

Feb. 9, 1937.

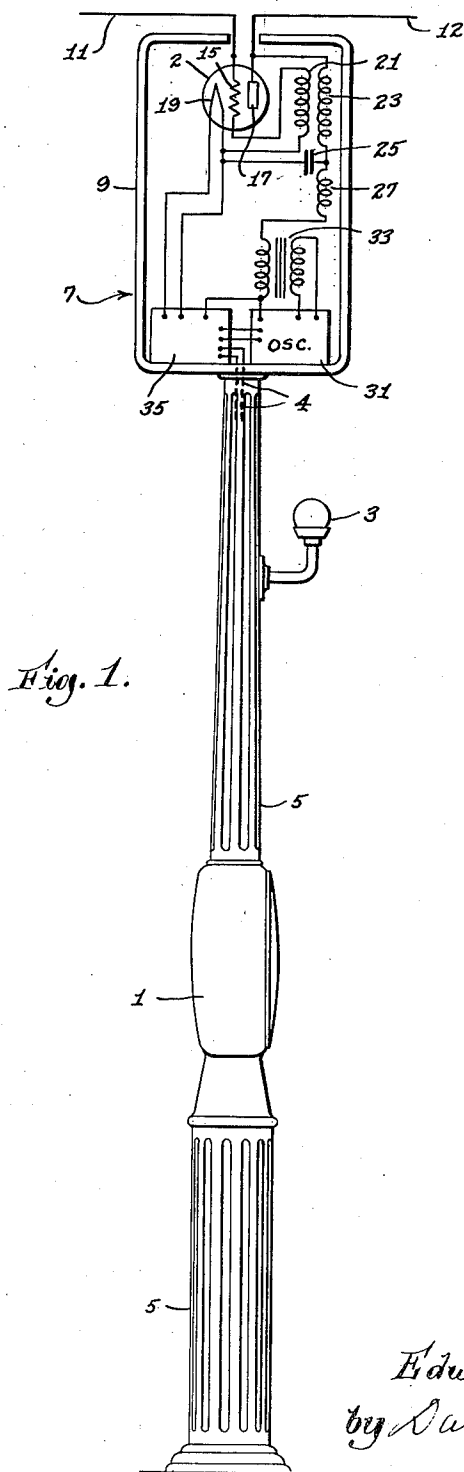
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2,070,112

POLICE COMMUNICATION SYSTEM

Filed Oct. 3, 1932

4 Sheets-Sheet 1



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POLICE COMMUNICATION SYSTEM

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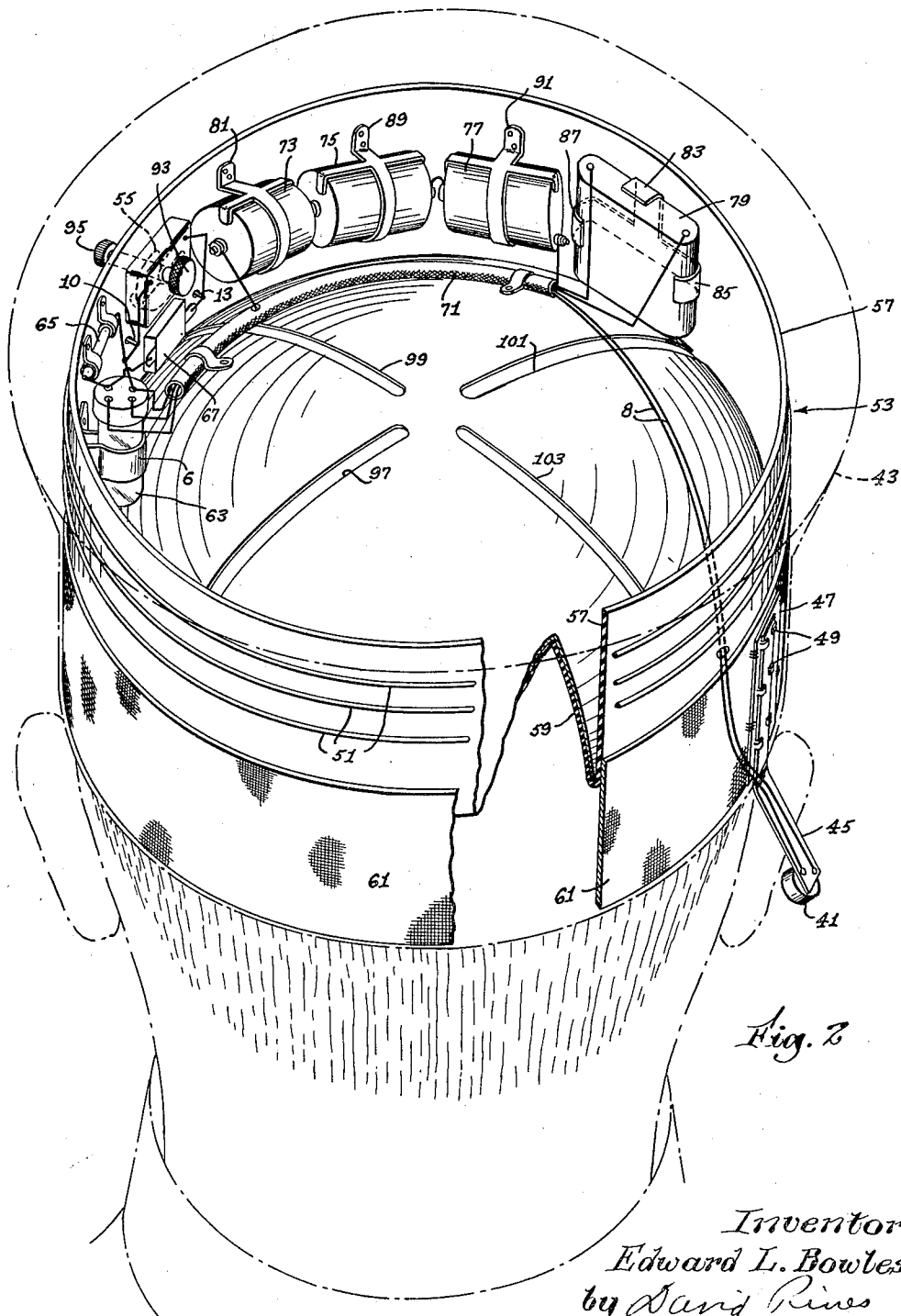


