No. 786,901. PATENTED APR. 11, 1905.

J. C. HUBINGER.

TELEPHONE EXCHANGE SYSTEM.

APPLICATION FILED APR. 18, 1904.

Fig. 1.

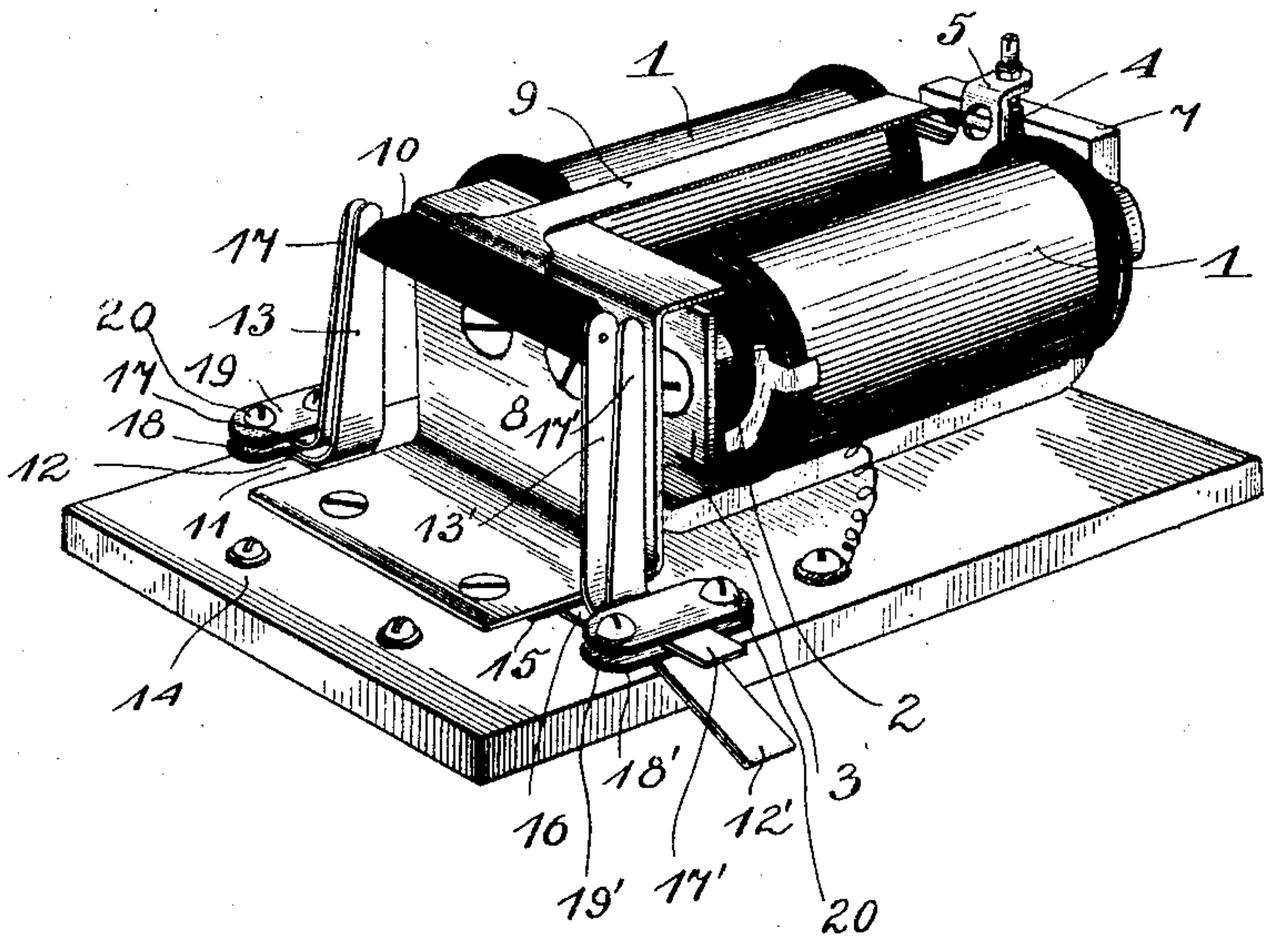
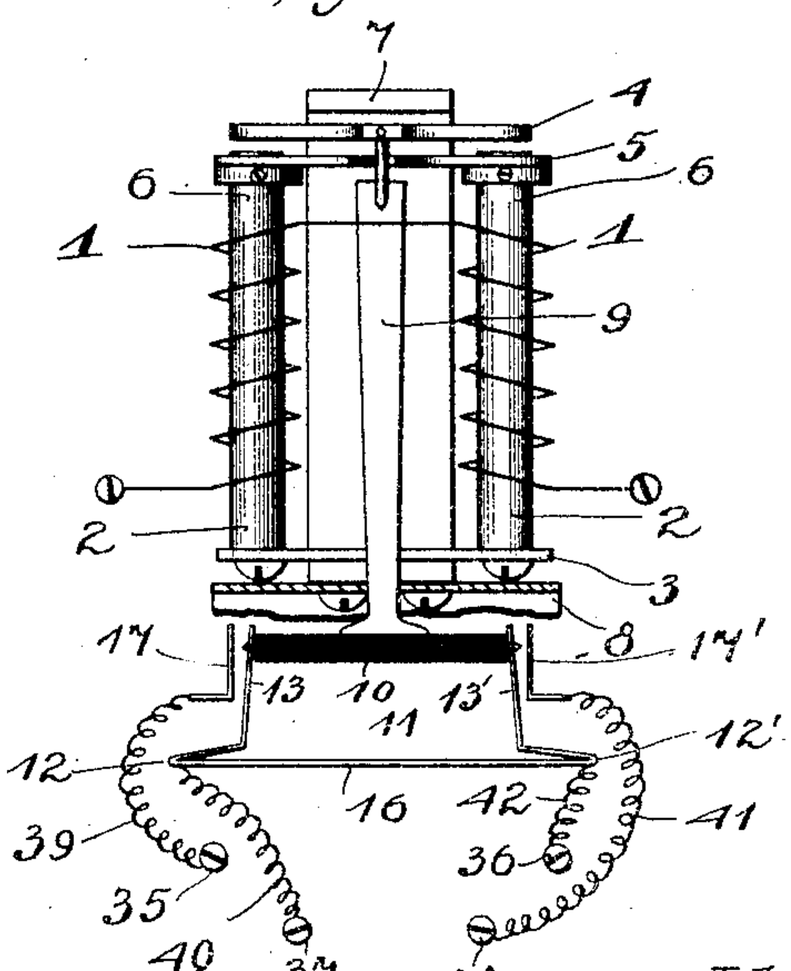


