

June 30, 1970

YASUTA SATO

3,517,458

MOVABLE TOY HAVING DETACHABLE AUXILIARY DRIVING WHEEL MEANS

Filed Dec. 11, 1967

FIG. 1.

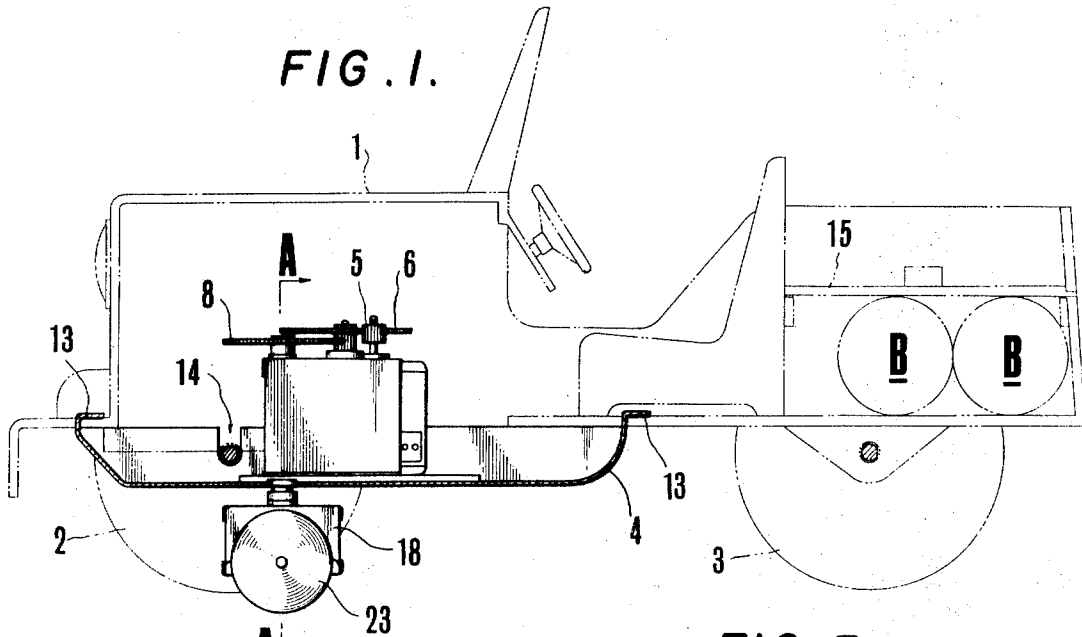


FIG. 2.

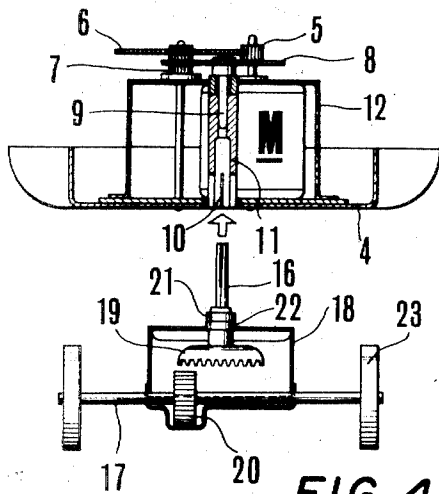


FIG. 4.

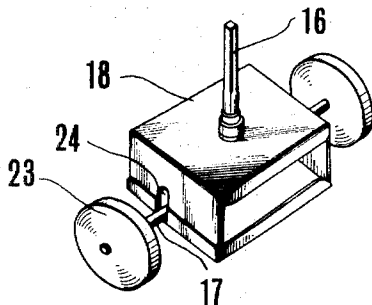


FIG. 3.

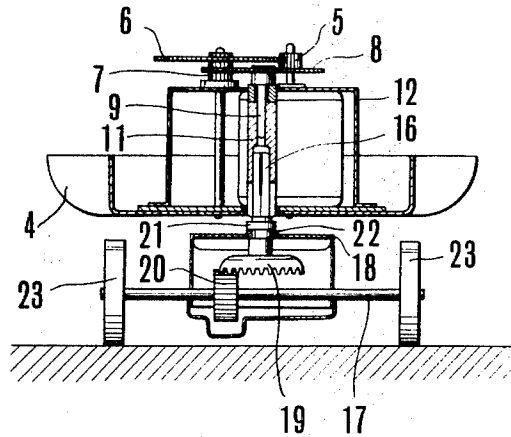
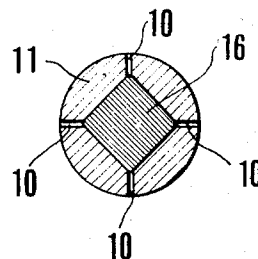


FIG. 5.



INVENTOR.

