

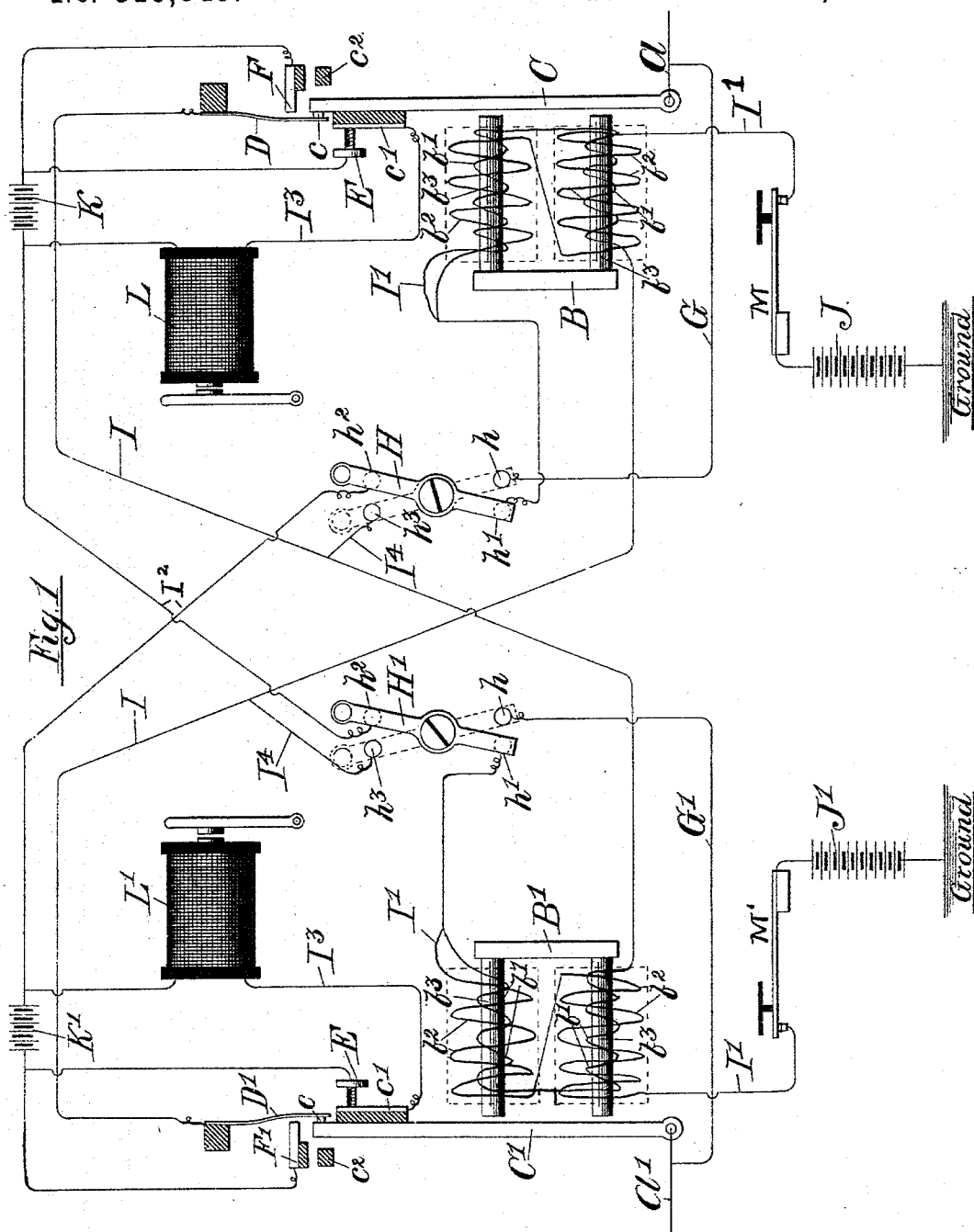
(No Model.)

2 Sheets—Sheet 1.

W. E. SLOAN.
TELEGRAPH REPEATER.

No. 515,845.

Patented Mar. 6, 1894.



Witnesses:

W. Graham
Louis M. F. Whitehead.

Inventor

William E. Sloan.

By Dayton, Pooled & Brown

Attys

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Fig. 2.

