(No Model.) 4 Sheets—Sheet 1.

A. G. HOLCOMBE.

ELECTRIC COMMUNICATING SYSTEM.

No. 397,364. Patented Feb. 5, 1889.

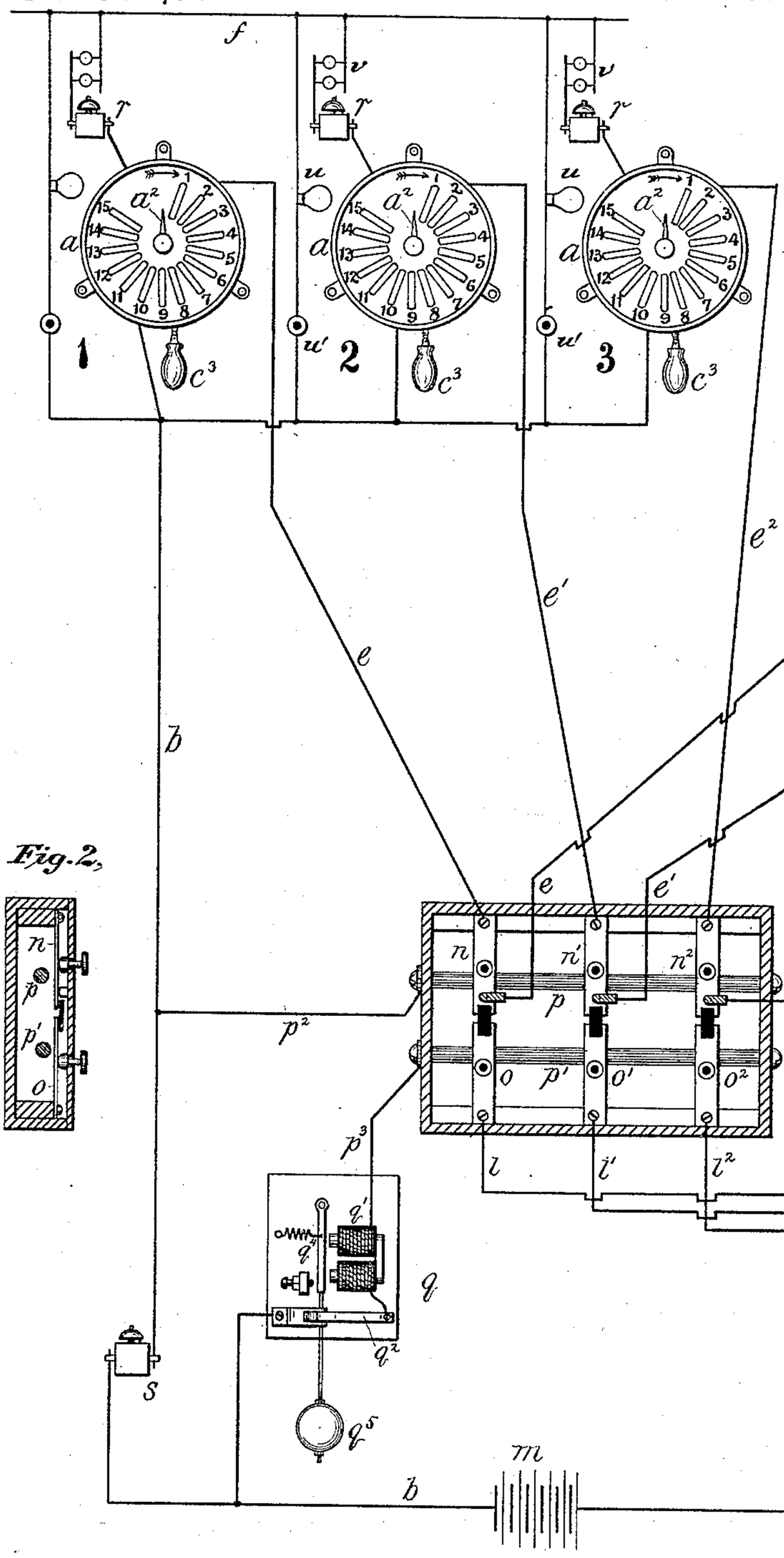

Fig. 1.

Fig. 2.

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(No Model.) 4 Sheets—Sheet 2.

A. G. HOLCOMBE.

ELECTRIC COMMUNICATING SYSTEM.

No. 397,364. Patented Feb. 5, 1889.

Fig. 5.

