Dec. 13, 1927.

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A. A. YEAGER, JR

CONTROL APPARATUS

Filed Feb. 12, 1925

Fig. 1.

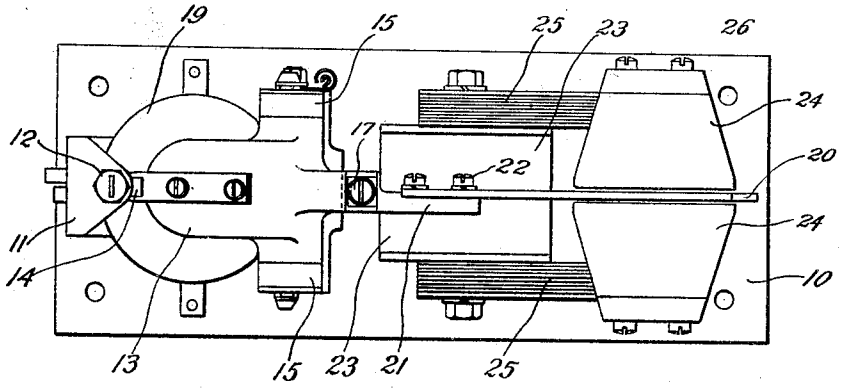


Fig. 2.

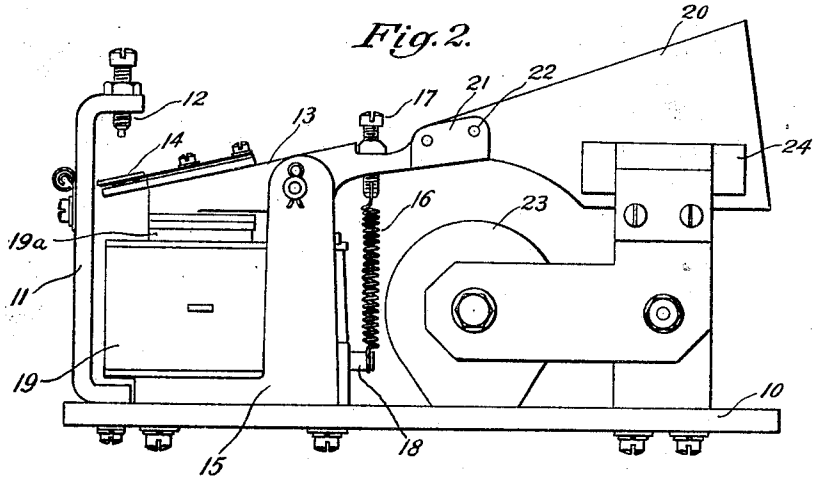
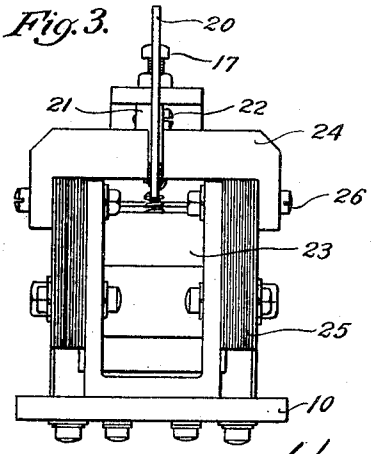


Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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CONTROL APPARATUS.

Application filed February 12, 1925. Serial No. 8,855.

My invention relates to improvements in relays and more particularly to time-element relays employed for control purposes.

One object of my invention is the provision of a relay that shall be simple and efficient in operation and readily and economically manufactured.

A more specific object of my invention is to provide for the retardation of the action of a relay in a manner that is not affected by changes in temperature and pressure.

A further object of my invention is to effect a retardation of the operation of a relay at any predetermined period in its operation.

It is also an object of my invention to provide for the balancing of the operating parts of a relay to permit the mounting of the relay in different positions without affecting the efficiency of operation.

Other objects of the invention will in part be obvious and in part appear hereinafter.

The invention, accordingly, is disclosed in the embodiment thereof shown in the accompanying drawing and comprises the features of construction, combination of elements and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawing, in which

Figure 1 is a top plan view of a relay constructed in accordance with this invention;

Fig. 2 is a view, in side elevation, of the relay showing the armature after it has been actuated through the energization of the coil; and

Fig. 3 is a view in end elevation of the relay.

Referring now to the drawing, the illustrated relay is provided with a frame or base 10. A bracket 11, having one end secured to the base 10, is provided for carrying an adjustable contact member or screw 12.

An armature 13, including a contact member 14, is pivotally disposed between a pair of standards 15, forming a part of the frame 10. In this particular construction, the contact member 14 of the armature 13 is mounted to normally make contact with the member 12, and is retained in that position by means of a tension spring 16, which is connected between an adjustable screw 17 that is mounted in the armature 13 and an arm 18 that is attached to the standards 15.

In order to effect the operation of the armature 13, an actuating coil 19 and a suitable core 19ª are positioned on the frame 10 on the opposite side of the standards 15 from the spring 16 and are alined with the front end of the armature 13. As will be readily understood, the coil 19 may be energized from any suitable source of current. If desired, the operation of the armature 13 may be utilized to interrupt the supply circuit to permit the return of the operating parts of the relay to their normal positions.

