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# EUROPEAN PATENT APPLICATION

21 Application number: 88107685.5

51 Int. Cl.4: A63H 31/00

22 Date of filing: 13.05.88

30 Priority: 17.12.87 IT 2307587

43 Date of publication of application:  
21.06.89 Bulletin 89/25

84 Designated Contracting States:  
CH DE ES FR GB LI

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54 Transmission for model or toy motorised rail vehicles.

57 In a transmission comprising an electric motor driving at least one axle assembly of the model or toy rail vehicle (locomotive or the like) by way of a worm and gear wheels, the presence of at least one rocker arm supported under friction on a shaft of at least one of the gear wheels, said gear wheel being engaged with a pair of gear wheels supported by the rocker arm and selectively, according to the direction of rotation of the motor, engaging an output gear wheel which transmits motion to the rail vehicle axle.

On stoppage of the motor, the rail vehicle runs on under inertia by disengaging from the output gear wheel the corresponding gear wheel carried by the rocker arm.

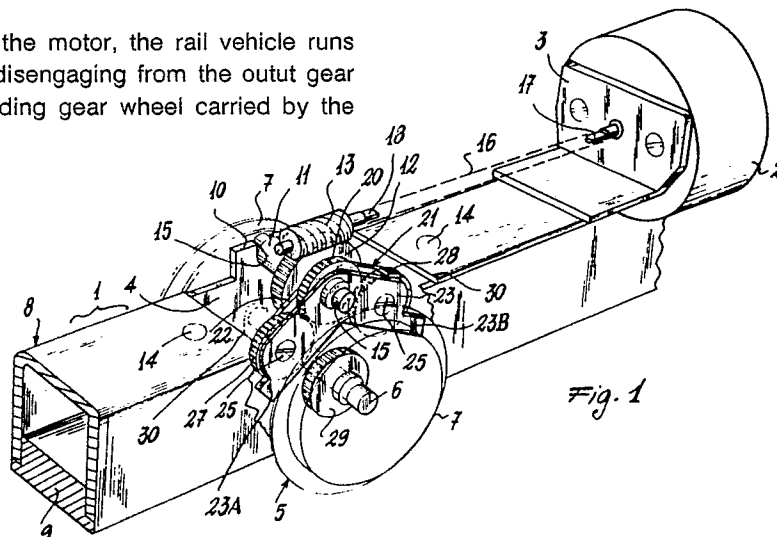


Fig. 1

## TRANSMISSION FOR MODEL OR TOY MOTORISED RAIL VEHICLES

This invention relates to a transmission for model or toy motorised rail vehicles such as locomotives or the like, said transmission comprising a reversible electric motor driving at least one axle assembly of the rail vehicle by way of a gear wheel worm coupling.

These vehicles behave unrealistically when the current is suddenly removed, such as at a signal block. In this respect, as the irreversibility of the worm gear wheel coupling does not allow the motor to be rotated by the inertia of the vehicle (and train), the vehicle stops instantly when the current is suddenly removed.

An object of the present invention is therefore to provide a simple and compact transmission which without using electronic, electrical or electromagnetic means is able to prevent the aforesaid unrealistic behaviour of model or toy rail vehicles.

This and further objects which will be more apparent from the detailed description given hereinafter are attained according to the invention by a transmission of the initially indicated type, characterised essentially in that on a shaft driven by the motor by way of the worm and carrying at least one central gear wheel there is mounted a rocker arm carrying two gear wheels which are engaged with said central gear wheel and which depending on the direction of rotation impressed on the worm by the motor enter alternately into engagement with an output gear wheel for transmitting motion to at least one axle assembly of the railway vehicle, but which disengage therefrom on stoppage of the worm.

The invention will be more apparent from the detailed description of a preferred embodiment and modifications thereof given hereinafter by way of non-limiting example with reference to the accompanying drawing in which:

Figure 1 is a partial perspective view with parts omitted showing a frame of a model or toy rail vehicle provided with a transmission constructed in accordance with the present invention;

Figures 2, 3 and 4 are diagrammatic side views of three positions which the rocker arm assumes during forward travel, reverse travel and stoppage;

Figure 6 is a diagrammatic side view of a transmission comprising two worms and two rocker arms, and suitable for model or toy articulated rail vehicles;

Figure 5 is a section on the line V-V of Figure 2;

Figure 7 is a diagrammatic side view of a transmission in which the two gear wheels of the rocker arm are in direct engagement with a gear wheel which is directly engaged by the worm;

Figure 8 is a diagrammatic plan view of a transmission for driving two axle assemblies of the model or toy rail vehicle, said transmission using only one rocker arm;

Figure 9 shows in sectional view the assembly of one of the peripheral wheels of the rocker arm;

Figure 10 is a section through a modified embodiment provided with a screw which prevents rocker arm movement.

