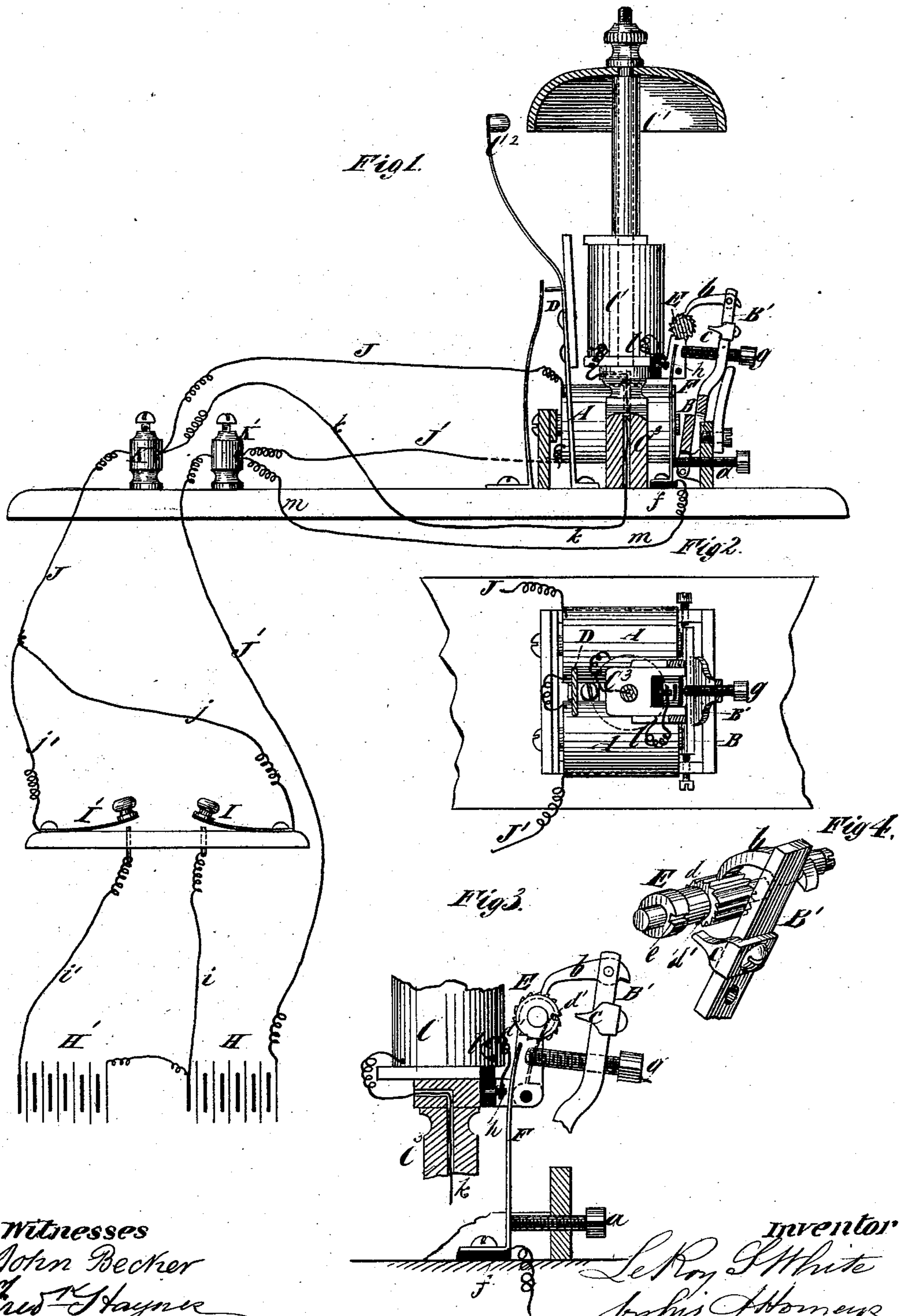


(Model.)

LeR. S. WHITE.
Electric Signal for Telephone Lines.

No. 236,131.

Patented Dec. 28, 1880.



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LE ROY S. WHITE, OF WATERBURY, CONNECTICUT.

ELECTRIC SIGNAL FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 236,131, dated December 28, 1880.

Application filed July 2, 1880. (Model.)

To all whom it may concern:

Be it known that I, LE ROY S. WHITE, of Waterbury, in the county of New Haven and State of Connecticut, have invented certain
5 new and useful Improvements in Electric Calls or Signals, of which the following is a specification.

Although my improvements may be embodied in electric calls for various purposes, they
10 are particularly adapted for use in connection with telephone-lines to permit any one instrument of a number of instruments located upon one line to be called from the central office without calling all the instruments.

