

J. P. DOWNS.  
RELAY DEVICE.

APPLICATION FILED MAY 7, 1902.

NO MODEL.

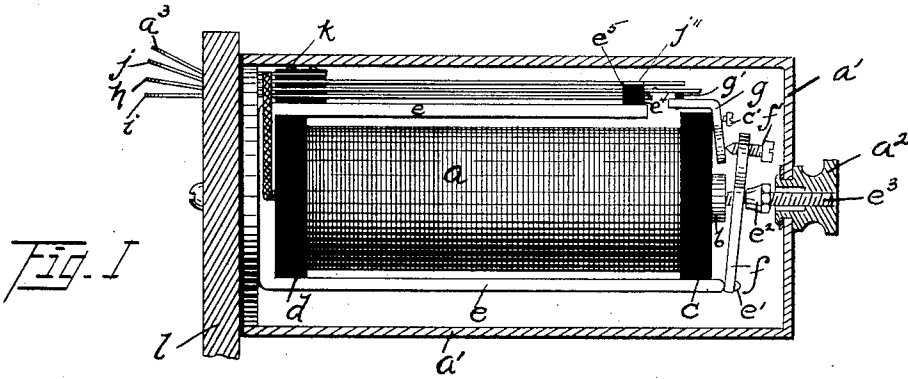


FIG. I

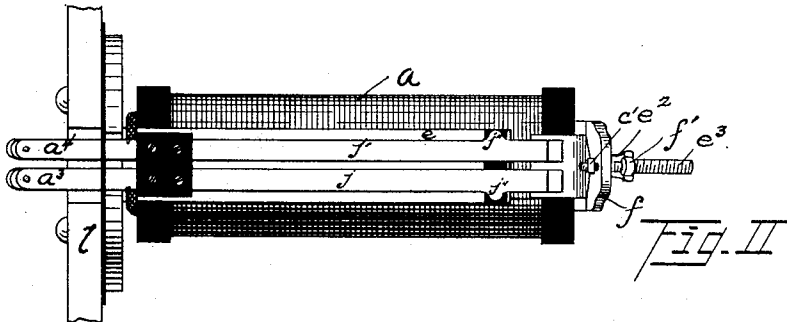


FIG. II

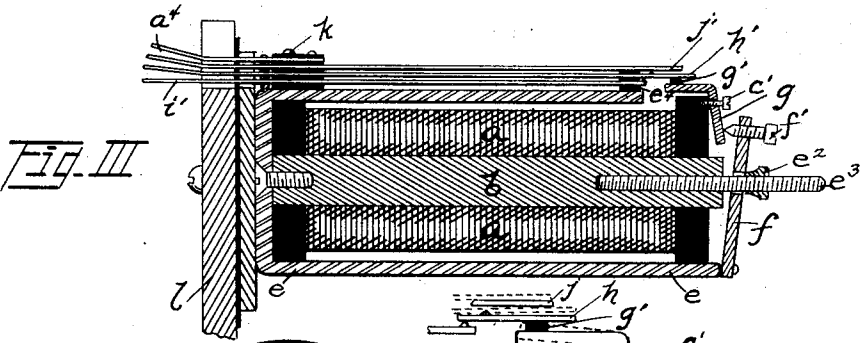


FIG. III

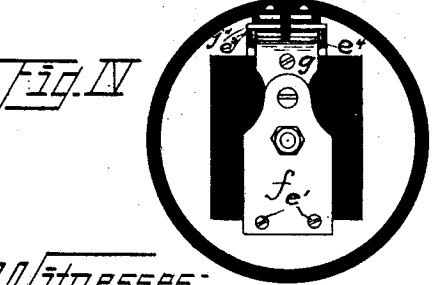


FIG. IV

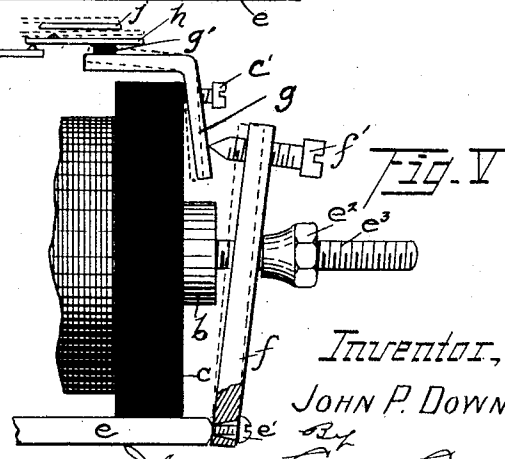


FIG. V

Witnesses:  
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*E. M. Golding*

Inventor,  
 JOHN P. DOWNS,  
 By  
*Albert C. Lawrence,*  
 Attorney.

