

(No Model.)

4 Sheets—Sheet 1.

T. F. GAYNOR.
ELECTRIC SIGNAL BOX.

No. 515,762.

Patented Mar. 6, 1894.

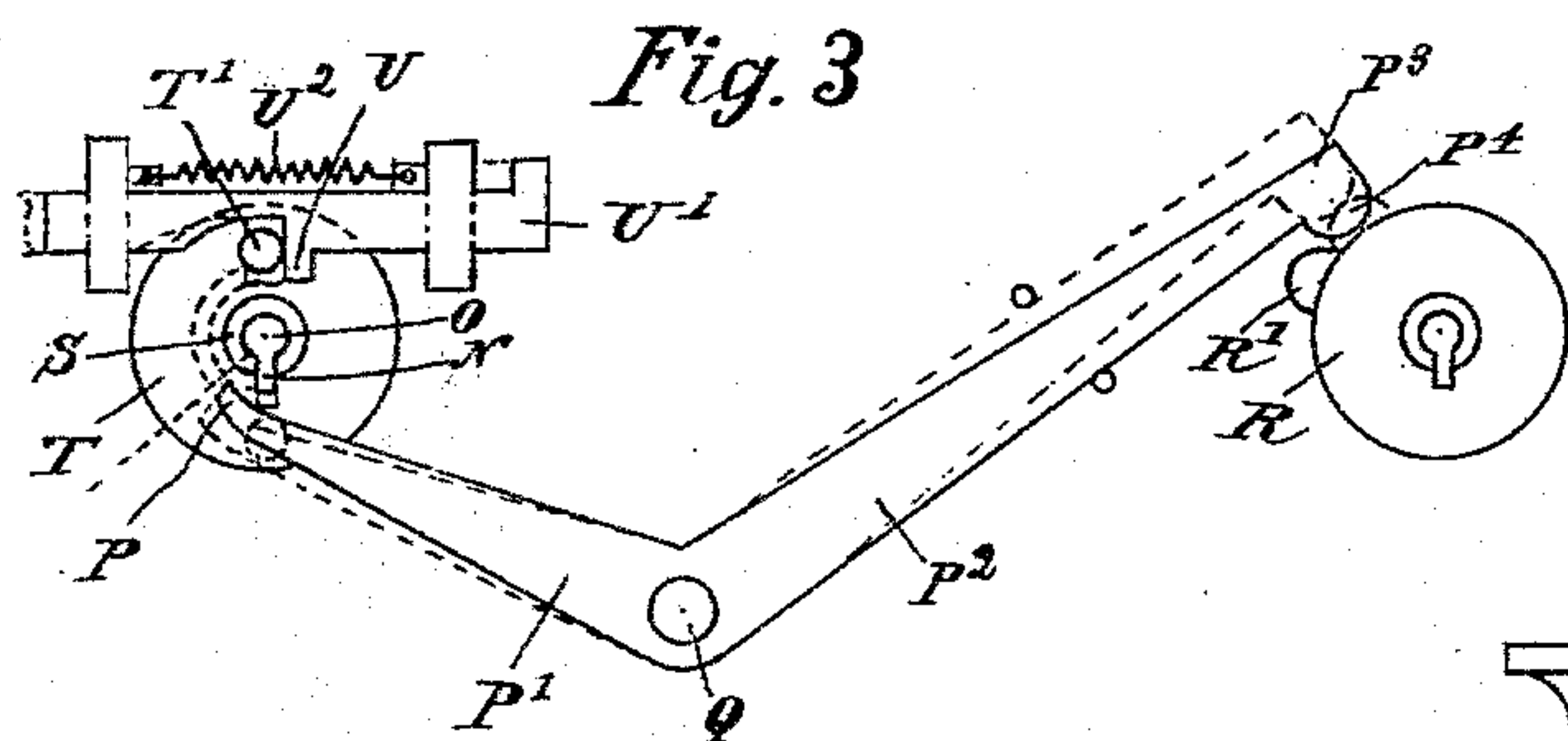


Fig. 1.