15 In carrying out my invention I use at the central office two batteries of unequal strength, or a battery comprising two portions, one of which may be used separately, or both of which may be used combined; or I may use other
20 means of producing weak and strong currents. These batteries, or their equivalents, are connected with a line passing through the several stations, and at each station is a branch circuit containing a bell.

25 My invention consists in the combination, in an electric call apparatus, of an electro-magnet, an armature therefor, means for producing weaker and stronger currents of electricity in said magnet, a yielding armature-stop capable
30 of resisting the action of the weaker current but incapable of resisting the action of the stronger one, a barrel which, in operation, moves in one direction only, and is furnished with a ratchet having one or more of its teeth longer or of
35 greater pitch than the others, and with one or more notches independent of said ratchet-teeth, a pawl connected to and moved by said armature to operate on said ratchet, and a projection, also connected with said armature to
40 enter said notch or notches.

The notch or notches in the barrels of the instruments at the several stations are differently arranged relatively to the long tooth in the ratchet, the notch in the barrel at one station being arranged one tooth behind the said
45 long tooth, the notch in the barrel at another station being arranged two teeth behind said long tooth, and so on, the number of successive short teeth in the ratchet being in all cases at
50 least equal to the number of stations on the line. The yielding armature-stop, when it is pushed

inward by the movement of the armature under a strong current, will close the branch circuit and sound the bell at any one station, provided that the notch in the barrel at such
55 station is in such position that the projection upon the armature may enter it and thus permit the full movement of the armature.

In the operation of my call a succession of weak currents, one more in number than the
60 successive short teeth of the ratchets, are sent through the line, and as the yielding armature-stop will not permit the pawl to move the ratchet forward the length of the long tooth, the long-teeth ratchets of the several barrels
65 will all be brought to a position coincident with each other. The position of the notch in the barrel at each station relatively to the long ratchet-tooth being known, it is only necessary, in making a call, to send a number of
70 weak currents through the line to bring the notch in the barrel at the station which it is desired to call up to the projection, and then send a strong current through the line, whereupon the projection at the desired station will
75 enter the notch in the barrel, completing its full movement, and close the bell-circuit, while the projections at all the other stations will strike upon the periphery of the barrel, and thus prevent the armatures from moving far
80 enough to close the other branch circuits.

In the accompanying drawings, Figure 1 represents a vertical section through an apparatus embodying my invention, and a diagram view of the circuits, batteries, and keys
85 necessary to produce strong and weak currents. Fig. 2 represents a plan, partly in section, of the apparatus. Fig. 3 represents a sectional side view, on a larger scale, of a portion of the armature and appurtenances, showing more clearly the manner of closing the
90 branch bell-circuit; and Fig. 4 represents a perspective view of the barrel, the upper portion of the armature, and the pawl and projection, upon the same scale as Fig. 3.

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

A designates an ordinary electro-magnet, (shown as comprising two helices,) and B designates an armature operated thereby in the
100 usual way.

C designates a second electro-magnet, and

D the armature operated thereby for sounding the bell C' by the hammer C² when the branch circuit in which the said magnet is situated is closed.

5 The armature B is provided with an upwardly-projecting arm, B', to the upper end of which is pivoted a pawl, *b*, and which is also provided with a projection, *c*.

10 E designates a barrel adapted to turn in bearings at each end, which exert a slight frictional resistance to the too free turning thereof.

I do not here claim the advancing step by step of the ratchet-wheel by the armature under the impulse of a succession of weak currents of electricity; nor do I claim the armature adapted to move farther under the impulse of a strong current to effect the closing of a local circuit, as the same is fully described in my
20 pending application, filed May 19, 1880.

If desirable, a spring acting as a friction-brake might be employed to prevent the barrel from turning backward. Near one end of this barrel are a series of ratchet-teeth, one or
25 two of which, *d'*, are of greater length than the others, *d*. The longer teeth *d'* should, however, be situated, as here shown, at opposite sides of the barrel, so as to leave a succession of shorter teeth, one more, at least, in number
30 than the number of stations in the line-circuit—between the longer teeth, for a purpose hereinafter described. The pawl *b* engages with these ratchet-teeth, as shown clearly in Fig. 4, and by the vibrations of the armature B turns
35 the barrel E.

The barrel E is provided in its periphery with a notch, *e*, (see Fig. 4,) of a size to receive the point of the projection *c*, and, as here shown, formed in a collar upon the barrel.
40 The barrel may be conveniently made of a single piece of iron or steel, with the notched collar and ratchet-teeth formed in the same piece therewith.

The notches *e* in the barrels of the instruments at the several stations each bear a different relation to the longer tooth *d'* of the barrel, for a purpose hereinafter to be described. As shown clearly in Fig. 4, the notch *e* is situated one tooth behind the longer tooth *d'*.
50 This barrel would be the barrel of the instrument at station No. 1, while the notch at station No. 2 would be situated two teeth behind the longer tooth, at station No. 3 three teeth behind the longer tooth, and so on with all the
55 stations.