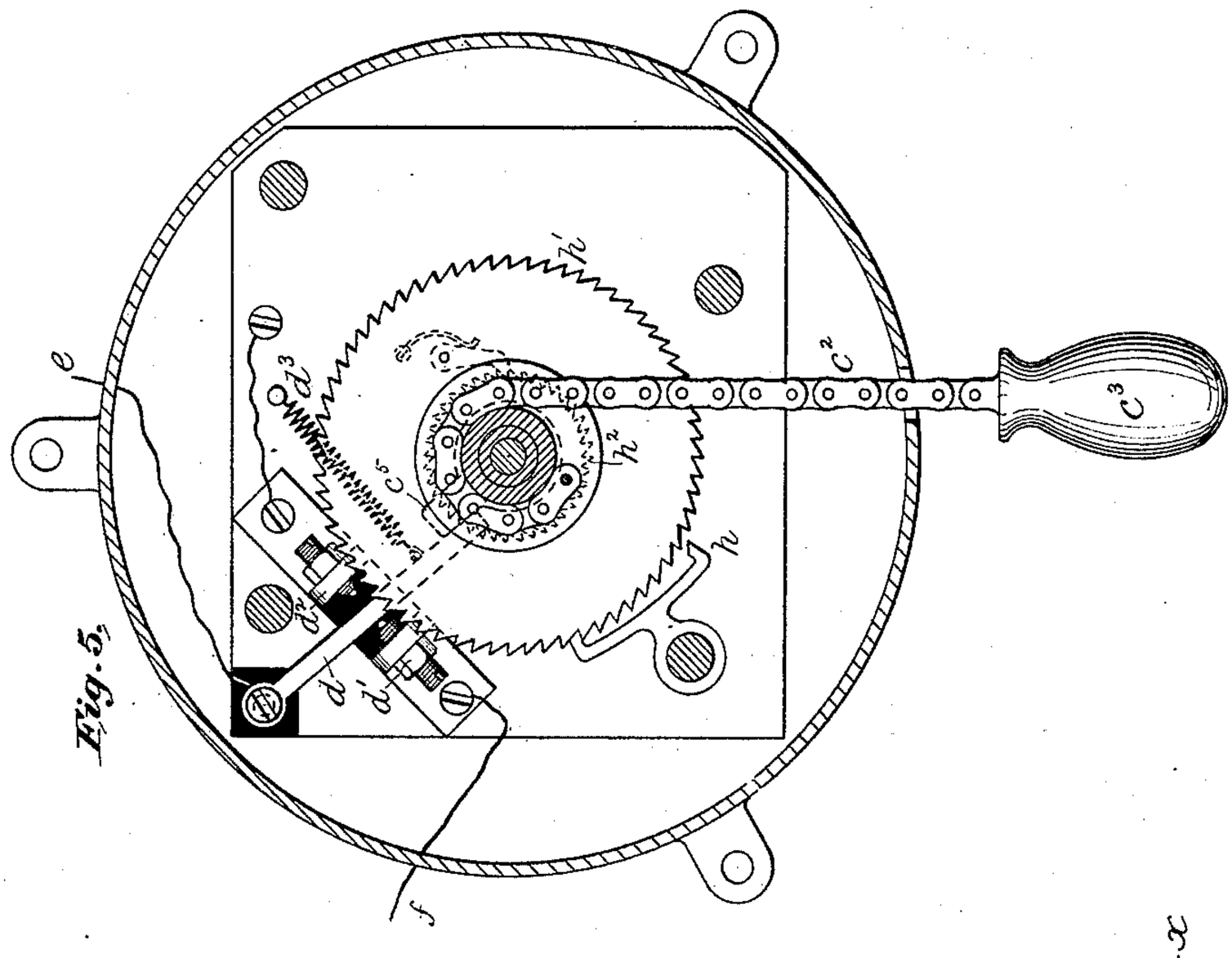


Fig. 3.

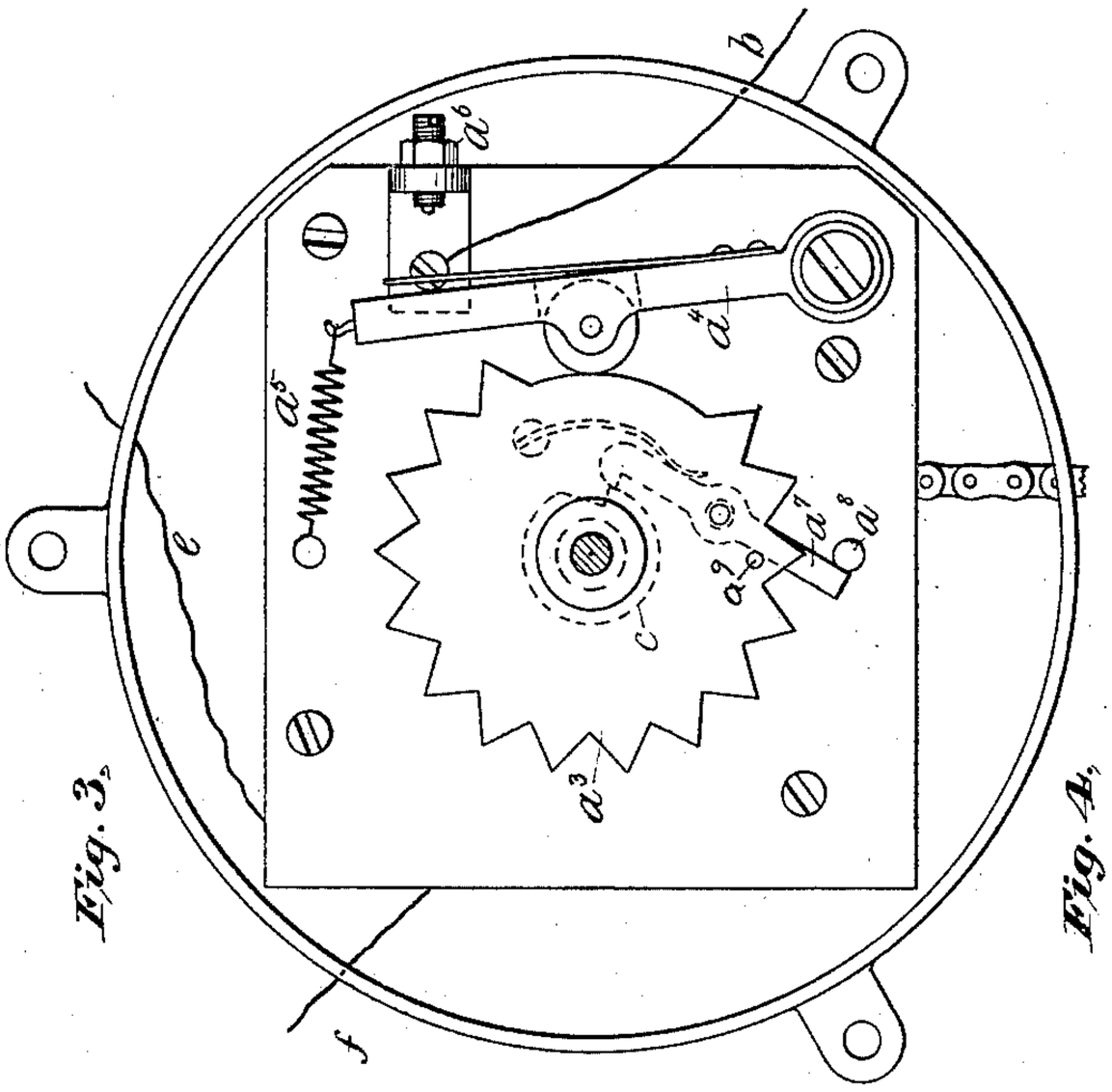
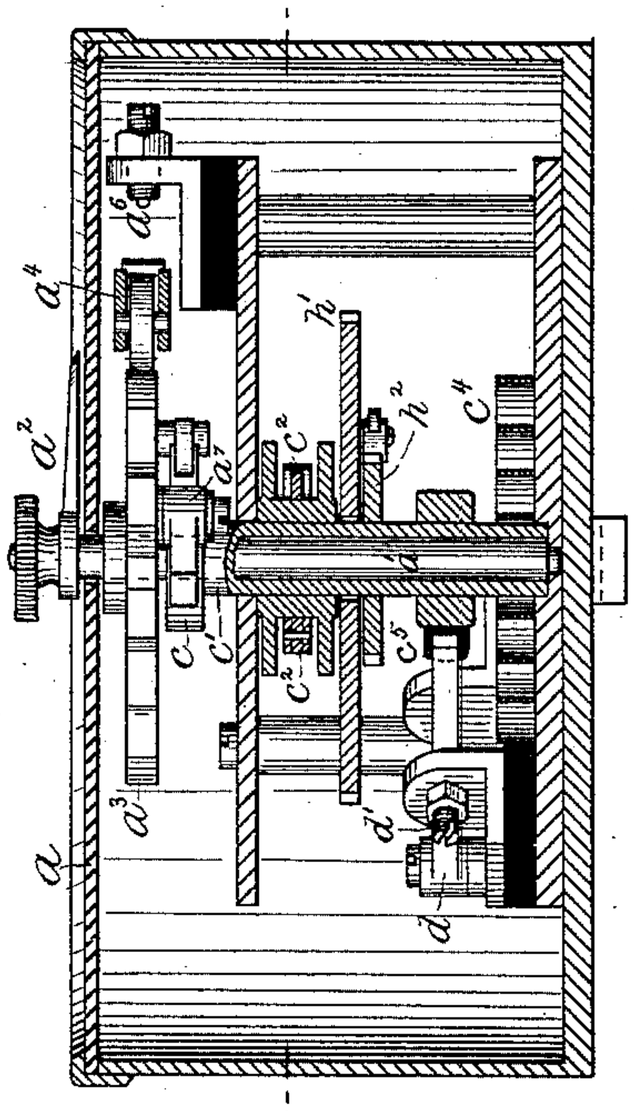


