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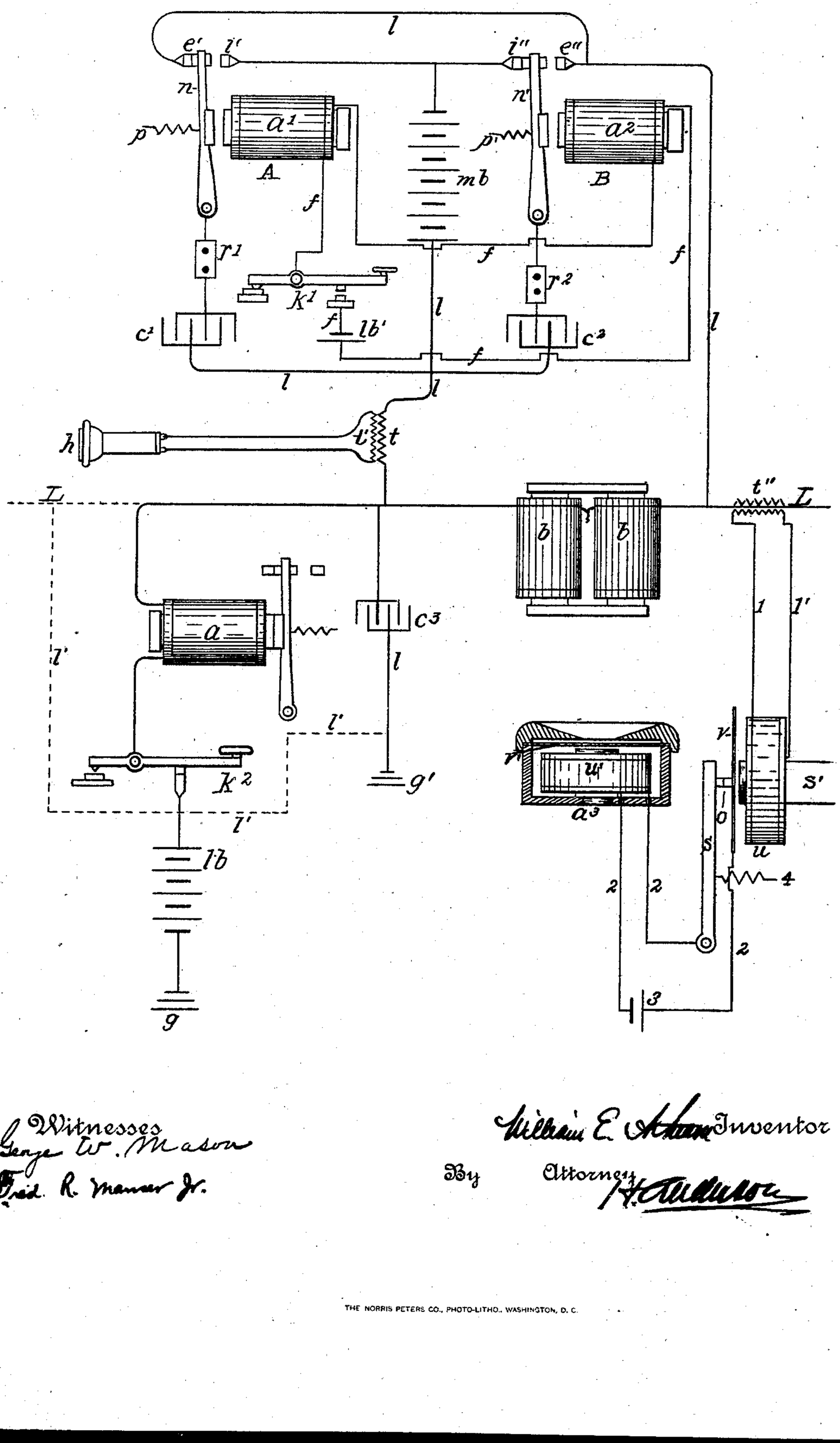
W. E. ATHEARN.

TELEGRAPHY.

(Application filed Apr. 5, 1900.)

(No Model.)



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TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 664,369, dated December 25, 1900.

Application filed April 5, 1900. Serial No. 11,568. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM EDWARD ATHEARN, a citizen of the United States, and a resident of New York, (Brooklyn,) in the county of Kings and State of New York, have invented certain new and useful Improvements in Telegraphy, of which the following is a specification.

