

July 14, 1970

H. W. FAIRBAIRN
TOY OR MODEL VEHICLES

3,520,080

Filed March 7, 1968

3 Sheets-Sheet 1

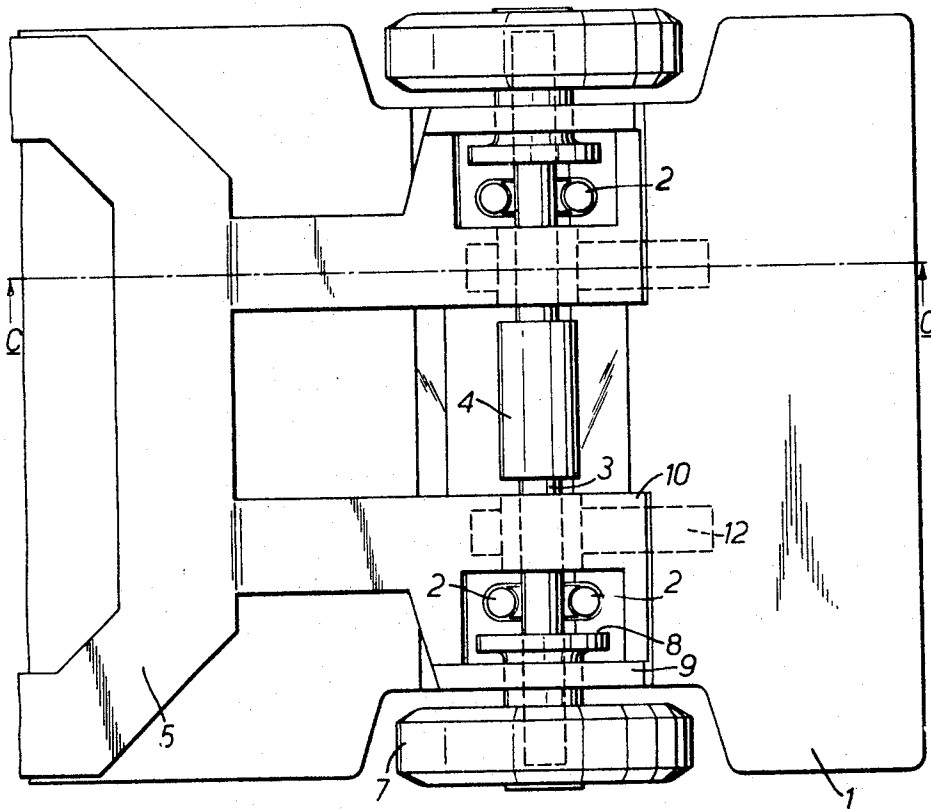


FIG. 1.

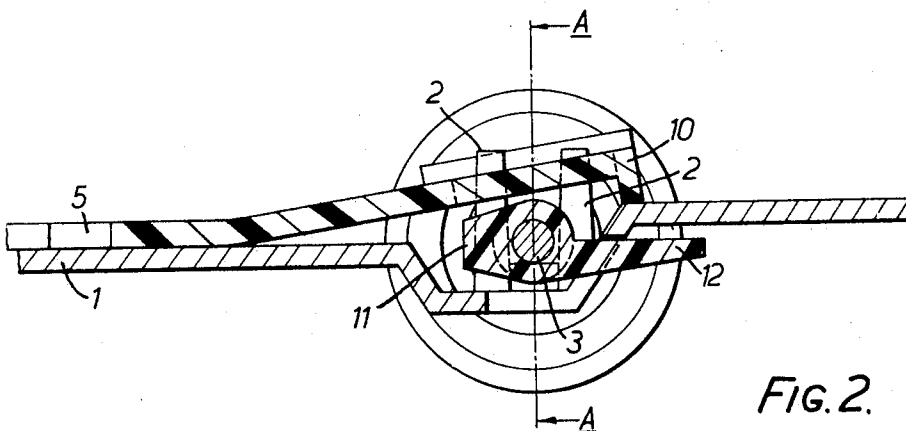


FIG. 2.