Fig. 4.



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(No Model.) 4 Sheets—Sheet 3.

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ELECTRIC COMMUNICATING SYSTEM.

No. 397,364. Patented Feb. 5, 1889.

Fig. 6.

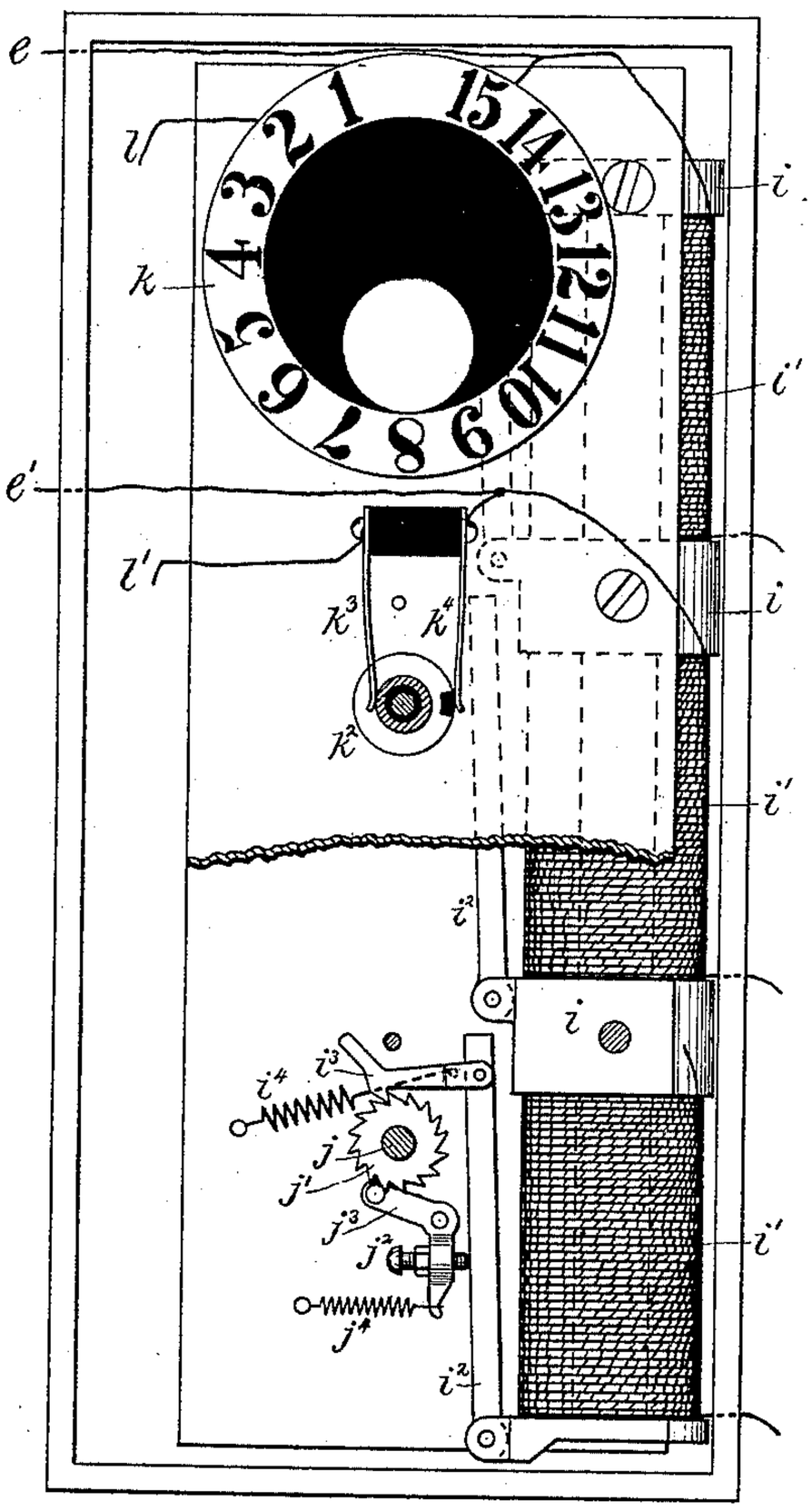


Fig. 7.

