(No Model.) 3 Sheets—Sheet 1.

C. HERRMANN.

MULTIPLE CALL BOX.

No. 350,882. Patented Oct. 12, 1886.

Fig. 1.

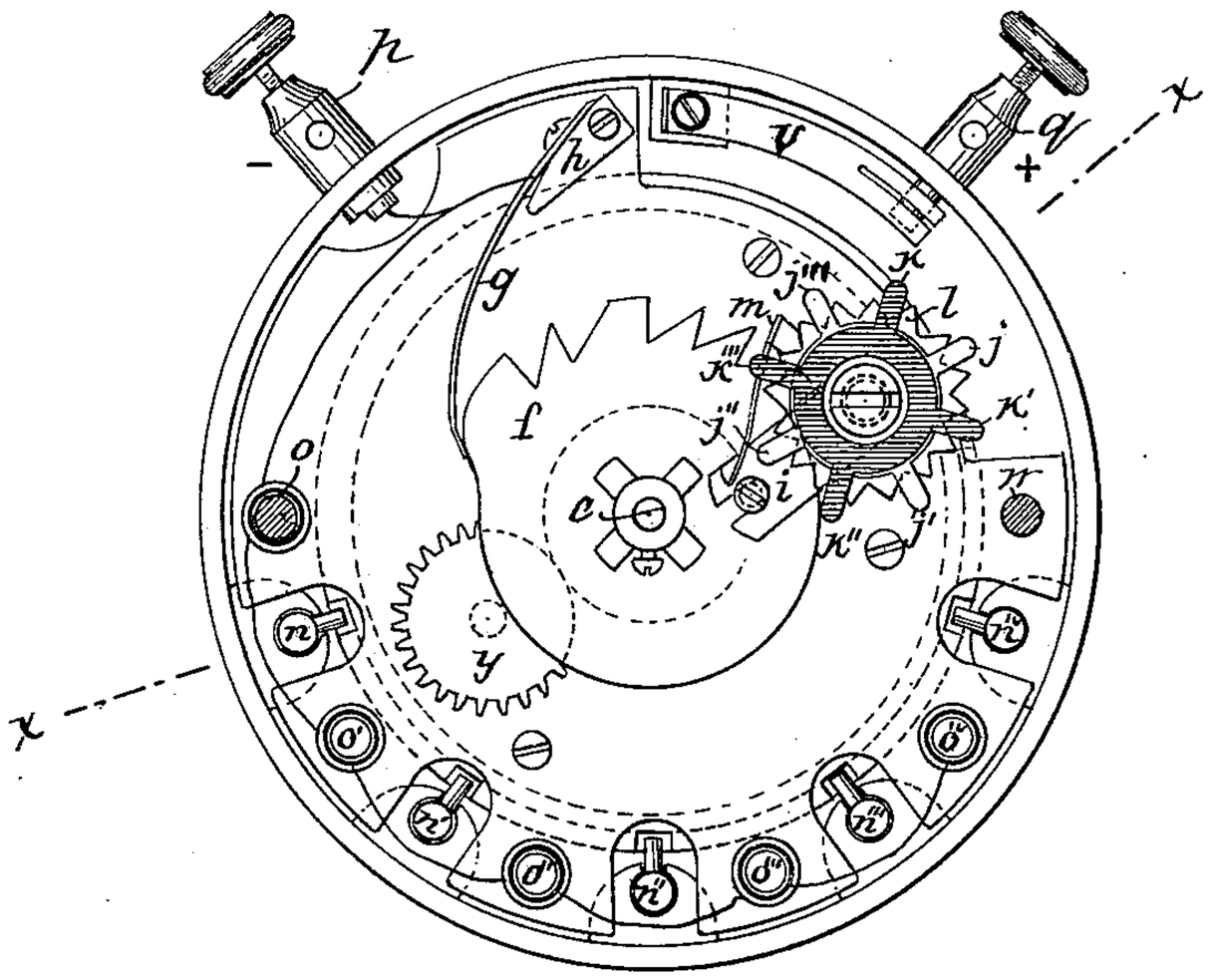
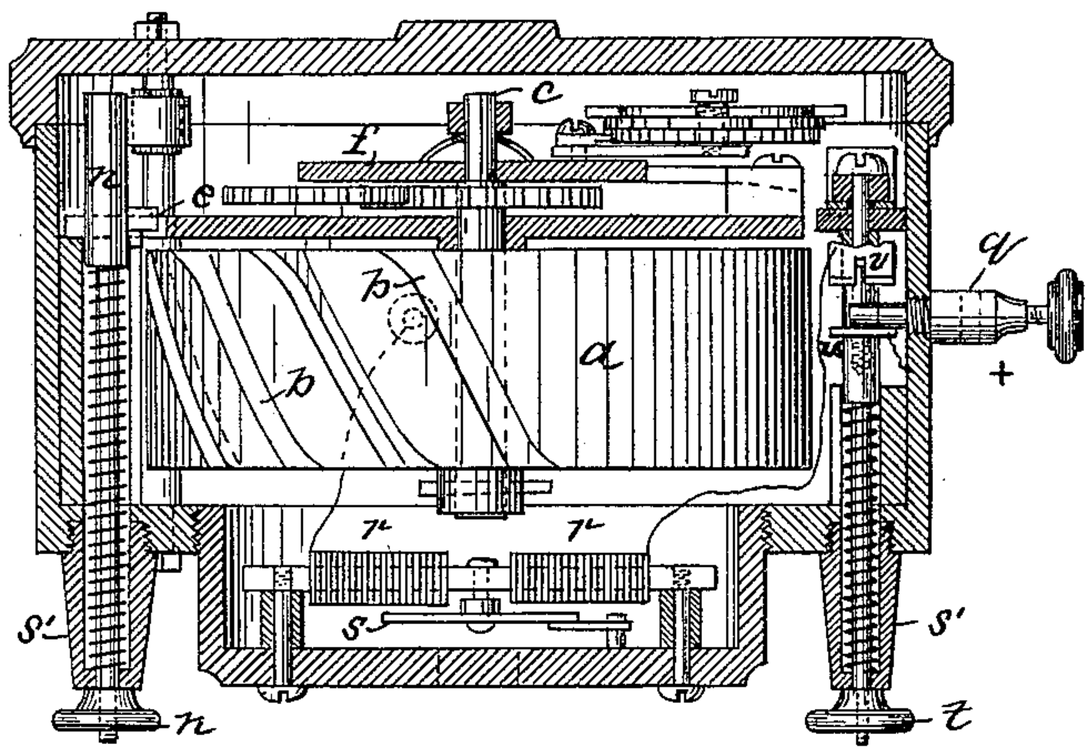


