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J. A. LE PAGE

1,940,552

TOY MOTOR

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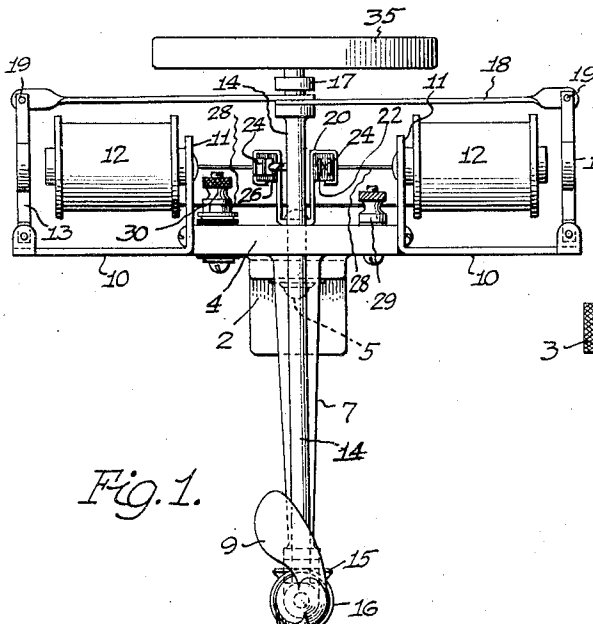


Fig. 1.

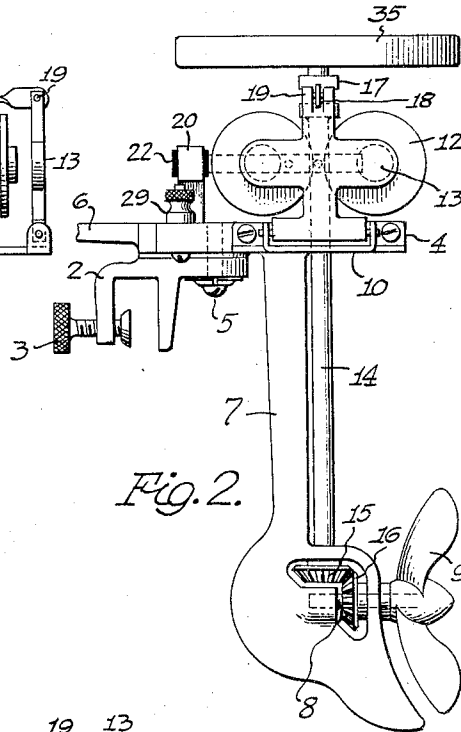


Fig. 2.

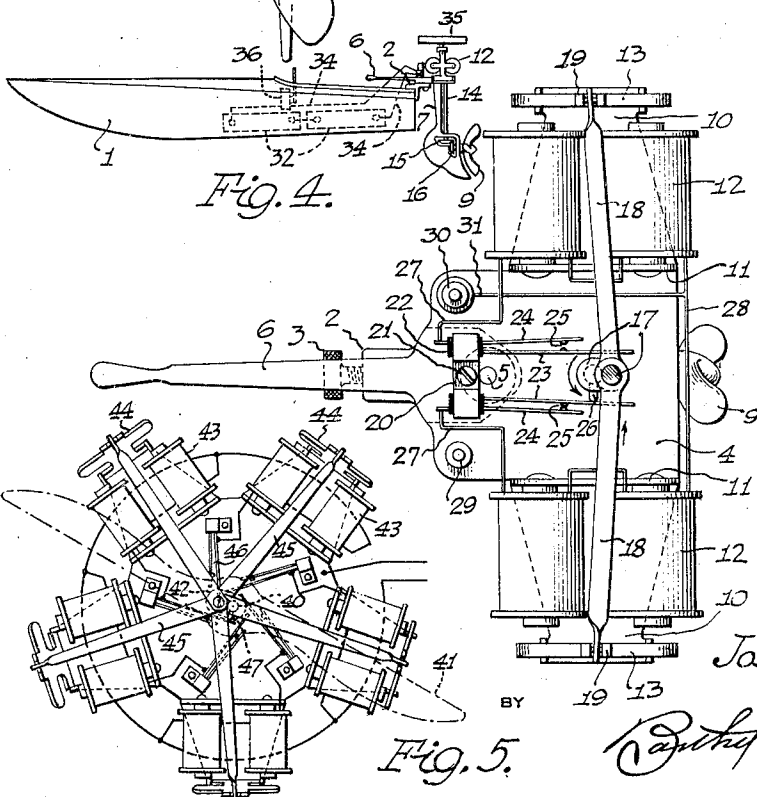


Fig. 3.