In the figures the reference numeral 1 indicates a conventional load-bearing frame of a model or toy rail vehicle, such as a locomotive, driven by a direct current electric motor 2 supported by the frame on a bracket 3. The frame comprises a channel-shaped part 8 and a closure element 9 which are fixed removably together in any conventional manner. Again in conventional manner, the frame supports axle assemblies 5 in the form of an axle 6 with two wheels 7.

At one of said axle assemblies (the one shown in Figure 1), the part 8 comprises an aperture 4, on the longitudinal sides of which there is formed a fork 10 supporting a shaft 11. This shaft carries a gear wheel 12 which engages with a worm 13. The worm 13 is supported conventionally in a cover 13A, which is fixed by screws at 14 and also covers the forks 10 so as to prevent the shaft 11 escaping therefrom. Longitudinal movement of the shaft 11 is prevented by providing it with end recesses 15 to thus form shoulders which oppose such movement by making contact with the forks 10.

The worm 13 is coupled to the electric motor 2 by a coupling formed from a plastics or rubber tube provided with a non-circular bore. The correspondingly shaped ends 17, 18 of the worm 13 and shaft of the electric motor 2 engage in this bore.

All this is conventional and can be found for example in many types of model locomotives manufactured and sold by RIVAROSSA NUOVA GESTIONE S.p.A. of Como (Italy).

According to the invention, a second gear wheel 20 is fixed on the shaft 11, on this latter there also being supported rotatably under friction a rocker arm indicated overall by 21. The rocker arm is formed from two plates shaped as a very open V, at the vertex of which there is located the shaft 11. The gear wheel 20 is positioned between

these two plates. In proximity to its ends the rocker arm rotatably supports between its plates on shafts 25 two gear wheels 27, 28 which both engage the central gear wheel 20. The plate 23 comprises two stop appendices 23A, B arranged to cooperate with the transverse edges 30 of the aperture 4 to limit the travel of the rocker arm 21 in the two directions.

On the shaft 6 there is fixed a gear wheel 29 positioned so that it can be engaged alternately by the gear wheels 27, 28 carried by the rocker arm 21.

The operation is described hereinafter with reference to Figures 2, 3 and 4.

It will be assumed that the electric motor 2 is at rest and that, as shown in Figure 4, the rocker arm is in a position such that neither of its two gear wheels 27, 28 engages the gear wheel 29 fixed on the shaft 6.

If the electric motor 2 is now powered in the manner required for the locomotive to travel in a forward direction (arrow A of Figure 2), the following happens:

the gear wheels 12 and 20 rotate clockwise, the gear wheels 27 and 28 rotate anticlockwise, and the rocker arm 21 is rotated anticlockwise by the effect of friction to engage the gear wheel 27 with the gear wheel 29. To prevent this arrangement causing the rocker arm 21 bringing the gear wheel 27 into excessively penetrating engagement so that it acts as a wedge and blocks rotation, the angular travel of the rocker arm 21 is limited by the engagement of the appendix 23B against the rear transverse edge 30 of the aperture 4. When power to the electric motor is interrupted or rather when this latter stops, the worm 13 and gear wheels 12, 20, 27, 28, cease to rotate, but not the gear wheel 29 because of the effect of the inertia of the vehicle itself and of any carriages or trucks pulled or pushed by it. This causes the gear wheel 27 to disengage from the gear wheel 29 so that the rocker arm 21 rotates clockwise and returns to the position shown in Figure 4.

If the motor is now powered in the manner required for the locomotive to travel in the reverse direction (Figure 3 - arrow X), the friction (between the shaft 11 and rocker arm 21) causes the rocker arm 21 to rotate clockwise so that the gear wheels 28 and 29 engage to an extent limited by the contact of the ledge 23A against the rear transverse edge 30 of the aperture 4.

Figures 5 and 9 illustrate by way of example the assembly of the rocker arm 21 and of the relative gear wheels (20, 27, 28).

