q¹¹, and arranged to engage with the lower cross-bar Q⁷ midway the length thereof, the inner end of the said lever Q¹⁰ being passed through an opening Q¹⁶ formed in the frame I and pivoted to the back of the case A, and its outer end being pivotally connected through a link Q¹² with the lower arm of an armature Q¹³, hung in adjustable centers Q¹⁷, and having the form of a bell-crank lever, the upper arm whereof stands in the presence of the poles of a tripping-magnet Q¹⁴, which, when energized, attracts its armature to it, and so effects the lifting of the arm Q¹⁰, and releases the gang-switch, which thereby drops downward under the control of the long, spiral counter-balances springs Q¹⁵, Q¹⁵, which are attached to its arms Q⁸, Q⁸, toward the lower ends thereof, and to the upper portion of the case A, of the main-receiver. When the gang-switch drops downward, as described, all of its springs Q are simultaneously disengaged from the contact-buttons J. The gang-switch is lifted into its normal position, in which it is locked by the mechanism just described, by means of two lifting arms R R, arranged to engage with the outer face of its lower cross-bar Q⁷, and mounted in a heavy shaft R', having its opposite ends journaled in bearings R² R², secured to the lower end of the frame I, the said shaft R' being rotated by means of a pin R³ mounted in it, so as to project outward, and arranged to be engaged by the free end of a horizontal lever R⁴ forming a part of the mechanism secured to the inside of the door B, of the case of the main-receiver. A small foot or standard R⁵ secured to the frame I, is arranged to support the pin R³, and so hold the same in a position of readiness to be engaged by the lever R⁴, before mentioned. The bars Q' before referred to, are insulated each from the other by rubber strips Q⁴ and Q⁶, but are coupled together in groups of three by means of horizontal straps S, as shown by Fig. 2 of the drawings, where the cross-bar Q² and the insulating strip Q⁴ are

broken away for the purpose. One of the said strips is also shown by Figs. 4 and 5 of the drawings. In this manner the contact-springs Q are divided into isolated groups, whereby the buttons with which they respectively engage and which form terminals of the sub-stations, are also divided into groups. The number of sub-stations so grouped will depend upon practical conditions, and may be more or less, but as herein shown, each group contains ten sub-stations, it having been found that that number can be conveniently operated in one group. Each group of contact-buttons J, is provided with a relay-button J', connected by a wire J², (see Fig. 20) with a relay J³ connected by a wire J⁴ with the main relay line J⁵, which includes the gravity battery J⁶, connected through a wire J⁷ with the ground. One of the three bars Q' of each group, is provided with a bifurcated contact spring for engagement with the relay-button J'. These springs are like the springs Q but for convenience of identification they will be designated by Q¹⁸. Each group of bars Q', therefore carries eleven contact-springs, while each group of buttons contains the same number, although of course, the number of buttons and springs in each group may be varied if desired, as before referred to. Each group has its independent relay, and each relay is independently connected through a wire corresponding to the line J⁴ with the main relay line J⁵, including the battery J⁶, as before referred to. The object of arranging the sub-stations in groups, as above set forth, will be fully explained after a detailed description of the other apparatus of the central and sub-stations has been given. At the inner end of the horizontal series of contact-buttons including the buttons J and the relay-buttons J', are located two buttons J¹⁹⁷ J²⁰⁰ (see Fig. 2) which are arranged one above the other, and respectively engaged by contact-springs Q¹⁹⁹, Q¹⁹⁹ (see Fig. 4^a) attached to the inner face of the vertical bar Q' located at the extreme inner end of the gang-switch. The said buttons and springs make and break the circuit through the tripping-magnet Q¹⁴, as will appear later on. A coupling-pin T, projecting from the locking-wheel P, (see Figs. 2 and 4) is engaged when the door B, is closed, by a rotating-arm T' (see Fig. 3) secured to the inner end of the spindle E, carrying the locating-indicator D, which is thus caused to operate in unison with the rotal circuit-closer O, as the same sweeps over the terminal-plates L. When the said arm T' is engaged with the coupling-pin T, the said circuit-closer, the locking-wheel P, and the locating-indicator D, are, for all purposes of reliable indication, positively coupled together. The said spindle E is journaled in two movement-plates U and U', secured together and to the back of the door B, and corresponding to the two plates of a clock-movement. A heavy coiled spring W, is located between said plates and

drives a train of wheels and pinions including a pinion W' and a wheel W², mounted on the spindle E, which is thus actuated. An escapement wheel W³ engaged by an anchor-shaped pallet W⁴, controls the running of the train, which is normally locked by the engagement of a stop-tooth W⁵ located upon the periphery of a wheel W⁶, mounted on the same shaft with the escapement-wheel W³, with a detent formed by the tail of an armature W⁷, located in the presence of the poles of the starting-magnet W⁸, which is mounted horizontally upon the upper edges of the plates U and U', and located over the train just described, the upper end of said armature being provided with a finger W⁹, adapted to engage when the magnet is energized and the armature attracted to its poles, with an adjustable contact point W¹⁰, insulated from the said plates. A light spiral-spring W¹¹ attached to this armature, serves to hold it normally away from the poles of the magnet, with its tail in position to be engaged by the stop-tooth W⁵ of the wheel W⁶. The said train, which will be called the locating-train because it drives the locating-indicator, forms mechanical means for actuating the said indicator, leaving nothing for the current to do, so far as locating the sub-stations is concerned, but to release the train, whereby the device may be operated with a very light current. Although the said train has been fully shown in the drawings, it has been deemed unnecessary to specify and letter its several members further than to identify those wheels and pinions directly co-operating with other parts of the machine. The spindle E, also carries the sleeve H, of the signal-indicator G, such sleeve being provided with a heart-shaped cam V (see Figs. 4 and 6) the function of which will be set forth later on. A pinion V', frictionally coupled with the said sleeve, meshes into an idle pinion V², which in turn meshes into a pinion V³, secured to an arbor V⁴, journaled in the plates U and U', and also carrying a pinion V⁵, and a wheel V⁶, constituting elements of a train actuated by a coiled spring V⁷, forming the motive power for the actuation of the signal-indicator G, and corresponding to the spring W before mentioned. The said train is controlled in running down by an escapement-wheel V⁸, and an anchor-shaped pallet V⁹, shown by Fig. 3 of the drawings. The hub of the said escapement-wheel V⁸ is provided with a detent-arm V¹⁰, which normally engages with a detent pin V¹¹, carried by a stop-lever V¹², pivotally secured to the plate U, and having its lower end normally held in engagement with the cogs of the make-and-break wheel V¹³, by the spiral-spring W¹¹ before referred to. The upper end of this lever V¹², is pivotally connected with an armature V¹⁴, located in the presence of the poles of the signal-magnet V¹⁵, which is secured to the upper edges of the plates U and U' over the train last described, which will be called the

signal-train, because it actuates the signal-indicator G in reproducing the signals to which the variable-signal transmitters at the sub-stations are set. This train thus forms mechanical means for operating the signal-indicator, leaving nothing for the current to do, so far as the reproduction of the signal is concerned, but to release the signal-train, whereby the apparatus works with the minimum of current. The signal-train also has another important function in actuating the make-and-break wheel, and thus relieving the current of that work.

