

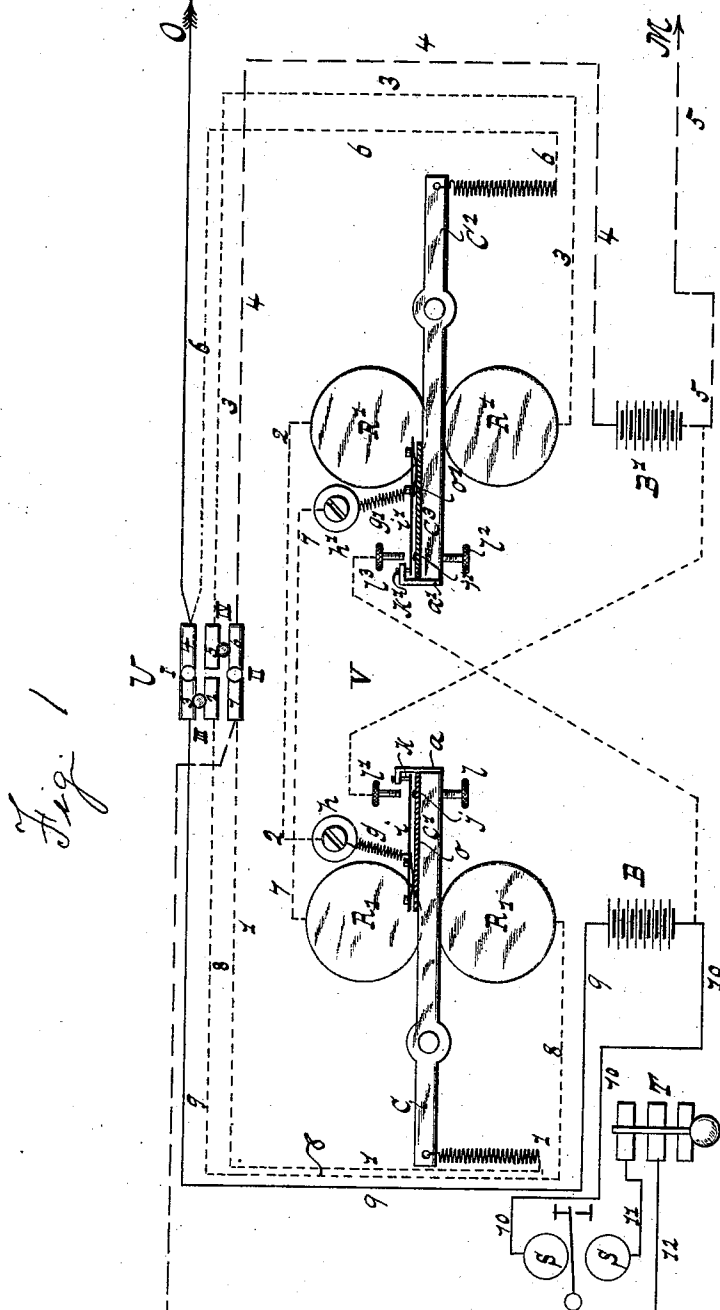
(No Model.)

2 Sheets—Sheet 1.

J. KÖLZER.
TELEGRAPH REPEATER.

No. 376,661.

Patented Jan. 17, 1888.



WITNESSES:

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William Miller

INVENTOR:

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BY
Van Santvoord Hauff
ATTORNEYS

(No Model.)

