

March 3, 1931.

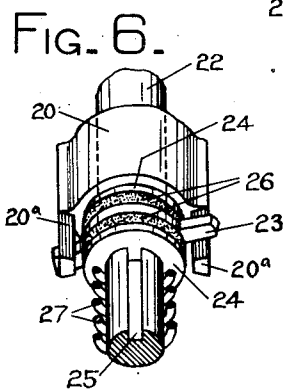
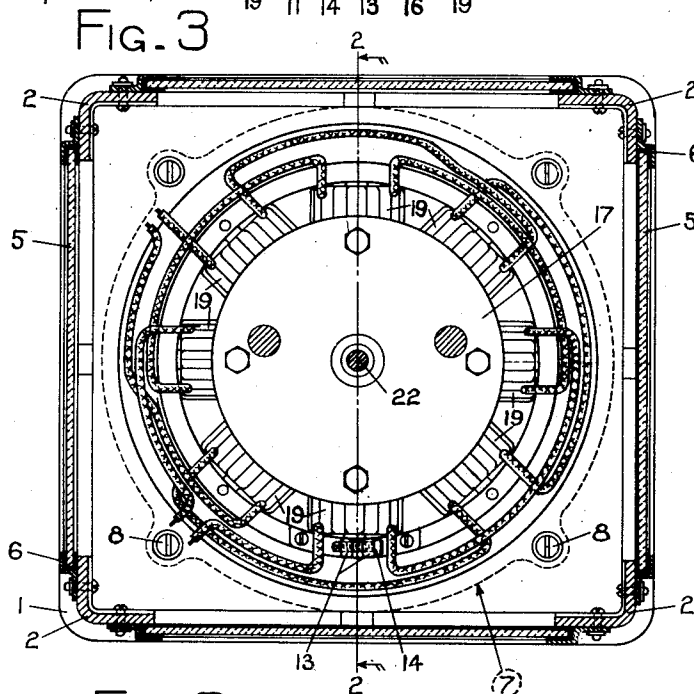
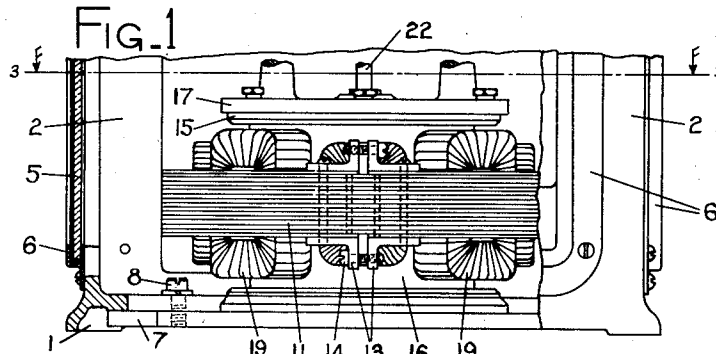
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1,794,618

ALTERNATING CURRENT RELAY MOTOR

Filed Nov. 17, 1926

2 Sheets-Sheet 1



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FIG. 2.

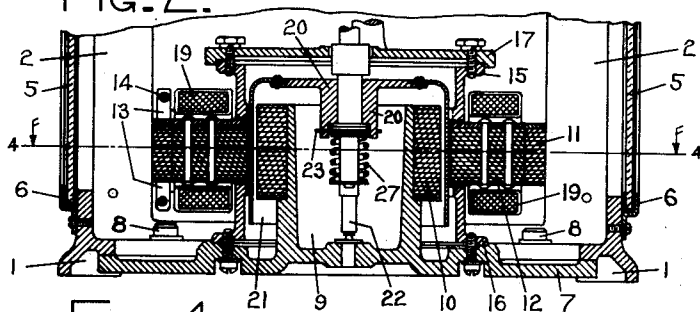


FIG. 4.

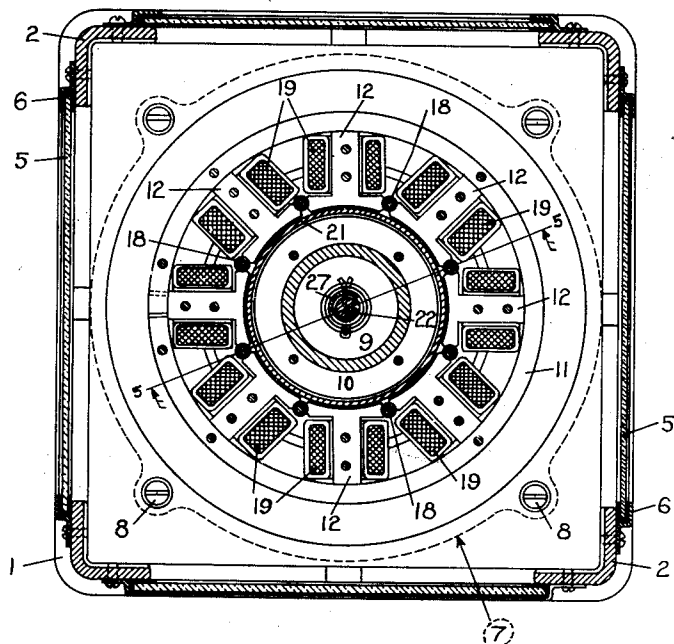
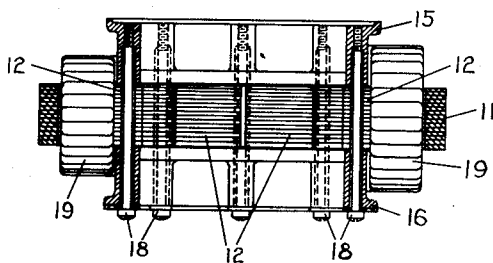


