

(No Model.)

G. L. ANDERS.

Signaling Apparatus for Telephone Lines.

No. 231,888.

Patented Sept. 7, 1880.

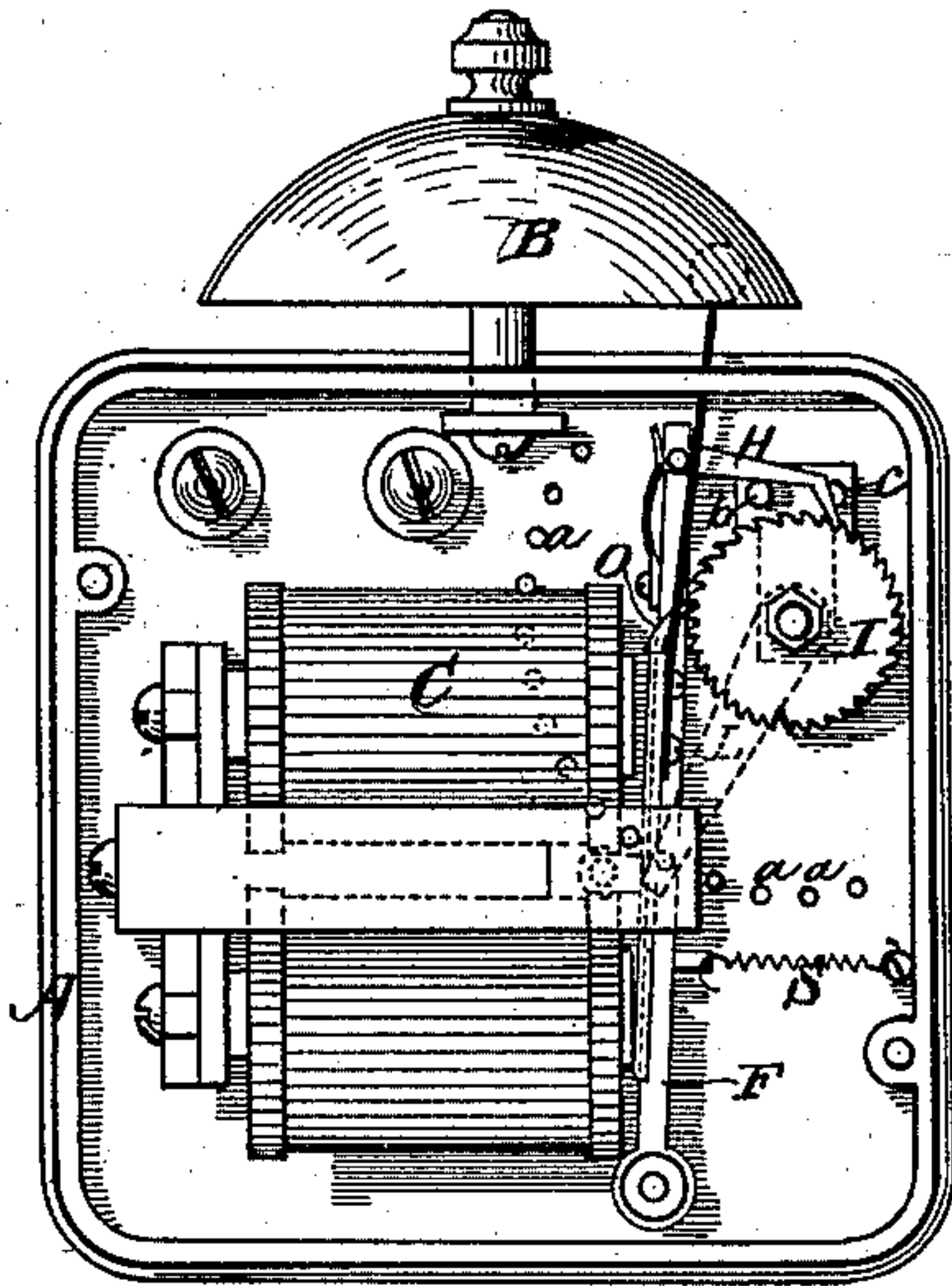


Fig. 1.