My invention relates to the system of telegraphy that employs both the common Morse instruments and apparatus for signaling by induction impulses simultaneously upon the same line; and my object is to employ static discharges from condensers instead of induction impulses from induction-coils, by means of which I produce a more perfect method of dual transmission than has heretofore been attained.

In all attempts at telegraphing Morse signals by the employmont of inductive impulses much difficulty is encountered in properly distinguishing between the "front" and "back" strokes in the receiving instruments. I find that far better results may be obtained by deriving the signaling impulses from condensers than by the use of induction or magnetic coils, and with my equipment I obtain peculiar advantages.

The accompanying drawing illustrates an arrangement of ordinary Morse instruments with my devices as a shunt from the main line.

The Morse outfit comprises a relay a, controlling the usual circuits of the sounder-key k^2, and the line-battery $l\ b$. Upon the upper side of the line L is an equipment, as follows: A main battery $m\ b$ is connected with the points $i'\ i''$. Opposite the points $i'\ i''$ are points $e'\ e''$, that are united by the line l, which continues to and is connected with line L. The levers $n\ n'$ are held normally in contact with the points $e'\ i''$ by springs $p\ p'$ and are connected with condensers $c'\ c^2$. The other sides of these condensers are connected with the lower side of the main battery $m\ b$, the connection continuing to the main line L and from the main line to the condenser c^3, the said condenser being grounded, as shown at g'.

The effect of operating the key is this: With the key k' open, as shown, the battery $m\ b$ is in circuit, through the point i'' and the lever n', with the condenser c^2 and has charged the condenser. Upon the closing of the key, lever n leaves the point e' and closes with the point i', and lever n' leaves the point i'' and goes to e'', thus throwing the static charge from the condenser c^2 into the lines l and L and the battery-current into and charging the condenser c'. Opening the key causes the levers to resume the positions shown, connecting the condenser c' with the lines l and L, into which it discharges, and again causes the battery to charge condenser c^2. Thus the closing and opening of the key will send two impulses upon the line, and the time-space between the two impulses will determine whether the signal is a dot or a dash. These signals are taken upon a diaphragm receiver, which may be a telephone-receiver, as at n. Two impulses sent upon the line by a closing and opening of the key will produce two "clicks" in the receiver, just as similar clicks are produced on a distant sounder by closing and opening a Morse key, in the latter case the closing of the key producing the front stroke, indicating the beginning of a signal, the opening of the key producing the back stroke or the end of a signal.

In the inductive systems of telegraphy a difficulty is experienced in distinguishing between the strokes and determining which is the front and which the back stroke. With my equipment, as described, this difficulty does not appear, nor is it easily explained why such is the fact. My explanation is this: In adjusting an ordinary sounder if the tension upon the spring that retracts the lever and produces the back stroke is nearly equal to the magnetic power of attraction that acts upon the lever and produces the front stroke then the two strokes sound almost precisely alike and confusion is liable to result. In the static-current equipment described the front stroke is produced by closing the key and the back stroke by opening the key, just as in the Morse system; but when the key is closed it is with a firm pressure of the hand, and the contact of the lever n' against the point e'', through which the front stroke goes to the line, is by a strong magnetic torque that makes a firm contact and a perfect passage for the current. When the key is opened, the making of the contact of the lever n

against the point e', through which the back stroke goes to the line, is dependent only on the force of the retractile spring p, and the circuit is not so perfect as in the other case. Hence a perceptible difference in the sound produced in the receiver, and the signals are as intelligible as those upon a Morse sounder. It is obvious, however, that a still more marked difference could be produced in the two strokes by making condenser c' of less capacity than condenser c^2.

