

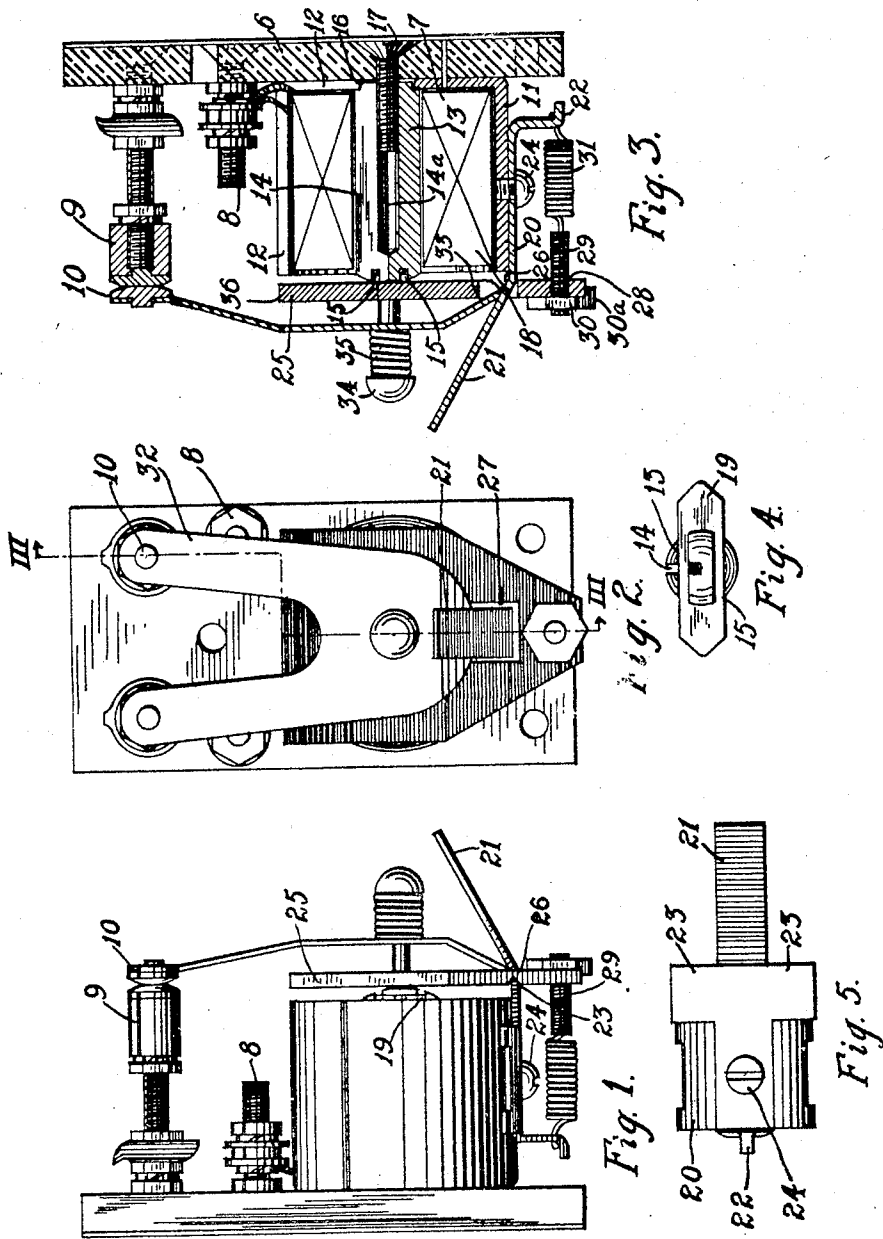
Oct. 25, 1927.

1,646,888

H. E. TRENT

RELAY SWITCH

Filed March 29, 1924



INVENTOR
Harold E. Trent
BY *J. A. Procter*
ATTORNEY

UNITED STATES PATENT OFFICE.

HAROLD E. TRENT, OF LANSDOWNE, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO J. STRUTHERS DUNN, OF PHILADELPHIA, PENNSYLVANIA.

RELAY SWITCH.

Application filed March 29, 1924. Serial No. 702,744.

My invention relates to electromagnetic devices and particularly to relay switches.

One object of my invention is to provide a relay switch that shall have a minimum
5 number of parts.