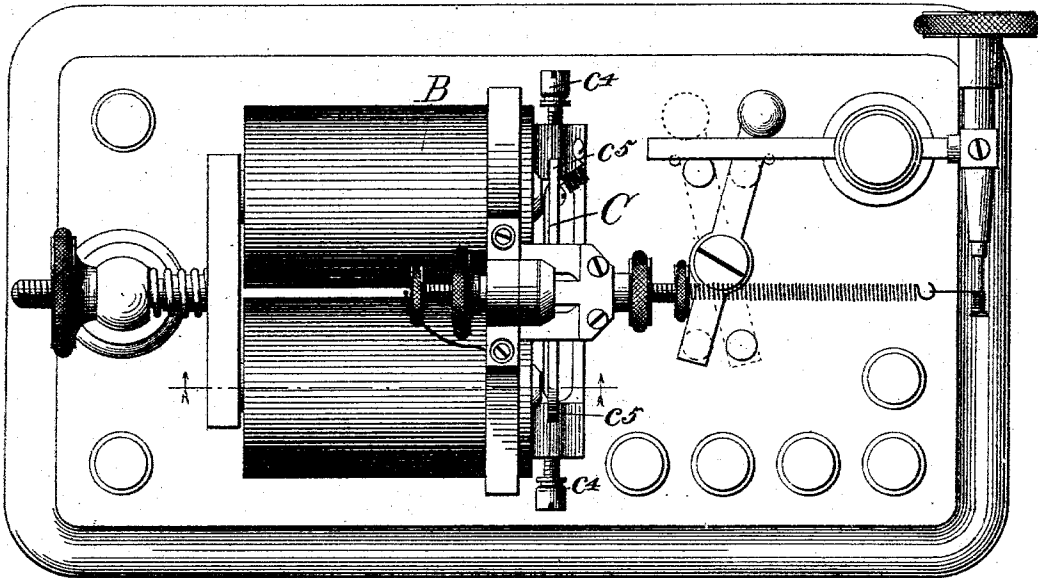
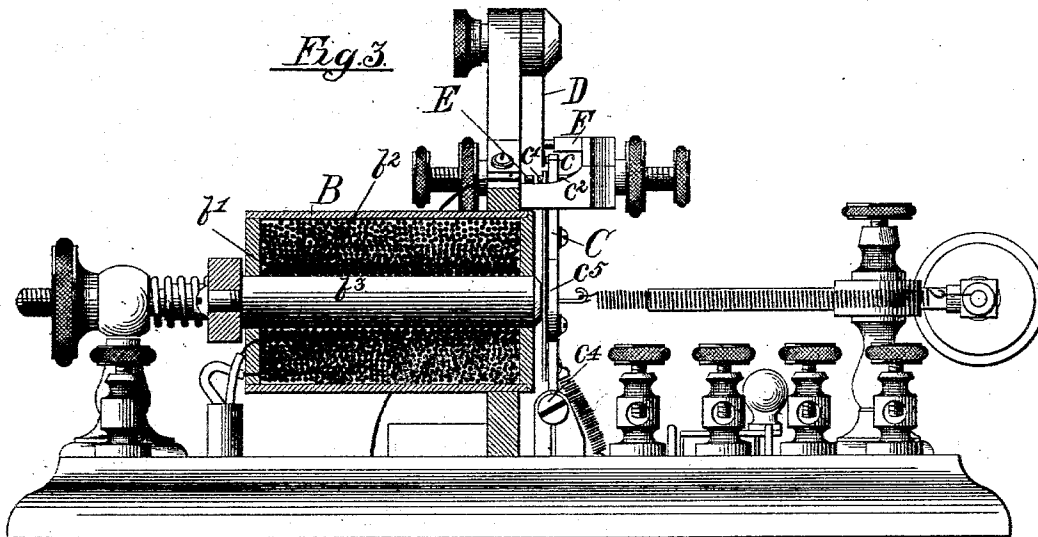


Fig. 3.



Witnesses:

W. Graham.
Louis H. L. Whithead

Inventor.

William E. Sloan.

By Dayton, Pool & Brown
Attys.

UNITED STATES PATENT OFFICE.

WILLIAM E. SLOAN, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO
CHARLES A. KNIGHT, OF SAME PLACE.

TELEGRAPH-REPEATER.

SPECIFICATION forming part of Letters Patent No. 515,845, dated March 6, 1894.

Application filed July 14, 1893. Serial No. 480,512. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. SLOAN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in Telegraph-Repeaters; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon,
10 which form a part of this specification.

This invention relates to telegraphic instruments, and more especially to automatic repeating instruments, or those by which signals may be transmitted automatically from
15 one electric circuit to another in either direction.