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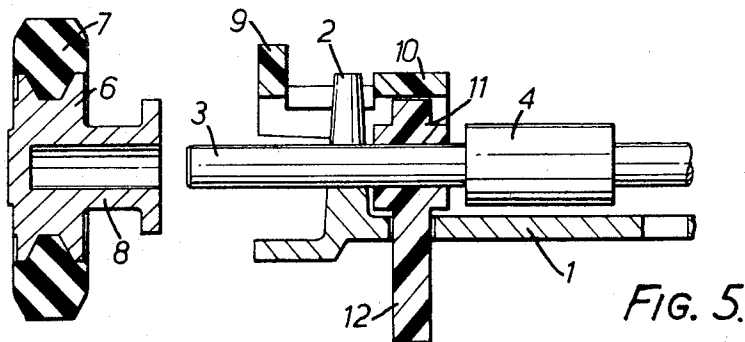
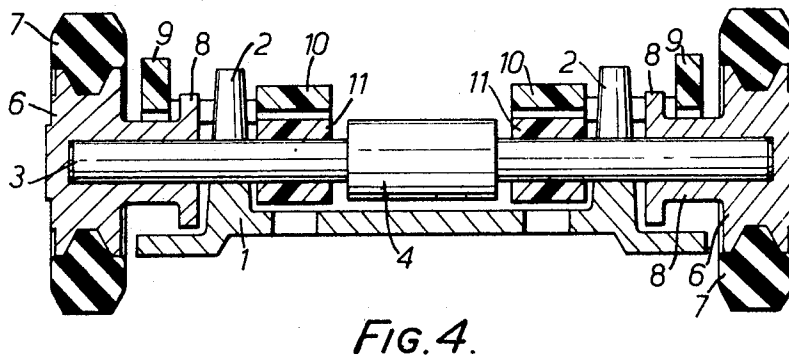
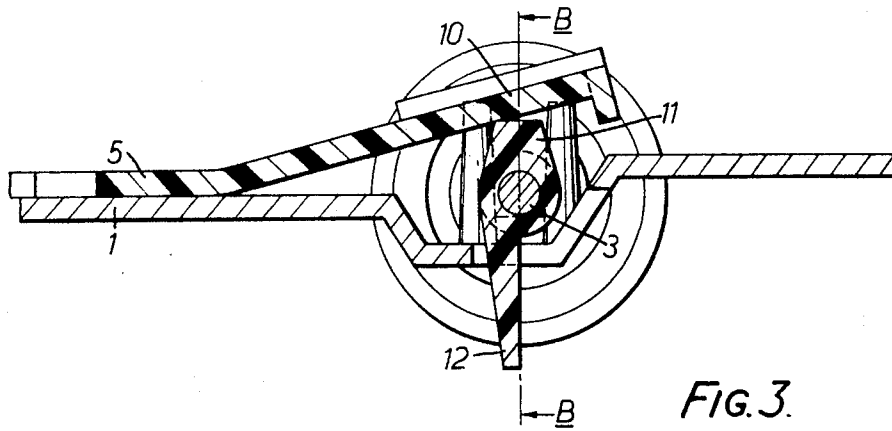
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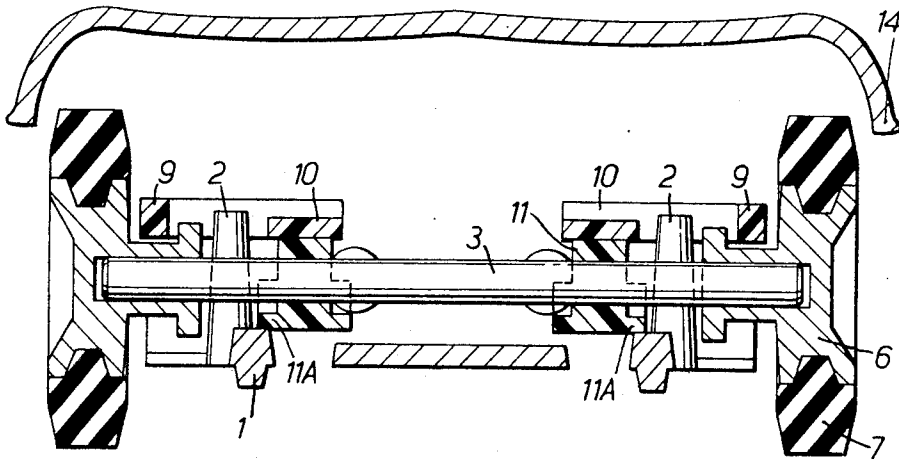


FIG. 6.