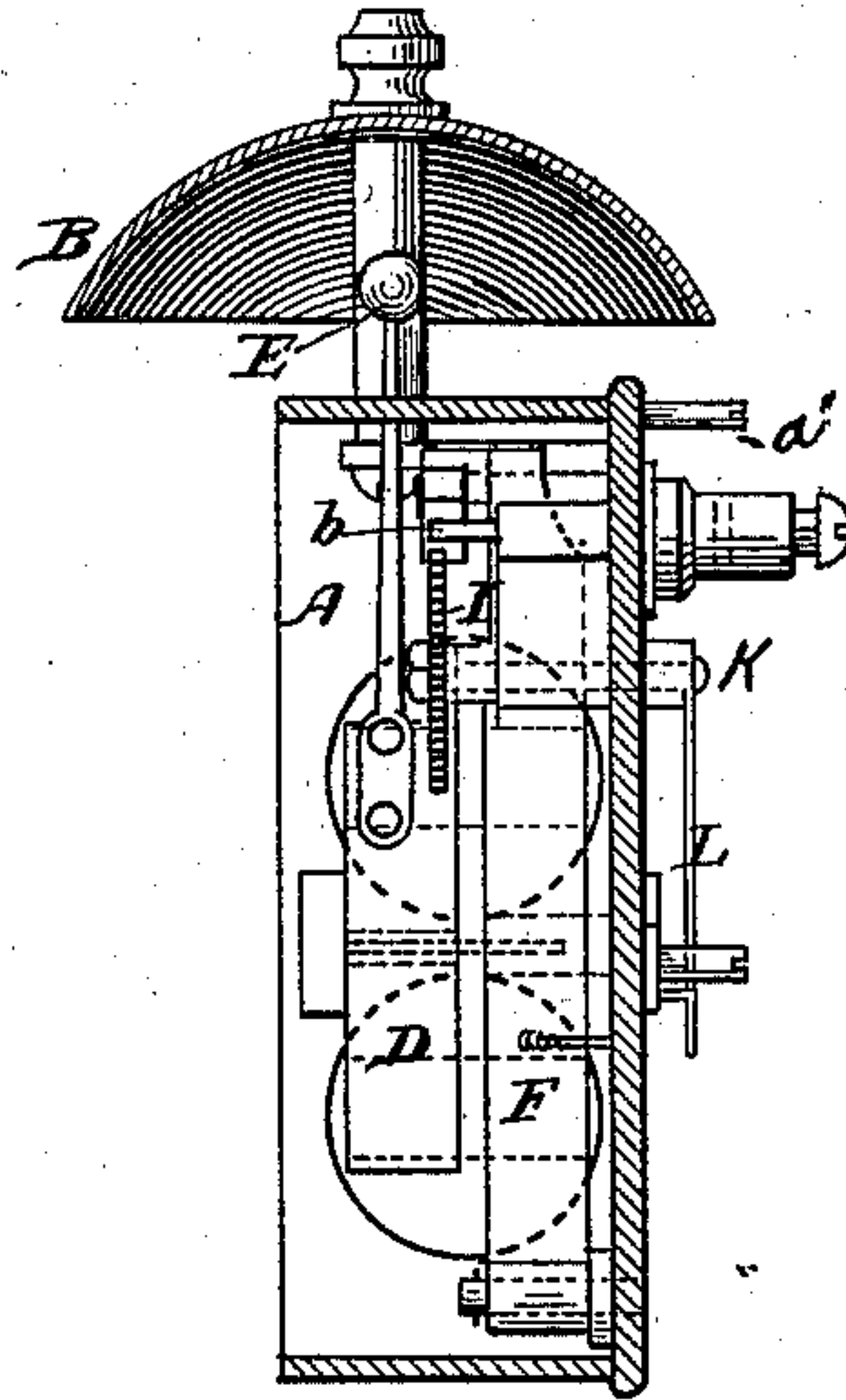


Fig. 2.

