R. E. TAYLOR.

ELECTRIC MOTOR.

APPLICATION FILED MAR. 2, 1917.

1,309,159.

Patented July 8, 1919.

3 SHEETS—SHEET 1.

Fig: 1.

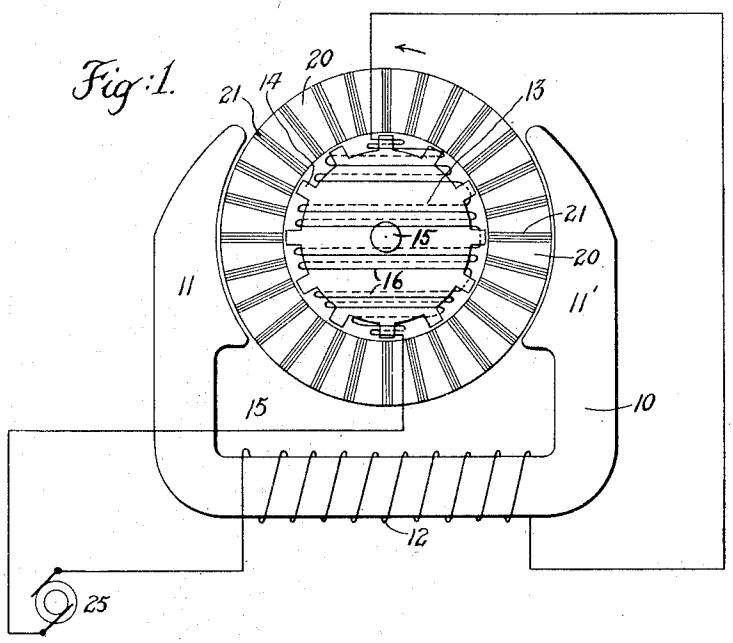
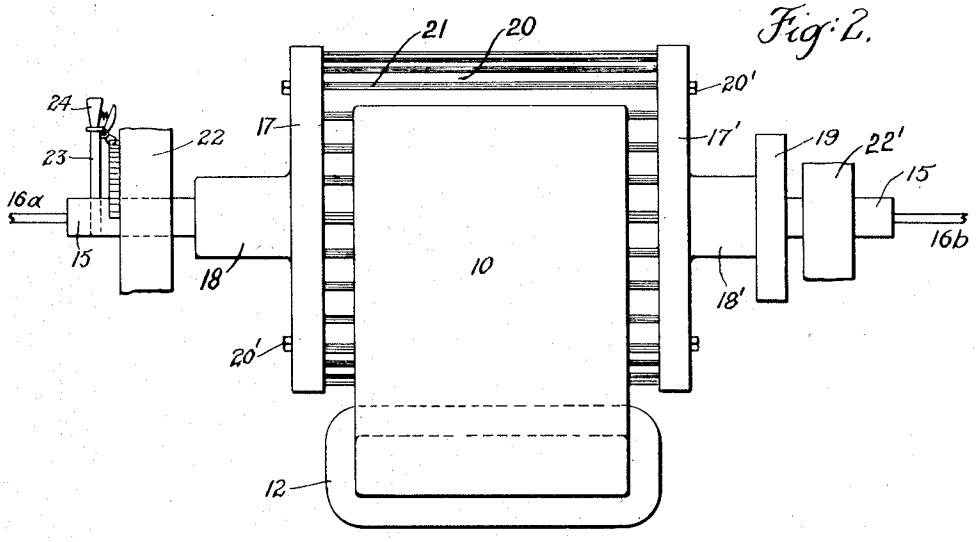


Fig: 2.



Russell E. Taylor Inventor

By his Attorneys,

Edwards, Sager & Richmond.

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3 SHEETS—SHEET 2.

Fig: 3.