Fig. 2.



Witnesses.
J. Lynn Hull
David Force

Inventor.
C. Herrmann

(No Model.) 3 Sheets—Sheet 2.

C. HERRMANN.

MULTIPLE CALL BOX.

No. 350,882. Patented Oct. 12, 1886.

Fig. 3.

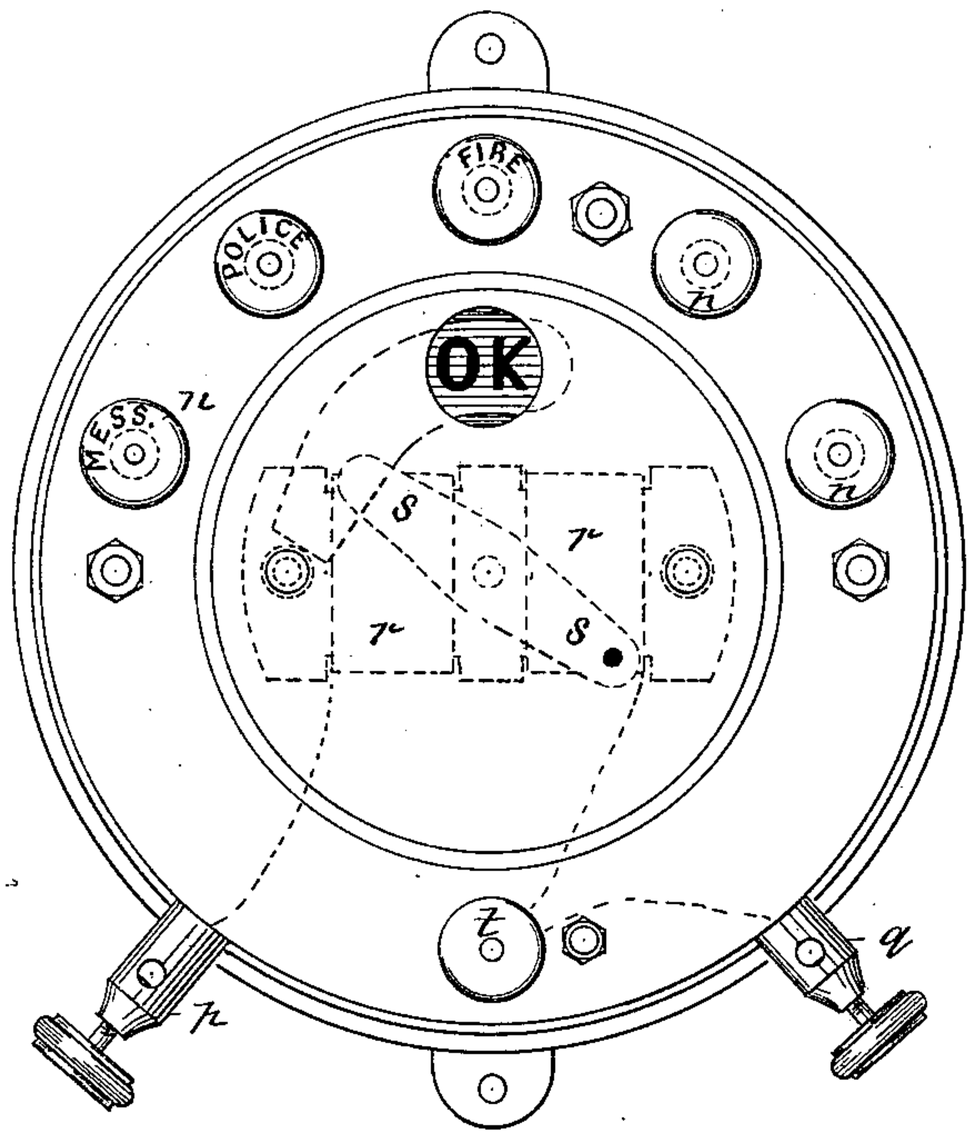
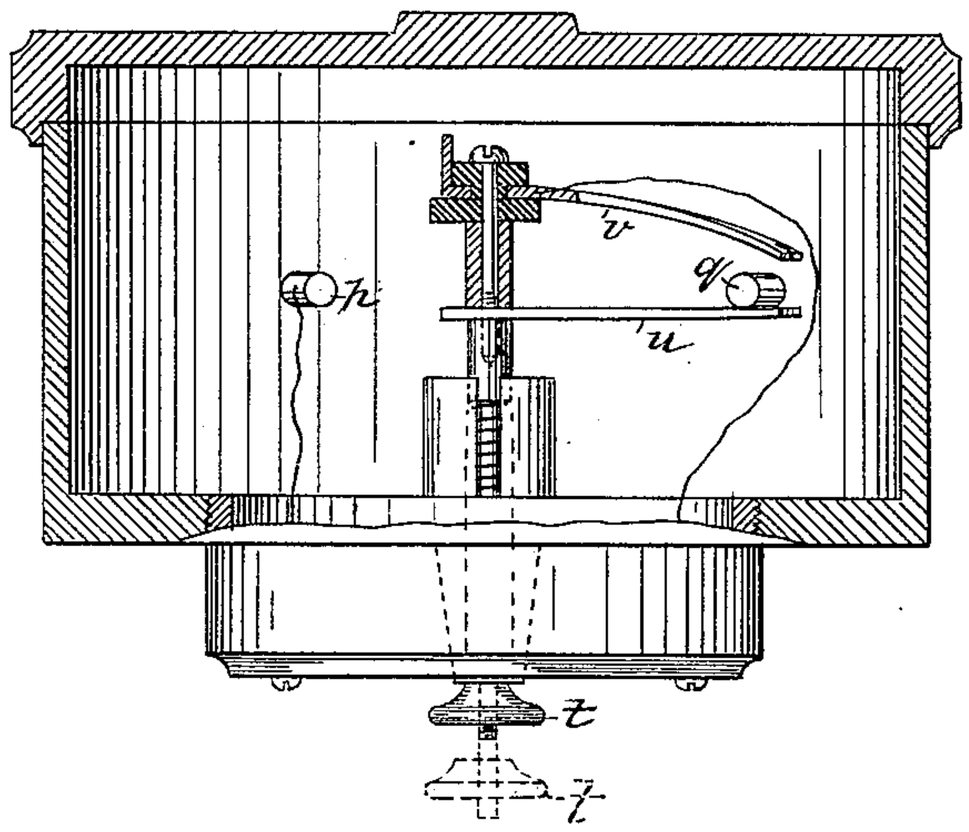


