

March 5, 1929.

J. J. RUDDICK

1,704,104

TRAFFIC SIGNALING SYSTEM

Filed Dec. 15, 1920

7 Sheets-Sheet 1

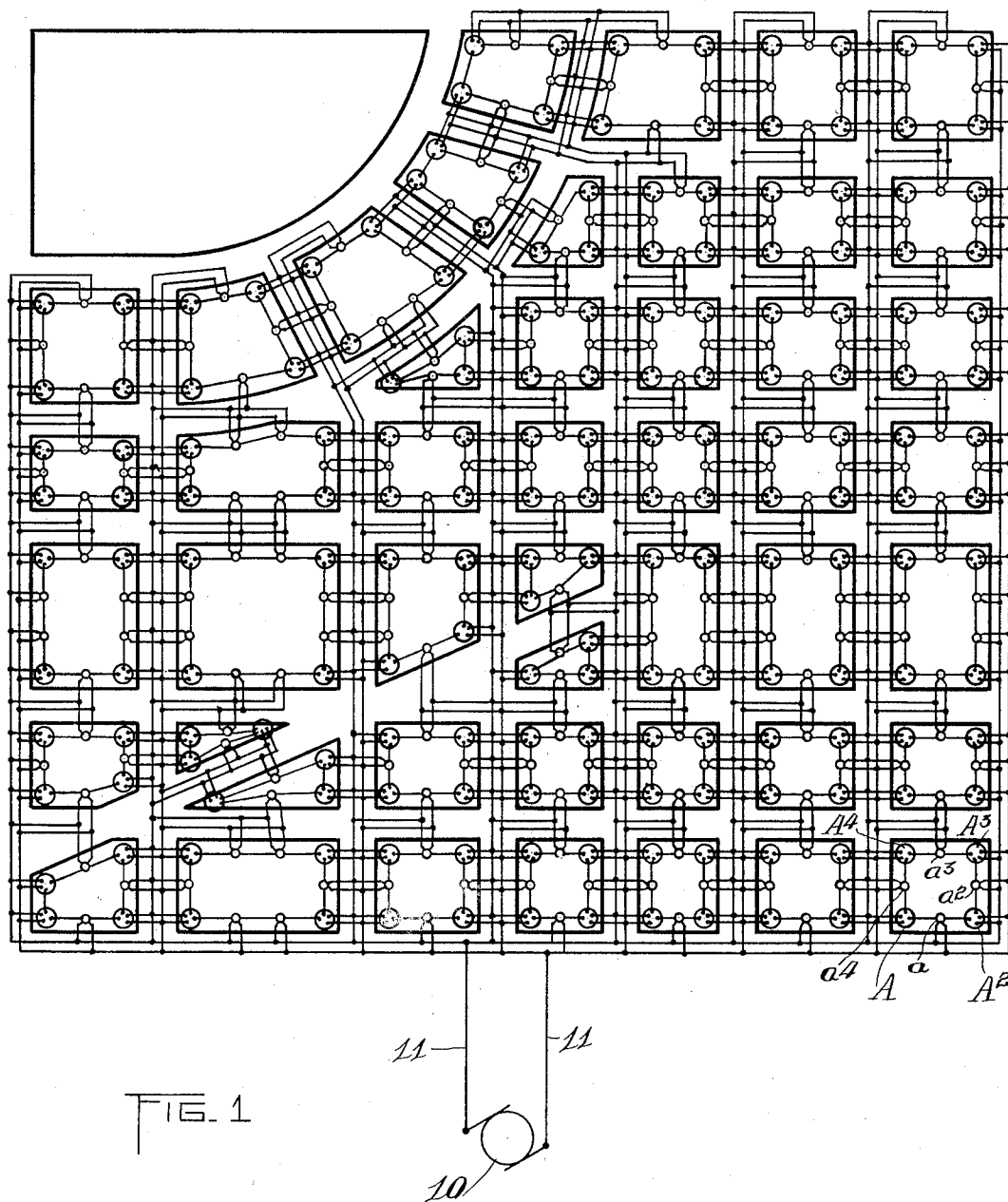


FIG. 1

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TRAFFIC SIGNALING SYSTEM

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7 Sheets-Sheet 2