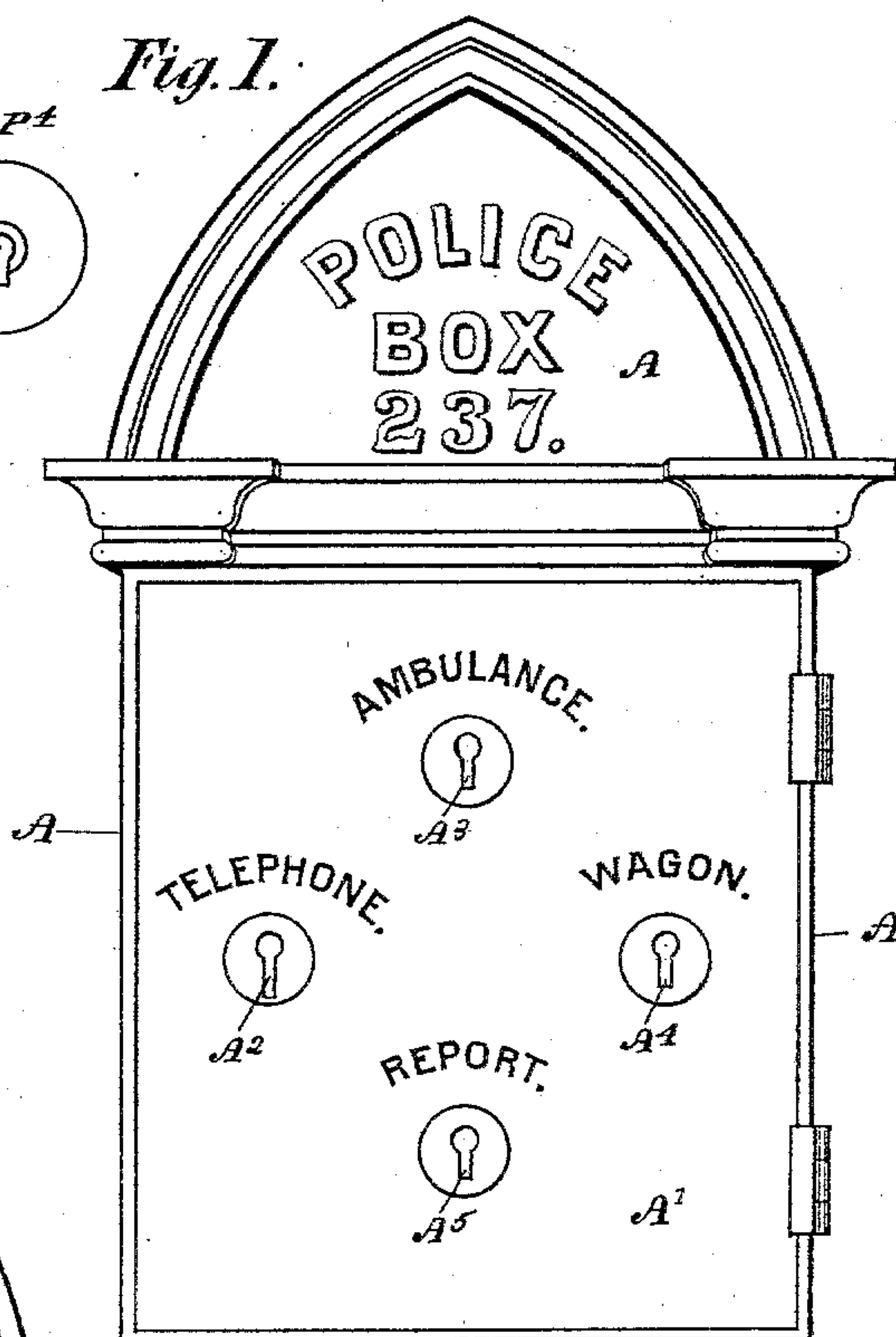
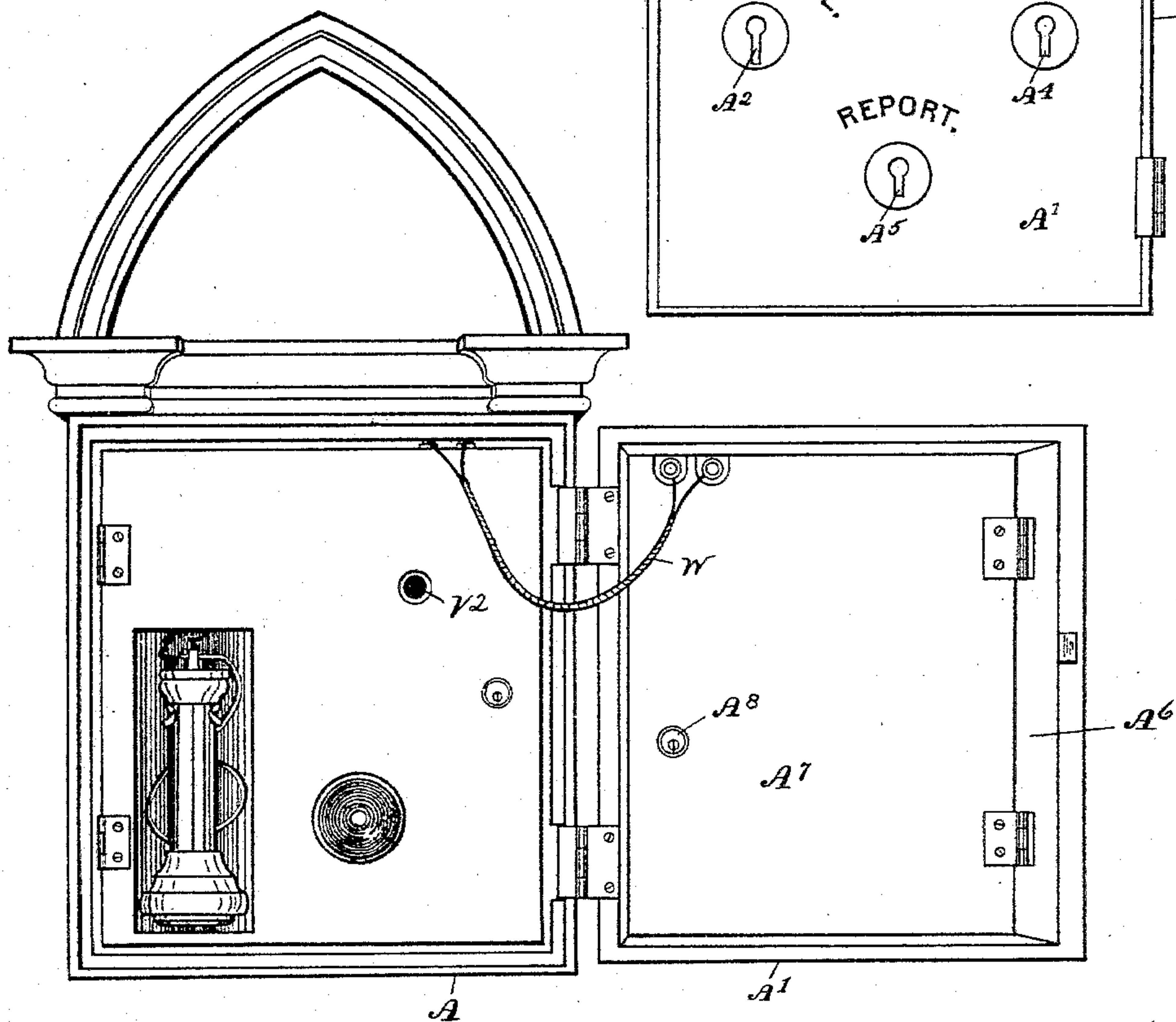


Fig. 2.



WITNESSES:

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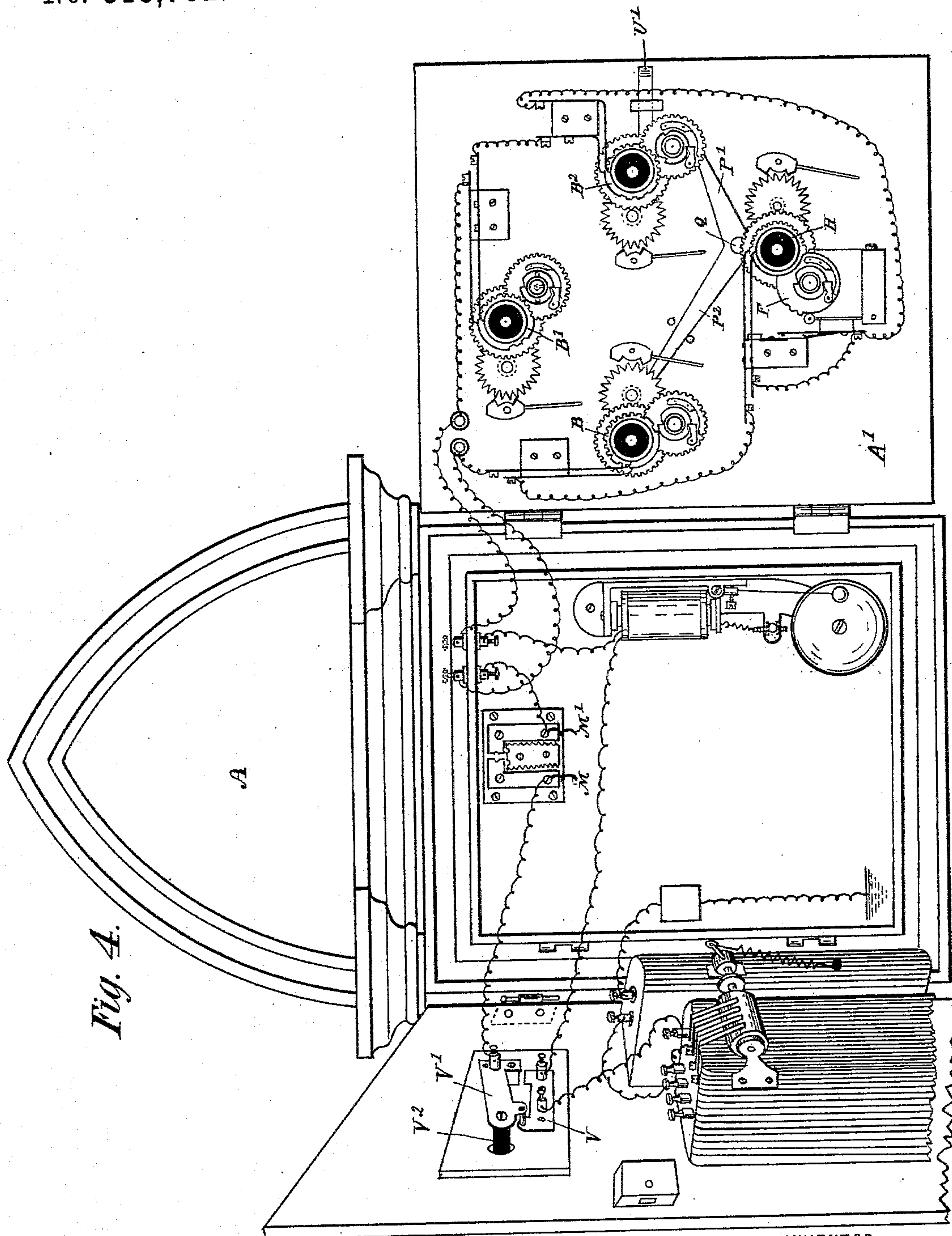
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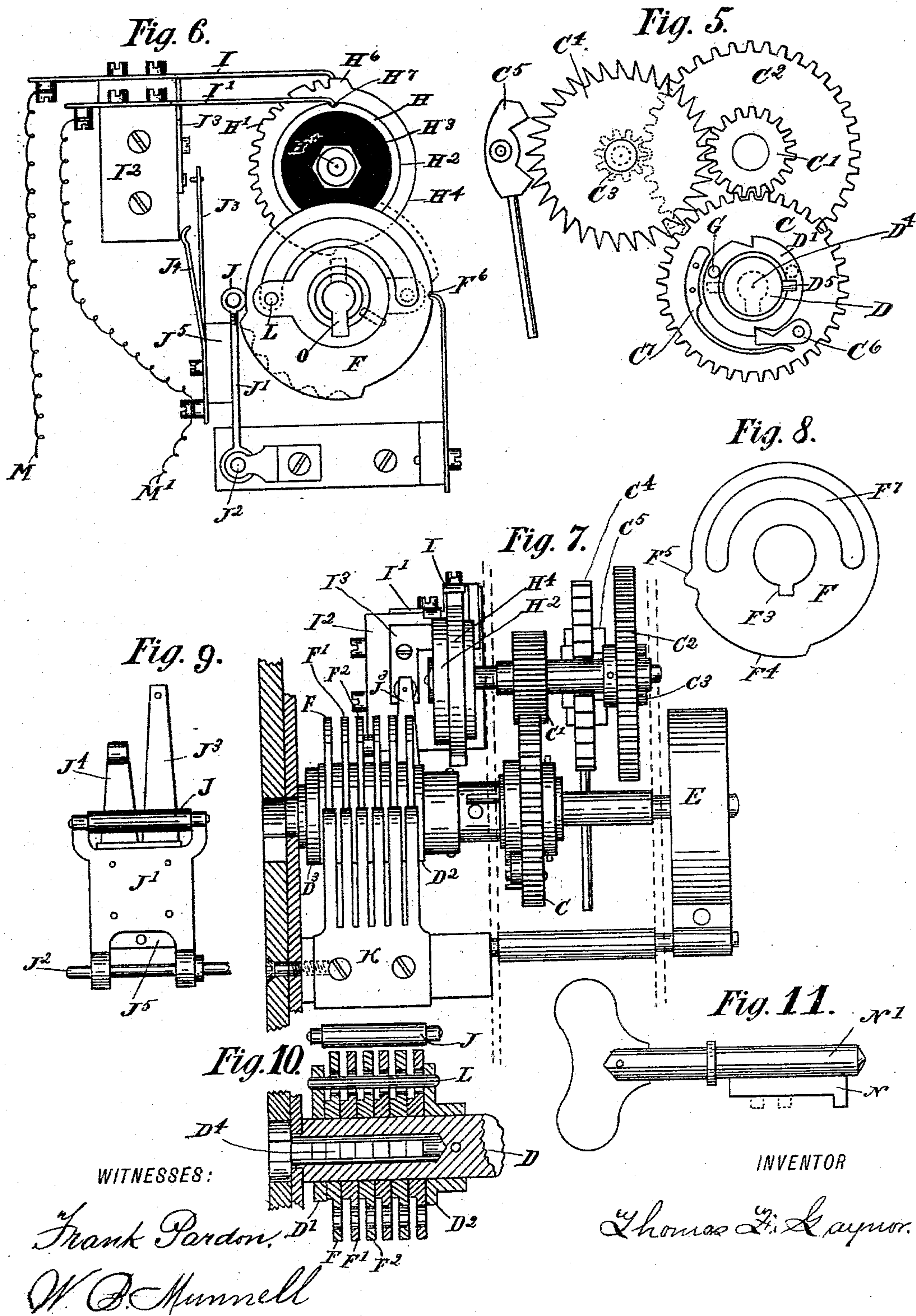
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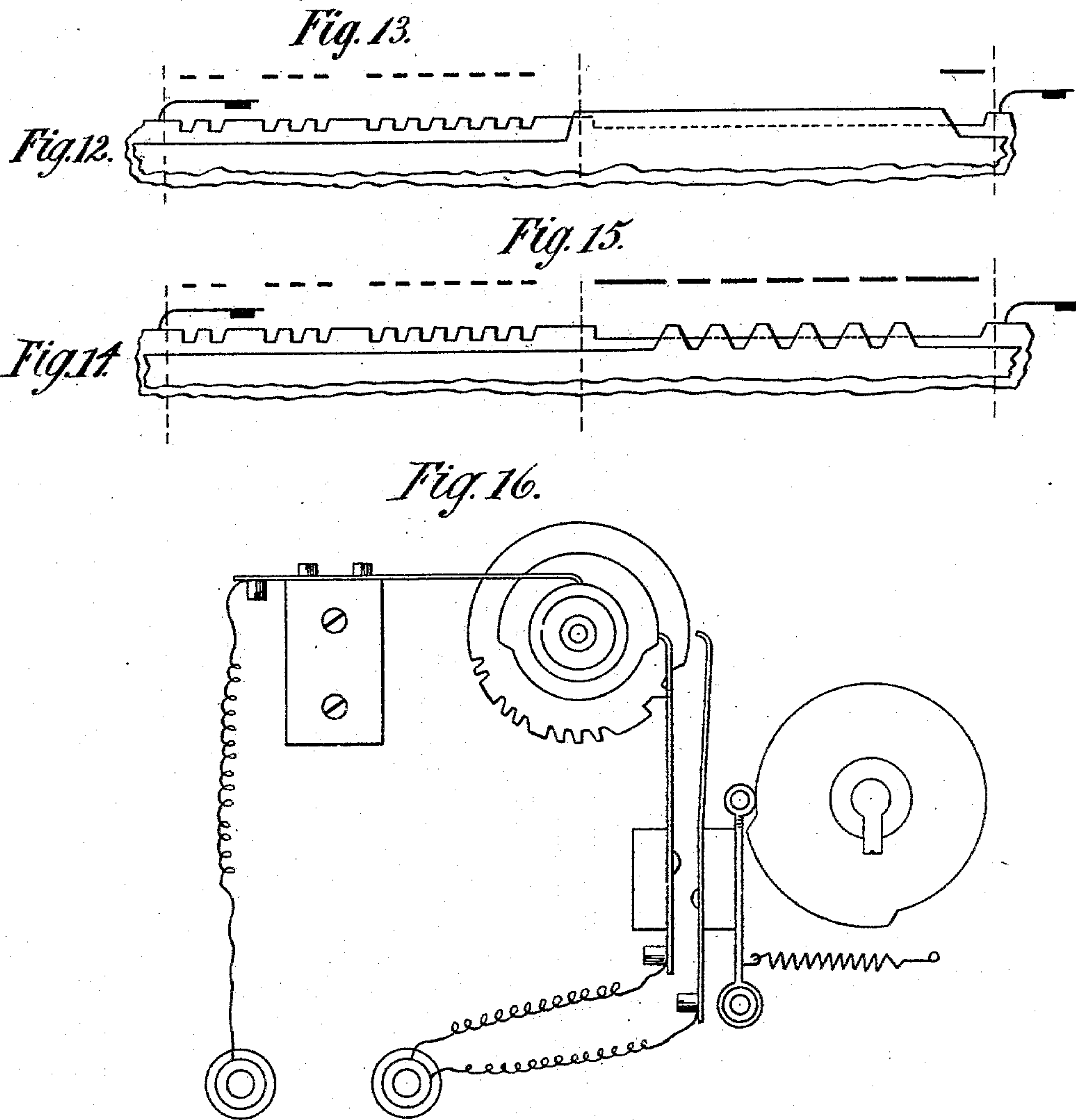
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4 Sheets—Sheet 4.