Although the locating and signal-trains are herein shown to be operated by springs, it is apparent that they may be operated by weights if desired. The signal-train is also fully shown by the drawings, but for reasons before set forth in connection with the locating-train, it has been deemed unnecessary to identify each of its members by letters or numbers. A long restoring-lever X, adapted to be vertically reciprocated in bearings X' X', secured to the back of the door B, is located between the same and the outer plate U' of the two plates U and U'. This lever is adapted at its lower end to be engaged with the long horizontal lifting-lever R⁴ with which it is kept in engagement by the guard-plate X². The outer end of the said lever R⁴ is pivoted in a bracket X³, secured to the back of the door near the outer edge thereof. The free inner end of the lifting-lever R⁴ rests upon the edge of an eccentric X⁶, rigidly secured to a horizontal shaft X⁷, journaled in the said door, and provided at its outer end with a crank X⁸, having a handle X⁹, by means of which the crank is swung from the vertical to lift the restoring-lever X' through the medium of the eccentric X⁶, and the horizontal lifting-lever R⁴. Small rollers Y Y, (see Fig. 6,) located side by side, and extending inwardly from the lever X', to which they are secured, are respectively engaged by the inner ends of two horizontal winding-arms Y', Y', attached to the forward ends of the arbors to which the inner ends of the actuating-springs W and V⁷ are attached, whereby the lifting of the said restoring-lever operates to wind the springs, and so furnish power for the actuation of the locating and signal-trains. A lever Z, pivoted to the restoring-lever at a point thereon near the rollers Y Y, but on its opposite side therefrom, stands in an inclined position and has its upper end notched for engagement with an anti-friction roller Z² carried by the lower end of a short lever Z' pivoted to the outer face of the movement-plate U. The lower end of the said lever Z, receives one end of a bowed spring Z³, the opposite end whereof is secured to a small block Z⁴ attached to the outer face of the operating-lever X. When the said operating-lever is lifted by the means heretofore described, the notched upper end of the lever Z, lifts the anti-friction roller Z² of the lever Z' into engagement with the periphery of the

heart-shaped cam V, and inverts the same with the effect of restoring the signal-indicator G, carried by the sleeve H, which also carries the said cam, to its normal position, in which it points to the uppermost or zero compartment in the series of signal compartments on the dial C, the said indicator and cam being arranged so that the indicator extends in exactly the opposite direction from that in which the depression of the cam normally faces. The said spring Z³ is provided for holding the lever Z up in position for doing its work and yet permitting it to yield after the cam has been inverted, so as to avoid any strain upon the spindle B upon which the sleeve H carrying the cam is mounted. The wheel V' is frictionally coupled with the sleeve H in order to permit the cam V and the signal-indicator G to be restored to their normal positions independent of the wheels V', V² and V³, which are in positive connection with the signal-train. The friction established between the said pinion V' and the sleeve H, is however, sufficient to couple the two parts together for all purposes of driving the signal indicator G from the train. A long pin 2, projecting inwardly from the upper end of the restoring-lever X, co-operates with a horizontal catch 3, pivoted over the starting-magnet W⁸, and provided upon its lower face with a shouldered finger 4, the shoulder whereof is normally engaged with the upper end of the armature W⁷ of the said magnet, so that when the magnet is energized, and the armature is withdrawn from under the said shoulder, the catch 3, will drop by gravity, and hold the armature in its attracted position, in which its lower end, forming a train-dent, is carried beyond the range of the stop-tooth W⁵ of the wheel W⁶ of the locating-train, which will run as long as the armature is so held, and there is any power in its actuating spring W. When the restoring-lever X is lifted, its pin 2 lifts the catch 3, and permits the spring W¹¹ to pull the armature W⁷ back to its normal position, in which its dent stands in the path of the stop-tooth W⁵. The lifting of the restoring-lever therefore permits the spring W¹¹ to lock the locating-train and hold it against operation after the locking-lever P' has by the same movement of the lever, been disengaged from the locking-wheel P. A bent arm 5, secured to the inner face of the restoring-lever X, is shaped so that when the door B of the case A is closed, its free end will extend under the long arm of the locking-lever P'. The function of this rod is to lift the said arm of the locking-lever and so disengage the short arm thereof from the locking-wheel P, which is thus unlocked, the lever being held in this adjustment by the engagement of the end of its long arm with the lower end of the armature P² of the locking-magnet P⁴. The said locking-lever P is automatically released for locking the locking-wheel P when the locking magnet P⁴, is energized, whereby the ar-

mature P^2 is attracted thereto and disengaged from the long end of the lever, permitting the spring P^6 to throw the short and hooked end of the said lever into engagement with the teeth of the locking-wheel P . The arm 5, therefore provides for mechanically operating the locking-lever to release the locking-wheel, and leave it in a position of readiness to perform its locking function automatically.

In connection with the main-receiver a switch-board 6 is employed. As herein shown (see Figs. 1 and 4), it forms an extension of the lower end of the case A, but this is not of course essential as it may constitute an independent structure. Each jack has a bowed arm 7, having its inner end pivoted to a binding-screw 8, and its outer end shaped to fit into a shoe 9 with which it is normally engaged by a spring 10. If desired, however, the construction described may be replaced by a plug-switch or any other form of spring-jack, or any equivalent thereof. But whatever form they or equivalent devices replacing them, assume, they will be connected with the respective sub-stations. This is illustrated in Fig. 20 of the drawings which shows a wire K^4 leading from the shoe 9 of the spring-jack to one of the contact-buttons J additionally identified by the number 171 and a wire K^3 leading from the stud 8 of the jack to one of the binding-screws K' located in the top of the case and also identified by the number 170. The spring-jacks are thus virtually interposed between the contact-buttons and the terminal-plate L, and their function is to cut the main-receiver out of the main-line and to cut a telephone or a variable signal-transmitter into that line, as will be fully described at another time.

The apparatus at the central-station also includes, as has been already mentioned, a telephone (see Fig. 1) having a transmitter 11, receiver 12, and a plug 13, the latter being adapted to be inserted into any of the spring-jacks of the switch-board, so as to cut out the main-receiver, and cut the telephone into connection with any of the sub-stations. The central-station also includes a variable-signal transmitter inclosed in a case 14 (see Fig. 1^a) and having a magnet 15 (see Figs. 7 and 8), an armature 16 therefor, hung between bearings 17 and a vertically movable operating-rod 18, having its upper end arranged under the outer end of the armature, and its lower end pivotally connected with a link 19, the lower end of which is pivoted to an arm 20, connected with an anchor-shaped pallet 21, pivoted between two frame-plates 22. (Only one of them is shown.) A spring 23, connected with the said anchor-shaped pallet, is provided for lifting the same, and hence the link 19 and the operating-rod 18, so as to hold the latter in an elevated position for being depressed when the armature 17 is attracted by the magnet 15. The anchor-shaped pallet 21, co-operates with a star-

wheel 24, mounted upon an arbor 25, journaled in the plates 22, and also carrying a hub 26, provided with an insulating strip 27, which is set into its surface, the said hub being constantly engaged by two trailing spring-fingers 28 (only one of them is shown) the connections whereof will be described hereinafter. An indicator 29 (see Fig. 1^a) secured to the outer end of the arbor 25, sweeps over a dial 30 (see Fig. 9) secured to the front of the case 14, and having its face divided into a circular series of compartments, each of which contains a signal or want. The insulating strip 27, before referred to, and the indicator 29, are relatively arranged so that when the indicator is in its normal or zero position, in which it stands against the star-compartment of the dial, the insulating strip will stand under the spring-fingers 28, the circuit being thus normally broken through the instrument. A knob 31, (see Fig. 8) secured to the extreme outer end of the arbor 25, is provided for turning the same, in setting the indicator against the compartments on the dial containing the signal which it is desired to transmit to a sub-station. A spring (see Fig. 8) encircling the arbor, and having one of its ends attached thereto and its other end secured to the outer of the two plates 22, is provided for actuating the arbor in its retrograde movement instead of relying upon the current for such work, the spring operating to turn the arbor and the star-wheel as rapidly as the latter is released by the actuation of the pallet 21 through the link 19 and the rod 18, which are thereto moved by the armature 16, under the influence of the magnet 15. Heretofore the pallet itself has been relied upon to actuate the star-wheel, and hence the arbor and indicator in their retrograde movement, and my improvement consists, so far as the transmitter is concerned, in providing means for actuating the said parts in their retrograde movement independently of the current, whereby I secure positiveness of action, and therefore greater reliability of communication. A stop-pin 33, (see Fig. 7) carried by the hub 26, and projecting radially therefrom, is arranged to be engaged with a corresponding stop-pin 34, mounted in a block 35, and thus prevent the arbor from being turned more than one revolution in either direction to avoid the winding or unwinding of the spring 32 beyond safe limits.

I would have it understood that I do not limit myself to the use of a spiral-spring for mechanically effecting the retrograde movement of the indicator under the control of the magnet of the instrument, but that I may replace the said spring by a spring of other form, or by a weight; nor do I limit myself to using this feature with the particular form of instruments shown and described, as it is applicable to other forms of transmitters, such for instance as one in which the indicator is moved over a series of wants arranged in a

straight line, in which case the star-wheel would be replaced by a rack, and the anchor-shaped pallet by a pawl.

A rheotome 36, (see Fig. 10) located in the lower part of the case 14, containing the transmitter, is operated by a rotary handle 37, (see Fig. 1^a), projecting forward from the said case, and located under the dial 30 before mentioned. This rheotome may be of any improved construction, and will not be particularly described. It is provided with a plug 38 designed for insertion into any one of the spring-jacks of the switch-board for the purpose of cutting the main-receiver out of line, and for cutting the variable signal-transmitter into the line, and connecting it with any one of the sub-stations.

