The present invention relates to a toy train. More particularly, the present invention relates to a coupling device for use in a toy electric train that is constructed of molded plastic material.

The toy electric trains known heretofore have been developed to such an extent that they simulate actual size railway cars and equipment in minute detail. In order to make these design details, the parts comprising prior known toy trains are necessarily constructed of metal materials while laboriously assembled by the manufacturer. Because of the labor expended in fabricating and assembling the metal parts that comprise the train cars, the prior known electric trains have been relatively expensive. Some efforts have been made in recent years to construct toy trains of plastic material, but these trains have usually been push toys or simple one- or two-car mechanical wind-up propulsion-type systems. It has not been possible heretofore to provide a molded plastic car for use in electrified systems because of the difficulty in constructing suitable coupling devices. In the prior known molded plastic train cars, the coupling member was formed as an integral part of the car body and was therefore inflexible in use. In multi-track toy electric train systems, the cars must travel on variously curved trackways, and it is necessary therefore that the coupling devices be pivotally mounted for enabling the toy cars to travel on each other on the curved track sections.

It is therefore an object of the present invention to provide a coupling device for use in a toy train that enables the train cars to roll freely on a curved track.

Another object of the present invention is to provide a toy electric train system that is fabricated entirely of a molded plastic material, thereby lowering the cost of the plastic train cars.

Still another object of the present invention is to provide a toy train that includes a pivotally mounted coupling device, the coupling device being especially adapted for use with toy railway cars that roll on curved track sections.

Still another object of the invention is to provide a coupling device for use in a toy train that includes a pivotally mounted coupling link, the coupling link being pivotally connected to a projection that extends from a fixed wheel axle.

Still another object of the present invention is to provide a toy electric train system wherein the toy train is battery powered.

A further object of the present invention is to provide a toy electric train system which is less susceptible to breakage, safer for children to play with, and which still is attractive and amusing, while at the same time being relatively simple and inexpensive to manufacture, having a minimum of moving parts.

Other objects and the nature and advantages of the instant invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a fragmentary side elevational view, partly broken away, showing a portion of two toy train cars wherein the coupling device embodied in the present invention is illustrated coupling the train cars together;

FIG. 2 is a vertical sectional view taken along line 2-2 in FIG. 1;

FIG. 3 is a front elevational view of one of the cars illustrated in FIG. 1, with the coupling link shown in section;

FIG. 4 is a perspective view of the axle and wheel assembly embodied in the present invention;

FIG. 5 is a view similar to FIG. 4 showing the wheels removed from the axle unit; and

FIG. 6 is a perspective view of the coupling link that is adapted to be pivotally connected to the axle illustrated in FIGS. 4 and 5.

Referring now to the drawings and particularly FIG. 1, a portion of two toy train freight cars are illustrated therein and are generally indicated at 10 and 12. The car 10 simulates the open box type freight car whereas the car 12 simulates a caboose. The cars 10 and 12 are fabricated of a molded plastic material, such as polyethylene, for example, and with the exception of the coupling unit and wheel and axle assembly, to be described hereinafter, are formed in one construction. It is understood that any type car may be simulated by the molding process. It is further contemplated that the car simulating the engine be provided with a battery powered electric motor (not shown) which will be utilized as the prime mover for the toy train.

The electric toy train cars embodied in the present invention are adapted to be employed with some form of trackways, and it is seen that as the cars move over curved sections of the trackway, the coupling connecting the cars must pivot. It is for the purpose of enabling the cars to follow in coupled relation on the trackway that the coupling embodied in the present invention is provided.

Referring again to the drawings, the cars 10 and 12, as shown, are molded with different body formations to simulate the open box car and the caboose; however, the cars 10 and 12 have similar wheel and axle constructions and include bracket portions 14 which are molded integral with the frame of the car and depend therefrom. As shown in FIG. 1, the brackets 14 are molded with surface configurations that simulate actual wheel brackets and have rectangularly shaped openings 16 formed therein that are adapted to accommodate the ends of the axle unit to be described hereinafter. Referring now to FIGS. 4 and 5, the wheel and axle assembly is illustrated and includes a molded plastic axle unit generally indicated at 18. It is understood that all the wheels and axle assemblies used in connection with the present invention are constructed similarly and may be interchangeably used on various types of cars and on either the front or rear thereof.

The axle unit 18 which is shown in FIG. 5 includes a central portion 20, to which an upwardly projection 22 is integrally joined intermediate the ends thereof. Formed on the upper end of the projection 22 is a reduced neck 24 to which is joined a rounded head member 26. Formed integral with the central portion 20 at opposite ends thereof are reduced portions 28 which terminate in end portions 30, the end portions 30 having a rectangular shape in cross section and having thereon integral retaining lugs 31.

