

(No Model.)

3 Sheets—Sheet 1.

J. H. CARY.

INDIVIDUAL SIGNALING APPARATUS FOR TELEPHONES.

No. 281,450.

Patented July 17, 1883.

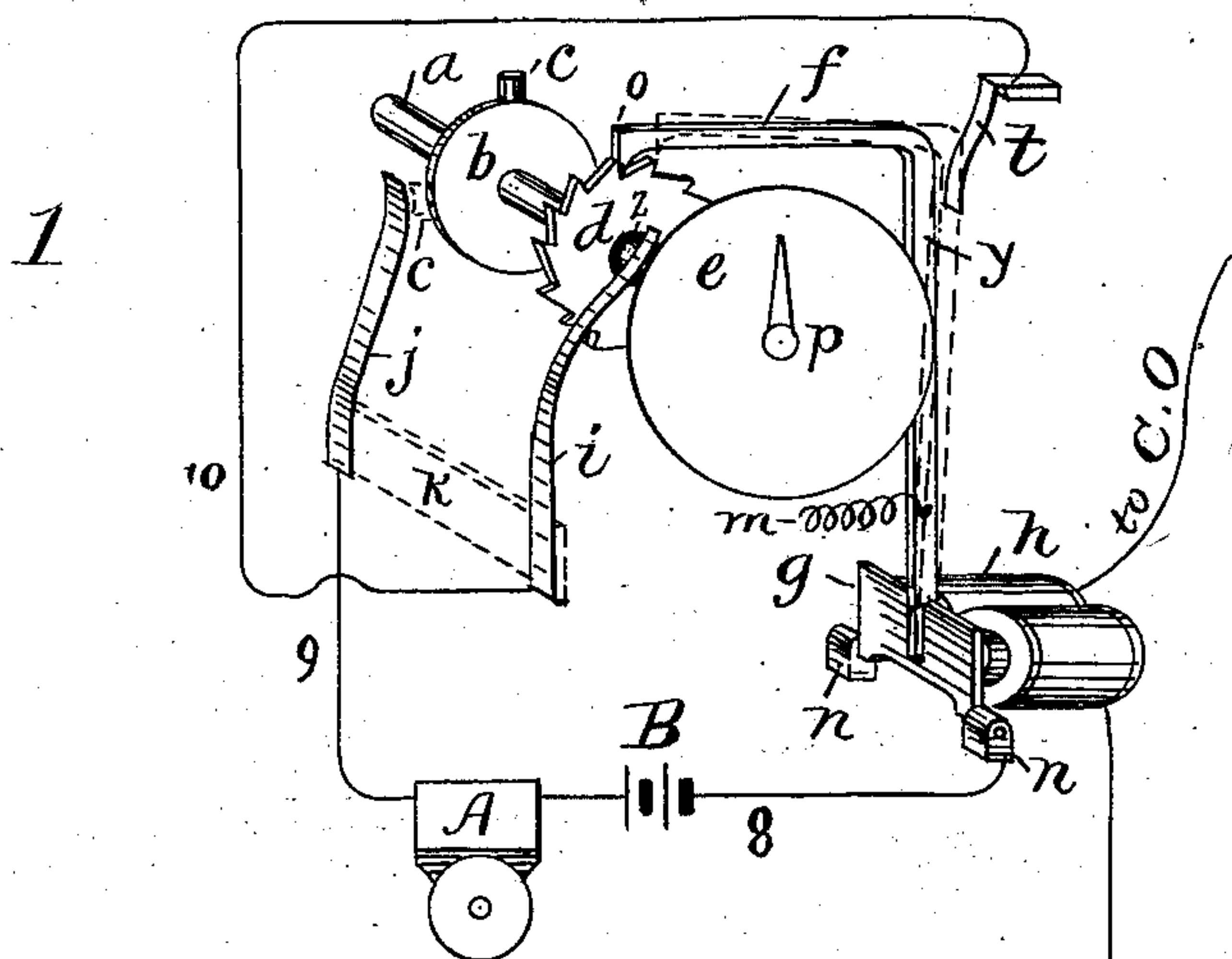
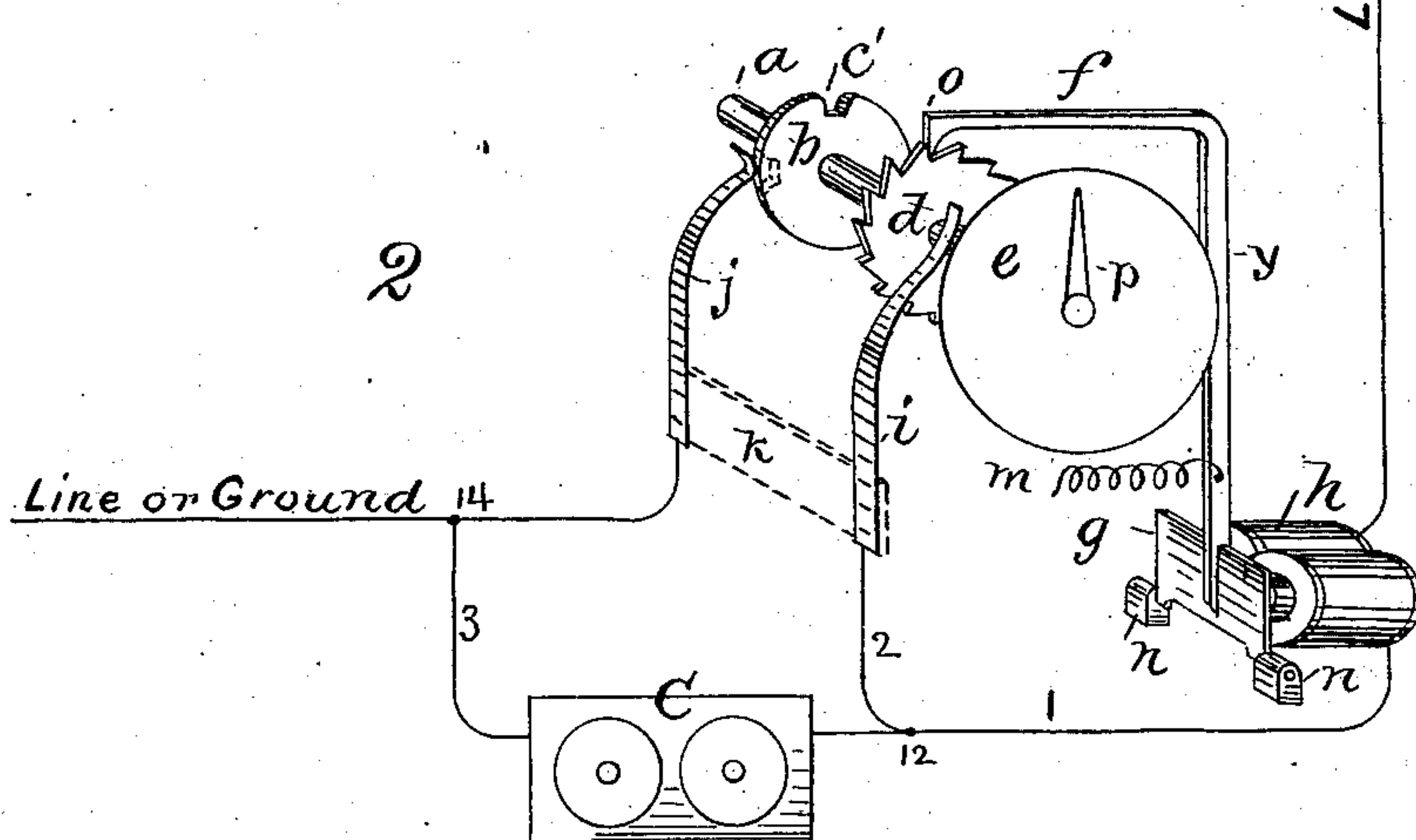