Fig. 4.



Witnesses.
David Force
J. Emerson Bell

Inventor.
C. Herrmann

(No Model.) 3 Sheets—Sheet 3.

C. HERRMANN.

MULTIPLE CALL BOX.

No. 350,882. Patented Oct. 12, 1886.

Fig. 5.

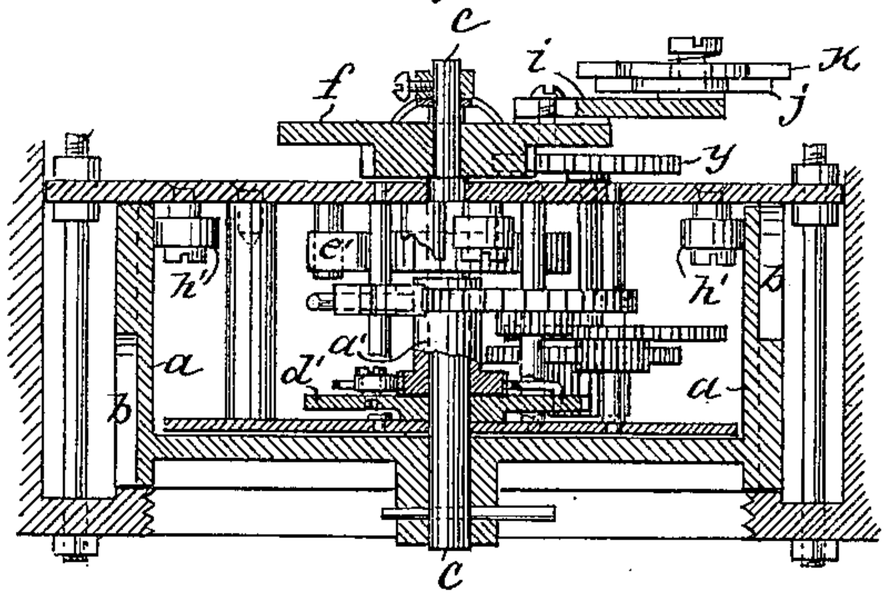
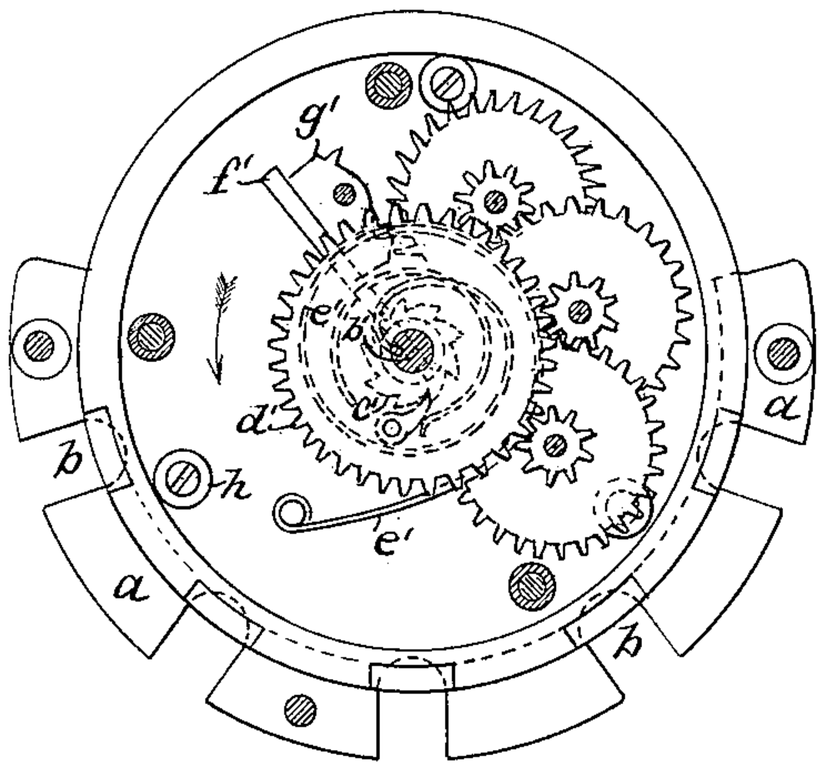