The gear wheel 12 is either force-fitted onto the shaft 11 or is formed in one piece with it. The plate 22 is mounted on the central greater-diameter part 11A of this shaft in such a manner that slight

friction arises between them. Internally threaded bushes 25A with a flanged end 25B are inserted into suitable holes in the plate 22. These bushes form the pivots 25 for the gear wheels 27, 28. The gear wheel 20 is then fixed on the shaft 11 in contact with the shoulder of the central part 11A. The gear wheels 27, 28 are then mounted on the bushes 25 and the other plate 23 of the rocker arm is then mounted as a light friction fit on the shaft 11 while at the same time inserting the reduced-diameter end 25C of the two bushes 25A into corresponding holes. Screws 25D are then screwed into the bushes 25. The dimensioning of the parts is such that the gear wheels 27, 28 are not gripped between the plates 22, 23.

A modified embodiment is shown in Figure 6. It is of use for example on articulated vehicles.

In this figure, in which the preceding reference numerals increased by 100 are used, a single electric motor drives two worms 113 connected together by a coupling which in known manner can be a universal, flexible or slider coupling. Each worm acts on an arrangement identical to that described with reference to the preceding figures.

In the modification shown in Figure 7, in which the reference numerals of Figures 1- 5 increased by 200 are used, the gear wheel 212, directly engaged with the worm, acts directly on the peripheral gear wheels 227, 228 of the rocker arm 221. This therefore eliminates the gear wheel 20, which is replaced by the gear wheel 212.

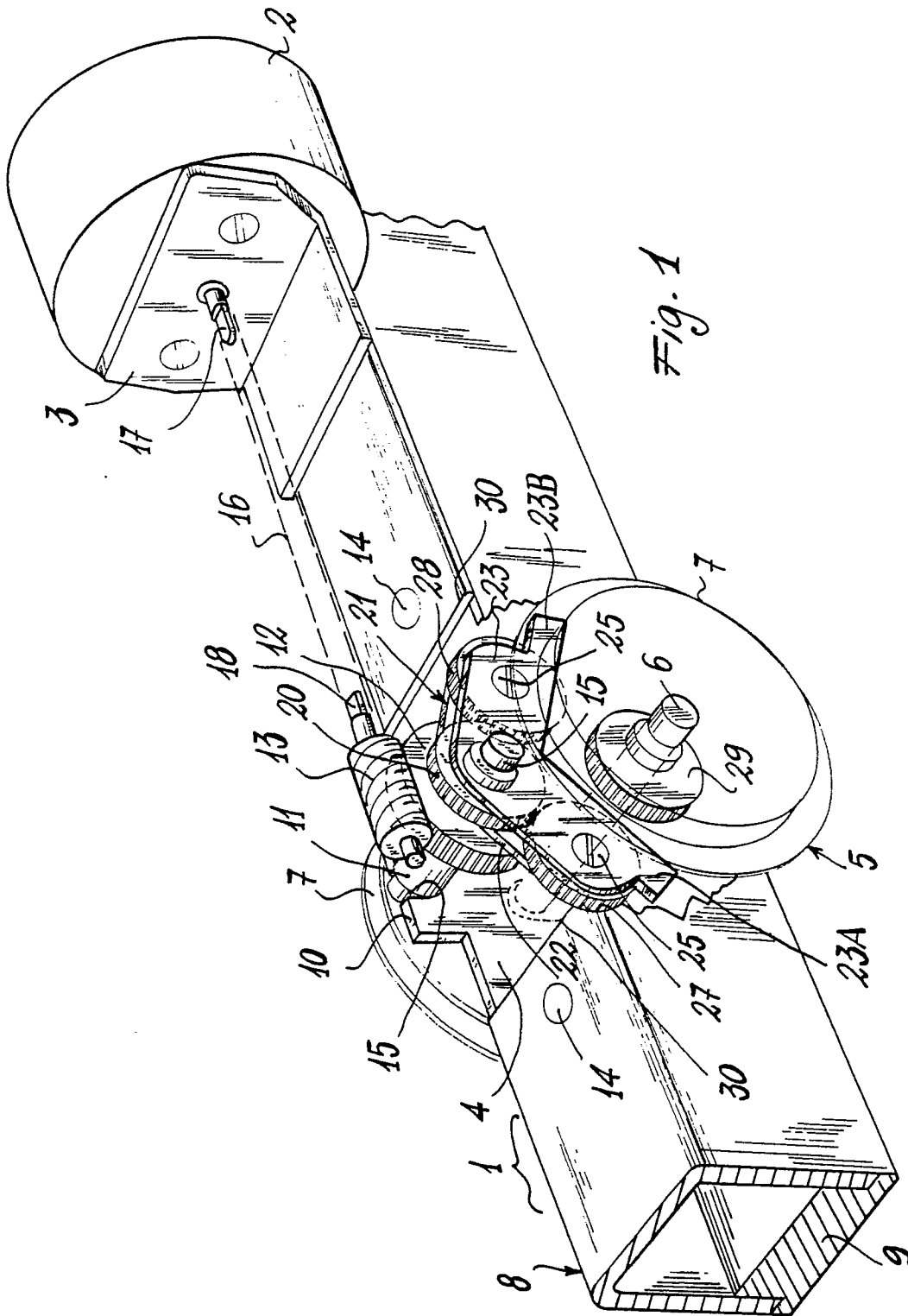
In the modified embodiment shown in Figure 8, in which the reference numerals of Figures 1-5 increased by 300 are used, on the axle 306 driven by way of the rocker arm 321 there is fixed a second gear wheel Z which through an idle gear wheel R transmits motion to a gear wheel P fixed on a further axle assembly 305' of the vehicle.

