

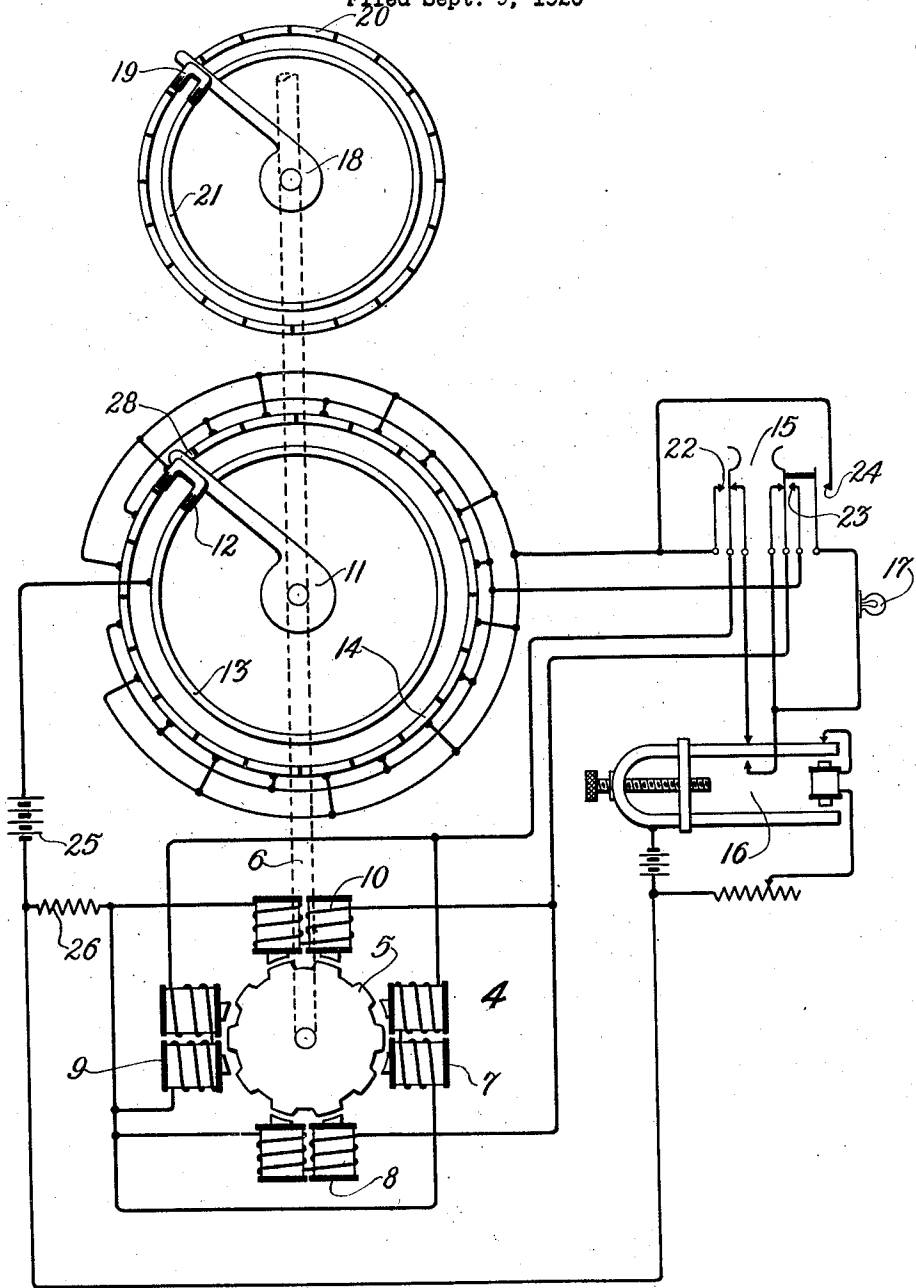
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P. M. RAINEY ET AL

STARTING DEVICE

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UNITED STATES PATENT OFFICE.

PAUL M. RAINEY, OF GLEN RIDGE, NEW JERSEY, AND GEORGE A. LOCKE, OF MASPETH, NEW YORK, ASSIGNORS TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

STARTING DEVICE.

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To all whom it may concern:

Be it known that we, PAUL M. RAINEY and GEORGE A. LOCKE, citizens of the United States, residing at Glen Ridge, in the county of Essex and State of New Jersey, and at Maspeth, in the county of Queens and State of New York, respectively, have invented certain new and useful Improvements in Starting Devices, of which the following is a full, clear, concise, and exact description.

