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DRIVING MECHANISM FOR RUNNING TOYS

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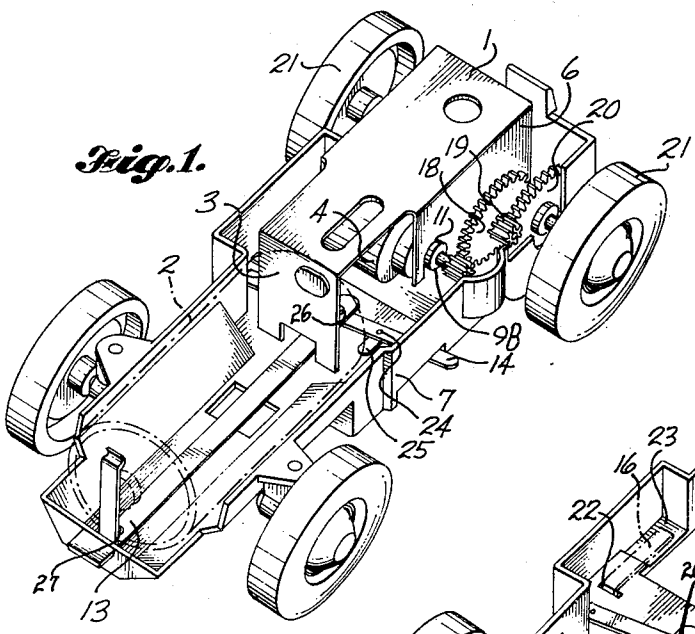


Fig. 1.

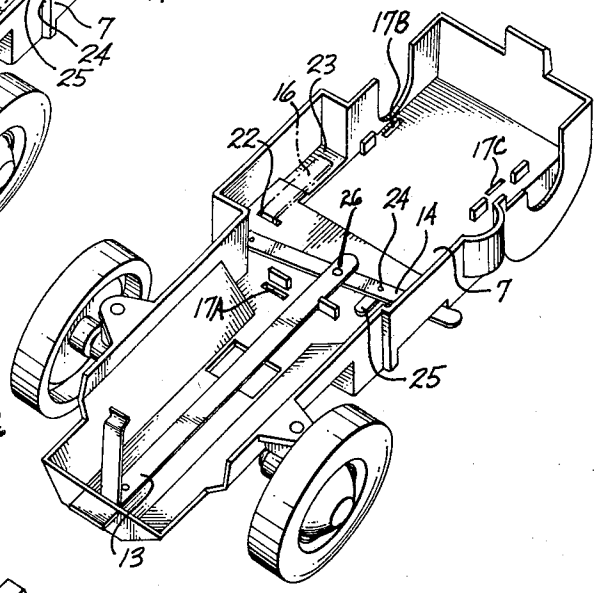


Fig. 2.



Fig. 3.

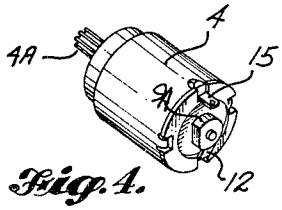


Fig. 4.

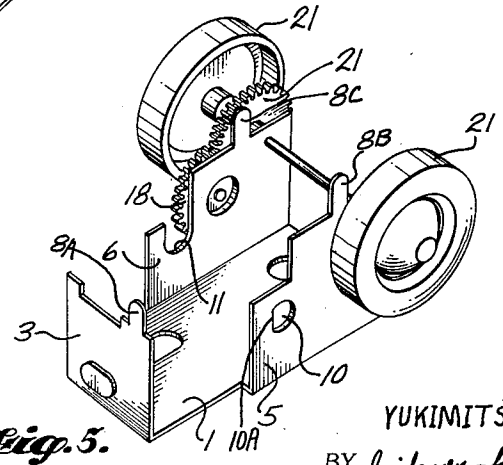


Fig. 5.

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DRIVING MECHANISM FOR RUNNING TOYS

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ABSTRACT OF THE DISCLOSURE

This application discloses a drive mechanism for toys and similar miniature running vehicles which can be easily assembled without the need for conventional electric lead lines. Construction details as well as the manner of assembling a preferred embodiment are provided, including details of a battery holder, switch assembly, and electric motor frame and drive assembly.

