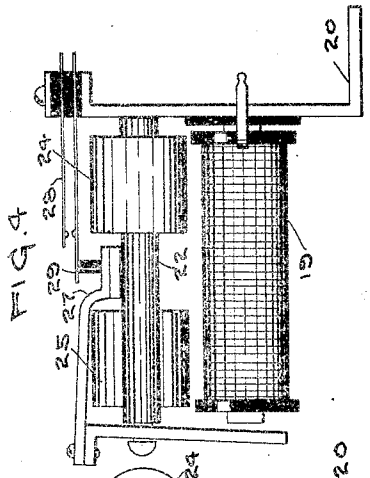
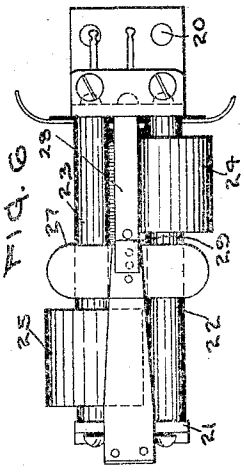
J. ERICKSON.

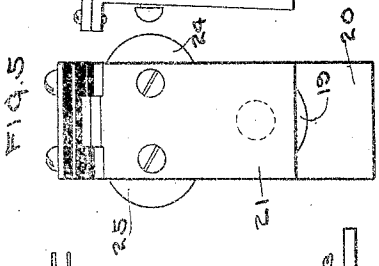
RELAY.

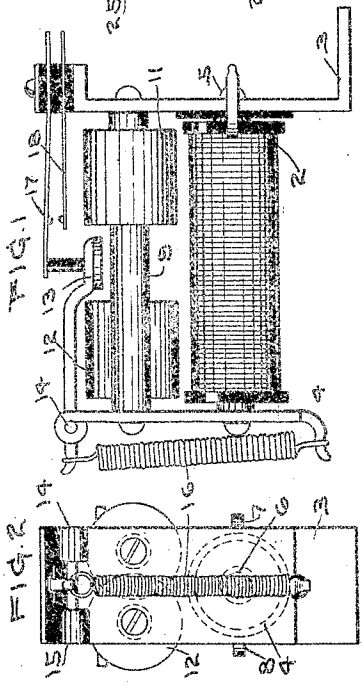
APPLICATION FILED AUG. 9, 1919.

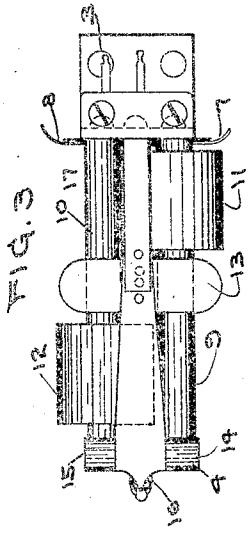
1,342,256. Patented June 1, 1920.











Inventor
John Erickson
By Fales Atty.

UNITED STATES PATENT OFFICE.

JOHN ERICKSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO AUTOMATIC ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

RELAY.

1,342,256. Specification of Letters Patent. Patented June 1, 1920.

Original application filed December 8, 1917. Serial No. 206,318. Divided and this application filed August 9, 1919. Serial No. 316,536.

To all whom it may concern:

Be it known that I, JOHN ERICKSON, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Relays, of which the following is a specification.

My invention relates to electromagnetic circuit closing devices, and more specifically to a relay for closing any kind of a circuit.

This application is a division of my application Serial No. 206,318, filed December 8, 1917. The feature which I desire to patent in this division is that of a relay such as shown in Figure 1 of the drawings.

One of the objects of my invention is to provide a relay which may be connected in circuit with sources of either alternating or direct current and which may be arranged to operate with the direct current only, or which may operate in a particular manner with both alternating current and direct current.

Another object of my invention is to provide a relay which utilizes the Wheatstone bridge principle as applied to magnetic flux rather than to electric current and in which the armature of said relay forms the bridge across the arms of a Wheatstone bridge corresponding to the receiver or galvanometer bridge.

Another object of my invention is to provide a relay which may be connected in circuit with a direct current and which will attract its armature momentarily when the circuit is closed and again only momentarily when the circuit is broken.

Other features and objects of my invention will be pointed out in the specification by referring to the accompanying drawings in which—

Fig. 1 shows one form of my improved relay.

Fig. 2 is an end view of the relay shown in Fig. 1 taken from the left of said figure.

Fig. 3 is a top view of the relay in Fig. 1.

Fig. 4, shows another form of my improved relay, and Figs. 5 and 6 are, respectively, an end view and a top view of the relay shown in Fig. 4.