This invention relates to starting devices and particularly to means whereby a La Cour motor may be automatically started from a position of rest.

The La Cour motor comprises a toothed member which forms the armature of the motor and which is arranged to be propelled by a series of magnets. These magnets are designed to be alternately energized and de-energized for producing a torque sufficient to cause the rotation of the armature. The energization and deenergization of the respective magnets is accomplished by means of a tuning fork or other suitable vibrating contact means operative at a uniform speed. Heretofore, in order to produce a condition whereby the motor will be driven by impulses produced by the tuning fork, it has been customary to start the motor by either rotating the armature by hand until the speed thereof is substantially that of the tuning fork, or by the use of an auxiliary motor.

It is the object of the present invention to provide an arrangement embodying means whereby the motor will automatically attain a speed substantially equal to that of the tuning fork without resorting to either of the methods heretofore described.

The above and other objects of the invention will be fully set forth in the following description and will be readily comprehended when considered in conjunction with the accompanying drawing, wherein one embodiment of the invention is shown.

In the drawing, there is shown a La Cour motor 4 which consists of a toothed member 5 mounted on a shaft 6. This member 5 forms the armature of the motor and is adapted to be set in rotation by means of suitable magnets 7, 8, 9 and 10. These magnets are connected in multiples of two, each set being arranged to be alternately energized and deenergized for producing a

torque sufficient to cause the member 5 to rotate.

Mounted on the shaft 6 is an arm 11 which carries a brush 12. The brush 12 is designed to bridge a continuous ring 13 with the segments of a segmented ring 14, the alternate segments of the ring 14 being connected together forming two sets of ten segments each. The two groups of magnets are connected with the respective sets of segments so that as the brush 12 passes over the segments, current will be alternately applied to the magnets. The arm 11 is mounted on the shaft 6 with relation to the member 5 in such a manner that whenever a pole of this member is between the pole pieces of the magnets, the brush 12 will be on a segment applying battery to that particular magnet or group thereof. Connected between the segments of the segmented ring 14 and the magnets of the motor is a switch 15. This switch serves to connect the magnets with either the segmented ring 14 or the tines of the tuning fork 16. When the key 15 is in its normal position as shown in the drawing, the magnets are connected with the upper tine of the tuning fork, while when it is in its actuated position, the magnets of the motor are connected with the segmented ring 14.

Inasmuch as the principle of the operation of the tuning fork is well known, it is considered that a description thereof is unnecessary, especially since it does not form a part of the present invention.

There is also mounted on the shaft 6 a second arm 18 carrying a suitable brush 19 designed to bridge a segmented ring 20 with a continuous ring 21. This distributor may be used either for the receiving or sending of the current impulses composing a message. It is also possible, after the motor has attained a speed approximating that of the tuning fork and the circuits of the magnets 7, 8, 9 and 10 have been transferred thereto, to utilize the distributor comprising the rings 13 and 14 and the brush 12 for this purpose. The use thereof under other circumstances may also be found advantageous.

In order that an operator may readily determine when the motor is in synchronism with the impulses of the tuning fork, an incandescent lamp 17 is provided. As

shown in the drawing, this lamp is connected between one set of segments of the segmented ring 14 and a contact on the tuning fork 16 through a contact on the key 15.

5 The point to which this lamp is connected being opposite in polarity when the fork is on a contact at the same time that the brush 12 is on one of the segments to which the lamp is connected, a circuit will be estab-

10 lished including this lamp. If, however, the fork is vibrated and the motor stationary on one of the segments to which the lamp is connected, a series of short flashes will be produced due to the vibration of the fork.

15 These flashes will appear at the lamp as a practically steady light. When the distributor begins to revolve the lamp will only receive a series of flashes while the brush of the distributor is passing over the seg-

20 ments to which the lamp is connected. While the brush is passing over the other segments of the distributor the circuit including the lamp is severed and periods of darkness will therefore be produced. As

25 the speed of the motor increases the period at which the lamp flashes will be of a short duration gradually approaching the time required for the tongue of the tuning fork to remain on its contact. After this point,

30 the periods of light and darkness will increase in length. This is due to the fact that when the brush is passing over the segment to which the lamp is connected, the fork will also be on the contact to which the lamp is in turn connected. The periods of light will

35 be produced in this case by a series of flashes due, not to the fork contact alone, but to the combined effect of the distributor brush and the fork contact. The periods of dark-

40 ness will also be produced due to the fact that the distributor is not yet up to the speed of the tuning fork and therefore there will be times when the speed of the fork will be ahead of that of the distributor so

45 that when the distributor is on the segment to which the lamp is connected the fork will be on the opposite contact and vice versa when the brush passes to the next segment. As the speed of the distributor approaches

50 the speed of the fork the periods of light and darkness will increase. Therefore, as the two attain approximately the same speed periods of light and darkness of maximum duration will be produced.