T. F. GAYNOR.
ELECTRIC SIGNAL BOX.

No. 515,762.

Patented Mar. 6, 1894.



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FIRE ALARM AND POLICE SIGNAL COMPANY, OF WEST VIRGINIA.

ELECTRIC SIGNAL-BOX.

SPECIFICATION forming part of Letters Patent No. 515,762, dated March 6, 1894.

Application filed February 4, 1892. Serial No. 420,286. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. GAYNOR, of Louisville, county of Jefferson, and State of Kentucky, have invented new and useful Improvements in Electric Signal-Boxes, of which the following is a description, reference being had therein to the accompanying drawings.

My invention relates to that class of signal boxes which are used for municipal signaling purposes, and especially adapted for police departments. In this class of devices the best form of box now in use is one having a multiple signal mechanism, constructed like the old district telegraph box, having an index, by the manipulation of which the desired signal can be determined, and having a lever by the "pulling" of which afterward the motor mechanism is wound up, and finally the "letting go" of which causes the signal to be transmitted to the police headquarters to be there received and recorded upon a register mechanism in the usual way. There is also usually included in the outfit a telephone apparatus, a bell mechanism to make audible signals, and the incidental lightning arresters, switches, cut-outs and conductors to make the whole combination operative and complete. Now this whole mechanism is included in a metal box, or else a booth, having a door provided with a lock and keys for the same which are held by the members of police departments to whom the incased apparatus is alone accessible. To allow a citizen to give calls for police service a special key is provided, which through a complex set of intermediate mechanism will enable him to pull down the lever which gives the box number signal, by the insertion of the key into the key-hole, and its manipulation outside of the box without opening the box at all. This system prevents him from having access to the multiple mechanism within and thereby giving wrong signals from it. But in this arrangement, as the telephone apparatus is also within the box (and necessarily so for its protection) he is thereby excluded from its use entirely, and can have no connection with the department whatever, only such as is given by the arbitrary automatic signal already indicated, which usually means a call for an officer. A single "emer-

gency" call may also be given by a policeman without opening the box door by means of his key in the same manner as the citizen gives his signal, and through the same mechanism. But in giving all of the "report" calls which make the great majority of signals sent in from a box, and in giving all the emergency calls except the one already referred to, the officer must first unlock and open the door before he can have access to the signal mechanism, and then he must move the index to the proper position, next pull down the lever and let go, and finally after giving his signal and awaiting a possible response to the same he closes the door and takes his key out and goes on his beat to the next station where he repeats these operations. It, therefore, will be seen that the art of police signalling appears to be in a transitional state between the district telegraph box of the old system and the key system of fire alarm box signaling illustrated in my United States Letters Patents Nos. 335,025 and 335,026, dated January 26, 1886, to which reference is made, and now in general use. Now, if all the signals adapted both for policemen's and citizens' use as already indicated could be given from the outside of the box without unlocking it and be given by the manipulation of a key alone, it would save the time incidental to the present system, and thereby simplify the service and make it more rapid. Again, if without the possibility of interference with the other mechanism, the citizen could have access to the telephone apparatus in the box in addition to giving his arbitrary automatic signal, as is now done he could have a more complete method of communication with the department than that which now prevails. And furthermore, if by the act of unlocking the door preparatory to using the telephone within the box the incidental calling up signal could be transmitted to headquarters, the telephone could be used without giving the customary signal beforehand which now is necessary.

The object of this invention is therefore to provide a mechanism that will obviate these objections, accomplish the desired ends, and by discarding the index principle of the district call box, establish a simpler and

quicker acting method than now exists, and to produce an exclusively key system of automatic police signaling.

This invention consists in providing different circuit-wheel mechanisms for the different emergency calls, (which usually include the wagon, the ambulance, the telephone and the citizen's call,) and a special multiple signal device for the several different individual "report" calls, and arranging them within a box of special construction in such a manner as to be each directly operative through its own keyhole in the door or box by means of a key alone, without necessitating the opening of the box at any time, except when the telephone is to be used, or the mechanism is to be examined.

The invention further consists in the apparatus provided for making one of the emergency calls thus given answer for the telephone calling-up-signal, and at the same time unlocking the door that the telephone may be used.

The invention also consists in the devices provided for trapping the citizen's key and releasing the same, and in such other improvements as will be more fully set forth hereinafter.

Similar letters refer to similar parts throughout the several views.

Figure 1, represents a front elevation of my improved box in which a series of key holes are shown arranged in different positions in the door of the box and through which a key may be inserted and by its manipulation actuate a signal mechanism placed within the box adapted to give the box number and a special signal adapted to indicate its character as designated by the words "Ambulance," "Wagon," "Report," "Telephone," &c., imprinted over the key holes respectively. Fig. 2, represents a front elevation of the box and the outer door after the latter has been opened and shows the connection between the electric mechanism secured to the outer door and the other electric mechanism within an inner box the door of which is shown as being closed and through which the mouthpiece or telephone transmitter, and the push button of a circuit breaker project and having a recess in which a telephone suspended upon a pivoted cutout is also shown. Fig. 3 represents a front elevation of a key trapping mechanism and a bolt releasing device by means of which the outer door of the box may be unlocked, it also shows how by the manipulation of a policeman's key through another key hole in the door a citizen's key may be released after it has become trapped by the act of giving a signal or opening the door. It is shown in the position it would appear if the door of the box as shown in Fig. 1, were cut away so as to leave it exposed to view only being developed to about double the size for the purpose of clearness of illustration. Fig. 4, represents a front elevation of a box with the outer door shown open and the case which

covers the mechanism thereon as seen in Fig. 2, being removed therefrom so that the circuit wheel mechanism and the multiple signal wheel mechanism as well as the key trapping device and the bolt for the door may all be seen in their several respective positions and with relation to each other. Only the essential parts of the mechanism are shown; the frame plates and unimportant pieces of construction being entirely omitted for purposes of clearness of illustration. An inner box is also shown having therein a bell mechanism and lightning arrester of ordinary construction. The door for the inner box which is shown as closed in Fig. 2, is here shown in part in a perspective open position that the telephone apparatus and the automatic cut-out mechanism therefor as well as the push button circuit breaker may be more clearly seen and understood: and the door is shown as being unhinged and detached from the inner box. A diagram of the wire connections between the several parts of the apparatus is also shown in this figure. Fig. 5 represents a front elevation of the clock frame of a simple circuit wheel mechanism that may be used as a motor train for either a simple circuit wheel mechanism three of which are shown in Fig. 4, or else for the combined circuit wheel mechanism and multiple signal wheel mechanism shown near the bottom of the door in Fig. 4, and which will be more fully understood when taken in connection with the subsequent descriptions of the other figures. It also shows the winding shaft and ratchet mechanism adapted to operate the train. Fig. 6, represents the front elevation of a circuit wheel with a pair of contact springs for the same and it also shows the position of the signal wheels with reference to the circuit wheel and contact springs and shows how the circuit is closed between the two contact springs by the rotation of the signal wheels against a pivoted lever which carries a circuit closer and causes it to close contact with one of the contact springs and thereby give the special signals adapted to identify and distinguish the several report signals or the like which the device is intended to transmit. It also shows the cross-sectional shape of the hole in the winding shaft into which the keys are intended to be fitted as well as a view of the restoring pin mechanism which carries the signal wheels back to their normal position again after the mechanism has been used and it shows a frictional spring device adapted to prevent any accidental frictional movement of any of the signal wheels other than the one actuated by the key. Fig. 7, shows the general side elevation of the train shown in Fig. 5, and the circuit wheel mechanism and signal wheel mechanism seen in Fig. 6, and in their respective relative positions and the position of the whole mechanism with relation to the door of the box a part of which is shown in vertical section through a key hole. Two of the frame plates are indicated