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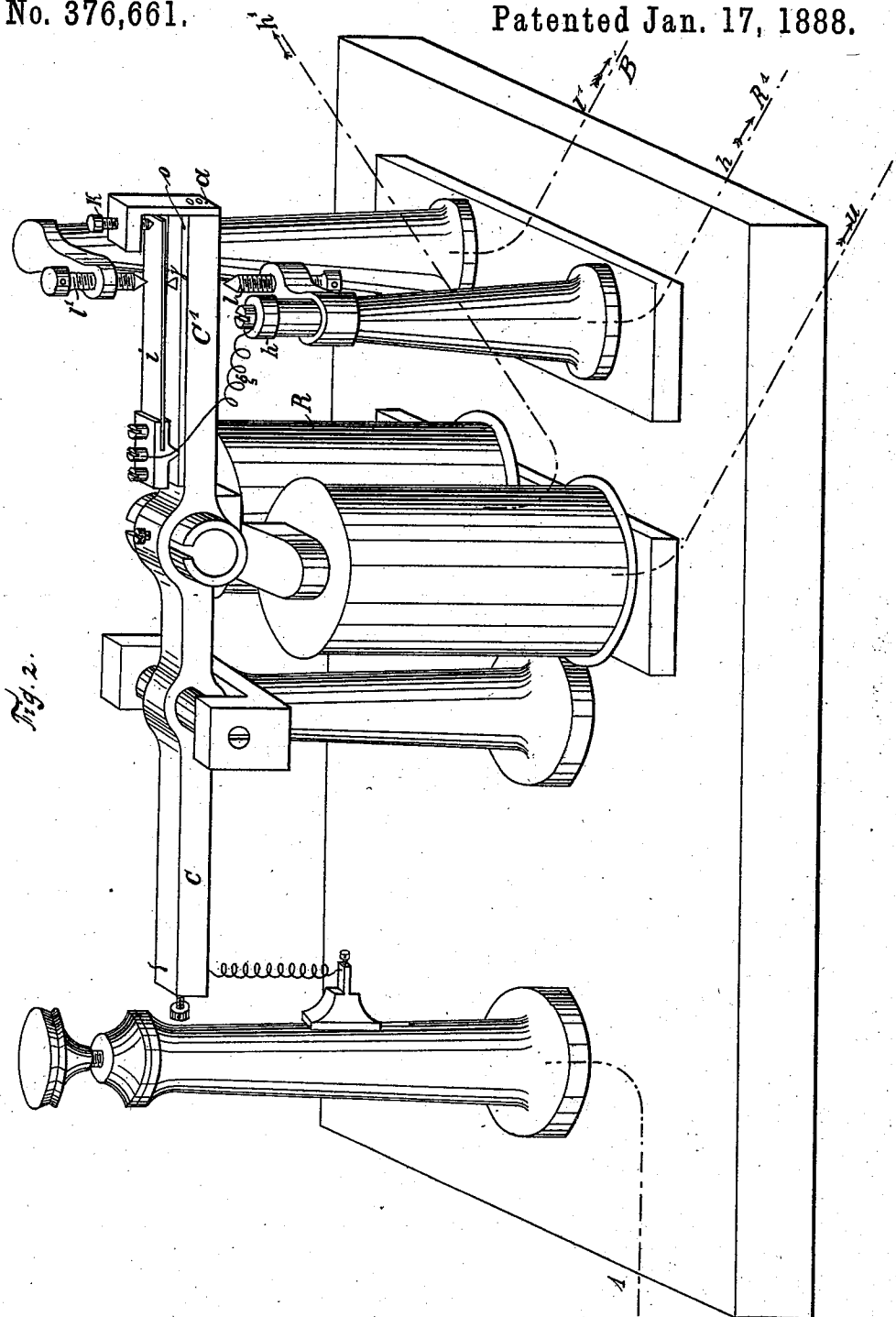


Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

JOSEPH KÖLZER, OF DUISBURG, PRUSSIA, GERMANY.

TELEGRAPH-REPEATER.

SPECIFICATION forming part of Letters Patent No. 376,661, dated January 17, 1888.

Application filed April 8, 1886. Serial No. 198,270. (No model.) Patented in Germany May 31, 1884, No. 30,517; in France June 10, 1884, No. 162,342; in Belgium June 11, 1884, No. 65,449; in England June 14, 1884, No. 8,990; in Italy June 30, 1884, XXXIII, 467; in Sweden October 17, 1884; in Austria-Hungary November 13, 1884, 34/2,236 and XVIII/2,218; in Spain November 15, 1884, No. 441; in Norway December 4, 1885, and in Denmark January 12, 1886, No. 993.