Fig. 1.



Witnesses.

C. F. Brown.
A. L. White

Inventor:

James H. Cary

(No Model.)

3 Sheets—Sheet 2.

J. H. CARY.

INDIVIDUAL SIGNALING APPARATUS FOR TELEPHONES.

No. 281,450.

Patented July 17, 1883.

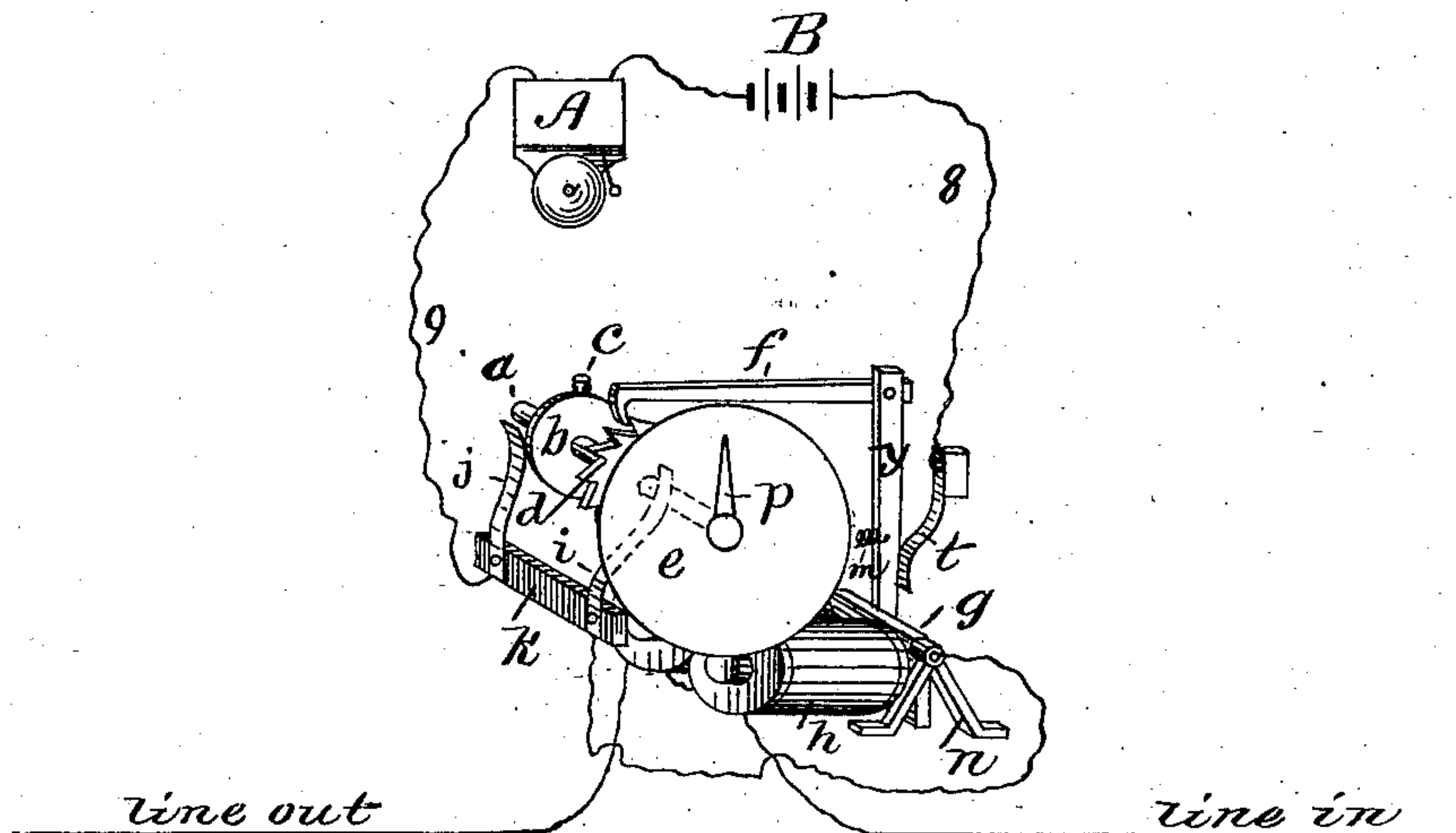


Fig. 2.

Witnesses.

C. F. Brown

A. L. White

Inventor

James H. Cary

(No Model.)