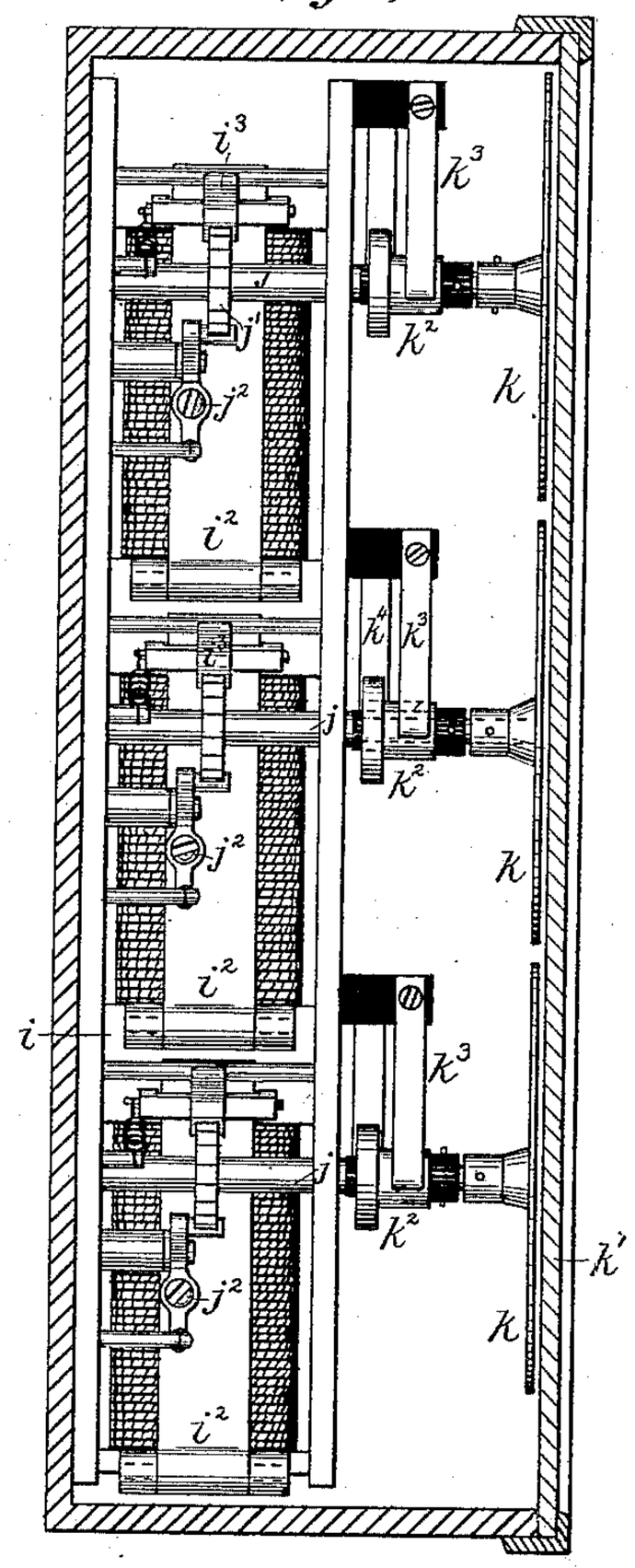


Fig. 8.

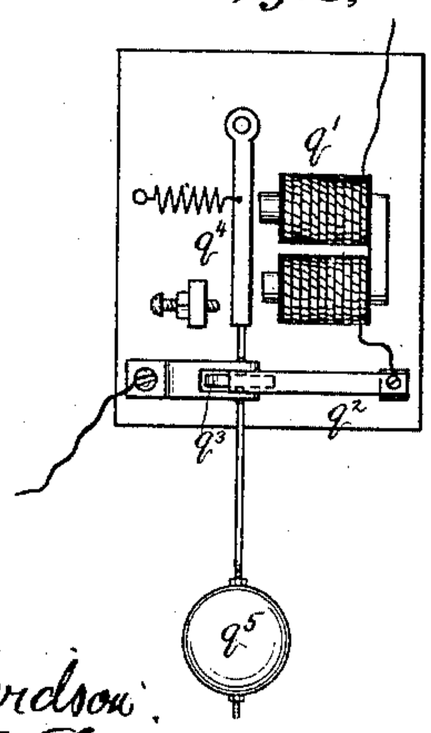
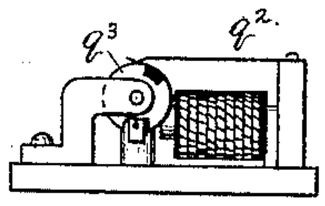


Fig. 9.



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(No Model.) 4 Sheets—Sheet 4.

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ELECTRIC COMMUNICATING SYSTEM.

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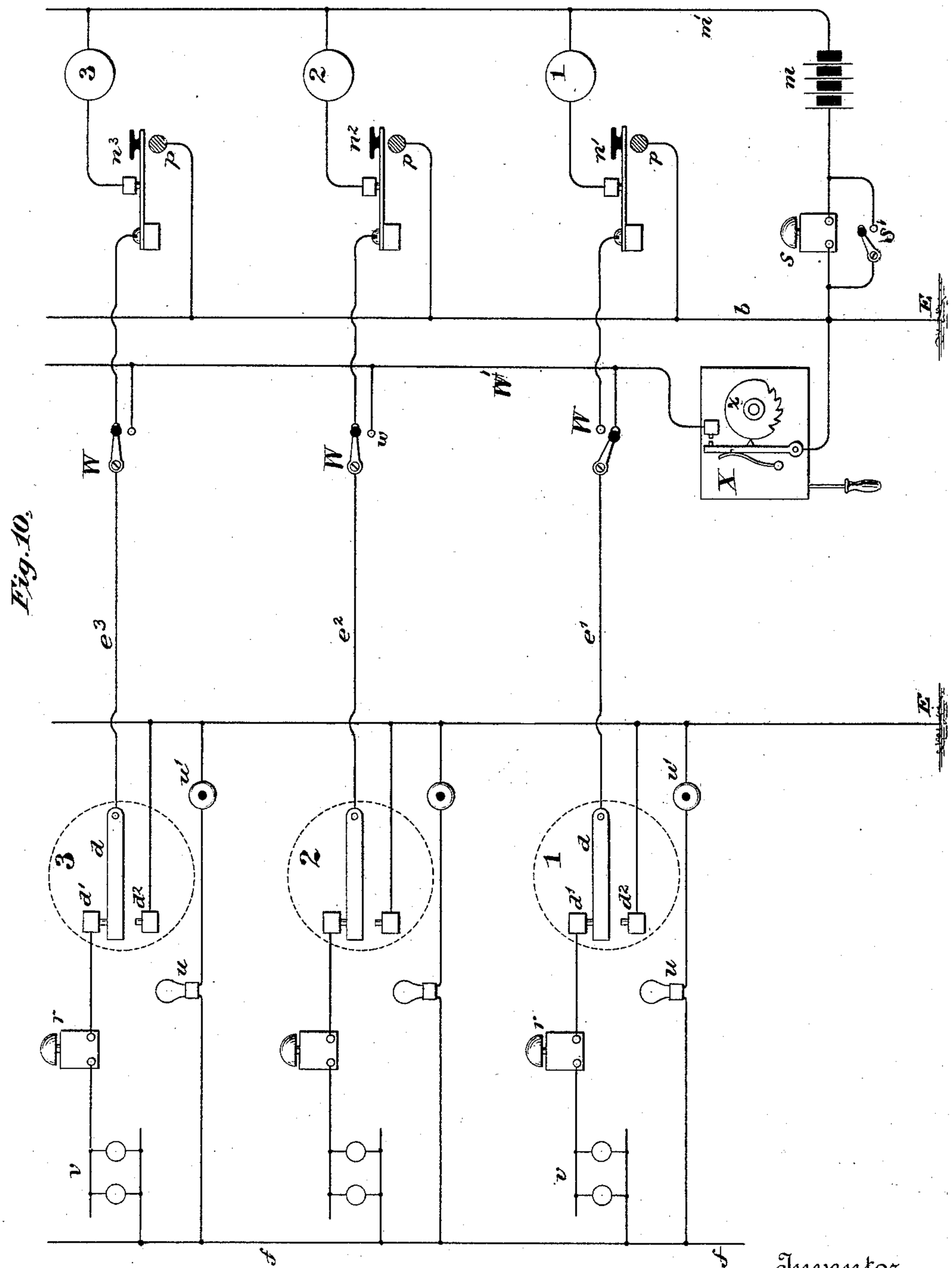