Fig. 2

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Fig. 3

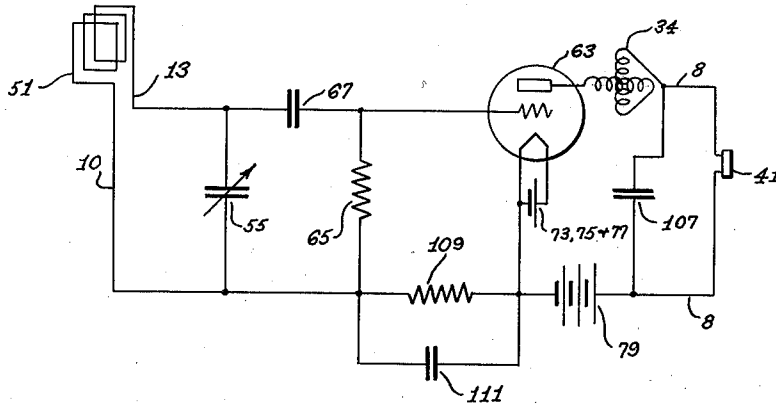
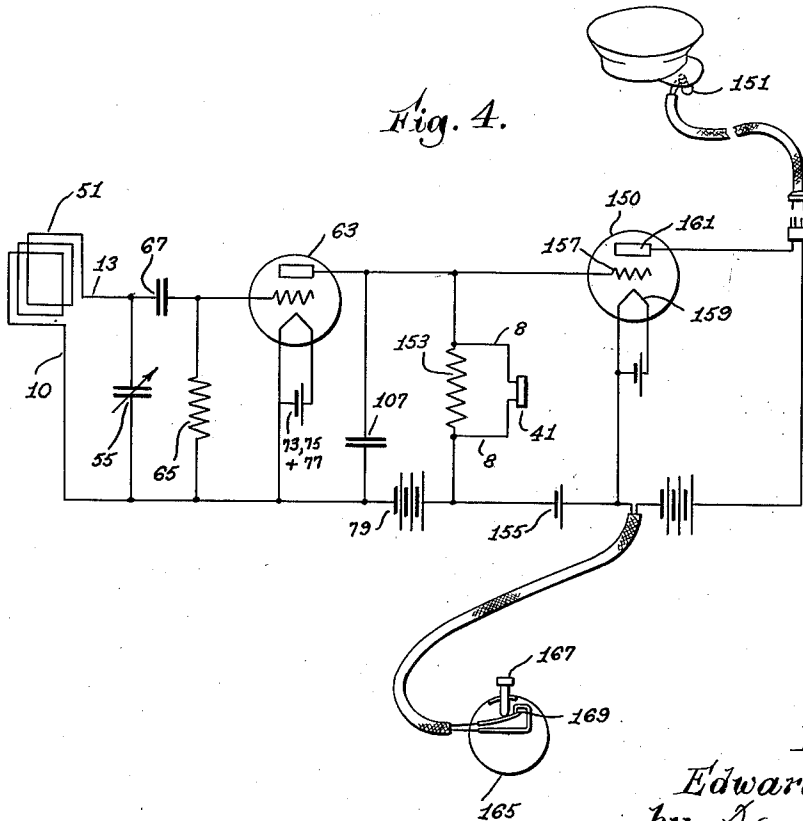