In using a diaphragm-receiver I prefer not to connect it directly in the line, but to take the message by induction. The object of the magnets b b in the main line is that of choke-coils. They do not affect the Morse signals, and they divert the static impulses through the equipment shunted around them. In the line l at t is represented a transformer or induction coil, the line forming the primary, and t' representing the secondary, coil, which is connected with a telephone-receiver n. It is not material in what part of the line the transformer may be located, and it may be in the main line, as indicated at t''. Connected with the transformer (indicated at t'') is a telephonic relay used for the purposes of a receiver and to overcome another difficulty encountered in inductive-telegraph systems—*i. e.*, that of conflicting currents upon lines running parallel, as in cables, with circuits thus employed. The sounds that come to the diaphragm-receivers are not strong and usually require that the ear shall be applied close to the receiver. As a consequence it often happens that high-tension currents on said parallel lines induce impulses of such intensity and power as to cause great annoyance and often discomfort to the person receiving inductive messages. To avoid this, I use in connection with the equipment shown a diaphragm-relay comprising an electromagnet on a magnet s' in circuit with the secondary of the transformer t'' by means of the lines 1 1'. In front of the magnet s' is a diaphragm v, having a contact o fast to its center and against which the lever s is held by a spring 4. An electromagnetic receiver or any suitable diaphragm-receiver is put in circuit with a battery 3, the diaphragm v, and lever s through lines 2, as shown. If the tension of the condenser impulses to be used upon a line are determined or fixed at a degree in excess of ordinary disturbing influences along the line, then by means of the spring 4 the tension of the lever s against the diaphragm v may be so adjusted as to exclude all but the occasional extraordinary influences, and even their disturbing effects will be softened.

As each static signaling equipment has its own battery, no circuit-closers are used on the keys, so that the circuits for the static impulses are never broken except during the instants of opening and closing the keys. It is therefore obvious that one station can always interrupt the sending of another, if need be.

If either of the levers n or n' should be pushed separately against their opposite contacts, a short-circuiting of the condensers c' and c^2 would result, and in consequence the flow of current would weld the contact-points together. I find that low resistances of two to four ohms interposed in the circuits, as at r' r^2, is a preventive of such injury to the contact-points, and that is the purpose of the said resistances.

The broken line l' indicates how condenser c^3 would be connected with the line L in an intermediate station.

It is assumed to be understood how in this and allied telegraph systems the static discharges are ineffectual for actuating the Morse instruments and that the Morse battery-signals do not conflict with inductive or static signals.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a telegraph-line of a pair of condensers, a source of electrical energy for charging said condensers, and Morse signal-transmitters for alternately discharging said condensers into the line substantially as herein shown and described.

2. The combination with a telegraph-line of a pair of condensers, a source of electrical energy for charging said condensers, Morse signal-transmitters for alternately discharging said condensers into the line, and a transformer in the line connected with a diaphragm-receiver for receiving said static signals, as herein set forth.

3. In combination with a telegraph-line, a pair of condensers, a source of electrical energy for charging said condensers, Morse signal-transmitters for alternately discharging said condensers into the line, and telephonic receivers for receiving said static signals, substantially as described.

4. In combination with a telegraph-line a pair of condensers, a source of electrical energy for charging said condensers, Morse transmitters for alternately discharging said condensers into the line, a transformer in said line the primary of the transformer included in the line, the secondary of the transformer in circuit with a diaphragm-receiver, a lever held against the diaphragm of said receiver by a spring, and a magneto-diaphragm receiver in circuit with said lever, the diaphragm against which said lever rests and a battery, substantially as set forth.

5. The combination with a telegraph-line of a pair of condensers, a source of electrical energy for charging said condensers, Morse signal-transmitters for alternately discharging said condensers into the main line, the said equipment of said condensers and transmitters included in a shunt from said main line, choke-coils in the main line between the shunt connections with said line, and a diaphragm-receiver in circuit with a transformer or induction-coil the primary of said transformer

or induction-coil forming a part of the line in which it may be inserted, substantially as herein set forth.

6. The combination with a telegraph-line and a pair of condensers, Morse signaling instruments as shown for alternately discharging said condensers into the line, of resistances between the condensers and their discharging-points as and for the purpose set forth.

7. The combination in a telegraph-line of a pair of condensers, a source of electrical energy for charging the condensers, Morse signaling instruments for alternately discharging said condensers into the line, a diaphragm-receiver connected with a transformer in the line for receiving the static impulses, and a condenser in the circuit from the main line to the ground for the static impulses, substantially as set forth.

Signed at 195 Broadway, New York, in the county of New York and State of New York, this 26th day of March, A. D. 1900.

WILLIAM EDWARD ATHEARN.

Witnesses:
C. A. VAN BRUNT,
ALBERT TOMPKINS BENEDICT.