Another object of my invention is to provide a relay switch or contactor that shall have means whereby the armature and the movable contact members may be removed
10 as a unit without affecting the relative adjustment and without removing any screws or other holding members.

Another object of my invention is to provide a relay that shall have a single member for pivoting, limiting and adjusting the
15 movement of the armature.

Another object of my invention is to provide a relay that may be disassembled without affecting its calibration.

Another object of my invention is to provide an electromagnet that shall have a single means for retaining its winding in position and for precluding chattering of
20 its armature.

Another object of my invention is to provide a relay having a core member of such construction and cross section that it is adapted to operate without heating when the relay winding is energized by either alternating or direct current.
25

A further object of my invention is to provide a relay, of the above-indicated character that shall be simple and inexpensive to construct and effective and efficient in its operation.
30

In practicing my invention, I provide an outer magnetizable member, an inner core member having a longitudinal slot therein, a winding around the core member and an armature member. A supporting member is mounted on the outer magnetizable member for pivotally supporting the armature, for limiting its movement and for supporting an adjusting spring therefor. Contact members are resiliently secured to the armature and are readily removable from the stationary portions of the relay with the armature without disturbing the adjustment or calibration of the device.
35

In the accompanying drawings:

Figure 1 is a side elevational view of a relay switch or contactor embodying my invention;

Fig. 2 is a front elevational view of the switch shown in Fig. 1;
55

Fig. 3 is a sectional view taken along the line III—III of Fig. 2;

Fig. 4 is a detail view of one end of the core member shown in Fig. 3; and

Fig. 5 is a detail view of the supporting member embodied in my invention.
60

My invention comprises, in general, a base plate 6 upon which is mounted an electromagnet 7 and a plurality of stationary terminals 8 and contact members 9 that cooperate with movable contact members 10 that are actuated by the electromagnet.
65

The electromagnet 7 comprises an outer magnetizable cup member 11 having a narrow slot 12 therein extending from the center of its base to its outer periphery to prevent generation therein of eddy current. An inner core member 13 having a longitudinal slot 14 therein, two lateral slots 15 at the outer end and a shoulder 16 at its inner end. The shoulder 16 engages an opening in the cup member 12, and a screw 17 extending through the base 6 and into an axial opening 14^a in the core member 13 holds the entire device together and to the base. The axial opening 14^a extends to within a relatively short distance of the outer end of the core member 13 but the screw 17 only extends a part way through the core member.
70

A winding 18 is disposed in the cup member around the core member 13 and a short-circuited conductor 19 is disposed in the slots 15 and over the winding 18 to hold the winding in place and also to so lag the flux traversing a portion of the core member as to ensure continuous flux therethrough when alternating current traverses the winding 18. This provides a non-chattering electromagnet under all conditions.
75

A supporting member 20 having two projections 21 and 22 and a knife edge portion 23 is screwed to the cup member 11 by a screw 24. The member 20 is slightly curved to conform to the surface of the cup 11 and thus is retained in position by the single screw.
80

An armature 25 is provided with grooves or slots 26, which register with the knife edges 23 in the member 20 to constitute a pivotal support for the armature. The ar-
85

95

100

105

mature has an opening 27 therein through which extends the projection 21 of the member 20 that serves as a limiting stop for the armature. The armature is also provided
 5 with an opening 28 in the end thereof to receive a screw-threaded member 29. A nut 30 having an overhanging lip 30^a is disposed on the member 29 to prevent it from passing through the opening 28 and a spring 31 is
 10 secured to the member 29 and to the projection 22. From the above, it will be seen that the member 20 serves the several functions of pivotally mounting the armature, limiting its movement and for holding the
 15 adjusting means. The lip 30^a engages the edge of the armature to prevent the nut 30 from being turned inadvertently.

A bifurcated resilient member 32 carries a contact member 10 on each of its bifurcated portions and its inner end passes through the opening 27 in the armature 25 and rests against the stop 21. A non-magnetic stud 34 that is secured to the armature 25 passes through an opening in the member 32, and a spring 35 surrounds the stud 34 and normally holds the member 32 in engagement with the armature 25. The stud 34 extends through the armature to provide a non-magnetic button to engage the core
 30 member 13 to prevent "freezing" in the closed position.