FIG. 5.



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ALTERNATING-CURRENT-RELAY MOTOR

Application filed November 17, 1926. Serial No. 148,876.

This invention relates in general to relays for use in railway signaling systems and has more particular reference to an alternating current motor for such relays.

Among the objects of the invention are to improve and simplify the construction of alternating current motors used in relays, to increase the efficiency and reliability of the same, and to decrease the cost of production thereof.

A further object is to provide means for protecting those parts of a motor of the character in question which are most liable to become obstructed by dust and dirt, by completely enclosing the same in a casing, and at the same time leaving various portions of the motor outside of this casing in plan view so as to facilitate inspection of such portions.

Various other objects, purposes, and characteristic features will appear as the description progresses, reference being had to the accompanying drawings, showing solely by way of illustration, one form of device embodying the present invention. In the drawings:—

Fig. 1 is a front elevation of a motor and adjacent parts of a relay, embodying this invention, portions of the casing being shown broken away;

Fig. 2 is a sectional side elevation of the motor, taken substantially on the line 2—2 of Fig. 3, viewed in the direction of the arrows;

Fig. 3 is a horizontal section taken substantially on the line 3—3 of Fig. 1, viewed in the direction of the arrows;

Fig. 4 is a horizontal section substantially on the line 4—4 of Fig. 2, viewed in the direction of the arrows;

Fig. 5 is a vertical section substantially on the line 5—5 of Fig. 4, viewed in the direction of the arrows; and

Fig. 6 is a detail view of a friction clutch used in connection with the invention.

Referring to the drawings, the motor shown to illustrate this invention is supported and enclosed in a box-like casing formed of a skeleton framework comprising a base 1 and corner posts 2, with glass side walls 5 fastened to the framework by bezel rings 6 provided with suitable gaskets as shown.

The motor received in this casing comprises a multi-polar stator, a shell-type rotor, and a fixed core within the rotor. These parts are carried by a detachable bottom plate 7 fastened by screws 8 to the base 1 of the main framework of the relay. This bottom plate 7 has an integral hollow core support 9 onto which the laminæ 10 of the core are pressed. The stator is made up of a circular yoke 11, and a plurality of pole pieces 12. This stator yoke 11 consists of a stacking of laminæ in the form of split rings having their ends slightly separated, the joints of the several rings being staggered, as shown in Figs. 1 and 4. Angle brackets 13 are riveted to the ends of this stator yoke 11 and are connected by clamp screws 14 (see Fig. 1) so that the yoke can be contracted. Each of the pole pieces 12 consists of a stacking of T-shaped laminæ riveted together and having a butt joint with the yoke 11.

The whole stator, including the yoke 11 and the pole pieces 12, is supported by the walls of a rotor casing which comprises upper and lower octagonal shells 15 and 16 (see Fig. 5) of brass or other suitable non-magnetic material, and a cover 17 fastened to the upper shell 15 by tap bolts (see Fig. 2). The lower shell 16 is fastened to the bottom plate 7 by screws having their heads countersunk in recesses in said bottom plate. The stator 11 is disposed between the shells 15 and 16, with suitable interposed gaskets, and said shells are clamped together by a number of long screws 18 surrounded by suitable bushings. These screws 18 pass between the tips of the pole pieces 12, which tips are slightly recessed to receive said screws and bushings (see Fig. 4). The coils 19 for the stator are form wound, and are put in place before the pole pieces 12 and the stator yoke 11 are assembled. By tightening the screws 14, the yoke 11 can be contracted to form a tight joint with the pole pieces 12 and hold all the parts rigidly together. The alternate coils 19 are connected in series, as shown in Fig. 3, to form a two-phase winding, comprising a local winding and a track or line winding.

