(No Model.)

C. E. BUELL.

ELECTRIC INDIVIDUAL SIGNALING APPARATUS.

No. 258,625. Patented May 30, 1882

Fig. 1.

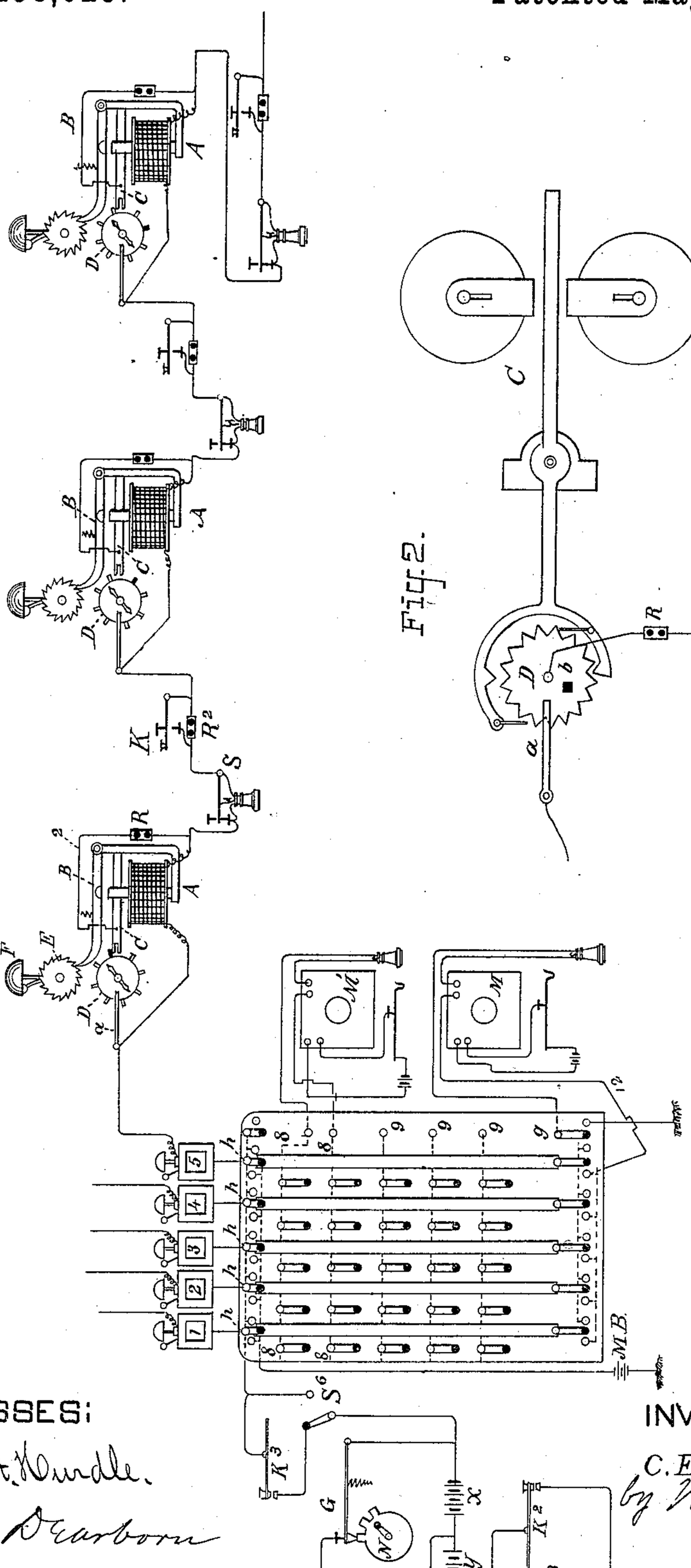

Fig. 2.

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UNITED STATES PATENT OFFICE.

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ELECTRIC INDIVIDUAL SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 258,625, dated May 30, 1882.

Application filed July 6, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BUELL, a citizen of the United States, residing at New Haven, county of New Haven, and State of Connecticut, have invented certain new and useful Improvements in Individual Signaling Apparatus, of which the following is a specification.

The object of my invention is to provide means whereby any one of several stations upon the same telephone or telegraph line may be called or signaled to the exclusion of the others.