# UNITED STATES PATENT OFFICE.

JOHN P. DOWNS, OF CLEVELAND, OHIO, ASSIGNOR TO THE NORTH ELECTRIC COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

## RELAY DEVICE.

SPECIFICATION forming part of Letters Patent No. 749,814, dated January 19, 1904.

Application filed May 7, 1902. Serial No. 106,319. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN P. DOWNS, a citizen of the United States of America, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Relay Devices, (Case No. 2,) of which the following is a specification.

My invention relates to improvements in relay devices, and has for its object the provision of a simple and efficient instrument of this class and one affording a wide range of adjustment for the actuating parts.

The embodiment of my invention herein shown and described comprises a straight single-cored electromagnet having a side yoke or polar extension parallel therewith and terminating in the plane of the forward end of the core. Resting upon pins or screws which closely draw it against the rounded terminal face of the said extension is the armature which engages the lower portion of an actuating part or bell-crank lever through the means of an adjusting-screw. The upper portion of said lever extends beneath the actuated springs of the relay and is adapted to raise the same from their normal position when the armature is attracted.

The said device will be more fully explained by referring to the accompanying drawings, wherein—

Figure 1 is a view thereof in side elevation. Fig. 2 is a plan view of the device. Fig. 3 is a vertical sectional view. Fig. 4 is an end view, and Fig. 5 an enlarged detail of the forward end of the relay device embracing the actuating parts.

The same character of reference is employed to designate similar parts throughout each of the several figures of the drawings.

The helix *a* is wound in the usual manner upon the straight core *b*, whose ends extend through front and rear insulating-blocks *c* *d*. A U-shaped polar extension *e*, of soft iron, is screwed to the rear end of the core, its forward end as viewed from the side being slightly rounded to accommodate the oscillation of the armature and the same terminating substantially in the plane of the front end of

said core. The armature *f* is supported from the front end of said extension by means of two screws *e'*, which extend through counter-sunk holes drilled in the lower portion of said armature and draw the same closely against the forward rounded extremity of the polar extension *e*. The armature is thus held in position to be drawn inward by the core *b* whenever the helix is excited by energizing-current. An adjusting-nut *e''*, carried upon the tapped screw *e'*, provides a secondary adjustment for the armature, while a thumb-screw *e'''*, engaging said screw and rotatably mounted in the forward end of the tubular soft-iron casing or shell *a'*, (shown in section in Fig. 1,) permits the ready adjustment and removal of the latter. At the upper end of the armature an adjusting-screw *f'* bears against the lower portion of bell-crank lever *g*, fulcrumed upon the block *c* and held in position by screw *c'*.

Insulating-buttons *g'*, carried upon the upper end of the bell-crank lever, engage the extremities of the actuated springs *h* *h'*, which are mounted above the rear insulating-block *d* immediately over their coacting springs *i* *i'*, with which they rest normally in engagement. Above the springs *h* *h'* are mounted the additional springs *j* *j'*, with which the former may be raised into contact. A U-shaped insulating-block *e<sup>t</sup>*, carried upon the shorter or upper limb of the polar extension *e*, forms a seat in its recessed portion for springs *i* *i'*, while normally supporting the laterally-extending lugs *j''* of springs *j* *j'* upon the elevated extremities *e<sup>s</sup>* of said block. The terminals *a<sup>s</sup>* *a<sup>t</sup>* of the helix *a* are mounted immediately above the said springs *j* *j'*, all of said springs and terminals being rearwardly separated by thin strips of insulating material and clamped to polar extension *e* by the screws *h*.