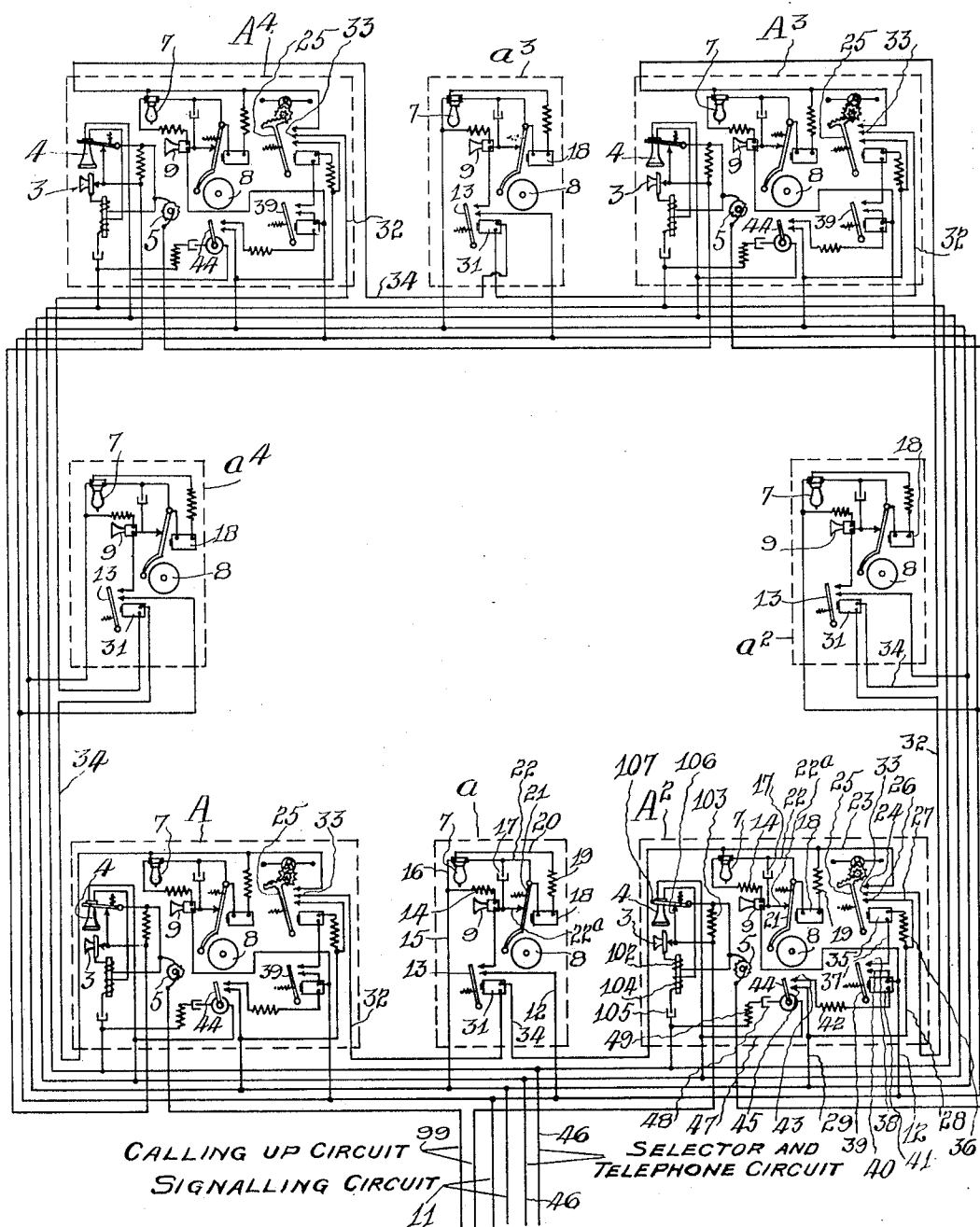


FIG. 2

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TRAFFIC SIGNALING SYSTEM

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7 Sheets-Sheet 3

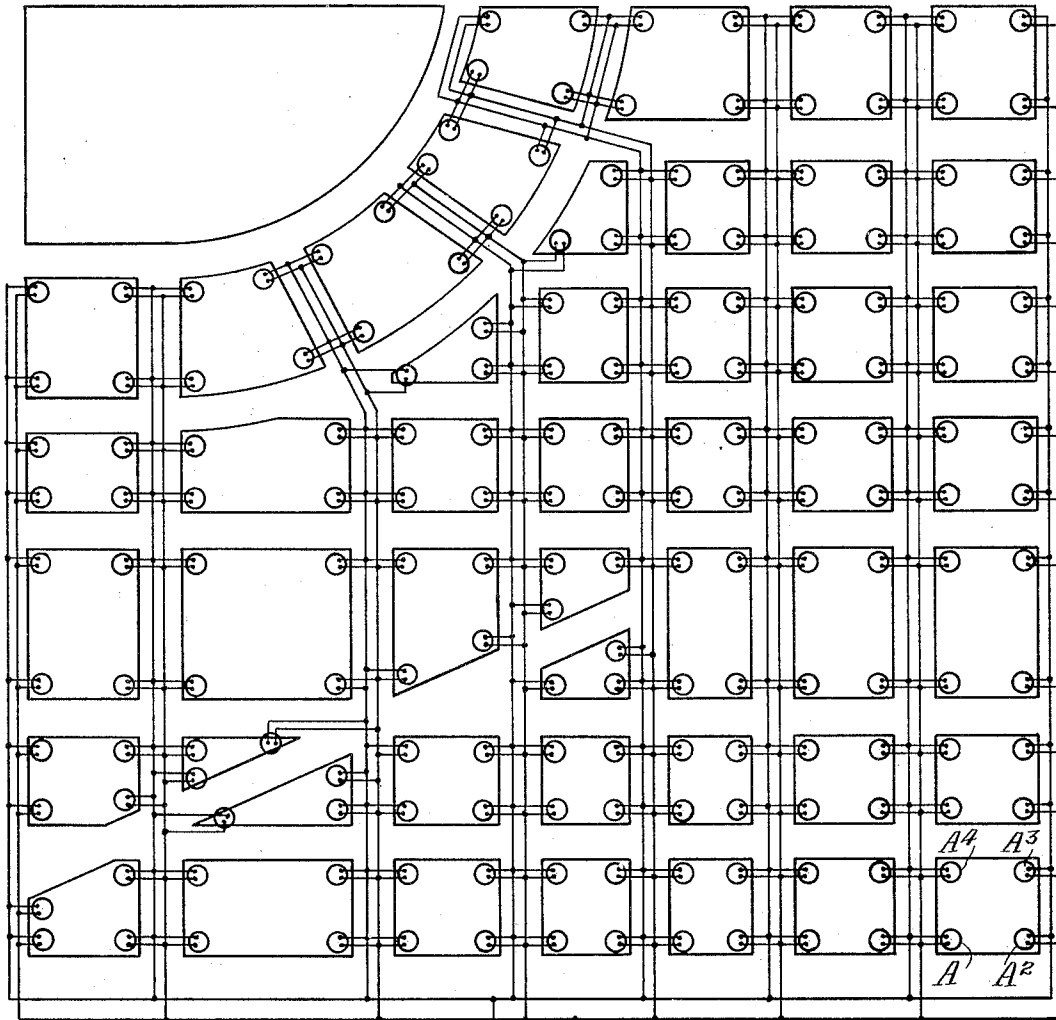
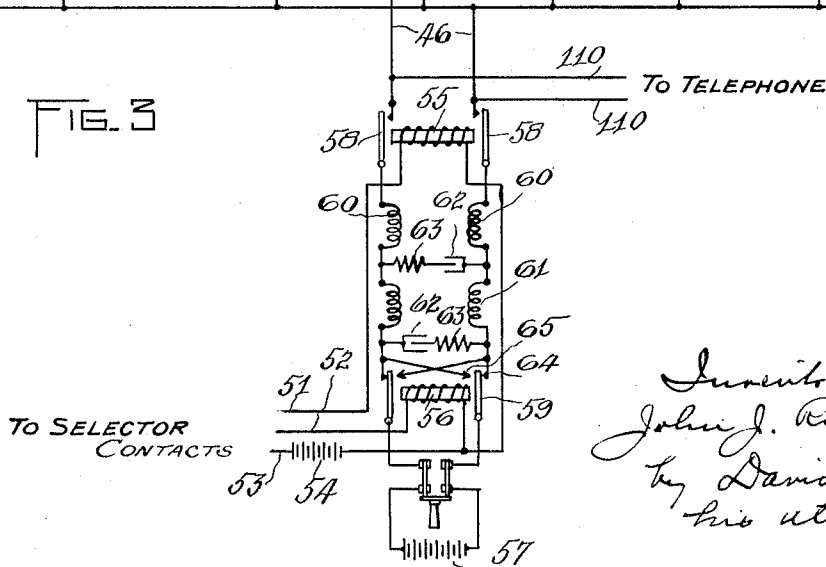