Fig. 4.



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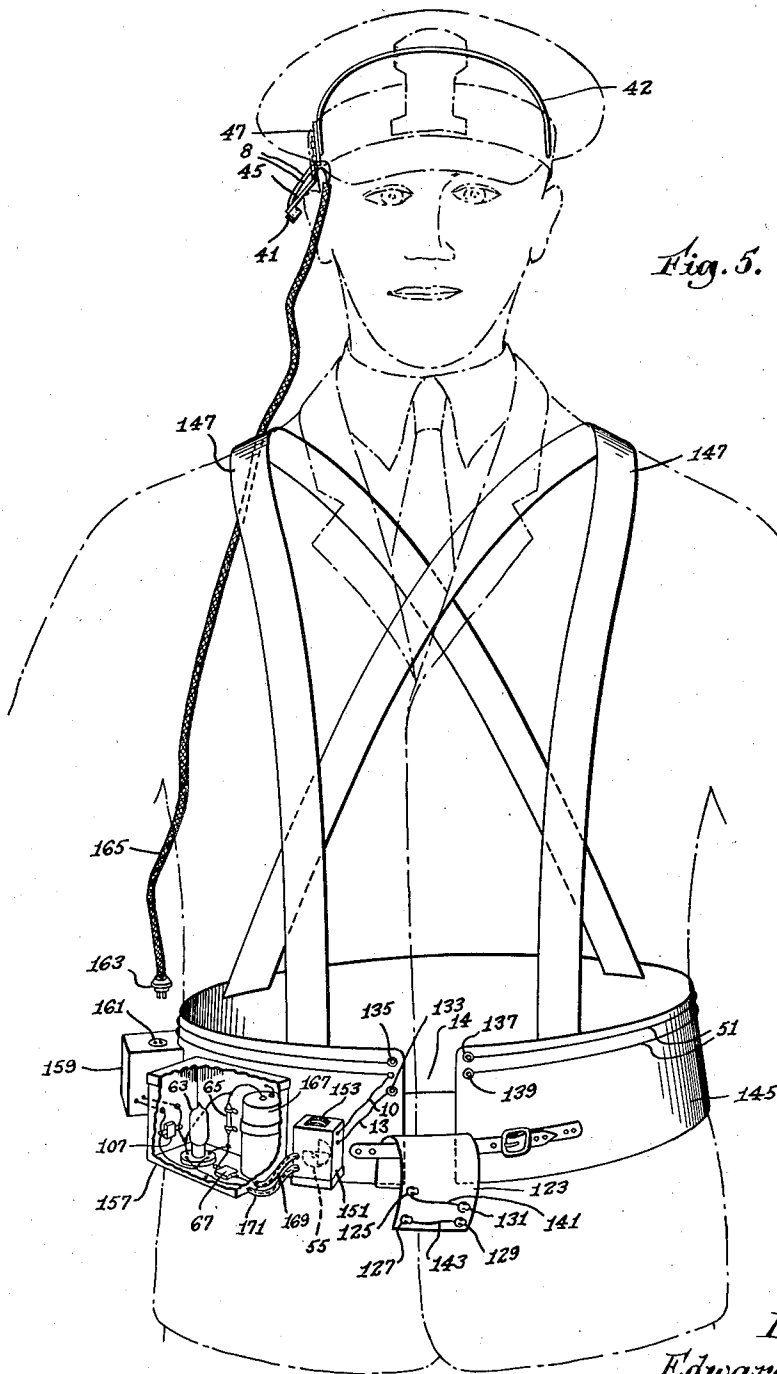


Fig. 5.

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UNITED STATES PATENT OFFICE

2,070,112

POLICE-COMMUNICATION SYSTEM

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5 Claims. (Cl. 250-14)

The present invention relates to communication systems and more particularly to systems by which police headquarters may communicate with the patrolmen on their beats.