When the contact members 9 and 10 are in engagement by reason of the armature 25 being attracted when the winding is energized, the spring 35 permits the member 32 to pivot around the point 33 where it engages the stop 21 in the armature 25 and disengages the armature at the point 36 where it normally engages it.

It will be understood from the above that the contact members 10 have a rubbing motion before and during engagement and disengagement by reason of the member 32 pivoting about the points 33 and 36 during its
 45 movement. It will further be seen that in order to disassemble the moving parts of the device, it is only necessary to slip the spring 31 off the projection 22 and to lift the unitary armature 25 and the contact-carrying member 32 from the knife edges 23. The members 25 and 32 retain their relative positions and, consequently, the adjustment or calibration of the device is not altered.

In order to calibrate or adjust the device, it is only necessary to lift nut 30 and turn the same with respect to the member 29.

The slot 14 and the longitudinal opening 14^a in the core member 13 are provided to enable the same core member to be used on an alternating current as on direct current as it has been found that with such construction the electromagnet will operate without overheating on both alternating and direct current. An electromagnet of this character has been found to be highly efficient

and it will not chatter when used on alternating-current circuits.

The electromagnet may be completely disassembled by removing the single screw 17 and, consequently, it is simple to assemble and adjust.

My invention is not limited to the specific structure illustrated as many changes may be made therein without departing from the spirit and scope thereof, as set forth in the
 75 appended claims.

I claim as my invention:

1. An electromagnet comprising a stationary magnetizable member of cup shape, a winding therein, a movable armature, a contact-carrying member, resilient means for securing the contact-carrying member to the armature, a single supporting member mounted on the side of the stationary-magnetizable cup member having a projection on each end thereof, one of the projections being adapted to be disposed in an opening in the armature to limit the movement of the armature, and an adjustable spring connected between the armature and the other projection on the supporting member.

2. A relay comprising a stationary core member, a stationary magnetizable casing, a winding disposed around the core member within the casing and a short-circuited conducting member disposed in one end of the core member to retain the winding in position within the casing and for precluding the relay from chattering.

3. A relay comprising a stationary core member, a stationary magnetizable casing, a winding disposed around the core member within the casing, an armature and means disposed in the outer end of the core member to retain the winding in position within the casing and for precluding chattering of the armature.

4. An electromagnet comprising an outer magnetizable cup member, an inner removable core member having a longitudinal slot therein, a winding disposed around the core member, an armature, and a short-circuited conductor disposed in the outer end of the core member and extending over the winding.

5. A relay switch comprising a stationary magnetizable cup-shaped member, a winding therefor, an armature, a resilient bifurcated member having contact members on the bifurcated portions thereof, a stud mounted on the armature and passing through an opening in the bifurcated member, a spring disposed around the stud for resiliently holding the bifurcated member and the armature together and means on the magnetizable cup-shaped member for pivotally supporting the armature.

6. A relay switch comprising a stationary magnetizable cup-shaped member, a winding therefor, an armature, a resilient bifur-

5 cated member having contact members on
the bifurcated portions thereof, a stud
mounted on the armature and passing
through an opening in the bifurcated mem-
ber, a spring disposed around the stud for
resiliently holding the bifurcated member
and the armature together and means on the
magnetizable cup-shaped member for pivot-
ally supporting the armature and for limit-
10 ing its movement in one direction.

7. A relay comprising an outer cup mem-
ber, a winding therein, an armature having
a slot across one face thereof, and two open-
ings therein, a supporting member mounted
15 on the cup member and having two projec-
tions thereon, and a knife edge portion for
engaging the slot in the armature, a spring,
an adjustable member secured to the spring,
the spring being connected to one of the
20 projections and the other projection extend-

ing through one opening in the armature,
the adjusting member being disposed in the
other opening in the armature.

8. An electromagnet comprising a station-
ary magnetizable cup member, a winding 25
therein, a movable armature having an
opening therein, a contact carrying member,
resilient means for securing the contact car-
rying member to the armature, a supporting
member mounted on the side of the cup 30
member and having a projecting portion for
extending through the opening in the arma-
ture and a shoulder portion to serve as a
bearing for the armature whereby the arma-
ture and the contact carrying member may 35
be removed as a unit from the cup member.

In testimony whereof, I have hereunto
subscribed my name this 24th day of March,
1924.

HAROLD E. TRENT.