FIG. 2



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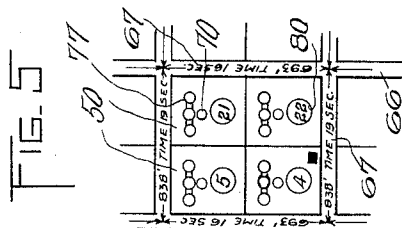
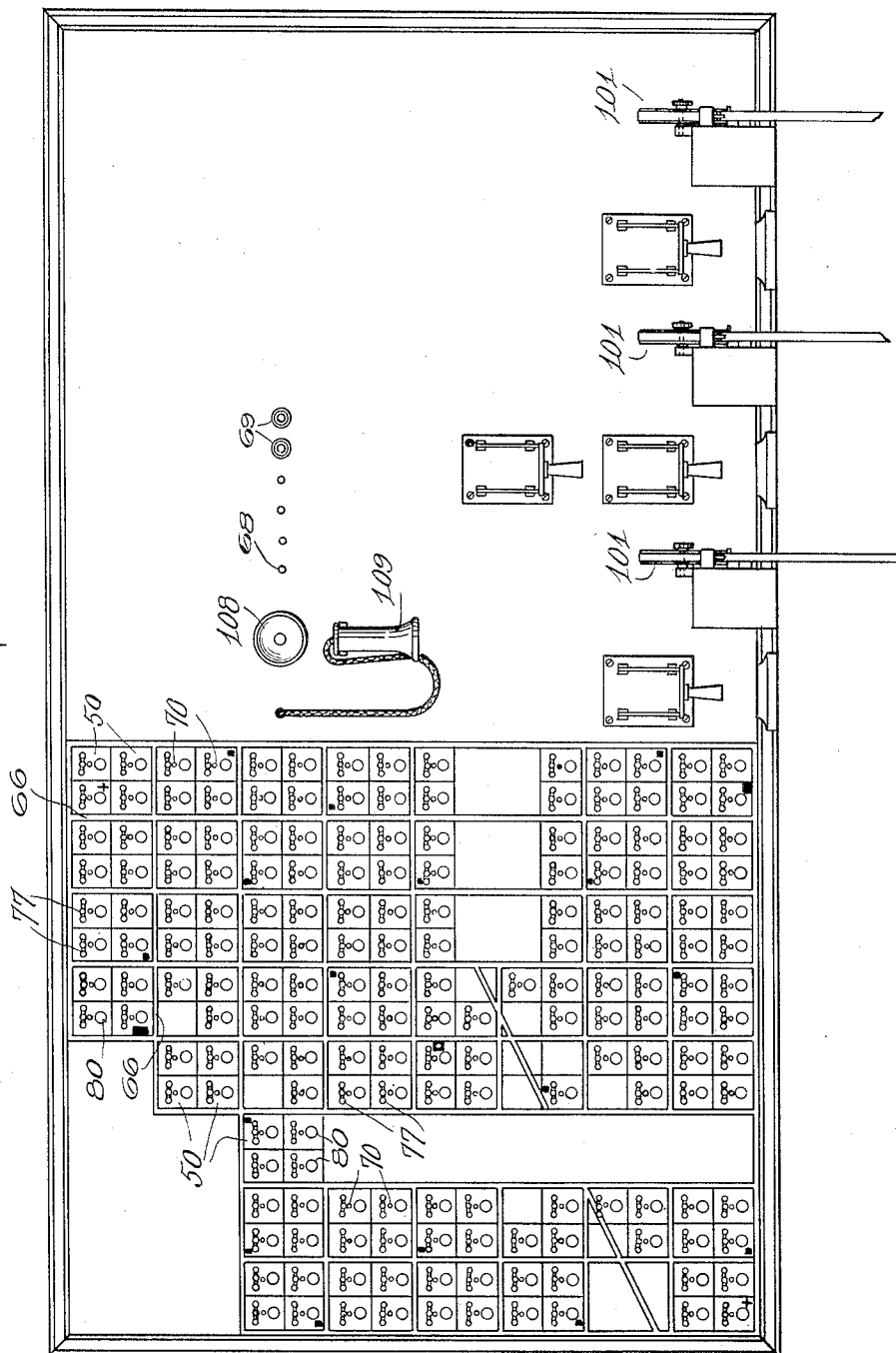
1,704,104

TRAFFIC SIGNALING SYSTEM

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7 Sheets-Sheet 4

FIG. 4



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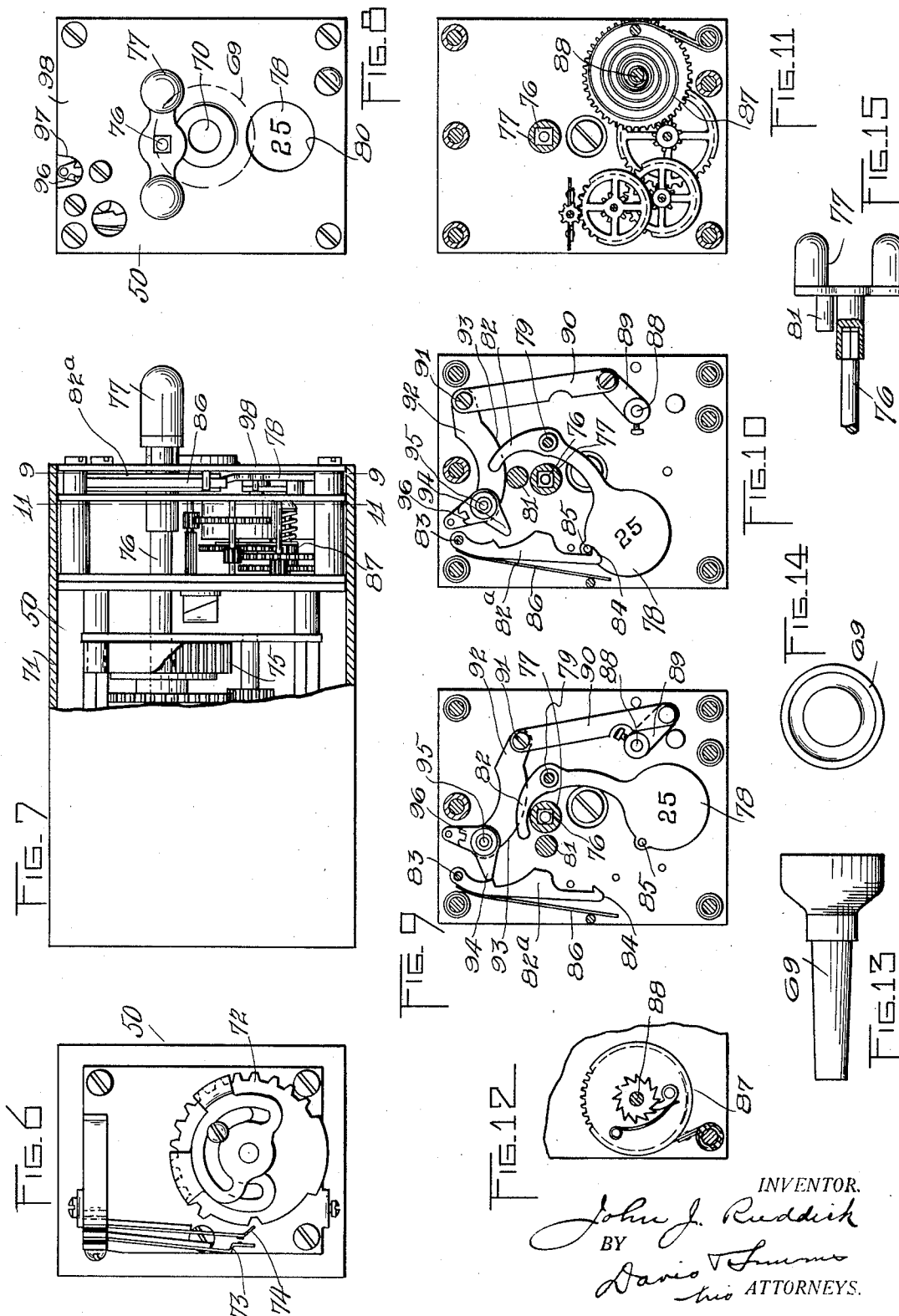
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TRAFFIC SIGNALING SYSTEM