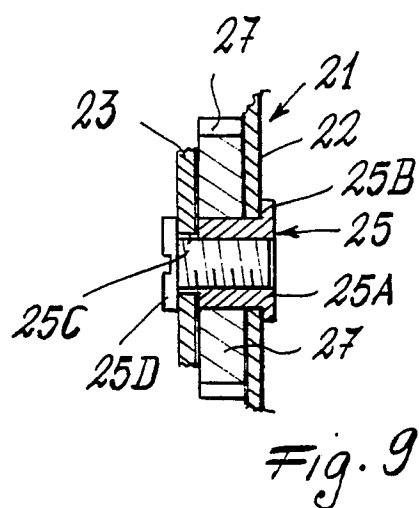
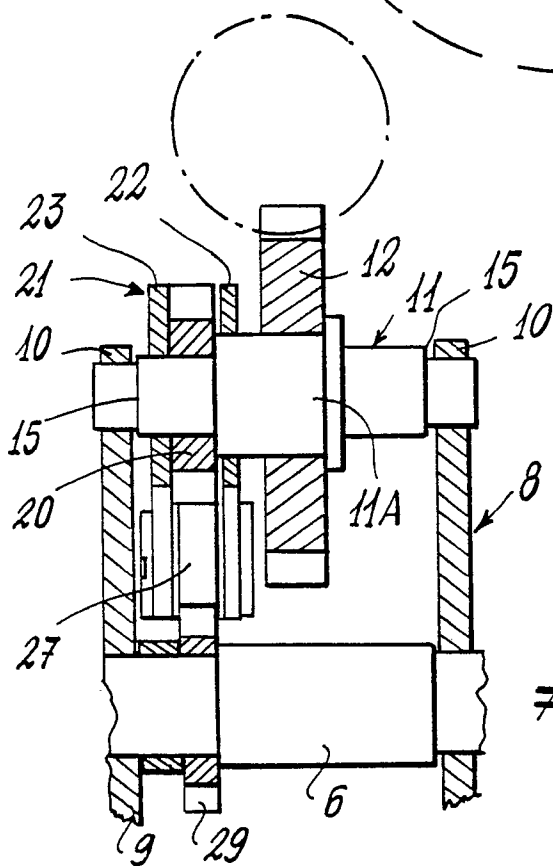
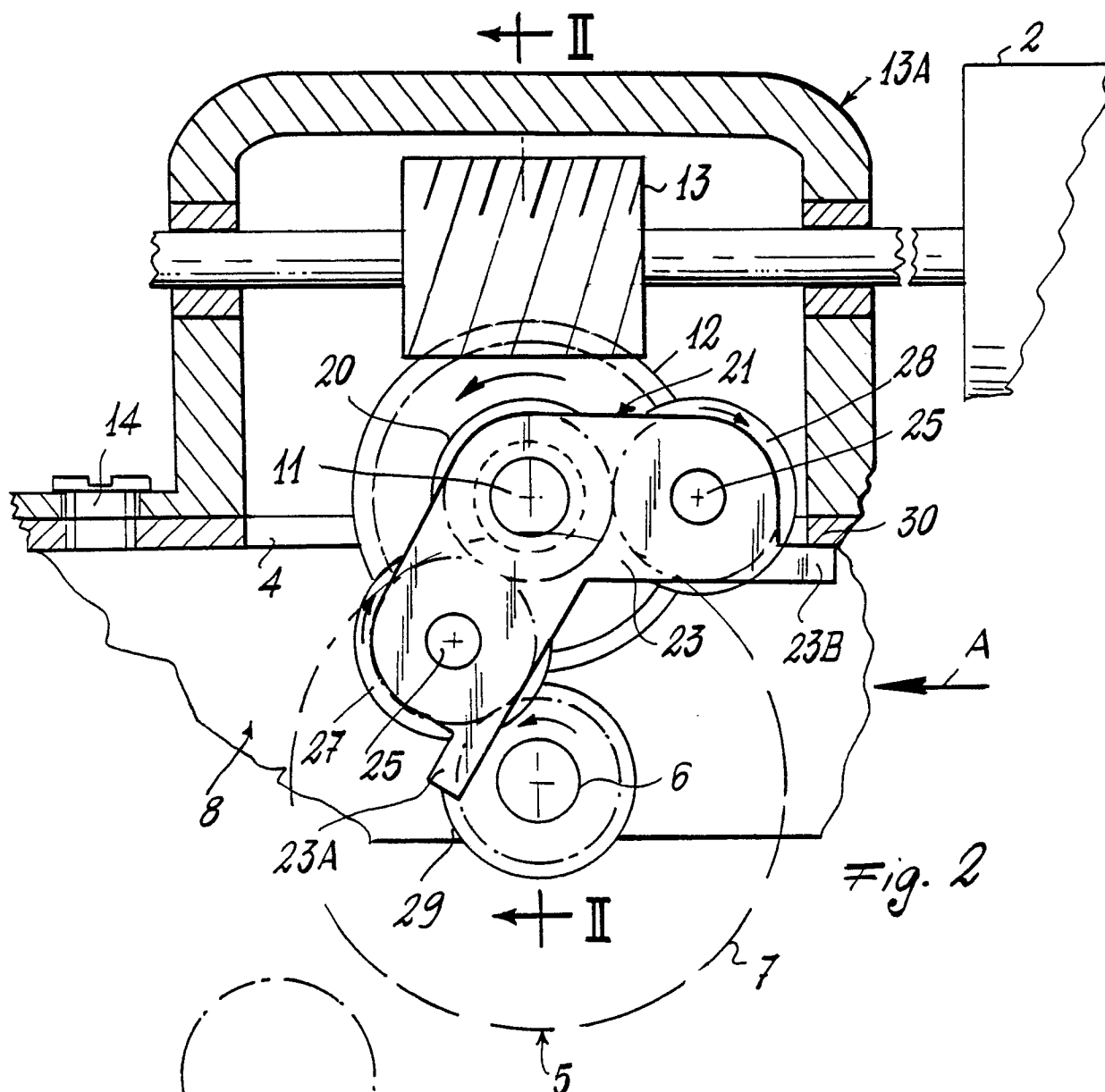
It is apparent that the invention also comprises an embodiment in which instead of being disposed on the shaft 11, 111, 211, 311 of the gear wheel 12, 112, 212, 312 which engages the worm 13, 113, 213, 313, the rocker arm can be disposed on an auxiliary shaft driven by said gear wheel by way of known transmission means such as gear wheels and/or toothed belts or not.