In practice numbers of these relays are mounted upon a common strip *l*, suitably slotted to accommodate the extremities of the springs, which extend through the slots and are rearwardly divergent, thus permitting their ready connection with the controlling and controlled circuits of the relay. The screws *e'* are adapted to draw the lower portion of the armature against the presented end

of the polar extension, thereby completing the magnetic circuit throughout their widths, while by means of the screw  $f'$  the armature and the bell-crank lever may be adjusted in position normally to permit the springs  $h h'$  to bear upon and establish contact with their coacting contact-springs  $i i'$ . When the helix is excited, therefore, the armature will be drawn inward, and the bell-crank lever, through the medium of the adjusting-screw, will be actuated to raise the springs  $h h'$  out of engagement with their respective contact-springs  $i i'$  and into engagement with their upper springs  $j j'$ , thereby opening and closing the respective circuits controlled by said springs. The armature, it is seen, is maintained in its most effective position to actuate the controlled springs under the influence of a very moderate energizing-current. The range of adjustment of said screw  $f'$ , however, is such that the upper end of the bell-crank lever may be raised sufficiently to carry the springs  $h h'$  out of engagement with the lower springs  $i i'$ , thereby, in effect, disconnecting the controlled circuit from the relay device, and accordingly upon the energization of said relay the effect will be merely to engage the springs  $h j$  and  $h' j'$ , thus closing their controlled circuits, or, on the contrary, by withdrawing screw  $f'$  the upper end of bell-crank lever  $g$  and the actuated springs  $h h'$  may be sufficiently lowered in position upon the relay so that their contact with springs  $i i'$  alone is broken upon the energization of the relay, the springs  $j j'$  being above the line of movement of the actuated springs  $h h'$ .

From the above it will be seen that by means of the adjustment herein provided and above explained the relay device may be rendered extremely sensitive to the flow of an energizing-current, and in addition the control of either the upper or lower set of contact-springs may be thereby effected.

The device described is extremely simple and not at all likely to get out of order and may be readily inspected and adjusted.

The omission or change in the arrangement of the springs herein shown and described may be readily effected to adapt the device to given requirements.

Having now described the preferred embodiment of my invention, I claim as new, and desire to secure by these Letters Patent, the following:

1. In a telephone-relay device, the combination with a helix-wound core having a polar extension, of an armature mounted upon said polar extension in position to be actuated by the core, an intermediate lever part  $g$ , parallel contact-springs adapted to be moved into and out of engagement by said part  $g$ , and a screw adjustment interposed between said armature

and part  $g$ , controlling the operative movement of the latter under the influence of the armature, substantially as set forth.

2. In a relay device, the combination with a helix-wound core, of a polar extension, an armature engaging therewith and disposed before the core, an interposed actuating part, a plurality of contact-springs adapted to be actuated into and out of engagement with each other, and adjusting means interposed between the armature and said actuating part, substantially as set forth.

3. In a relay device of the class described the combination with a helix-wound core of its polar extension lying substantially parallel therewith and terminating in practically the plane of the forward end of said core, an armature mounted upon the forward end of said polar extension and magnetically engaging the same, an actuated part  $g$ , a plurality of contact-springs, and adjusting means interposed between the armature and actuated part substantially as set forth.

4. In a telephone-relay device the combination with a helix-wound core, of a polar extension, an armature mounted before the same and adapted to be actuated by the core upon its excitation, an actuated part  $g$ , a plurality of contact-springs adapted to be moved into and out of electrical engagement by the said part, and an adjusting-screw interposed between the armature and said actuated part whereby their operative position may be regulated substantially as set forth.

5. In a telephone-relay device the combination with a helix-wound core of its U-shaped polar extension terminating in a slightly-rounded face substantially in the plane of its forward end, an armature secured thereto and engaging the same throughout their widths, an actuated part  $g$ , a plurality of contact-springs, and a screw  $f'$  providing an adjustment between the armature and the actuated part substantially as set forth.

6. In a telephone-relay device the combination with a helix-wound core of its polar extension  $e$ , an armature  $f$  mounted upon the end of said polar extension before the core, a bell-crank lever  $g$ , an adjusting-screw  $f'$  disposed in the armature and bearing against the lower portion of the bell-crank lever, and a plurality of contact-springs adapted to be actuated into and out of electrical engagement through the medium of the bell-crank lever substantially as set forth.

Signed by me, in the presence of two subscribing witnesses, at Cleveland, Ohio, this 30th day of April, A D. 1902.

JOHN P. DOWNS.

Witnesses:

CHARLES S. BEARDSLEY,  
ALBERT LYNN LAWRENCE.