3 Sheets—Sheet 3.

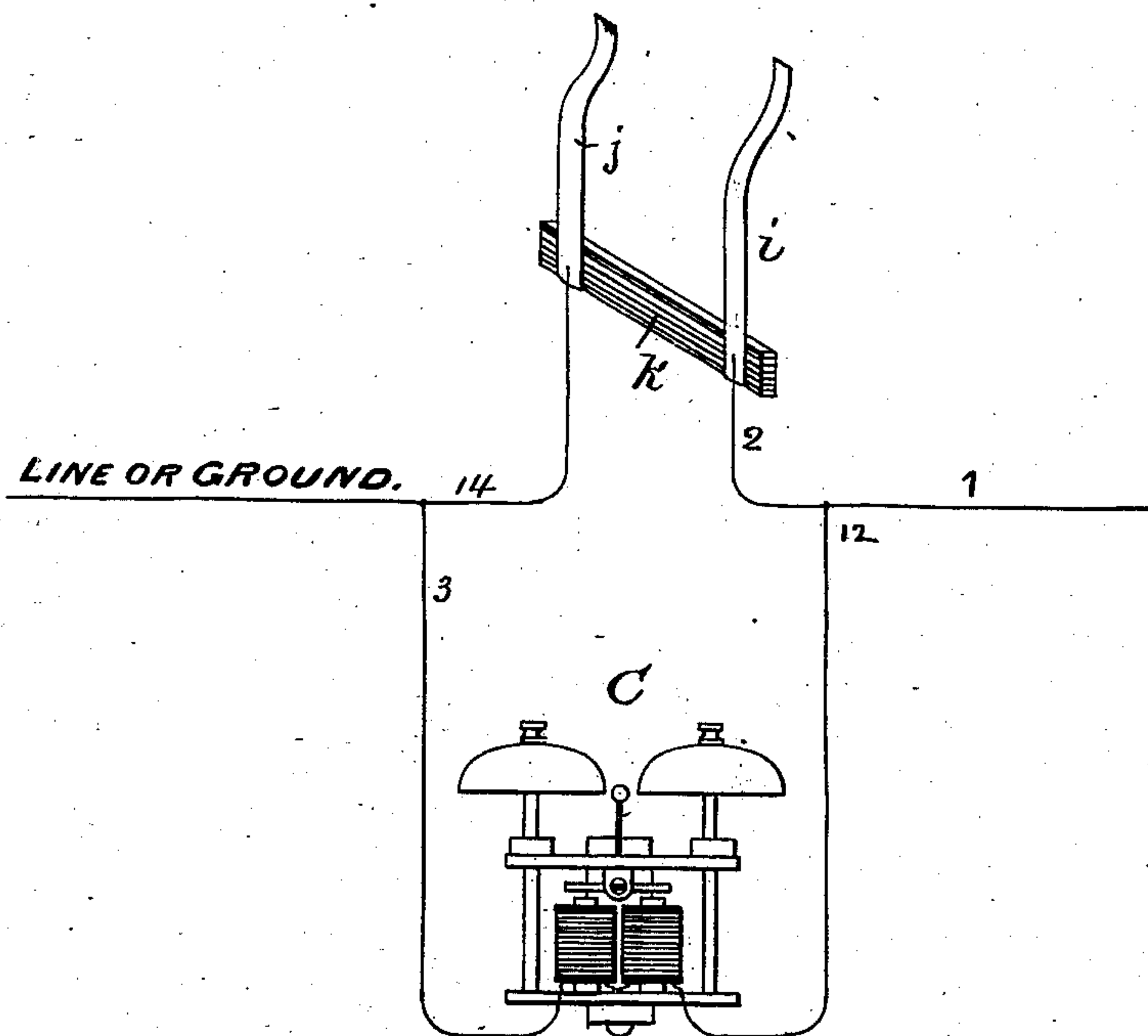
J. H. CARY.

INDIVIDUAL SIGNALING APPARATUS FOR TELEPHONES.

No. 281,450.

Patented July 17, 1883.

Fig. 3.



Witnesses.
W. Rogers
A. L. White

Inventor:
James H. Cary
by Wright & Brown
Attys

UNITED STATES PATENT OFFICE.

JAMES H. CARY, OF BOSTON, MASSACHUSETTS.

INDIVIDUAL SIGNALING APPARATUS FOR TELEPHONES.

SPECIFICATION forming part of Letters Patent No. 281,450, dated July 17, 1883.

Application filed March 12, 1883. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. CARY, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Individual Signaling Apparatus for Telephones, of which the following is a specification.

My invention relates to electric signaling; and its specific object is to provide simple yet yet perfectly-efficient devices whereby a large number of sub-stations may be connected in a single line-circuit, all of the stations being perfectly controlled by a central station, and whereby each of the said sub-stations may be signaled to the exclusion of the others, when communication therewith is desired.

