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INVENTOR

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IMPROVEMENT IN KEY SYSTEMS FOR QUADRUPLIX TELEGRAPHS.

Specification forming part of Letters Patent No. **218,181**, dated August 5, 1879; application filed December 14, 1878.

To all whom it may concern:

Be it known that I, FRANCIS W. JONES, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Key Systems for Quadruplex Telegraphs, which is fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of my improved key system; and Fig. 2, a plan view of the relay system heretofore patented by me, with sounders connected therewith.

My present invention relates entirely to the transmitting apparatus or key system, and is an improvement on Letters Patent No. 191,440, which were granted to me May 29, 1877.

The improvement is, however, intended for use in connection with my differential relay system, for which Letters Patent No. 191,439 were also granted to me May 29, 1877; hence I have shown the said relay system in connection with my improved key system, (though the former constitutes no part of my present invention,) in order that the operation of my present improvement may be perfectly understood.

In the key system described in the Patent No. 191,440 there are three separate batteries, combined with transmitters and wires constructed and arranged in a special manner.

The present invention consists in a special arrangement of the battery, wires, and transmitters, whereby but a single battery is used, a part of it being cut out or the entire battery-force employed, as may be desired, as will be hereinafter fully described, and more distinctly pointed out in the claim.

In the drawings, A and B represent two transmitters, which are mounted on pivotal bearings, in the ordinary way, and are of the usual well-known construction in their general features. These transmitting-levers are provided with contact-points, attached to each end of the respective levers. The points *a* of the transmitter A are insulated, as shown in the drawings. The point *b* on one end of the transmitter B is also insulated; but the point *b'* at the other end of said transmitter is connected directly to the lever without insulation.

Contact-springs are also mounted upon the levers A B, two of them, *c c'*, being arranged on the lever A, and two, *d d'*, on the lever B, and all of them insulated, in the usual way, by supporting them on ordinary insulating-blocks.

Contact-points C C' and D D' are mounted on insulating-posts, and are located over the springs, respectively, which are arranged on the levers A and B, as above described. These points are ordinary contact-points, and are so well known as to require no further description.

A third contact-point, *a'*, is mounted on the transmitter A, between the two end points, and is insulated like the others. A third insulated contact-spring, *e*, is also mounted on the same transmitter near this contact-point, and above it is arranged an insulated contact-point, E, similar to the points C D.

A single battery, X, is employed, of any desired number of cups, collected together in the usual way. The positive pole of this battery is connected, by a wire, *x*, with the insulated point *b* on the transmitter B, and the negative pole, by a wire, *y*, to the insulated points C C'. A third wire, *z*, attached to one of the cup-connections of the battery, extends thence to the contact-point D.

The points *a* on the transmitter A are connected together and to the contact-spring *d* on the transmitter B by means of a wire, F.

A wire, G, connects the contact-points E and D', and the contact-point *a'* on the transmitter A is connected, by a wire, H, to the contact-spring *d'* on the transmitter B, and a wire, I, connects the contact-spring *c'* to the wire G.

The relay system is connected to the contact-spring *e* by a wire, T, which connects with the relay system in the same manner as described and shown in my Patent No. 191,440.

The contact-spring *c* on the transmitter A and the transmitter B are permanently connected to ground respectively by wires J and K.

It will be understood, of course, that the apparatus is provided with the usual devices for opening and closing the transmitters.

It is evident from the description above that under certain conditions the wire *z* will divide

the battery X into two parts, Y and Z, and these parts may be proportioned to each other, as described, by making the connection at the suitable point.

The transmitters may be brought into either one of four relations to each other. First, both may be open; second, transmitter A may be opened and B closed; third, A may be closed and B open; and, fourth, both may be closed.

In the drawings the transmitters are shown in the first condition, and it will be found by tracing the connections that the line-circuit is grounded and the battery stands open, and consequently no current will flow to line.

In the second condition contact is made between the point D' and the spring d', and broken between the point D and the spring d, and at the same time made between this spring d and the point b. The full current of battery X will now be sent to line through the wire at the positive pole of the battery.

In the third condition contact is broken between the point C and the spring c, and at the same time made between said spring and the point a. Contact will also be broken between the spring c' and the point a, and made between this spring and the point C'; also broken between the point a' and the spring c, and made between this spring and the point E. The transmitter B will remain in the position shown in Fig. 1 of the drawings.

By tracing the connections it will be found that the wire x is open, the wire z is grounded, the wire y is brought into connection with the line; hence a current will flow to line through the wire y from the section z of the battery.

In the fourth condition the transmitter A will be placed in the same relation as above described in the third condition, and the transmitter B in the relation described for the second condition. It will now be found that the wire x is grounded, the wire z open, and the wire y placed in connection with the line; hence a full battery-current will flow to line from the negative pole through the wire y.

From this explanation it will be seen that the order in which the currents are sent to line

by the key system herein shown and described does not differ from that covered in my former Patent No. 191,439.

In my present invention, however, there is a new arrangement of transmitters, wires, and batteries, and a separate ground-wire is attached to each transmitter, thereby enabling each to ground the line-wire independently of the other; but at the same time a certain mutual dependence by the transmitters on each other for line-connection is maintained.

I do not limit my improvement to the precise construction and arrangement of parts shown in the drawings. For instance, the additional spring and points on the transmitter A may be arranged differently, and perhaps more conveniently provided, only that they are insulated properly. The connections with the battery may also be reversed, so far as the relation of the poles is concerned; and I do not limit myself to any arbitrary division of the battery, but each section may be composed of any desired number of cups, as may be determined by the necessities of the circuit. Other mechanical changes may be made in the system without changing the principle of operation which constitutes my improvement; and although, as stated above, this key system is intended especially to be used with my patented differential relay system, I do not limit myself to this specific application, but claim the system constructed and operating substantially as described wherever it is applicable.

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

The double transmitters A and B, provided with a series of contact springs and points, as specified, in combination with the connecting-wires F, G, H, and I, the ground-wires J and K, the battery X, and connecting-wires x y z, and the line-wire T, all arranged and operating substantially as described.

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Witnesses:

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