According to present-day methods of signaling, a patrolman is signaled by means of signal lights located on the different beats. Because of fog or other factors, however, the patrolman is not always able to see the lights.

An object of the present invention, therefore, is to provide a novel system for communicating with patrolmen, thus dispensing with the necessity for their being always in sight of the signal lights.

A further object is to provide a simple signaling system for the police, which may be conveniently carried about by the ordinary patrolman.

Another object is to provide a small transmitter and receiver, particularly for police, and adapted for use with short waves.

Other and further objects will be explained hereinafter.

The invention will now be described in connection with the accompanying drawings, in which Fig. 1 is an elevation of a police call box, equipped according to the present invention, a diagram of circuit connections and other electric elements being embodied therein for clearness; Fig. 2 is a perspective view, parts being broken away for clearness, of a patrolman's head, his hat, shown in dot-and-dash lines, being provided with a preferred receiving system; Fig. 3 is a diagram of circuits arranged according to a modification of the arrangement shown in Fig. 2; Fig. 4 is a modified circuit diagram; and Fig. 5 is a diagrammatic view, similar to Fig. 2, illustrating the equipment of the present invention as worn by a patrolman's belt.

Referring first to Fig. 1, the usual police call or signal box 1 and call light 3 are shown carried upon the usual supporting post 5. A radio-signaling, transmitting system 7 is shown carried at the top of the post 5. The signaling system 7 comprises a unit carried in a housing 9 for a generator of radio frequency and a radiating antenna system 11, 12. The receiving-system equipment, as will hereinafter appear, is built into the patrolman's uniform. According to this invention, therefore, it is possible to call a patrolman who is not, at the moment, in sight of his call light 3, either because of momentary duties carrying him outside of the realm of vision of this light, or because of fog or other obstructing cause.

The radiating elements 11 and 12 are shown associated with a vacuum tube 2 having a grid 15, a plate or anode 17 and a filament or cathode 19. The oscillating circuit is completed, in the ordinary, well known, way by means of coupled coils 21 and 23 in the input and the output circuits, respectively, of the vacuum tube 2. A bypass condenser 25 is disposed in the output circuit to prevent the direct voltage from a common source 35 of power supply from reaching the filament 19. A radio-frequency choke 27 prevents the radio-frequency energy from reaching the modulating and power sources.

A vacuum-tube oscillator and amplifier, for modulation, schematically represented at 31, is capable of producing a given modulation frequency: for example, 500, 800 or 1,000 cycles per second, intended to be within the range of maximum ear sensitivity. The output from this modulating unit 31 is coupled to the oscillator of the vacuum tube 2 by means of a transformer 33. Both the modulated oscillator and the modulator unit 31 are supplied from the power source 35, which may comprise either batteries, or the usual rectifier-and-filter arrangement, converting alternating current into direct current. The power source 35 may supply, as well, filament-transformer facilities to heat the filament 19 or other heating elements of the vacuum tubes necessary for the oscillator and the modulator. When energy is sent to the power supply 35 from the signalling station (not shown) at headquarters, along conductors 4, modulated oscillations will be radiated into space from the elements 11 and 12.

By making use of exceptionally high, radio frequencies, it is possible to make this radiating system extremely small and, above all, to make the receiving unit, about to be described, exceedingly small.

The police receiving system is intended to produce either an audible or a visible signal by means of apparatus attached to the patrolman. In Fig. 2, for example, the police receiving-system equipment is shown comprising a miniature, telephone, sound reproducer 41 that is held close to, but separate from, the ear. This miniature sound reproducer 41 is tuned to the modulating frequency of the police transmitter 7, thus yielding the maximum possible sensitivity of this translating element 41. This sound reproducer 41 is so arranged that it will not in any way interfere with the normal function of the ear. It is, however, mounted upon a flexible and spring-like section 45, in order that, if the patrolman should wish to

detect an unusually weak signal, or if, because of local noise, he should wish to make sure of the signal received, he may momentarily flex the section 45, thus pressing this sound reproducer element 41 to his ear. The sound reproducer 41 will spring back, away from the ear, when the pressure is released. The spring-like section 45 may be mounted upon headgear, such as a head band 42 (Fig. 5) or other head-harness arrangement that may be worn immediately beneath the patrolman's cap or helmet 43. It is preferred, however, to mount the spring 45 for holding the sound reproducer 41 directly on the hat or helmet 43, as illustrated, upon a fixture 47 which, in turn, is secured to the inside of the helmet or cap 43 in any desired manner. This fixture 47 is provided with clips 49 for retaining the spring element 45, so that it may extend downward below the hat 43 and adjacent to, and separated from, the ear. It may be moved up or down for adjustment to a particular ear or to a particular cap setting.