To all whom it may concern:

Be it known that I, JOSEPH KÖLZER, a subject of the King of Prussia, residing at Duisburg, in the Kingdom of Prussia, German Empire, have invented new and useful Improvements in Telegraphic Apparatus, (for which I have obtained patents as follows: in Great Britain, No. 8,990, dated June 14, 1884; in Belgium, No. 65,449, dated June 11, 1884; in France, No. 162,342, dated June 10, 1884; in Germany, No. 30,517, dated May 31, 1884; in Spain, No. 441, dated November 15, 1884; in Italy, XXXIII, 467, dated June 30, 1884; in Austria-Hungary, 34/2,236 and XVIII/2,218, dated November 13, 1884; in Norway, without number, dated December 4, 1885; in Denmark, No. 993, dated January 12, 1886, and in Sweden, without number, dated October 17, 1884,) of which the following is a specification.

My invention relates to improvements in telegraphic apparatus whereby messages can be transmitted from stations in one main line to stations in a second main line.

In carrying out my invention I make use of relays of special construction, such as are described in my prior application filed August 14, 1884, Serial No. 140,597, an arrangement of circuit-closing keys, registers, a novel commutator, and connections between the main lines, whereby the above-mentioned result is accomplished, all of which is more fully pointed out in the following specification and claim, and illustrated in the accompanying drawings, in which—

Figure 1 represents a plan view of the operating parts and connections; and Fig. 2 is a perspective view, on a larger scale than the preceding figure, of a relay.

In the drawings, the letters M N and O W respectively designate the two main lines. V is the central or connecting station. R and R' are the relays thereof. S is a register. B B' are the batteries in the lines. T is a finger-key of the connecting-station V, and U a commutator, all arranged as shown.

The armature-lever C of the relay R is provided with an extension, C', having thereon a head-piece, *a*, which projects upward and is bent over to form a hook, on the end of which

is a downwardly-extending contact, *k*, which may be a small metal screw.

i is an elastic steel spring or arm, which is secured by small screws to the armature-lever C C', but is separated therefrom by a plate or layer, *o*, of an insulating material. When in its normal position, the free end of the spring-arm *i* bears against the contact *k*, so that the circuit is closed. *l* and *l'* are the contacts or stops, the latter having an insulated point. *j* is a button or stud, which projects from the insulating-layer *o* and forms a stop for the spring-arm *i*, so that the entire surface of the latter cannot bear upon the insulating-layer. The spring-arm *i* is connected, by a spiral spring, *g*, to a binding-post, *h*, insulated from the relay R, and the said spring is made of very thin wire, so that it can yield to the movement of the armature-lever C without retarding the said motion.

The armature lever C' of the relay R' is constructed and arranged as the armature-lever of the relay R, just described. By the use of these two Morse relays, or by two polarized relays similarly constructed, in combination with suitable connections, the sideward connection of the two main-line circuits O W and M N approaching one another is effected. A part of the line-battery is short circuited, so that no special local battery is necessary. The position of the point of connection of the main line depends only on the reciprocal position of the circuits to be united, and must be so chosen, if possible, that the circuits are divided into equal parts. By this sideward connection of the two main lines is simultaneously produced both the possibility of a sideward transmission from a main-line circuit to a main-line circuit and the lengthwise transmission from a main-line circuit to a main-line circuit. The first is accomplished by separating at the point of connection one branch of one of the main circuits and conducting said branch to the ground, and the latter is accomplished if at the point of connection the easterly branch of one main-line circuit and the westerly branch of the other line-circuit are conducted to the ground.

