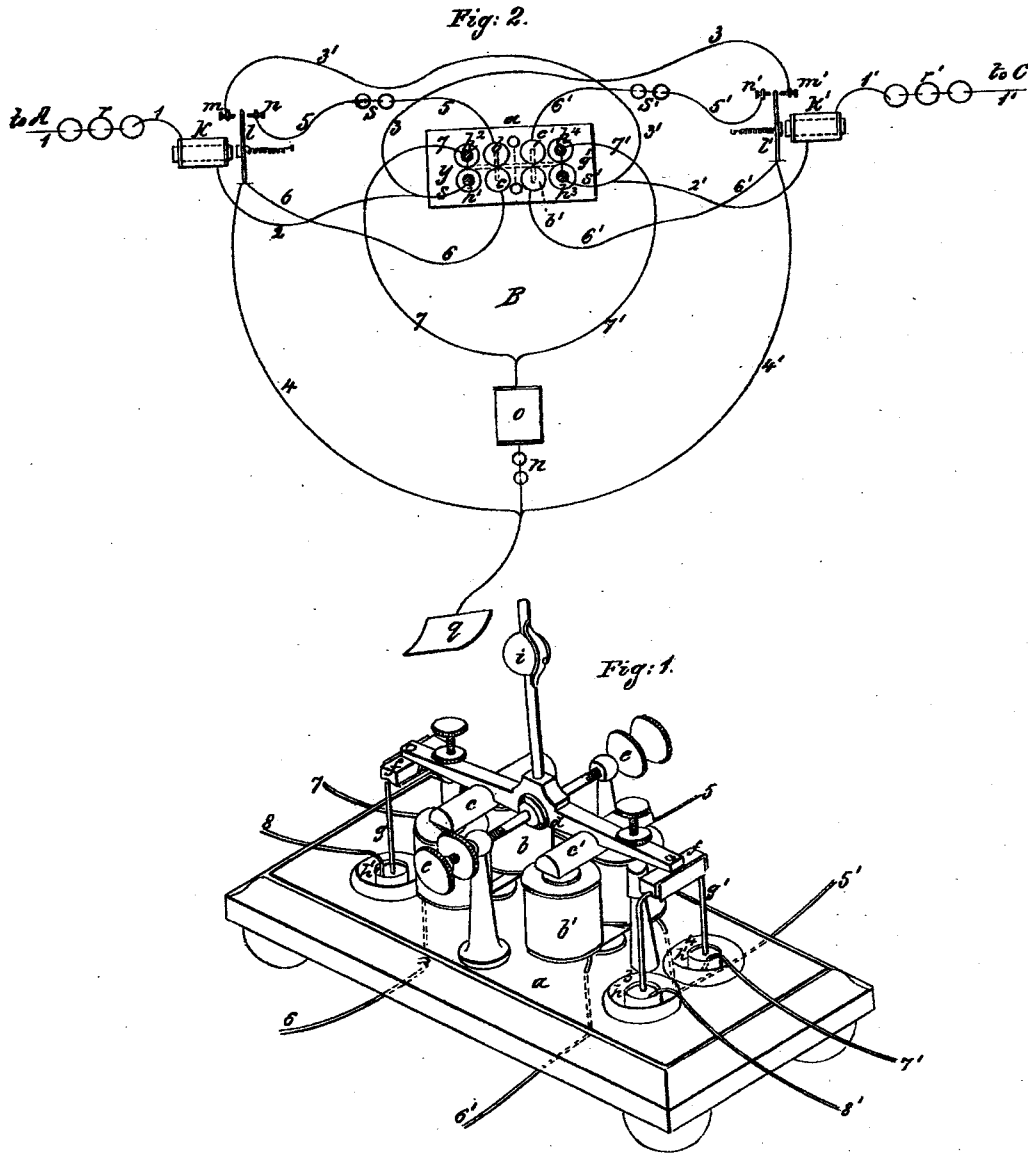


C. S. BULKLEY.
Telegraphic Repeater.

No. 8,340.

Patented Sept. 2, 1851.



UNITED STATES PATENT OFFICE.

CHAS. S. BULKLEY, OF MACON, GEORGIA.

IMPROVEMENT IN CIRCUIT-CHANGERS FOR ELECTRO-MAGNETIC TELEGRAPH.

Specification forming part of Letters Patent No. 8,340, dated September 2, 1851.

To all whom it may concern:

Be it known that I, CHARLES S. BULKLEY, of Macon, in the county of Bibb and State of Georgia, have invented certain Improvements in Circuit-Changers; and I do hereby declare that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known, and of the usual manner of making, modifying, and using the same, reference being had to the accompanying drawings, of which—

Figure 1 is a perspective view of the circuit-changer, and Fig. 2 is a diagram showing the arrangement of the wires, magnets, &c., at a relay-station.