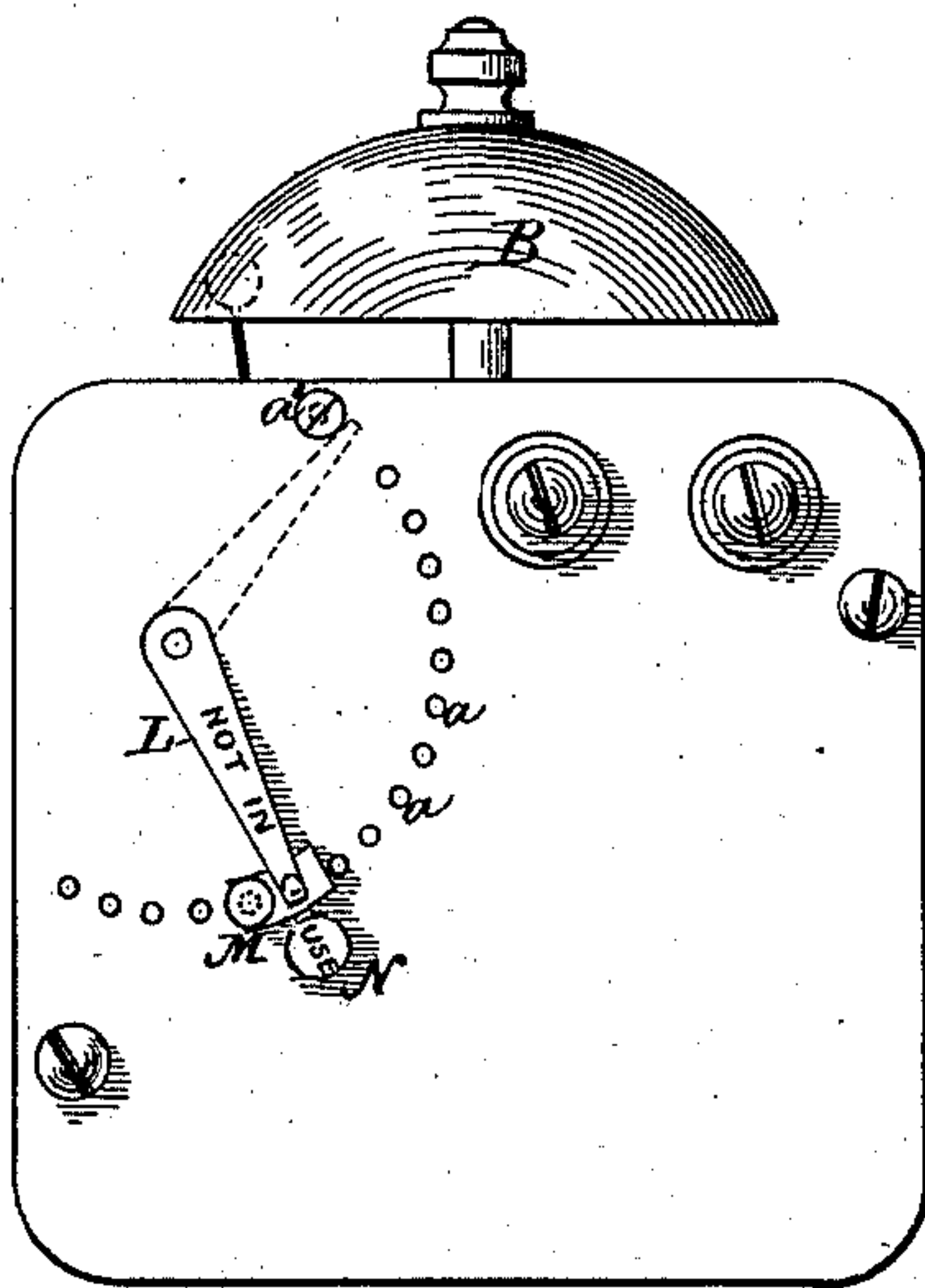


Fig. 3.

