C. E. DAVIES.

TELEGRAPH REPEATER.

APPLICATION FILED MAR. 11, 1908.

917,263. Patented Apr. 6, 1909.

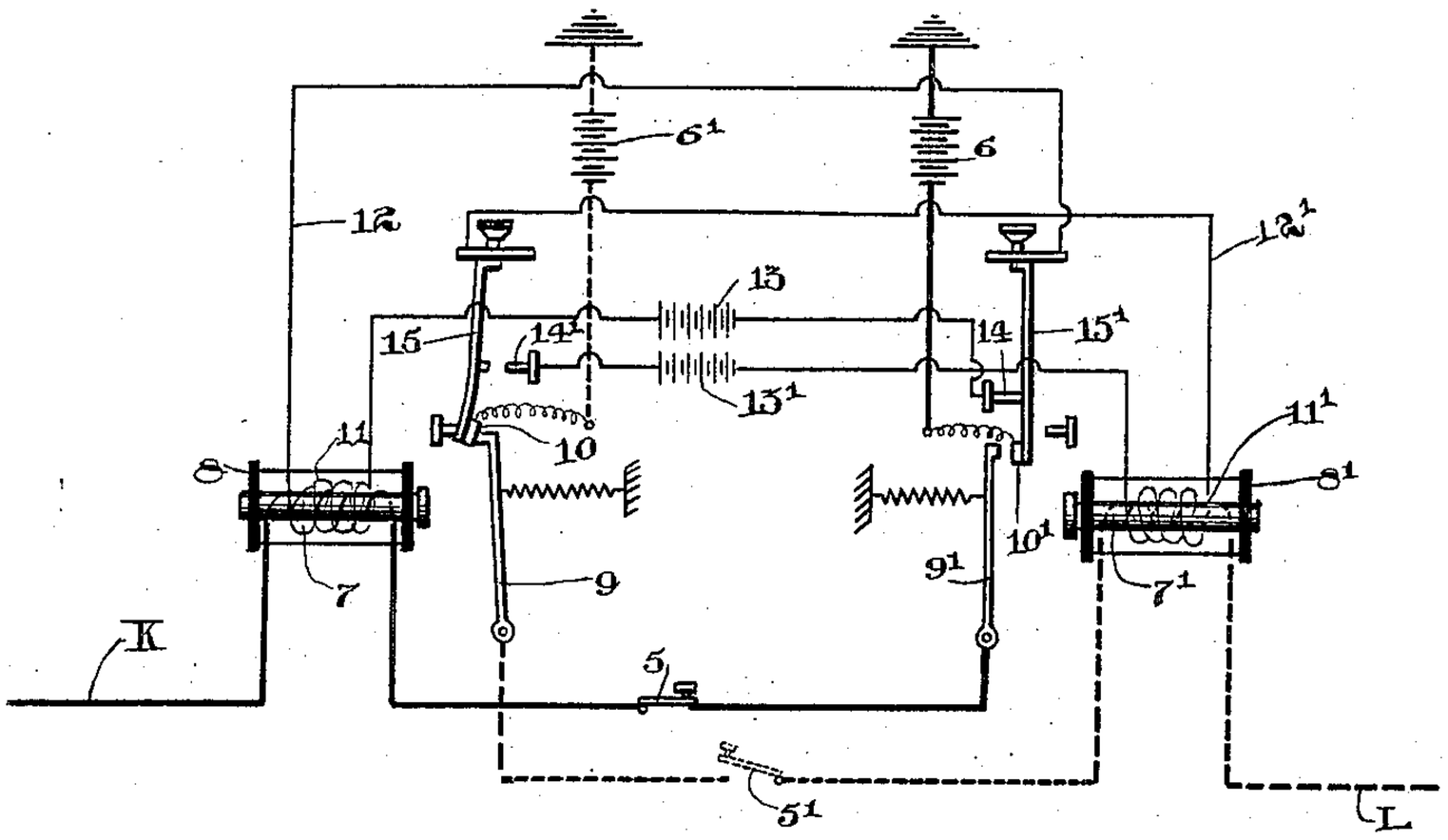

FIG. 1.

