

May 12, 1931.

A. M. CURTIS

1,804,746

HIGH SPEED RELAY

Filed June 23, 1928

FIG. 1

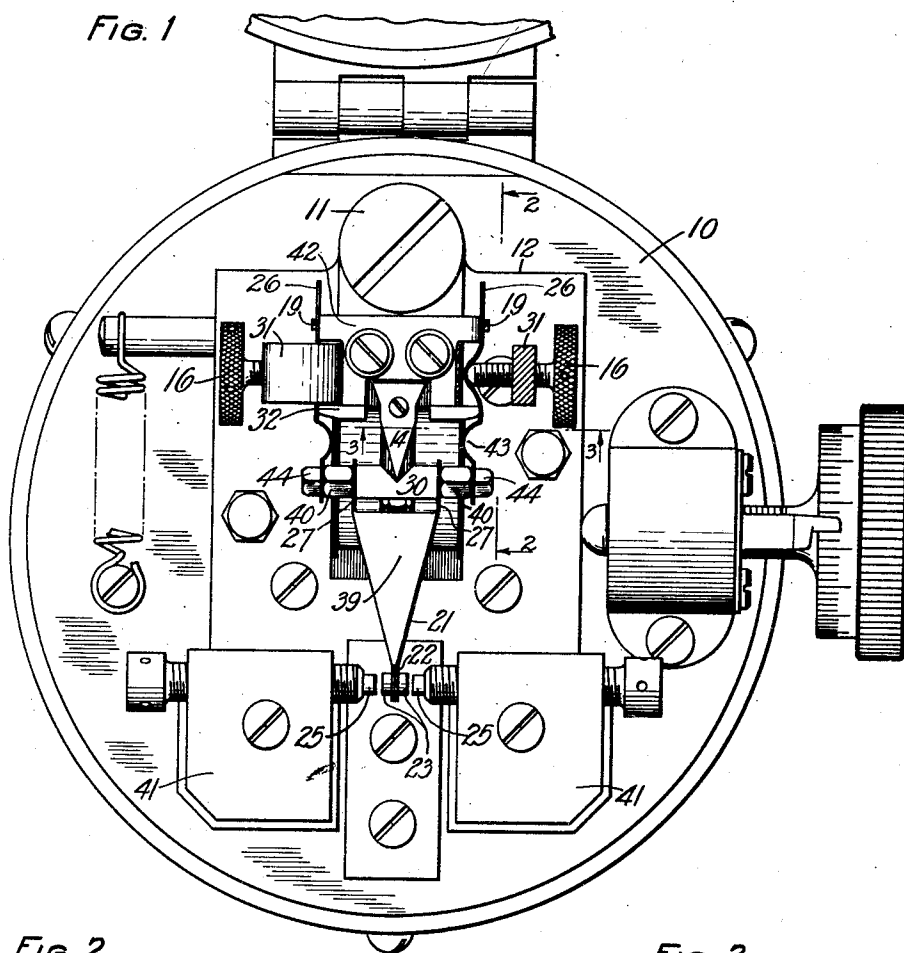


FIG. 2.

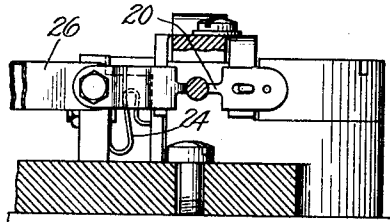


FIG. 3.

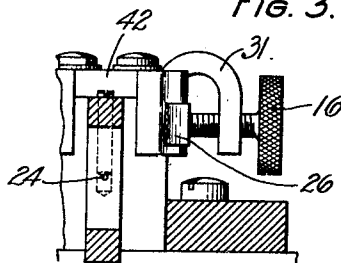
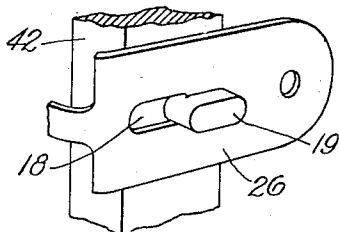


FIG. 4.