The invention includes both improvements in repeating instruments proper, and also in devices used in connection with the repeating instruments to make a complete apparatus for repeating, receiving and transmitting.
20

The invention consists in certain novel features, combinations and arrangements of parts as hereinafter set forth and more particularly pointed out in the appended claims.
25

The invention may be more readily understood by reference to the accompanying drawings, in which—

30 Figure 1 is a diagrammatic view illustrating the arrangement of parts in accordance with my invention. Fig. 2 is a top plan view of one of a pair of instruments adapted to carry out my invention. Fig. 3 is a side elevation, with parts in section, of the same.

35 In the diagram, A and A' designate the main or line wires of two electric circuits over which messages are received, transmitted, or repeated from one to the other, as the case may be.
40

B and B' designate the electro magnets of the receiving instruments, of which latter a pair constitutes a set. These electro-magnets B B' are of peculiar construction, each consisting of the usual core b^3 , about which is wound an inner coil b' of relatively few turns
45 and small resistance and an outer coil b^2 of many turns and greater resistance, the coils being so connected that when in circuit with the main lines, which are usually relatively
50 weak, both coils will be brought into action,

while when in circuit with the local batteries the inner coils only will be brought into action or in circuit.

C and C' are armature levers operated by 55 the electro-magnets B and B' respectively, and adapted by their movements to make or break electric circuits as hereinafter described. These armatures are in the present instance each provided with two contact
60 points c and c' , the former c being in electrical circuit with the main body of the lever, while the latter is insulated therefrom, and both being adapted for contact with oppositely arranged contact points or pieces D D'
65 and E E' when the electro-magnets B and B' are energized. An insulated back contact or stop c^2 serves to limit the backward movement of the armature levers.

The contact pieces D D' are made in the 70 form of strips or tongues of spring metal so arranged as to be forced out of their natural position by the contact points c , and adapted to spring back against back contact pieces F F' when the armature levers are at the backward limit of their movement. 75

The connections forming the main and local circuits are as follows: The armature levers C C' are connected directly with the line wires A A'. A branch line G and G' also
80 leads from each main line wire to the contact points h h' of switches H H'. From the contact piece D a conductor I leads to the electro-magnet B' of the other instrument and is connected with the inner coil b' thereof,
85 and from thence leads to the contact point h' of the switch H'. From a point on the wire I between the electro-magnet B' and the contact point h' of the switch H', a wire I' leads to a second coil b^2 of the electro-magnet
90 B' and from thence to a main battery J' and to the ground. From the contact point h^2 of the switch H' a wire leads to a local battery K, and from thence back to the contact piece F of the first instrument. Similarly, a wire
95 I leads from the contact piece D' to the coil b' of the electro-magnet B and back to the contact point h' of the switch H, while a wire I' leads from a point between the magnet and said switch back to and is connected
100 with the outer coil b^2 of the magnet B and from thence to a main battery J and to the

ground. A conductor I^2 leads from the contact point h^2 of switch H to a local battery K' and from thence back to the contact piece F' . From the insulated contact pieces c' of each instrument a conductor I^3 leads to sounders L and L' respectively, from the sounders to the local batteries K and K' respectively, and from thence back to the contact pieces E and E' of the respective instruments. A wire I^4 connects the fourth contact point h^3 of each switch H and H' with the wire I of its own instrument, all as clearly shown in the diagram.

When connected and arranged as above described, the main and local circuits will be as follows: The main circuit from line A will be through armature lever C, contact point c, tongue D, conductor I, inner coil b' of magnet B', back through outer coil b^2 , thence to battery J' and to ground. Upon the backward movement of the armature lever C, the local circuit will be from local battery K through contact pieces F and D, conductor I, through inner coil of magnet B', switch H' and back to local battery K. Inasmuch as the instruments are interconnected in exactly the same correlation with each other, the main and local circuits from line A' will be exactly the same through corresponding parts of the opposite instrument.

When connected as above described and with the switches in the positions shown in full lines in the diagram, the instruments will operate both as automatic repeaters to transmit signals from either main line to the other, and as relays to open and close the local circuits operating the sounders, while at the same time their arrangement is such as to allow the operator at the local station to open either main circuit for the purpose of sending a message without possibility of interfering with the other main line circuit and without possibility of his own circuit being broken. Normally the main line circuits are closed and the armature levers C and C' stand in the position shown in the diagram. If now the circuit of which line A forms a part be broken, the electro magnet B' will become demagnetized and the armature will be drawn back, the spring contact strip D' following it back until the latter strikes the piece F' thus closing the circuit through the local battery K' at the instant the circuit through the armature C' is broken. The effect of closing the local circuit through battery K' is to keep the magnet B energized notwithstanding the main circuit there-through has been broken by the backward movement of the armature lever C', with the result of retaining the armature C in its forward position. The signal is thus repeated from line A to line A'. Meanwhile, the dropping back of the armature C' breaks the circuit through contact points c' and E', the sounder L' and local battery K', thus operating the sounder. Upon again closing the circuit through the main line A the magnet

B' becomes energized and the armature C' and sounder L' resume their normal positions.