In operating the variable signal-transmitter the knob 31, located at the outer end of its arbor, is grasped, and the indicator 29 turned to a signal displayed on its dial, the signals whereof correspond to the signals upon the dials of the receivers located at the sub-stations, but arranged in reverse order. After the transmitter has been so set, the rheotome is operated by its handle to make and break the circuit so as to step the indicator of the transmitter back to its normal or zero position, and the indicator of a receiver at a sub-station forward to the same signal to which the indicator of the transmitter at the central station was set, as will be hereinafter described.

The central-station apparatus is also provided with a relay 212, (see Fig. 20,) which operates in conjunction with a register 39, shown in the same figure of the drawings.

Having described the apparatus located at the central station, all of the apparatus connected with one of the sub-stations will now be explained. The sub-stations, as herein shown, (although not necessarily) have the form of specialized lamp-posts, each consisting of a standard 41 (see Fig. 11) forming its lower section, a box 42, having a door 43 forming its central section, and a top 44, forming its upper section. The upper end of the said top of the post is enlarged as at 45, to receive a visual signal formed by a colored glass globe 46, (see Fig. 13,) which is removably secured to a globe-carrier 47, attached to the upper end of a tube 48, encircling the gas-pipe 49, and adapted to be raised and lowered over the same, so as to permit the said globe to be lifted to inclose the gas-burner 50. The said tube 48, extends downward into the box 42, and is provided at its lower end with two horizontal arms 51 51, to the ends of which are attached chains 52 52, running over rollers 53 53, journaled in the tapering upper end of the box 42, the said chains being provided with weights 54 54, which exert a constant tendency to lift the globe into position to inclose the gas-burner. Normally, however, the globe is retained in its retired position against the tendency of the said weights to elevate it, by means of a finger 55, (see Fig. 14,) having

the lower face of its outer end beveled, and forming a part of a collar 56, secured to the lower end of the tube 48, the said finger 55, being normally caught under a corresponding finger 57 (see Fig. 14), having its upper face beveled, and projecting forward from the inner end of a short shaft 58, journaled in bearings 59 59, connected with the back of the box 42. The said shaft 58, is provided with a downwardly projecting tripping-pin 60, having its lower end notched and beveled for engagement with a beveled nose 61 formed at the outer end of the armature 62, of the magnet 63, which is of high resistance. A long flat spring 64, (see Figs. 12, 14 and 15) having its upper end curved to pass in front of the shaft 58, is arranged to engage with a pin 65, mounted therein, and exerts a constant effort to rotate the shaft and swing the notched tripping-pin 60 into position to engage with the beveled nose 61 of the armature 62. The said armature is itself normally lifted into position for being engaged by the pin 60 by a coiled spring 66, (see Fig. 15,) adapted to be adjusted in tension, and connected with a curved arm 67, united by a link 68, with a small vertically movable rod 69, the upper end whereof stands in close proximity to the inner end of the said armature when the same is in its normal or unattracted position. The curved arm 67, before referred to, is pivotally connected with an anchor-shaped pallet 70, (see Fig. 15,) which co-operates with the star-toothed escapement wheel 71, of a variable signal-receiver. The said wheel 71, is mounted upon an arbor 72, journaled in a frame, consisting of two plates 73, (only one of them is shown,) and provided at its outer end with an indicator 74, see Fig. 12, consisting of a disk having a heavy line 75 marked upon its outer face, and located behind a dial 76, provided with a central opening through which the said mark 75 is visible, and divided into a circular series of compartments, each containing a signal or want, the said signals or wants corresponding to those inscribed upon the dial of the variable-signal transmitter located at the central-station. The said arbor is also provided with a small pinion 77, (see Fig. 15) which inter-meshes with a toothed segment 78, hung on a pivot 79, and provided with an offsetting arm 80, to which a restoring-arm 81 is pivoted by a screw 82, on which the arm is permitted to turn within the limits of a short slot 83, receiving a stop-pin 84, mounted in the arm 80. A stiff spring 85, secured to the lower edge of the segment 78, and engaging with the lower edge of the inner end of the restoring-arm 81, holds the latter in its normal position, but permits it to yield and be depressed within the limits of the slot 83, in case the outer end of the arm 81 is pushed down too far in retiring the visual signal globe 46. When the magnet 63 is energized, which it will be when the circuit at the central-station is closed, its armature 62, is attracted, re-

leasing the pin 60, and permitting the shaft 58, to turn in its bearings under the action of the weights 54 54. As the said shaft is rotated, its finger 57, (see Fig. 14,) clears the finger 55, of the collar 56 on the tube 48 which is now free to be raised by the weights, whereby the signal-globe 46 is lifted into its elevated position, in which it surrounds the burner 50. It will thus be seen that the visual signal is automatically displayed under the control of the central-station. It is mechanically retired by the officer at the sub-station by means of a manual or hook 86, secured to a rigid upright bar 87, having its upper end attached to the forward face of the collar 56, and its lower end attached to the corresponding face of a collar 88, located upon the lower end of the tube 48, the extreme lower end whereof carries a nut 89, forming a buffer, which engages with a spiral spring 90, (see Fig. 12,) encircling the gas-pipe 49 at the point where the same enters the lower end of the box 42. A restoring-pin 91, (see Fig. 14) secured to the rear face of the collar 88, and guided at its inner end between two upright parallel guides 92, (only one of them is shown) attached to the back of the box, is provided for engaging with the outer end of the restoring-arm 81, when the hook 86 is pulled down to retire the glass globe 46, whereby the segment 70 (see Fig. 15) operating upon the pinion 77, causes the indicator 74 to be restored to its normal or zero position, in which its indicating line or mark 75 is brought into alignment with the compartment on the face of the dial 76 containing the zero mark or star.

By my invention also the gas is turned on and off by the vertical movements of the tube 48. To this end the burner 50 (see Fig. 13), before mentioned, is constructed in the well known manner of sustaining an extremely small flame constantly, so that when the gas is turned on full head, the small flame will light the gas. As these burners are well known, I will not describe the one I have shown, specifically. Its key 93 is provided with an arm 94, having a rod 95 attached to its outer end, the lower end of the said rod being connected with an arm 96, attached to the tube 48. A spring 97 encircling the upper end of the rod 95, is secured thereto at its upper end, while its lower end is provided with a washer 98, loose to move up and down on the rod. A corresponding spring 99 encircling the lower end of the rod and held thereon by a small button 99^a, is adapted to be engaged at its upper end by the arm 96. Under this construction, when the tube is raised, the arm 96 will engage with the movable washer 98 and gradually compress the spring 97, until the endwise resistance thereof is sufficient to overcome the friction under which the pin 93 turns in its bearings, after which the arm 94 will be gradually lifted and the gas turned on, and immediately lighted by a flame communicated from the small constant flame be-

fore referred to. On the other hand, when the rod 48 is pulled down, the arm 96 will engage with the upper end of the spring 99, and in the same manner gradually pull the arm 94 down and turn off the gas, except for the small quantity which is allowed to escape to sustain the constant flame. The springs 97 and 99 prevent the gas fixture from being in any way strained under any sudden upward or downward movement of the tube 48. A small buffer 100 located within the carrier 47, is provided with a small spiral spring 101, which engages with the base of the burner 50, and cushions the rising action of the carrier. It will thus be seen that the gas is automatically turned on and shut off by means of the tube 48, which in its vertical movement, also retires and displays the signal and restores the variable signal-receiver to its normal adjustment. A telephone consisting of a receiver 102, (see Fig. 12) and a transmitter 103, is also located within the box 42, for use in conjunction with the variable signal-receiver already described. The said receiver and telephone are supplemented by a variable signal-transmitter, which is provided for use in communicating with the central-station, when it may not be possible or convenient to use the telephone. This variable signal-transmitter corresponds in its essential features to the variable-signal transmitter located at the central-station, and already described. It is provided with a dial 104, divided into a circular series of compartments, containing a series of signals or wants chosen to meet the requirements of code communication and corresponding in matter and arrangement to the wants or signals on the dial of the main-receiver. This dial has a large central opening 105, (see Fig. 12^a) through which is displayed an indicator 106, consisting of a disk having an indicating mark 107, drawn upon it, the disk being secured to the outer end of an arbor 108, which is also provided at its outer end with a knurled thumb-nut 109, by means of which it is manually rotated to set the mark 107 in line with any one of the signals or wants in the compartments on the dial. The said arbor is journaled at its outer end in a frame-plate 110, and at its inner end in the back 127 of the case 120 which incloses the instrument being described, as well as the variable signal-receiver and the tripping mechanism interposed between the magnet of the same and the tube of the visual signal. The said arbor 108 also carries a star-wheel 111, (see Fig. 15,) embraced by an anchor-shaped pallet 112, the shank whereof is rigidly secured to one leg of an armature 113, pivoted in the frame 110, and having its upper arm located in the presence of the poles of a magnet 114, the connections whereof will be described hereinafter. A spiral-spring 115, connected with the armature 113, and adjustable in tension, is provided for regulating its action. A hub 116, also mounted on the arbor 108, is provided with an insulating strip 117,