Fig. 6.



Witnesses.
J. Ryan Bell
David Force

Inventor.
C. Herrmann

UNITED STATES PATENT OFFICE.

CHARLES HERRMANN, OF NEW YORK, ASSIGNOR TO WILLIAM J. MATHESON, OF BROOKLYN, NEW YORK.

MULTIPLE CALL-BOX.

SPECIFICATION forming part of Letters Patent No. 350,832, dated October 12, 1886.

Application filed July 3, 1885. Serial No. 170,559. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HERRMANN, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Multiple Call-Boxes, of which the following is a description in such full, clear, concise, and exact terms as will enable any one skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawings, making part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 is a rear view of my improved call-box with the cover removed to expose the mechanism to view. Fig. 2 is a vertical cross-section through the same on the line *x x*, Fig. 1. Fig. 3 is a front view of the box, and Fig. 4 a vertical cross-section showing certain features of its construction in detail. Fig. 5 is a vertical cross-section through the drum to illustrate in detail the operating mechanism thereof, and Fig. 6 a bottom view of the same.

Similar letters of reference indicate corresponding parts in all the figures.

Referring to said drawings, *a* is a drum having its periphery cut with parallel grooves *b b*, diagonal to the axis thereof. This drum revolves about and is attached to a shaft, *c*, placed at intervals around the outside, and projecting above the head of the drum *a* is a series of stops, *n n'*, carrying near their inner ends the projecting pins *e e*, a separate stop being provided for each groove *b*, and the pins *e* carried thereby, when in their normal position, standing immediately above or at the entrance of the corresponding grooves *b*, as clearly shown in Figs. 1 and 2. These stops are each provided with a spring, to bring them back to their normal positions when they are drawn out, as hereinafter described.