The driving mechanism hitherto employed for running toys and similar miniature vehicles powered and driven by small electric motors has used lead lines to connect a motor to a battery or a switch. Typically, the enclosing frame for holding a battery and the frame to which the motor and transmission gears etc. were to be attached were constructed separately with the final assembly being completed by securing them to the body of the toy by rivets or other fasteners. Because of this procedure, this traditional method of assembly involved very complex assembly operations, inefficient procedures, and had a tendency to result in many inferior products due to errors in assembly operations and related causes.

The present invention removes many, if not all, of these shortcomings in that it provides a simplified apparatus which is easily assembled with the resulting assembly being assured of operation. As explained below in detail by reference to one preferred embodiment, a metal plate bent on its front end and also at both sides forms a frame with an end panel for holding a battery with side panels being provided for holding a motor with one of its terminals in contact with one of the panels; a metal bar which, while being insulated from the said frame, holds the battery snug and secure with the aid of the end panel of the said frame; and a switch lever, which is installed in such a manner that it can make contact freely with the spring piece which in turn is coupled to the other terminal of the motor with the switch lever being coupled to the said metal bar in a manner such that the switch can move freely.

The above as well as additional objects and advantages of the invention will be more clearly understood from the following description when read with reference to the accompanying drawings.

FIGURE 1 is a perspective view showing in detail one preferred embodiment of the invention in its assembled condition.

FIGURE 2 is a perspective view similar to that of FIGURE 1, but having many of the components removed to illustrate more clearly details of the main body.

FIGURE 3 is a perspective view of one of the spring members forming part of the assembly and shown in dashed lines in FIGURE 2.

FIGURE 4 is a perspective view of the drive motor with the motor being in inverted position so that it corresponds to the inverted motor holding assembly illustrated in FIGURE 5.

FIGURE 5 is a perspective view of the rear drive train and motor holding frame with the apparatus of FIGURE 5 being inverted to illustrate more clearly the construction details thereof.

Turning now to the drawings and in particular to FIGURES 1 and 2 a main frame **1** is illustrated as being bent at its front end as well as along both sides so that the same serves as a holder end **3** for holding the battery **2** in position with the side panels **5** and **6** serving as holders for the motor **4**. As seen most clearly in FIGURE 5 the holder end **3** and the side panels **5** and **6** each have a claw **8A**, **8B**, and **8C**, respectively, for securing the frame **1** to the main body **7** of the running toy. Also as seen in FIGURE 5 the side panels **5** and **6** are respectively provided with a hole **10** and a curved hollow open-ended opening **11** adapted to receive the shaft journals **9A** and **9B** of the motor **4**. The frame **1** is made of a conductor and the side panels **5** and **6** thereof are so constructed that while holding the motor **4**, the terminal **12** of the motor which is bent around one side of the motor (see FIGURE 4) makes contact with the inside of the side panel **5**. The metal bar **13**, which with the help of the end panel **3** holds the battery snug in the vehicle is secured to the vehicle body **7** independently from the frame **1**. The metal bar **13** will be seen to be connected to the switch lever **14** (FIGURE 2) in such a manner that the switch lever can be freely moved. The metal spring piece **16**, which is positioned for making the contact with the other motor terminal **15** which protrdues from one side of the motor **4**, is installed within the moving range of the switch lever **14**. In order to make the contact between the terminal **15** and the spring piece **16** good, the spring piece **16** is provided with sufficient elasticity and also the part of the body **23** where the terminal **15** and the spring piece **16** make contact is advantageously constructed to be one step lower than the rest of the body. The arrangement is such that when the apparatus is assembled the spring piece **16** will be stressed due to the pressure exerted thereon by the contact or terminal **15**. The body **7** is provided with openings **17A**, **17B**, and **17C** for receipt, respectively, of the claws **8A**, **8B**, and **8C**. The drive gears **18–20** are installed on the frame **1** for driving the wheels **21**. As seen in FIGURE 2, a slot **22** is provided in the body **7** for receiving the angled end of the spring contact member **16** of FIGURE 3. A depression **24** is provided in the switch arm **14** for engagement with the elevated surface **25** of the main body **7** with the arrangement being such that the depression **24** and the elevated portion **25** act as a detent to maintain the lever **24** in any selected position to which it is moved. The body **7** is preferably made of any suitable plastic material which can be readily molded to the form indicated most clearly in FIGURE 2.

