

Description

The invention concerns a toy wheel, which is preferably intended for an electrical toy or model train where the wheel can collect electrical current from an electrically conducting rail.

In electrically driven toy or model trains it is a problem to obtain good electrical contact between rail and wheel and also a high friction between rail and wheel. The electrical contact is necessary to ensure continuous operation of the train, and the high friction is necessary to obtain a reasonably high tractive force for the train.

It has previously been proposed to solve the problem by equipping the train with special drive wheels having the necessary friction while other wheels ensure the electrical connection with the rail body. Such a structure is known e.g. from GB 2 176 124 A. The friction on the special drive wheels is usually obtained by providing the metal wheel with a groove in which a so-called adherence ring of elastic material, e.g. rubber, is embedded. This solution has the drawback that owing to short, dead sections on the rail body, the train must necessarily have at least two sets of electrically conducting wheels, which together with the drive wheels results in a total of three sets of wheels.

DE 31 33 560 discloses wheels where the adherence rings are made of a conducting, elastic material; but the conductivity of such materials is considerably inferior to that of metal so that sufficiently good electrical contact between rail and wheel cannot be obtained.

DE 33 00 072 provides wheels which are coated with a conducting layer of high friction, e.g. a layer of hard metal dust or diamond particles. The drawback of this solution is both that it is a cumbersome process to apply the coating, and that the friction obtained is still considerably inferior to the one obtainable with traditional adherence rings.

Current transmission by means of the rolling face of the wheels moreover has the general drawback that it causes spark formation and radio noise owing to obliquities, irregularities and the like, which result in unstable contact. Further, the spark formation per se involves dirtying of both rails and wheels, which gradually makes the problem worse.

The invention provides a wheel which enables good electrical contact while having a high friction. The wheel moreover has a self-cleaning effect, so that dirtying of rails and wheels is prevented.

This is achieved according to the invention in that the wheel comprises a carrying part with a rolling face and an electrically conducting part arranged axially at one side of the rolling face. The electrically conducting part extends radially outside the rolling face and is elastically movable and spring-loaded in a direction toward the rolling face.

When the electrically conducting part is made elastically movable and spring-loaded, as mentioned, certain current collection will be obtained because this part is constantly pressed against the conductor rail, and also a self-cleaning effect preventing dirtying of wheel and rail.

When, as described in claim 2, the rolling face of the wheel is given a surface with a high coefficient of friction, high tractive force of the train is obtained in addition to the certain current collection.

The electrically conducting part may expediently be formed as a cone-shaped flange, as mentioned in claim 3. This entails that the wheel has a great resemblance to a normal railway wheel.

As stated in claim 4, the spring-loading may be established by providing one or more spring bodies on a bracket which are adapted to press the electrically conducting part resiliently against the carrying part. This is particularly advantageous when the said spring bodies are moreover incorporated in an electrical current path from the electrically conducting part to the current consumers of the train, e.g. a motor, as stated in claim 5.

As stated in claim 6, the carrying part and the electrically conducting part may be retained against mutual rotation.

This may take place, as stated in claim 7, in that the carrying part has holding pins adapted to engage corresponding openings in the electrically conducting part. The electrically conducting part is supported hereby and also has a certain movability with respect to the carrying part.

In an alternative embodiment, which is mentioned in claim 8, the electrically conducting part may rotate about its axis independently of the rolling face. This provides an improvement of the self-cleaning effect in certain situations.

The invention will be described more fully below with reference to the drawing, in which

fig. 1 shows the use of a wheel according to the invention for a vehicle,

fig. 2 is a perspective view of components for a wheel according to the invention,

fig. 3 is a vertical section through the wheel of fig. 2,

fig. 4 is a perspective view of the wheel of fig. 2, fig. 5 shows components for an alternative embodiment, and

fig. 6 is a vertical section through the wheel of fig. 5.

Fig. 1 shows the technical principles of a vehicle for a toy or model train where a wheel according to the invention may be used. The vehicle may run on rails 2a, 2b to which an electrical voltage may be coupled, e.g. from a battery 3. As shown in fig. 1, the vehicle 1 may e.g. have two sets 4 of wheels, consisting of two wheels 5 on a

shaft 6. Both wheel sets 4 may be adapted to collect electrical current from the rails 2 (and to carry the current further on to an electric motor 7 and optionally other current consumers on the vehicle) as well as to serve as drive wheels to cause the train to be propelled. This takes place in that the motor 7 is mechanically connected with a shaft 6 via a gear wheel transmission 8. As described more fully below, each wheel 5 has an electrically conducting part, and the current is collected from there by means of current collectors 9 and is conveyed through a current conductor 10, 14 to one connection terminal of the motor. The other wheel of the wheel set is correspondingly connected with the other connection terminal 11 of the motor.