set down flush with its periphery, which is constantly engaged by two spring-fingers 118 118, normally engaged with the said strip, whereby the circuit is broken through the instrument, the indicator 105 whereof normally stands against the star located in the uppermost compartment of the dial 104. A strap 119 secured to the case 120, carries at its outer end a circuit-interrupter, consisting, as shown, of a hasp 121, provided midway of its length with a hollow boss 122, adapted to fit over the thumb-nut 109, and forming a guard therefor, an operating button 123, and an inwardly projecting finger 124, which engages, when the hasp is closed, with a contact-spring 125, inclosed in a chambered block 126 of insulating material, secured to the case 120 at a point thereon opposite the strap before mentioned. When the hasp is closed, the circuit through the magnet 114 is completed, but when the hasp is open, this circuit is broken. It will be understood from this construction that when the hasp is open, the transmitter is cut out of the circuit, whereby its indicator may be set against any of the signals displayed upon its dial. After the instrument has been set as described, the hasp is closed, and the circuit completed. Except for breaking the circuit before setting the indicator of the instrument, the circuit would be closed with the first movement of the indicator, and the main-receiver located at the central-station would be actuated in operation before the officer at the sub-station had time to set the indicator, in case he desired to place it against any signal removed more than one point from its zero position, but by temporarily cutting out the instrument by means of the hasp, the officer is given all the time that he needs for setting it. I do not, however claim the hasp which is described and claimed in United States Patent No. 414,868, granted November 12, 1889, to Frank Edward Morgan. The shaft 58, the variable signal-transmitter and the variable signal-receiver, are secured to the back 127 of the case 120, the said back being a plate which is fastened to the back of the box 42, as well shown by Fig. 12^a of the drawings. The inner edge of the case 120 is cut away to permit the restoring-arm 81, to project through it into the range of the restoring-pin 91.

A citizen's-transmitter, located within a case 128, (see Fig. 12) secured to the back of the box 42, and situated under the telephone-transmitter 103, is designed to be operated by means of a key inserted into a key-hole 129, (see Fig. 11) formed in one corner of the door 43. This device is designed to enable citizens as well as policemen or officers to send in numbers to the central-station, where such numbers are recorded as identifying special localities. As herein shown, this instrument is provided with a flat-key lock 130, (see Fig. 16) constructed on the principle of retaining the key when the bolt is thrown. As locks of

this description are well known, detailed description of the lock is unnecessary.

A handle-lever 131, hung midway of its length upon a screw-stud 132 entering the frame-plate 133, projects at its upper end through an opening in the case 128, so that it may be operated by an officer when the door 43 of the box 42 is opened for restoring the instrument to its normal adjustment. Normally the lower end of the lever is engaged with the inner edge of the bolt 134 of the lock 130, as shown by the full lines in Fig. 16 of the drawings. When, however, a suitable key 135 is inserted into the lock, and the bolt 134 thereof retracted, the lever is at once thrown by its spring 131^a into the vertical position in which it is shown by dotted lines in the same figure of the drawings. The lower end of the lever now stands directly over the bolt, which cannot be thrown out again until the lever has been swung back into its normal position, which can only be done from the inside of the box 42, and as the key cannot be withdrawn from the lock except when the bolt thereof is thrown, the person using the key is forced to leave it in the lock, whereby he becomes responsible for the operation of the device, for the different persons having the keys are charged with them, and a record kept at the central-station. A flat spring 136, having its upper end secured to the handle-lever just below the stud 132 thereof is provided at its extreme lower end with a beveled pin 137 (see Fig. 18), which projects through an opening 138, formed for it in the lower end of the handle-lever. This beveled pin co-operates with a finger 139 having its outer edge made straight and beveled, and its inner edge cut on an incline, the said finger forming the outer end of an operating-lever 140, the inner end whereof is rigidly secured to an arbor 141, carrying a star-wheel 142, embraced by an anchor-shaped pallet 143, the shank whereof is rigidly secured to one arm of an armature 144, pivoted in the frame 145, and having its other arm located in the presence of the poles of a magnet 146. A spiral spring 147, adapted to be regulated in tension and attached to the said armature, controls the action of the magnet. The arbor 141 also carries a hub 148 (see Fig. 19) provided with an insulating strip 149, normally engaged by two spring contact-fingers 150, whereby the instrument is normally cut out of circuit. When, however, the key is entered into the lock through the door 43 of the box 42, and turned, and the bolt withdrawn from engagement with the lower end of the handle-lever, the same is thrown by its spring 131^a into the position shown by broken lines in Fig. 16 of the drawings. As this movement of the handle-lever takes place, the straight outer edge of the beveled pin 137 engaging with the inclined inner edge of the finger 139 of the operating lever 140, causes the same to be lifted and the arbor 141 to be rotated on its axis sufficiently to carry the

insulating-strip 149 out of engagement with the fingers 150, whereby the instrument is cut into the circuit. When the handle-lever is manually swung back into its normal position, the beveled pin 137 being carried by a spring-plate 136, rides over the said finger 139 formed at the outer end of the operating-lever and engages with the inclined inner edge thereof, and thus resumes its position of readiness to lift the operating-lever and when the bolt is withdrawn by the key as above described.

A light spiral-spring 151, connected at one end with the arbor 141, and at its opposite end with the frame 145, is provided for automatically turning the arbor 141 back into its normal position, in which the insulating strip 149 is brought into engagement with the contact-fingers 150, when the escapement wheel 142 is released to permit the said movement of the arbor by the anchor-shaped pallet 143, which is thereto actuated by the armature 144 acting under the control of the magnet 146, which is energized once for the purpose by a single closing of the main-circuit in the main-receiver at the central station, the said arbor having to move only one step so to speak, in order to be restored to its normal position, inasmuch as the citizen's transmitter is constructed with reference to locating the want which indicates its use, in that one of the compartments next to the zero or uppermost compartment on the dial C, of the main-receiver. The spring 151 acts in exactly the same way as the spring 32, (see Fig. 8,) of the variable signal-transmitter located at the central-station. The said citizen's-transmitter is located in a branch of the main circuit, which includes the high resistance magnet 63, (see Fig. 15,) the said branch circuit being normally closed through the hub 148 and the fingers 152 152, (see Fig. 19.) When, however, the hub is rotated as described, the magnet 63 is cut out of the circuit by the engagement of the insulating strip 153, mounted in the hub, with the said finger 152. The object of cutting out the high resistance magnet 63 before operating the citizen's-transmitter is to clear the line so that magnet 146, (see Fig. 16,) may work freely.

The citizen's-transmitter is also adapted to be operated without a key, and from a remote point, such as a private house. With this end in view, the arbor 141 is provided with a secondary operating-lever 154, which is normally engaged by the tail 155 of the armature 156 of the magnet 157, (see Fig. 17,) which is secured to the edge of the plate 158 forming the back of the case 128, the said magnet being located in a local circuit including the private house, and closed thereat for the operation of the transmitter by any suitable device, such as a key. When the magnet 157 is energized, it attracts the armature 156 to it whereby the tail 155 of the armature is caused to move the secondary operating lever 154, so as to rotate the arbor 151

sufficiently to cut the instrument out of the circuit of the high resistance magnet 63, and into the circuit of the magnet 146, which corresponds in resistance to the starting-magnet V^{15} of the main-receiver at the central-station. This actuation of the arbor 141 in no wise interferes with the handle-lever 131, or the adjuncts thereof. Each sub-station is also preferably furnished with a switch adapted to receive a small pocket signal-transmitter designed to be carried by the respective officers, and adapted to send in their several numbers. As herein shown (see Fig. 21) this switch consists of two parallel spring-plates 159 159, insulated from each other by blocks 160 160, to which their ends are secured, the said blocks being in turn attached to one of the side walls of the box 42. The two sections 161 161 of a small split tube are respectively secured to the inner surfaces of the plates 159 159, so that their edges will come close together without touching. These two tube sections together form a spring-jack and a holder, and receive the circular plug of the pocket-transmitter. It is designed that each officer shall have one of these transmitters, adapted to send in to the central station a number corresponding to his number, every one of them being internally adapted to send in a different number. This instrument is used in conjunction with the variable signal-transmitter in the lamp-post, and with a small switch located in the main-receiver, situated at the central station, and shown by Figs. 6 and 20 of the drawings.