In order to transmit intelligence by telegraph for very long distances, it has been found necessary to have what are called "relay-circuits," the vibrations of making and breaking the circuits in writing being communicated from one to the other by "receiving-magnets;" but by these means the writing can only be done in one direction unless a rearrangement is made in the connections, which can only be done by the operators at the intermediate stations, and consequently, if they wish to write back, or if an error takes place, or any other difficulty occurs, the writer cannot be notified of it without considerable difficulty.

My invention is designed to obviate these defects, and to put it in the power of the operators at either end of the line to arrange the circuits at the intermediate or relay stations suitably for them to transmit the message, and the operator at the opposite end having the power to interrupt and write back at pleasure, and, besides, in the event of any of the circuits breaking, the operator is immediately aware of it by his own instrument ceasing to operate.

The circuit-changer is constructed as follows: *a* is the base, to which all the parts are attached. *b b'* are two electro-magnets. *c c'* are their respective armatures attached to the piece *d*, and suspended above the magnets by the pivot-screws *e e*. On the ends of the piece *d* are pieces of ivory *f*, to which are suspended the bent wires *g g'*. The ends of these wires dip into cups of mercury *h' h² h³ h⁴*. *i* is a sliding weight, by the raising or lowering of which the quickness of action is regulated.

Fig. 2 is a diagram showing the arrangement of the magnets, batteries, wires, &c., at a relay-station. We will suppose, for the purposes of explanation, three stations, A, B, and C, A and C being the distant stations communicating with each other, and B the intermediate or relay station. *a*, Fig. 2, is a plan of the circuit-changer. *k k'* are receiving-magnets, with armatures *l l'* vibrating between the screws *m m'* and *n n'*. *o* is simply a register or recording-magnet of the relay-station, in local circuit of battery *p*. *q* is the plate making the ground-connection. *r r'* are batteries on the main lines, and *s s'* batteries on the changer-circuits.

The several wires are indicated by numbers.

When not in use the main circuits are kept closed, the galvanic currents from A and C passing through the wires 1 1', which coil round the receiving-magnets *k k'*, from thence through 2 2' 3 3', the armatures *l l'*, and the wires 4 4', to the ground-plate *q*. When A wishes to communicate with C he first breaks his circuit, which allows the armature *l* of the receiving-magnet *k* to fall back by the force of its spring, and thus completes a circuit through the helix of the electro-magnet *b* through the wires 5 and 6 and the armature *l*. The magnet *b* then attracts its armature *c* and draws it down, together with the bent wires *g*, the ends of which dip simultaneously into the mercury-cups *h' h²*, thus connecting the wires 7 and 8, which dip into the cups. A connection of conductors is thus formed from the main wire 1 through 2, 8, *g*, and 7, and then through the register-magnet *o* to the ground. At the same time the similar connection which had previously existed with the other circuit is broken by the ends of the bent wire *g'* being withdrawn from the cups *h³ h⁴*, and the armature *l'*, falling back, sets the electro-magnet *b'* in action, but without effect, as its attraction of the armature *c'* is counterbalanced by the other magnet, *b*, and the tendency of the weight *i* to keep the piece *d* in the position to which it is inclined. The mercury-cups are filled to such a level that the ends of the wire *g'* do not break the connection till the piece *d* has passed the center. This causes the main circuit from C to remain closed until the piece *d* has passed the center, when the armature *c* being close to the magnet *b*, and the weight *i* being also on

that side of the center, gives that end the preponderance, and therefore it remains as placed. The writing is then done in the usual manner by making and breaking the circuit by a key at A, which is communicated to C by means of the receiving-magnet *k*, through the wires 1' 2' 3', the armature *l*, and the wire 4, to the ground.

To communicate from C to A, the operation is reversed, and the connections made in a precisely similar manner, but in the opposite direction.

By the use of these circuit-changers at each relay-station on a long line, the operator at either end has it in his power to arrange the connections so that he can write through from one end to the other without the assistance of the operators at the intermediate stations.

Having thus fully described my improvements, what I claim as new therein, and which I desire to secure by Letters Patent, is—

The circuit-changer, substantially as above described, in combination with the arrangement of wires, magnets, &c., as set forth, for the purpose of enabling the operator at either one of two distant stations to arrange the connections at the intermediate stations so that he can write through to the other end station at pleasure.

CHAS. S. BULKLEY.

Witnesses:

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