The manner of assembling the apparatus is as follows. First, the metal bar **13** to which the switch lever **14** is attached is installed in a fixed position to the main body **7** (which is of nonconductive material) and the spring piece **16** is inserted into the matching slot **22** of the body **7**. Two small rivets **26** and **27** are shown for the purpose of holding the metal bar **13** and the switch assembly **14** in position on the body **7**. Next the motor **4** is installed in the frame **1** with the shaft journals on each side being inserted into the shaft journal openings **10** and **11** of the side panels **5** and **6**. Note that the journal **9A** is provided with one flatted side adapted to correspond to the flatted edge of the opening **10** in side panel **5**. With the motor **4** installed in frame **1** the drive pinion **4A** on the motor engages drive gear **18**. The assembly is complete when the claws **8** are inserted into the corresponding claw slots **17** of the body **7** and then bent around beneath the body **7**. Note in FIGURE 1 that the lower front end of the frame **1** (i.e. the lower end of the battery holding panel **3**) is provided with a cut-out section to clear the

metal bar **13** when the frame **1** is positioned on the body **7**.

It will be seen that the interrelationship of the components is such that when the assembly is completed the lower side of the motor **4** will rest stable on the surface of the body **7** and the terminal **15** of the motor **4** will make good electrical contact with the spring piece **16**.

Thus the present invention makes it possible to build strong and yet inexpensive toys by making the assembly operation simple. The motor **4**, the battery **2**, the spring piece **16**, and the swtich lever **14** together form an electrical circuit which is switch controlled and yet which avoids the need for any lead wires. Thus the errors typically due to the wrong connections of the terminals caused by unskillful welding of lead wires is avoided. Also the possibility of inferior contacts as well as erroneous assembly are avoided.

While the invention has been disclosed by reference to presently preferred embodiment, it will be obvious to those skilled in the art that changes can be made without departing from the inventive concepts disclosed. It is therefore intended that such changes will be encompassed by the following claims.

What is claimed is:

1. A driving mechanism for toy vehicles comprising in combination: an electrical drive motor having first and second electrical contacts; a metal frame panel having first and second spaced apart parallel side panels with motor holding openings therein and also having a battery engaging end panel, said one contact being engaged with said frame when said motor is positioned in said side panels; a first metal bar having an upstanding battery holding portion which is spaced from said end panel by a distance to define between said end panel and said portion a battery holding opening, said bar being electrically insulated from said end panel; a spring contact bar engaged with said second contact of said motor; and a switch lever attached to said first metal bar and movable between positions of engagement and disengagement with said spring contact bar.

2. Apparatus as defined in claim **1** wherein said spring contact bar is a flat spring member; said vehicle including a chassis having means for holding said spring member in a substantially unstressed condition prior to engagement of said second contact of said motor therewith, and the spacing between said spring contact bar and said second contact is such that when the motor is positioned within said side panels said second motor contact holds said spring bar contact in a stressed condition.

3. The apparatus of claim **1** including a vehicle chassis having a hole therein, and wherein said spring contact bar includes first and second substantially parallel sections respectively located on opposite parallel surfaces of said chassis with a section thereof passing through said hole and interconnecting said sections.

4. The apparatus of claim **3** wherein said metal frame comprises a single unitary member having a flat top section, said first and second side panels and said end panel extending downwardly at right angles from said top section.

5. The apparatus of claim **4** including a pair of drive wheels, an axle having said wheels on opposite ends thereof, and wherein said side panels support said axle.

6. The apparatus of claim **2** wherein said metal bar extends from a point beneath said metal frame, and wherein said switch lever is pivotally connected to said lever at a point beneath said end panel which is between the end panel and the motor.

7. The apparatus of claim **6** wherein the vehicle chassis has a plurality of frame attachment holes therein, and wherein said side panels have bendable tabs which pass through a plurality of said holes and hold said frame to said chassis.

8. The apparatus of claim **7** wherein said end panel has a single tab passing through one of said holes and a support section engaged with the interior surface of said frame.

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