Fig. 2.



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No. 786,901. Patented April 11, 1905.

UNITED STATES PATENT OFFICE.

JOHN C. HUBINGER, OF KEOKUK, IOWA.

TELEPHONE-EXCHANGE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 786,901, dated April 11, 1905.

Application filed April 18, 1904. Serial No. 203,573.

To all whom it may concern:

Be it known that I, JOHN C. HUBINGER, a citizen of the United States, residing a Keokuk, in the county of Lee and State of Iowa, have invented a certain new and useful Improvement in Circuit-Changing Apparatus, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to multiparty-line telephone-exchange systems; and its object is to provide improved substation selective apparatus and improved arrangement of substation-circuits. To accomplish this, I provide a polarized relay at each substation of novel construction. Polarized relays heretofore employed have been actuated by pulsating current, the armature thereof being usually spring-adjusted to allow it to respond to a current of a certain polarity. This spring adjustment is very inefficient and unreliable and must be continually regulated owing to the varying conditions of the atmosphere. The relay of my invention is adapted for actuation by direct currents, the relays at all the substations being identical. The armature of each relay is provided with an arm, which, depending upon the polarity of the current through the relay-winding, is moved either to the right or left to close a local signal-circuit containing a rheotome-bell. The normal position of the armature is such as to leave all contacts open, which minimizes the danger due to lightning or other disturbances.

Certain novel features of construction of my improved relay and the connection thereof with their substation apparatus may be more clearly understood by referring to the accompanying drawings, in which—

Figure 1 is a perspective view of the relay employed, and Fig. 2 is a diagrammatic view showing the relative arrangement of the relay parts.