The current conductors 10, 14 and the current collectors 9 may optionally be combined to a single spring body, which is pressed against the wheel 5 at one end and may have direct contact with the commutator of the motor at the other end, which is a very inexpensive solution.

The mode of operation is as follows: when the battery 3 is connected to the rails 2a, 2b, electrical current runs from the positive pole of the battery via the connection lead 15 to one rolling rail 2a and from there via the electrically conducting part of the wheel, the current collectors 9 and the current conductor 14 to one connection terminal 12 of the motor. The current runs from the other terminal 11 of the motor via the current conductor 10, the current collectors 9, the electrically conducting part of the wheel, the rail 2b and the connection lead 13 back to the negative pole of the battery. This current makes the motor 7 rotate and thereby the vehicle move on the rails 2a, 2b. If the battery is inverted (the positive pole is connected to the rail 2b and the negative pole to the rail 2a), the motor 7 rotates in the opposite direction and thereby causes the vehicle to move in the opposite direction on the rails 2a, 2b.

Fig. 2 is a perspective view of the components of which a wheel according to the invention is composed. It is a carrying part 20 which is typically made of a plastics material, an electrically conducting part 21 of metal, a spring body 22 comprising the current collectors 9 and a shaft 23.

Fig. 3 shows a vertical section through an assembled wheel according to the invention, and the wheel is shown in perspective in fig. 4.

The carrying part 20 is made of insulating plastics material and firmly mounted on the shaft 23. The carrying part is formed along its periphery with a groove 24 in which an adherence ring 25 of a material with a high coefficient friction, e.g. a rubber material, is embedded. This ring 25 constitutes the rolling face of the wheel and entails because of its high friction that the vehicle has a

high tractive force.

The carrying part 20 is moreover provided with a plurality of holding pins 26 serving to retain and guide the electrically conducting part 21, which is provided with a corresponding number of openings 27. Since each holding pin 26 engages one of the openings 27, the carrying part 20 and the electrically conducting part 21 are locked to each other so that they cannot rotate mutually, but have to rotate about their axis with the same speed of rotation. A projection 28 on the holding pin 26 ensures that the electrically conducting part 21 cannot drop out of the wheel, and it also forms a stop for the movement of the electrically conducting part. The spring body 22, which is provided with two springs/current collectors 9, urges, by means of these, the electrically conducting part 21 to a position where it engages the carrying part 20.

When the electrically conducting part 21 is subjected to a force on the flange 29, e.g. from the rail 2a, 2b in fig. 1, the springs 9 yield, and the electrically conducting part 21 moves in a direction towards the spring body 22, optionally until it hits the projections 28. Thus, the springs 9 are used both for current collection and for providing spring force. Owing to the spring effect, the flange 29, when the wheel rolls on a rail, will constantly be pressed against the rail and thereby ensure good electrical contact with the rail. The spring action simultaneously gives a self-cleaning effect since both the rail and the electrically conducting part 21 of the wheel are kept clean of dirt.

Figs. 5 and 6 show an alternative embodiment. This too includes a carrying part 30 and an electrically conducting part 31 as well as a spring body 22 and a shaft 23. Instead of the holding pins 26, the carrying part 30 has a circular flange 32 engaging a corresponding groove 33 on the electrically conducting part 31. This entails that the two parts may rotate about their axis independently of each other, which can improve the self-cleaning effect.

Though it is mentioned in the foregoing embodiments of a wheel according to the invention that the wheel is used for a train rolling on rails, it is noted that the wheel may also be used in other forms of toy vehicles. An example is an electrically driven aerial cableway where one or more electrically conducting cables are used instead of the rails.

It should finally be mentioned that e.g. the spring body 22 may be constructed in many other ways, e.g. as a spring disc applying a uniform pressure all the way around on the electrically conducting part.



Claims

1. A toy wheel preferably for an electrical toy or model train, where the wheel (5) can collect electrical current from an electrically conducting rail (2a, 2b), **characterized** in that the wheel (5) comprises a carrying part (20, 30) with a rolling face and an electrically conducting part (21,31) arranged axially at one side of the rolling face, and that the electrically conducting part extends radially outside the rolling face and is elastically movable and spring-loaded in a direction toward the rolling face.
2. A toy wheel according to claim 1, **characterized** in that the rolling face has a surface with a high coefficient of friction.
3. A toy wheel according to claim 1 or 2, **characterized** in that the electrically conducting part comprises a cone-shaped flange.
4. A toy wheel according to claims 1-3, wherein the wheel is journaled in a bracket, **characterized** in that a spring body is provided on the bracket, said spring body being adapted to press the electrically conducting part resiliently against the carrying part.
5. A toy wheel according to claim 4, **characterized** in that said spring body is incorporated in an electrical current path from the electrically conducting part to one or more current consumers on the train.
6. A toy wheel according to claims 1-5, **characterized** in that the carrying part and the electrically conducting part are retained against mutual rotation.
7. A toy wheel according to claim 6, **characterized** in that the carrying part has holding pins adapted to engage corresponding openings in the electrically conducting part to thereby support the electrically conducting part with a certain movability with respect to the carrying part.
8. A toy wheel according to claims 1-5, **characterized** in that the electrically conducting part can rotate about its axis independently of the rolling face.