In an application for Letters Patent of the United States filed April 4, 1881, No. 29,884, I have described an apparatus for the same purpose, in which the bell-ringing devices are released or operated directly by an electro-magnet in a derived circuit that is normally short-circuited, said electro-magnet being independent of that used in setting the general apparatus into condition for giving a signal.

My present invention is designed to simplify the construction of the apparatus therein described and to improve its operation.

In the accompanying drawings, Figure 1 shows a telephone-line having three stations provided with my apparatus, and a central-office switch apparatus, like that described in my application before referred to, for signaling to the various stations and for placing any two lines in electrical connection. Fig. 2 shows a modified form of escapement and electric shunting device that may be used in place of that shown in Fig. 1, but to which no claim is herein made, it having been described and claimed in my application before referred to.

In Fig. 1, A represents a polarized electro-magnetic receiving-instrument of any suitable construction, provided with a neutral armature, B, and a polarized armature, C, the latter carrying escapement-pallets that engage with the teeth upon an escape-wheel, D, driven by clock-work or any suitable power. Bearing upon the face of the escape-wheel is a circuit-closing spring, *a*, joined to the line upon one side of the station, and forming under the usual condition of the apparatus a portion of a branch circuit around the coils of the electro-magnet A, through the teeth of the wheel D, the escapement-lever, the wire 2, and the resistance R, which is approximately equal to that of the electro-magnet, but may be more or less, as desired. Each escapement-wheel is provided at one point in its periphery with a tooth of insulating material, as indicated in solid black, whereby the derived circuit containing the resistance is broken when the wheel is rotated to a point where the tooth is engaged by the armature, thus causing the whole current to circulate through the coils of the electro-magnet. Each station is also provided with a gravity-switch, S, for short-circuiting the telephone apparatus, and with a signaling-key, K, which serves, when depressed, to short-circuit a resistance, R^2, so as to increase the strength of current flowing upon the line, and thus give a signal or call at the central office.

In place of the escapement and means for completing and breaking the derived circuit shown in Fig. 1, I ordinarily prefer to use that shown in Fig. 2, the nature of which will be readily seen. In this case a star-wheel escapement is used, which is impelled step by step by the movements of the polarized armature without the employment of a driving-train. The derived circuit is normally from the resistance R directly to the wheel D or its supports, and out through the spring, as in Fig. 1. When the wheel is rotated to a point where the spring rests upon an insulated block, *b*, let into the face of the wheel, the derived circuit is broken.

The escapement-wheel D is rotated to the desired point for breaking the derived circuit at any station by a series of reversals of the line-current, and the signal is given by increasing the current to an extent sufficient to overcome the tension of the retracting-spring upon armature B, said spring being adjusted above the strength of the reversed currents used in operating the polarized armature. The armature B is thus made in the present case to release a wheel, E, upon a train which serves to give a vibratory motion to the hammer of a bell, F, in a well-known manner.

At the central office the devices for producing the desired changes in the polarity and tension of the current consist of a toothed wheel, N, which is turned by a crank-handle, and

which vibrates a lever, G, so as to make and break the short circuit of a battery, *x*, and of a key, K^2, which increases the tension of the current by short-circuiting the resistance R^3. Batteries *x* and *y* are placed with the same poles opposed to one another, and *x* is of approximately twice the number of cells of *y*. When *x* is short-circuited *y* sends, for instance, a positive current to line. When the short circuit of *y* is broken by the dropping of lever G battery *x* overcomes battery *y* and sends a current to line of the opposite polarity and of the same strength.

At the top of each line-strip 4 of the switch-board is a switch-lever, *h*, connected to line, and capable of being turned to connect the line either to one of a series of buttons which are shown as connected through a wire, 10, to main-line or charging battery M B and to earth or to one of a similar series of buttons connected to a wire which leads to a key, K^3, and to the singaling apparatus through a switch, S^6, or directly through said switch to the same apparatus.

At the bottom of each line-strip is a switch-lever adapted to connect said strip to a series of buttons connected through wire 12 to the telephone apparatus M, whose other terminal is connected with switch *g*, through which a connection may be made with ground or with the terminal button of a series, with any one of which the lower series of switches may be thrown into contact. By these means any line may be connected directly with the telephone apparatus at the central station and to earth; or any two lines may be connected together through said apparatus. Similar telephone apparatus, M′, may be interposed between any two lines by means of the two upper longitudinal series of connecting-buttons and wires, 8 8.