The relay is provided with windings 1 1, disposed on cores 2 2, connected by a yoke 3. An armature 4 is pivoted in the non-magnetic frame 5, secured to the pole ends 6 6. A permanent magnet 7 is secured to a support 8 and serves to polarize the relay in the usual manner. An arm 9 is secured to the armature at its pivot-axis and extends forwardly, being secured at its front end to a transverse actuating-bar 10, preferably of insulating material. A frame 11 is preferably formed of conductive spring sheet material and is bent into a shape, as best shown in Fig. 2. This frame is substantially U-shaped, the corners of the same, however, being folded together, as shown, to form terminals 12 and 12′. The frame is held in position so that the limbs 13 and 13′ thereof engage at their extremities with the ends of the contact-bar 10. The frame is preferably clamped between the support 8 and the mounting-block 14, being insulated therefrom, however, which may be done by interposing a sheet 15 of insulating material between the support 8 and the yoke part 16 of the spring-frame 11. The limbs 13 13′ serve as contact-springs and normally serve to maintain the armature-arm in a central position and also to break contact with their associated contact-springs 17 and 17′. The springs 13 and 13′ may be insulated from their associated springs 17 and 17′ in any well-known manner. I have shown clamping-plates 18 and 18′ of insulating material disposed, respectively, between the terminals 12 and 17 and the terminals 12′ and 17′, while plates 19 and 19′, also of insulating material, are disposed over the springs 17 and 17′, respectively, the screws 20 20 serving to clamp the plates and the springs firmly in place, the springs and terminals being thus also insulated from each other by means of these plates. Thus the energization of the relay by current of one polarity will move the armature and the contact-bar to cause engagement between the springs 17 and 13, while energization of the opposite polarity will cause the contact-bar to move in the opposite direction to engage the springs 13′ and 17′, and, as before stated, under normal conditions the springs will be out of contact and the contact-bar will be maintained in a central position.

Each relay is provided with terminals 35, 36, 37, and 38. Conductors 39 and 40 are respectively permanently connected to the contact-springs 17 and terminals 12, the ends of these

conductors being intended for interchangeable connection with the terminals 35 and 37. Conductors 41 and 42 are permanently connected, respectively, to contact-spring 17′ and terminals 12′, the other ends of these conductors being intended for interchangeable connection with the terminals 36 and 38 and the circuit to be controlled would be permanently connected to terminals 37 and 38. Thus with the connection shown in Fig. 2 the circuit to be controlled would be closed only upon actuation of the arm 9 toward the right and through the spring 17′, spring 13′, the yoke part 16, terminal 12, and conductor 40. Upon interchanging the conductors 39 and 40 and 41 and 42, however, the controlled circuit would be closed only upon actuation of the arm to the left and through the conductor 42, terminal 12′, yoke part 16, spring 13, spring 17, and conductor 39. The terminals 35 and 36 serve merely as a means for securing the inactive conductors to prevent their interference with other conductors or parts.

It will be seen that the U-shaped member 11 serves various purposes. In the first place the limbs 13 and 13′ thereof serve as contact-springs, at the same time serving to normally maintain the arm 9 in its neutral position. Again, the corners of the U-shaped frame being folded serve as terminals for the conductors 40 and 42, and the yoke part 16 serves both as a mechanical means for rigidly connecting the limbs 13 and 13′ and as a common conductor for the circuit controlled by the relay.

I thus provide a very efficient circuit-controlling relay having a minimum number of parts and a relay which is devoid of delicate adjustments.

I do not wish to be limited to the arrangement and construction as herein outlined, as those skilled in the art may readily make changes without departing from the scope of my invention.

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

1. In a polarized relay, the combination with an armature, of an arm extending therefrom, spring switch members permanently engaging with the end of said arm, one at either side thereof but insulated therefrom, and an associate switch member for each of said spring members, said spring members being normally disconnected from the associate members and serving to retain the arm in a neutral central position, actuation of said armature causing said arm to engage the corresponding spring member with its associated member.

2. In a polarized relay, the combination with an armature, of an arm extending therefrom, a transverse actuating-bar at the end of said arm, an actuating switch-spring engaging each end of said bar, and an associate switch-spring for each actuating-spring, said actuating-springs being normally out of engagement with their associated springs and serving to maintain said arm in a neutral central position.

3. In a polarized relay, the combination with an armature, of an arm extending therefrom, a transverse actuating-bar at the end of said arm, an actuating switch-spring engaging each end of said bar, said actuating-springs being permanently connected together by a conductor, and an associate switch-spring for each actuating-spring, said actuating-springs being normally out of engagement with their associate spring and serving when the relay is de-energized to maintain the armature and arm in a neutral position.

