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ELECTRIC PROPULSION UNIT FOR MINIATURE RAILWAYS

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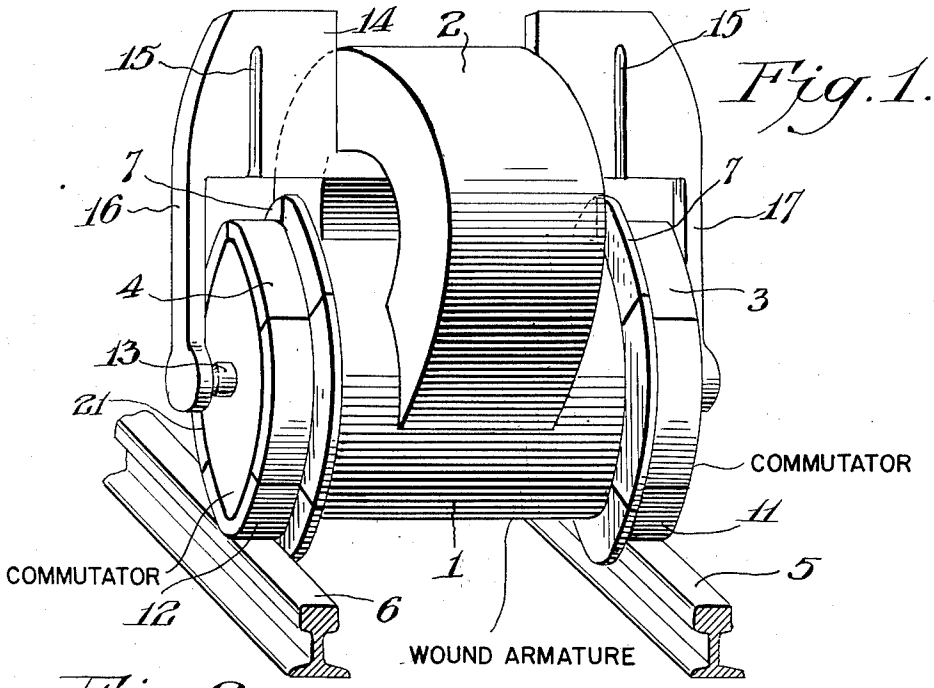


Fig. 1.

Fig. 2.

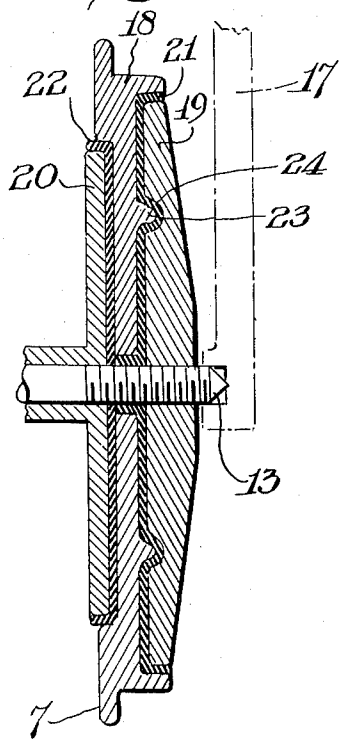
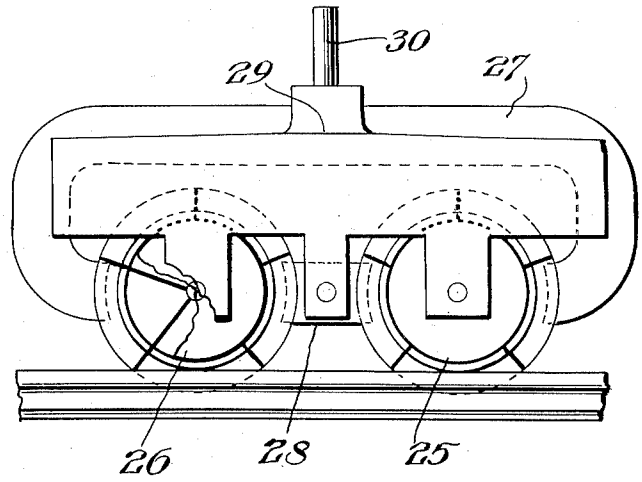


Fig. 3.