Fig. 10.

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UNITED STATES PATENT OFFICE.

ALFRED G. HOLCOMBE, OF NEW YORK, N. Y., ASSIGNOR TO THE EQUITABLE ELECTRIC COMPANY, OF SAME PLACE.

ELECTRIC COMMUNICATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 397,364, dated February 5, 1889.

Application filed June 14, 1888. Serial No. 277,069. (No model.)

To all whom it may concern:

Be it known that I, ALFRED G. HOLCOMBE, a citizen of the United States, residing at New York, county and State of New York, have invented certain new and useful Improvements in Electrical Communicating Systems, of which the following is a specification.

The electrical communicating system forming the subject-matter of my present invention is particularly adapted for use as a police-signaling system, though parts of the invention are suitable for use in hotels, apartment-houses, and elsewhere.

In the system herein described, generally speaking, among other things I employ, first, a call or signaling box located at each of the stations, rooms, or apartments, and adapted to send signals representing certain wants by making and breaking the circuit a definite number of times for each want; second, a call-bell at each of the stations or rooms in a branch circuit joining the call-boxes to a collective line or line common to all the stations or rooms; third, an annunciator at the central office having as many electro-magnetic devices as there are stations or rooms connected to the call-boxes in the stations by separate lines and a disk for each of the electro-magnetic devices provided on its face with numbers consecutively arranged and rotated step by step by its electro-magnetic device; fourth, a battery at the central office connected at one end to the coils of all the electro-magnetic devices in the annunciators and at the other end to all of the call-boxes at the stations or rooms by a main line; fifth, a switch-box having two sets of keys, those of one set being included in the individual station or room lines on normally-closed circuits and those of the other set being connected to contact devices in the annunciator, the circuits of which are broken when the indicating-disks are at the zero-mark, a bar or contact-piece arranged under the first set of keys and connected to the main line, and a bar or contact-piece located under the second set of keys and joined to the main line through a vibrating circuit-closer; sixth, a call-bell at the central office in the main line between the connections of the vibrating circuit-closer and the contact-piece under the first set of keys in the switch-box; seventh, one or more incandescent electric lights at each station, which are flashed to indicate to the eye the signal or number of impulses transmitted, while the bell may also be used to simultaneously sound the signal, and, eighth, an incandescent lamp placed within the signal-box in connection with a circuit-closer, push-button, or switch, by means of which it may be lighted by the roundsman to illuminate the interior of the box.

To send a message to the central station, the operator selects from the wants or signals marked on the face of the signaling or call box the one which he desires to transmit, sets the pointer of the instrument thereat, and pulls down a knob projecting from the box, thereby separating the individual line from the collective line and winding up a spring, which, when the knob is released, moves the pointer back to zero, and while doing so closes the main-line circuit a number of times equal to the position occupied by the signal in the list of signals. These electric impulses, passing through the section of the annunciator belonging to the station from which the signal emanates, energize the electro-magnet and cause its armature to vibrate, and this armature, by mean of a connected pawl or dog, acts on the numbered disk and exposes the number corresponding to the signal sent by the impulses over the line. The central-station operator is at the same time notified by the ringing of his call-bell, and he, upon ascertaining from the annunciator the number of the station and the signal received, informs the calling-station that the message has been received, by depressing that key of the first set of keys in the switch-box which corresponds to the station number, thereby breaking the individual line from the annunciator and connecting it through the main line to the battery. The current of the battery thus passes over said individual line through the call-bell and flash-light at the station to the collective line and back to the battery through all of the other individual lines. To move the displaced annunciator-disk back to zero, the attendant presses that one of the second set of keys in the switch-

board which corresponds to the station number, thereby breaking the individual line to the station and connecting the battery through the vibrating circuit-breaker or rheotome to the contact device in the annunciator, which is now closed.

The vibrating circuit-breaker causes the current to flow in impulses through the electro-magnet of the annunciator, thereby actuating its armature, which, by means of its connected pawl, moves the disk until the zero-mark or blank space thereon appears under an opening in the annunciator-face, an insulated plug in the contact device then stopping further flow of current from the battery.

To transmit signals to any sub-station, currents are thrown upon its individual line by a key or suitable transmitting devices. The impulses thus sent according to any predetermined code or system ring the call-bell and actuate the semaphore or visual indicator—or, in other words, flash the lights—simultaneously.

At the outlying stations the flash or signal lights may be placed in an elevated and conspicuous position, and a roundsman a considerable distance away may be at once apprised of what is required of him. In cases of emergency much time is therefore saved. This is of importance in police-signaling systems. The use of the lights is obviously not limited to the conjoint use of a calling-bell or audible signaling-instrument.