by the dotted lines and the front one is partly shown in vertical section and close against the box door. Fig. 8, represents a front elevation of one of the signal wheels detached from the other part of the mechanism. Fig. 9, represents a side elevation of the signal wheel pivoted lever detached from the other mechanism that the roller which plays against the signal wheels, the contact spring which closes the circuit between the two contact springs of the circuit wheel mechanism and the tension spring which keeps the roller against the signal wheels and opens the contact of the contact spring from one of the circuit wheel contact springs may all be more clearly seen and understood. Fig. 10, represents a horizontal section through the winding shaft and series of signal wheels. It also shows the position of the pin which restores the signal wheels to their normal position and its connection with the winding shaft by means of two collars which are secured to the shaft and which carry the restoring pin and which retain the signal wheels which are loosely fitted to the shaft in their correct position thereon. It also shows a section through a small part of the box door and the front frame plate of the mechanism as well as a top view of the pivoted lever roller which plays against the signal wheels. Fig. 11, shows a front elevation of a key adapted to fit into the hole in the winding shaft and by means of which the latter may be turned around so as to wind up a motor mechanism of the device so as to cause it to transmit a signal. The bit of the key is shown as having a single tooth upon its extreme end of a width adapted only to pick up one of the signal wheels which in this case would be the innermost one of the signal wheels and carry it around with the winding shaft when the latter was wound up preparatory to giving a signal. It also shows in dotted lines where other teeth for the other wheels would be located. Fig. 12, represents the peripheries of the circuit wheel and one of the signal wheels of the multiple signal device developed in a straight line and parallel with each other to show the respective positions of the two wheels with relation to each other after being wound up with a key and ready to give a signal a movement being supposed to be from right to left. The distance between the two vertical dotted lines being supposed to represent the full circumference of the wheels. Fig. 13, represents the breaks that the united wheel mechanism make in a closed circuit when placed therein and during the act of giving a signal:—in other words the marks that would appear upon the tape of a register mechanism adapted to receive and record a signal. Fig. 14, represents a pair of wheels developed as in Fig. 12 only that the signal wheel has several notches cut in its periphery to indicate how a variety of signal characters could be obtained. Fig. 15 shows the form in which the signal would be recorded from

a wheel mechanism as developed in Fig. 14. Fig. 16 shows how a signal wheel could be made to bring a contact spring to bear directly upon a circuit wheel mechanism in case it was necessary or desirable to have the breaks in the circuit made by the circuit wheel direct. It also shows how the circuit closer could be used as a switch to make a contact with a contact point that would lead through suitable terminal connections to the contact spring of the circuit wheel mechanism when the latter is to be placed some distance away from the signal wheels in another part of the box. The wiring and terminals are omitted but can be understood.

A, represents a signal box having an outer door A', provided with a series of keyholes A², A³, A⁴, and A⁵, through any one of which a key may be inserted and by its means a motor shaft of a corresponding circuit wheel mechanism secured to the inner side of the door, may be wound up and caused to give a signal.

A separate circuit wheel mechanism is provided for each keyhole, each being adapted to transmit the box number and the particular special signal required to indicate its nature, as is imprinted upon the front of the door, by the words, "Telephone," "Wagon," "Ambulance," "Report," &c. The simplest form of a circuit wheel mechanism will serve for each of these calls except for that of the "report" keyhole as a circuit wheel having the box number notches with the additional notches for the special call, and a motor clock train to run it, is all that is needed to give any single and special signal. B, B', and B², in Fig. 4, therefore represent circuit wheel mechanisms of this class which are secured to the door of the box,—the frame work and fastenings to the door being omitted for the purpose of clearness of illustration and needing no further description.

As several patrol men make their reports from the same box, and as it is necessary to distinguish their signals at headquarters a multiple circuit wheel mechanism is provided for the "report" keyhole A⁵, having several special signal wheels, some one of which is adapted to be set by the patrolman when he operates the "report" mechanism with his key. Each officer in the same beat and on duty during the same watch has a differently shaped key, so that his key will always work the same signal wheel exclusively, and his signal will be thus recognized at headquarters, and several men can make their reports from the same box at the same time. All of the keys are, however, of such shape as will fit any of the "emergency" call transmitters, and operate them when required.

In the key system two plans of action are open for selection. One is to let the officer have but a single key which will answer all the purposes already referred to: this, however, necessitates as many keyholes and circuit wheels as there are special "emergency"

calls. The report circuit wheel mechanism, without a signal wheel being operated with it, being of itself a distinct signal. The other plan being to let each officer have a key for his "report" signal and one for each of the "emergency" calls, or else a key provided with an adjustable bit, by means of which he could change the shape of the key so that with it he could work any of the signals at will; this arrangement would permit of dispensing with all of the keyholes and movements except the multiple signal mechanism, (which can be extended to include the "emergency" calls,) and its keyhole, but it necessitates the use of more than one key, or else one of complex character and manipulation; therefore, I prefer the use of the former plan of a series of keyholes and a single key, to the latter method. I refer to both ways that it may be understood that either system may be adopted under my invention. One of its objects, however, is to reduce the number of both keys and keyholes required to a minimum; hence this method is more fully shown and described.

As has been already stated, the simplest form of a circuit wheel mechanism will answer for any of the "emergency" calls, because only one signal is to be transmitted from each of them, but as there are several officers to give their reports through the "report" keyhole by means of the multiple transmitter behind it, I will now describe its mechanism in detail.

Fig. 5 represents a front elevation of the motor mechanism of a circuit wheel shaft, consisting of the main gear C, pinion C', wheel C², pinion C³, escape wheel C⁴, and pallet C⁵.

D, represents the winding shaft upon which the main wheel C, is mounted, and to which the motor spring E, is secured. See Fig. 7. The shaft D, is provided with a ratchet wheel D' having two notches diametrically opposite each other, and into which the ratchet C⁶, plays, and which is secured to the main wheel C, which is also provided with the ratchet spring C⁷, which keeps the ratchet in position. The shaft D, projects forward from the train, and is adapted to act as the axis for a series of signal wheels, F, F', F², &c., which are loosely fitted thereon. The shape of these signal wheels is more clearly shown in Fig. 8, where one is shown detached from the mechanism. These signal wheels are held in position by means of the collars, D², and D³, which are secured to the shaft D. A hole D⁴, is bored longitudinally into the shaft D, beyond the innermost one of the signal wheels, and made of a cross sectional shape similar to that of a key. See Fig. 10. The circuit wheels are also provided with a corresponding slot, F³, so that when a key like that shown in Fig. 11 is inserted into the hole, D⁴, and the slot F³, of the signal wheel F, is in a corresponding position therewith, both the shaft D, and the signal wheel F, may be rotated together, just as though the wheel F,