The terminals 9 9 are trunk-line connections, to which any subscriber's line may be connected by the appropriate switch of the longitudinal series to which 9 is connected. M and M′ are provided with the usual gravity-switches and local batteries, as shown. The horizontal series of buttons 9 may be used for connecting two lines directly with one another without passing through the telephone apparatus.

Signals are given to the central office in the usual way, either by a circuit-breaking key, which breaks the circuit of the main battery M B, to which every line should be normally connected by its appropriate switch-lever, or by increasing the resistance in the line, or by diminishing it. In the present instance the keys K at subscribers' stations transmit a signal by diminishing the resistance.

When the central-office operator desires to signal any particular station the switch-lever *h* of the line upon which it is placed is connected to the wire leading to the switch S^6 and the pole-changing and tension-changing apparatus.

The operation is substantially as follows: Normally the insulating-teeth upon the wheels D at the various stations are in different positions with relation to the escapement-lever, and at all of the stations a conducting-tooth is in contact with the lever. Two paths are under these circumstances provided at each station for the current—one through the coils of the electro-magnet and the other through the spring *a*, wheel D, conducting-tooth, lever, and resistance R. The diversion of a portion of the current through the latter path serves to weaken the magnet A sufficiently to prevent it from drawing armature B forward under the action of the currents used in vibrating the polarized armature-lever.

To call any particular station the central-office operator turns the wheel N, thus producing a series of reversals of current upon the line and allowing the wheels D to rotate step by step. When the insulating-tooth at the station to be called has been brought into contact with the escapement-lever, thus breaking the derived circuit, the central-office operator may, by depressing key K^2, increase the tension of the current sufficiently to draw down the armature-lever B and operate the bell-ringing devices. The bells will be operated at no other stations, since in them all the derived circuit will be closed, so as to divert a portion of the circuit from the magnet and prevent the full current from acting upon it.

The apparatus as thus constructed is simpler and more compact than that described in my application before referred to.

My invention is not limited to any particular construction or form of bell-ringing mechanism, and others may be substituted for that shown as operated or released by the action of the supplemental neutral armature B.

Other kinds of escapement mechanism and other devices for breaking the derived circuit at the proper point may be employed in place of that shown. So, also, other pole-changing and tension-changing devices may be substituted for those described.

No claim is herein made to the central-office apparatus herein shown, as that is described and claimed in my application filed April 4, 1881; nor do I make any claim herein to the combination, with an escapement or ratchet wheel, of an armature for operating it, arranged to both form part of the same shunt-circuit, as this is claimed in my application filed April 4, 1881.

What I claim as my invention is—

1. In a step-by-step signal mechanism, a polarized electro-magnetic receiving-instrument controlling step-by-step circuit-breaking devices, and provided with a supplemental neutral armature controlling the bell.

2. In combination with bell devices and step-by-step mechanism which serves to throw the bell devices into and out of operative electrical condition, a polarized electro-magnetic receiving-instrument provided with a supplemental neutral armature.

3. The combination, substantially as de-

scribed, in an individual signaling apparatus, of a metal escapement-wheel connected to the main electric circuit on one side of said apparatus, and provided with an insulated tooth, and an escapement-lever having conducting-pallets electrically connected with the circuit upon the other side of the apparatus.

4. The combination of an electro-magnetic receiver provided with a polarized and a supplemental neutral armature, a circuit closer and breaker normally closing a branch circuit around the electro-magnet, devices controlled by the polarized armature serving to operate the circuit-closer so as to break the branch circuit at a predetermined point in its movement, and bell-ringing devices operated by the supplemental armature, substantially as described.

5. The combination of step-by-step mechanism, an electro-magnet in the main-line circuit controlling said mechanism, a derived circuit around said magnet controlled by the step-by-step mechanism, and containing a resistance, and a supplemental armature for said electro-magnet controlling the bell-ringing devices, and adjusted above the tension of the line-currents used in operating the step-by-step mechanism.

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