In Fig. 6 of the drawings the sleeve or hub of the heart-shaped cam V is shown to be provided with a pin 163, arranged so that just before the cam completes a rotation, the pin will operate to lift the spring 164 out of engagement with a finger 165, and thus cut the starting-magnet V^{15} of the receiver out of the circuit, (see Fig. 20 for wiring,) and re-engage the spring 164, with the finger 166, whereby the relay 212 is cut into the circuit, and hence also the register 39.

By reference to Fig. 12^a of the drawings, which also represents the dial of the variable signal-transmitter located at a sub-station, it will be noticed that the last signal point thereof is represented by the word "Register." Now whenever the indicator of the said transmitter is set against that signal, the same signal will be produced in the main-receiver at the central-station by carrying the signal-indicator D of the said receiver around to the last compartment in the want series. This movement of the indicator is accompanied by a corresponding movement of the heart-shaped cam and the sleeve thereof, whereby the pin 163 is caused to operate to lift the spring 164 from engagement with the spring 165 into engagement with the spring 166, whereby the main-circuit is shifted from the starting magnet V^{15} of the receiver to the relay and the register. When, therefore, an officer having one of these pocket-transmit-

ters desires to leave a permanent record at the central-station of a visit made to a lamp-post or sub-station, he opens the door of the box 42 thereof, and sets the indicator of the variable signal-transmitter therein to the word "Register." The main-receiver at the central-station is at once operated to reproduce the signal thereat, and to cut out the starting-magnet V¹⁵ and to cut in the relay and register. The officer now plugs his pocket transmitter into the switch provided therefor, and then operates the said transmitter so that the number wheel thereof is released to make and break the circuit, so as to transmit its number to the relay and register which makes a permanent record of his visit to the sub-station. To provide for cutting out the high resistance magnets at the respective sub-stations, the box 42 of each lamp-post is provided at its upper end with an insulated movable button 167, (see Figs. 14 and 21,) arranged to be pushed inward by the upper edge of its door 43 when the same is closed, so as to make contact between two springs 168 and 169 attached to the box, and forming terminals of the main line of the group in which the post is located. Under this arrangement, the circuit in the post is closed through the high resistance magnet of its variable-signal receiver so long as the door of the box remains closed, but the moment the door is opened, the elasticity of the spring 169 will cause the same to fly away from the spring 168, and thus break the circuit through the high resistance magnet of the post, and cut it out of the circuit. The resistance of this magnet being removed, the normal battery current of the apparatus is enabled to operate the relay magnet of the group in which the post is located, and hence the starting magnet of the main-receiver located at the central station, the said starting-magnet being located in a local circuit and controlled by the relay-magnets of the respective groups.

The object of locating the sub-stations in groups and connecting each group with the main circuit by means of an independent relay located at the central-station; may now be explained. It will be apparent that in order to permit the operation of the main-receiver located at the central-station from any one of the sub-stations, the special circuits of all of the sub-stations must normally be closed in the gang-switch located in the main-receiver, and through the relay magnets, and therefore virtually through the starting-magnet V¹⁵ of the said instrument. It will also be apparent that in order that the officer at the central-station may communicate with the officers in the field under surveillance by means of the visual-signals at the sub-stations, the circuits must be kept closed through the variable signal receivers located at such stations. It is necessary therefore to operate the apparatus, considered as a whole, on the basis of resistances. Thereto the magnets of the variable signal-receivers located at the

sub-stations are wound to higher resistance than any other magnets connected with the apparatus, except the magnet of the variable signal transmitter at the central-station which has to work in connection with the said magnets. But as the high resistance magnets of the respective sub-stations are connected with the central station by what is known as the multiple arc principle, it follows that the resistance in the main line of the central-station apparatus will be reduced in proportion as the number of high resistance magnets in connection with it is increased, and that the number of co-operating high-resistance magnets and hence sub-stations must be limited so that the average resistance in their main line will be sufficiently above the resistance required to control the receiver at the central station. As my invention contemplates the connection of a large number of sub-stations with a single receiver, I avoid making the resistance of the high resistance magnets excessively high or of working the main-receiver on a very light current, by arranging the sub-stations in groups containing so few stations that the average resistance in their main line will be correspondingly high, and connecting each group with an independent relay located at the central station and connected with a starting-magnet placed in a local circuit, and common to all the relays. As herein shown the sub-stations are arranged in groups of ten and assuming that the high resistance magnet of each of these stations is wound to a resistance of three hundred ohms, then the average resistance of the main line with which all of the magnets in the groups are connected, will be thirty ohms. To provide, under this arrangement, for an ample protection for the main-receiver, the relay-magnet of each group is wound to five ohms, and its armature spring made very weak for a reason to be disclosed later on. Preferably the starting-magnet is also wound to five ohms although its resistance has no direct relation to the resistance of the relay-magnets. In order to balance the magnets throughout the apparatus including those at the central and sub-stations, they are wound to the same resistance as the relay-magnets, except as specified, but in order to prevent the variable signal transmitters located at the sub-stations from operating in unison with the relay-magnets, the springs connected with the armatures of their magnets are placed under sufficient tension to prevent the said armatures from being attracted to their magnets, which are energized at the same time the relay-magnets are energized, so that the indicators of the said transmitters will not be disturbed after being set until the main-receiver has located the sub-stations containing them and has shunted sufficient additional battery power onto the main line to overcome the tension of the said spring and permit the armature of the transmitter magnets to be operated, whereby the transmitters are caused to send

in their messages. The foregoing will show why it is necessary to provide for maintaining a higher average resistance in the main line than in the main-receiver so that the latter may be controlled and the danger of its accidental starting avoided. It will be understood, of course, that when the door of any sub-station post is opened, its high resistance magnet will be cut out so that when the variable-signal transmitter in the post has been set and cut into the line and its hasp closed, the entire battery current will flow over the line of the group in which the sub-station is located, for the reason that all of the magnets now on the line are balanced each with the other, and that the battery-current will take the path offering the least resistance. Normally, as aforesaid, the high resistance magnets at the sub-stations are located in the main circuits, and to cause them to operate in releasing the normally retired visual-signals, the high resistance magnet of the variable signal transmitter located at the central-station is temporarily cut into the circuit by means of the insertion of the plug 33, (see Fig. 1^a) into one of the spring-jacks of the switch-board thereat. It will thus be seen that although the circuit of the apparatus is constantly through the variable signal-receivers located at the sub-stations, they cannot operate automatically or abnormally, inasmuch as the normal current is entirely insufficient to energize their magnets, and that although the current of the apparatus is constantly through the relay magnets of the main-receiver located at the central station, said receiver can never be automatically or abnormally started, on account of the resistance offered to the current by the high resistance magnets located at the sub-stations. Of course the number of sub-stations located in each group may be varied according to the dictates of circumstances, and I do not limit myself to using groups of ten herein shown for illustration, but in fact forming a convenient and effective arrangement.