A perfect system for communication is thus provided by means of simple inexpensive instruments positive in operation and not liable to derangement of parts and simple line-connections by which all possibility of interference between the different instruments is avoided. The capacity of the battery alone fixes the limit of the number of instruments which can be used at the same time.

To enable a full understanding of the invention to be had, I will now refer to the accompanying drawings, in which—

Figure 1, Sheet 1, is a diagram of the complete system. Fig. 2, Sheet 1, is a cross-section of the switch-box. Fig. 3, Sheet 2, is a face view of the call-box with the front plate removed. Fig. 4, Sheet 2, is a central section of the same. Fig. 5, Sheet 2, is a section on the line $x\,x$, Fig. 4. Fig. 6, Sheet 3, is a part face view and a part section of the annunciator with the face-plate removed. Fig. 7, Sheet 3, is a side elevation of the actuating mechanism of the same, the frame being in section. Fig. 8, Sheet 3, is a face view of the vibrating circuit-breaker. Fig. 9, Sheet 3, is an under side view of the same; and Fig. 10, Sheet 4, is a diagram view indicating a somewhat different arrangement from that shown in Fig. 1.

To illustrate the operation of my improved communicating system, only three outlying-stations or call-boxes, with their corresponding instruments, are shown. The large numbers 1 2 3, Fig. 1, indicate the stations, at each of which are placed a call-box, a bell, and lamps.

The construction and operation of the various instruments and devices employed will be first described.

The call or signaling box shown in detail by Figs. 3, 4, and 5 has the signals marked or printed on its face a on radial lines, as shown at Fig. 1, in which view for want of space the wants are indicated by figures. On the central shaft, a', in front of the face a, is secured the pointer a^2 and thumb-piece by which it can be rotated, and immediately behind the face is located the serrated disk a^3, rigidly secured to the shaft a' and provided with as many teeth as there are signals or wants. A roller on the lever a^4, pivoted to the frame of the instrument, is caused to bear against the edge of the disk a^3 by means of the spring a^5, and this lever, when the disk is rotated, is caused by the action of the teeth of the disk against the roller to make contact with the insulated stop a^6. This stop a^6 is joined to the main line b of the system. At the back of the disk a^3, and pivoted to it, is the spring-acting hooked pawl a^7, the projecting tail of which strikes the stud a^8, when the pointer a^2 is brought back to the zero position, and thus moves the hooked end of the pawl clear of the notch in the flange c on the end of the sleeve c', through which the shaft a' passes, as shown at Fig. 3. The movement of the pawl a^7, when struck by the stop a^8, is limited by a pin, a^9, on the disk and the rotation of the disk checked. To a flanged drum on the sleeve c' is attached the chain c^2, which passes down through the lower side of the case and is provided with the knob or handle c^3. A coil-spring, c^4, is attached to the rear end of the sleeve c' and to the frame, and to this sleeve, just in front of the spring c^4, is secured the insulated lug c^5, which acts as a stop for the spring and determines the normal position of the sleeve c' and attached parts by resting against the end of the lever-switch d, to which the individual line e is connected. This lever d plays between the two insulated stops d' and d^2, but is held against the stop d', to which the collective line f is joined, by the lug c^5, and is brought into contact with the other stop, d^2, by the spring d^3 when the sleeve c' is rotated. This stop d^2 is electrically connected through the frame to the lever a^4.

The speed-controlling gear $h\ h'\ h^2$ is of the ordinary construction.

In the indicating-annunciator three sections only are shown, and in Fig. 6 a different face view of the mechanism of each section is given. The electro-magnets of all sections in each vertical row of the annunciator are composed of a single bar of iron provided with pole-pieces i, between which the coils of insulated wire i' are wound. In front of each of the coils, hinged to a pole-piece, is an armature, i^2, the free end of which faces the

pole-piece next above the one to which it is hinged, thus forming a nearly-closed magnetic circuit with the part of the bar constituting the core between said adjacent pole-pieces. As the operative parts are alike in all sections of the annunciator and similarly lettered, the following description will apply to the mechanism of each section: The shaft j extends through the frame in front of the armature i^2, and is provided with the ratchet-wheel j', into which plays the hooked pawl i^3, pivoted to the upper end of the armature i^2, said pawl being held in contact with the ratchet-wheel j' by the spring i^4, which also draws the armature away from the pole-piece i of the magnet. The extent of the movement of the armature is determined by the adjustable screw j^2, fitted in the bell-crank lever j^3, the other arm of which is provided with a pin arranged to come in contact with the teeth of the ratchet-wheel j', and thus rectify the position of the wheel and lock it when the armature, in its retrograde movement, strikes the screw j^2, thus preventing the shaft j and attached parts from being moved farther than one tooth of the ratchet-wheel j' for each movement of the armature toward the magnet. The light spring j^4 holds the pin on the lever j^3 always against the ratchet-wheel, thus causing it to act as a back-stop therefor. On the end of the shaft j is secured the disk k, having a series of numbers marked on its face corresponding to the fifteen signals marked on the call-boxes and a blank space between the numbers 1 and 15, making sixteen divisions in all, which correspond to the number of teeth formed on the ratchet-wheel j'. The central part of this disk, with the exception of a circular spot, is made black. The face k' of the annunciator has numbers marked thereon indicating the stations, and each section has two holes, one in front of the blank space between the numbers 1 and 15, and the other in front of the circular white spot on the disk when the disk is in normal position; but when the disk is rotated by its electro-magnet, so as to expose a number in place of the blank space, then a black circle appears in the lower opening, which makes a distinctive mark on the face of the annunciator, by means of which the attendant readily observes the number of the station making the call.

Under the annunciator in Fig. 1 may be located a card showing the wants or signals and numbers corresponding thereto.

On each of the shafts j, but insulated therefrom, is the flanged collar k^2, against which the insulated springs k^3 and k^4 bear, the flange having an insulated piece on which the spring k^4 normally rests. Each of the springs k^4 is connected to one of the individual lines $e\ e'\ e^2$ of the system, each of which is joined to one end of its respective coil i', and the springs k^3 are connected by the lines $l\ l'\ l^2$, respectively, to the switch-box hereinafter described. The other ends of the coils i are connected to one terminal of the battery m by the line m', the main line b being joined to the other terminal of the battery.