were keyed to the shaft D, the bit of the key answering the purpose of a spline in this manner. When the key is, therefore, inserted through the keyhole of the box, and into the mechanism, which is normal as in the position shown in Fig. 6, and a half revolution is given to the key, it brings the shaft D, and one of the signal wheels into the position as shown by the dotted lines. Its further motion forward is arrested by a pin D⁵, which is secured in the shaft D, against a pin G, which is in one of the frame plates of the mechanism. This half turn of the shaft D, allows the opposite notch of the ratchet wheel D', to become engaged with the ratchet C⁶, and when the key is released the spring E, propels the shaft D back again to its normal position, causing the circuit wheel H, to make a complete revolution, as the wheel C, and the pinion C', are in the proportion of two to one respectively. The circuit wheel H, is provided with two steps, H', and H², against which the contact springs I and I', make contact respectively, said contact springs being insulated from each other upon the rubber block I². The circuit wheel H, is also insulated from its shaft mechanism by being mounted upon a rubber bushing H³. The outer step H', of the circuit wheel H, is cut down for about one half of its circumference, as indicated by H⁴, so that after the wheel has made about half a revolution the spring I, will cease to make contact during the latter half of the revolution of the circuit wheel. The signal wheels F, F'—F², &c., each has its periphery cut away in a similar manner to that of the circuit wheel H, only that the contact portion is about one quarter of the circumference. The shaft D, being geared to the circuit wheel shaft H⁵, in the proportion of two to one causes the signal wheels to make one quarter of a revolution in the same time that the circuit wheel makes half a revolution, and the contact part F⁴, of the signal wheel consequently passes a fixed point in about the same length of time that it takes the circuit wheel to make a half revolution. Now the contact part F⁴, of the signal wheel F, is so arranged with relation to the circuit wheel H in its normal position that when it is carried around half a revolution by the key, and the latter released, that in running backward again it makes contact with a roller J, which is pivoted upon the lever J', which in turn is mounted upon a stud J², and causes a contact spring J³, to make contact with a part I³, of the spring I, and close the circuit between the wires M and M² while it is passing by the roller J. This closure occurs while the cut away portion H⁴, comes under the contact spring I, and it is so arranged as to begin before the circuit wheel H, breaks contact with the spring I, so that no break occurs in the circuit in which the mechanism is placed after the box number is given as indicated by the notches upon the circuit wheel, until the end F⁵, of the signal wheel F, passes

the roller J, when a short break in the circuit is made until the time when the first tooth H⁶, of the circuit wheel again makes contact with the contact spring I, and the circuit wheel has completed its revolution. Now this final break in the circuit caused by the contact spring J³, leaving contact with the lower portion I³, of the contact spring I, when the end F⁵, of the signal wheel F, passes by the roller J, as has already been explained, constitutes the special signal intended to characterize it. If several notches are made in the wheel F, as indicated in Fig. 6, several such breaks or signals will be given, and always during the interval in which the cut away portion H⁴, of the circuit wheel H, is passing clear of the contact spring I. The position and length of these notches in the signal wheel F, can be varied to suit the several different signals required, as well as the number of them that is cut in the wheel, and it is these various signals that can be thus produced, that constitute the different report signals intended to distinguish the several policemen reporting from the box, as each officer has a key, the bit of which is adapted to pick up some one or more of the signal wheels F, F', &c., when he makes his report from the box. See Fig. 11. A spring J⁴, forming a part of the contact spring J³, presses against the rubber I², and thus keeps the roller J, against the wheels F, F', &c., and keeps the circuit open between the springs J³ and I³, except when a signal wheel is giving its signals. It will be observed that when the key is rotated in the act of giving a signal, that although the spring J³, makes several contacts with the plate I³, as the edge F⁴ of the signal wheel F, passes against the roller J, when the mechanism is being wound up by the operator, yet no effect will be produced in the circuit between the springs I, and I', because the circuit is also closed through the circuit wheel H, and consequently no break in the circuit can occur, as the circuit wheel H, remains at rest during this act of winding up the shaft D. As a preventative of any accidental breaks in the circuit caused by the possible rotation of the circuit wheel H, in the act of winding or from lost motion, or the like, the spring I', rests in a slight depression, H⁷, in the smaller step H² of the circuit wheel H.

To prevent the possible movement by friction or other cause of any of the signal wheels F, F', &c., except the one that is being actuated by the key, a spring K, is provided of a comb shaped form, each tooth of which is adapted to impinge against one of the signal wheels, and having a bearing against the same in a depression F⁶. See Fig. 6.

The collars D², and D³, upon the shaft D, are provided with a restoring pin L, which is parallel with the shaft D, and is carried around with it whenever the latter is rotated.

Each of the signal wheels F, F', F², &c., is provided with a semi-circular opening F⁷, in which the restoring pin L, plays whenever the

mechanism is operated. The position of the restoring pin L, and the opening F⁷, in the signal wheels with relation to each other, and when the mechanism is in its normal position, is shown in Figs. 6 and 10. When a half revolution of the shaft D, is made the pin L, is carried around to a position diametrically opposite as shown by the dotted lines in Fig. 6, so it can be seen that it can make a half rotation around the shaft D, without moving any of the signal wheels F, F', &c. But when one of these signal wheels is rotated with the shaft D by means of a key, the opening F⁷, of course makes a corresponding movement around with the shaft, going with the pin L. The object of this device is that if the key would be withdrawn at any time before it had assumed its normal position as shown by the full lines in Fig. 6, the pin L, would nevertheless carry the signal wheel back again to its normal position, independent of the key. In this latter event the keyhole in the door and the frame plate would of course, have to be modified in shape to permit this withdrawal of the key. Another purpose served by this restoring pin is, that it keeps the signal wheels always in their normal position as indicated in Fig. 6, so that even if any accidental movement of the signal wheels out of position by any cause should occur, they would be again restored to their normal position by this means. The lever J', as shown in Fig. 9, is of a sufficient width to carry the contact spring J³, forward, no matter which of the signal wheels F, F', &c., is actuated, and so that only one spring J³, is necessary, although the series of signal wheels is adapted to move it. The spring J³, is insulated from the lever J', by means of the rubber block J⁵, to which both are secured. The wires M, M', lead to the main circuit in which the mechanism is placed.

Fig. 11 shows a general form of the key adapted to actuate the device. The width and depth of the bit N, as well as the number of teeth placed thereon, are matters that are determined by the nature of the mechanism required to be used, and can be understood without further description. The key shown is intended to represent one adapted for use by a policeman, but when made for the use of private citizens, the key should be made with a deeper bit, so that the latter would be too long to enter any of the keyholes as shown in Fig. 1, except the one adapted to open the door, and indicated by the word "Telephone," in Fig. 1. This would prevent any possible manipulation of the report call or the wagon and ambulance calls, but would of itself send in a signal indicative of its character by means of the circuit wheel mechanism which it operates.

It is deemed advisable to secure the key of a citizen who uses the apparatus for identification, as with fire alarm boxes, so I provide the device shown in Fig. 3 for this purpose, in which is also shown the means by which

the door is unlocked at the time the citizen gives his signal. O, represents the cross-sectional shape of a key N' that is inserted in the box for the purpose of giving a citizen's call. The manipulation of the key being supposed to be in a right handed direction, in this instance as well as when any of the other signals are manipulated, that is, in the direction in which the hands of a clock move.

Beneath the bit N, the end P, of a locking lever P', is arranged in such a manner as to allow the key to be turned forward, and make its customary half revolution without obstruction, in the act of giving a signal, as already described, because the bit presses down the end P, of the locking lever P', to the position shown in the dotted lines, and which allows the key to be moved forward as indicated by the outer dotted semicircle, but when it moves backward again and reaches the position indicated by the radial dotted line, its backward motion is further arrested by coming against the end P of the lever P', which assumes its normal position again, and in this manner prevents the key from regaining its normal vertical position again, until the lever P' is depressed, as indicated by the dotted lines, so as to cause it to clear the key, and allow the latter to be removed from the keyhole.