As shown in FIG. 4, wheel members 32 are rotatably mounted on the reduced portions 28 and abut against a shoulder 34 defined by the reduced portions and the central portion 20, being retained in position thereby. The end portions 30 project outwardly from the wheel members 32 and are adapted to be inserted into the rectangularly shaped openings 16 formed on the brackets 14 and thereby mount the axle unit 18 in fixed position on the underside of the car frame. As will be obvious, the inherent resilience of the plastic material will enable the retaining lugs 31 to be forced through openings 16 in order to resiliently and reliaxeably maintain brackets 14, axle unit 18 and wheels 32 in assembled relation. The wheel members 32 which are also molded of a plastic ma-
material are formed with an annular flange 36 which acts to retain the wheel members 32 in place on a track 33 (see FIGS. 1 and 3) as is well known in the art.

As shown in FIG. 3, when the axle unit 18 is fixed in position in the opposed brackets 14, the projection 22 extends upwardly into the interior of the car. The car illustrated in FIG. 3 is of the open box type corresponding to the car 10 shown in FIG. 1 and is formed with a floor or bottom wall 40 (FIG. 2). It will be understood that the floor 40 is formed with a suitable opening for receiving the projection 22, the opening permitting the extension of the projection into the interior of the car 10.

In enclosed cars, such as the carhouse 12, a floor is not required and thus the projection 22 extends into the car interior without the necessity of forming additional openings therefor.

Since the toy cars utilized in connection with the subject invention are adapted to roll on curved track sections, it is essential that the coupling device connecting the cars together be pivotally mounted. The cars are, however, fabricated of a molded plastic material which limits the type of coupling devices that can be employed. Referring now to FIG. 6, a coupling link fabricated of a molded plastic material is generally indicated at 42 and includes a bar 44 formed with an opening 46 adjacent the outer end thereof. The bar 44 is rounded on the outer end and tapers gradually to stepped-down end portion 48. The end portion 48 constitutes the coupling member and includes an upstanding coupling pin 50 formed on the outer end thereof, an opening 52 being formed adjacent the step joining the bar 44 and end portion 48.

In the assembled position, the coupling link 42 is pivotally mounted on the projection 22, the head member 26 extending through the opening 46. Since the bar 44 is deformable, the head member 26 is easily pushed through the opening 46 which is slightly smaller in diameter than the head member 26, the wall of the opening being in position around the neck 24 and being retained thereon by the shoulder defined by the reduced diameter of the neck 24 and the projection 22. Since the inner end of the coupling link 42 engages the upstanding projection 22, it is necessarily positioned within the interior of the toy car.

In order to afford access for the outer stepped-down end portion 48, a slot is provided in the front or rear wall of the car such as indicated at 54 in FIG. 3. It is seen that the coupling link 42 extends through the slot and is pivotally mounted on the projection 22, the limit of pivotal movement being defined by the ends of the slot 54.

Since the coupling link 42 must be provided for the front and rear of the toy cars, the slot for providing access for the coupling link exteriorly of the car is normally formed in both the front and rear walls thereof. However, the carhouse 12 only utilizes one coupling link and only one slot is necessary in this instance. Furthermore, due to the particular construction of the carhouse 12, the slot is not formed in the wall but rather is located beneath the platform. It is understood, of course, that the slot for receiving the coupling link 42 will be formed in the front and rear section in each particular toy car in accordance with the construction thereof, but the slot will not necessarily be formed in the front or rear wall thereof if the construction of the toy car does not require such an arrangement.

In assembling the coupling device, the wheels and axle are first assembled in position by locating the wheel members 32 on the reduced portions 28. With the projection 22 fixed, the coupling link 42 is secured by the bracket 14 and lugs 31 of the axle unit 18 are then snapped through the rectangularly shaped openings 16 formed in the brackets 14. Since the brackets 14 are molded integral with the toy car and are also of a deformable material, they may be twisted or spread to accommodate the axle unit as the outer end portions 30 are inserted into the openings 16. With the axle unit 18 in position, the coupling bar 44 of the coupling link 42 is inserted through the slot 54 and into the interior of the car leaving the outer end or stepped-down portion 48 exposed. The head member 26 is next snapped into the opening 46 and the coupling link 42 is thus pivotally mounted in position. The assembly operation is then repeated for the opposite end of the toy car.

In use, the cars are positioned on the track 38 and coupled together by inserting the coupling pin 50 into the opening 52 of the coupling link 42 of the adjacent car. The opening 52 in turn receives therein a pin 50 of the adjacent coupling link. In this connection, it will be obvious that the adjacent, interconnecting coupling links must extend in opposite directions or, more specifically, one of the pins 50 must extend upwardly while the other extends downwardly in order that the desired interconnection be effected. (See FIG. 2.)

It is seen that with the coupling pins 50 inserted in their respective openings 52, there is no pivotal movement of the coupling links at this point. The pivotal movement of the coupling only occurs at the interconnection of the coupling link 42 on the projection 22. With the cars coupled together, as illustrated in FIG. 2, they are moved over the track 38 by any convenient means until preferably by a battery powered engine, until a curved section of the track is reached, the cars will begin to shift with respect to each other, and in order to accommodate this shifting, the coupling links 42 pivot on their respective projection 22 and within the limits defined by the slot 54. It is thus seen that the slots 54 are of sufficient width to allow the coupling links 42 to freely pivot as the cars roll on the curved sections of the track 38. Referring to FIG. 2, the positions of the coupling links 42 are illustrated before and after shifting of the cars, the shifted position of the cars being indicated in dotted lines.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification, but only as indicated in the appended claims.