Having now described in detail the various mechanical features of both the apparatus located at the central and at the sub-stations, the wiring of the entire apparatus and the circuits thereof will be set forth. Each sub-station is connected with the central-station by a special or independent wire M (see Fig. 20) only one of which is shown as that is sufficient to illustrate all of the others. This wire is led to one of the binding-screws K', located in the top of the case of the receiver, the particular screw to which the wire is led being also designated 170, for convenience of identification, and for the same reasons others of the screws K' will be identified in the same way by numbers. From this screw the current flows through a wire K³ to the stud 8, and curved arm 7 of one of the spring-jacks in the switch-board, and thence through the shoe 9 of said spring-jack, and the wire K⁴ to one of the contact buttons J,

this button being also designated 171 for convenience, thence to one of the springs Q of one of the groups of springs in the gang-switch, thence to the relay-spring Q¹⁸ of the said group, thence to the relay-button J' thereof, thence through wire J² to the relay magnet J³ of the group in question, and from this magnet through the wire J⁴ to the binding-post 172, which is one of the screws K', and thence through the line J⁵ to the gravity battery J⁶, and thence through the main-relay line J⁷ to the ground-plate G. The completion of the circuit just described has for its object the energization of the relay-magnet J³, which, when energized, attracts its armature 173 and causes the free end thereof to be engaged with the adjustable contact-screw 174. Beginning at the said adjustable contact-screw 174, the current of the relay circuit thus closed, flows through the wire 175 to the post K'—176 in the top of the case A of the main-receiver, thence through the wire 177 to the call bell 178, which is thus actuated in giving a single stroke, thence from the bell through the line 179 to the local battery 180, thence through the wire 181 to the binding-screw K'—182, located in the top of the case, thence through the wire 183 to the starting-magnet W⁸, and through the wire 184 to the heel of the armature 173. The completion of the circuit last described has for its object the energization of the starting-magnet W⁸, which by attracting its armature W⁷ to it, disengages the lower end thereof from the stop-tooth W⁵, (see Fig. 3,) in the wheel W⁶ of the locating-train, which is thus liberated, and allowed to start in sweeping the circuit-closer over the circular series of terminal-plates L. The attraction of the armature W⁷ to the starting-magnet W⁸ also operates to engage the finger W⁹ carried by the free end of the armature with an adjustable contact-screw W¹⁰, the said finger being held in contact with the screw by the catch 3, (Fig. 3,) which operates by gravity as soon as the armature is drawn to the magnet. The current of the local circuit thus established flows from the finger W⁹ through the armature W⁷, the plates U and U' of the movement attached to the back of the door B of the case A, thence through the wire 185, to a flat plate 186, (Figs. 3 and 20,) secured to the back of the said door, thence through the two fingers of a spring 187, attached to the extreme upper end of the restoring-lever X, thence to a corresponding plate 188, thence through the wire 189 to the screw K'—190 located in the top of the main-receiver A, thence through a wire 191 to the battery 192, thence through wire J⁷, thence through wire 193 to the binding-screw K'—194 located in the top of the case, through the wire 195 to the tripping-magnet Q¹⁴, thence through the wire 196 to the contact-button J—197, (see Figs. 2 and 20,) located in the upper portion of the frame I, (Fig. 2,) thence through the contact springs Q—199 Q—199 of the gang-switch, thence through the cor-

responding contact-button J—200, thence through the wire 201 to the adjustable contact-screw W¹⁰. The closing of the circuit last described has for its object the energization of the tripping-magnet O¹⁴, which through its armature Q¹³ (Fig 4) the link Q¹², and the tripping lever Q¹⁰, operates to unlock the gang-switch, which then falls away and simultaneously breaks the circuits through all of the simple and special contact-buttons J, which are in effect the terminals of the special or independent wires connecting the central station with the respective sub-stations, and of some of the local circuits. Meanwhile the circuit closer is being driven by the locating-train and swept over the said terminal-plates L, and so soon as its fingers O⁵ engage with that one of the terminal plates L which correspond to the sub-station at which the circuit has been closed, the gang-switch having been unlocked and the special-circuits of all the sub-stations being thereby broken, the current is forced to flow from the contact-button 171, which is the terminal of the line of the sub-station where the circuit has been closed, thence through the line K² to the terminal-plate L, thence through the spring-fingers O⁵ of the circuit-closer, the bar O thereof, the fingers O⁶ attached to its opposite end, the concentric ring N, thence through the wire 202 to the locking-magnet P⁴, thence through the wire 203 to the spring 204, thence to the corresponding spring 205, with which the spring 204 is now engaged, the wire 206, the spring 164, spring 165, the wire 207, the starting-magnet V¹⁵, thence through the wire 208, the make-and-break spring 209, the make-and-break wheel V¹³, thence through the movement-plates U U', the wire 185, the plate 186, the fingers of the spring 187, the plate 188, the wire 189, the binding screw K'—190, the wire 191, the battery 192, thence to the ground. The completion of the circuit last described effects the energization of the locking-magnet P⁴, (see Fig. 2) whereby the armature P³ thereof is attracted thereto and disengaged from the long arm of the lever P', the short arm whereof is at once thrown by the action of the spring P⁶, into engagement with the locking-wheel P, which is coupled through the pin T, carried by it, with the arm T', carried by the spindle E, which also carries the locating-indicator D, which is stopped and held against the number on the dial corresponding to the number of the sub-station on the line M. The completion of the circuit last described also energizes the signal-magnet V¹⁵, whereby the armature V¹⁴ thereof is attracted thereto with the effect of disengaging the pin V¹¹ (Fig. 3) carried by the lever V¹² from the wire V¹⁰, whereby the signal-train is released for actuation by its spring V⁷, the said wheel being freed for rotation by the retraction of the extreme lower end of the lever V¹² from it. As the make-and-break wheel is rotated the intermittent engagement of the spring 209 with its cogs, operates to make and break the circuit, whereby the magnet 114, (see Fig. 15,) of the variable signal-transmitter located at the sub-station to which the line M leads, for every interruption of the circuit by means of the said make-and-break wheel, attracts its armature 113, which operates its anchor-shaped pallet 112, in releasing the star-wheel 111, for being reversely rotated step by step by the spiral spring 211 (corresponding to the spring 32 seen in Fig 8) which rotates the arbor 108 in reverse direction, until the insulating strip 117 mounted in the hub 116 of the arbor is brought into engagement with the springs 118, so as to break the main-line circuit, with the indicator 106 in its normal position, in which its mark 107, stands against the uppermost or star compartment on the dial 104 of the instrument which is thus restored step by step from the adjustment to which it was set prior to any action of the main-receiver at the central-station. For every interruption of the line-circuit the magnet V¹⁵ is demagnetized and when the circuit is finally broken in the variable signal-transmitter located at the sub-station, the magnet V¹⁵ is demagnetized, allowing the lower end of the lever V¹² to engage with the make-and-break wheel, which action has before been prevented during the interruptions of the line circuit by the closing of the circuit, and the energization of the magnet V¹⁵ before the lower end of the lever V¹² could enter the depressions between the cogs of the wheel, this action being attained by a proper adjustment of the spring 209 with relation to the lever V¹². When the said lever enters one of the depressions in the make-and-break wheel, the same is stopped, and the signal-train arrested, with the indicator G standing opposite the signal on the dial C, corresponding to the signal to which the indicator of the variable-signal transmitter at the sub-station was set when the circuit through the apparatus was first closed, for the main-receiver is started in operation only by closing the circuit at one of the sub-stations, and it will be understood that all of the operations referred to have been preceded by the closing of the circuit at one of the sub-stations. In case the variable-signal transmitter located at the sub-station calling, has its indicator set to the word "Register" upon its dial, which is the last call or want of the series of calls or wants thereupon, the main-receiver located at the central station will just before it stops, operate through the pin 163, (see Fig. 6,) to lift the spring 164 away from engagement with the spring 165, and into engagement with the spring 166, whereby the signal-magnet V¹⁵ of the receiver is cut out, and the register-relay 212 which is located within the case of the main-receiver, is cut into the line. The circuit will now be from the sub-station through to the spring 164, as before described, and then through the spring 166, the wire 213,

the register-relay 212, the wire 214, the binding-screw 190, thence through the wire 191, the battery 192, to the ground-plate G. The closing of the circuit through the register-relay 212, energizes the magnet thereof, and moves its armature 215 into engagement with the contact-screw 216 closing the circuit, which beginning with the said screw will flow through the wire 217, to the binding-post 218, located on the outside of the case A, (see Fig. 1,) thence through the wire 219 to the register battery 220, thence to the wire 221, to the register 39, thence through the wire 222 to the binding-post 223, and the wire 224 to the heel of the armature 215. The register when thus cut into the circuit will make a permanent record of the breaking and closing of the circuit at the sub-station by means of the policeman's or pocket transmitter, which is adapted, as has been already explained, to reproduce the policeman's number, which will therefore be recorded by the register.