The rotor comprises a hub 20 and a shell 21, the shell being made of brass, aluminum

or similar light and electrically conductive material. The hub 20 is connected to a rotor shaft 22 by a friction clutch and lost-motion device shown in detail in Fig. 6. This device comprises a driving member 23 loose on the shaft 22 and having two radial arms which engage lugs 20^a integral with the hub 20. On each side of this member 23 is a washer 24 having an integral tongue fitting into the slot or keyway 25 in the rotor shaft 22, and between said member 23 and each washer 24 is a friction disc 26, these parts being pressed together by a spring 27. The inner washer 24 bears against a shoulder on the shaft 22, and the rotor hub 20 may turn freely on said shaft except as its movement is limited by the engagement of the lugs 20^a with the arm of member 23 and friction between member 23, washers 24, and the friction disks 26.

When the stator windings are energized with alternating current having the proper phase displacement the rotor is caused to rotate in one direction or the other, depending upon the phase relation of the currents in said windings, in much the same way as the well known induction motor operates. Assuming that the rotor turns in the counterclockwise direction as viewed in Fig. 6, the lugs 20^a engage the arms of member 23 and drive the shaft 22 and actuate the circuit controlling elements of the relay. During this operation the movement of the parts is comparatively quick, and the friction clutch is employed so that the rotor may, if necessary, continue its movement and over run slightly in opposition to the friction of the clutch, when the circuit controlling elements stop, thereby avoiding shock and jar to the mechanism.

Upon de-energization of the relay, which in practice is usually accomplished by cutting off the supply of alternating current to one of the stator windings while maintaining it on the other, the parts of the relay, including the shaft 22 and the rotor 21, are returned to their neutral or biased position, by a suitable counter-weighting means not shown. This return movement drives the rotor 21 and its shaft 22 backward, that is, in the clockwise direction in the instance assumed; and during this backward movement the rotor acquires considerable momentum on account of its speed and weight. After the circuit controlling elements of the relay come to a stop in the de-energized position, the rotor may continue its movement for part of a revolution, and one of the stator windings being energized, the rotor is gradually braked and brought to rest by the eddy currents induced in it by this winding, and also by the friction between the hub 20 and shaft 22. Thus, the momentum of the rotor is absorbed and does not tend to rotate the shaft 22 beyond its biased position and produce the objectionable "bobbing"

of the contacts which often occurs in practice when the rotor is directly connected to its shaft and the circuit controlling element.

The above rather specific description of one form of applicant's invention, is given solely by way of illustration and is not intended, in any manner whatsoever, in a limiting sense. The invention can take many different physical forms and is susceptible of various modifications, and all such forms and modifications are intended to be included, as come within the scope of the appended claims.

Having described my invention, I now claim:—

1. In a motor for alternating current relays, a stator comprising a plurality of separate laminated pole pieces having widened inner pole faces and spaced outer ends, a laminated ring constructed to be contracted at will and having a butt joint with the spaced ends of said pole pieces opposite said pole faces, and form wound coils on said pole pieces.
2. In an alternating current relay, the combination, with a shell-type rotor, of a stator having a plurality of pole pieces with widened pole faces, a form wound coil on each pole piece, said pole faces embracing approximately all of the rotor circumference, non-magnetic spacers between, and bearing against, adjacent parts of said pole pieces, and a contractible stator ring for simultaneously forcing all of said spacers and pole pieces together.
3. A motor for relays, comprising, a rotor and a stator including, a plurality of separate pole pieces, a split ring surrounding the pole pieces and wholly separate therefrom, and means for contracting the ring against the pole pieces to form an unattached butt joint.
4. In a motor, a stator for cooperating with a rotor and including, a plurality of pole pieces, coils on the pole pieces, a laminated split ring enclosing the pole pieces and butting thereagainst, spaced brackets fixed to the ring at opposite sides of the ring split, and means in the brackets for drawing them together to thus contract the ring against the pole pieces.
5. In a motor, a rotor, and a stator including, a plurality of pole pieces, coils on the pole pieces, a laminated split ring enclosing the pole pieces and butting thereagainst, means to contract the ring against the pole pieces, and a casing enclosing the rotor with the stator coils outside thereof.
6. In a motor, a rotor, and a stator including, a plurality of pole pieces, coils on the pole pieces, a laminated split ring enclosing the pole pieces and butting thereagainst, spaced brackets fixed to the ring at opposite sides of the ring split, means in the brackets for drawing them together to thus contract the ring against the pole pieces, and a casing enclosing

ing the rotor with the stator coils outside thereof.

7. A motor for relays, comprising, a rotor, a stator comprising pole pieces and a split ring, a casing enclosing the rotor, coils on
5 the stator outside of the casing, said split ring encircling said pole pieces, and means for contracting said ring against said pole pieces.

In testimony whereof I affix my signature.

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WINTHROP K. HOWE.

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