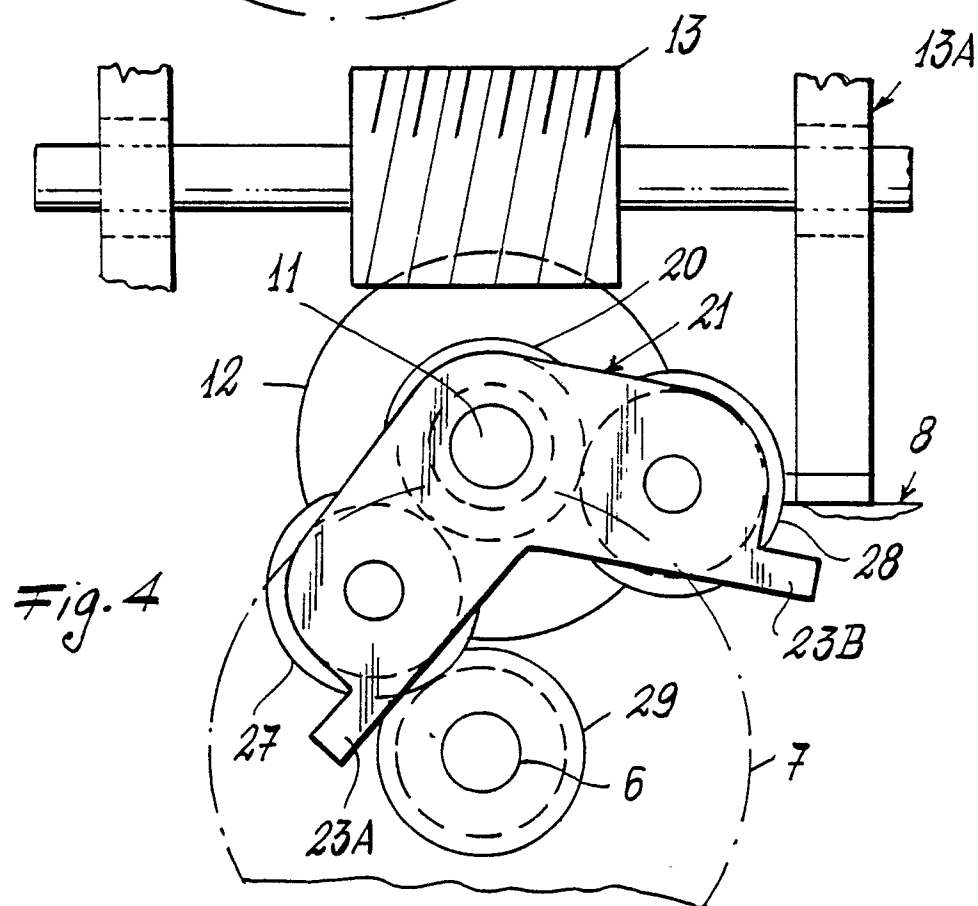
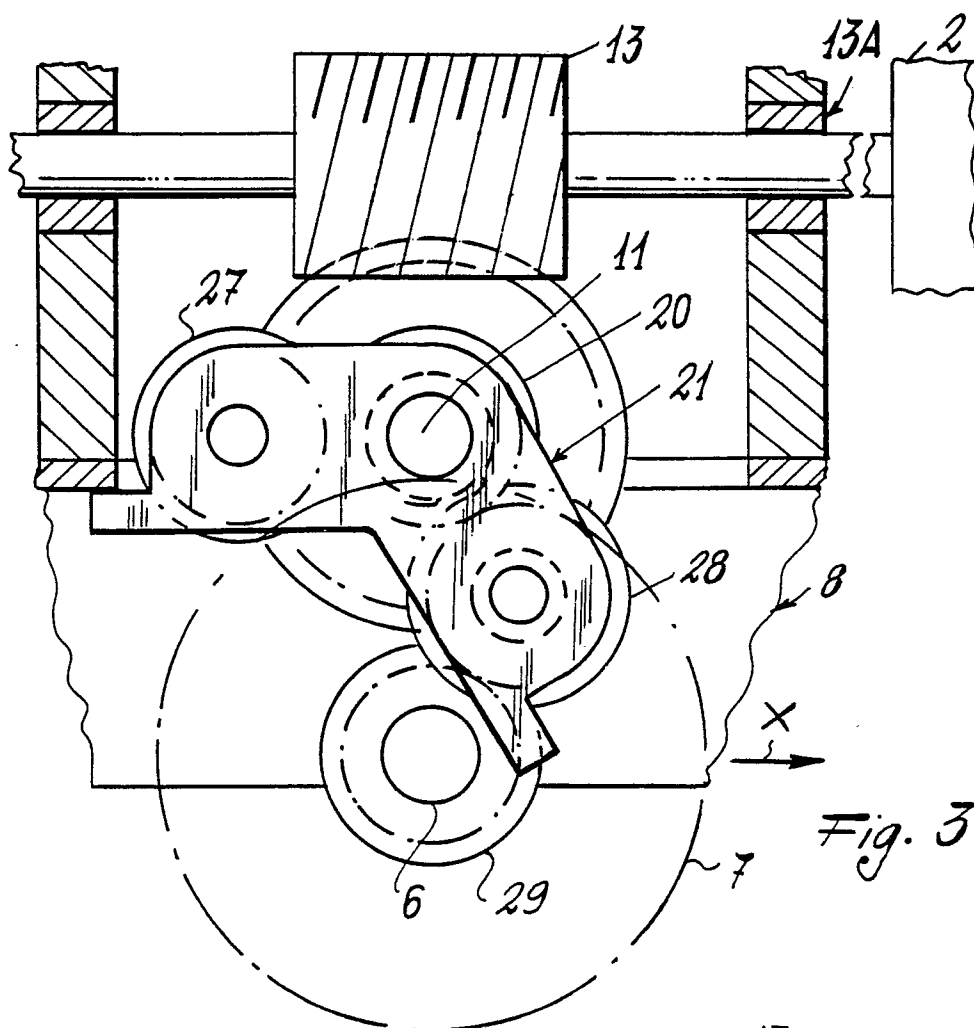
In the modified embodiment shown in Figure 10, in which the reference numerals of Figures 1-5 increased by 400 are used, a screw 90 is provided screwed into the structure 91 which supports the worm 413 and rocker arm 421. When slowly screwed in, this screw acts eccentrically on the rocker arm so as to lock it and keep the gear wheel 427 permanently engaged with the gear wheel 429. The user can thus operate the rail vehicle either in the conventional manner (with the rocker arm locked) or realistically under the effect of inertia (with the rocker arm free).