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7 Sheets-Sheet 5



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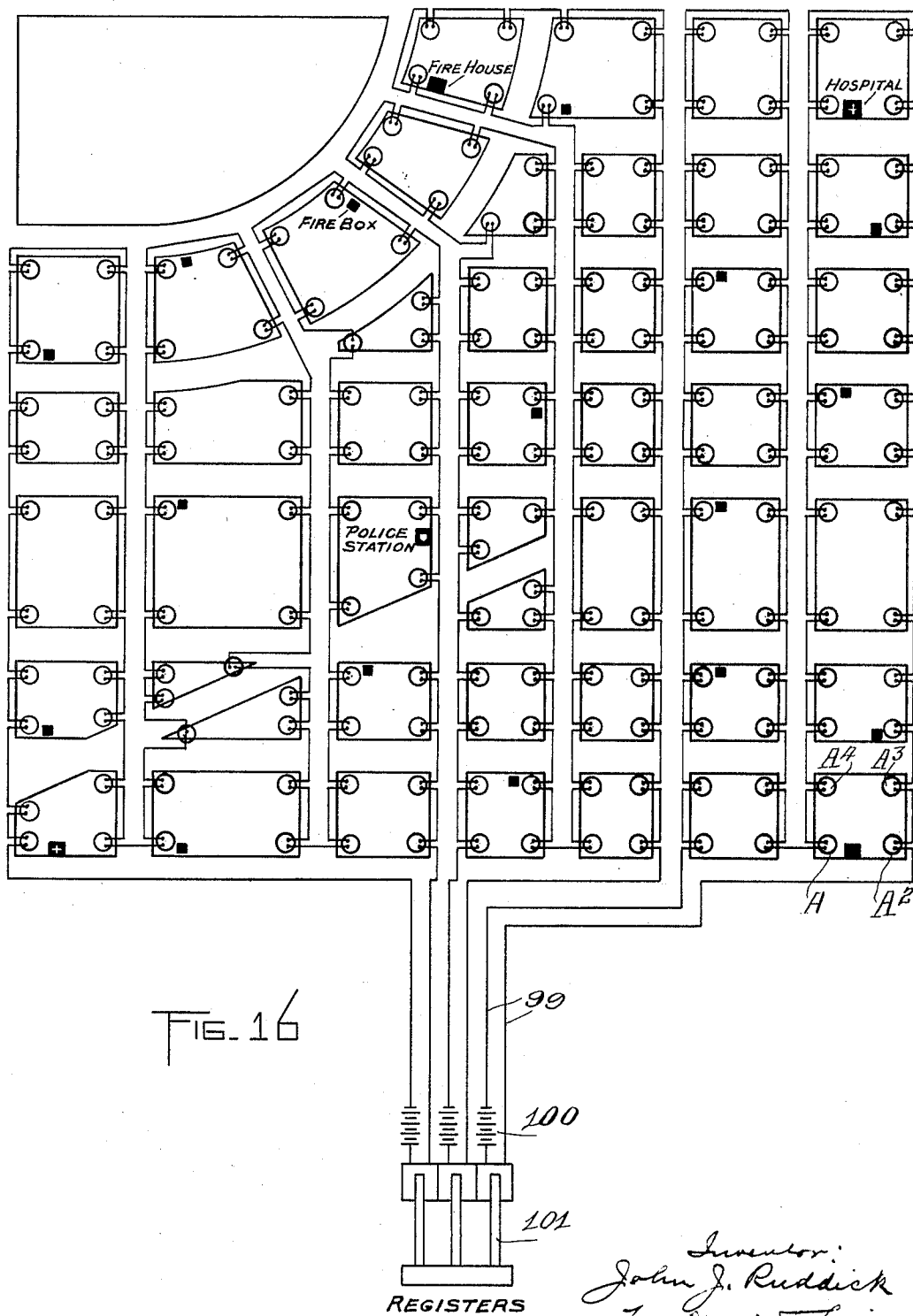
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TRAFFIC SIGNALING SYSTEM