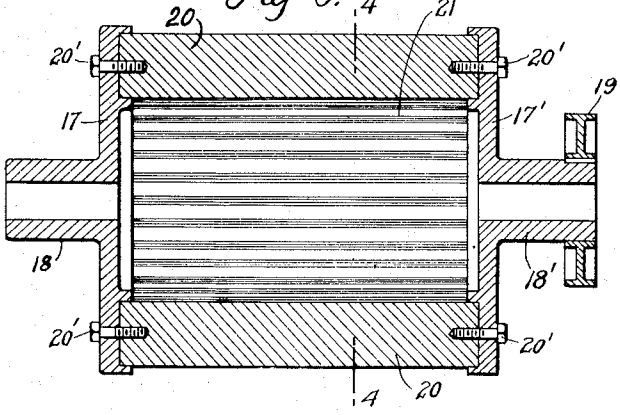


Fig: 4.

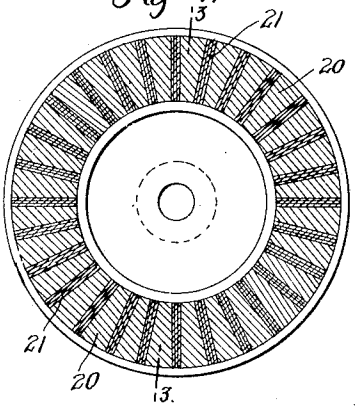
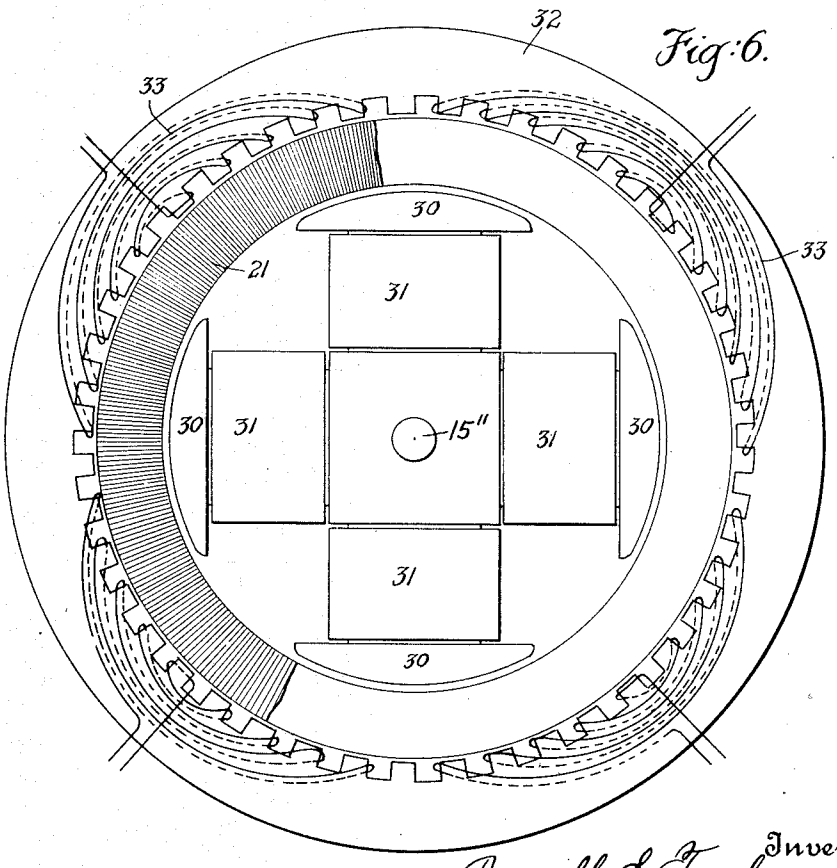


Fig: 6.