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ELECTRIC PROPULSION UNIT FOR MINIATURE RAILWAYS

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3 Claims. (Cl. 105—54)

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My invention relates to an electric power unit. More particularly it concerns such a power unit having the usual fixed magnet and a rotating armature, in which the power developed is taken off directly from two commutators at opposite ends of the armature. In a preferred embodiment, my invention has to do with an extremely simple, small, power unit, particularly designed for miniature railways and the like, in which the two commutators serve as driving wheels and draw the electric current directly from the rails.

The principal object of my invention is to eliminate a number of parts of the conventional electric power unit, such as the brushes, reduction gears, etc., thereby eliminating a great deal of friction and some common sources of trouble. A further object is to provide a complete, self-contained power unit requiring no electrical connections other than its driving wheels. Yet another object is to provide such a power unit which can easily be installed in miniature locomotives or similar toys. Additional objects and advantages of my invention will become apparent from the following description.

The outstanding feature of my invention resides in the provision of two commutators at opposite ends of the armature, which act as the driving means for my novel power unit. Generally these commutators serve the function of driving wheels and act upon a pair of conductors through which the electric current is supplied to the armature. Such a pair of conductors may, for example, be the rails upon which a miniature locomotive runs. However, my invention is not limited to this application of my power unit, since many other applications will undoubtedly occur to those skilled in the art. The idea of employing a pair of commutators as the driving means may be applied whenever the power unit is to move with reference to a corresponding pair of conductors from which the electric current can be drawn. The underlying principle of my invention may aptly be called "rolling commutation," thus distinguishing it from the usual sliding commutation.

In order to utilize the new principle of my invention, it is necessary that the conventional type of armature be modified by providing it with two commutators, one at each end, instead of the usual, single commutator. The pair of commutators so provided are connected to the conventional armature coils in such a manner that the electric current will flow from one segment of one commutator through an armature coil to a corresponding segment of the other commutator. This is, of course, a definite departure from

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the usual practice of employing a pair of brushes to pass current through opposite segments of a single commutator.

My invention can best be described and understood by reference to the accompanying drawings which illustrate several preferred embodiments thereof. In these drawings:

Fig. 1 shows a perspective view of a power unit according to my invention, riding upon a pair of rails from which the electric current is supplied.

Fig. 2 is a detailed, cross-sectional view showing the construction of one of the commutators of the unit shown in Fig. 1, that are used as the driving wheels.

Fig. 3 illustrates, more or less diagrammatically and with parts broken away, another preferred embodiment of my invention in which a pair of armatures each having two commutators is employed to form a self-powered truck having four driving wheels.

Referring now to Figs. 1 and 2, the armature generally is represented by the reference numeral 1. Disposed about said armature is the conventional magnet 2 with its poles diametrically opposed. At the ends of the armature 1 are the commutators 3 and 4 which ride upon the rails 5 and 6, respectively. These commutators are provided with flanges 7 and serve as the driving wheels for the power unit.

No attempt is made to show the actual coil windings of the armature 1, because these are conventional with the exception that, instead of being connected to opposite bars or segments of a single commutator, they are connected to corresponding segments 11 and 12 of the commutator wheels 3 and 4. Thus the rails 5 and 6 serve the function of the pair of brushes that act upon opposite segments of the single commutator in the conventional electric power unit.

A very simple mechanical connection between the magnet 2 and the common axle 13 of the revolving armature 1 and commutator wheels 3 and 4 is provided by the bridge 14 whose cut-out portions 15 impart sufficient elasticity to the arms 16 and 17 to permit them to be spread to receive the ends of the axle 13.

The detailed construction of the segmented driving wheels (commutators) 3 and 4 can best be seen from Fig. 2 in which 18 represents one of the segments. This segment is rigidly held between two discs 19 and 20 and is insulated therefrom by the insulating layers 21 and 22. A locking action is provided by means of the projection 23 upon the segment 18, which fits into a corresponding recess 24 in the disc 19. When the wheel is tightly assembled, it will be com-

posed of the desired number of segments, each insulated from its neighbors and from the axle 13.

