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(54) Toy vehicle.

(57) Toy vehicles are known which have a steering system such that, when they are driven in one direction (usually forwardly) they travel in a generally straight line, and when they are driven in the opposite direction they turn. The application provides a way of achieving this, by providing on the vehicle an assembly (8) comprising two wheels (11, 12) supported by an axle (9) which is freely rotatable about a pivot axis perpendicular to the axle and spaced from the centre thereof, the axle being rotatable about said axis between a rear stop (14) and a forward stop (13). Articulated toy vehicles comprising a tractor (1) and trailer (2) have a drive means (4) installed in the trailer and stop means (16, 17) to prevent jack-knifing. Such articulated vehicles may be provided with a steering assembly (8).

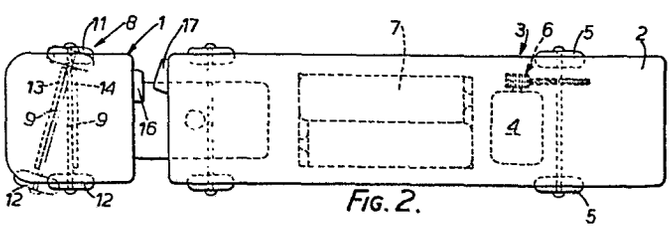

FIG. 2.

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TOY VEHICLE

This invention relates to toy vehicles.

Toy cars are known which are steerable in that they move along a generally straight path in the forward direction, and turn when driven in a reverse direction. One example of such a car comprises a fifth wheel located between the front wheels of the car, the fifth wheel being pivotally mounted on the vehicle in the manner of a castor. The fifth wheel is so arranged that it is aligned with the longitudinal axis of the car when moving forwardly, but when the vehicle moves rearwardly the wheel rotates within a confined angle causing the car to turn. Thus, control of the car is achieved simply by driving the car using simple control methods, which may be mechanical, electrical or electronic.

These known toy cars have the disadvantage that the fifth wheel engages the ground and the front wheels of the vehicle are lifted slightly from the ground, so that the vehicle does not appear to be authentic.

We have now devised an improved steering arrangement for toy vehicles by which this disadvantage is overcome.

According to the invention, there is provided a toy vehicle which comprises a vehicle body (1) and wheeled steering means (8) therefor including a wheel to engage a support surface, said steering means being pivotally

mounted on the body and so arranged that, when the vehicle is moved in one direction the vehicle follows a generally straight path, and when moved in the opposite direction, the vehicle turns, characterised in that the wheeled steering means (8) comprises two wheels (11,12) supported by an axle (9) which is freely rotatable about a pivot axis perpendicular to the axle and spaced from the centre of the axle, and wherein two stop means (13,14) are provided which are engageable with the axle to limit angular movement thereof, the first (14) of said stop means holding the axle perpendicular to the longitudinal axis of the vehicle in one direction of movement of the vehicle, and the second (13) of said stop means holding the axle at an angle to the vehicle longitudinal axis when the vehicle moves in the opposite direction.

In this way the vehicle is steered in only one direction of movement, which is preferably the reverse direction. Movement of the axle is achieved by the drag of the wheels on the surface on which the vehicle runs, and power-operated means for rotating the axle, and thus steering the vehicle, are not required.

The toy vehicles of the invention may include a motor for selectively driving the vehicle in a forwards and a reverse direction and the motor may, if desired, be remotely controlled.

The steering axle is preferably at the front or forward end of the vehicle, and will generally extend transversely of the vehicle. The pivot axis is spaced from the mid-point of the axle (which will normally be on the longitudinal axis of the vehicle) and is preferably at or close to one end of the axle, i.e. at or close to a wheel.

In one preferred arrangement, the vehicle has a generally planar base portion and the two stops are formed as projections from this base, so that the axle slides over the base (either above or below it) between the two stops. A further planar member may be provided parallel to the base so that a generally triangular box-like structure is formed

in which the axle is housed, the structure extending generally transversely of the vehicle with two sides thereof constituted by the two stops.

The steering arrangement of the present invention can be employed in a variety of toy vehicles. It is especially useful in articulated toy vehicles which include a tractor and a trailer releasably and pivotally coupled thereto, the steering arrangement normally being located on the tractor.