F designates a yielding armature-stop, secured to the bed A' and insulated therefrom at *f*. The tension of the yielding stop F may be adjusted by means of a screw, *a*, of insulating material, having a bearing in the armature-support.
60

The arm B', attached to the armature, carries an adjustable screw, *g*, of non-conducting material, such as rubber, which strikes against
65 the stop F when the armature is moved up by a current passed through the magnet A. When

a weak current is passed through the magnet the strength of the stop is sufficient to stop the movement of the armature; but when a stronger current is passed through the magnet
70 A the stop, being incapable of resisting the movement of the armature, is forced inward until the projection *c* strikes upon the periphery of the barrel E. If, however, the pawl *b* has moved the barrel sufficiently to bring
75 the notch *e* opposite the projection *c*, the dent enters the notch and permits the stop to be forced in by the movement of the armature, acting through the screw *g*, until contact is made between the said stop and a contact-
80 point, *h*, embedded in insulating material, as shown clearly in Fig. 3, and connected electrically with the magnet C in the branch bell-circuit, thus closing the said branch circuit and ringing the bell.
85

The arrangement of the conductors and means for producing weaker and stronger currents of electricity will now be described.

Any means for producing weaker and stronger currents may be employed. The means here
90 shown consists of a battery composed of two portions, H H', each of which are connected by conductors *i i'* with two keys, I I'. These keys are both connected by conductors *j j'* with the main-line wire J. By operating the
95 key I the current is only derived from the portion H of the battery and sent to the main conductor J by the conductor *j*. When, however, the key I' is operated a stronger current, derived from both portions of the battery, is
100 sent through the conductor *j'* to the main conductor J. From the binding-post K the current passes through the main conductor J to the magnets A, which are connected as shown in Fig. 2, and thence through the conductor
105 J' back to the binding-post K' and to the portion H of the battery.

The branch bell-circuit is composed of a conductor, *k*, through which the current passes from the binding-post K up through the column C³, supporting the magnet C, and to said magnet; thence through the magnet, through the conductor *l*, to the contact-point *h*. When the yielding stop F is pressed inward sufficiently to make contact with the point *h* the
110 circuit is closed, the current passing through the stop, thence through a conductor, *m*, back to the binding-post K', producing the ringing or striking of the bell.

One advantage of my apparatus is that a
115 simple vibrating bell may be used as only one station is called, instead of a stroke-bell.

It being understood that the notches *e* in the barrels of the several instruments are coincident severally with successive short teeth *d* of
120 the ratchets upon the barrels, the operation is as follows: When the instrument at any particular station is to be called a succession of weaker currents, one more in number than the number of successive short teeth in the ratchets, are sent through the line-wire, and by this means the barrels are all brought into a coin-

cident position, the several pawls *b* being opposite the long teeth *d'* in said barrels, and a single strong current is then given to cause the pawls *b* to pass the long teeth and start all the ratchets simultaneously. If it is desired to call station No. 1, a second strong current is passed through the line-wire, and as the notch *e* in the barrel at said station is now opposite the projection *c* the projection enters said notch and permits the armature to move inward, overcoming the resistance offered by the stop, and pressing the latter against the contact-point *h*, thus closing the branch bell-circuit and sounding the bell at station No. 1. At no other station, however, is the notch *e* opposite the projection *c*, and therefore in all the other instruments the dents strike against the peripheries of the barrels and block the instruments. If it is desired to call station No. 2, a weak and a strong current are sent through the wire. If No. 3, two weak and one strong current. If No. 4, three weak and one strong current, and so on with all the stations.

It will be observed that the parts of my instrument which are new are simple in construction and few in number, and that therefore I am enabled to produce at a small cost a simple and durable instrument, which will not be liable to get out of order.

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

1. The combination, in an electric call apparatus, of an electro-magnet, an armature therefor, means for producing weaker and stronger currents of electricity in said magnet, a yielding armature-stop capable of resisting the action of the weaker current but incapable of resisting the stronger one, a barrel which is furnished with a ratchet having one or more of its teeth longer or of greater pitch than the others and with one or more notches independent of said ratchet-teeth, a pawl connected with and moved by said armature to operate on the said ratchet, and a projection also connected with said armature to enter said notch or notches, all substantially as herein described.

2. The combination, with the electro-magnet and its armature and the pawl and projection attached to said armature, of the barrel constructed or furnished with a ratchet which extends entirely around it and which has one or more of its teeth longer or of greater pitch than the others, and constructed or furnished with a notched collar, the said ratchet-teeth and notches occupying a fixed position relatively to each other, substantially as herein described.

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Witnesses:

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