Magnetic coupling device for toy vehicles, composed of two coupling halves of opposite poles which halves are rigidly attached to their respective toy vehicle and have a convex coupling surface facing away from the vehicle.
COUPLING DEVICES FOR TOY VEHICLES

Until now, the most common method of coupling toy vehicles of, for example, wood, is by means of small metal hooks and corresponding metal eyes. This method, however, displays several disadvantages, for example, children playing with the toy vehicle can easily be injured by the point of the metal hook which often is sharp; moreover, the vehicles are relatively difficult to couple together, and from the point of view of production technique the screwing in of the metal hooks and metal eyes respectively represents an undesirable production phase. More recently, couplings of the magnet type have been used more and more, for the above reasons, and this involves the fastening of a magnet at one end of one vehicle, while the next vehicle is fitted with a similar magnet but of the opposite pole. A prior art magnet coupling of this kind comprises washer-shaped circular magnets which are fixed, by means of a nail, with their one flat face in engagement with the toy vehicle. Thus, if two vehicles are connected together in a straight line, the area of contact between the two magnets will be made up of the total flat end surfaces of both magnets. In order that this large total surface area should also when the vehicles are placed at an angle to each other, the nails are not fixed so hard that the magnets become immobile. Moreover, the central nail holes of the magnets are of a slightly larger diameter than the nails themselves, for which reason the total end surfaces of the magnets can engage each other also when the vehicles are placed at a limited angle in relation to each other. However, when the vehicles are positioned at a wider angle in relation to each other, the area of contact between the magnets decreases immediately so that only a certain linear contact is maintained at the peripheral edges of the magnets, thus decreasing substantially the magnetic force of the coupling halves. A further disadvantage with the above-mentioned method of coupling is that the magnets, which are manufactured of ceramic material, are totally unprotected and thus may be easily broken when subjected to bumps and knocks. In certain countries, finally, it is prohibited by law to sell toys with easily removable attachments, which renders impossible the use of this type of coupling.

The object of this invention is to produce a coupling device for toy vehicles which eliminates the above-mentioned disadvantages.

According to the invention, the magnets in a coupling of the type outlined above are rigidly connected to each vehicle and have a convex coupling surface.

The convex coupling surface is formed by a head on a fixing member, for example a nail or screw, fixing the magnet on the vehicle.

The head is manufactured of magnetically conductive material.

The head substantially covers that face of the magnet which faces away from the vehicle.

The invention will be set forth in greater detail hereinafter, with reference to the accompanying drawing which illustrates a preferred embodiment of the invention and in which:

FIG. 1 is a side elevation of a dismantled coupling according to the invention;

FIG. 2 is a front elevation of the coupling according to the invention;

FIG. 3 shows a toy train which is fitted with the coupling according to the invention.

As is apparent from FIG. 1, the coupling comprises a disc-shaped magnet 1 which presents symmetry of rotation and has a through hole 2 at its centre. Said magnet is fixed and protected by a member of a fixing member 3 which comprises a nail with a head 4 and a shank 5 which when the coupling is mounted on a wooden toy vehicle, is passed through the centre hole 2 in the magnet 1 and nailed into the vehicle. The shank 5 should be nailed in so far that the magnet 1 is firmly attached and bears against both the vehicle and the nail head 4. The head facing away from the magnet is convex, thus ensuring that the coupling devices, when coupled together, always have a common point of contact at which the magnetic flux is concentrated. When the coupled vehicles are placed at an angle to each other the convex sides of the heads will simply roll on each other with the result that the magnetic power is, at all times, used at maximum capacity.

Thus, because of the convex form of the nail heads, the magnetic coupling possesses a substantially greater power of attraction than that of prior art magnetic couplings. Moreover, this power of attraction, as opposed to prior art devices, remains undiminished when the coupled vehicles are moved at an angle to each other, allowing an angular position of the vehicles of up to 90°.

In their operative state the magnets lie flush with the surface of the vehicle and are, moreover, protected by the nail head which covers that face of the magnet which faces away from the vehicle, with the result that the fragile ceramic material of which the magnet is made will be completely protected from bumps and knocks.

Furthermore, the firm assembly of the coupling device makes it impossible for children to remove the coupling from the vehicle.

Finally, the device according to the invention involves a very simple method of mounting the coupling on the vehicle, i.e., by simply placing the magnet on the vehicle and by driving in the nail to such a position that the nail head is brought into firm contact with the magnet.

What I claim and desire to secure by Letters Patent is:

1. A coupling device for vehicles which comprises a pair of coupling contact members each made of magnetically conductive material and having a convex surface; a pair of permanent magnets; and a pair of fastener means, one of said fastener means being operable to fixedly secure one permanent magnet and one coupling contact member to one vehicle, and the other fastener means means being operable to fixedly secure the other permanent magnet and other coupling contact member to another vehicle, said permanent magnets being positioned between their respective coupling contact members and associated vehicles and with the north pole of one magnet facing toward the south pole of the other magnet to establish mutually attractive magnetic forces transmitted through said coupling contact members when their convex surfaces are in contact.

2. A coupling device according to claim 1 wherein said coupling contact members have their convex surfaces formed as bodies of revolution, and a fastening member is secured to each coupling contact member.

3. A coupling device according to claim 1 wherein said permanent magnets each have a central aperture accommodating the extension therethrough of a corresponding fastening member for connection to the corresponding vehicle.

4. A coupling device according to claim 2 wherein said coupling contact members are of a size sufficient to cover the end poles of said permanent magnets.