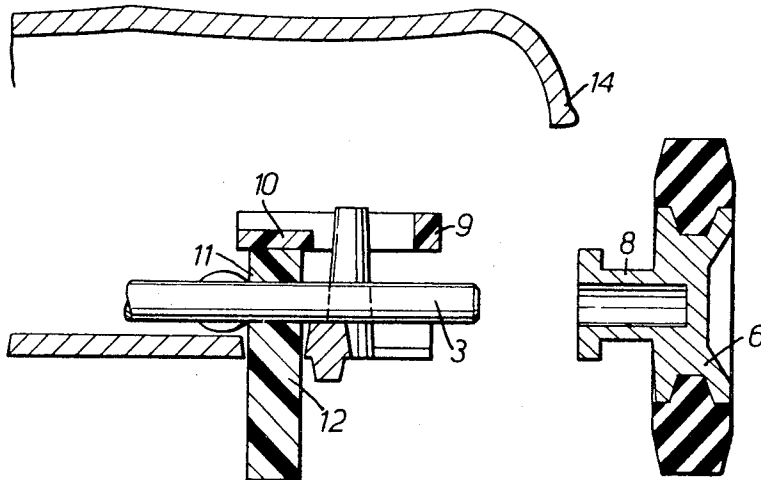


FIG. 7.

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TOY OR MODEL VEHICLES

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6 Claims

ABSTRACT OF THE DISCLOSURE

For improving the realism and play value of toy motor vehicles, the road wheels of such vehicles are removable from their supporting axles. Each wheel has on its inner face an axial extension formed externally with a circumferential groove, in which is normally engaged a detent. The detent can be moved out of the groove at will to free the road wheel for removal from its axle. Preferably, the detent is formed by a spring which serves to oppose upward movement of the axle, relative to the body. The means for moving the detent may comprise a rotary cam, mounted on the axle, and having an operating lever which serves as a jack to support the vehicle with one wheel off the ground. The cam may mount the axle on the body, and cause it to be displaced downwardly, in the same action which disengages the detent, to permit the removal of a wheel which would otherwise foul a wheel arch of the body.

This invention relates to toy vehicles, such as the small scale models of real motor cars which have been produced in very large numbers for many years past. In these toys, as previously manufactured, the road wheels have been permanently secured on their axles, a pair of wheels being usually threaded onto an axle rod, whose ends are headed over to retain the wheels.

Manufacturers have for some time sought suitable methods of facilitating wheel changes, thereby to increase the realism and play value of the models, but no commercially practical solution has so far been proposed. The obvious way of providing this facility is to secure the wheels to their axles by means of lock nuts, but in small scale vehicles, say $\frac{1}{40}$ or $\frac{1}{50}$ scale, such a solution cannot be used.

In accordance with the present invention, however, there is provided a toy vehicle including a body and a plurality of rotatable ground wheels, each mounted on an axle and having on its inner face an axial extension formed externally with a circumferential groove, a plurality of detents, one for each road wheel, mounted on the body and each normally engaging in the said recess to retain the wheel on the axle, and means for disengaging any one of the detents from the respective groove to permit removal of the wheel from its axle.

In many known toy vehicles, the road wheel axles are mounted so that they can move vertically relative to the body, upward movement of the axle being opposed by one or more springs, thus simulating spring suspension of the vehicle. In the preferred form of the present invention, the spring opposing upward movement of the axle also forms the detent for releasably retaining the wheel on the axle. To facilitate release of a road wheel from its axle, there is preferably provided a cam rotatably mounted on the axle and adapted to engage the detent and move it clear of the groove in the wheel. Conveniently, the cam is provided with an operating lever which normally lies substantially horizontally below the chassis plate of the vehicle and can be swung down into a substantially vertical position to cause the cam to lift the

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detent out of the wheel groove. By giving the cam operating lever a length rather greater than the radius of the road wheel, the lever can be made to serve also as a jack, holding the vehicle supported with the road wheel clear of the ground.

A preferred embodiment of the invention and a modification are further described below, by way of example only, with reference to the accompanying drawings, in which:

FIG. 1 is a plan view of one end of the chassis of a toy vehicle;

FIG. 2 is a section taken on the line C—C of FIG. 1;

FIG. 3 is a view similar to that of FIG. 2, showing the parts in a different position;

FIG. 4 is a section taken on the line A—A of FIG. 2;

FIG. 5 is a half-section taken on the line B—B of FIG. 3, and

FIGS. 6 and 7 are views, corresponding to FIGS. 4 and 5, respectively showing a modification.

FIGS. 1, 2 and 4 of the drawings shows the parts in their normal relative positions. A chassis plate 1 of metal or other substantially rigid material, and forming part of the body of the vehicle, carries on its upper surface lugs 2 which locate an axle rod 3 extending transversely above the plate while permitting upward movement of the axle. A central enlargement 4 of the axle, which may be formed integrally or may be constituted by a separate sleeve secured on the rod, prevents axial withdrawal of the rod when the parts have been assembled. Upward movement of the axle rod is opposed by a spring plate 5, moulded from plastics material, which is secured against the upper face of the chassis plate 1 and has a free end portion extending over the axle. Fitting freely onto each end of the axle rod there is a road wheel comprising a hub 6 and a rubber tyre 7. The hub is formed on its inner side with an axial extension 8 which is grooved circumferentially, and in this groove there engages a portion 9 of the spring plate 5. Beneath another portion 10 of the spring plate 5, there is rotatably mounted on the axle rod a cam 11, provided with an operating lever 12.