To effect this depression of the lever P', it is pivoted to the door of the box upon the stud Q, and is provided with a long arm P², the end P³, of which is adapted to rest upon a collar R, of another key shaft mechanism, and which is horizontal therewith. The end P³, of the lever P', is provided with a semi-circular lug, P⁴, and the collar R, is provided with a corresponding shaped cam projection R', arranged in such a position with reference to the lug P⁴, as that when the collar R is rotated a fraction of a revolution by a key inserted in the keyhole, which in this instance is indicated by the word "Wagon," the end P³, will be lifted, and the corresponding end P, depressed so that the trapped key can be thus released. As any policeman's key can be used for this purpose, the first policeman that responds to the citizen's call can thus release the latter's key.

Whenever a policeman desires to open the door and use the telephone, he can do so with his key, which also unlocks the door, and does not become trapped like the citizen's key does, as already described, because the bit of the policeman's key, not being so large, as that provided for the citizen, does not come in contact with the locking lever at all, but moves in the path indicated by the smaller semi-circle, as seen in Fig. 3. The signal intended to be operated from this keyhole may be used as the telephone calling-up-signal, so that when the door is being unlocked the operator will give the telephone call signal to headquarters, and when he opens the door of the box, he only need take the telephone apparatus and use it. The citizen can likewise have access to the telephone in this way, be-

sides giving his arbitrary automatic signal, and this acquisition of the use of the telephone by the citizen in addition to the automatic signal already provided, constitutes one of the important features of this invention. Now it is possible that the citizen would have to give more than one call with the mechanism to secure attention at police headquarters, and if the key shaft of the mechanism required a half revolution to allow the ratchet mechanism to engage with a notch in the ratchet wheel as indicated in Fig. 5, he could not do this on account of the obstruction of his key by the locking lever mechanism as already described. This point, however, can be met by putting three teeth in the ratchet wheel mechanism equi-distant from each other, as shown in the right hand movement on the door of the box, as seen in Fig. 4, as the motion of the key then need only be through an arc of one hundred and twenty degrees, and the lock lever mechanism allows considerably more than that.

The bolt mechanism will now be described. Secured to the winding shaft S, is a collar T, in which a pin T', is placed, which is adapted to play against the shoulder U, of a bolt U', when the collar is rotated a half revolution in the act of giving a signal, the pin T' is arranged in such a position with reference to the shoulder U, of the bolt, as to come in contact with it, and press the bolt back at the end of the movement of the winding shaft, and after the ratchet mechanism of the device has engaged with the wheel work of the signal mechanism. When the bolt is thus drawn back it clears the flange of the box which serves as the door jamb, and the door can be opened in the usual manner. A retracting spring U², presses the bolt forward in the usual manner, and the bolt is thus in construction and operation like any ordinary knob latch mechanism, and needs no further description.

A telephone apparatus of the usual construction is placed against the inside of the door to an inner box, as seen in Fig. 4, the door being detached from the box and partly shown in perspective. This telephone apparatus is provided with the usual battery cut-out and automatic switch mechanism incidental to police telephone and signal systems, which can be well understood and needs no further description here. A circuit breaker is also shown secured to this door consisting of the terminal plates V, V', having a spring connection with each other, and one of which is provided with a push button V², which projects through the door so as to be manipulated when the door is closed, as shown in Fig. 2. This is for the purpose of giving independent signals, or even for calling up telephone service, if it was thought inconvenient to manipulate the key calling-up mechanism, as already described. A lightning arrester, and bell mechanism are also shown within the inner box of the usual construction.

The condenser mechanism, battery and other minor details go with the box, and can be understood without further explanation.

All of the circuit wheel and signal wheel mechanism which is shown in Fig. 4, as being secured to the inner side of the door A', is protected by a case A⁶, having a door A⁷, which is provided with a lock A⁸, as may be seen in Fig. 2, so that the mechanism can be in no way manipulated or interfered with when the box is opened to use the telephone.

In Fig. 2, the wire connection with the mechanism shown as secured to the box door in Fig. 4, is illustrated by the double flexible conductor W, which connects the signal mechanism with the other devices within the box and with the main line in which the box is to be placed. Any other hinged or jointed connection as used for electric light fixtures or the like may be used for this purpose as well.

The signal mechanism that is shown connected with and secured to the door of the box can be secured to a fixed side of the box as well as in the manner shown, and the door which would give access to the telephone mechanism within the box might form one of the other sides of the box as well so that the door when opened would show only the telephone calling-up mechanism and circuit breaker as illustrated as being connected to the inner door of the box as seen in Fig. 4. So also might the signal mechanism be fixed to one of the sides of the box in the manner already described and the telephone mechanism fixed within the box so that nothing would be upon the door that is to be opened but a lock alone. These different ways of connecting up the mechanism to the box or within it are all matters of choice and convenience to be determined by the economy of construction or convenience of manipulation decided upon when the apparatus is to be fitted up for service. They are only referred to here to show that the construction of the device is not limited to the form of box herein shown and described as any other well known form of signal box construction may be adopted as well.

In Figs. 12, 13, 14, and 15, the circuit wheels and signal wheel are shown developed in a straight line with relation to each other and the breaks they would make in the circuit or in other words the marks they would make on a register tape is shown to illustrate how the signals would be given and how they could be varied by changing the notches in the peripheries of the wheels.

Fig. 16, shows how the signal wheel could be used to control the movement of a circuit closer (which might also be a switch) so as to enable the circuit wheel to not only give the box number but also the distinctive signal as well. In this case a series of circuit wheels could also be arranged upon one shaft each having its own special signal notches as well as the box number notches cut upon its periphery, but of course each signal wheel would require its own circuit closer, that is one for

each and every signal wheel in the series. It would be also understood that when the circuit closer would be used as a switch the circuit wheel mechanism might be arranged in any other suitable position in the box without reference to the position of the signal wheel mechanism but this would require an extra contact spring for each circuit wheel and a contact point for each of the circuit closers and each contact spring wired to each circuit closer contact point.

The operation and use of the mechanism will now be described. These boxes are arranged at suitable points around throughout the city or police precinct in the manner of police signal boxes generally and from which the signals incidental to police telegraph systems are usually received and given. It is usual for the police department to arrange their "beats" in such a manner as to make two or more of them converge to one of these signal stations so that several patrolmen may make their reports and communicate with police headquarters from one of these boxes and during the same "watch." Now each of the policemen is provided with a key similar to that shown in Fig. 11, and when he reaches the box he may make his report by simply inserting his key in the bottom key hole over which the word "Report" appears in Fig. 1, and giving it a half turn to the right and letting go for a few moments during which the circuit wheel and signal wheel mechanism already described rotate and transmit their signals to headquarters, the former giving the box number and the latter its special signal which would identify the key holder (or the patrolman) who had thus made his report which would mean that he had reached the box on his rounds over his beat, while the mechanism was thus giving its signal the key could not of course be withdrawn from the key hole until the signal had been completed when the key assumes its normal vertical position again and can be then taken out. As it is so arranged in modern police systems that what is known as an "answer-back" signal may be given immediately after a report signal has been transmitted by a patrolman to headquarters, this detention of the key in the key hole serves the purpose of detaining the officer at the box a sufficient length of time in anticipation of the reception of such an "answer-back" signal (which is usually sounded upon the bell within the box) as he cannot withdraw his key until his report signal has been completed as has already been explained and he is consequently obliged to remain the requisite length of time for the "answer-back" signal to be given to him. When another officer is to make his report from the box his manipulations with his key and the results therefrom will be precisely the same as has just been described only that his key having a differently shaped bit will pick up another one of the signal wheels and thus transmit a different signal to head-