Inventor

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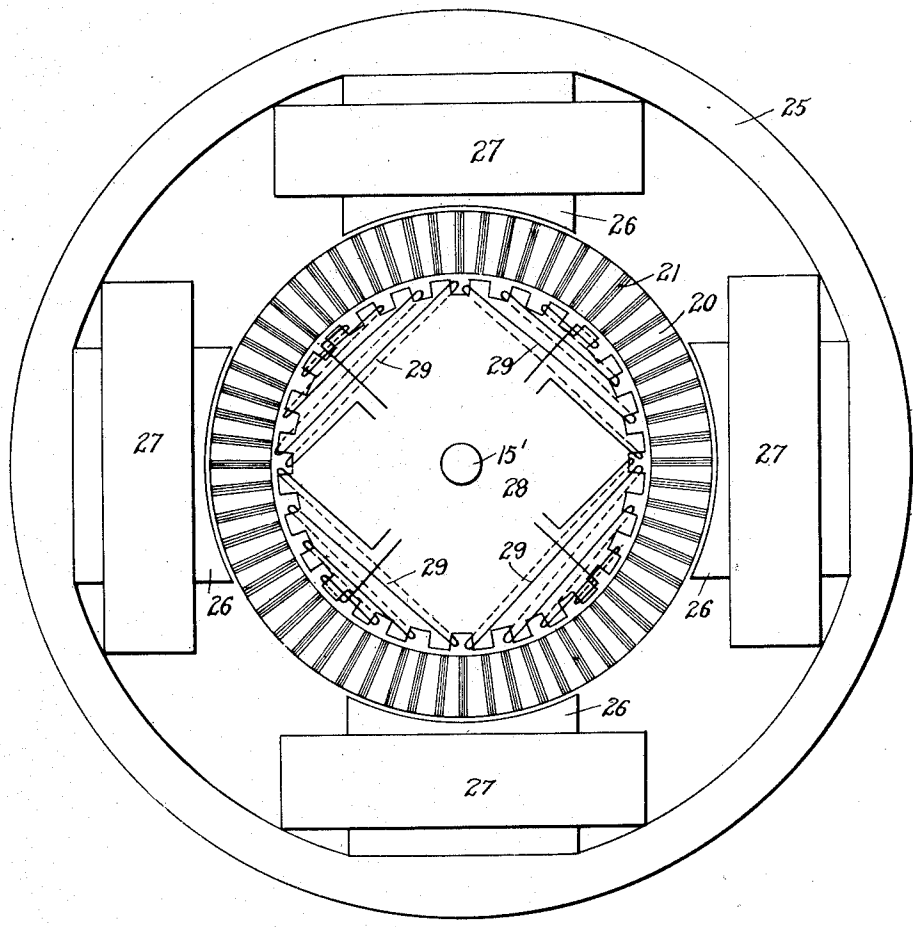
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3 SHEETS—SHEET 3.

Fig: 5.



Inventor
Russell E. Taylor,
By his Attorneys,
Edwards, Sager & Richmond.

UNITED STATES PATENT OFFICE.

RUSSELL E. TAYLOR, OF NEW YORK, N. Y.

ELECTRIC MOTOR.

1,309,159. Specification of Letters Patent. Patented July 8, 1919.

Application filed March 2, 1917. Serial No. 151,934.

To all whom it may concern:

Be it known that I, RUSSELL E. TAYLOR, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electric Motors, of which the following is a specification.

This invention relates to an improved type of electric motor adapted for operation by alternating current.

One object of my invention is to avoid the use of rotating current-carrying conductors as well as the use of sliding contacts, conducting current. Another object is the provision of a simple, rugged and durable form of construction and relationship of parts which in operation require no appreciable attention and substantially avoid damage from careless or improper use. Other objects and advantages of my invention will be understood from the following description and accompanying drawings.

My invention is based upon the influence of a magnetic field upon magnetic elements so as to cause the continuous rotation of such magnetic elements by reason of the latter being caused to successively enter the magnetic field and being influenced thereby to exert a torque upon the rotatably supported member carrying said elements.

Referring to the accompanying drawings, Figure 1 is an end view of one form of motor embodying my invention partly in diagram and with certain structural parts omitted for clearness; Fig. 2 is a side view of the motor; Fig. 3 is a vertical cross section of the rotating element of the motor; Fig. 4 is a cross section on the line 4—4 of Fig. 3; Fig. 5 is an end view of a four pole motor embodying my invention with certain parts omitted and partly in diagram, and Fig. 6 is a similar end view of another form of my improved motor.