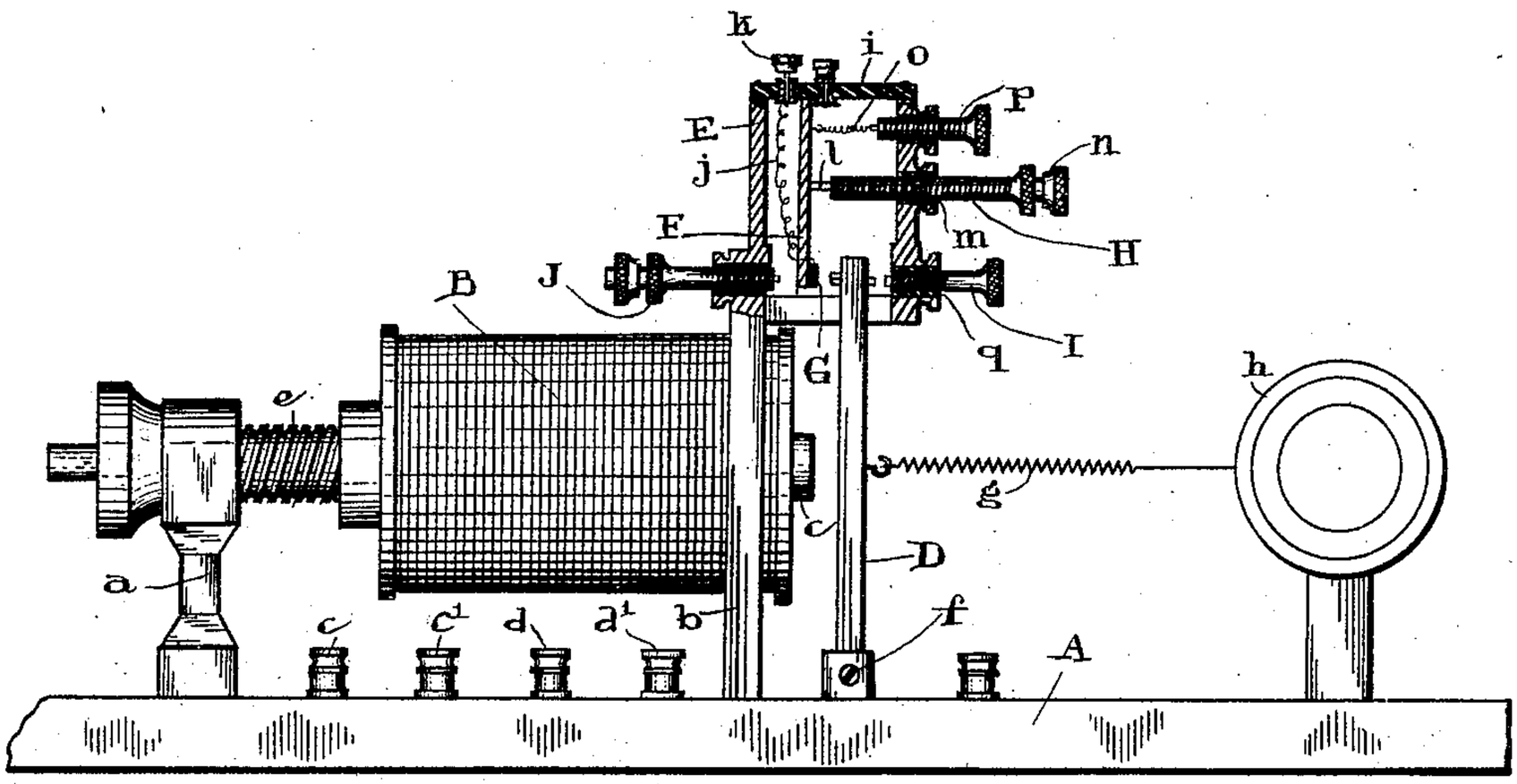

FIG. 2.