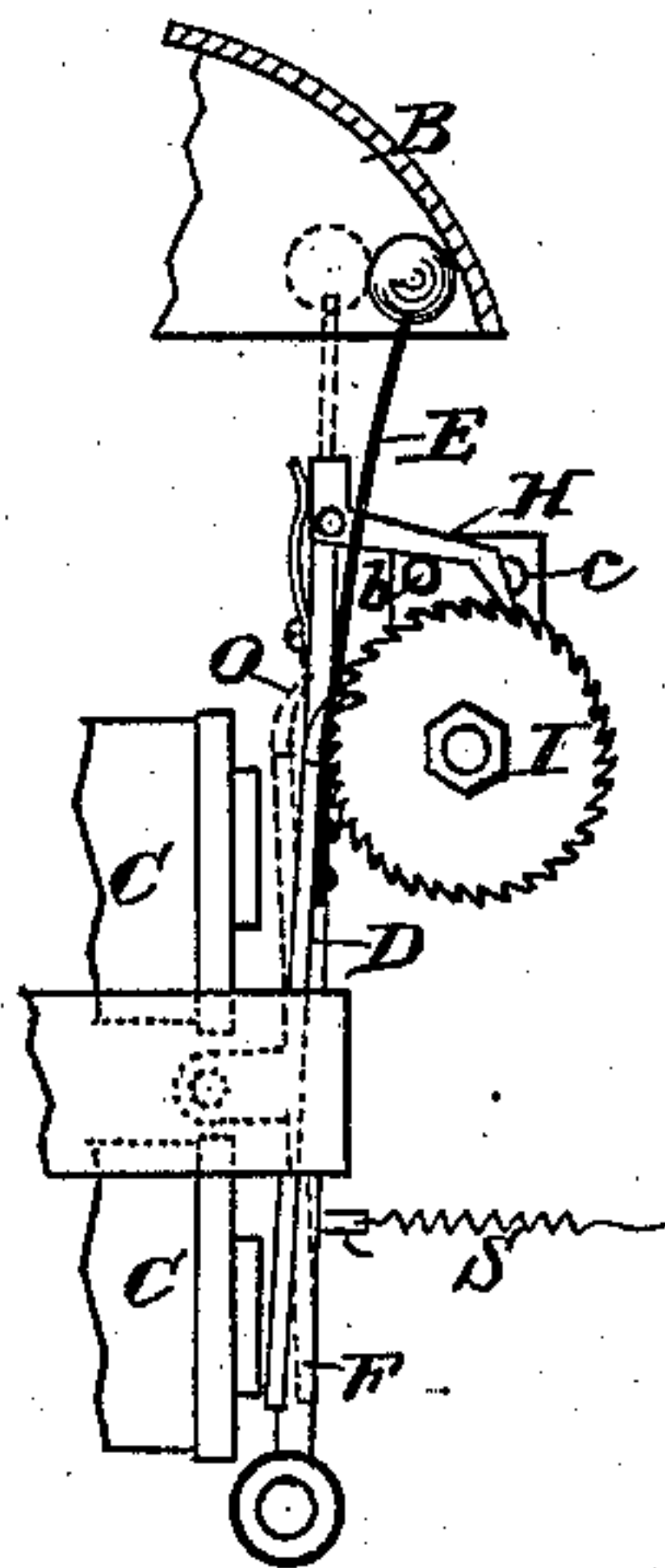


Fig. 4.