In Letters Patent granted to me October 10, 1882, No. 265,753, I have described an individual signaling apparatus, in which, at each sub-station, an electro-magnet provided with a neutral armature is arranged to rotate a ratchet with a step-by-step movement by means of successive electrical pulsations of definite direction, which are transmitted over the line from the central station. Each of these ratchets is combined with a circuit-breaking device, which, at a definite point in the rotation of the ratchet, differing for each station, is brought into action and actuated to introduce into the main-line circuit a call-bell magnet, which, when so introduced, may be rung by rapidly-alternating currents transmitted from the central station.

My present invention is an improvement on the foregoing patent; and it consists in combining with a series of sub-stations signaling-instruments of the character described therein, a second series of signaling-instruments, in which the call-bell electro-magnet is included in a local-battery circuit normally open at two separate points, and is thus adapted to become operative only when the local circuit is closed at the said two points simultaneously. The signaling-instruments of the second series are also operated by ratchets and brought into their ringing position, which differs for each one of the series, by means of a step-by-step movement.

The method of producing the signal in the bells of the second series differs materially from that of producing a signal in those of the first, and therefore by combining both series in

one system I am enabled to connect a greatly-increased number of sub-stations in circuit on a single line without impairing the individuality of any of them, for although two bells—one of each series—may be simultaneously brought to the ringing-point, only one of them is rung, because each will only respond to its proper method of manipulation.

In the drawings which form a part of this specification, Figure 1 shows a diagrammatical representation of a portion of an electrical signaling-circuit including the signaling apparatus of two sub-stations, one of which is adapted to work on the principle described in the patent hereinbefore cited, and the other adapted to operate as hereinafter described. Fig. 2 represents a part of the apparatus having certain differences in details of construction. Fig. 3 represents a diagrammatic view, showing a polarized bell.

I have deemed it sufficient to show but one apparatus of each class, it being perfectly obvious that the number of each class that can be successfully operated on one circuit depends solely upon the number of teeth in the ratchets. Moreover, I have not herein shown or described any central-station transmitting or controlling apparatus, since I purpose to use the devices which I have described in a prior application filed October 23, 1882, No. 74,944, which consists of suitable reversing-keys, combined with a magneto-generator and adapted to transmit at will constant electrical currents of either direction, or constantly-alternating currents, according to the key pressed. In the drawings, 1 represents a sub-station fitted with apparatus adapted to close a local circuit through the electro-magnet of a call-bell, and give a signal after a definite number of pulsations, provided the controlling-current continues to flow in the main-line circuit; and 2 represents a sub-station provided with apparatus adapted to introduce into the main circuit a polarized bell, arranged and constructed to ring when a succession of constantly-alternating currents are sent to line.

I will first describe the mechanism of the apparatuses, and then trace the electrical circuits and connections thereof.

The apparatus at station 1 consists of a disk, *b*, having at one point of its periphery a stud or cam, *c*, and mounted, together with a ratch-

et-wheel, *d*, on an arbor, *a*, which also carries on its front end a pointer, *p*, adapted to rotate therewith, and by its position with reference to the face of a dial, *e*, indicate the condition of the line. The ratchet-wheel *d* is, by a suitable non-conducting bushing, *z*, insulated from the arbor *a*, and is adapted to be rotated by the successive reciprocating motions of the pallet *o* on the end of the lever *y*, this being attached to the armature *g*, which is pivoted in the support or bearings *n*.

An electro-magnet, *h*, when energized by passing currents, attracts the armature, which, when unattracted, is withdrawn from the said electro-magnet by the retractile spring *m*. When the armature is attracted, the pallet *o* of the lever *y* slides backward over the teeth of the ratchet *d*, and when the attraction ceases and the armature is retracted by the spring *m* the pallet *o* engages the ratchet-teeth, forcing the ratchet, its arbor, and the disk *b* one step forward, and these to and fro motions are repeated as often as the magnet is charged and discharged.

Immediately in the rear of the lever *y* is a spring or other contact-plate, *b*, supported in any suitable way, while on a block of non-conducting material, *k*, the other springs are supported, one of them, *i*, being arranged to press upon the arbor *a*, as shown, thus subserving the double purpose of making an electrical connection therewith, and of serving as a friction or retaining brake whereby the arbor and ratchet are maintained in position during the retraction of the pallet *o* for a second stroke. The other spring, *j*, is, at its free end, normally out of contact with any part of the apparatus, but is adapted to come into contact with the stud or cam *c* when by the rotation of the arbor the stud is brought within the range of the said free end of the spring.