INVENTOR
AUSTEN M. CURTIS
BY *J. W. Schmied*
ATTORNEY

UNITED STATES PATENT OFFICE

AUSTEN M. CURTIS, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO BELL TELEPHONE LABORATORIES, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

HIGH SPEED RELAY

Application filed June 23, 1928. Serial No. 287,714.

The present invention relates to improvements in electromagnetic devices and is particularly exemplified herein by a relay designed for use in a high speed telegraph circuit.

This application relates to improvements upon the electromagnetic device disclosed in U. S. Patent 1,757,703, patented May 6, 1930 to A. M. Curtis.

An object of the invention is to provide improved means for adjusting electromagnetic devices such as high speed signaling relays.

A further object of the invention is to expedite the adjusting of a high speed three-position signaling relay.

A feature of the invention includes means for quickly and conveniently relieving the armature of a signaling relay from the restraint of its adjusting springs in order to permit it to be adjusted to a position of magnetic equilibrium with respect to the poles of the magnetic circuit.

In the application above mentioned, there is described and claimed a high speed two-position relay and in Fig. 5 thereof, there is shown one modification of that relay which is suitable for use as a three-position relay. A relay of this type is provided with means for centering the contact arm of the armature, which means consists in this, that the ends of the springs are clamped between a flat surface and the rough surface of a vertical knurled pin. This method of centering, however, suffers from the following disadvantages. First, although one of the gripping surfaces is rough, the other must be smooth, and lack of sufficient care in tightening the clamping screw is likely to permit the spring to slip and thus throw the relay out of adjustment. Second, the rough surface tends to cut the spring ends, thus causing their rapid wearing out. Third, in adjusting the relay, it is necessary first to center the relay armature magnetically, which requires that the armature be freed from control of the springs by removing the rough surfaced pin, and which in turn requires the removal of the smooth clamping surface and of the screw which adjusts its pressure against the

spring, a procedure which is time-consuming and tedious. The readjustment of the armature to a central position and to a specified sensitivity is also tedious as the tension of the springs must be regulated by minute rotations of the rough knurled pin.

In accordance with the present invention, centering of the relay armature and its adjustment to any specified or desired sensitivity may be carried out with a high degree of accuracy and expediency. Whereas in relays of the earlier type the centering and adjusting operations normally consumed approximately one hour, a relay, in accordance with the present invention, may usually be adjusted in five minutes. This is an important consideration in a system wherein a large number of relays must be adjusted from time to time.

One method of practicing this invention will now be described in connection with the accompanying drawings in which,

Fig. 1 represents a top view, partly in section of the completely assembled relay embodying the invention;

Fig. 2 shows a vertical sectional view of the improved spring construction taken from line 2—2 of Fig. 1; and

Fig. 3 is a vertical sectional view of the improved spring construction taken from line 3—3 of Fig. 1.

Fig. 4 is a detail view in perspective of the mode of mounting the rear end of the improved relay springs, only one spring end being shown.

Referring now to Fig. 1, secured to the base 10 by means of a pivot screw 11 is the relay carriage 12 through the aperture of which extends the head of armature stem 30. Secured to the head of the armature stem is a contact arm 39 having a substantially triangular form, as shown, and made of a thin plate of strong but light material, such as duralumin. The plate is preferably reinforced by lateral flanges 21 which extend beyond the apex of the triangle and form a tongue 22 carrying contacts 23 adapted to touch fixed contacts 25, held in massive blocks 41. The other extremities of flanges 21 extend rearwardly to provide ears 27 by

means of which the contact arm 39 is fastened to the top of armature stem 30.

