J. ERICKSON.

RELAY.

APPLICATION FILED MAR. 31, 1911.

1,082,310.

Patented Dec. 23, 1913.

FIG. 1.

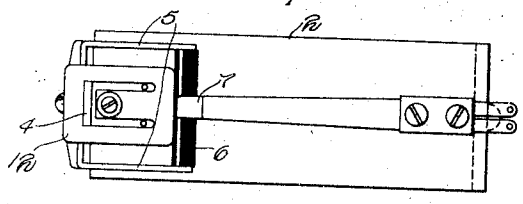


FIG. 5.

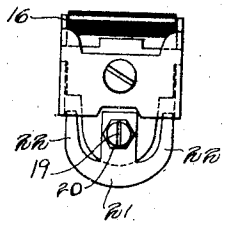


FIG. 2.

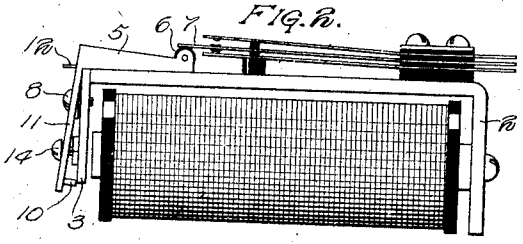
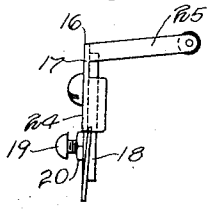


FIG. 6.



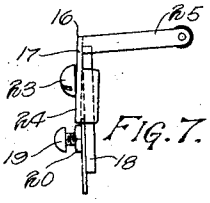


FIG. 7.

FIG. 4.

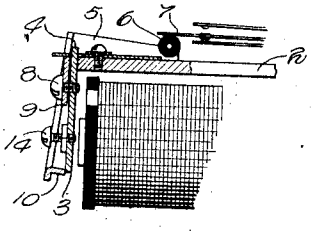
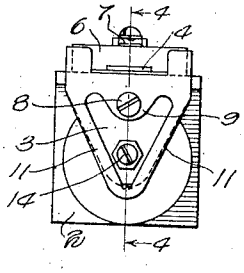


FIG. 3.



WITNESSES

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RELAY.

1,082,310. Specification of Letters Patent. Patented Dec. 23, 1913.

Application filed March 31, 1911. Serial No. 618,147.

To all whom it may concern:

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

My invention relates to relays of that particular character in which the armature is provided with an arm extending at an angle thereto for operating the springs by which the electrical circuits are controlled. In a relay of this kind the said arm is ordinarily rigid with the armature, being integral therewith, and for this reason the angle between the armature and its arm cannot be readily varied or changed to regulate the action of the relay. In fact, and in a relay of this particular construction, the action is regulated or adjusted, in most cases, by removing the armature and forcibly bending the arm or arms thereof to obtain the desired angle. This has been found to be unsatisfactory for various reasons. For example, it is difficult, where the armature has two parallel arms, to bend the two arms the same extent. Again, the armature must often be taken off and bent and then put back in place and this operation repeated several times before the desired result is accomplished.

The object of my invention is, therefore, to provide a relay of the foregoing general character in which means are provided for varying or changing the angle between the armature and its arm or arms in an effective and convenient manner and without the necessity of removing the armature from the relay.

To this and other useful ends my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a top view of a relay embodying the principles of my invention. Figs. 2 and 3 are a side and end view, respectively, of the same. Fig. 4 is a partial sectional view on the line 4—4 in Fig. 3. Figs. 5, 6 and 7 show different constructions of the armature.

As shown herein, the coil of the relay is attached to an L-shaped heel piece 2 upon the end of the longer portion of which the armature is mounted. The armature proper consists simply of a flat piece of iron 3 provided at its upper portion with a short projection 4 (Fig. 3). Attached to the armature there is an elbow lever through the medium of which the springs of the relay are controlled. The arm which controls the springs comprises two side arms 5 joined at their ends by a cross pin carrying a bushing 6. The other arm of the elbow lever extends down in front of the armature 3, and is attached thereto by means of a screw 8 which passes through a smooth hole in the portion 9 into a threaded hole in the armature. Below the portion 9 the front part of the lever is cut out so as to leave two narrow side arms 11, at the junction of the lower ends of which there is a short projection 10 which extends backward and bears against the face of the armature. The angle between the two arms of the elbow lever is preferably slightly obtuse, so that when it is attached to the armature, as shown in Figs. 1 and 4, the angle between the armature and the rearwardly extending arm will be approximately a right-angle. The upper edge of the plate 2 forms a knife-edge bearing upon which the armature and lever rock, they being held in place by the tongued spring 12 in a manner which is fully described in United States Letters Patent No. 929,844, granted Aug. 3, 1903, to John Erickson, for improvement in relays.

