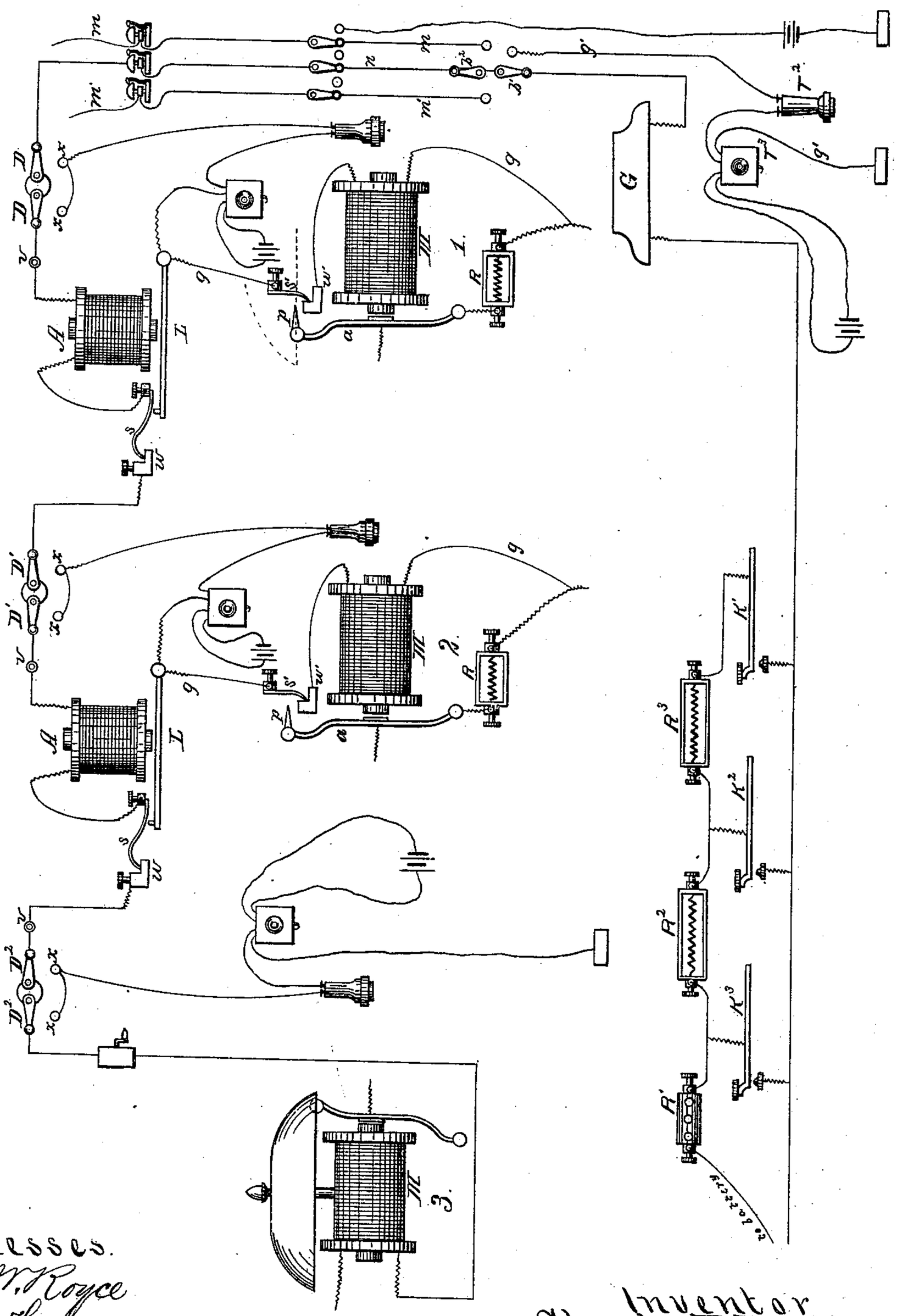
(No Model.)

C. E. BUELL.

TELEPHONE SIGNAL.

No. 251,520. Patented Dec. 27, 1881.



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UNITED STATES PATENT OFFICE.

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TELEPHONE-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 251,520, dated December 27, 1881.

Application filed June 14, 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, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Telephone-Signals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the letters or figures of reference marked thereon, which form a part of this specification.

My invention relates generally to that class of signals known in telephony as "individual call systems," and having in view the calling from a central office of any one of several stations without operating the signal apparatus at any other station in the same circuit; and it relates especially to the subdivision of the said class in which the signals of the several stations in a common circuit are controlled by electro-magnets of different adjustments.

The object of the invention is to simplify and render certain and positive in its operation the apparatus used in signal systems of this class.

The accompanying drawing is a diagram illustrating the apparatus according to my invention at three stations in the same circuit, and a central office, which is provided with signal-transmitting apparatus which may be connected with several different circuits successively.

The numerals 1 2 3 indicate the three stations upon the same circuit, the letter M designating the bell-magnets at the several stations, and A denoting the signal-controlling magnets. Each station is provided with the usual receiving and transmitting telephones.

The letters K′, K², and K³ indicate the signal-transmitting keys at the central station.

R′, R², and R³ are resistances, which may be connected to and disconnected from the line by said keys.

G is a galvanometer for constantly indicating the resistance of the lines.

T³ is the transmitter, and T² the receiving-telephone, both in a ground-wire, *g′*, at the central station, and capable of connection with several circuits successively by means of suitable switches, *b′* and *b²*.

The signal-controlling magnets A are arranged in relation to each other so that those of more delicate adjustment, or requiring less strength of current for their operation, are respectively more remote from the central station.