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7 Sheets-Sheet 6



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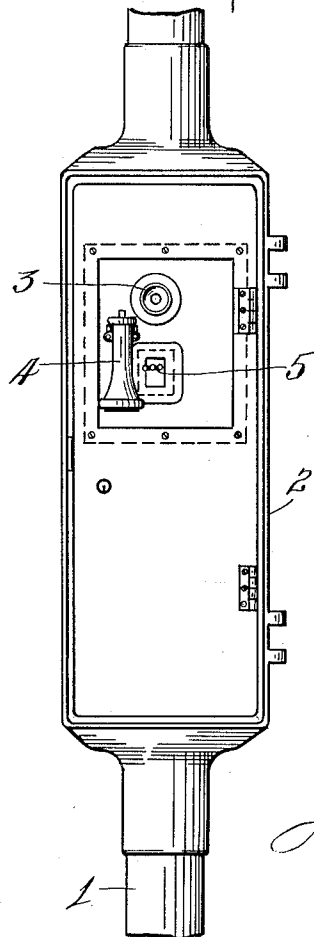
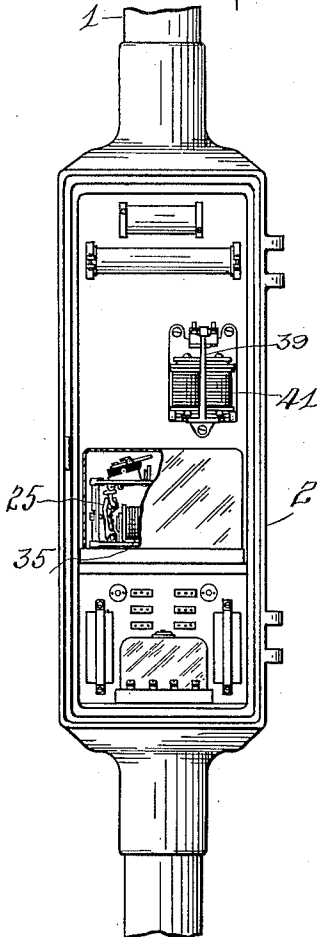
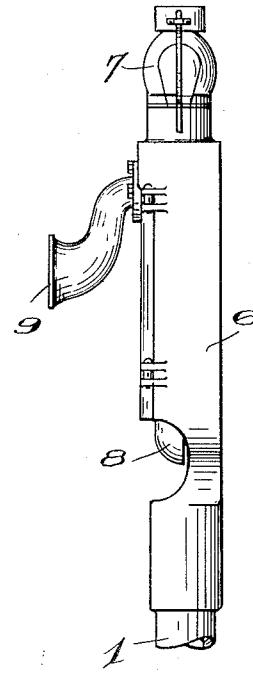
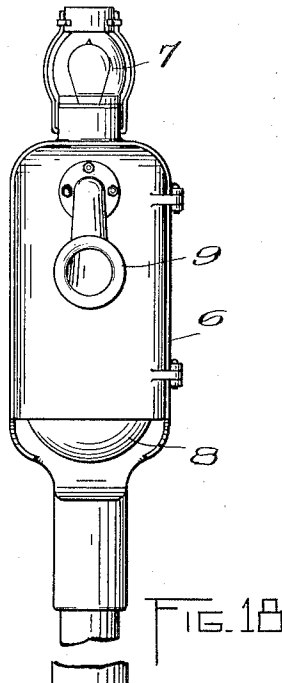
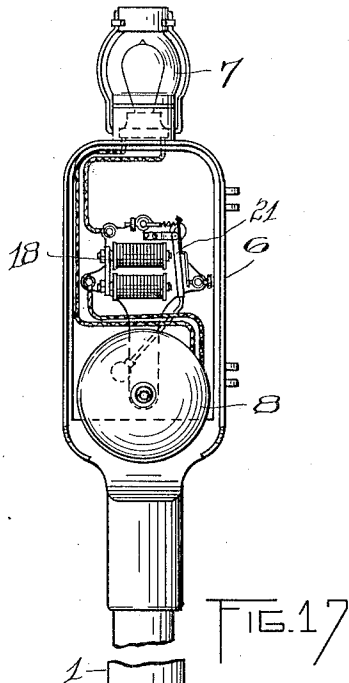
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TRAFFIC SIGNALING SYSTEM

Filed Dec. 15, 1920

7 Sheets-Sheet 7



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UNITED STATES PATENT OFFICE.

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TRAFFIC SIGNALING SYSTEM.

Application filed December 15, 1920. Serial No. 430,864.

The present invention relates to traffic signaling systems of the type in which a plurality of signals are distributed in the streets of a city and controlled from a common point, an object of this invention being to provide at the central station, controlling devices for the different signaling stations arranged in a relation corresponding to the arrangement of the signaling stations so that a course of operation of the signaling stations may be readily laid out from the positions of the controlling devices at the central station. Another object of the invention is to provide in connection with the controlling devices, means which will point out the controlling devices to be operated in order to define the path which the vehicle is to travel in the streets of the city. A still further object of the invention is to provide in connection with the controlling devices at the central station, indicating means which will indicate the duration of the operation of the signaling devices. Another and still further object of the invention is to provide a traffic signaling system employing a number of signaling stations, each with one or more signaling devices and a time switch at such station for controlling the signal, the time switch in turn being controlled by a selector operable from the central station.

To these and other ends the invention consists of certain parts and combinations of parts, all of which will be hereinafter described, the novel features being pointed out in the appended claims.

In the drawings:

Fig. 1 is a diagram of an imaginary city showing the signaling circuit of the system;

Fig. 2 is a diagram of one of the blocks of the city, showing the circuits in such block;

Fig. 3 is a diagram showing the selector circuit;

Fig. 4 is a face view of the switch board at the central station;

Fig. 5 is an enlarged view of a portion of the switch board;

Fig. 6 is an end view of the impulse mechanism used in connection with the selector circuit;

Fig. 7 is a side view of the impulse mechanism with parts broken away;

Fig. 8 is a front view of one of the impulse mechanisms;

Fig. 9 is a section on the line 9—9, Fig. 7;

Fig. 10 is a similar section showing the parts in another position;

Fig. 11 is a section on the line 11—11, Fig. 7;

Fig. 12 is a detail view of the spring casing of the indicator releasing mechanism;

Fig. 13 is a side view of the plug used in connection with the impulse mechanism;

Fig. 14 is a face view of the plug;

Fig. 15 is a detail view of the key for operating the impulse mechanism;

Fig. 16 is a diagram of the calling-up circuit;

Fig. 17 is a front view of the signaling station with the closures to said station removed to illustrate interior parts;

Fig. 18 is a front view of the signaling station with the closures in position; and

Fig. 19 is a side view of the upper portion of the signal station.

According to this invention, signal stations are arranged at intervals throughout the streets of the city or along those streets where there is congested traffic or other conditions that will warrant the installation of signal stations. Each station is equipped with suitable signaling means and the signal means of the different signal stations may be selected from the central office. There may also be provided at each signaling station, a calling-up device by which the central office may be reached for the purpose of calling the fire apparatus or other vehicle, such as an ambulance or police wagon, and the station may be further equipped with a telephone by which telephonic communication with the central office may be established.

Each signaling station, in this instance, may consist of a post or upright 1 provided with a box 2 enclosing the transmitter 3 and the receiver 4 of a telephone as well as a calling-up device 5, the outer door, not shown, of the box having a glass plate which is broken in order to reach the telephone instrument and calling-up device. This post may also carry at its top, one or more signaling devices. In this instance, a visible signal 7 is provided in the form of an electric lamp and two audible signals are provided, one an electric bell 8 and the other an electric horn 9, the horn being shown as mounted on the closure for a box 6 which contains the bell, while the lamp is mounted upon the top of the box.

The signaling circuit embodies at the central office, a generator 10 which by circuit lines or conductors 11, connects with the different signaling stations. These stations, in the diagram shown in Fig. 1, are illustrated by circles preferably in the four corners of the city blocks represented by rectangles and other geometrical figures, the spaces between the figures representing the streets. In Fig. 2, the circuits of one rectangular block are illustrated and in this drawing the characters A, A², A³ and A⁴ indicate the main signal stations in the block, and the characters α , α^2 , α^3 and α^4 indicate the sub-signal stations which are provided midway between the main signal stations on large blocks, but are not equipped with telephone instruments, calling devices or selector devices.