In using a relay of this type for control purposes, it often becomes necessary to retard the operation of the armature. In order to effect a retardation of the movements of the armature 13 in a manner that is not subject to changes in atmospheric conditions, the device to be described hereinafter is provided.

As shown in Figs. 1 and 2, a vane 20 is connected to an extension 21 of the armature 13 in any suitable manner, such as by the use of screws 22. In order to permit the mounting of the relay in any desired position, the vane 20 is made of some metal, such as aluminum, having a low specific gravity, so that, when the relay is shifted from one position to another, the balance of the parts will not be greatly affected and the efficiency of operation will not be decreased.

In order to retard movements of the vane 20, an electromagnet 23 is mounted on the frame 10 below the vane 20, and is provided with suitable pole pieces 24 that are located on opposite sides of the vane. As shown in Fig. 1, the pole pieces 24 are spaced apart sufficiently to permit the vane 20 to move between them. Thus, the electromagnet 23 is provided to develop a suitably directed magnetic field and the vane 20 is disposed to move in the magnetic field.

It will be readily understood that the electromagnet 23 may be energized from any suitable source of current supply and that the energization may be controlled in any suitable manner, to develop a magnetic field at any time or for any predetermined period of time.

As shown, the side core members 25 of the

electromagnet 23 are of the laminated type so that the energization of the core is not affected by eddy currents. As shown, the pole pieces 24 are attached to the outer ends of the core members 25 by means of screws 26.

Under normal conditions, when the coil 19 is deenergized, the contact member 14, constituting a part of the armature 13, is retained in contact with the member 12 by means of the spring 16. When the coil 19 is energized, the armature is rotated counter-clockwise, as viewed in Fig. 2, about its pivot point, thereby breaking the contact between the members 12 and 14 and overcoming the normal bias of the spring 16.

Assuming that the contact members 12 and 14 are connected in the energizing circuit of the coil 19, then the rotation of the armature counter-clockwise breaks the contact between the members 12 and 14 and the energizing circuit is opened, thus permitting the spring 16 to function to return the armature to its original position and to again close the circuit of the coil 19. However, it is to be understood that the circuit for energizing the coil 19 may be controlled by any means independent of the relay.

In order to retard the movement of the armature 13 under the influence of spring 16, the coil 23 is energized to build up a magnetic field between the pole pieces 24 when the armature reaches the limit of its counter-clockwise movement. Then, as the armature rotates clockwise, the vane 20 moves through a magnetic field which retards or damps its movement. In this manner, the re-establishment of the energizing circuit of the coil 19 may be delayed, as desired.

Furthermore, the counter-clockwise rotation of the armature may be retarded by energizing the coil 23 at the same time as the energization of the coil 19 is effected. Thus, as the armature 13 is rotated counter-clockwise, the vane 20 is moved through a magnetic field, thereby retarding the movement of the armature.

It will be readily understood that the coil 23 may be energized at any predetermined time to effect the desired retardation of the movements of the armature 13. Furthermore, by varying the strength of the magnetic field between the pole pieces 24 or the tension of the spring 16, the speed of operation of the armature 13 may be changed at will. The tension of the spring 16 may be adjusted by means of the set screw 17.

Since various changes may be made in the above-described construction and arrangement of parts, and different embodiments of the invention may be made wthout departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:—

1. A relay comprising, in combination, an armature, a coil for actuating the armature, means for developing a magnetic field, and means disposed for movement transversely of the lines of force of the magnetic field co-operative to retard the movements of the armature in either direction.

2. A relay comprising, in combination, an armature, a coil for actuating the armature, means for developing a magnetic field, and means carried by the armature and disposed for movement in the magnetic field co-operative to retard the movement of the armature, the timing of said retarding action being dependent upon the development of the magnetic field.

3. A relay comprising, in combination, an armature, a coil for actuating the armature, and electromagnet having a pair of pole pieces disposed in spaced relation, said electromagnet being adapted to permit energization at any predetermined time, and means disposed for movement between the pole pieces co-operative to retard the movements of the armature when said electromagnet is energized.

4. A relay comprising, in combination, an armature, resilient means for holding the armature in a predetermined position, a coil for actuating the armature, an electromagnet for developing a magnetic field, and a vane carried by said armature and disposed for movement in said magnetic field to retard the movements of the armature.

5. A relay comprising, in combination, an armature, resilient means for holding the armature in a predetermined position, a coil for actuating the armature, an electromagnet for developing a magnetic field, and a vane carried by said armature and disposed for movement in said magnetic field to retard the movements of the armature, said vane being made from a metal having a low specific gravity, thereby to provide for substantially the same balance of the operating parts in all positions of the relay.

6. A relay comprising, in combination, a frame, an armature pivotally mounted on the frame, resilient means for retaining the armature in predetermined position, a coil for actuating the armature, an electromagnet adapted to be energized at will, said electromagnet being provided with a laminated core and pole pieces disposed adjacent one another, and a vane carried by the armature disposed for movement between said pole pieces, thereby to provide for the retarding of the movements of the armature.

In testimony whereof, I have hereunto subscribed my name this 24th day of Jan. 1925.

ALBERT A. YAEGER, JR.