The loop 51 is shown in Fig. 2 wound around an insulating, shape-retaining form or shell 53 that comprises a cylindrical outer portion 57, a dome-like, inner portion 59 and a fabric, flexible base 61. It is sometimes desirable to cover the dome 59 with aluminum foil which has been cut radially to suppress eddy currents, as indicated at 97, 99, 101 and 103. This entire structure, which is relatively rigid, and relatively free from changes of tuning due to the mechanical movement of the parts, may be fitted inside the cap or helmet.

The terminals 10 and 13 of the loop 51 connect with a variable condenser 55 suitable for tuning the loop to the signal it is desired to receive. The condenser 55 is provided with adjusting knobs 93 and 95. The tuned loop is associated with a detector tube 63 which is held in a clamp 6 that is fixed to the shell 53. This detector tube 63 is, in turn, associated with a grid leak 65, a grid condenser 67, and batteries 73, 75 and 77 for energizing or exciting the filament of the detector tube 63, and a battery 79 for energizing the plate circuits. These batteries 73, 75 and 77 are respectively held in place by clips 81, 83 and 91. The battery 79 is held by clips 83, 85 and 87. A cable 71 carries conductors for furnishing the battery supply to the tube 63 and also for carrying the output leads 8 to the sound reproducer 41.

The arriving signal affects the tuned, loop-receiving circuit 51, 55, thus affecting the detector tube 63 and its associated circuits, giving a signal of the modulated frequency in the resonant sound reproducer 41.

In Fig. 3, there is disclosed a receiving circuit which will respond well to both strong and weak signals. The loop antenna 51 and the tuning condenser 55 are connected in the input circuit of the detector tube 63, which input circuit has the usual grid condenser 67 and the usual grid leak 65. In the plate circuit, there is connected the resonant sound reproducer 41, as well as a by-pass condenser 107 for radio frequencies. In addition, however, there is included in the circuit a resistor 109, and a by-pass condenser 111 for radio and audio-frequencies. In this circuit, with strong signals, to rectify grid currents, an average bias is produced which increases negatively with signal intensity, thus preventing overloading. In addition to the signal-curling device, comprising the elements 109 and 111, a variometer 34 is shown connected in the plate circuit of the tube to introduce regeneration. It may even be sometimes desirable to make the circuit super-regen-

erative in any well known fashion. As is well understood by those skilled in the art, a straight wire or open antenna may be used in place of the coil antenna 51.

In some cases, it is advantageous to carry the receiving equipment on the belt 145, rather than in the helmet 43, as illustrated in Fig. 5. The loop 51 consists of convolutions about the belt. As the belt 145 is split at 14 to facilitate mounting on the person, it is provided with an insulated connecting plate 123. The plate 123 may be connected with the ends of the belt 145 by a plug-and-socket connection. Any desired number of plugs 125, 127, 129 and 131 on the plate 123 may engage in a corresponding number of sockets 133, 135, 137, 139, respectively, provided upon the belt 145. The plugs 125 and 131 are connected together by a lead 141, and the plugs 127 and 129 are connected together by a lead 143. The leads 141 and 143 complete the turns of the loop 51. There will be as many connecting leads 141 and 143 as there are pairs of plugs 125, 131 and 127, 129 connecting with the turns of the loop antenna 51 on the belt 145. If desired, the loop convolutions may be partly disposed, where convenient, about supporting straps 147 for the belt 145.

The loop 51 is associated with a tuning condenser 55, in a shielded box 151, and provided with an adjusting knob 153. This knob 153 consists of a large dialed wheel, only a portion of which extends outside the box, as clearly shown in Fig. 5. The condenser 55 is connected to the receiving equipment in a shielding box 157 which, in turn, is connected with a container 159 for holding battery equipment to supply the plate or anode circuit of the detector in the container 157. The container 157 carries the detector tube 63, the grid leak 65, the grid condenser 67 and the plate by-pass condenser 107. These are associated with a filament-energizing battery 167. Shielded leads 169 and 171 connect this receiving circuit with the variable condenser 55 which, in turn, is connected with the receiving loop 51 in the usual manner.

The connections are substantially as shown in Fig. 3. At the top of the shielded container 159, there is a double plug 161, the leads of which may be connected to the sound reproducer 41 by means of a plug 163 and a flexible cord 165.

