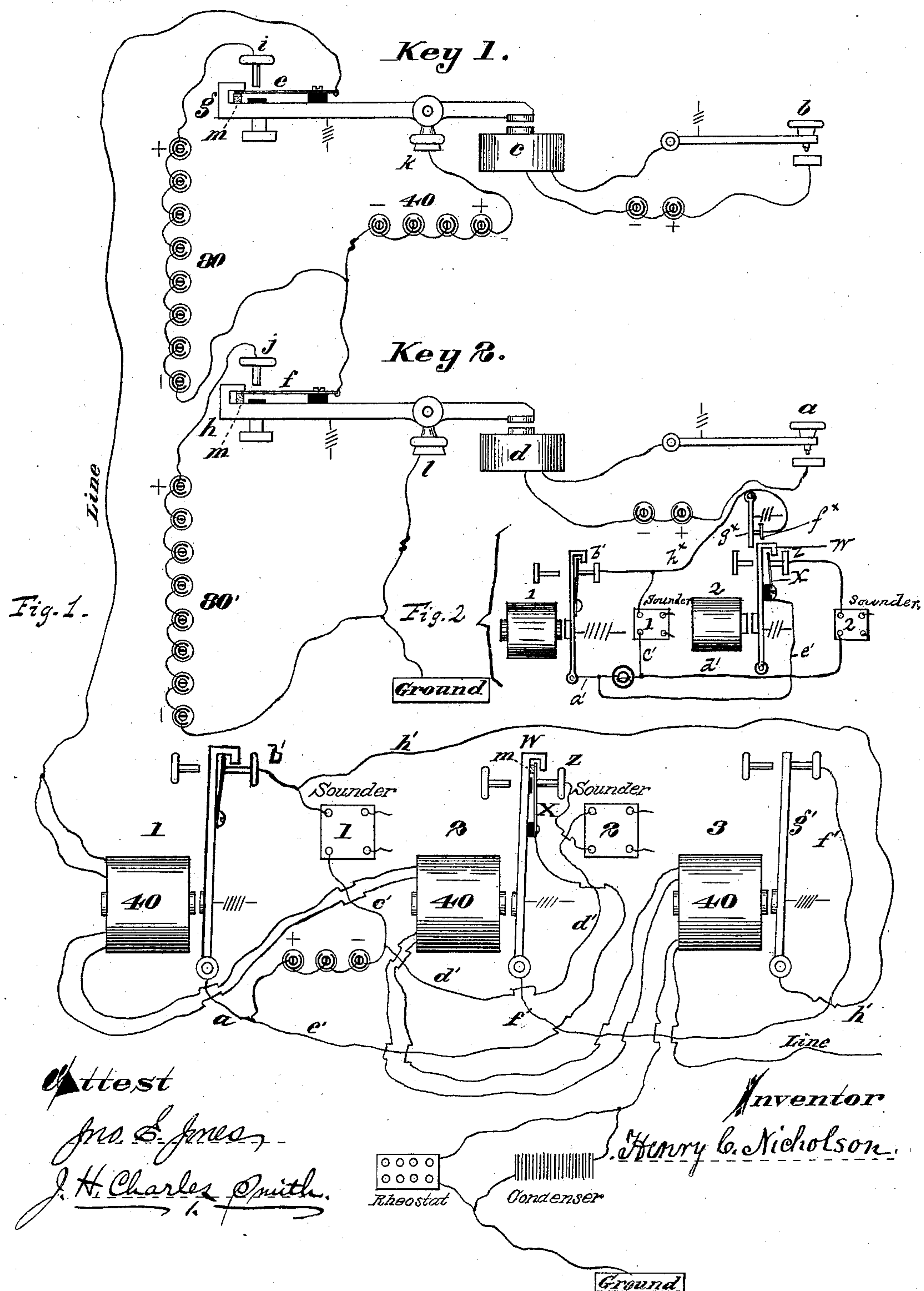


(No Model.)

H. C. NICHOLSON.
QUADRUPLEX TELEGRAPH.

No. 257,181.

Patented May 2, 1882.



UNITED STATES PATENT OFFICE.

HENRY C. NICHOLSON, OF KENTON, KENTUCKY.

QUADRUPLIX TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 257,181, dated May 2, 1882.

Application filed May 2, 1881. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. NICHOLSON, of Kenton, in the county of Kenton and State of Kentucky, have invented certain new and useful Improvements in Quadruplex Telegraphs; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings and points of reference thereon, which are a part of this specification.

My invention relates to that class of quadruplex telegraphs in which are used two single transmitting-keys—key 1, key 2—with suitable battery and circuits, so that four differing strengths may be presented to line, in order that each one will have an effectual potential sufficient to operate the relays, substantially as herein described—to wit, if both transmitting-keys are open, one strength of battery will be to line; if key 1 be separately closed, two strengths will be to line; if key 2 be separately closed, three strengths will be to line, and if both keys are closed, four strengths of battery will be to line. The retractile springs belonging to either relay being properly adjusted so that the one strength will not close either relay, two strengths will close relay 1, three strengths will close relays 1 and 2, and four strengths of battery will close relays 1, 2, and 3.