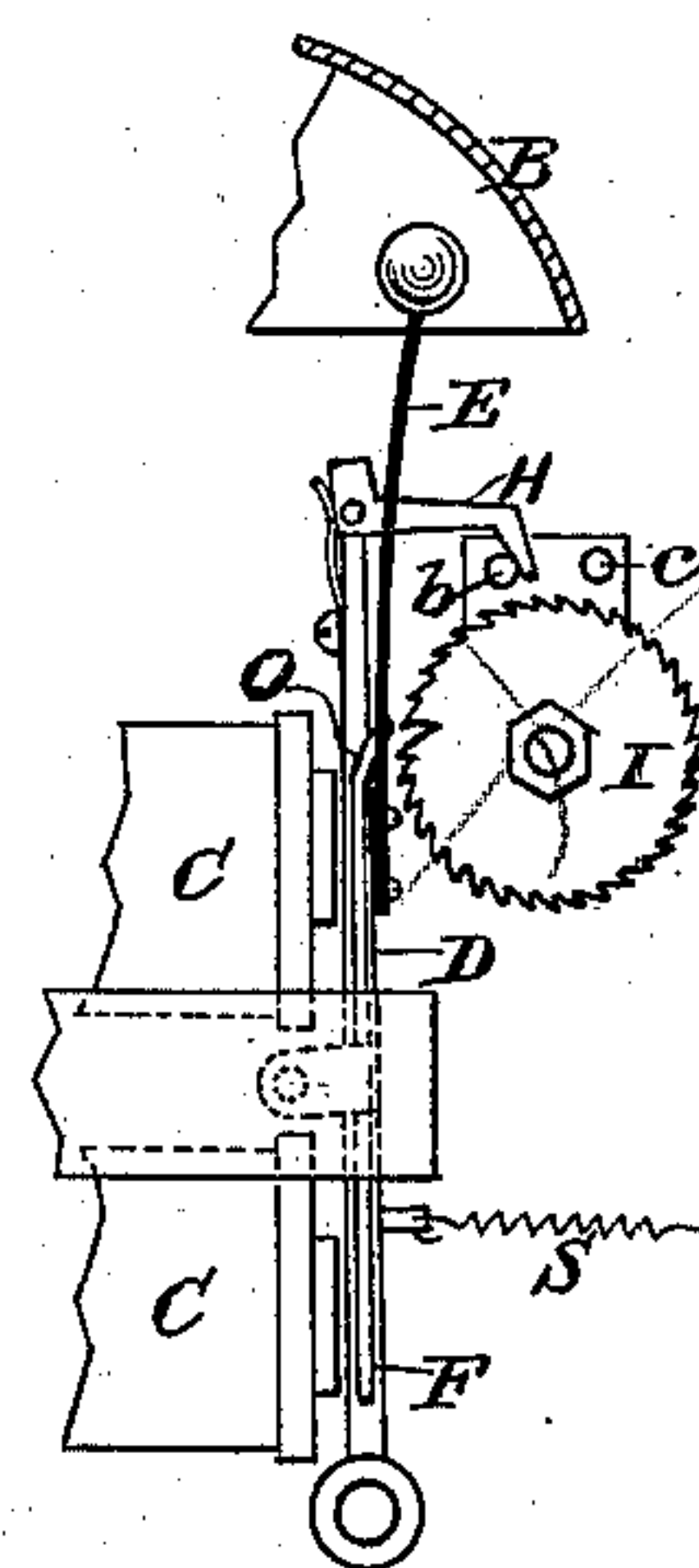


Fig. 5.

Witnesses.

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SIGNALING APPARATUS FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 231,888, dated September 7, 1880.

Application filed March 12, 1880. (No model.)

To all whom it may concern:

Be it known that I, GEORGE LEE ANDERS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Individual Signaling Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

This invention is an improvement upon the individual signaling apparatus described in Letters Patent No. 219,059, issued to me September 2, 1879, in which signaling apparatus there is a disk, the edge of which is an obstacle to the movement of the bell-hammer, so that the hammer is prevented from striking the bell until the notch in the disk is brought opposite to the hammer-rod, and which disk is rotated to effect this result by the action, upon a ratchet-wheel attached to the axis of the disk, of a pawl vibrated by intermittent currents.

In the present invention the disk is not used, and the bell is rung by a polarized electro-magnet, such as is commonly used for ringing bells by magneto-induction currents, and there is a neutral armature provided with a pawl, which acts upon a ratchet-wheel, so as to effect the rotation of the same by the vibration of the said armature, and the polarized armature is also provided with a holding-pawl, which bears against the teeth of the ratchet-wheel and prevents the bell-hammer lever from making its full stroke until by the rotation of the ratchet-wheel a deep tooth on the same is brought opposite this holding-pawl, and when both pawls are removed from the teeth of the wheel by reversing the current which operates the neutral armature the said wheel returns to its original position.