With the exception of the station farthest from the central station, the several stations are provided with devices which automatically cut off all that portion of the line beyond them outwardly from the central station, and at the same time put to earth through devices which cause the operation of a local signal that portion of the line which includes the acting apparatus and leads to the central station.

By manipulating the key K′, which closes the circuit from battery to line through all the resistance-coils R′ R² R³, the call-bell magnet M at station 3 is operated without making operative the electro-magnets A at either of the stations 1 and 2, this resulting from the fact that the said magnet at station 3 is the most easily operated or has the slightest adjustment of any magnet in the circuit, and may be operated by the battery-current, while all the resistances R′ R² R³ are interposed in the line; but when said current is weakened by the interposition of all these resistances it is incapable of operating the controlling-magnets A at the other stations, which are adjusted to require a stronger current. In like manner the key K² will close the circuit through resistances R′ and R² and operate the controlling-magnet A at station 2; but the current will not be strong enough on the line to operate the controlling-magnet A at station 1, as this magnet is controlled by key 3, which closes circuit through only the resistance R′.

By the action of the electro-magnet A at either of the intermediate stations its armature L is caused to press against a spring, *s*, which forms a part of the main circuit, forcing said spring out of contact with the anvil *w*, thus cutting off all that portion of the line outwardly beyond the magnet so acting.

The lever L at each of the intermediate sta-

tions is connected with a ground-wire, *g*, and at the same time that the spring *s* is raised the remaining portion of the line, which includes the acting magnet and terminates at the other end at the central station, is connected to said ground-wire and to the signal-bell magnet which is in said ground-wire. This closing of the circuit through the signal-bell causes it to act and call the station.

At each station the line, when there broken, should have that portion remaining connected with the central station connected with suitable resistance to compensate for the portion of the line cut off, in order that the normal resistance of the line may be preserved and the signal-controlling magnets remaining in circuit be kept in proper relation to each other and the signal-transmitting apparatus at the central station.

The signal apparatus at each of the intermediate stations is a vibratory bell, and its magnet M automatically cuts itself in and out of circuit without disturbing the continuity of the main-line circuit by diverting the current through a resistance at R equal to its own when its armature in its vibrations cuts out its helix. The resistance R may be a coil of wire or any other suitable conducting-resistance.

The cutting of the magnet in and out is performed by a point, *p*, projecting from the bell-lever *a*, and a spring, S′, which is connected in the ground-wire *g* and normally bears lightly against an anvil, *w′*, connected with the magnet-helix. When the magnet attracts its armature the point *p* strikes the spring *s′*, throwing it off the anvil, and the current then flows from the spring over the point, the bell-lever, and resistance R to ground. The magnet, becoming thus discharged, releases its armature, a retracting-spring draws back the lever, which moves the point *p* away from the spring, which closes circuit over the anvil, and the operation is repeated, the bell *b* ringing until it is switched out of circuit. The bell-coil and the resistance R are arranged to effect the compensation for the resistance of the portion of the line which may be cut off beyond the station.

The receiving and transmitting telephones may be in the ground-wire *g*, as shown, or in a separate ground-wire, as described, and any suitable switches—such, for instance, as shown at D D′ D²—may be used for making the necessary connections through contact-points, or at *x*, or otherwise suitably arranged. When the proper switch is operated to connect the telephones at any line-station with the central station, the signal-controlling magnet at the station is cut out; but the resistance of the telephones is sufficient to compensate for that cut out.

Each station is provided with a circuit-breaking push button or key, as at *v*, and the line, when not in use, may be normally kept connected at the central station to a light battery for signaling purposes, or magneto bells may be used.

The wires *m m′* represent the terminals of different telephone-circuits, in which the stations may be arranged as heretofore described; or any suitable number of stations may be arranged in the same circuit on the same plan.

The switch b^2 at the central station may connect with either of the lines *m*, *m′*, or *n*, and the switch *b′* may connect with the central-station ground-wire *g′*, which includes a receiving and transmitting telephone, or with the line through the galvanometer and to the anvils of the transmitting-keys.

The electro-magnets A may have different resistances as well as different adjustments, and be utilized for varying the current's tension, and these magnets may be employed in the ordinary manner as relays to close the circuit of a local battery through a call-bell and transmitter, or either.

Having now fully described my invention, I claim—

1. In a telephone-signal system, the combination, with a line-wire, of a series of station apparatuses, each provided with an electro-magnet connected in said line-wire and an armature controlled by said magnet and connected with a switch, whereby a single movement of the armature will cut off a fragment of the main line and ground the remainder, and a central or main station provided with means, substantially as described, for operating any particular switch through its controlling electro-magnet without disturbing intermediate switches.

2. In a telephone system, the combination, with a main line having a series of stations thereon, of a series of electro-magnetic switches of different constructions or adjustments, arranged in said line to break and close the same, and in such order that the more delicately adjusted or more easily operated switches shall be at stations more remote from a central station than those of higher adjustment or requiring more force to operate them, and means at a central or main station for sending over the line an electric current suitable for operating any particular switch independently of intermediate switches, whereby the main line may be cut off outwardly beyond any particular station without interrupting the circuit at intermediate stations.

3. The combination, with a ground-wire connected with a telephone-circuit, of an electro magnet arranged in said ground-wire, a shunt-circuit including a resistance equal to that of the magnet-coils, and a retractile armature operated by the magnet and arranged to entirely shunt the ground-circuit from its coils and to the shunt-circuit and its included resistance, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES E. BUELL.

Witnesses:
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