The switch-box at the central office contains two sets of keys, the upper set, $n\ n'\ n^2$, being included in the individual lines $e\ e'\ e^2$ and normally closing these lines, and the other set, $o\ o'\ o^2$, constituting the terminals in the switch-box for the branch lines $l\ l'\ l^2$. The keys of the two sets are arranged in pairs, the keys $o\ o'\ o^2$ being provided at their ends with projecting pieces of non-conducting material overlapping the ends of the keys $n\ n'\ n^2$, but not connected thereto. Located under these two sets of keys are the bars p and p', respectively connected to the main line b—the bar p by the wire p^2, and the bar p' by the wire p^3, the latter including the device q, adapted to automatically make and break at regular intervals the circuit of the current passing through it. This circuit-controller comprises an electro-magnet, q', a spring, q^2, resting on a pivoted metal disk, q^3, included in the circuit, and a pivoted armature, q^4, actuated by a spring against the attraction of the magnet thereon and provided with an adjustable weight, q^5, by which its beats as a pendulum can be regulated. The pendulum-rod passes through a notch or fork wider than the pendulum-rod cut in the disk q^3, thus causing the disk to move on its pivot and bring an insulated piece fitted in the periphery thereof under the spring q^2 when the armature approaches the magnet, thereby breaking the circuit, which is again closed when the armature moves away from the magnet. By this construction the time during which the current is flowing through the magnet is much increased over that in the ordinary spring-acting vibrating circuit-closers, and positiveness and deliberateness of action consequently assured, because the pendulum or vibrating armature-rod moves a given distance when vibrating in either direction before it moves the circuit making and breaking devices. At each of the stations is located a call-bell, r, placed in a branch leading to the collective line f, which is common to all of the stations, and a call-bell, s, is placed at the central office in the main line b, between the lines p^2 and p^3.

All the circuits are normally open, so that no waste of battery power occurs, and the one battery supplies the current for all operations carried out by this system, which I will now proceed to describe.

As an example of the working of the system, suppose that an officer at station 2 wants an ambulance. He simply turns the pointer a^2 of his call-box until it lies over or points to the word ambulance or to the number standing therefor—say 5. This in itself does not affect the circuits. It may here be mentioned that the pointer can be rotated forward and back to the starting-point indiscriminately without any injury to the apparatus. When the pointer is thus set, the hooked pawl is carried around with the ser-

rated disk a^3. The officer now pulls down the knob c^3, which winds up the spring c^4 and allows the spring d^3 to move the lever d against the stop d^2, thus breaking the collective circuit at d' and connecting the individual line e to the lever a^4, which lever closes the main line at a^6 each time a tooth of the disk a^3 acts thereon, as the disk is caused to move back into normal position by the engagement of the notch in the flange c with the hooked end of the pawl a^7. The five impulses thus caused to flow through section 2 of the annunciator energize its coil i', and through the medium of the armature and pawl, move the ratchet-wheel j forward the distance of five teeth, thus exposing the number 5 in the opening of the face of the annunciator. These impulses in passing through the main line actuate the call-bell s. The attendant at the central station or office, having noted the call number, informs the officer that his signal has been received by pressing down the key n', thereby separating the individual line e' from the annunciator and connecting it to the bar p, thus opening a path for the battery-current through the main line b to wire p^2, bar p, key n', line e', lever d in the call-box, and to the collective line through the call-bell r of the station by the contact-stop d'. From the collective line the circuit is completed to the other side of the battery through all of the other individual lines and included instruments, but without affecting any of these latter instruments, the quantity of current flowing through each being insufficient to energize the electro-magnets. The attendant at the central office now sets the disk k back to the zero position by pressing on the key o', which breaks contact between the key n' and the line by which it is connected to the annunciator (but does not make contact between n' and bar p) and closes the circuit through the vibrating circuit-breaker q, the springs k^3 k^4, and the insulated flanged collar k^2, the insulated section in the flange of which is now away from the spring k^4, the coil i, and the battery m, the lines involved being part of the main line b, the wire p^3, line l', and line m'. The current, because of the interruptions in the circuit caused by the circuit-breaker q, flows in impulses, each impulse causing the armature i^2 to move the ratchet-wheel j' one tooth, and this operation continues until the insulated part of the flanged collar k^2 comes under the spring k^4, in which position the disk k of necessity pauses and exposes the zero-mark or blank space.

By manipulating the key n n' n^2 of course any required signal may be transmitted to each sub-station and is there reproduced by the call-bell r.

As is obvious, any number of sub-stations (for which there is sufficient battery) may simultaneously transmit signals to the central station, the signal from each station being recorded on its own annunciator, and at the same time the operators at the central station may send signals to any sub-stations or return the annunciators of any lines to zero, all without the least interference or confusion. In other words, each sub-station is as free to send or receive signals at any time as if it had a battery and circuits devoted to its exclusive use.

The system thus far described is for many purposes complete; but for a police system I add the following important features: At each station the call-box will of course be inclosed in a box or casing, the key of which is carried by the officer. In order that the box may be illuminated at night, so that the officer may clearly see the dial and avoid error in transmitting signals, I place an incandescent lamp, u, and push-button u', Figs. 1 and 10, within the casing and include them in a branch circuit normally open at the button, running from the collective wire f to the battery-wire b. By depressing the button, therefore, the lamp is lighted and the face of the call-box illuminated.

To provide a semaphore or visual signal that may be read by the officer at night and from long distances, if desired, I place in series with the call-bell between the collective lines f and the call-box at each station one or more incandescent lamps, v. These lamps may, as above remarked, be elevated into a conspicuous position and will flash in coincidence with the strokes of the bell as the circuit is made and broken. Signals of any code based upon numbers or intervals may therefore be readily transmitted. A lamp may also be placed within the casing and serve as the signal-receiving device, either alone or in connection with the call-bell. Any desired number of lamps may be used, and they will in practice be distributed throughout the beat of an officer, so that from all points within his beat a signal-light will be in sight. He may therefore receive orders in this way direct or proceed to his signal-box for instructions.

Instead of using keys n n' n^2 to transmit the signals from the central station, they may be sent out by means of notched disks, as indicated in Fig. 10. In that figure each line e' e^2 e^3, &c., passes to the key n' n^2 n^3 through a switch, W, which may be placed upon the contact-point w of a wire, W', joined to b, thus disconnecting the line from the key and connecting it through an automatic transmitter, X, with one pole of the battery. This transmitter may be of any usual construction, and the disks x are removable, one disk with the requisite number of circuit-breaking teeth being used for each signal to be transmitted. The call-bell S is located between the automatic transmitter and the battery, and may be shunted through a branch wire and switch, s', when desired. In this figure the earth forms part of the all-around battery-line b, leading to the several stations. The arrangement is obvious from the drawings and no further description is necessary, and as disk-transmitters such as X are well known illustra-

tion and description of details are not needed. Since in sending in a signal from a sub-station the contacts *d d'* are opened, the lamps are cut out of circuit.

