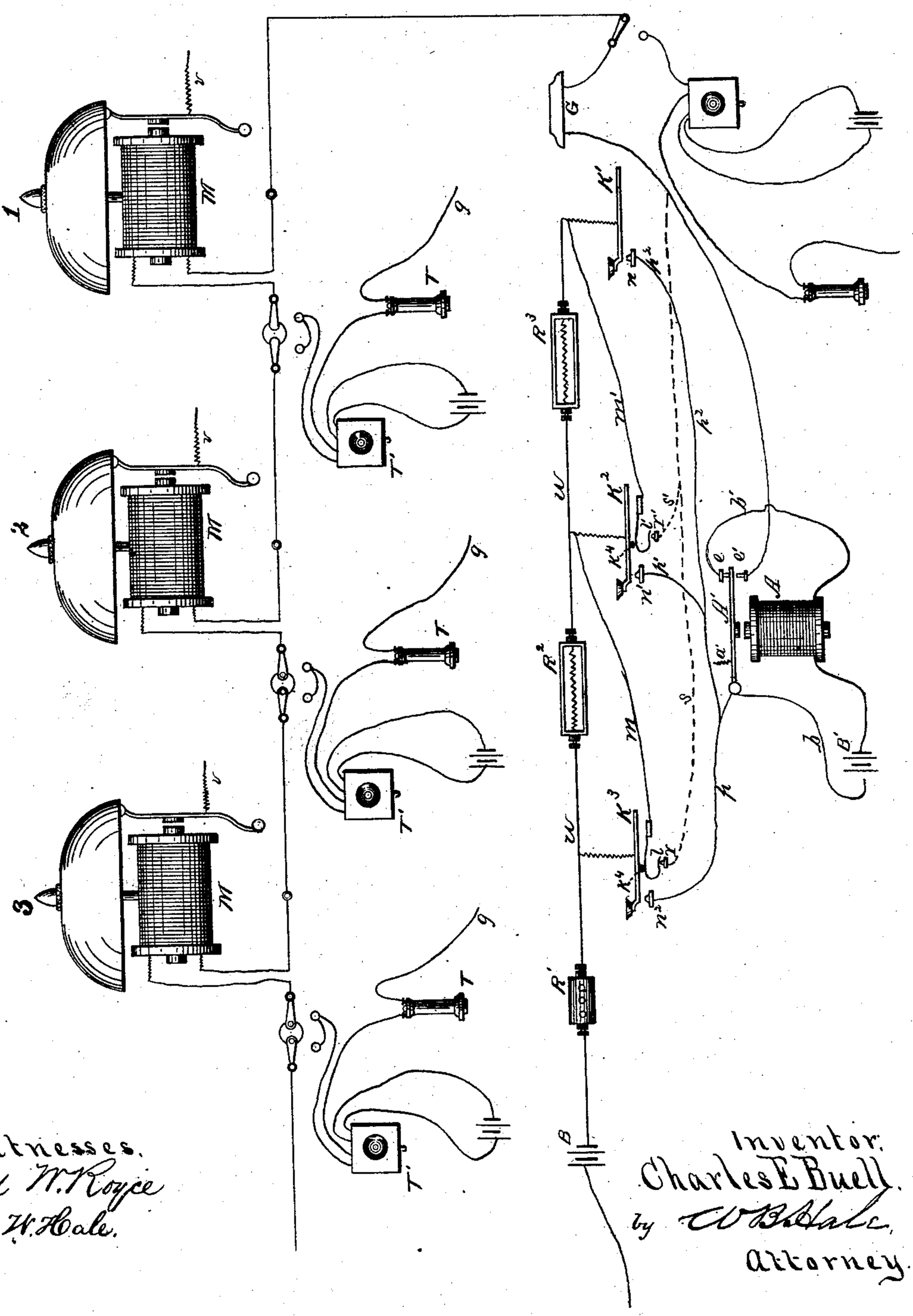
(No Model.)

C. E. BUELL.

TELEPHONE SIGNALS.

No. 248,135. Patented Oct. 11, 1881.



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UNITED STATES PATENT OFFICE.

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TELEPHONE-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 248,135, dated October 11, 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.

This invention relates to that class of individual call telephone-signal systems in which the signal-controlling electro-magnets at the several stations in the same line are differently adjusted, so that no two of said magnets require the same definite amount of tension in an electrical current to operate them.

The invention constitutes an improvement upon the subject of Letters Patent No. 221,512, granted to me November 11, 1879.

The object of this invention is to provide a novel and convenient arrangement of central-station devices, by means of which, when a given station is called, the signal-controlling magnets which are more delicately adjusted than that at the said station will be held closed and prevented temporarily from operating their signals while the desired call is being given. It has also in view the enabling of a cheap and simple class of open-circuit bells to be used at the several stations.

The accompanying drawing is a diagram illustrating the arrangement of devices at the central station according to my invention, and a subscriber's line connected therewith and including three stations.

The outlying stations are designated by the numerals 1, 2, and 3, and each is provided with a signal-bell, the magnet M of which has a different adjustment from the corresponding magnets of each of the other stations, the more delicately adjusted magnets being successively more remote from the central station. Each line-station is also provided with the usual receiving-telephone, T, transmitter T′, and ground-wire *g*, with suitable switches for making the necessary connection for the purpose of communication.