Referring to Figs. 1 to 4, the element 10 is stationary and made up of laminæ of the general form shown in Fig. 1 having poles 11, 11′ and a winding 12 adapted to receive current from an outside source for magnetizing the laminæ 10. Another stationary element 13 is located between the poles 11, 11′ and is also laminated, the laminæ being of the general outline shown in Fig. 1 having projecting teeth 14. The element 13 is supported upon a shaft 15 and this element and shaft is normally stationary during the operation of the motor. The element 13 is wound with an exciting winding 16 located in the slots of the magnetic element 13 and is shown as wound so as to produce a pair of poles of opposite polarity at the upper and lower portions of the element 13.

The movable element of the motor is made up of non-magnetic end plates 17, 17′ having bearing sleeves 18, 18′, which are journaled upon the normally stationary shaft 15, the sleeve 18′ being shown as carrying a pulley, gear, or the like, 19, for delivering mechanical power therefrom. Between the end plates 17 and 17′ are a series of supporting parts 20 of non-magnetic material. Between these supports 20 are uniformly distributed magnetic elements of soft iron or soft steel and in this particular instance are shown in the form of soft iron or soft steel laminæ 21 in the form of rectangular strips of approximately the same dimensions and shape as the supporting and spacing strips 20. In the present instance several laminæ 21 are grouped together and located between successive supports 20, but in some instances only one lamina may be inserted between successive spacing blocks. I preferably insulate each lamina by a coating of varnish, japan or other insulating sheet material. The spacing sections 20 and laminæ 21 are supported by the end plates 17, 17′, which plates may be secured to the spacing sections 20 at suitable points by screws 20′ or by through bolts extending between the end plates.

The normally stationary shaft 15 is indicated in Fig. 2 as being supported by fixed supports 22, 22′. Secured to the shaft 15 is a projecting lever 23 with a handle 24 with any suitable latch or locking device adapted to secure the lever 23 to the support 22 so as to hold the shaft 15 in any desired fixed position after adjustment thereto by the handle 24.

The two leads from the winding 16 may be conveniently passed through its supporting shaft 15 for connection to the outside source of current, as indicated by the leads 16^a, 16^b in Fig. 2.

The windings 12, 16 are shown in Fig. 1

as connected in series with each other and with an alternating current source 25, and when current is supplied to the motor, the intermediate movable element will rotate giving power available from the pulley 19.

When the magnetic element 13 is adjusted angularly by means of the handle 24, the speed of the motor gradually decreases and when the north pole of the magnetic element 13 is directly opposite the south pole of the element 10, there will be no rotation of the motor, the magnetic flux tending to retain the movable element in fixed position.

Fig. 5 shows a multipolar form of construction of my improved motor. The frame 25 carries projecting poles 26 of alternating polarity which poles have exciting windings 27. The poles 26 and magnetic frame 25 are built up of laminæ. The inner stationary element is indicated at 28 made up of laminæ supported upon the shaft 15′ and having windings 29 wound as shown to give four poles of alternate polarity corresponding to the four poles of the outside stationary element, but angularly displaced therefrom for securing rotation of the movable element. The movable element in this figure is the same form of construction as already described, being made up of supporting non-magnetic sections 20 between which are located the laminæ 21 of soft iron or soft steel.

Fig. 6 illustrates a form of my invention wherein the stationary member having salient poles is the inner member and the element having the distributed windings is the outer stationary element. Thus the figure shows shaft 15″ supporting salient poles 30 having thereon exciting windings 31. The outer element has the stationary internally toothed magnetic element 32 having distributed exciting windings 33 which create four magnetic poles corresponding to the four poles of the inner element. The movable element, as may be desirable in some cases, has all of its circumference occupied by laminæ in this figure.

The magnetic elements 21 will preferably be in such a number of sections, in case of division into sections, in relation to the salient poles and teeth of the exterior and interior elements as to have an unsymmetrical relation thereto.

It will be understood that in some instances the inner and outer elements may from special consideration be made the movable elements and the intermediate element be stationary.