The two main lines M N and O W are connected with each other at the central station,

V, and for transmitting a message—say from a station in the main line M N to the main line O W—the holes III and IV of the commutator U are plugged, and to disconnect the lines the plugs are removed from holes III and IV and inserted in holes I and II. In the latter case the batteries B B' remain in the line circuit. When the holes III and IV of the commutator U are plugged, as before stated, to throw the main lines in communication with each other, and all the finger-keys are in their normal or open position, the current in the line-circuit M N takes the following course: from a point, N, in the line to commutator U, over plate 1 thereof to wire 1, through armature-lever C of relay R, contact *k*, spring-arm *i*, spring *g*, binding-screw *h*, the coils of relay R', through wire 2, and back to plate 5 of the commutator, through the medium of wire 3. From plate 5 the current passes over plugged hole IV to plate 6, and from thence to one pole of the battery B' through wire 4, and continues in the circuit M N along wire 5, while from the other pole of the battery B the current flows in a direction from point O in the line O W to plate 4 of the commutator U, over plate 4, through wire 6 to the armature-lever C' C' of the relay R', through contact *k'*, spring-arm *i'*, spring *g'*, binding-post *h'* to relay R', through the wire 7. The current passes through the coils of this relay and returns to the commutator through wire 8, which is connected with plate 2, and then over plate 2, plugged hole III, plate 3, through wire 9 to one pole of battery B, through wire 10 to the register S, through wire 11 to the finger-keys T, and continues in the line O W along wire 12.

If a key is depressed in any station on the line M N, the writing or registering instruments in all the stations on the line O W are actuated. For instance, if at the station V a finger-key is depressed, all the armature-levers of the receiving-instruments in the circuit O W fall off, the armature-lever of the relay R at station V is attracted, and closes first, by means of spring-arm *i* and stop *l'*, the local circuit of battery B' to relay R', so that the position of the armature-lever C' C' of the latter remains unchanged from the position shown in the drawings, and only after this can the current pass through the contact *k* to spring-arm *i*, whereby the current is broken in line-circuit M N. All the instruments in the stations on the main lines M N and O W are consequently set in operation. When the finger-key at the station V is released and thereby thrown out of contact, the current is re-established in the main line O W, as the contact through *i'* *k'* at relay R' had not been broken previously. The armature-lever C C' returns to its normal position, whereby the circuit M N is first closed by contact *k* and spring-arm *i*, and the local current through spring-arm *i* and stop *l'* is broken. If it be conceived that the branch

M of the circuit M N is separated and conducted to the ground at the station V, I have in the remaining lines of the circuit O W and N a sidewise translation from a main line, O W, to a main-line current, N.

If the branches M and W of the two main lines M N and O W are separated at station V and grounded, I have in the remaining line, O N, the lengthwise translation from a main-line circuit to a main-line circuit. The Morse or polarized relays previously described can be replaced by Morse registers, the anchor-levers of which are constructed in a similar manner as those of the relays. The registers in this case perform both the function of writing and transmitting.

The commutator used and necessary in the above described arrangement consists of a base and six plates, 1, 2, 3, 4, 5, and 6, and plates 3 and 4 are separated by a hole, I, plates 1 and 6 by a hole, II, plates 2 and 3 by a hole, III, and plates 5 and 6 by a hole, IV. The holes separating plates 3 and 4 and plates 1 and 6 lie between the ends of the plates, and the holes separating the plates 2 and 3 and 5 and 6 lie between the sides of the plates. Plugs are always situated either in holes I and II or in holes III and IV, as described.

I have in my application for patent, Serial No. 140,597, filed August 14, 1884, and in my Patents No. 311,330, dated January 27, 1885, and March 9, 1886, No. 337,590, shown telegraphic apparatus whereby messages can be transmitted from a remote station in a main line to a remotestation in a branch line, from a remote station in a branch line to a remotestation in a main line, and also from a station on a branch line to a home or receiving station that has been disconnected from a main line.

The present invention differs from the above so far as the special arrangement of the circuits and form of the commutator is concerned, and relates altogether to the means whereby messages can be transmitted over two wires.

What I claim as new, and desire to secure by Letters Patent, is—

In a telegraph apparatus, the combination, with the two main-line circuits O W and M N and the batteries B B' included therein, of the relays R R', constructed as described, and the commutator U, having six plates, four holes, and two plugs, and circuit-wires connected with the relays and main-line circuits, whereby the latter can be united or separated, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH KÖLZER.

Witnesses:

WALTER H. SCHULZ,
CARL BADE.