WITNESSES

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TELEGRAPH-REPEATER.

No. 917,263. Specification of Letters Patent. Patented April 6, 1909.

Application filed March 11, 1908. Serial No. 420,494.

To all whom it may concern:

Be it known that I, CHARLES EDWARD DAVIES, of the city of Ottawa, in the county of Carleton, Province of Ontario, Canada, have invented certain new and useful Improvements in Telegraph-Repeaters, of which the following is a specification.

My invention relates to improvements in telegraph repeaters, and the objects of my invention are to provide a repeater having a reduced number of instruments and in which the make and break of the main line will be made directly by the moving armatures, which armatures shall also operate to make and break the local circuits.

The details of the invention are described more fully in the following specifications and accompanying drawings and specifically set forth in the claims.

In the drawings, Figure 1 is a diagrammatic view illustrating the connections of the various circuits. Fig. 2 is a side view of the actual construction of one of the pairs of instruments constituting the repeater.

Referring first to Fig. 2, A represents a suitable base having a magnet B supported thereon by brackets *a* and *b*, and provided with two sets of windings connected respectively to the pairs of binding posts *c*, *c'*, *d* and *d'*, and through the center of the magnet a core C extends adjustable by means of a screw *e*. In front of the magnet an armature D of suitable magnetic material is provided, and pivoted at *f* adjacent to the base. This magnet is normally retained in its position farthest removed from the magnet by means of a tension spring *g* connected to a suitable bracket *h* on the base. Above, and slightly in front of the magnet, a bracket E is provided having a top member *i* of insulating material, which supports a flexible spring lever F which carries at its extremity a contact point G which is suitably insulated from the remainder of the lever and has connected thereto a fine wire *j* which leads to a binding post *k*. The contact point G is adapted to be engaged by the end of the armature D when drawn toward the magnet. The upper part of the lever F carries a second contact point *l* which is adapted to coact with a similar point carried on the end of a screw H supported by an insulating bushing *m* in the bracket E and having a binding set-screw *n* at the extremity thereof. In addition to the tension of the spring metal in the lever F a small spring *o* is connected to the upper part thereof, and to a screw *p* extending through an insulating bushing in the frame, whereby the tension may be accurately adjusted. In the bottom of the frame E a screw I may be supported in an insulated bushing *q*, the end of which is adapted to form a back stop for the armature D and on the opposite side a screw J may be provided, adapted to contact with the reverse side of the spring lever F at once affording a back stop for the same and means for making and breaking an auxiliary circuit should it be so desired. It will be observed in connection with the mechanical structure of the instrument itself that the combination of the spring operating the armature D, the spring lever F, and tension spring *o* connected to the same, afford together an exceedingly accurate means of adjusting and regulating the movements of the lever and armature.

Referring now to Fig. 1, which diagrammatically shows the connection of the two instruments which constitute the repeater, K and L represent the east and west main lines respectively having keys 5, 5' and batteries 6, 6' therein. Each of these lines are connected to the windings 7, 7' on the electro-magnets 8, 8' forming part of the two instruments. Each main line circuit after passing through one winding of the magnet of one instrument is then led to the opposite instrument and connected to the armature 9 or 9' thereof, and from thence through the contact point 10 or 10' to the battery 6 or 6' to the ground. The second windings 11, 11' on the magnets 8, 8' are connected to auxiliary circuits 12, 12' which include the batteries 13, 13' and are completed through contacts points 14, 14' and the spring levers 15, 15', the electro-magnet 11 or 11' and the lever 15 or 15' in each auxiliary circuit, being thus on opposite instruments; that is to say, tracing out the auxiliary circuit, it will first pass through the magnet of one instrument, then pass to the spring armature of the other instrument, back through the contact point coöperating therewith, through its own battery and from thence to the electro-magnet again.

It may be observed here that the term "auxiliary circuit" is intended to include the ordinary local circuit illustrated which has a source of power independent of the main line as well as the other form of auxiliary circuit frequently used in which the power is de-

rived from the main line led through a rheostat.