Patentansprüche

1. Ein Spielzeugrad, vorzugsweise für ein elektrisches Spielzeug oder eine elektrische Modellisenbahn, wobei das Rad (5) elektrischen

Strom von einer elektrisch leitenden Schiene (2a, 2b) aufnehmen kann, dadurch gekennzeichnet, daß das Rad (5) einen Tragteil (20, 30) mit einer Rollfläche und einen elektrisch leitenden Teil (21, 31) aufweist, der axial an der einen Seite der Rollfläche angeordnet ist, und daß der elektrisch leitende Teil sich radial außerhalb zur Rollfläche erstreckt und elastisch bewegbar ist und in einer Richtung auf die Rollfläche zu federnd vorgespannt ist.

2. Ein Spielzeugrad nach Anspruch 1, dadurch gekennzeichnet, daß die Rollfläche eine Oberfläche mit einem hohen Reibungskoeffizienten aufweist.
3. Ein Spielzeugrad nach einem der Ansprüche 1 oder 2, dadurch gekennzeichnet, daß der elektrisch leitende Teil einen konusförmigen Flansch aufweist.
4. Ein Spielzeugrad nach einem der Ansprüche 1 bis 3, wobei das Rad in einem Tragteil gelagert ist, dadurch gekennzeichnet, daß ein Federkörper an dem Tragteil vorgesehen ist, wobei der Federkörper so ausgebildet ist, um den elektrisch leitenden Teil nachgiebig gegen den Tragteil zu drücken.
5. Ein Spielzeugrad nach Anspruch 4, dadurch gekennzeichnet, daß der Federkörper in einem elektrischen Stromkreis von dem elektrisch leitenden Teil zu einem oder mehreren Stromverbrauchern auf dem Zug untergebracht ist.
6. Ein Spielzeugrad nach den Ansprüchen 1 bis 5, dadurch gekennzeichnet, daß der Tragteil und der elektrisch leitende Teil unverdrehbar zueinander gehalten sind.
7. Ein Spielzeugrad nach Anspruch 6, dadurch gekennzeichnet, daß der Tragteil Haltezapfen aufweist, die mit entsprechenden Öffnungen in dem elektrisch leitenden Teil zusammenwirken, um auf diese Art und Weise den elektrisch leitenden Teil mit einer gewissen Bewegbarkeit in bezug auf den Tragteil zu halten.
8. Ein Spielzeugrad nach den Ansprüchen 1 bis 5, dadurch gekennzeichnet, daß sich der elektrisch leitende Teil um seine Achse unabhängig von der Rollfläche drehen kann.

Revendications

1. Roue-jouet préférablement pour un jouet électrique ou train miniature, où la roue (5) permet de prélever du courant d'un rail (2a,2b) électro-



- conducteur, caractérisé en ce que la roue (5) comprend un élément (20,30) porteur comprenant une surface de roulement et un élément (21,31) électroconducteur situé sur l'axe latéral de la surface de roulement et en ce que l'élément électroconducteur s'étend radialement à l'extérieur de la surface de roulement et peut être déplacé de manière élastique et être chargé par ressort en direction de la surface de roulement.
- 5
- 10
2. Roue-jouet selon la revendication 1, caractérisé en ce que la surface de roulement comprend une surface avec un haut coefficient de friction.
- 15
3. Roue-jouet selon la revendication 1 ou 2, caractérisé en ce que l'élément électroconducteur comprend une bride conique.
- 20
4. Roue-jouet selon les revendications 1 à 3, où la roue est montée sur un palier, caractérisé en ce qu' un corps de ressort est situé sur le palier, le corps de ressort servant à presser l'élément électroconducteur élastiquement vers l'élément porteur.
- 25
5. Roue-jouet selon la revendication 4, caractérisé en ce que le corps de ressort est introduit dans un chemin de courant de l'élément électroconducteur à un ou plusieurs consommateurs sur le train.
- 30
6. Roue-jouet selon les revendications 1 à 5, caractérisé en ce que l'élément porteur et l'élément électroconducteur sont retenus contre une rotation mutuelle.
- 35
7. Roue-jouet selon la revendication 6, caractérisé en ce que l'élément porteur comprend des chevilles d'arrêt servant à engager des ouvertures correspondantes dans l'élément électroconducteur pour supporter l'élément électroconducteur avec une certaine mobilité relative à l'élément porteur.
- 40
- 45
8. Roue-jouet selon les revendications 1 à 5, caractérisé en ce que l'élément électroconducteur peut tourner autour de son axe indépendamment de la surface de roulement.
- 50

55

5