quarters to that given by the first officer and in that way he will be "individualized" or distinguished there. In this way a number of patrolmen (each one having his own specially shaped key adapted to pick up exclusively some one of the signal wheels) may make their reports from the box and all be recognized at headquarters by the signals which they send in, and all of which can be done by the simple manipulation of the key alone from the outside of the box. All of the keys however that are held by the policemen may be inserted in the key holes designated by the words "Wagon," and "Ambulance" and signals given therefrom because each of these signals is given by a simple circuit wheel mechanism having the box numbered and some characteristic signal notch or notches alone and necessitating only a winding shaft alone like that shown in Figs. 5, 6, 7, and 10 with all the multiple signal wheel mechanism omitted therefrom. The manipulation of the key in either of these key holes is precisely the same as that described in giving the "report" signals. The mechanism and key manipulation adapted to the "calling-up" telephone signal are similar to those already described only that in addition to giving a special "calling-up" telephone signal (with the box number) the manipulation of the key also draws back the bolt which fastens the door so that the latter may be opened and the telephone apparatus become accessible. All the policemen's keys will of course operate this telephone call and open the door in the manner already described and this is the only instance in which it becomes necessary for any of the patrolmen to open the box at all in using this mechanism which of course is rendered necessary to get at the telephone apparatus which is kept locked up to protect it. It can therefore be seen that all of the ordinary signals given by the policemen are transmitted by the simple and instantaneous method of manipulating the key alone from the outside of the box and this is rendered possible by means of the arrangement of the key holes and key mechanism and the multiple signal mechanism shown and described and which has never been accomplished heretofore in the art of police signaling.

In order to give authorized citizens the means of communicating with the police department, a key, similar in shape to that shown in Fig. 11, and to those in the hands of the policemen and differing only in that the bit is made of a sufficiently greater depth so as not to enter any of the key holes but that designated by the word "Telephone," is provided for the purpose by means of which a citizen may give a signal from the box and unlock the latter and by means of the telephone hold oral communication with police headquarters in addition to sending in his automatic signal which the "calling-up" signal answers for. The manner in which the

key becomes trapped and that in which it may be released by the policeman who responds to the call by means of his key has already been described.

If it is necessary to distinguish between the policeman's telephone call and the citizen's automatic call and his telephone call this may be accomplished by the addition of one or two of the signal wheels with their incidental mechanism shown as adapted to give the "report" call. By this device it will be seen that the citizen has not only the means of giving an automatic arbitrary call which is the custom in other signal systems but he also in addition thereto can hold telephonic communication with headquarters which it has been deemed necessary to deprive him of in other police systems equipped with a multiple call dial mechanism lest he would manipulate the latter accidentally or intentionally by reason of its accessibility and thus cause signals that are intended for the exclusive use of the policemen to be transmitted to headquarters.

This use of the telephone which is placed at the disposal of the citizens in addition to the automatic call heretofore given by them constitutes one of the advantages of this system and is rendered feasible by the use of my improved mechanism.

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

1. A signal box door having a signal circuit breaker provided with a winding shaft mechanism, secured thereto, and being provided with a bolt, and a pin secured to the winding shaft, and adapted to impinge against the bolt and thereby unlock the door, substantially as specified.

2. A signal box having a door to which the winding shaft mechanism of a bolt retracting device is secured, and adapted to be actuated by means of a key, a locking lever one end of which is adapted to engage with the bit of the key so as to prevent the removal of the latter from the key hole after being used to retract the bolt, the other end being so arranged with reference to another key hole in the door as that when another key is inserted through the latter, it will cause through the rotation of an intermediate winding shaft mechanism the change in the position of the locking lever, which will allow the release of the trapped key from its key hole, and the intermediate winding shaft mechanism by means of which the locking lever is so controlled, all combined, substantially as specified.

3. A multiple signal transmitter provided with a series of signal wheels loosely mounted upon a shaft "D," which is provided with a longitudinal slot "D⁴," and into which a key may be inserted, and by means of which the wheels will be rotated against a circuit breaker "J³," substantially as specified.

4. The combination of the shaft "D," having a slot D⁴, a signal wheel loosely fitted thereon and provided with a slot "F³," and a

key fitted in the slot "D⁴" of the shaft and the slot "F³" of the wheel, by means of which both may be rotated, substantially as specified.

5 5. The combination of a shaft having a series of signal wheels loosely and rotatably mounted thereon, and separate keys fitted to the shaft and signal wheels for rotating them, substantially as specified.

10 6. The combination of a shaft having a signal wheel loosely and rotatably mounted thereon, and a key fitted to the shaft and signal wheel for rotating them, substantially as specified.

15 7. In combination with a circuit closer, a signal wheel loosely fitted upon a shaft, and a key mechanism to secure the signal wheel and its shaft together, that the movement of the circuit closer may be controlled by the signal wheel, substantially as specified.

20 8. In combination with the circuit closer "J³," a signal wheel "F," adapted to control its movements, a shaft "D" upon which the signal wheel is loosely mounted, and a key device to fasten the wheel to the shaft so
25 as both will rotate together, substantially as specified.

9. In combination with the circuit closer J³, a signal wheel "F," adapted to control its movements, a shaft "D" upon which the signal wheel is loosely mounted, a key device
30 fitted to the shaft so that both will rotate together, a motor mechanism "E," adapted to rotate the shaft "D" and the signal wheel mounted thereon, and a train of wheels C', C²,
35 &c. to regulate the rotation of the shaft "D²," substantially as specified.

10. The combination of the signal wheel "F²," a shaft "D" upon which the signal wheel is loosely mounted, and a restoring
40 mechanism "L," secured to the shaft "D," substantially as specified.

11. In combination with a series of signal wheels F, F', F², a shaft upon which the signal wheels are loosely mounted, and a restoring
45 pin mechanism L, secured to the shaft "D," substantially as specified.

12. In combination with the shaft D, having loosely mounted thereon a signal wheel
50 "F," both being adapted to be rotated by means of a key, the circuit wheel mechanism

"H," adapted to give electric signals in conjunction with the signal wheel mechanism, substantially as specified.

13. In combination with the shaft D, having loosely mounted thereon a series of signal
55 wheels F, F', F², any one of said wheels adapted to be rotated by means of a key which fastens shaft and wheel together, the circuit wheel mechanism "H," adapted to give electric
60 signals, in conjunction with the signal wheel mechanism, and a motor mechanism "E," adapted to control the motion of the signal wheels and the circuit wheel mechanism,
substantially as specified.

14. In combination with the circuit wheel
65 "H," having the contact springs I, I', the circuit closer J³, adapted to close the circuit between the wires M and M² and thereby short circuit the circuit wheel "H²," and a signal
70 wheel "F," being provided with the shaft "D," upon which it is loosely mounted and being adapted to control the movements of the circuit closer J³, by its rotation, substantially as specified.

15. The combination of a circuit wheel
75 mechanism, a circuit closer adapted to make contact with the circuit wheel mechanism and thereby short circuit the circuit wheel, and a signal wheel being provided with a shaft upon
80 which it is loosely mounted, and with which it is adapted to be rotated by means of a key to cause the circuit closer to close the circuit through the circuit wheel, substantially as
specified.

16. The combination of a circuit wheel
85 mechanism, the circuit closer adapted to close a circuit through the circuit wheel mechanism and thereby short circuit the circuit wheel, and a signal wheel provided with a
90 shaft upon which it is loosely mounted, and with which it is adapted to be rotated by means of a key, and a signal wheel that will cause the circuit closer to close the circuit around the circuit wheel, substantially as
specified.

THOMAS F. GAYNOR.

Witnesses:

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LOUIS FERDINANDUS.