Articulated toy vehicles pose another problem where it is desired to include equipment therein such as a motor and switching arrangement to drive the vehicle. This equipment cannot normally be accommodated in the tractor. Steering of such a vehicle could be readily controlled if the tractor had drivable wheels connected to a motor within the tractor body and the trailer contained the other equipment, such as control switch and batteries. In an electrically operated vehicle, such an arrangement would require a plug and socket between the tractor and trailer, which is not practical on a small toy unless the tractor and trailer were to be permanently connected, which is not desirable.

We have now found, in accordance with another aspect of the present invention, that this problem can be overcome by providing a toy articulated vehicle comprising a tractor and a trailer releasably connected to the tractor, said trailer having means for driving the vehicle, and said tractor having means for steering the vehicle along a generally straight path when the vehicle is driven in one direction and a generally curved path when the vehicle is driven in the opposite direction, and stop means for limiting the rotation of the tractor relative to the trailer when the vehicle is driven in said opposite direction. Such articulated toy vehicles of the invention preferably comprise a steering arrangement of the invention as previously

described.

An articulated toy vehicle in accordance with the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

FIGURE 1 is a side elevational view of the vehicle;

FIGURE 2 is a top plan view;

FIGURE 3 is a plan view showing the vehicle in a turning mode;

FIGURE 4 is a detail plan view illustrating diagrammatically extreme positions of the front axle and steering wheels; and

FIGURE 5 is a partial sectional view taken on line A-A of Figure 4.

The vehicle comprises a cab part or tractor 1 to which is detachably and pivotally connected in known manner a trailer 2. A drive arrangement 3 for the vehicle is located in the trailer 2 and preferably comprises a motor 4 which is arranged to drive the rear wheels 5 of the trailer, for example through gears 6, a battery 7 and a switch arrangement (not shown). The switch arrangement provides "off", "forward" and "reverse" modes and is preferably operated by remote control, for example using a manually operated remote control unit (not shown) which may, for example, transmit sonic, radio, infra-red or ultrasonic waves. The switch arrangement may however be manually operated, or it may be in a separate, hand-operated control unit connected by wiring to the motor 4. The motor 4 may optionally be clockwork and manually actuated to operate in the required modes.

A steering arrangement is provided for the vehicle, by which the vehicle moves in a straight path when travelling forwardly and by which the vehicle is caused to turn when travelling in a reverse direction. In the illustrated embodiment, the steering arrangement comprises

an assembly 8 permitting pivotal movement of the front axle 9 of the tractor 1 between two extreme positions, in one of which the axle 9 is perpendicular to the longitudinal axis of the vehicle and in the other of which the axle 9 is at an angle to the longitudinal axis, as illustrated in Figures 2 and 4. The axle 9 is pivotable about a vertical axis which is disposed to one side of the centre of the axle and is preferably close to one of the front wheels 11, the other front wheel 12 being permitted to move through an arc. The extreme positions of the axle 9 are determined by elongate front and rear stops 13,14 which are secured to the underside of the tractor 1. Any suitable means may be used to support the axle 9, for example a bottom plate attached to the stops 13,14 the plate supporting the axle 9 in all permitted angular positions thereof. A second plate (not shown) may be provided over the stops 13 and 14 to form a generally triangular box-shaped structure accommodating axle 9.

When the vehicle is travelling forwardly, the frictional drag of the wheels 11,12 urges the axle 9 against the rear stop 14 to ensure that the vehicle runs along a straight path. In the reverse direction, the frictional drag on the wheels 11,12 rotates the axle about its pivot axis and against the front stop 13 resulting in a turning movement of the tractor 1, and thus of the vehicle, as best illustrated in Figure 3.

To prevent excess rotation of the tractor 1 in the turning direction, and thus to prevent jack-knifing when reversing, a stop 15 is provided to limit angular movement of the tractor relative to the trailer. The stop 15 preferably comprises inter-engageable projections 16,17 formed respectively on the tractor 1 and trailer 2, as shown, but may take any suitable form.

In normal use, jack-knifing in the angular direction opposite to the turning direction does not occur,

but it has been found that under certain conditions, for example when running on a smooth surface, jack-knifing can occur. To prevent this it is possible to provide a further stop (not shown), similar to the stop 15, to limit rotation of the tractor relative to the trailer in the direction opposite to the usual turning direction. However it is considered that the play value of the toy is increased by allowing such jack-knifing in the non-turning direction.