Although I have described the windings of the two elements as being connected in series with each other, they may in some cases be connected in parallel relation, or the windings of the different poles may be connected in parallel relation or in series parallel combinations as desired. When a polyphase source of supply is utilized, the windings will be connected in polyphase circuits correspondingly.

Although I have described one element as having salient poles and the other element as having their poles created by distributed windings, yet in some instances, both elements may have distributed windings and in some cases both elements may have salient poles.

Although I have described the soft iron or soft steel magnetic elements of the intermediate member as being in the form of rectangular shaped laminæ, yet they may have other forms of construction and supported in various other ways than the particular construction above described; also instead of these elements being formed from sheet iron or steel, they may be cast in some instances and supported in any suitable manner.

It will be understood that various other modifications may be made without departing from the scope of my invention.

I claim:—

1. The combination with an alternating current source of an alternating current motor, said motor having an inner element, an outer element, each of said elements having magnetic poles and having windings excited from said alternating current source, and an intermediate relatively movable element comprising magnetic material subjected to the influence of said poles and interposed non-magnetic material for opposing passage of magnetic flux in a circumferential direction.

2. The combination with an alternating current source of an alternating current motor, said motor having an inner element, an outer element, each of said elements having magnetic poles displaced relatively to the poles of the other element and having windings excited from said source, and an intermediate relatively movable element comprising magnetic material subjected to the influence of said poles and means for opposing passage of magnetic flux in a circumferential direction through said intermediate element.

3. The combination with an alternating current source of an alternating current motor, said motor having an inner magnetic element, an outer magnetic element, each of said elements having magnetic poles and having windings excited from said source, and an intermediate element comprising soft iron or steel magnetized by the influence of the poles of said inner and outer elements and having means for opposing the passage of magnetic flux in a circumferential direction through said intermediate element.

4. The combination with an alternating current source of an alternating current motor, said motor having an interior magnetic element, an exterior magnetic element,

said elements having magnetic poles of different character and having windings excited from said source, and an intermediate movable element comprising soft iron or steel magnetized by the influence of said poles and having means for opposing passage of magnetic flux in a circumferential direction through said intermediate element.

5. The combination with an alternating current source of an alternating current motor, said motor having an exterior stationary element having magnetic poles, an interior stationary element having magnetic poles, the poles of one of said elements being salient and having windings and the poles of the other of said elements being excited by distributed windings, said windings being excited from said source, and an intermediate movable element having magnetic portions affected by said magnetic poles.

6. In an electric motor, an exterior element having magnetic poles, an interior element having magnetic poles, the poles of one of said elements being salient and the other of said elements having poles comprising a plurality of projecting teeth, the poles of one element being angularly displaced with reference to the poles of the other element, windings on said poles, and an intermediate element having magnetic portions affected by said magnetic poles.

7. The combination with an alternating current source of an alternating current motor, said motor having an exterior element having magnetic poles, an interior element having magnetic poles, windings on said poles excited from said source, and an intermediate magnetic element having its magnetic material radially disposed and extending in a direction parallel to the axis of the motor and affected by said poles, the magnetic circuit of said material in a circumferential direction being interrupted to minimize passage of magnetic flux in a circumferential direction.

8. The combination with an alternating current source of an alternating current motor, said motor having an exterior element having magnetic poles, an interior element having magnetic poles, windings on said poles excited from said source, an intermediate element having magnetic portions subjected to the influence of said poles and having means for opposing passage of magnetic flux in a circumferential direction and means for relatively adjusting the relationship between the poles of the inner and outer elements.

9. The combination with an alternating current source of an alternating current motor, said motor having an outer stationary element, an inner stationary element, said elements each having windings excited from said source, and an intermediate rotor, said rotor having means for transmitting lines of force from one of said elements to the other and having means for opposing passage of magnetic flux in a circumferential direction through said rotor.

10. The combination with an alternating current source of an alternating current motor, said motor having an exterior element having magnetic poles, an interior element having magnetic poles, windings on said poles excited from said source, and an intermediate element having portions of magnetic material spaced apart by non-magnetic material for opposing passage of magnetic flux in the circumferential direction through said intermediate element.

RUSSELL E. TAYLOR.