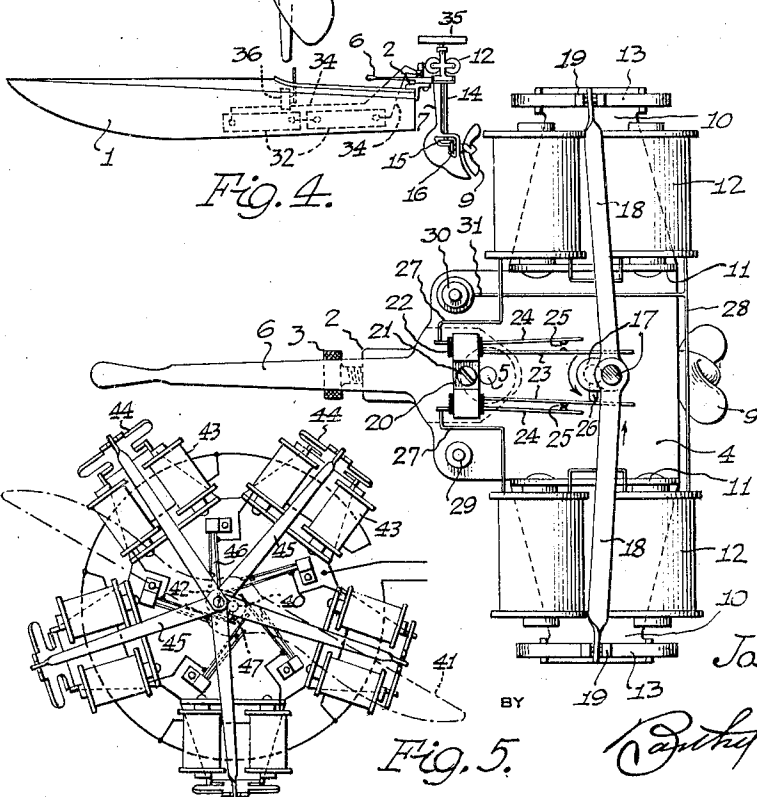


Fig. 4.

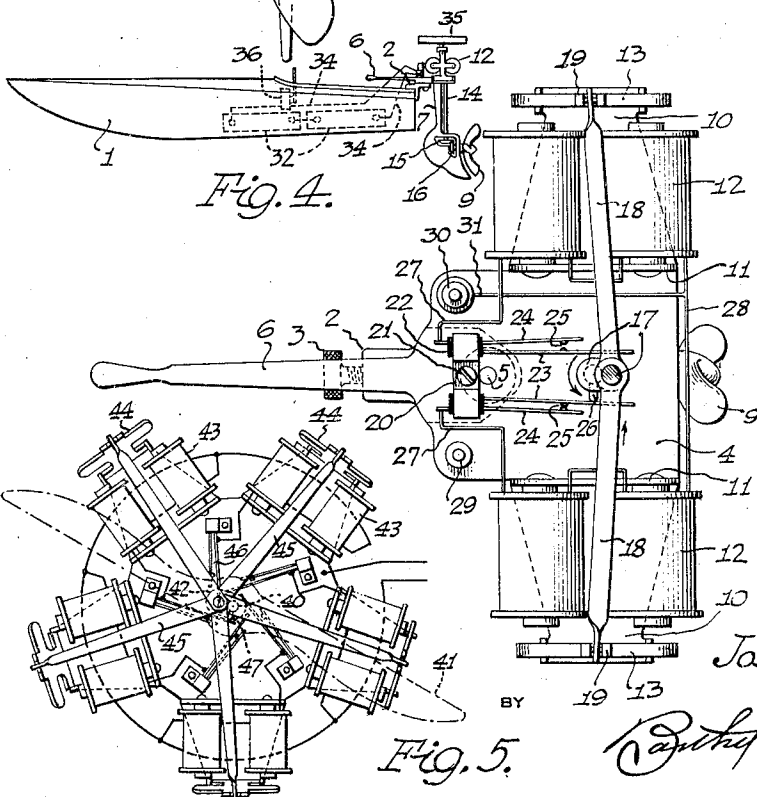


Fig. 5.