Although described above with a steering arrangement requiring rotation of the front axle 9, other steering arrangements could be used. For example, in a non-illustrated vehicle the tractor 1 has a fifth wheel mounted on the underside of the tractor and arranged to lift the front wheels of the tractor slightly away from the surface on which the vehicle is running. The fifth wheel is mounted on an axle perpendicular to the longitudinal axis of the vehicle and the plane of the wheel is offset from that axis.

In this case, forward movement tends to cause the tractor to rotate and a constraint between the tractor and trailer is provided to prevent such rotation. In the reverse direction however the fifth wheel tends to rotate the tractor in the opposite direction in a generally circular path, as described above with reference to the accompanying drawings.

CLAIMS:

1. A toy vehicle which comprises a vehicle body (1) and wheeled steering means (8) therefor including a wheel to engage a support surface, said steering means being pivotally mounted on the body and so arranged that, when the vehicle is moved in one direction the vehicle follows a generally straight path, and when moved in the opposite direction, the vehicle turns, characterised in that the wheeled steering means (8) comprises two wheels (11,12) supported by an axle (9) which is freely rotatable about a pivot axis perpendicular to the axle and spaced from the centre of the axle, and wherein two stop means (13,14) are provided which are engageable with the axle to limit angular movement thereof, the first (14) of said stop means holding the axle perpendicular to the longitudinal axis of the vehicle in one direction of movement of the vehicle, and the second (13) of said stop means holding the axle at an angle to the vehicle longitudinal axis when the vehicle moves in the opposite direction.

2. A toy vehicle according to claim 1, characterised by including motor means (4) for selectively driving the vehicle in said one direction or in said opposite direction.

3. A toy vehicle according to claim 1 or 2, characterised in that the said axle (9) is at the front of the vehicle.

4. A toy vehicle according to claim 1,2 or 3, characterised in that said one direction of movement is a direction forwards of the vehicle.

5. A toy vehicle according to any of claims 1 to 4, characterised in that said axle (9) extends generally transversely of said vehicle axis with the said wheels (11,12) respectively mounted one at each end of the axle, and wherein the said pivot axis is at or adjacent one of said wheels (11).

6. A toy vehicle according to claim 5, characterised in that said axle (9) is mounted in a generally triangular box-like structure extending transversely of the vehicle, one side of which constitutes said first stop means (14) and another side of which constitutes the second stop means (13).

7. A toy vehicle according to any preceding claim characterised in that the vehicle is an articulated vehicle comprising a tractor (1) and a trailer (2) with means for releasably coupling the tractor to the trailer, and wherein the said wheeled steering means is provided on the tractor.

8. A toy articulated vehicle which comprises a tractor (1) and a trailer (2), means for releasably pivotally coupling the tractor to the trailer, characterised in that said trailer (2) comprises means for driving the vehicle (4), and said tractor (1) comprises means (8) for steering the vehicle along a generally straight path when the vehicle is driven in one direction, and a generally curved path

when the vehicle is driven in the opposite direction, and stop means (16,17) for limiting the rotation of the tractor relative to the trailer when the vehicle is driven in said opposite direction.

9. A vehicle according to claim 8, characterised in that the tractor comprises wheeled steering means comprising two wheels (11,12) supported by an axle (9) which is freely rotatable about a pivot axis perpendicular to the axle and spaced from the centre of the axle, and wherein two stop means (13,14) are provided which are engageable with the axle to limit angular movement thereof, the first (14) of said stop means holding the axle perpendicular to the longitudinal axis of the vehicle in one direction of movement of the vehicle, and the second (13) of said stop means holding the axle at an angle to the vehicle longitudinal axis when the vehicle moves in the opposite direction.

10. A vehicle according to claim 9, characterised in that said axle (9) extends generally transversely of said vehicle axis with the said wheels (11,12) respectively mounted one at each end of the axle, and wherein the said pivot axis is at or adjacent one of said wheels (11).