Attached to the inner end of the shaft *c* is a wheel, *f*, a segment of which is of increased diameter and is cut into a number of notches. A spring, *g*, mounted on an insulated base, *h*, is so adjusted as to bear upon the elevated segment of the wheel *f*, but not to come into contact with the depressed circumference of said wheel. The notched wheel *f* carries an arm, *i*, which in turn carries a pivot on which two spur-disks, *j* and *k*, fastened together in the relation shown in Fig. 1, are free to revolve. One of said disks is composed of a conducting and the other of a non-conducting material. The spring *m*, with a V-shaped projection at its extremity, rests upon the periphery of a notched wheel, *l*, attached to said spur-wheels *j* and *k*. Placed at stated distances around the circumference of the drum *a*, and projecting above its surface, is a series of posts, *n n'*, which are insulated from the metal frame of the box, and each of which is fitted with a metal sleeve, *o o'*, said sleeves being connected together in series, as shown, or otherwise.

Situated in the front part of the box (see Fig. 2) is an electro-magnet, *r*. In the front of said electro-magnet a magnetic needle, *s*, is pivoted. (See Figs. 2 and 3.) This needle is weighted at its lower end to insure its standing normally in a vertical position. The upper end of this needle bears a disk cut in the form of an arc of a circle and having engraved on it a symbol, such as "Ok." The case of the box is perforated, so as to expose said segmental disk always to view. The current enters at the binding-post *q*. A stop, *t*, (see Fig. 4,) capable of longitudinal motion and controlled by the action of a spring, projects from the box. Attached to this stop is a metal spring, *u*, which normally rests in contact with the binding-post *q*. Also attached to said stop, but insulated therefrom, is the spring *v*, which is not normally in contact with said binding-post.

Referring to Fig. 1 of the drawings, the binding-post *q*, spring *u*, stop *t*, drum *a*, disk *f*, arm *i*, and wheel *j* are in continuous electrical contact with each other. The binding-post *p*, spring *g*, and each of the sleeves *o o'*, &c., are in continuous electrical contact. So, also, are the binding-post *p*, magnet *r*, and spring *v*. The stops *n* are at all times insulated from the other portions of the box.

Figs. 5 and 6 illustrate in detail the means I employ for translating the motion imparted to the drum *a* by one or the other of the stops *n n'*, &c., into the rotary motion of the wheel *f*, carrying the arm *i* and wheels *k j*, as hereinbefore described. The shaft *c* carries the sleeve *a'*, bearing the ratchet-wheel *b'*, operated by the pawl *c'*. The gear-wheel *d'*, which carries the pawl *c'* and the wheel *f*, revolve about said shaft, but are not attached thereto. The coiled spring *e'* is attached to the stationary cap of the drum *a* at one end and to the shaft *c* at the other.

f' is a pin, which passes through the sleeve *b'* and keys said sleeve to the shaft *c*.

g' is an anchor, and acts as an escapement to the clock-work movement in gear with the wheel d'.

h' h' are guide-wheels to steady the drum a in its revolution.

The operation of the drum is as follows: When the drum is turned in the direction of the arrow by the longitudinal motion of one of the stops, acting in the diagonal grooves on its periphery, as hereinafter described, the coiled spring e', attached to the stationary cap of said drum at one end, is wound up, and at the same time the ratchet-wheel b' is advanced one step, so that the pawl c', remaining stationary, drops into the next preceding tooth. At the same time the pin f' is withdrawn from its position, resting on the back of the anchor g', and leaves said anchor free to operate as an escapement to the clock-work train. When the stop n is released, the action of the coiled spring revolves the drum back to its original position, carrying with it the ratchet-wheel b', and also, by the connection between said ratchet and the pawl c', pivoted to the wheel d', said wheel d', which operates the clock-work movement, with pins and gears so proportioned as to turn the wheel f, which is in gear with said train, one complete revolution. When this is accomplished, the pin f' resumes its position in contact with the back of the anchor g', which thus arrests the movement of the train. Other means for accomplishing substantially the same result may be substituted without affecting the general principles of my invention.