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TOY MOTOR

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5 Claims. (Cl. 172-126)

The present invention pertains to a novel motor designed particularly for use in toys and operated by the attraction of an armature to an electromagnet. The principal object of the invention is to provide such a motor which may be conveniently installed in a toy and operated by a battery in the toy and which further is so constructed that the electromagnets resemble cylinders and thereby given the appearance of a full size motor. This arrangement lends itself particularly to the construction of miniature outboard and aeroplane motors which have at least a general resemblance to full size, practical constructions.

In the preferred embodiments of the invention, the electromagnets are preferably provided in multiples at different angles to a power shaft and operatively connected to the shaft by rods extending from their respective armatures to a crank on the shaft. Each electromagnet has a separate control switch which is normally open, and the switches are successively closed by a cam or similar device carried by the power shaft. Thus, the armatures are attracted in succession and are joined to the power shaft in such a manner as to apply successive impulses thereto, thereby maintaining the shaft in rotation. Where only two armatures are employed, as in an outboard motor, the shaft carries a flywheel for turning it over dead center.

The invention is fully disclosed by way of example in the following description and in the accompanying drawing, in which—

Figure 1 is a rear elevation of a miniature outboard motor constructed according to the invention;

Fig. 2 is a side elevation;

Fig. 3 is a plan section;

Fig. 4 is a side elevation of a boat equipped with a motor according to the invention; and

Fig. 5 is an elevation of a radial motor for an aeroplane.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

Figure 4 illustrates a toy boat 1 to which an outboard motor built according to the invention is to be applied. The attachment is made by means of a bracket 2 secured to the stern of the boat by a clamping screw 3. Upon the bracket is mounted a base member 4 held by a pivot pin 5, and a tiller 6 extends from the base member into the boat for a purpose which will presently be described. An arm 7 extends vertically downward from the base 4 and serves as the bearing

for a propeller shaft 8 which carries a propeller 9.

To opposite edges of the base member 4 are secured L-shaped brackets 10, the vertical portions 11 of which are inward or immediately adjacent the base member. To the portions 11 are secured electromagnets 12, preferably arranged in pairs. To the outer end of each bracket is pivotally attached an armature 13 for the adjacent electromagnet or magnets.

A vertical power shaft 14 is journaled in the base 4 and in the lower part of the arm 7, and its lower end carries a bevel pinion 15 meshing with another bevel pinion 16 on the propeller shaft 8. The upper end of the shaft 14 is formed with a crank 17, from the outer end of which are extended connecting rods 18 pivotally attached to the upper ends of the respective armatures 13 as indicated by the numeral 19.

A bracket 20 is secured upon the base 4 by a screw 21 and is symmetrical with the longitudinal axis of the base. The bracket carries a pair of insulated blocks 22 at opposite sides of this axis, and in each block are secured the ends of a pair of spaced contacts 23 and 24 insulated from each other and from the base 4. The members 23 extend beyond the shaft 14 at opposite sides thereof and normally tend to separate from the respective contacts 24. The inner faces of the members 23 and 24 carry suitable contact points 25 adapted to come into engagement with each other when the corresponding contact 23 is engaged by a finger or cam 26 extending from the shaft 14.

The contacts 24 are joined respectively by conductors 27 to one terminal of the magnet or magnets at the sides of the base 4. The remaining terminals are bridged by another conductor 28. On the base 4 is a binding post 29 grounded thereto, and the base carries another binding post 30 insulated therefrom and joined to the conductor 28 by a conductor 31.