My improvement consists in the proper arrangement of three relays, in combination with two sounders or receiving-instruments, arranged and operated substantially as described, and as shown in the accompanying drawings.

In the drawings, Figure 1 represents two transmitting-keys, three main or line batteries, three neutral or non-polar relays, two sounders, and one local battery, one rheostat, and one condenser for balancing the line-resistance and static discharges in the usual methods; also, two common Morse keys and local magnets and local batteries to actuate the transmitting-keys; and Fig. 2 represents a modification in which a supplemental contact-lever is substituted for the third relay, shown in Fig. 1.

The accompanying drawings represent the

apparatus at one station, arranged for quadruple transmission, to be connected by the single-line wire with a similar apparatus at a distant station. Both keys and relays are open and the two sounders are closed. Either of the sounders when operated will respond on back-stroke. The route will be from ground to post *l* in key 2, hook *h*, spring *f*, main battery 40, post *k*, hook *g*, and spring *e* to line, artificial circuit, and distant station. The relays at the distant station will not be affected until one or both of the transmitting-keys are closed, each relay resting on stops *b'*, *Z*, and *f'*. Sounder 1 will close by the local battery and route *a'*, *b'*, and *c'*. Sounder 2 will close *via* *d'*, *d'*, *Z*, *X*, and *e'*. If key 1 is closed by means of Morse key *b* and magnet *c*, spring *e* will close on stop *i* and *e* will break from hook *g*. This change will cut out battery 40 and substitute 80, making the route *via* *f*, 80, stop *i*, and spring *e* to line. The increase of battery will cause relay 1 at the distant station to move its armature-lever from stop *b'* to front stop, and thus break the local circuit to sounder 1. If key 2 is closed by Morse key *A* and magnet *d*, spring *f* will close on stop *j* and *f* will break from hook *h*. The route to line will be from ground *via* battery 80', stop *j*, spring *f*, battery 40, post *k*, hook *g*, and spring *e* to line. The greater strength from combined battery 80' and 40 will actuate relays 1 and 2 at the distant station, and the armature-lever of relay 2 will pass to front stop, spring *X* will close on hook *W*, and also simultaneously break from stop *Z*. Sounder 1 will be closed *via* *c'* *h'* *h'* *g'* *f'* *f'* *W* *X* *e'* to local battery. Sounder 2 will be broken at stop *Z*. If key 1 and key 2 are both closed, both the large batteries 80 and 80' will be in circuit *via* 80', stop *j*, spring *f*, 80, stop *i*, and spring *e* to line. This will actuate relays 1, 2, and 3, throwing each armature-lever to front stop, and both sounders in responding will be open. Sounder 1 between *a'* and *b'* and *f'* and *g'* is open. Sounder 2 is open between stops *Z* and spring *X*.

A small piece of elastic material may be placed under the springs *e*, *f*, and *X*, as marked at *m m m*, the object of which is to prevent a metallic jar at the contact-points. A bit of flexible rubber will answer the purpose. A sup-

plemental lever might also be substituted for relay 3 and actuated by relay 2, the lever to have the same local connection and retractile spring adjusted as in relay 3. Fig. 2 shows such an arrangement. Relays 1 and 2 are actuated precisely as the corresponding relays of Fig. 1, and in addition relay 2 operates the supplemental contact-lever in opposition to its retractile spring whenever both keys are simultaneously closed, sending a current of sufficient strength to overcome the force of the retractile spring of the supplemental contact-lever. The supplemental contact-lever forms the front stop for the armature-lever of relay 2 when actuated by a current sent by key 2 alone. As in Fig. 1, sounder 1 is included in a local circuit passing through the armature-lever of relay 1, which is normally closed, and another local circuit which is normally open. The normally-open circuit includes the spring X and the armature lever of relay 2, but, different from the arrangement of Fig. 1, passes thence to the back contact of the supplemental contact-lever, which is connected by a wire with a wire connecting the back contact *b'* of relay 1 with the helix of the electromagnet of sounder 1. Under this arrangement sounder 1 will respond when relay 1 alone is operated. Sounder 2 will respond when relays 1 and 2 are operated by the operation of key 2 alone, the normally-open local circuit of sounder 1 being then closed simultaneously with the opening of its normally-closed circuit.

Both sounders will respond when both key 1 and key 2 are operated, so that both relays are actuated and the supplemental contact-lever separated from its back contact by the armature-lever of relay 2, in consequence of which both local circuits of sounder 1 are simultaneously opened. The armature-lever of relay 1 should be provided with a spring to make a yielding contact between it and its back contact, in order to maintain the local circuit for sounder No. 1 when key 2 alone is operated until insulated contact-spring X makes contact with hook W, and thus prevent a kick in sounder No. 1 at such time.

I claim as my invention—

The combination, substantially as before set forth, of two sounders and three neutral relays for operating the same independently, the local battery terminals for one of the sounders consisting respectively of a hook and an insulated contact-spring on the armature-lever of one of the relays, while the local-battery terminals of the other sounder consist respectively of the armature-levers and back contacts of the other relays.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HENRY C. NICHOLSON.

Witnesses:

F. W. BROWNE,

J. H. CHARLES SMITH.