As shown in Fig. 2, the spring 7 normally holds the arm 5 flat on the plate 2, thus holding the armature a short distance away from the end of the core of the relay coil. When the coil is energized the armature is pulled down until it strikes the core, causing the arms 5 to raise the end of the spring 7 a certain distance. The distance through which this spring is raised depends upon the

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distance through which the armature has to move before it reaches the core, and therefore is dependent upon the angle between the arms 5 and the armature 3. If this angle is increased, the armature 3 will normally stand at a greater distance from the core and will therefore have a longer stroke. This angle may be increased by turning the screw 8 so as to force the portion 9 in nearer the armature, which rotates the arms 5 about the upper end of the armature as a pivot. Since the lower ends of the arms 11 are held away from the armature by the projection 10, when the portion 9 is forced inward by the screw 8 these arms 11 are forced to bend and are therefore placed under tension. If the screw 8 is loosened, this tension restores the arms 5 to their original position. By first adjusting the relay with the screw 8 turned down far enough to place a small amount of tension in the side arms 11, the stroke of the armature may thereafter be either increased or decreased by the simple operation of turning the screw 8. Sufficient tension should always be maintained in the arms 11 to keep the elbow lever forced snugly against the armature.

The screw 14 is for the purpose of preventing the armature from sticking to the core of the magnet, and has nothing to do with my invention. This screw is often replaced by a small rivet of non-magnetic material, or the end of the core is covered with a non-magnetic cap.

In the form of the armature shown in Figs. 5, 6 and 7, the elbow lever 16 is mounted upon the armature proper so as to swing about its upper edge 17 as a fulcrum. The vertical portion of the elbow lever does not extend down the entire length of the armature, but terminates about midway of its length. Attached to the lower portion of the armature by means of the screw 19 and nut 20 there is a member 21 provided with two resilient arms 22 which extend upward and behind the lower edge of the vertical portion of the elbow lever. These arms tend to hold the lower portion of the lever 16 away from the armature by a distance equal to the thickness of the member 21, as shown in Fig. 7. By means of the screw 23, however, the vertical arm 24 may be forced inward against the tension of the arms 22 so as to increase the angle between the horizontal arm 25 and the armature, as shown in Fig. 6. If desired, the arms 22 may be bent outward slightly out of the plane of the central portion of the member 21, thereby giving a greater range of adjustment than when said arms are straight. The form of the invention shown in Figs. 5, 6 and 7 is practically the same as that shown in Figs. 1, 2 and 3, with the exception that in Figs. 1, 2 and 3 the arms 11 form a continuation of and are integral with the elbow lever, while in Figs. 5, 6 and 7 the corresponding arms 22 are from a separate member.

From the foregoing it will be seen that I provide an L-shaped armature member the angle of which can be changed or varied to adjust the stroke of the armature without removing the same from the relay. The adjustment is made in an effective and convenient manner without disconnecting it from the relay, and in such a way that the degree of adjustment necessary in any particular case is readily determined. In other words, the screw on the front of the armature is simply turned one way or the other until the stroke of the armature has been regulated to produce the desired result.

I do not limit myself to any particular construction of relay, or to any particular means for regulating the stroke of an armature of this character.

What I claim as my invention is:—

1. In a relay, a set of circuit-controlling springs, an armature provided with an arm extending at an angle thereto for operating said springs, said arm being movable relative to the armature, and means for changing the angle between the armature and said arm to regulate the stroke.

2. In a relay, an electromagnet, an armature therefor supported in front of one end thereof, an arm carried by said armature, which arm extends lengthwise of the magnet toward the other end thereof, a set of circuit-controlling springs controlled by the distal end of said arm, the said arm being movable relative to the said armature, and means on said armature for changing the angle of said arm relative thereto.

3. In a relay, an electromagnet, a support for said magnet, an armature carried at one end of said support and depending in front of one end of said magnet, circuit springs mounted on said support, the free ends of said springs extending toward the armature, an arm carried by the armature and extending lengthwise of the magnet to control said springs, said arm being movable relative to said armature, and a screw connecting the said arm with the outer face of the armature, which screw is adjustable to change the angle between the said armature and said arm.

4. In a relay, an armature therefor provided with an arm extending at an angle thereto, which arm is mounted for movement relative to the armature, and means on the outer face of the armature for changing the angle between the armature and said arm.

5. In a relay, an electromagnet, an arma-

ture therefor, an arm extending at an angle to said armature, said arm being provided with a flexible portion extending at an angle thereto, and a screw for clamping said flexible portion upon the outer face of the armature, which screw is adjustable to change the tension of said flexible portion and thereby change the angle between the armature and said arm.

6. In a relay, a magnet and an armature therefor, a circuit-controlling arm for said armature, a spring on the armature for holding the arm at an angle to the armature, and means for changing the tension of said spring to vary the said angle.

Signed by me at Chicago, Cook county, Illinois, this 24th day of March, 1911.

JOHN ERICKSON.

Witnesses:
ARTHUR J. RAY,
E. D. FALES.