The operation of my improved electrical multiple call-box is as follows: The box illustrated in the drawings forming part of this specification is furnished with five calls; but the number of such calls may be increased at pleasure. If it is desired to call a messenger, the stop designating such call is drawn out. The pin e, which said stop bears, rides down the corresponding groove on the drum a, and thereby turns said drum through a given arc. The coiled spring therein contained is thus wound up, while the disk f remains stationary. When the stop d is brought to its position of greatest projection, it is released and the coiled spring last referred to turns the drum (provided with a gear-train and escapement) back to its normal position, operating at the same time a train of gears, which causes the notched plate f to make a complete revolution. When the mechanism is in the position shown in Fig. 1, the current entering at binding-post q passes, by spring u, stop t, frame, disk f, spring g, to binding-post p. As the disk f revolves under the influence of the coiled spring in the drum, as above described, the said current is intermittently broken as the notches in said disk pass under the spring g. As before explained, the posts o o', &c., and stop n n', &c., project up above the surface of the drum a and in the path of the wheels l and k, when the disk f carrying said wheel revolves. As said notched disk revolves, the spurs on wheels k l successively and alternately come in contact with said stops and caps and cause said wheels, which are fastened together, to revolve progressively step by step. The notched wheel l and spring-connection m insure the said wheels being revolved equal steps as they come in successive contact with the several stops and posts, as will be readily understood. Supposing the first stop n to have been drawn out and the disk to be revolving, as before explained, the current through the box is broken as the notches on wheel f pass under the end of the spring. When the spring has passed the last notch, electrical connection between said spring and said disk remains broken until the disk arrives at the position shown in Fig. 1. In the meantime the spur j comes in contact with the cap on the post o. The current is then closed from binding-post q, spring u, stop t, frame, disk f, arm i, spur j, cap o, to binding-post p. The disk f, continuing to revolve, turns said wheels one step and breaks the connection between the spur j and the cap o. It will be remembered that the stop n is now withdrawn, as the signal "messenger" is being sent over the line to the receiving terminus. The disk f, continuing to revolve, therefore next brings the spur k in contact with the cap o'; but as the spur k is formed of non-conducting material no current flows. Then the spur j''', formed of conducting material, comes in contact with stop n'; but as these stops are all insulated from the binding-post p, no current flows. Thereafter, successively, the spurs k''' come in contact with cap o'', j'' with stop n'', spur k'' with cap o''', j' with stop n''', spur k' with cap o^{iv}, and spur j with stop n^{iv}, k with stop w, while the current remains continuously broken through the box until, as before explained, it is closed by the spring g coming in contact with the raised segment of the notched wheel f, as shown in Fig. 1, when the force of the coiled actuating-spring is spent, and the train anchored, the mechanism comes to a state of rest, ready to be actuated again by the withdrawal of one of the stops n n', &c. At the receiving terminus the receiving-instrument is constructed to bring the marker in contact with the tape when the current through the box is broken. In this case, therefore, the receiver records two dots, a space, three dots, (indicating that the signal has proceeded from box No. 23,) dash, and then a long dash, (indicating that the first call—a messenger—is operated.) If the third stop (fire) were drawn out, the operation of the box would be as follows: After the box-number has been sent the spur j comes in contact with the cap o, closing the circuit, the spur k with stop n, the spur j''' with o', again closing the circuit, the spur k''' with n', the spur j'' with o'', again closing the circuit. The stop n'' being withdrawn, the spur k'' comes in contact with cap o''', the spur j' with stop n''', k' with o^{iv}, j with n^{iv}, and k with w, and the receiving-instrument records two dots, space, three dots, dash, two dots, and a long dash,

indicating that the third call is operated. After the call has been dispatched, as aforesaid, the operator draws out the stop *t*. As has been explained, (see Fig. 4,) electrical contact between the binding-post *q* and spring *u* is thereby disrupted, and contact established between said binding-post and the spring *v*. The current then flows from said binding-post *q* through the magnet *r* to the binding-post *p*. To indicate that the message is properly received and understood at the receiving-station, the attendant there, by a suitable mechanism, reverses the polarity of the line-currents, which causes the needle *s* to revolve toward the left hand and expose the letters Ok to the operator. The stop *t* is then released, the needle resumes its horizontal position, and the current again flows through the box until the next signal is sent.