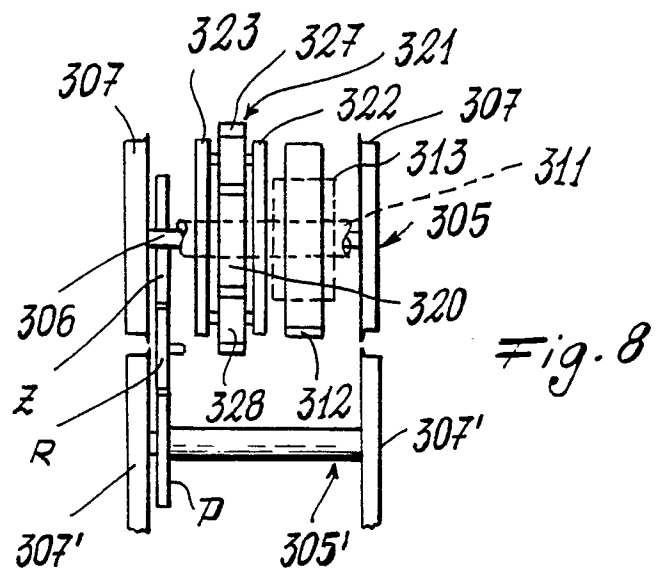
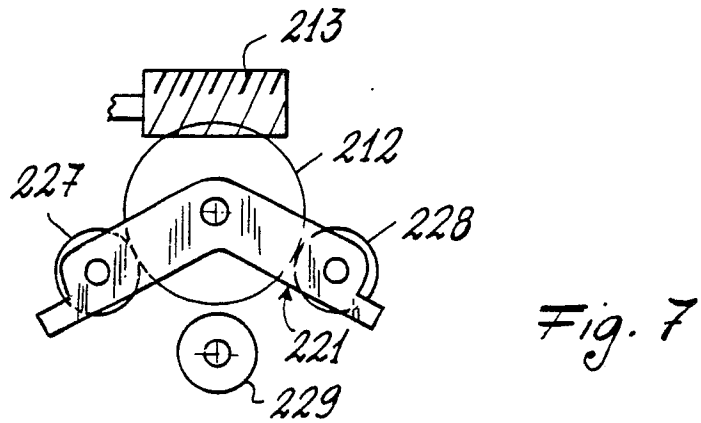
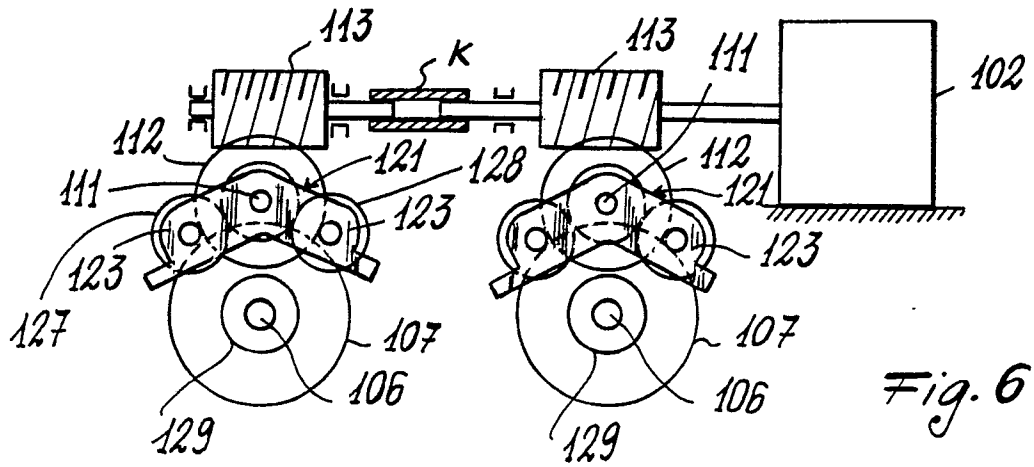
## Claims