Referring to the diagram, Fig. 2, it will be noted that the signaling devices 7, 8 and 9 of the different signaling stations, both main and sub, are in multiple in the signaling circuit throughout the system. Each signal circuit of the signaling circuit at the signaling station, main or sub, has the signaling instruments arranged therein in such a manner that all three may operate together without interference by the others.

Referring first to the sub-stations, it will be noted that a conductor 12 leads from one of the lines of the circuit 11 to a switch 13 and from the latter to one terminal of the electric horn 9. The other terminal of the horn connects through a resistance 14 with a conductor 15 leading to the other conductor of the signaling circuit 11. The lamp 7 has one terminal connected by a conductor 16 to the conductor 15, whereas, the other terminal connects with the switch 13 through a condenser 17, the latter and the lamp being in parallel with the horn 9 and its resistance 14. The purpose of the condenser is to permit the lamp to have a continuous flow of current therethrough due to its relation with the make and break device of the bell. The electromagnet 18 which operates the bell 8 connects through a resistance 19 and the conductor 20 with the conductor 16 and through the latter and the conductor 15 with one line of the signaling circuit 11, whereas, the other terminal of the electromagnet 18 connects with the armature 21 and from the latter leads to the switch 13 by way of the conductor 22, which connection places the electromagnet in series with the condenser 17 and in parallel with the lamp 7. The armature also connects by a contact 22^a with the switch 13 so as to short circuit the magnet 18 and the condenser 17.

Referring to the main stations, it will be noted that the conductor 12 leads from one line of the signaling circuit 11 to one terminal of the horn 9. A resistance 14 is connected to the other terminal and to the conductor 23 which leads to a contact 24 of a switch 25. Another contact 26 of the switch leads by a

conductor 27 to a conductor 28 which connects with a conductor 29 leading to the other line wire of the signaling circuit 11. The resistance 19 as well as the electromagnet 18 of the bell 8 connects with the conductor 23 and through the conductor 22 and condenser 17 with the conductor 12. The armature 21 connects the conductor 22 with the contact 22^a and short circuits the condenser. The lamp 7 connects with the conductor 23 and with the conductor 12 through the condenser 17.

The control of the switch 13 at each sub-station is effected by an electromagnet 31 arranged in a circuit controlled by the switch 25 of an adjacent main station. Referring to the signal station A of Fig. 2 and to the sub-station α controlled thereby, it will be noticed that a conductor 32 leads from a contact 33 on the switch 25 to the electromagnet 31 and from the latter a conductor 34 leads to and through the signaling devices of the station A². It follows therefore, that the closing of the switch 25 at the station A effects the operation of the signaling devices at such station, at the sub-station α and at the station A². When the switch 25 at the signal station A² is operated, then the signal devices of such station as well as the signal devices of the sub-station α^2 and the main signaling station A³ will be operated. If the switch at the station A³ is operated, then the signal devices of such station, sub-station α^3 and main station A⁴ will be operated, and if the switch 25 at the station A⁴ is operated, then the signal devices of such station, sub-station α^4 and main station A will be operated. It will thus be seen that the signal devices along any side of the block may be simultaneously operated by the operation of a switch at one of the main stations on such side.

The switch 25 is, in this instance, a time switch as for example, of the type disclosed in my application filed on the 2nd day of August, 1920, Serial No. 400,624, and is operated in one direction, preferably through an electromagnet 35 which through a resistance 36 connects with the conductor 28 and through a conductor 37 connects with the contact 38 of a switch 39, the other contact 40 of the switch connecting with the conductor 12. This switch has a ratchet connection with the motor which is energized by the electromagnet and which effects the opening of the switch after a predetermined time. A switch of similar construction is shown in the patent to Testor No. 857,215, granted June 18, 1907.

The electromagnet 35 is deenergized as soon as the switch 39 opens but the time switch 25 remains closed until eventually opened by the timing mechanism which controls it. The electromagnet 35 is in multiple with the electromagnet 41, the circuit of electromagnet 35 being as follows: conductor 28, resistance 36, electromagnet 35, conductor 37, switch 39 and

conductor 12. The circuit of this electromagnet 35 is controlled through the switch 39, which is operated by the electromagnet 41. Electromagnets 41 and 35 are in multiple and both connect with the line wires 11.

The circuit of the electromagnet 41 embodies the conductor 29, selector 44, resistance 42, electromagnet 41 and thence to conductor 12. The circuit for the electromagnet 35 embodies the conductor 29, conductor 28, resistance 36, electromagnet 35, conductor 37, switch contacts 39 and conductor 12.

With the energization of the electromagnet 41, the switch 39 closes and as the electromagnet 35 is in multiple with the electromagnet 41 through the conductor 37, resistance 36 and conductor 28, the closing of the switch 39 effects the energization of the electromagnet 35. This electromagnet 35 controls the time switch which is held in closed position for a certain length of time. During this time, the electromagnet 41 becomes deenergized due to the fact that the selector which controlled it has ceased to function on such electromagnet 41, thus deenergizing the magnet 35.

The selector devices are of known construction and are operated through different impulses received from the central station over a circuit indicated by conductors 46, the selector devices being through conductors 47 arranged in multiple in said circuit 46, a condenser 48 and a resistance 49 being arranged in series with each selector device. The condenser connects with the terminals of the vibrating armature of the bell in such a manner that the discharge of the condenser will be in opposition to the flow of the current in the vibrating circuit breaker when the circuit is broken at said circuit breaker.

In Fig. 3 is shown a diagram of the selector circuit throughout an imaginary city of the design illustrated in Fig. 1. The switch board at the central office is illustrated in Fig. 4 and has arranged thereon a number of impulse producing mechanisms 50, shown in fuller detail in Figures 6 to 15, inclusive all of which are connected to the selector circuit 46 through three conductors 51, 52 and 53 forming two circuits having a common source of energy 54, one of said circuits having a common electro-magnet relay 55 and the other having a pole changing relay 56. Arranged in the circuit 46 of the selector circuit is a source of electrical energy 57 and two pairs of switches 58 and 59, the first of said pairs being moved to closed position by the bipolar electromagnet 55 and the second pair of said switches 59 being controlled by the bipolar electromagnet 56. Between the two pairs of switches 58 and 59, the circuit has each of its conductors provided with retardation coils 60 and 61, and these conductors are also connected together by condensers 62 and resistances 63, the poles in the two condensers be-

ing reversed in the two connections, and the retardation coils 61 being arranged between the two connections. The switches 59 each control two contacts 64 and 65, one of these contacts being connected to one of the conductors of the circuit 46, while the other is connected to the other conductor.