The audible signals may be used in combination with a visual receiver, in the form of a signal light 251. It is possible to add to the detector tube 63, and to its associated receiving circuit, an auxiliary circuit comprising a tube 150 of the "Thyratron" type, that is, a grid controlled arc tube, having a grid 257, a filament 259 and a plate 261. The signal light 251, connected in the output circuit of the tube 150, is conveniently fixed to the patrolman's cap visor, so as to be always in sight, as illustrated in Fig. 4, the operation of which is as follows:

In the illustrated, grid-condenser, grid-leak type of detection, the average plate current is less during the reception of the signal than during the absence of the signal. The grid 257 and the filament 259 of the "Thyratron" tube 150 are connected across a resistor 253 in the plate circuit of the detector 63. The average voltage across this resistor will, therefore, decrease during the presence of a signal. Advantage of this fact is taken by connecting this resistor in series with a battery 155 and the grid-filament terminals of the tube 150. The grid 257 may be so biased, by means of the battery 155, in conjunction with the normal voltage across the re-

sistor 253, that, without a signal, it is too negative for the arc discharge to take place between the filament 259 and the anode 261. Thus there will be substantially no current in the plate circuit of the tube 150 connected to the light 251. If, on the other hand, a signal arrives and produces an additional voltage drop across the resistor 253, it will be such as to decrease the negative bias on the grid 257, thus making this grid more positive with respect to its filament 259 than it originally was, and if the adjustment of the battery 155 is correct, the tube 150 will be caused to break down into an arc discharge between plate and filament upon the arrival of a signal, thus causing the light 251 to glow. In order to extinguish the light, it is necessary to open the plate circuit of the tube 150. This is accomplished by means of a small, push-button, switch arrangement 265, which may be placed at any convenient point on the patrolman's person; for example, it may be secured to his belt. Pressing the button 267 will cause the contact member 269 to open, thus restoring the tube 150 to its original, trigger-sensitive condition. Upon releasing the button 267, the contact member 269 will become reclosed, leaving the tube 150 once more ready to function upon the reception of another signal.

It will be understood that the above-described embodiments are illustrative merely and that they are shown diagrammatically, to illustrate the invention, and without any attempt to maintain the relative scale of the various parts. In Fig. 1, for example, the radiating elements 11 and 12 of the antenna will, in practice, be raised higher above the housing 9 than is illustrated, in order to produce a vertically and horizontally polarized radiation field.

Further modifications will also occur to persons skilled in the art, and all such are considered to fall within the spirit and scope of the invention, as defined in the appended claims.

What is claimed is:

1. A receiving system comprising an insulating form and an insulating dome disposed in a wearer's hat, a receiving loop wound about the insulating form, a signal indicator suspended from the hat adjacent to the wearer's ear, and means connecting the loop and the signal indicator in a receiving system.

2. A radio receiving system comprising a detector having an input circuit and an output circuit, means for picking up the energy of radio waves from a transmitter, tuning means in the input circuit for selecting the energy of the said transmitter, a signal indicator connected independent of the transmitting means in the output circuit, a "Thyratron" tube connected with the output circuit for controlling said signal indicator and restoring means for said "Thyratron" tube.

3. A radio receiving system comprising a detector having an input circuit and an output circuit, means for picking up the energy of radio waves from a transmitter, tuning means in the input circuit for selecting the energy of the said transmitter, a signal indicator comprising a lamp connected independent of the transmitting means in the output circuit, a "Thyratron" tube connected with the output circuit for controlling said signal indicator and restoring means for said "Thyratron" tube.

4. A radio receiving system comprising a detector having an input circuit and an output circuit, means for picking up the energy of radio waves from a transmitter, tuning means in the input circuit for selecting the energy of the said transmitter, a signal indicator connected independent of the transmitting means in the output circuit, a second signal indicator for indicating when the first-named signal indicator is operating, a "Thyratron" tube connected with the output circuit for controlling said signal indicator and restoring means for said "Thyratron" tube.

5. A radio receiving system comprising a detector having an input circuit and an output circuit, means for picking up the energy of radio waves from a transmitter, tuning means in the input circuit for selecting the energy of the said transmitter, an audible signal indicator connected independent of the transmitting means in the output circuit, a second visible signal indicator for indicating when the first-named signal indicator is operating, a "Thyratron" tube connected with the output circuit for controlling said signal indicator and restoring means for said "Thyratron" tube.

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