Inasmuch as the instruments are interconnected in the same manner, a signal from line A' will be automatically repeated to line A and sounder L in precisely the same manner as above described.

For the purpose of sending signals from the local station over either line A or A', keys M and M' are provided, and the operation of the instruments in sending a message will be as follows: Assuming that a message is to be sent over line A, the operator breaks the circuit with key M, the magnet B loses its energy and the armature C is drawn back, thus transmitting the signal over line A and at the same time closing the circuit from local battery K through the magnet B', thereby retaining the armature C' in its normal or closed position and preventing the circuit over which the message is being sent from being broken except as may be necessary for the transmission of a return signal to the operator who is sending the message.

By changing the position of switches H and H' to the position shown in dotted lines, the instruments are no longer adapted to repeat from one line to the other, but become simply receiving relays, operating their respective sounders, while their operation in sending a message from the local station will be the same.

It will be observed that the sounders L L' are located in auxiliary circuits the omission of which will not in the least interfere with the operation of the instruments as automatic repeaters, and said sounders may therefore be dispensed with when desired, in which case the contact points c' of the armature levers C C' may also be omitted.

From the above description it will be obvious that my invention may be carried into effect in various ways, as, for instance, the repeaters may, by the employment of suitable connections and parts, be combined in the form of a single instrument, but as a preferred form I have shown in Figs. 2 and 3 an instrument forming one of a pair of repeaters adapted for carrying out my invention. Referring to said figures, B is the electro-magnet, mounted on a suitable base in properly insulated supports. C is the armature lever which is vertically arranged and pivotally supported at its lower end between pivot screws $c^4 c^4$, and is provided with the usual cross arm c^5 forming pole-pieces adapted to be attracted by the magnet B when the latter is energized. The armature C is provided with two front contact points $c c'$, the former of which is in electrical circuit with the main body of the armature lever and is adapted for contact with a depending spring strip or tongue D, and the latter c' being insulated from the body of the armature and adapted to strike a contact piece E when the lever C is in its forward position. An insulated back contact point or stop c^2 serves to limit the backward move-

ment of the lever C, while the depending tongue is so arranged as to spring back or follow the lever C in its rearward movement until it engages a back contact point F, when the lever C continuing in its backward movement breaks contact with the tongue D and rests against the insulated stop c^2 . These contact points against which the armature lever strikes are all formed on or are supported by the main yoke or frame which surrounds and supports the back end of the electro-magnet, the points E and F being in electrical circuit with said frame, while the upwardly extending part or standard which supports the tongue D is insulated from said yoke or frame. The magnet B (shown in longitudinal section in the drawings, Fig. 3) contains two coils, as hereinbefore described, the inner coil being shown as made of larger wire than the outer coil. The means for adjusting the various parts are all of common construction, as clearly shown in the drawings, and need not, therefore, be herein particularly described. The binding posts, switch and connecting wires shown are also of the usual kind and the various connections will be readily understood by reference to the diagram, Fig. 1.

I claim as my invention—

1. A duplex automatic repeater, comprising two electro-magnets and armatures therefor the movements of which operate to open and close main and local circuits, said electro-magnets each being provided with two sets of coils, both of which are in the main circuit

when the latter is closed, and one only of which is in circuit with the local battery when the main circuit is open, substantially as described.

2. A duplex automatic repeater, comprising electro-magnets, as B B', each having two sets of coils in the main line, armature levers, as C C', movable contact pieces, as D D', contact points, as F F', local batteries, and conductors, as A A' I I I' I' I² I², interconnected and operating substantially as set forth.

3. A duplex automatic repeater, comprising electro-magnets, as B B', each having two sets of coils in the main line, armature levers, as C C', movable contact pieces D D', contact points, as F F', switches, as H H', local batteries, and conductors, as A A' I I I' I' I² I² and I⁴ I⁴, interconnected and operating substantially as described.

4. A duplex automatic repeater and relay, comprising electro-magnets, as B B', each having two sets of coils in the main line, armature levers, as C C', movable contact pieces, as D D', contact points, as E E' F F', switches, as H H', local batteries, sounders, as L L', and conductors, as A A', I I I' I' I² I² I³ I³ and I⁴ I⁴, interconnected and operating, substantially as set forth.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

WILLIAM E. SLOAN.

Witnesses:

C. CLARENCE POOLE,
G. W. HIGGINS, Jr.