55 Assuming now that it is desired to start the motor from a position of rest the key 15 would be actuated to close contacts 22, 23 and 24. The closure of these contacts connects the magnets of the motor 4 with

60 the two sets of segments of the segmented ring 14. Battery will thus be applied to the magnets connected with the segments upon which the brush 12 is at that time positioned, the circuit of which may be traced from

65 the positive terminal of the battery 25, re-

sistance 26, winding of magnets 9 and 7 in parallel, contact 22 of key 15, segment 28 of ring 14, brush 12, ring 13 to the negative terminal of the battery 25. The passage of current through the magnets 9 and 7 in this manner thereupon produce an electrical condition whereby the member 5 will be caused to rotate. As the member 5 rotates, the shaft 6 will likewise be revolved for moving the brush 12 to the next adjacent segment. When the member 5 has turned in this manner a pole thereof is now between the pole pieces of the other two magnets 8 and 10 respectively and since the brush 12 has also engaged the next segment of the segmented ring 14, current will thus flow through these magnets. It is therefore seen that a further torque is produced. By alternately connecting the respective magnets with the battery 25 the member 5 will gradually increase in speed until the friction, windage and other losses are equivalent to the power input.

During the starting of the motor the lamp 17 is connected in circuit with one set of segments of the segmented ring 14 and a contact on the tuning fork 16. This lamp will thereupon be lighted in the manner previously described. When the motor attains a speed approximating that of the tuning fork the periods of light and darkness of maximum duration will be produced, during each of which periods the motor circuit may be transferred to the tuning fork by merely restoring key 15 to normal.

What is claimed is:

1. The combination with a La Cour motor, having an armature and a plurality of magnets, a source of current, auxiliary means for connecting said source of current with said magnets for producing a torque sufficient to automatically start said motor, means for controlling the energization of said magnets at a uniform rate, and means controlled jointly by said motor and said last recited means for automatically indicating when a condition of synchronism exists between said motor and said last recited means.
2. The combination with a La Cour motor having an armature and a plurality of diametrically opposite magnets connected in pairs, means comprising a segmented ring having the alternate segments connected with alternate pairs of said magnets, a source of current, means cooperating with said ring for applying current from said source to said pairs of magnets in alternations for producing a torque sufficient to cause said motor to attain a speed approximating that of normal operation, a tuning fork for controlling the alternate energization of said magnets, and means controlled jointly by said motor and said tuning fork for automatically indicating

when the speed of said motor approximates the period of said tuning fork.

3. The combination with a La Cour motor having a plurality of sets of magnets, the magnets in each set being connected in multiple, a toothed armature, a shaft attached to said armature, a tuning fork operative at a uniform rate for alternately energizing said magnets, a self starting device comprising a distributor face having the alternate segments thereof connected in groups, a brush arm secured to said shaft and arranged to apply current to the sets of said magnets in alternation for starting said motor, a switch for transferring the circuits of said magnets from said distributor face to a line of said tuning fork, and means controlled jointly by said motor and tuning fork for automatically indicating when a condition of synchronism exists between said motor and said tuning fork.

4. The combination with a La Cour motor having a plurality of sets of magnets, the magnets in each set being connected in multiple, an armature, a shaft attached to said armature, means for alternately energizing said magnets, a self starting device for said motor comprising a segmented ring having the alternate segments adapted to be connected with respective sets of said magnets, contacting means co-operating with said ring and ro-

tating with said shaft for alternately applying current to said magnets whereby the speed of said motor may be increased, and means controlled jointly by said motor and said first mentioned means for automatically indicating when a condition of synchronism exists between said motor and said first mentioned means.

5. The combination with a La Cour motor having a plurality of sets of magnets, the magnets in each set being connected in multiple, an armature, a shaft attached to said armature, means for alternately energizing said magnets, a self-starting device for said motor comprising a segmented ring having the alternate segments connected with respective sets of said magnets, conducting means cooperating with said ring and rotating with said shaft for alternately applying current to said magnets whereby the speed of said motor may be increased, and a lamp under the joint control of said motor and said first mentioned means for automatically indicating when a condition of synchronism exists between said motor and said first mentioned means.

In witness whereof I hereunto subscribe my name this 2nd day of September, A. D. 1920.

PAUL M. RAINEY.
GEORGE A. LOCKE.