1. A transmission for model or toy motorised rail vehicles such as locomotives or the like, comprising a reversible electric motor (2) driving at least one axle assembly (5) of the rail vehicle by way of a gear wheel/worm coupling (12, 13, 113, 213, 313), characterised in that on a shaft (11) driven by the motor (2) by way of the worm (13, 113, 213, 313) and carrying at least one central gear wheel (20, 120, 212, 320) there is mounted a rocker arm (21, 121, 221, 321) carrying two gear wheels (27, 28, 127, 128, 227, 228, 327, 328) which are engaged with said central gear wheel (20, 120, 212, 320) and which depending on the direction of rotation impressed on the worm (13, 113, 213, 313) by the motor (2) enter alternately into engagement with an output gear wheel (29, 129, 229) for transmitting motion to at least one axle assembly (5) of the railway vehicle, but which disengage therefrom on stoppage of the worm (13, 113, 213, 313). 5 10 15 20
2. A transmission as claimed in claim 1, characterised in that said central gear wheel (212) is in direct engagement with the worm (213) (Figure 7). 25
3. A transmission as claimed in claim 1, characterised in that said central gear wheel (20, 120, 320) is mounted on the same shaft (11, 111, 311) as the gear wheel (12, 112, 312) which is in direct engagement with the worm (13, 113, 313) (Figures 1, 2, 3, 4, 5, 6, 8). 30
4. A transmission as claimed in claim 1, characterised in that the shaft on which the central gear wheel is mounted is driven by intermediate gear wheels which are themselves driven by the gear wheel which is in direct engagement with the worm. 35
5. A transmission as claimed in claim 1, characterised by comprising two worm/gear wheel couplings (112, 113) each associated with a rocker arm (121), two couplings being driven by the same motor (Figure 6). 40
6. A transmission as claimed in one or more of the preceding claims, characterised in that at least two axle assemblies (305, 305') of the rail vehicle are operationally connected together by gear wheels (Z, R, P) (Figure 8). 45
7. A transmission as claimed in one or more of the preceding claims, characterised in that the rocker arm can be locking in one position by a screw acting on it. 50