1. A toy train car comprising a unitary molded plastic frame, said frame including pairs of spaced depending wheel brackets formed thereon in opposed relation, each of said brackets having an opening formed therein, at least one end of said frame having a slot formed therein, an axle unit fixed normally from movement to each pair of said depending brackets and extending therebetween, the ends of each of said axle units being non-rotatably secured in the openings formed in said brackets, wheel members rotatably mounted on said axle units adjacent the outer ends thereof, each of said axle units having an upstanding projection formed thereon intermediate the ends thereof and extending upwardly into the interior of said car, and a coupling link, the inner end of which is pivotally secured to the upper end of said projection and the outer end of which projects through said slot and extends substantially beyond said frame, and means formed on the outer end of said coupling link for coupling said coupling link to an adjacent link pivotally secured to an adjacent car.

2. The combination of claim 1 further characterized in that said last mentioned means provides a rigid, straight-line coupling between said coupling link and said adjacent link.

3. In a toy train, a car comprising a unitary molded plastic frame, said frame including support means formed on the lower portion thereof, spaced axle units normally fixed from movement in said support means and extending across the bottom of said frame, wheel members rotatably mounted on said axle units adjacent the outer ends thereof, said axle units each having an upstanding projection formed thereon intermediate the ends thereof and projecting upwardly into the interior of said car, and a
coupling link releasably and pivotally secured to said projection adjacent the upper end thereof, said coupling link extending outwardly beyond the confines of the car interior and adapted to be engaged by a similar coupling link secured to an adjacent car.

4. In a coupling device for a toy car that includes a unitary molded plastic frame, an axle unit fixed to the underside of said frame and having wheel members rotatably mounted on the outermost ends thereof, an upperstanding projection formed on said axle unit intermediate the ends thereof and projecting into the interior of said car, and a coupling link pivotally secured to the uppermost end of said projection and extending outwardly beyond the confines of said car.

5. In a coupling device for a toy car as set forth in claim 4, the end of said frame adjacent said coupling link being formed with a slot that receives said coupling link therein, the ends of said slot defining the limits for pivotal movement of said coupling link on said projection.

6. In a toy train, a car including a frame, at least one axle unit mounted on the underside of said frame and normally fixed from movement with respect thereto, wheels mounted for rotation on the outer ends of said axle unit, and a coupling link operatively engaging said axle unit substantially intermediate the ends thereof for pivotal movement with respect thereto, said coupling link extending beyond the frame of said car and adapted to engage a corresponding coupling link mounted on an adjacent car.

7. In a toy train, a car including a frame, at least one axle unit mounted on the underside of said frame and normally fixed from movement with respect thereto, said axle unit including an elongated central portion, on the outer ends of which wheels are rotatably mounted, and a coupling link operatively and pivotally engaging said central portion substantially intermediate the ends thereof and independent of said frame, said coupling link extending beyond the frame of said car and being adapted to engage a corresponding coupling link mounted on an adjacent car.

8. In a toy train, a car including a frame having spaced brackets fixed to the underside thereof, at least one axle unit positioned on the underside of said frame, said axle unit including an elongated central portion, the ends of which extend through said spaced brackets to normally fix said axle unit from movement with respect to said frame, wheels rotatably mounted on the outer ends of said elongated central portion, and a coupling link, the inner end of which operatively engages said elongated central portion substantially intermediate the ends thereof independent of said frame and being pivotally movable with respect thereto, the outer end of said coupling link extending beyond the frame of said car and being adapted to engage the outer end of a corresponding coupling link mounted on an adjacent car.

9. In a coupling device for a toy car that comprises a unitary molded plastic frame having spaced brackets integrally formed thereon, an axle unit engaging said brackets and normally fixed from movement with respect to said frame, wheels rotatably mounted on the outer ends of said fixed axle unit, and coupling means pivotally engaging said fixed axle unit and extending substantially beyond said car frame for engagement with coupling means of an adjacent car.

10. In a coupling device for a toy car that includes spaced brackets formed on the underside thereof, an axle unit engaging said brackets in fixed relation and rotatably supporting wheels on the outermost ends thereof, and coupling means pivotally engaging said axle unit and extending substantially beyond said car frame for engagement with coupling means of an adjacent car.

11. In a toy train, a car having an elongated axle secured to the underside thereof and normally fixed with respect thereto, a coupling link operatively connected to said axle interiorly of said car and pivotally mounted with respect to said axle substantially intermediate the ends thereof, said coupling link extending exteriorly of said car and coupled to the coupling link of an adjacent car.

12. In a toy train, a car having spaced support means fixed to the underside thereof, an axle unit secured to said support means beneath the body of said car and fixed against rotation, wheels rotatably secured to the outer ends of said axle unit, and coupling means operatively connected to said fixed axle unit substantially intermediate the ends thereof and pivotally mounted with respect thereto, said coupling means being adapted to be coupled to a coupling means pivotally mounted on an adjacent car.

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