A is a signal-bell, and B a local battery. The three springs *t*, *i*, and *j*, together with the armature-lever *y* and the bell A, are all in the circuit of the local battery when the same is completed, and the said circuit may be traced as follows: from one pole of the battery B by wire 8 to bearing *n*, and to lever *y*, and from the other pole of the battery to the bell A and by wire 9 to the spring *j*. From the spring *t*, which forms the back contact with the lever *y*, a wire, 10, is led to the spring *i*. The local circuit, it will be seen, is normally incomplete, being open at the free end of the spring *j*, and also at the free end of the spring *t*. When, by successive impulses, the arbor is rotated until the stud *c* is brought into contact with the spring *j*, the bell may be rung by causing the armature *g* to be steadily attracted to its magnet, and thus closing the local circuit at its second open point at the spring *t*. Since the position of the cam *c* upon the disk *b* differs from the several stations provided with this class of apparatus, it is clear that no two bells of this class can be rung at once.

To prevent a single stroke of any bell, which

may occur while the stud *c* of its apparatus is passing the spring *j*, this bell is so adjusted that it will not strike under the brief impulse that may be given while the stud and spring are in contact while passing one another in a bell nearer the central station than the one which it is desired to ring, but will require the cumulative action due to a longer closure of the circuit before its vibrations acquire sufficient amplitude to enable the hammer to reach the bell.

The apparatus of the second class, as shown in sub-station 2 in the drawings, is of the general construction described in my former patent, which I have hereinbefore cited, and consists in certain instrumentalities arranged in the following manner:

As in the apparatus shown at sub-station 1, an arbor, *a*, carries a disk, *b*, a ratchet-wheel, *d*, and a pointer, *p*, the latter being adapted to move coincidentally with the motion of the arbor over the face of the dial *e*, and thus indicate by any prearranged code the condition of the line-circuit. In this apparatus a notch, *c'*, takes the place of the stud *c* in the apparatus of station 1, and it is furthermore not necessary to insulate the ratchet-wheel *d* from arbor *a*.

An electro-magnet, *h*, furnished with an armature, *g*, supported on pivots in the bearings *n*, operates by means of a suitable lever and pallet the ratchet, and rotates the arbor with the same step-by-step motion hereinbefore described, when successive electrical impulses are transmitted over the line-circuit.

Two contact-springs, *i* and *j*, are mounted upon a block, *k*, of non-conducting material, and are both normally in contact at their free ends with the mechanism, the spring *j* normally resting upon and in contact with the periphery of the disk *b*, and the spring *i* resting at all times in frictional contact with the arbor *a*. The main-line circuit, after passing through the electro-magnet helices *h*, continues by wire 1 to the point 12, where it bifurcates, one path leading by wire 2, spring *i*, arbor *a*, disk *b*, and normally by spring *j* to the point 14, and thence to "line out," while the other path may be traced from the point 12, through the polarized bell C, and thence by wire 3 to the point 14, where the two paths reunite and pass outward to the earth or to the next station. Inasmuch as the path which includes the bell C is of much higher resistance than the other, the said bell is practically short-circuited as long as the spring *j* bears upon the disk *b*; but when, in the rotation of the said disk, the notch *c'* passes under the end of the spring *j*, the short circuit is broken and the only path for the line-current is through the bell C, and if at this point the motion of the arbor and disk is stayed and a series of alternating currents sent the neutral armature *g* of the controlling-magnet will not respond thereto, by reason of the retracting-spring *m*; but the polarized bell C will be rung. The frictional - contact spring *i*, which presses

against the shaft or arbor *a*, in addition to forming a part of the local circuit, serves the purpose of a brake, and counteracts any tendency to lost motion on the part of the said shaft.

Instead of the notch *c'*, a small piece of non-conducting material may be let into the edge of the disk *b* in a manner well understood. In practice, instead of a rigid pallet, *o*, on the end of the armature-lever, it will be found convenient to use jointed or pivoted pawls suitably attached to said lever.