YASUTA SATO

BY

Kelman and Berman
Agents

1

3,517,458

**MOVABLE TOY HAVING DETACHABLE
AUXILIARY DRIVING WHEEL MEANS**
Yasuta Sato, 48-333-2 Matsugaoko, Nagareyama-shi,
Chiba-ken, Japan

Filed Dec. 11, 1967, Ser. No. 689,622
Claims priority, application Japan, Oct. 11, 1967,
42/88,345

Int. Cl. A63h 29/22

U.S. Cl. 46-243

6 Claims

ABSTRACT OF THE DISCLOSURE

A movable toy has a body provided with pairs of front and rear wheels which are idlers and a source of driving power including an electric motor. An auxiliary driving wheel attachment including a driving shaft connected to an axle carrying a pair of driving wheels is detachably connected to the body and the source of driving power by its driving shaft.

This invention relates in general to movable toys, and in particular to a movable toy with idler wheels which is provided with additional auxiliary driving wheel means adapted for being freely attached to and detached from a toy body.

In one type of movable toys known to the art of toy manufacture, a movable toy has pairs of front and rear wheels which are idle wheels, and a body driven by auxiliary driving wheel means. In another type of such toys, auxiliary driving wheel means is actuated, when the moving toy body is brought into collision with an obstacle and stopped in its forward movement, to automatically control the direction of travel of the toy body whereby the toy can continue its forward movement by avoiding the obstacle. Such auxiliary driving wheel means cannot be separated from the toy body once the former is connected to the latter. This arrangement has a disadvantage in that when it is desired to manually move the toy by means of the front and rear idle wheels without using the auxiliary driving wheel means, the auxiliary driving wheel means interferes with the manual operation, so that it is not possible to move the toy by means of the front and rear wheels.

The present invention obviates the aforementioned disadvantage of movable toys of the prior art provided with additional auxiliary wheel means by providing a movable toy which can be used for different kinds of operations without difficulty. The movable toy according to this invention is provided with auxiliary driving wheel means including a pair of driving wheels which is detachable, in addition to pairs of conventional front and rear wheels. When it is desired to have the toy move under its own power, the auxiliary driving wheel means is connected to a driving mechanism mounted on the toy body so that the toy can move under its own power by means of the auxiliary driving wheel means. When the toy strikes against an obstacle and is stopped in its forward movement, the auxiliary driving wheel means driving the toy body can be pivoted horizontally to automatically change the direction of travel of the toy so that the toy can continue its forward movement. When it is desired to manually move the toy on its front and rear wheels, the auxiliary driving wheel means can be detached from the toy body so that the toy can be moved freely by hand without any interference. The characterizing feature of this invention is that in switching from one kind of operation to another kind of operation as described above, no tools are required for connecting the auxiliary driving wheel means to the toy body or disconnecting the former

2

from the latter, so that switching can be effected readily and quickly. Furthermore, the auxiliary driving wheel means is maintained in a stable condition once connected to the toy body, permitting the toy to move smoothly.

The invention provides a toy whose body has a plurality of wheels mounted on the underside thereof. The wheels jointly define a surface tangential to each wheel, and normally roll on such a surface. The source of driving power for the toy includes a motor mounted on the body, a first coupling member accessible from the underside of the body and mounted on the same for rotation about an axis transverse to the afore-mentioned surface and a first motion transmitting train which drivingly connects the motor to the coupling member.

The toy has a driving attachment on whose frame a driving wheel is rotatably mounted. A second coupling member is mounted on the frame for rotation about an axis transverse to the axis of rotation of the driving wheel, and the attachment includes a second motion transmitting train which drivingly connects the second coupling member to the driving wheel.

One of the coupling members is formed with a recess to constitute a chuck, and the other coupling member is shaped for partial, releasable, conforming engagement with the chuck. When the last-mentioned coupling member is engaged with the chuck, the axes of rotation of the coupling members substantially coincide, and the driving wheel of the driving attachment projects from the underside of the toy body beyond the afore-mentioned surface.

One embodiment of the invention will now be explained with reference to the accompanying drawings in which:

FIG. 1 is a side view of a toy automobile incorporating the present invention;

FIGS. 2 and 3 are views in section taken along the line A-A of FIG. 1, FIG. 2 showing the toy body and auxiliary driving wheel attachment separated from each other and FIG. 3 showing the body and auxiliary driving wheel attachment connected to each other;

FIG. 4 is a perspective view of the auxiliary driving wheel attachment; and

FIG. 5 is a horizontal sectional view of the coupling connecting the body to the attachment in the device of FIG. 3.