The magnet 2 illustrated is a permanent magnet, which is the preferred type, because it permits directional control simply by reversing the flow of direct current. It is also possible to employ an electromagnet, in which case the magnet would have to be energized either through shoes on the rails (shunt) or through brushes acting on the tops of the commutator wheels 3 and 4. The use of an electromagnet thus introduces some friction, additional parts and complicates directional control, since some form of relay would be required.

As previously indicated, the armature 1 is of the conventional type, except that its coils are connected to corresponding segments of two commutators, instead of to opposite segments of a single commutator. It will include a plurality of coils and poles, preferably 2, 3 or 5, depending upon the type of performance desired. It is unnecessary to go into detail with regard to the armature windings, since these are constructed in accordance with well-known principles, the sole difference being that the current is passed through a second commutator, instead of through a separate segment of the same commutator.

Fig. 3 illustrates an embodiment of my invention that is particularly designed for Diesel and power coach reproduction. It shows a self-powered truck including a pair of my new electric power units, which can be installed in a model Diesel or power coach simply by placing the body of the coach over the upwardly projecting pin of my duplex unit.

In the duplex unit of Fig. 3 there are employed two armatures, one of each pair of commutator driving wheels 25 and 26 being shown. A large permanent magnet 27 is disposed above the two armatures with its poles facing opposite sides of each. Between the two armatures is another, smaller permanent magnet 28 whose poles (of opposite polarity) face the sides of each armature opposite to those faced by the poles of the larger magnet 27. A simple mechanical connection 29 (not shown in detail) is provided to maintain these parts in their proper relationship. Above the center of this mechanical connecting means and forming a part thereof is a projecting pin 30 which will fit into a corresponding opening in the body of the miniature Diesel locomotive or power coach that is to be powered by the unit. Thus a simple mechanical connection is afforded, that will permit the entire unit to turn relatively to the body, in order to negotiate curves in the track.

It will be apparent that any desired number of my new power units may be installed in a model train or locomotive to supply whatever amount of power may be desired. One outstanding advantage of these units for this particular purpose, is the elimination of the very substantial friction inherent in the conventional miniature power units, due to the use of brushes and reduction gears. This enables the miniature locomotives and trains employing my new units to coast in a realistic manner, when the electric current is shut off, instead of sliding to a quick stop, as invariably happens when employing the conventional power units.

While I have described my new units with particular reference to their use in miniature locomotives, trains and other track-borne devices, there are many other possible applications. For example, the commutator driving wheels could be shaped in the form of gears and impart a positive drive to a pair of much larger meshed gears from which the electric current is supplied. My power unit could either rotate about the circumference of the larger gears, owing to the absence of further electrical connections, or it might be fixed, thus serving to rotate the larger gears. Instead of large circular gears, one might employ a pair of conductive belts or chains upon which the commutator driving wheels could act.

Since many widely varying embodiments of my invention are possible, it should be understood that it is not limited to those specifically discussed herein. It includes all devices embodying the novel principles I have disclosed, coming within the scope of the appended claims, and their obvious equivalents.

I claim:

1. An electric power unit for miniature railways comprising a permanent magnet, a rotatable armature between the poles thereof, and two separate commutators mounted at opposite ends of the armature, said commutators having the form of flanged driving wheels adapted to ride upon a pair of rails, whose flanges and bearing surfaces are divided into a plurality of segments, each of which is insulated from the others, electrically connected to a coil of the armature and rigidly held between two discs forming part of the wheel, from which it is likewise insulated.

2. A self-contained electric power truck for miniature railways, comprising a relatively large, C-shaped permanent magnet, two rotatable armatures lying side by side between the poles thereof, and a relatively small I-shaped permanent magnet disposed between said armatures with its poles directed towards opposite poles of the larger magnet, each of said armatures having two separate commutators mounted at opposite ends, said commutators having the form of flanged driving wheels, adapted to ride upon a pair of rails, the flanges and bearing surfaces of said wheels being divided into a plurality of segments each of which is insulated from the others and electrically connected to the armature, said segments being rigidly held between clamping discs to form the wheels.

3. A flanged driving wheel adapted to ride upon a rail and to act as a commutator of an electric power unit, said wheel comprising a plurality of similarly shaped segments of conductive material, each including a portion of the flange and bearing surface of the wheel, said segments being assembled in circular form and rigidly held between two discs forming part of the wheel, and each segment being insulated from the others and from said discs.

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