Having thus described the circuits at the central-station, and some of their adjuncts not elsewhere referred to, and the effect upon the central-station apparatus of closing and interrupting its circuits, the circuits in one of the sub-stations and some adjuncts thereof not already mentioned, will now be set forth by reference to the diagram shown by Fig. 21 of the drawings. In the normal condition of the apparatus in any sub-station, the circuit will be from the ground-wire 225 to the ground-side 226 of the lightning-arrester located in the box 42 of the sub-station, thence through the wire 227 to the spring 152 (see also Fig. 19), thence to the hub 148 mounted on the arbor 141 of the citizen's-transmitter, thence from the said hub to the corresponding spring 152, thence through the wire 228 to the spring 169 now in contact with the spring 168, thence from the spring 168 through the wire 229 to the high-resistance magnet 63 of the variable signal-receiver located at the sub-station, thence from the said magnet to the wire 230, to the line plate 231 of the lightning-arrester and thence through the line wire M, which appears on the other diagram. Should a call be sent from the central station to the sub-station, following the path described, the high-resistance magnet 63 therein, will be energized with the effect of releasing the visual-signal, as before set forth.

In case an officer in the field desires to communicate with the central-station, he opens the door 43 of the box 42 of the lamp-post, and thereby breaks the contact between the door-springs 168, 169, and thus cuts out the high-resistance magnet 63 from the circuit. It will be understood that directly upon the sending of a call from the central-station to any of the sub-stations, the operator at the central-station will remove from the switch-board thereat the switch-plug which was required to connect the sub-station to be called with the central-station, whereby the high-

resistance magnet of the variable-signal transmitter located at the central-station will always be cut out of line, leaving the line connected through the receiver at the central-station, and free to be operated from any of the sub-stations. The officer at the sub-station now sets the indicator of the variable signal-transmitter therein to the signal or want which he desires to have reproduced at the central-station. The circuit closed by setting the variable signal-transmitter as described, will be from the ground-wire 225, see Fig. 21, to the ground plate 226, thence through the wire 232 to the right-hand spring 118 of the variable signal-transmitter, thence through the hub 116 of the transmitter to the corresponding left-hand spring 118, thence through the wire 233 to the transmitter-magnet 114, thence through the wire 234 to the strap 119, the hasp 121, the inwardly projecting finger 124 thereof, the contact-spring 125, (see Fig. 12^a), the wire 235, and the line-plate 231 of the lightning-arrester, and then out through the line wire M. The closing of this circuit last described starts the main-receiver at the central-station in locating the sub-station, and reproducing the signal as before described.

In case the officer at the sub-station desires to communicate telephonically with the central-station, he sets the variable-signal transmitter to the word "Telephone" on the dial thereof, whereby the main receiver at the central-station is caused to locate the sub-station, and indicates that the officer at the sub-station desires to telephone. The officer at the central-station then inserts the plug 13 of the telephone 11, at the central-station into that spring-jack in the switch-board of the central-station which corresponds to the sub-station calling. The officer at the sub-station now removes the handle-telephone 238 from the hook 239, which will then be lifted into engagement with the spring 240, thus cutting the telephone into the line, and also into engagement with the springs 241 241, and thus cutting the transmitter 242 of the telephone into line. The circuit will now be from the ground-wire 225 to the ground-plate 226 of the lightning-arrester, thence over the wire 243 to the handle-telephone 238, thence through the wire 244 to the induction-coil 245 of the telephone-transmitter 242, thence through the wire 246 to the spring 240, through the hook 239, to the wire 247, and thereto to the line-plate 231 of the lightning-arrester, and thence to the line M. At the same time the circuit will be closed through one of the plates, 241 through the wire 248, through the induction-coil 245, thence through the wire 249 to the telephone-battery 250, thence through the wire 252 to the other plate 241, which is now connected with its fellow by means of a metallic strip which is not shown.

In case a citizen desires to send a call into the central-station, he inserts a key which is

charged to him, into the key-hole 129, (see Fig. 11,) formed in the door 43 of the box 42 of the lamp-post forming the sub-station. The turning of the key interrupts the operation of the citizen's transmitter, as before described, in moving the star-wheel thereof one point so as to close the circuit through the instrument, in opening the normal circuit through the sub-station, and in cutting out the high resistance magnet 63 of the sub-station, by disengaging the contact-springs 152 152 of the instrument (see Fig. 21) from the metallic strip 153 (see Fig. 19), located in the non-conducting hub 148. The circuit will now be from the ground-wire 225 to the plate 226, thence over the wire 252 to the magnet 146 of the instrument, thence through the wire 253 to the left-hand spring 150, thence through the conducting strip 149 to the right-hand spring 150, thence through the wire 254 to the line plate 231, thence to the line wire M. In case the citizen's-transmitter is operated from a private house by closing a local circuit thereat, the current will enter the apparatus through the binding-post 255, (see Fig. 21,) thence through the wire 256, to the spring 257, thence to the contact-spring 258, thence through the wire 259, to the magnet 157, thence through the wire 260 to the binding-post 261. The energization of this magnet 157 by attracting its armature 156, causes the tail 155 thereof to move the secondary operating-lever 154, and therefore rotate the star-wheel 142 and the arbor 141 sufficiently to cut the high-resistance magnet 63 out of circuit, and the magnet 146 into the circuit. The circuit now established will be the same as that just described.

In case an officer desires to leave a permanent record at the central-station of his visit to the sub-station and his individual number, he opens the door of the lamp-post, and sets the variable signal-transmitter therein to the word "Register" as before described, whereby he causes the actuation of the main-receiver at the central-station to cut in the relay and the register thereat. He then plugs his pocket-transmitter into the switch provided therefor in the lamp-post. The path of the current now established is from the ground wire 225 to the ground-plate 226, thence through the wire 262 to the spring-plate 159, thence to the left-hand section 161 of the split-tube, thence through the pocket-transmitter, thence through the right-hand section 161 of the split-tube, the other plate 159, and through the wire 263, to the line-plate 231 and over the line wire M.

Having now described the several circuits of the central station and sub-station apparatus, the use of the apparatus will be briefly set forth independent of any special reference to the circuits. Supposing that at the central-station it is desired to call up any officer in the field, the officer at the central-station inserts the plug of the variable transmitter

thereof into the spring-jack connected with the sub-station located in the beat of the officer whom he desires to call. Having done this, he turns the indicator of the transmitter against the signal or want which he desires to place before the said officer in the field, and then turns the crank of the rheotome located at the central-station, whereby the circuit leading to the said sub-station is interrupted with the effect of operating the variable signal-receiver at that station, and reproducing the want or call to which he has set the variable signal-transmitter in the office, and throwing up the visual signal, which is released by the magnetization of the magnet of the receiver in the sub-station. The officer On the beat being now attracted to the sub-station by the exhibition of the visual-signal, goes up to the lamp post and opens the door thereof, and reads upon the dial of the receiver the message sent to him from the central-station; his further action will depend upon the character of that message, but before leaving, he retires the visual signal, and in so doing restores the variable signal-receiver to its normal adjustment. Should it be necessary for the officer on his beat to communicate with the central-station, he opens the door of the lamp-post and sets the indicator of the variable signal-transmitter therein to the want or signal which he desires to reproduce at the central-station; if he desires to communicate with the officer at the central-station telephonically, he sets the indicator of the transmitter to the word "Telephone," which is reproduced by the main-receiver in the central station together with the number of the station which he is calling from. The officer at the central-station then places his telephone in line, and the two officers telephone to each other. Should it be impossible or not desirable to use the telephones for communication between the central-station and the sub-station, or should the sub-station not be provided with a telephone, the variable signal-transmitters respectively located at the central-station and the sub-station may be used as a means of communication. In this case the door of the sub-station must be closed immediately after the officer at the sub-station has sent in the signal to the central-station in order that the receiver at the sub-station may be cut into the circuit for receiving the message from the central-station. Instead, however of closing the door of the lamp post, the officer may hold the springs 168—169 closed by his fingers. In this case also the officer at the central-station must remove the plug of the transmitter thereat from the switch-board every time he asks a question of the officer at the sub-station, so that the receiver at the central-station will be in readiness to receive the message sent by the officer at the sub-station. After the receiver at the central-station has been operated in the receipt of a message, the officer manipulates the

crank thereof so as to release its restoring-lever X, which with its manifold connections, restores all the parts of the said receiver to their normal positions of readiness to be operated again from any one of the sub-stations. The use of the apparatus by a citizen sending in a call, and also of the officer in the field to obtain a permanent record of any visit that he may make to a sub-station, has been so fully described that it does not need further exemplification.