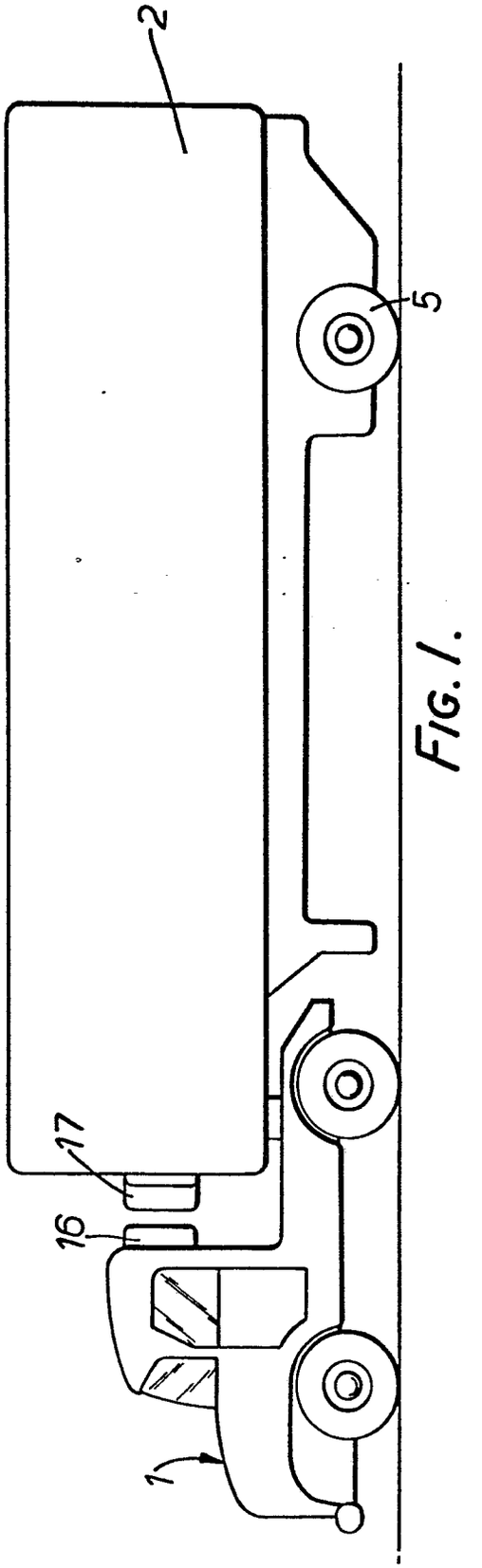

FIG. 1.

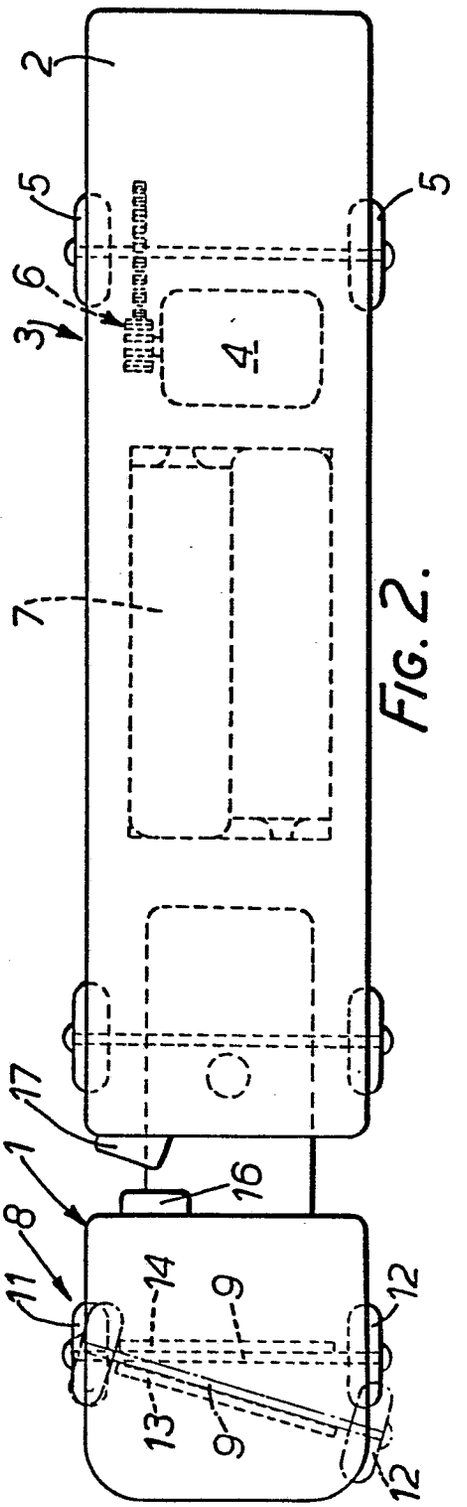

FIG. 2.