In operation, when the line is at rest both the armatures 9, 9′ will be kept closed by the current in the main lines operating through the windings 7, 7′ of the electro-magnets. When however one line is open to give a signal, which is the condition illustrated in Fig. 1, where the west line is open, the armature 9′ will be released breaking the east line, but at the same time as this is done the auxiliary circuit 12 is completed, preventing the magnet from becoming demagnetized and continuing to hold the armature 9 in position, thus maintaining the continuity of the main line L through the armature 9 and contact point 10. From this it will be seen that whenever one of the main lines are broken to give a signal the corresponding auxiliary circuit is automatically completed and operates to prevent the breaking of the main line giving the signal through the deënergizing of the magnet, which would otherwise result from the breaking of the opposing main line.

The manner of transmitting the signal from one line to the opposing line is particularly to be noted. It will be observed that whenever a break is made in one line, for instance L, the deënergizing of the magnet 8′ will result in a break between the armature 9′ and the contact point 10′, which will break the main line K. When the line L is again completed, the magnet 8′ will be energized again completing the circuit L, the make and break in the opposing line being at all times effected by an armature operated directly by the current in the line transmitting the signal, thus constituting a "direct point" repeater.

It will be observed that the number of instruments in the repeater have been very much reduced, the one set of levers serving for both the main and local circuits owing to the fact that the magnets 8 and 8′ carry two windings. As explained hereinbefore, the adjustment of the instrument can be made very finely.

While the invention has been described herein with great particularity of detail, yet it will be readily understood that in carrying out the construction of the same, changes may be made within the scope of the appended claims without departing from the spirit of the invention.

What I claim as my invention is:

1. In a telegraph repeater, the combination with the main lines; compound electro-magnets therein and armatures controlled thereby, of auxiliary circuits including a winding of said compound electro-magnets and controlling the same armatures, and means operated by the movement of each armature for simultaneously breaking the auxiliary circuit which energizes the magnet controlling the opposite armature and holding closed the main line which energizes the magnet operating the moving armature.

2. In a telegraph instrument, the combination with the main lines, electro-magnets therein, and armatures controlled thereby, means directly operated by the movement of each armature for making and breaking the opposite main line to that controlling the electro-magnet operating the armature, and auxiliary circuits thrown into operation by the movement of the armatures and having means therein for energizing the magnet controlling the armature of the transmitting main line.

3. In a telegraphic repeater, the combination with the main line, compound electro-magnets therein and armatures controlled thereby, of auxiliary circuits including a winding of said compound electro-magnets therein and controlling the same armatures, spring levers adapted to be engaged by the movement of the armatures, and means carried by each spring lever for simultaneously breaking the auxiliary circuit which energizes the opposite magnet and holding the main line corresponding thereto closed.

4. In a telegraph repeater, the combination with the main line, compound electro-magnets therein and armatures controlled thereby, of auxiliary circuits including a winding of said compound electro-magnets therein controlling the same armatures, spring levers having insulated contact points thereon adapted to engage the armatures in their movement and to enable the circuit of the main line to be completed through the armature and contact point, and additional means carried by the spring levers for breaking the auxiliary circuits, which energize the electro-magnet controlling the armature of the opposite line to that completed through the contact point on the said lever.

5. In a telegraph repeater, the combination with the main line, compound electro-magnets therein and armatures controlled thereby, of auxiliary circuits including a winding of said compound electro-magnets therein, and controlling the same armatures, spring levers having insulated contact points thereon adapted to engage the armatures in their movement, and to enable the circuit of the main line to be completed through the armature and contact point, and additional means carried by the spring levers for breaking the auxiliary circuits which energize the electro-magnet controlling the armature of the opposite line to that completed through the contact point on the said lever, and spring regulating means for the spring lever.

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

CHARLES EDWARD DAVIES.

Witnesses:

RUSSEL S. SMART,

J. H. GLEN.