In the accompanying drawings, Figure 1 is the rear view of this signaling apparatus with the back plate of the inclosing-case removed. Fig. 2 is an end view of the same. Fig. 3 is a front view of the apparatus, showing the indicator. Fig. 4 is a view showing the position of the ratchet-wheel when the bell can be rung, and Fig. 5 is a view showing the position of the armature when the ratchet-wheel can return to unison.

In these several figures the same letters refer to the same parts.

A is a suitable case, which incloses the working parts of the apparatus and affords a support for the same, and B is a bell attached to this case.

C is an ordinary polarized electro-magnet suitably attached to the front plate of the case A, and D is its polarized armature, pivoted at its center near the permanent magnet. To this armature the bell-hammer E is attached.

F is a bar of soft iron opposite the poles of the magnet, which bar is pivoted at one end to the front plate of the case, and has pivoted to its other extremity a propelling-pawl, H. This bar forms the neutral armature of the electro-magnet C, or, if made of other metal than soft iron, has a soft-iron armature for said magnet attached to it. A spring, S, attached to the bar acts to draw it away from the magnet.

I is a ratchet-wheel attached to a suitable shaft, K, supported in the case A, and with the teeth of this wheel the pawl H engages. This pawl is formed to operate between the pins *b* and *c* in such a manner that when the armature is attracted toward the magnet the pawl will be lifted away from the teeth of the ratchet-wheel by its contact with the pin *b*, and when the armature is drawn away from the magnet the pawl will be acted upon by the pin *c* to lock the ratchet-wheel, so that the other pawl, O, can be vibrated without changing the position of the ratchet-wheel.

The shaft K projects through the case and carries an arm, L, on the outside of the case. Arranged on the circumference of a circle described by the end of this arm are a series of perforations, *a a a*, in the case, corresponding to the teeth of the wheel, and M is a movable pin, which can be inserted in any one of these perforations, so as to limit the movement of the arm, for the purpose that will be hereinafter explained. Attached to this pin is a small disk, N, to which the end of the arm is opposite when the latter is against the pin and the line is not in use.

To the upper end of the vibrating polarized armature D is attached a pawl, O, which engages with the teeth of the ratchet-wheel and acts to prevent the return movement of the said wheel when it is rotated by the action of the pawl H.

The ratchet-wheel I is situated at such a distance from the magnet and most of its teeth are of such a depth that the contact of the pawl O with the said teeth prevents the bell-hammer from striking the bell when the polarized armature to which the bell-hammer is attached is vibrated; but by providing the ratchet-wheel with a tooth which is deeper than the others the bell-hammer is able to move far enough to strike the bell when the pawl O falls into this deep tooth. This deep tooth is situated at a different distance from the starting-point of the ratchet-wheel in each of the apparatus of the series on the same circuit, and consequently a different number of impulses for each instrument will be required to bring this deep tooth opposite the pawl O, so as to admit of the bell being rung, thus enabling any bell in the series to be sounded without sounding any of the other bells. This deep tooth is situated so as to come opposite the pawl O when the ratchet-wheel is rotated to such an extent as to bring the arm L against the uppermost pin, and consequently the number of impulses required to effect this result will depend upon the number of teeth between the pawl O and the deep tooth when the wheel is at rest, and this number is different in every instrument and depends upon the position of the pin M. In the drawings this pin is represented in the eleventh perforation, and the deep tooth is the eleventh from the pawl O when the arm L is against the pin M, and consequently the neutral armature F must be attracted by the electro-magnet eleven times before the deep tooth can be brought opposite the pawl O, so as to permit of the bell being rung. At each instrument on the series the pin M will be placed in different perforations, and consequently, as before stated, a different number of impulses will be required for each station in order to ring the bell.

When the arm L is brought against the upper pin, a' , the ratchet-wheel is held fixed, and the pawl H in its movements works over the teeth of the ratchet-wheel without rotating the said wheel, the back motion of the armature being arrested when a tooth is engaged by the pawl.