Within the boat 1 are mounted the required number of batteries 32 which are suitably interconnected, and the terminals of the set are connected to the posts 29 and 30 by conductors 33 and 34. In the operation of the device, with the parts in the position shown in Figure 3, the cam 26 causes engagement of one of the pairs of points 25, and a circuit may be traced from the post 29 through the base 4, shaft 14, cam 26, engaged contacts 24 and 25, the corresponding conductor 27 and associated electromagnets 12, conductors 28 and 31, to the post 30. The armature 13 occupying the lower position is thus attracted, turning the crank 17 which is now off dead center.

ter. The cam 26 then disengages the previously mentioned contact 23 and opens the previously described circuit, but the momentum of the shaft 14, assisted by the flywheel 35 at its upper end, turns the shaft at least until the cam 26 engages the opposite contact 23. The corresponding points 25 are thus brought into engagement, completing a circuit from the post 29 thereto and to the associated conductor 26 and magnets 12, returning along a portion of conductor 28 and through conductor 31 to the post 30. This action continues, attracting the armatures alternately and maintaining the shaft 14 in rotation while the batteries 32 are connected to the posts 29 and 30, which connection is controlled by a switch 36 inserted in one of the conductors 34.

In Figure 3, the crank 17 is midway between its two dead center positions, but the cam 26 engages the contact 23 about 45° in advance of the position illustrated, so that a circuit to the magnets is completed when the crank is about 45° away from dead center in the direction of rotation. An impulse is given to the shaft at this time and is continued for at least several degrees after the crank passes through the intermediate position shown in Figure 3, when the cam 26 leaves the contact 23. Thus, the device is so constructed that the shaft is given its impulses when in a favorable position, that is, when the crank is off dead center.

This device lends itself admirably to use as a toy or miniature outboard motor inasmuch as it has the general appearance of a double opposed gasoline motor, the coils 12 representing cylinders. Moreover, the entire motor unit may be turned on its pivot 5 by the tiller 6 within the boat, thereby presenting another characteristic of a full size outboard motor boat. Further, the clicking caused by the successive engagement of the armatures with the magnets resembles the explosion noises of an outboard motor.

The invention is also applicable to other toys such as aeroplanes and automobiles, and an assembly for an aeroplane is illustrated in Figure 5. The propeller shaft 40 carries a propeller 41 and is formed with a crank 42. The electromagnets 43 are arranged preferably in pairs, grouped in a circle and disposed radially. Each set of magnets has a suitably supported armature 44 which in turn is joined to the crank 42 by a connecting rod 45. The circuit through each set of magnets is governed by a normally open pair of contacts 46 which are closed successively by a cam 47 on the shaft 40. The cam is so positioned that when it closes the contacts of a given set of magnets the crank 42 is off dead center with respect to the connecting rod 45 of said magnets. Here also the magnets resemble radial cylinders, and the impact of the armatures against the magnets simulates the explosions.

It may now be seen that the invention provides

automatic timing means for the successive energizing of magnetic devices adapted to exert impulses on a shaft, thereby maintaining the shaft in continuous rotation. The number of magnets having armatures connected to the shaft is immaterial, and the invention is useful in any form of device, other than those already mentioned, whose operation depends on the rotation of a shaft.

Although specific embodiments of the invention have been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention, as indicated by the appended claims.

What I claim is:—

1. As a propelling means for toys, a motor for producing rotary movement to an operating shaft of the toy, said motor simulating appearance characteristics of the type of internal combustion motor used in service with commercial apparatus of which the toy is a toy replica, said toy including electro-magnets positioned in the motor assembly in correspondence with the positions of cylinders of the motor of the commercial apparatus to simulate the cylinder appearance, pivoted armatures for said magnets and operatively connected to the shaft to be driven, circuit connections between the magnets and a source of electrical energy supply, and a timing mechanism operative within said connections to render the latter active in a sequence such that the magnets will be rendered active in a definite cycle to thereby cause the respective armature movements to provide a succession of impulses to the driven shaft in simulation of the impulses produced by the activity of the cylinders of the commercial motor, said armatures being positioned to cause forcible contact between armatures and magnets to provide audible simulations of the explosion sounds of the commercial motor.

2. A motor as in claim 1 characterized in that the magnets are positioned to present the cylinder locations of a double-opposed impulse motor applied as an outboard motor assembly.

3. A motor as in claim 1 characterized in that the magnets are positioned to present the cylinder locations of a double-opposed impulse motor applied as an outboard motor assembly, the assembly being pivotally supported and having a handle to simulate the steering handle of the outboard assembly.

4. A motor as in claim 1 characterized in that the magnets are positioned to present the approximate cylinder locations of an airplane radial motor.

5. A motor as in claim 1 characterized in that the magnet axes extend in the general direction of the shaft to be operated, the respective armatures being located at the magnet ends remote from such shaft.

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