The impulse transmitting mechanism first sends an impulse to energize one of the electromagnets 55 or 56, say 55, thus closing the switches 58 and causing the battery 57 to connect with the circuit 46 throughout the system. Thereafter the electromagnet 56 is energized, causing the switches 59 to shift to the contacts 65 so that the poles of the electrosources of energy 57 are reversely connected to the circuit 46. A cooperative action between the magnets 55 and 56 continues in a well-known manner so that the selector at the proper station when it has received a predetermined number of impulses, closes the switch 44 at the selected main station.

The impulse transmitting mechanisms 50 see Fig. 4 are arranged on the switch board in a relation which corresponds to the signal stations distributed throughout the city, the impulse transmitting devices controlling the signals in one block being arranged together and separated from the impulse transmitting devices which control the adjacent blocks by spaces 66 which correspond to the streets of the city each of such devices having its selector contacts and common return wire connected to the wires 51, 52 and 53 of the relay system shown in Fig. 3. These spaces 66 may have indicating means to indicate the street as well as indicating means 67 such, for instance, as printed matter for indicating substantially the time required for a vehicle to travel the length of the different sides of the blocks. Of course, if a block has fewer or more than four signal stations, then the switch board will have within the area defined by the spaces 66, a number of impulse transmitting mechanisms corresponding to the signal stations on any given block. With the purpose in view of laying out the path to be traveled by a vehicle from any given point to another given point, the switch board is provided with a number of sockets 68 in which are received plugs 69. These plugs may be removed from the sockets 68 and introduced in sockets 70 formed in the front wall of each impulse producing mechanism. When the plugs 69 are arranged in the sockets, they act as visual indicators, indicating to the operator at the central station the particular blocks and selectors which are to be successively actuated as also the order of their actuation.

An impulse producing mechanism which may be used in connection with this invention is illustrated in the patent to Gregory Brown No. 1,155,640, granted October 5, 1915, and said mechanism will not be de-

scribed in detail herein see Figs. 6 to 15 inclusive. Each mechanism is, in this instance, removably enclosed in a housing 71 and on the rear wall of the mechanism, a contact wheel 72 is arranged to control the contacts 73 and 74, these contacts as well as the wheel 72 being connected to the conductors 51, 52 and 53 for producing the desired impulse. The conductor 53 being connected to the contact wheel 72 and the conductors 51 and 52 being connected respectively to the contacts 73 and 74. The wheel 72 is controlled by a motor mechanism 75 and this motor mechanism is in turn wound up by a shaft 76 to which a key 77 is secured. The actuation of the impulse producing mechanism consists in winding up the spring by turning the key 77 as far as it can be turned and then releasing it so that the spring in unwinding will actuate the contact wheel 72. In order that the operator at the central switch board may be kept advised as to when the signals at the next succeeding signal station are operating, each impulse transmitting mechanism is provided with an indicator 78 preferably pivoted at 79 on the rear face of the front wall of the mechanism, such front wall having an opening 80 through which the indicator may be viewed. When the key 77 is turned, a lug 81 on said key will engage with an arm 82 on the indicator and shift the latter so that it cannot be seen through the indicator opening 80. With the end of holding the indicator away from the opening after it has been shifted, there is provided a detent 82^a pivoted at 83 and having a nose 84 adapted to engage a pin 85 on the indicator. A spring 86 normally holds the detent toward detaining position. With the end in view of causing the release of the indicator 78 by the detent 82^a, there is provided a motor mechanism 87, the spring shaft 88 of which has an arm 89 to which is pivoted one end of a pitman 90, the other end of the pitman being pivoted at 91 to a lever 92 which has a cam face 93 lying in the path of the pin or projection 81 so that when the indicator 78 is shifted by the pin or projection 81, the lever 92 will be shifted to store energy in the spring motor 87. Connection between the spring motor and the detent 82^a may be established by a nose 94 which is preferably adjustable on the lever 92 about the axis 95 in order that the time of operation of the detaining member or detent 82 may be varied to correspond with the time required for actuating all of the signals at the main stations controlled by the impulse producing mechanism. A slotted arm 96 on the nose 94 is operable through a recess 97 in the front supporting plate 98 of the mechanism to effect such adjustment of the nose.

The calling-up of the central office from any one of the main signaling stations may be effected through the calling-up device 5 see Fig. 18 of known construction, arranged in a calling-up circuit 99 see Fig. 2 formed by conductors, the calling-up devices being in series in said circuit. The calling-up circuit is illustrated with reference to the imaginary city in Fig. 16 and may embody a number of separate circuits, should one not be sufficient to perform the work. Each of these circuits may have in addition to its source of energy 100, a recording register 101 arranged adjacent the switch board and which will give the number of the main signaling station.

It is desirable also to use in connection with the system, means by which telephonic conversation may be held between the different signal stations and the central station. This is effected see Fig. 2 by connecting the primary winding 102 of the induction coil of the telephone with the calling-up circuit so as to shunt a resistance 103 in said calling-up circuit, this resistance being of sufficient value in ohms to force enough current through the primary winding 102 to operate the telephone, the transmitter 3 of the telephone being arranged in this shunt circuit in series with the primary winding 102. The secondary winding 104 of the induction coil is arranged in the selector circuit, a condenser 105 being employed in connection with the secondary winding and the receiver 4 being in series with the secondary winding. In order to short-circuit the resistance 103 and the primary winding 102, a contact 106 is employed for engagement by the receiver supporting arm 107. This contact 106 and the receiver supporting arm 107 are electrically connected to the calling-up circuit in such a way as to short-circuit or shunt the resistance 103 and the primary winding 102, in order that an effective operation of the calling-up device may not be interfered with by the telephone instrument. When the receiver is taken off its hook or support, the arm 107, the resistance 103 and the primary winding 102 become effective in the telephonic circuit. At the central station, the telephone transmitter 108 and the receiver 109 connect with the selector circuit 46 by conductors 110 in advance of the switches 58.

The operation of the system will be apparent from the foregoing description, but it may be summarized as follows:

Assume that the system is installed for the purpose of clearing the streets in advance of a fire apparatus, by pointing out to the public the direction the apparatus is to take in going to a fire. In the event of a fire, the glass plate at the nearest signal station is broken, which permits the outer door of the box 2 to be opened so that the calling-up device 5 may be turned. This sends into the central station a record on one of the registers 101 see Fig. 16. The operator at the central office then by means of the plugs 69, maps out on the switch board a course which the fire apparatus will take in going to the

box or station from which the call is received. The impulse producing devices 50 as indicated by the plugs 69 are then operated by the operation at the central station one after the other, the one controlling the nearest block to the fire house, or house where the fire apparatus is maintained being first operated, the time between the operation of the impulse producing devices 50 along the route being determined by the indicators 78 the actuation of each device 50 being delayed until after the indicator 78 of the previously actuated device 50 has been returned to its normal position. In this way signal devices may be operated along the route to be traveled by the fire apparatus in advance of such apparatus so that the streets may be cleared of traffic. When an impulse producing device 50 is operated, the selector switch 44 at its corresponding signal station is actuated. This actuates the switch 39 and causes the actuation of the time switch 25. The closing of the time switch 25 not only effects the operation of the bell, lamp and horn, but it closes the switch 13 at its substation, thereby effecting the actuation of the lamp, bell and horn at such sub-station.