Fig. 3 is another form of apparatus at station 1, wherein the impulse given to the ratchet-wheel *d* is produced by the attraction instead of the retraction of the armature. An electro-magnet, *h*, in the circuit of the main line is provided with an armature, *g*, supported in the pivots *n*. When the armature is attracted by means of its lever *y* and pawl-extension *f* the ratchet-wheel is caused to advance, carrying with it the disk *b* and stud *c*, which, together with the ratchet, are fastened to the arbor *a*. *t* is a local-circuit contact-point. As in the No. 1 bell, *K* is an insulating-block supporting two springs, *j* and *i*. *A* is a call-bell, and *B* a local battery. When the ratchet is by successive pulsations rotated until the stud *c* will on the next pulsation make contact with the spring *j*, the next pulsation is continued for some time, causing the lever *y* to come in contact with the spring *t* at the same time that the other spring, *j*, makes contact with the stud *c*, and maintaining both contacts as long as the bell is desired to ring. In this case it is not necessary to insulate the ratchet.

It will be of course understood that although I have shown but one bell of each of the two classes described, the purpose of my invention is to connect a number of both kinds on the same circuit, and they may be arranged in any preferred order. For example, six of the class as shown as placed in sub-station 1 may be placed consecutively, and be succeeded by six of those described as connected in station 2, or they may be arranged alternately from one end of the circuit to the other; but, although one of the first series may have its ringing-point identical with one of the second, the two cannot ring at once, because one of the two rings only by the application of constantly-alternating currents, while the other rings only by the application of a steady, constant, and unbroken current in the main line.

I am aware that heretofore individual signals have been operated consisting of a signal-bell in a local circuit normally open at two points, both of which are required to be closed before the signal can be given; and I do not therefore broadly claim such a signal. My invention, however, differs from the above, in that it comprises two sets of signal-bells capable of being operated differently on the same circuit, and that the object of the doubly-open local circuit in one set is to maintain the bells of that set quiescent when the corresponding bell of the other set is to be rung, the corre-

sponding bells of the two sets being at the same time at the ringing-point.

Having now described my invention, I claim—

1. The combination of a main line, a series of sub-stations located thereon, signaling apparatus at one or more of the said sub-stations, consisting of a bell in a local circuit normally open at two points, a circuit-closer actuated by an electro-magnet included in the main-line circuit to close the local circuit at one of the said open points after a definite number of electrical pulsations have been transmitted over the main line, and a second circuit-closer adapted to close the second open point and give the signal when a constant current is transmitted over the main line immediately after the said definite number of intermittent pulsations, and signaling apparatus of different character at the remaining sub-stations, consisting of a signaling-bell adapted to ring only when rapidly-alternating currents are transmitted, a short circuit normally surrounding the said bell, a circuit-breaker, and actuating devices therefor adapted to be operated by an electro-magnet included in the main-line circuit, and to open the short circuit and introduce the signaling-bell in the main line after the transmission of a definite number of electrical impulses, substantially as and for the purposes described.

2. The combination, substantially as hereinbefore described, in an electric signaling-circuit, of a series of polarized signaling-bells, each normally short-circuited from the main line, and devices, as indicated, adapted to break the short circuit and introduce the said bells into the main line after a predetermined number of electrical pulsations, the said number differing from each bell of the series, with a series of vibrating or trembling bells, each in a local circuit normally open at two points, devices adapted, after a definite number of electrical pulsations differing for each bell of the series, to close the said local circuit at one of the normally-open points, and other devices adapted, when a constant current is transmitted over the main line, to close the local circuit at the second of the normally-open points, whereby two series of individual signaling apparatus may be operated on a single line, and the number of sub-stations greatly increased.

3. The combination, in an individual signaling-instrument, of an electro-magnet in a main-line circuit, an armature, armature-lever, and pawl therefor, a ratchet-wheel and shaft adapted to be engaged by the pawl and rotated by means of successive electrical impulses transmitted through the electro-magnet, a local circuit normally open at two points, an electric bell included therein, a circuit-closer consisting of a disk fixed on the ratchet-wheel shaft and carrying a projecting cam and a contact-spring, the said cam being adapted to come into contact with the said spring after a definite number of pulsations,

and close the local circuit at one of its normally-open points, a second circuit-closer, consisting of a terminal spring and a contact-point on the armature-lever, and a contact-
5 spring bearing upon the ratchet-wheel shaft and adapted to form a part of the local circuit, and also to bear frictionally upon the said shaft and prevent any lost motion thereof, all substantially as and for the purposes de-
10 scribed.

Intestimony whereof I have signed my name to this specification in the presence of two subscribing witnesses, this 9th day of March, 1883.

JAMES H. CARY.

Witnesses:

C. F. BROWN,
A. L. WHITE.