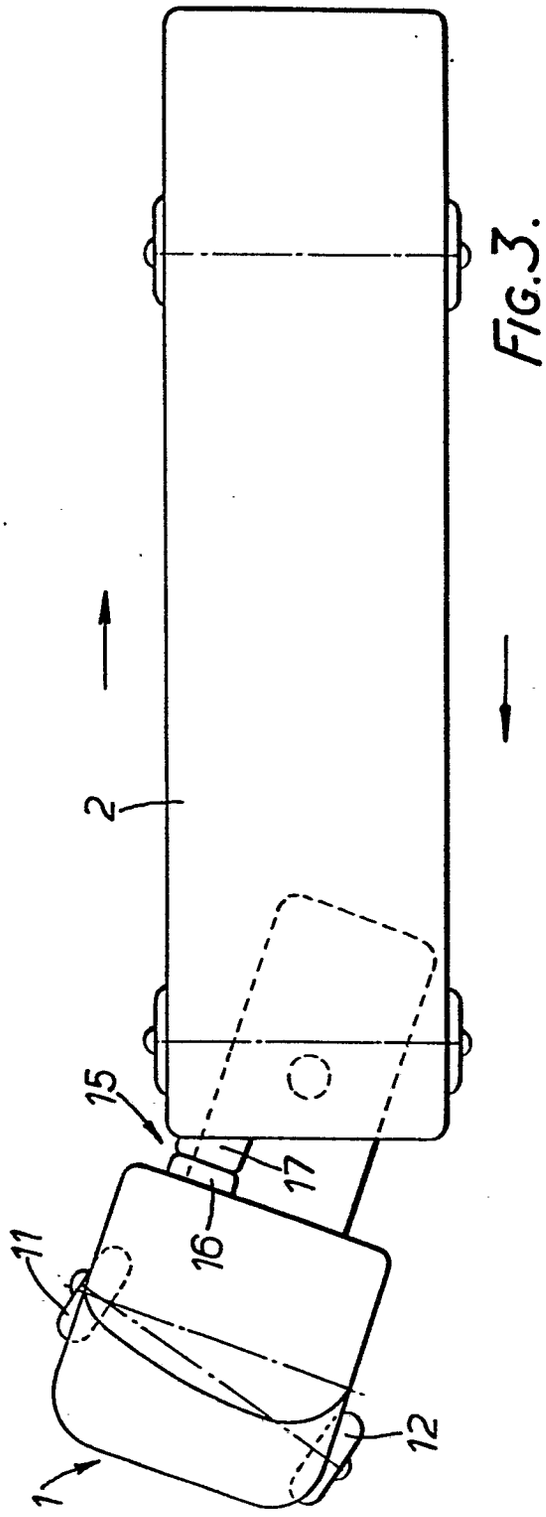

FIG. 3.

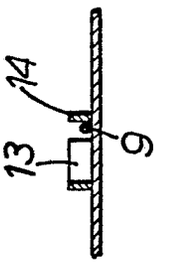

FIG. 5.

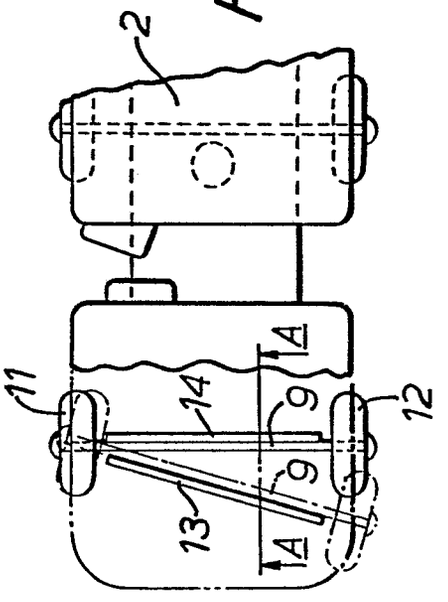

FIG. 4.

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Application number

EP 81 30 2853.7

EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	US - A - 2 683 956 (R.J. CONTE) * claims 1, 2; column 4, lines 3 to 37; fig. 8 to 10 *	1-5
	US - A - 2 943 418 (W. SMITH) * claim 1; column 3, lines 23 to 38; fig. 1 *	1-5
A	FR - A - 1 570 797 (RAIMUNDO PAYA RICO) * whole document, especially page 1, lines 24 to 35 *	1,3,4
A	DE - U - 7 033 183 (GAMA PATENTSPIEL-WAREN) * claims 1, 2; fig. 1 *	7,8

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

A 63 H 17/36
A 63 H 17/05

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

A 63 H 17/00
A 63 H 31/08

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	18-09-1981	CLOT