In another application filed by me January 14, 1889, Serial No. 296,341, I have shown a system similar in some respects to this, and any patentable subject-matter disclosed by this case and not herein claimed will be claimed in said application. For instance, electric-flash lamps for communicating according to a predetermined code, which may or may not be used in the system herein described, will be claimed in proper combination in said application.

I claim as my invention—

1. In an electrical communicating system, the combination, with a source of electric energy, signaling devices located at a central and sub stations, and circuit-connections uniting said stations, of electric lamps located in branch lines at the sub-stations and having suitable circuit-closing devices, whereby they may be lighted at the will of the operators at the sub-stations, substantially as set forth.

2. The combination, substantially as set forth, with the all-around battery-wire, of the collective wire, the sub-station signaling devices located between said wires, the individual lines leading from said signaling devices to the central station, and an electric lamp and its switch at each sub-station placed in a shunt around the signaling devices.

3. In an electrical communicating system, the combination, with the sub-stations, the individual lines, and the step-by-step indicators of each line, of a sub-circuit for each indicator including the operating-magnet thereof, an automatic rheotome or vibrator, and a circuit-completing switch or key, whereby, after a signal is registered upon the indicator, it may be automatically returned to zero by closing the vibrator-circuit, substantially as set forth.

4. The combination of the central and sub stations, the individual lines leading from the sub-stations to the keys $n\ n'\ n^2$ at the central station, through which they are normally closed through the magnets of their respective indicators, sub-circuits also including said magnets, a rheotome and normally-open keys, $o\ o'\ o^2$, and connecting bars or devices between the keys $n\ n'\ n^2$ and $o\ o'\ o^2$, whereby, when the latter keys are operated to close the sub-circuits to bring the indicator to zero the normally-closed individual lines are opened at the former keys, substantially as set forth.

5. The combination, with a battery located at the central station, of an all-around battery-wire connected therewith and leading to all the sub-stations, individual lines running from said stations to the central station, where each one passes through its indicator to the opposite pole of the battery, and a normally-open sub-circuit for each indicator connected with one pole of said battery and including an automatically-acting rheotome and connected through the indicator with the opposite pole of said battery, substantially as set forth.

6. The combination of the indicator-disk marked to correspond with the predetermined signals to be received, and also having portions of its face differently marked to indicate when it is at zero and when not, (as, for instance, a white spot to indicate zero and the remainder black,) of a face-plate having two apertures—one through which the received signal is read and another through which the face of the disk is seen—to indicate conspicuously when the disk has been moved from zero, substantially as and for the purpose set forth.

7. The combination of the indicator or annunciator, its individual line in which its actuating-magnet is included, a sub-circuit normally open at two points, contacts operated by the movement of the indicator which automatically close said sub-circuit at one point when the indicator is moved from the zero-point, a circuit opener or insulator which opens said contacts at the same point when the indicator is returned to zero, and a circuit-closing key or switch for closing the circuit at the other point at will to return the indicator to zero, substantially as set forth.

8. The combination of the indicator-disk, its actuating-magnet, ratchet and pawl, its individual line in which the magnet is included, the sub-circuit containing the automatically-acting rheotome and also including said actuating-magnet, the contacts $k^2\ k^3\ k^4$, included in the sub-circuit, and the insulator which opens said contacts when the indicator-disk is at zero, and a circuit-closing key or switch for closing said sub-circuit at will to return the indicator to zero, substantially as set forth.

9. The combination, with the rotating indicator-disk, its driving-ratchet, actuating-magnet, and armature-lever, of the pivoted lever j^3, having a stop located out of a line drawn from its pivot perpendicular to the armature and against which the armature-lever strikes when retracted to force the end of the lever j^3 between the teeth of the ratchet and rectify the position of the disk, substantially as set forth.

10. The combination, with the rotating indicator-disk, its driving-ratchet, actuating-magnet, and armature-lever and pawl, of the pivoted elbow-lever normally drawn by its spring against the driving-ratchet to prevent its false movement and a stop carried by the elbow-lever and located out of a line drawn from the pivot of said lever perpendicular to the armature, against which the armature-lever falls when retracted to operate the elbow and rectify the position of the disk, substantially as set forth.

11. The combination, with the indicator-actuating magnet and the sub-circuit in which it is included, of an automatically-acting rheotome consisting of an electro-magnet, its vi-

brating armature-lever, an independent circuit-completer operated by the armature-lever and loosely connected therewith, and a key for closing said circuit, substantially as and for the purpose set forth.

12. In a call-box, the combination of the rotating spindle carrying the pointer and the notched circuit-making wheel, the winding-sleeve, the movable contact-arm d, contacts d' d^2, the insulated stop on the winding-sleeve which normally holds said arm on one of said contacts, the lever a^4, connected with the other of said stops and operated by the notched circuit-making wheel, and locking devices interposed between the spindle and winding-sleeve, whereby when the pointer is set and the sleeve released the required signal is transmitted, substantially as set forth.

13. The combination, with the spindle carrying the notched signaling-wheel and pointer, of the winding-sleeve, the notched flange thereon, the catch or dog a^7, the stop or pin a^9 on the wheel, and the stop a^8, against which it works, whereby the pointer and notched signaling-wheel may be freely rotated in either direction, but are carried around when the sleeve is released in transmitting a signal.

14. The combination of the collective wire f, the stop d', with which it is connected, the contact-arm d, connected with the individual line and normally resting against said stop, the stop d^2, connected with the all-around battery-wire, against which the arm d rests when a signal is being transmitted, the notched transmitting-wheel and its spindle, the winding-sleeve and drum, and the locking devices between the sleeve and signal-transmitting devices, consisting of the pawl a^7, for engaging the sleeve, and the stops a^8 a^9, substantially as set forth.

In testimony whereof I have hereunto subscribed my name.

ALFRED G. HOLCOMBE.

Witnesses:
M. J. KELLEY,
EDWARD C. DAVIDSON.