Although shown and described herein in its adaptation to municipal purposes, my apparatus is especially suited for use in hotels in the place of the annunciating mechanisms ordinarily employed. I would therefore have it understood that I do not limit myself to the exact construction shown and described, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a series of sub-stations each containing a variable signal-receiver, a variable signal-transmitter, and a visual signal; of substantially the construction described of a central-station containing a main-receiver adapted to co-operate with the transmitters at the sub-stations to locate the same and to reproduce the wants to which the said transmitters may be set, a variable signal-transmitter to co-operate with the signal-receivers located at the sub-stations and through said receivers operate the visual signals, from the said central station and a rheotome also located at the central-station for co-operation with the said variable signal-transmitter thereat, substantially as described.

2. In an electric-receiver, the combination with a series of contact-buttons insulated from each other, of a gang-switch carrying a spring-finger for each button and normally held with its spring-fingers in engagement with the said buttons, and tripping mechanism for automatically releasing the switch to permit it to fall away from the buttons, and simultaneously disengage all of its fingers therefrom, substantially as described.

3. In an electric-receiver, the combination with a series of contact-buttons insulated from each other and forming terminals of sub-stations, of a gang-switch normally engaged with all of the said terminals, and having a rigid frame, means for mounting the switch to move in a curved path, tripping mechanism for holding the said switch in its normal position, and releasing it therefrom, and means for restoring the switch to its normal position after it has been tripped, substantially as described.

4. In an electric-receiver, the combination with a series of insulated terminals respectively connected with sub-stations, of a gang-switch normally engaged with the said ter-

minals and having a rigid frame, links attached to the said frame and to the case of the receiver, whereby the frame is caused to move in a circular path, tripping mechanism for holding the switch in its normal position, and releasing it therefrom, a restoring lever, and connection between the switch and the said lever for re-engaging the switch with the tripping-mechanism, substantially as described.

5. An electric apparatus for inter-communication between a central-station and a series of sub-stations, having at its central station a series of circuit-closers connected together for simultaneous movement, and arranged in isolated groups, each group communicating with an independent relay located in the main-line of the apparatus.

6. In an electric receiver, the combination with a series of contact-buttons, of a gang-switch consisting of a movable frame carrying a series of circuit-closers corresponding to the said terminals, and arranged in isolated groups, independent relays connected with the respective groups and located in the main line of the apparatus, tripping mechanism for holding the switch in its normal position in which its circuit closers are engaged with the said buttons, and manual restoring devices for returning the switch to its normal position after it has operated, substantially as described.

7. In an electric-receiver, the combination with a series of contact-buttons, of a gang-switch consisting of a movable frame carrying a series of circuit-closers corresponding to the said terminals and arranged in isolated groups, independent relays for the respective groups, relay-terminals arranged with the terminals mentioned, and relay circuit-closers carried by the switch and arranged thereon for engagement with the respective relay-terminals, terminals of the circuit of the tripping-magnet arranged with the terminals referred to, a special circuit-closer carried by the switch for the said terminals, tripping mechanism for holding the switch in its normal position in which all of the circuit-closers are engaged with their proper terminals, a circuit-closer in the starting-magnet circuit arranged to be closed by the switch when it drops away from the terminals, and manual restoring mechanism for returning the switch to its normal position, substantially as described.

8. In an electric apparatus for inter-communication between a central station and a series of sub-stations, the combination with a series of variable signal-receivers located at the respective sub-stations, having the circuit normally closed through them, and each containing a magnet of high resistance, of a series of variable signal-transmitters also located at the respective sub-stations and each containing a magnet of low resistance, a variable signal-transmitter also located at the

central station and containing a magnet of high resistance, a series of terminals located at the central-station and respectively connected with the sub-stations, and a series of
 5 movable contact-fingers located at the central station, connected together for simultaneous movement and arranged in isolated groups, in position to engage with the said terminals to which they correspond, an inde-
 10 pendent relay located in the main line of the apparatus for each group of terminals, substantially as described and whereby the abnormal operation of either the central or sub-station apparatus by reason of a too great re-
 15 duction of electric resistance is avoided.

9. The combination with a series of variable signal-transmitters respectively located at sub-stations, of a main-receiver located at the central-station and adapted to locate them
 20 and to reproduce signals to which they may be set, and containing a register switch which it brings into action when suitably operated by the transmitters; a relay and register connected with the said switch, which, when op-
 25 erated cuts in the relay whereby an electric connection is established between the sub-station at which the transmitter calling is located, and the register, substantially as described.

30 10. The combination with a series of variable-signal transmitters respectively located at sub-stations, of a receiver located at a central-station, and adapted to locate the said transmitters which are independently con-
 35 nected with it, and to reproduce the signals to which they may be set, and containing a register switch which it brings into action when suitably operated by the transmitters; a relay and a register connected with the said
 40 switch, which, when operated cuts in the relay whereby the electric connection is established between the station at which the transmitter calling is located and the register; and means respectively located at the sub-stations
 45 for receiving portable transmitters by means of which numbers are transmitted to the register, substantially as described.

11. In a citizen's transmitter, the combination with a circuit-controller, of an operating-
 50 lever connected therewith and provided with a shoulder having its outer edge beveled, and its inner edge inclined, a handle-lever provided with a spring-arm carrying a beveled finger which jumps from the beveled outer
 55 edge of the said shoulder to the inclined inner edge thereof when the instrument is set, a spring for moving the said handle-lever, whereby the said beveled-finger and shoulder co-operate to shift the operating-lever and
 60 hence the circuit-controller, and a lock arranged to have its bolt engaged by the lower end of the handle-lever for holding the same in its normal position, and constructed to retain its key when its bolt is retracted, sub-
 65 stantially as described.

12. In a citizen's transmitter, the combina-

tion with a circuit-controller, an operating-lever connected therewith and provided with a shoulder having its outer edge beveled and its inner edge inclined thereto, a handle lever
 70 provided with a spring-arm carrying a beveled-finger arranged to normally engage with the inclined inner edge of the said shoulder, a spring for moving the said operating-lever when the same is released, whereby the be-
 75 veled finger and inclined edge of the shoulder co-operate to shift the operating-lever and hence the circuit-controller, a lock having its bolt arranged to hold the lever in its normal position, and means for cutting out the high-
 80 resistance magnet by the shifting of the operating-lever, substantially as described.

13. In an electric apparatus for police-service, the combination with a normally retired visual-signal located at a sub-station, of a vari-
 85 able signal-receiver having a magnet and restoring mechanism, a tripping device operated by the said magnet for releasing the signal, and means for retiring the signal and locking it, and operating as an incident of
 90 their use to act upon the restoring mechanism of the variable signal receiver to restore the indicator thereof to its normal position, substantially as described.

14. In an electric apparatus for police-service, the combination with a normally retired
 95 visual-signal having a colored glass globe, a long tube, and a beveled finger located at the lower end of the said tube, of a rocking shaft provided with a beveled finger and with a de-
 100 pending pin, a variable signal-receiver having the armature of its magnet normally engaged by the said depending pin, and a restoring-arm projecting outwardly from its case, and means attached to the lower end
 105 of the said tube for engaging with the restoring arm of the receiver to restore the same to its normal adjustment, substantially as described.

15. In an electric-apparatus for police-service, the combination with a series of variable-
 110 signal receivers respectively located at the sub-stations and each having a high resistance magnet, of a main-receiver located at the central station and having variable sig-
 115 nal-receivers independently connected with it, a variable-signal transmitter located at the central-station and provided with a high resistance magnet corresponding to the mag-
 120 nets of the receivers located at the sub-stations, a series of variable signal-transmitters respectively located at the sub-stations, and means for cutting out the said high-resistance magnets for the co-operation of the variable-
 125 signal transmitters at the sub-stations with the main-receiver at the central station, substantially as described.

16. In a variable signal-transmitter, the combination with a dial displaying a series
 130 of signals or wants, of an indicator to specify any one of them, an escapement mechanism through which the indicator is automatically

operated, a magnet, and an armature for controlling the said escapement mechanism, and means for automatically actuating the escapement mechanism in its retrograde movement
5 when released by the armature and magnet, substantially as described.

In testimony whereof I have signed this

specification in the presence of two subscribing witnesses.

HORACE E. WALTER.

Witnesses:

FRED C. EARLE,

GEORGE D. SEYMOUR.