In the drawings, a toy automobile body generally designated 1 is provided with a pair of front wheels 2 and a pair of rear wheels 3. Disposed intermediate said pairs of front and rear wheels is a drive mechanism including an electric motor M which is mounted on a chassis plate 4. The driving mechanism comprises a gear 5 on the output shaft of the motor M, a gear 6 in meshing engagement with said gear 5, a pinion 7 mounted on a common countershaft with said gear 6, a gear 8 in meshing engagement with said pinion 7, and a rotary shaft 9 carrying said gear 8. Said rotary shaft 9 is fixedly fastened in a tubular shaft 11 formed with slits 10 at its lower end portion so that said lower end portion of the tubular shaft 11 can serve as a chuck. The end portion of the tubular shaft which forms a chuck is disposed adjacent the underside of the chassis plate 4, and a driving shaft of auxiliary driving wheel attachment subsequently to be described can be freely inserted in and withdrawn from said chuck. A frame 12 for enclosing the driving mechanism is secured to the chassis plate 4 on its upper surface. The chassis plate 4 is formed with catch members 13 at its front and rear edges for fixing the chassis plate 4 to the toy automobile body. A shaft for supporting the front pair of wheels is journaled in cutouts 14 formed on opposite sides of the body. Dry cells B are disposed in the rear

3

portion of the toy automobile body which is covered with a detachable cover 15.

The driving wheel attachment includes a square driving shaft 16 which can be freely inserted in or withdrawn from the chuck formed in the lower portion of the tubular shaft 11. The driving shaft 16 is connected to a frame 18 for free rotary motion relative thereto, said frame 18 transversely mounting an axle 17 carrying a pair of driving wheels 23 at its opposite ends. A crown gear 19 is secured to the portion of the driving shaft 16 which extends into the frame 18. The axle 17 mounts a pinion 20 which is in meshing engagement with said crown gear 19. Secured to the driving shaft 16 is a collar 21 which rests against a collar 22 on the frame 18. The axle 17 is loosely mounted in vertical slots 24 formed on opposite sides of the frame 18 whereby the axle 17 can be freely tilted relative to the frame 18. This arrangement permits the driving wheels 23 to firmly grip the floor surface on which they move in rolling motion, so that the toy automobile can move steadily.

From the foregoing description, it will be appreciated that the toy automobile according to the present invention permits to readily switch from one kind of operation to another kind of operation. When the driving shaft 16 is inserted in the chuck formed in the lower portion of the tubular shaft 11, the driving wheels 23 project downward beyond the front wheels 2, the toy automobile body 1 will be supported by the driving wheels 23 and rear wheels 3 and begin to move in an operation similar to the operation of movable toys of the prior are described in the opening paragraph of the specification when driving mechanism is started. If, on the other hand, the auxiliary driving wheel means is detached from the toy automobile body 1 by withdrawing the driving shaft 16 from the chuck, the toy automobile body will be supported by the front wheels 2 and rear wheels 3 and can be moved by hand without any interference. If the driving mechanism is connected to the front wheels 2 or rear wheels 3, the toy automobile can be made to move under its own power. The present invention thus provides a movable toy which can readily and quickly be switched from one kind of operation to another kind of operation. The auxiliary driving wheel means which can readily be attached to and removed from the toy body can be used with various kinds of movable toys.

What is claimed is:

1. A movable toy comprising, in combination:

- (a) a toy body;
- (b) a plurality of idler wheels mounted on the underside of said body and jointly defining a surface tangential to each of said wheels;
- (c) a source of driving power including
 - (1) a motor mounted on said body,
 - (2) a first coupling member accessible from said underside and mounted on said body for rotation about an axis transverse to said surface, and

4

(3) first motion transmitting means drivingly connecting said motor to said coupling member; and

(d) a driving attachment including

- (1) frame means,
- (2) a driving wheel mounted on said frame means for rotation about an axis,
- (3) a second coupling member mounted on said frame means for rotation about an axis transverse to the axis of rotation of said driving wheel, and
- (4) second motion transmitting means drivingly connecting said second coupling member to said driving wheel,
 - (i) one of said coupling members being formed with a recess to constitute a chuck, and the other coupling member being shaped for conforming, releasable, driving engagement with said chuck,
 - (ii) the axes of rotation of said coupling members substantially coinciding, and said driving wheel projecting from said underside beyond said surface when said other coupling member is engaged with said chuck.

2. A toy as set forth in claim 1, wherein said first coupling member is formed with said recess, the recess being open in the direction of said transverse axis for axial insertion of said second coupling member.

3. A toy as set forth in claim 2, said plurality of wheels including two pairs of coaxial wheels.

4. A toy as set forth in claim 1, wherein said driving attachment includes an axle carrying said driving wheel and mounted on said frame means for rotation about the axis of said driving wheel, and said second motion transmitting means include meshingly engaged gears on said axle and on said second coupling member.

5. A toy as set forth in claim 4, wherein one of said gears is a crown gear.

6. A toy as set forth in claim 1, wherein said other coupling member is of angular cross section transversely of the axis of rotation thereof.

References Cited

UNITED STATES PATENTS

3,232,005 2/1966 Lahr ----- 46-211 X

FOREIGN PATENTS

1,261,334 4/1961 France.

ROBERT PESHOCK, Primary Examiner

R. F. CUTTING, Assistant Examiner

U.S. Cl. X.R.

46-211