The currents which are used for moving the neutral armature are preferably of lower electro-motive force than the alternate positive and negative currents which are used for vibrating the polarized armature, the former currents being preferably derived from a battery, and the latter being preferably the alternate currents produced by a magneto-machine, which latter currents must be each of such short duration as to have no effect on the neutral armature, as shown in Fig. 4. Battery-currents rapidly reversed can be used instead of magneto-induction currents. The polarized armature must be lighter than the neutral armature, in order that it may respond to quick impulses that will not move the neutral armature.

The polarity of the currents which are used

for moving the neutral armature to effect the rotation of the ratchet-wheel must be such as to repel the upper end of the polarized armature; but a current of opposite polarity will attract this end of the polarized armature and withdraw both pawls from the ratchet-wheel, thus permitting the arm L to drop down against the pin and returning the ratchet-wheel to the starting-point.

The apparatus is operated by transmitting a sufficient number of currents of the same polarity to bring the deep tooth on the ratchet-wheel under the pawl O, and then giving a signal by vibrating the polarized armature by alternate positive and negative currents of such a character as not to affect the neutral armature, and, finally, after the signal has been given, releasing the pawls and permitting the ratchet-wheel to come to the unison-point by sending a current of such a character as to affect both armatures, but of a polarity reverse to that used for rotating the ratchet-wheel. Any suitable transmitting apparatus may be used for sending and reversing these currents.

When a series of these individual signaling-instruments are placed in an electric circuit, and it is desired that any two of them shall have the facility of calling one another, this can be accomplished by providing each of these instruments with a generator of magneto-induction currents, and providing on the ratchet-wheels of each of the two instruments a deep tooth at that point on said wheel which is presented to the pawl on the polarized armature when the indicating-arm is opposite to the signal-disk U, which is its position when the line is not in use. The stations having instruments with this provision can call one another by sending magneto-currents for ringing the bells of the respective instruments, and as the other instruments on the circuit have in the normal condition no deep tooth under the pawl carried by the polarized armature, their bells will not be rung.

In practice it is preferable to use the apparatus constructed as described, in which both of the armatures are operated by the same magnet; but it is obvious that each of these armatures may be operated by a separate magnet, and that each of the magnets may be in an independent circuit.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. The combination, with a polarized armature oscillated by alternate positive and negative currents, of a ratchet-wheel which is rotated by the vibrations of a neutral armature and forms an obstacle to the full movement of the polarized armature except at any desired point in said rotation, substantially as and for the purpose set forth.

2. An electro-magnet and polarized armature for retaining a ratchet-wheel in position when said magnet is excited by currents of one polarity, and releasing said wheel when

excited by currents of the opposite polarity, in combination with a neutral armature for rotating said ratchet-wheel, substantially as and for the purpose set forth.

5 3. A ratchet-wheel which, except when in a predetermined position, forms or operates an obstacle to the movement of a bell-hammer attached to a polarized armature, in combination
10 with a pawl operated by a neutral armature and rotating said ratchet-wheel, and a pawl operated by a polarized armature and retaining or releasing the said ratchet-wheel, according to the direction of the current operating the neutral armature, substantially as and for
15 the purpose set forth.

4. In a signaling apparatus, the combination, with the ratchet-disk and pawls, of a polarized armature arranged to be operated by a rapid succession of alternate positive and negative
20 currents, and a neutral armature which is not affected thereby, but is operated only by currents of longer duration, substantially as and for the purpose set forth.

5. The combination, with a polarized armature operated by a rapid succession of positive and negative currents, and a neutral armature not affected thereby, but operated by currents of longer duration, of a movable signal device operated by one of said armatures and controlling the movement of the other. 25 30

6. The combination of the pivoted pawl H, the locking and releasing pins *b* and *c*, and the ratchet-wheel, substantially as and for the purpose set forth.

7. The combination of the gravitating arm and the adjustable signal for indicating "line in use" or "out of use," substantially as and for the purpose set forth. 35

In witness whereof I have hereunto set my hand in presence of two subscribing witnesses. 40

GEORGE LEE ANDERS.

Witnesses:

ALEX. L. HAYES,
A. E. ANDREW.