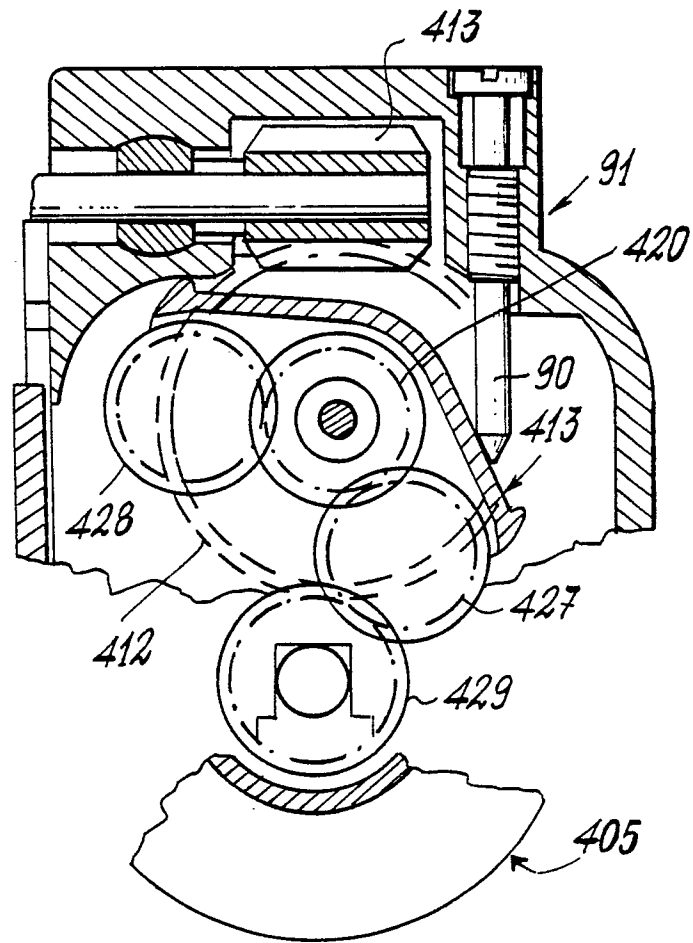


Fig. 10