In its normal position the contact point 23 of contact arm 39 is out of engagement with either of the contacts 25 although the gaps separating the contact points from contacts 25 are of the order of .002 inch only. This closely balanced position of the relay arm 39 is achieved by means of springs 26 which are connected to posts 40 carried on opposite sides of armature stem 30 by screws 44. Springs 26 are made of relatively strong but resilient material, such as phosphor bronze, and extend rearwardly in substantially parallel planes on opposite sides of knife edge 14. The springs are mounted at both sides of post 42 in a manner to be described below, and in conjunction with spring member 24 (see Fig. 2) hold the armature stem 30 with an evenly balanced pressure against knife edge 14. In accordance with the invention the springs are narrowed in width for a portion of their length as shown at 20 in Fig. 2 for the purpose of making this portion inferior in strength to the remainder of the spring and screws 16 are provided and adapted to travel through apertured and threaded posts 31 to press adjustably upon said narrowed portion in such a fashion that the variation of pressure against the springs adjusts the tension which the portion 43 of the spring opposes to the movement of armature stem 30 and contact arm 39.

Furthermore, in accordance with the invention the springs are mounted upon member 42 of the carriage by means of slots 18, provided in the rear ends of the springs, and hooks 19, as shown in detail in Fig. 4, in such a fashion that they may be demounted from member 42 with great ease and expediency. In this manner, when centering of the relay armature becomes necessary, it suffices to unscrew members 16 until the portions of spring 26 extending to the rear of frets 32 are no longer constrained by member 16 and, by exerting slight tension, upon the rear portions of the springs, disengaging them from hooks 19. Thus, the adjusting of the armature to a position of magnetic equilibrium with respect to the poles of the magnetic circuit is greatly facilitated and expedited.

The improvements herein described are not limited in their application to relays but may be applied to electromagnetic reproducers of the type described in United States patent to Holland 1,663,885 March 27, 1928 or to other similar devices.

What is claimed is:

1. In an electromagnetic device, a vibrating armature, means comprising two partly arcuate contractile springs tensioned longitudinally to flex in a plane perpendicular to the axis of said vibrating armature, and adjustable means individual to each of said

springs for exerting a lateral adjustable pressure upon each of said springs for varying the tension thereof.

2. In an electromagnetic device, an armature carrying a contact arm, said armature being adjustably balanced on a knife edge by two cooperative springs, the extremities of said springs which are farthest removed from said armature being provided with slots engaging hooks, whereby the armature may be rapidly relieved from the restraint of the springs.

3. In an electromagnetic device, an armature carrying a contact arm, said armature being adjustably balanced on a knife edge by two cooperative springs having a portion of reduced width, the extremities of said springs which are farthest removed from said armature being provided with apertures engaging means for opposing longitudinal displacements of said springs.

4. In an electromagnetic device such as a high speed relay, a vibrating armature carrying two partly curved coacting springs tensioned longitudinally, and means for adjusting the tension of one spring independently of the tension of the other spring.

5. In an electromagnetic device, a vibrating armature, means comprising two partly curved springs, one on each side of the axis of oscillation of said armature, means for exerting lateral pressure in a plane perpendicular to the axis of oscillation upon the portion of said springs intermediate said curvature and their rear extremities farthest removed from said curvature, characterized in this that the armature may be effectively relieved from the restraint of said springs by removing said lateral pressure upon said springs.

6. In an electromagnetic device such as a high speed relay, an armature carrying a contact arm, said armature being adjustably balanced upon a knife edge by two cooperative partly curved springs having a portion of reduced width, and in combination therewith adjustable means acting upon said portion of reduced width for varying the tension with which said springs oppose the motion and correct misadjustments of said armature.

7. In an electromagnetic device such as high speed relay, an electromagnetic reproducer or the like, a vibrating armature, means comprising partly arcuate contractile springs connected to the armature and tensioned longitudinally to flex in a plane perpendicular to the axis of said vibrating armature, and rigid adjustable means laterally impinging upon said springs for exerting a lateral adjustable pressure thereupon.

8. In an electromagnetic device such as a high speed relay, electromagnetic reproducer or the like, an armature vibrating in a plane, a spring having a portion tensioned longi-

tudinally in a plane transverse to the first
named plane and attached to said armature
for controlling it, means for adjusting the
tension of a portion of said spring by a body
movable at right angles to the direction of
5 tension.

In witness whereof, I hereunto subscribe
my name this 19th day of June, 1928.

AUSTEN M. CURTIS.

10

15

20

25

30

35

40

45

50

55

60

65