4. In a polarized relay, the combination with an armature, of an arm extending therefrom, a transverse actuating-bar secured to the end of said arm, a U-shaped frame of conductive material, the ends of the limbs of said frame engaging the ends of said actuating-bar, said frame serving to normally maintain said arm in a neutral central position, and a contact associated with each limb but normally out of engagement therewith, attraction of the armature toward either pole of the relay causing said actuating-bar to engage the corresponding limb with its associated contact to close a local circuit controlled by said relay.

5. In a polarized relay, the combination with an armature, of an arm extending therefrom, an actuating-bar secured transversely to the end of said arm, a U-shaped frame of conductive material, the corners of said frame being folded together to form terminals and the ends of the limbs thereof being in engagement with the ends of said actuating-bar, said frame serving normally to maintain said armature and arm in a neutral position, and a contact associated with each limb but normally out of engagement therewith, attraction of said armature toward either pole of the relay causing the actuating-bar to engage the corresponding limb with its associated contact to close a local circuit controlled by said relay.

6. In a polarized relay, the combination with an armature, of an arm extending therefrom, an actuating-bar of insulating material secured transversely to the end of said arm, a U-shaped frame formed of a band of conductive material, terminals for said frame formed by folding the corners thereof together, actuating-springs formed by the limbs of said frame and engaging at their ends with the ends of said actuating-bar, and a contact associated with each actuating-spring, said frame serving to normally maintain said actuating-springs out of contact with the associated contacts and to maintain the armature and arm in a neutral position, movement of said bar in either direction upon attraction of said armature causing the corresponding actuating-spring to engage its associated contact to close a local circuit controlled by said relay.

7. In a polarized relay, the combination with an armature, of an arm extending therefrom, an actuating-bar of insulating material secured transversely to the end of said arm, a U-shaped frame of conductive material, the limbs of said frame forming actuating-springs engaging at their ends with the ends of said actuating-bar, and a contact associated with each actuating-spring but normally out of contact therewith, said frame serving as a common conductor for a local circuit controlled by said relay, actuation of said actuating-bar in one direction upon attraction of said armature causing said local circuit to be closed by the engagement of the corresponding actuating-spring and associated contact, actuation of the cross-bar in the opposite direction causing closure of said local circuit through the other actuating-spring and associated contact, said frame serving normally to maintain said bar in a neutral position and to maintain said actuating-springs out of engagement with the associated contacts.

8. In a polarized relay, the combination with an armature, of an arm extending therefrom, an actuating-bar secured transversely to the end of said arm, a U-shaped frame of conductive material, the ends of the limbs of said frame engaging the ends of said actuating-bar and forming actuating-springs, a contact for each actuating-spring to constitute a switching mechanism therewith, said frame serving to normally maintain said actuating-bar in a neutral position and to maintain the actuating-springs out of engagement with the associated contacts, and a conductor permanently secured to each actuating-spring and each associated contact, the conductors of each switch mechanism being adapted for interchangeable connection with one terminal of a local circuit controlled by said relay, said U-shaped frame forming a conductor for said local circuit.

9. In a polarized relay, the combination with an electromagnet-frame, windings therefor and a permanent polarized magnet all secured to a mounting-block, of an armature, an arm extending forwardly from said armature, an actuating-bar of insulating material secured transversely to the end of said arm, a U-shaped frame formed of a band of conductive sheet material, terminals for said frame formed by the folded corners thereof, said frame being clamped to said mounting-block so that the limbs thereof extend upwardly and engage at their ends with the ends of the actuating-bar, said limbs forming actuating-springs of switching mechanisms, an associate contact-spring for each actuating-spring, means for insulating said frame from said associated springs, connecting terminals for the local circuit controlled by said relay, and a conductor permanently secured to each frame-terminal and associated springs, the other terminal of the conductors of each switching mechanism being adapted for interchangeable connection with one of said connecting-terminals whereby the local circuit may be closed by the engagement of one switching mechanism upon attraction of the armature, said frame serving to normally maintain the actuating-bar and the armature in a neutral position and to maintain the actuating-springs out of engagement with the associated springs, said frame also serving as a common conductor for said local circuit.

In witness whereof I hereunto subscribe my name this 15th day of April, A. D. 1904.

JOHN C. HUBINGER.

Witnesses:

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