I am aware that it is not new to combine with the sending-instrument an electro-magnet, and to place at the receiving end a circuit-breaking device, which are arranged and operated so as to indicate at the sending end that the signal has been received and understood; but it will be observed that the indicating device in such boxes is caused to operate by disrupting the line-circuit, and that the device would operate in the same way if a signal were sent from another box, or if the line-circuit were broken in any other way. Besides, in order to operate the device the line circuit must be broken, and when this is broken the receiving device begins to register or race while it remains open, while other messages coming over the line are lost, all of which causes inconvenience and confusion. On the other hand, the electrometer herein described can be operated only by the receiver, and it acts independently of the other signals without affecting the registering device or interrupting the continuity of the circuit.

I prefer to make the case or cover of my call-box by casting it of one of those metals or composition of metals known in the art as "white metals." These metals flow very freely when in a fluid state, are tough and strong, form a "sharp" casting, do not need refinishing after they are cast, and present a bright surface not readily affected by corrosion. Instead of making the posts *s'* and guides for the stop-pins of separate pieces, I may by the use of such metals conveniently make them an integral part of the box-casting. The letters designating the several stops and instructions for using the box, or other lettering, may be cast in the metal having the essential qualities of type-metal, and if cast in raised characters they may be japanned and the japan afterward rubbed off the face of the letters, exposing the bright surface underneath, making the letters stand out conspicuously by contrast with the japanned or painted portions of the box.

Having thus described my invention, I claim and desire to secure by Letters Patent the following:

1. In an electric call-box, the combination of a drum free to revolve on its axis, grooves cut in the periphery of said drum on a line diagonal with its axis, pins traveling in said grooves to revolve said drum in one direction, and a spring attached to said drum to revolve it in the opposite direction, said spring being wound up by the revolution of said drum under the actuating control of said pins, substantially as described.

2. In an electric call-box, the combination, with the line-circuit through said box, of a wheel bearing a series of prongs severally formed of conducting and non-conducting material, free to revolve on its axis and traveling in a path set with a series of stops, capable of being withdrawn therefrom, and posts, said stops and posts being formed, severally, of conducting and non-conducting material, substantially as described, for the purpose specified.

3. In an electric call-box, the combination, with the line-circuit through said box, of a wheel cut with notches to transmit a determinate signal, means for revolving said break-wheel, an auxiliary wheel carried by and having a bearing on said break-wheel eccentric to its axis, and means for making and breaking contact through said auxiliary wheel to transmit a variable signal, substantially as described.

4. In an electric call-box, the combination, with the line-circuit through said box, of a wheel having a bearing on a break-wheel eccentric to its axis, bearing a series of conducting and non-conducting spurs with means for closing the line-circuit through said wheel, substantially as described.

5. In an electric call-box, the combination, with the line-circuit through said box, of a series of conducting and non-conducting posts separated by intervening spaces and set in the path of a traveling contact-piece, substantially as described.

6. In an electric call-box, the combination, with the line-circuit through said box, of a drum, a series of pins moving in cam-bearings on said drum, by means of which the same is revolved, and a traveling contact-piece carried by said drum, substantially as described.

7. In an electric call-box, the combination, with line-circuit through said box, of a series of conducting and non-conducting posts separated by intervening spaces and set in the path of a traveling contact-piece consisting of a wheel revolving on its axis and carried by a traveling arm, substantially as described.

8. In an electric call-box, the combination, with the line-circuit through said box, of a series of conducting and non-conducting posts separated by intervening spaces and set in the path of a traveling contact-piece consisting of a wheel provided with conducting and non-conducting spurs revolving on an axis carried by a traveling arm, substantially as described.

CHARLES HERRMANN.

Witnesses:
J. EDGAR BULL,
DAVID FORCE.