In the normal assembled condition of the parts, the operating lever 12 lies substantially horizontally beneath the chassis plate 1, so that the cam 11 allows the spring plate 5 to flex downwardly to engage its portion 9 in the groove of the road wheel and retain the road wheel on the axle, while permitting the wheel to rotate freely. The axle and the parts mounted on it can move upwardly against the action of the spring, giving the vehicle a spring suspension. To detach a road wheel, the appropriate lever 12 is swung downwardly into a substantially vertical position (see FIGS. 3 and 4) when it forms a jack holding one corner of the vehicle supported with the road wheel clear of the ground. The resulting movement of the cam 11 lifts the parts 9 and 10 of the spring 5 which are associated with the road wheel in question sufficiently to free the part 9 from the groove in the road wheel, the parts 9 and 10 associated with the other road wheel on the same axle remaining in their wheel-retaining positions. With the jack thus operated, the road wheel can be withdrawn freely over the end of the axle and replaced by another wheel, subsequent return of the jack to its original position permitting the part 9 of the spring to engage in the retaining groove of the wheel and restoring all the parts to their original positions.

The construction illustrated eliminates the usual need to head the ends of the axle rod, an operation which may result in the rod becoming bent so that the toy will not run in a straight path. The hole in the wheel hub for receiving the axle rod does not extend completely through the hub, allowing the outer face of the wheel to be given a

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more realistic appearance. The wheel hub may be formed of metal by turning or die casting, or it may be formed by injection moulding from plastics material and in any case may be plated if desired. It will be understood, however, that this particular construction has been shown and described for purposes of illustration only and that numerous modifications are possible.

For example, in certain motor cars the design of the wheel arches is such that a wheel cannot be moved outwardly in the line of the axle to the extent necessary for hub extension 8 to clear the end of axle 3. In a model simulating such a car the construction illustrated may be modified, as shown in FIGS. 6 and 7, by omitting the web on the chassis plate which extends between the lugs 2 and limits downward movement of the axle relative to the chassis plate; such downward movement is instead limited by so shaping the member 11, 12 that when it is in its normal position it prevents the axle moving downwardly beyond the position illustrated, while when swung down into jacking position it permits an additional downward movement of the axle relative to the chassis plate, sufficient to allow removal of the wheel. More particularly, the cam 11 is formed with a projection 11A which, as shown in FIG. 6, normally rests on the adjacent surface of the chassis plate, holding the axle clear of the plate. On operative rotation of the cam 11 to the position shown in FIG. 7, the projection 11A is raised clear of the chassis plate, allowing the axle to be lowered towards the plate by the action of the spring 5, thereby allowing the wheel to clear the adjacent wheel arch 14.

What is claimed is:

1. A toy vehicle including a body, an axle mounted on said body, a pair of rotatable road wheels mounted on said axle, each said road wheel having an inwardly projecting axial extension, each said extension having means defining an external circumferential groove therein, detent means mounted on said body for movement relative to said road wheels and normally engaged in said grooves to prevent removal of said road wheels from said axle, and selectively operable means for moving said detents

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out of said grooves to permit removal of said wheels from said axle.

2. A toy vehicle as claimed in claim 1, wherein said axle is mounted on said body for vertical movement relative thereto, and comprising spring means engaging said axle and opposing upward movement thereof relative to said body, and wherein said spring means also constitutes said detent means.

3. A toy vehicle as claimed in claim 1, wherein said selectively operable means comprises cam means rotatably mounted on said body and engageable with said detent means.

4. A toy vehicle as claimed in claim 3, wherein said cam means has an operating lever operable to rotate the cam means and to act as a jack for supporting said vehicle body.

5. A toy vehicle as claimed in claim 3, wherein said cam means is rotatably mounted on said axle.

6. A toy vehicle as claimed in claim 2, wherein said selectively operable means comprises cam means rotatably mounted on said axle and normally serving to limit downward displacement thereof, relative to said body, by said spring means, and wherein operative rotation of said cam means to displace said detent means also causes said axle to be displaced downwardly, relative to said body, by said spring means.

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U.S. Cl. X.R.

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