I will now describe my invention more in detail. Referring to Figs. 1, 2 and 3, I have shown a coil 2 mounted upon an iron mounting bracket 3 at one end by means of the screw 5, and having another iron pole piece 4 firmly secured to the other end thereof by means of the screw 6. The coil 2 has a pair of terminals 7 and 8 to which any desired circuit may be connected. Firmly mounted between the upper extending ends of the brackets 3 and 4 are a pair of parallel soft iron cores or rods 9 and 10, which are secured by iron screws to the two brackets 3 and 4. On the right hand end of the core 9 is firmly attached a copper slug 11 and on the left hand end of the core 10 is secured another copper slug 12. These two copper slugs are mounted far enough apart to leave space for the armature 13 which is pivoted at the points 14 and 15 and held normally away from the cores 9 and 10 by means of the coil spring 16, thereby maintaining a pair of springs 17 and 18 normally out of contact. At certain times to be pointed out hereinafter, the pole pieces 9 and 10 will be charged as opposite pole pieces and will therefore attract the armature 13 to close the contact of springs 17 and 18.

The relay which I have described and which is shown in Figs. 1, 2 and 3 is designed so that the armature 13 will be attracted only when alternating current is flowing through the coil 2. Also the armature 13 will be attracted momentarily whenever a direct current is applied to the coil 2, and will again be momentarily attracted when the direct current is removed from the circuit of said coil. It will be seen that the path of the magnetic flux caused by applying a direct current to the winding of the coil 2 includes the core of said coil, the bracket 3, the cores 9 and 10 in multiple, the heel piece 4, and back to the core of coil 2. As is well known in the art, the copper slugs 11 and 12 have a retarding action which acts against any change in the magnetic flux flowing in their respective cores 9 and 10 so that when a magnetic flux is set up around the above traced circuit its increase or decrease in strength will be opposed at two places, that is, the flux in the right hand end of the core 9 will be opposed by the counter force set up in the slug 11, and the magnetic flux in the core 10 will be opposed in the left hand end of said core by the counter action of the slug 12. Thus it will be seen that the mid points of the cores 9

and 10 will act as north and south magnetic poles and cause the armature 13 to be attracted to said mid points, thereby short circuiting magnetically the two slugs 11 and 12. The magnetic flux will now flow from the core of coil 2, bracket 3, coil 10, to the mid point thereof, armature 13, and on through the left hand half of core 9, and through pole piece 4 to the core of coil 2. As soon, however, as the magnetic flux in the two cores 9 and 10 has reached its maximum point and the counter force generated in the slugs 11 and 12 dies down, the cores 9 and 10 will form a free path to the flux and the armature 13 will fall back. In the same manner when the direct current circuit through the coil 2 is opened the slugs 11 and 12 will again oppose the decrease in flux in the two cores 9 and 10 and the armature 13 will again be momentarily attracted by the counter magnetic force generated therein. It will be seen that I have utilized the Wheatstone bridge principle as applied to flux rather than electric current and that the coil 2 and its core act as the battery bridge, the left hand end of the core 10 and the right hand end of the core 9 act as the variable arms and the right hand end of the core 10 and the left hand end of the core 9 act as the fixed arms of said bridge, while the armature 13 acts as the receiver or galvanometer arm. Therefore when the two variable arms are changed in resistance relative to the fixed arms by the counter action of the slugs, a pull is exerted on the armature 13.

Now, when an alternating current is supplied to the winding of the coil 2 it will be seen that, as the alternating current is continually changing in direction, the magnetic flux in the cores 9 and 10 will never be steady and therefore the counter force in each slug 11 and 12 which is caused by a change in the flux of the cores 9 and 10, will be maintained constant and the armature 13 will therefore be held in its attracted position.

Therefore it will be seen that I have devised a very efficient and novel relay which is adapted for many uses and which may be arranged to close an alarm circuit or signal circuit momentarily when a direct current circuit is closed and again when it is opened and which will not hold up on direct current.

Having fully described my invention what I desire to protect and secure by Letters Patent will be pointed out in the appended claims.

What I claim as my invention is:

1. In a relay, a magnet, an armature for said magnet, means for applying direct or alternating current to said magnet, means for causing said armature to be attracted momentarily when direct current is applied to said magnet and for causing said armature to be permanently attracted as long as alternating current is applied to said magnet.

2. In a relay, a magnet, an armature for said magnet, means for applying direct or alternating current to said magnet, means for causing said armature to be attracted momentarily when direct current is applied to said magnet and for causing said armature to be permanently attracted as long as alternating current is applied to said magnet, and a circuit controlled by said relay.

3. In a relay, a magnet, a magnetic circuit for said magnet, said circuit having a portion thereof forming a Wheatstone bridge, a pair of permanent arms and a pair of variable arms for said bridge, an armature for said magnet, the points of said bridge between said variable and permanent arms forming pole pieces for said armature, said armature normally held out of engagement with said pole pieces, the other two points of said bridge being connected by a battery bridge comprising the core of said magnet, means for generating a magnetic flux in said core, and means for varying the reluctance of said variable arms to cause the magnetic flux to flow through said armature and attract the same.

Signed by me at Chicago, Cook county, Illinois, this 2d day of June, 1919.

JOHN ERICKSON.