What I claim as my invention and desire to secure by Letters Patent is:

1. A traffic signaling system comprising a central station, main signaling stations, each provided with a signaling device, a signaling circuit extending from the central station to the main signaling stations and having the signaling device at such main signaling stations in multiple therein, a selector circuit, a selector at each main signaling station controlled by such selector circuit, a plurality of impulse transmitting devices at the central station, one for each main signaling station, a switch at each main station operated through a selector to close the signaling circuit, means for effecting the automatic opening of the switch after a predetermined time, and an adjustable indicating mechanism associated with each impulse transmitting mechanism and operated by the latter to point out the time when a switch at a main station is operated to open a signaling circuit.

2. A traffic signaling system comprising a central station, a signaling circuit leading from the central station, main signaling stations arranged along a street, each having a signaling device in multiple in said signaling circuit, sub-stations arranged along the street between the main stations, each having a signaling device in multiple in said signaling circuit, a time switch at the main station having connection with the signals at both the main station and the sub-station to effect the operation of such signals, a selector circuit leading from the central station, electromagnets in multiple in said signaling circuit, some of the main stations having connection with the time switches to effect the operation

of the latter, and others at the substations having connection with the time switches at the main stations to be controlled by the latter, and with the time switches at the substations to control the latter switches, selectors arranged in said selector circuit and controlling those electromagnets which control the time switches, and a plurality of impulse devices at the central station in the selector circuit, one for each main signaling station.

3. In combination with a central station, signaling stations, signals at such signaling stations, a calling-up circuit, calling-up devices at the signaling stations in said calling-up circuit, a resistance in the calling-up circuit, a selector circuit, selectors at the signaling stations for effecting the operation of the signals, telephone instruments at the central station connected to the selector circuit, telephone instruments at the signal stations, and an induction coil for each set of telephone instruments at the signaling stations having its primary winding in shunt with the resistance in the calling-up circuit and its secondary winding in the selector-circuit.

4. In combination with a central station, signaling stations, signals at such signaling stations, a calling-up circuit, calling-up devices at the signaling stations in said calling-up circuit, a selector circuit, selectors at the signaling stations for effecting the operation of the signals, telephone instruments at the central station connected to the selector circuit, telephone instruments at the signaling stations, an induction coil for each set of telephone instruments at the signaling stations having its primary winding in the calling-up circuit, and its secondary winding in the selector circuit, the primary winding being in parallel with the calling-up device, a resistance in series with the calling-up device and in parallel with the primary winding, and means for shunting the resistance controlled by the receiver hook of the telephone instruments of the main station.

5. A traffic signaling system comprising signaling stations distributed in the streets of a city and each having a signaling device, and a central station from which said signaling devices are controlled having signal controlling devices, one for each station, arranged in a relation corresponding to the arrangement of the signaling stations so that a course of operation of the signaling stations may be readily laid out from the positions of said signal controlling devices at the central station and having also associated with each controlling device, an indicator adjustable to correspond to the time of operation of the signaling device.

6. A traffic signaling system comprising signaling stations distributed throughout the streets of a city and each having a signaling device, and a central station from which said signaling devices are controlled having

signal controlling devices, one for each station arranged in a relation corresponding to the arrangement of the signaling stations so that a course of operation of the signaling stations may be readily laid out from the positions of said signal controlling devices at the central station, said central station having associated with each controlling device, a movable indicator shiftable to one position upon the operation of its controlling device when said controlling device is operated to operate the signaling device at its signaling station, and means for effecting the return of the indicator to its original position operated by a controlling device.

7. A traffic signaling system comprising signaling stations distributed in the streets of a city and having each a signaling device and a time switch controlling such device, a central station from which said time switches are controlled having signaling controlling devices, one for each time switch, and indicating means associated with each signal controlling device and adjustable to indicate the time of operation of the time switch.

8. A traffic signaling system comprising a central station, main stations, substations located in proximity to at least some of the main stations, a signaling device at each main station, and at each substation, operating connections between the signal device at each substation and one of the main stations, so that the operation of the signaling device at such main station will effect the operation of the signaling device at a substation located in proximity thereto, a selector at each main station controlling the signaling device of such station, and means at the central station for controlling the selectors.

9. A traffic signaling system comprising a central station, main signaling stations, signals at the main signaling stations, switches at the main signaling stations controlling such signals, selectors at the main signaling stations controlling the switches, individual impulse transmitting devices at the central station controlling such selectors, means for effecting the automatic opening of the switches after a predetermined time, and individual indicating means associated with the individual impulse transmitting devices operated by the impulse transmitting devices to point out the time of the opening of the switch that is controlled by the individual impulse transmitting device with which it is associated.

10. A traffic signaling system comprising a

central station, a signaling circuit leading from the central station, main signaling stations arranged at the corners of a city block or square on the same street, each having a signaling device arranged in said signaling circuit, substations arranged on the same street between the main stations on the city block and each having signaling devices arranged in the signaling circuit, a switch at each main station controlling the signals at such main station, and another main station on the block, and also at a substation between the two main stations, a selector circuit, electro-magnets in the signaling circuit some of said electro-magnets having connection with the time switches in the main stations to control the latter and others having connection with the switches of the main stations for controlling the signaling devices at the substations, selectors arranged in said selector circuit and controlling those electro-magnets which control the time switches, and means at the central station in the selector circuit for controlling the selectors.

11. A traffic signaling system comprising a central station, a signaling circuit leading from the central station, main signaling stations arranged at the corners of a city block or square on the same street and each having a signaling device connected with the signaling circuit, substations arranged on the same street between the main stations on the block and each having a signaling device connected with the signaling circuit, and means at each main station having connection with another main station and also with a substation to effect the operation of the signaling device at such other main station and also at the substation upon the operation of the signaling at one main station.

12. A traffic signaling system comprising a central station, a signaling circuit leading from the central station, main signaling stations on the same street, each having a signaling device connected with the signaling circuit, a substation arranged between the main stations and having a signaling device connected with the signaling circuit, and means at a main station having connection with another main station and also with a substation to effect the operation of the signaling device at such other main station and also at the substation upon the operation of the signaling device at one main station.

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