At the central station a wire, *w*, leading from the battery B, has interposed in it at intervals three resistances, R′ R² R³. A key, K′, is arranged to close circuit through all these resistances over a wire, p^2, which leads from the key-anvil *n* to the metallic pivot of a metallic armature-lever, A′, which carries the armature of an electro-magnet, A. A key, K², closes circuit through the resistances R′ and R², over a wire, *p′*, leading to said armature-lever, and a key, K³, closes circuit through only the resistance R′ over a wire, *p*, leading to said armature-lever. The circuit of the local battery B′, which charges the magnet A, is connected to the armature-lever by a wire, *b*, and with a stop, *e*, by wire *b′*. A spiral spring, *a′*, draws the armature-lever against said stop to close circuit, which results in the charging of the magnet A and its attraction of its armature, thus breaking the circuit, and the magnet becomes immediately discharged, so that the spring *a′* again acts on the armature-lever to close the circuit, when the same operation is repeated, there being thus caused a rapid vibratory motion of the armature-lever, which alternately makes contact with the stops *e* and *e′*. The latter of these stops is connected with the line, which includes a galvanometer, G.

The key-stops or anvils may be connected directly with the main line instead of through the automatic circuit-breaker, and I do not claim as my invention the arrangement of an automatic circuit-breaker to be brought into a main circuit by means of a key, as that is old and well known.

The call-bell magnet M at station 3 is made operative by the manipulation of the transmitting-key K′, which makes and breaks the circuit through all three of the resistances, as before stated. The electro-magnets of stations 1 and 2, being too highly adjusted—that is, requiring a greater force to move their armatures than the magnet at station 3—do not respond to the force charging the circuit with all the resistances included therein. To make the magnet at station 2 respond, I manipulate key

K^2, which cuts off the resistance R^3, and thus increases the force charging the circuit sufficiently to cause the magnet at station 2 to respond, but not sufficiently to make operative the magnet of station 1, which only responds to the manipulation of the key K^3, which still further adds to the force charging the circuit by cutting off both the resistances R^2 and R^3.

When either of the keys is depressed the current flows from the battery B, over the key and its connecting-wire, to the vibratory armature-lever A′, the vibration of which rapidly makes and breaks the main-line circuit at the stop e', so that as long as any key is depressed the station signal-magnet which it controls will be rapidly charged and discharged, ringing its bell as long as the key is depressed at the central station. When the key K^3 is depressed there will be sufficient force of current on the line to operate the bell-magnets at all stations, and when the key K^2 is depressed there is force sufficient to operate the bells at both stations 2 and 3, so that it is necessary to provide means for preventing the ringing of the bells of slight adjustment when only the bell at a station where the magnet has a higher adjustment is desired to be rung. These means are as follows: A wire, *m*, leads from a point between the resistance R^2 and R^3 to a spring, *l*, arranged below the key K^3, and immediately below this spring is arranged a stop, *r*, which is connected by a wire, *s*, with the line around the vibratory armature-lever. The spring *l* is so arranged that when the key K^3 is depressed an insulated stud, K^4, projecting downward from the key, will force said spring into contact with the stop *r* before the key makes contact with its stop m^2. It will thus be seen that when the key K^3 is depressed it causes the battery-circuit first to be closed through the resistance R′ R^2 over the wire *m*, spring *l*, stop *r*, and wire *s*, a sufficient force of current being then upon the line to cause the bell-magnets at stations 2 and 3 to attract their armatures. Immediately, however, that the key comes in contact with its stop n^2 the battery-circuit is closed through the resistance R′ over key K^3, the stop n^2, and wire *p* to the vibratory armature-lever, and every time said lever makes contact with the stop e' the battery-current will flow over said lever to the line, avoiding the resistance R^2; but when the armature-lever breaks contact at the stop e' the current follows the completed circuit over resistance R^2. In both cases the current has force enough to cause the bell-levers at stations 2 and 3 to be attracted; but it is only when it reaches the line over the key K^3 and the armature-lever, avoiding the resistance R^2, that it is strong enough to operate the bell at station 1. As this route is broken by the vibration of the lever, the bell-magnet at station 1 will be only intermittently charged, and therefore its bell-lever will be caused to vibrate and ring the bell, being alternately moved by the attraction of the cores and force of the retractile spring V. The magnets at the other stations hold their armatures and bell-levers quiet all the time key K^3 is depressed. When the key K^2 is depressed it closes circuit first through all the resistances over wire m', spring l', stop r', and wire s' to line, causing the magnet at station 3 to attract its armature and bell-lever, and when the key strikes stop n' the route is opened for the current over wire p' and the armature-lever A′, avoiding resistance R^3 when the said lever closes, but passing through said resistance when it breaks the line-circuit; in the latter case only holding closed the magnet at station 3, and in the former case operating the bell at station 2 intermittently.

Having now described my invention and explained the operation thereof, what I claim is—

1. The combination, with a main electric line, of two or more electro-magnets of different construction or different adjustment arranged in said line, devices for varying the resistance of the circuit to correspond to the adjustment of said magnets, respectively, circuit-closers for closing the circuit through said resistance-varying devices to correspond to the adjustment of said magnets, as desired, and devices operated by said circuit-closers for closing and holding closed the magnets of more delicate adjustment, while an operative current over the line is caused to reach and actuate a magnet of higher adjustment.

2. The combination, with a main telegraph or telephone line having a series of outlying stations provided, respectively, with bell-controlling magnets of different adjustments, and a central office provided with circuit-closers for sending currents of variable tension over said line, of devices operated by said circuit-closers for sending a current to a more delicately adjusted magnet immediately in advance of and retaining it upon the line while sending a current to operate a magnet of higher adjustment, substantially as described.

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

CHARLES E. BUELL.

Witnesses:

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W. B. HALE.