Aug. 19, 1952 R. J. LOHR 2,607,163

SPRING DRIVEN TANDEM VEHICLE TOY

Filed Aug. 11, 1949 2 SHEETS—SHEET 1

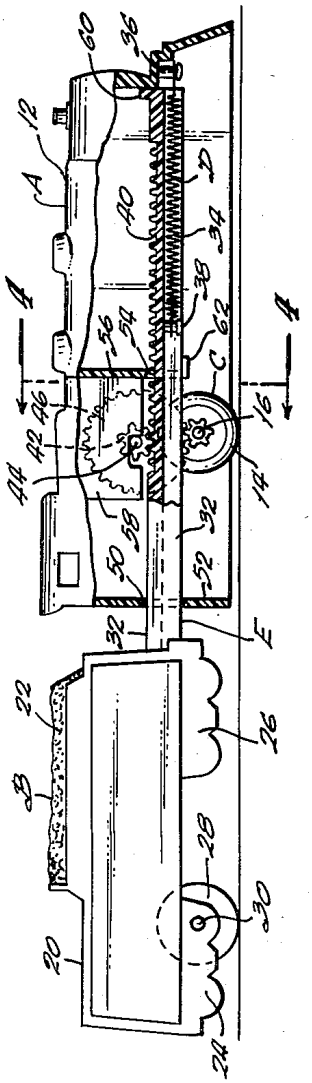

FIG. 1

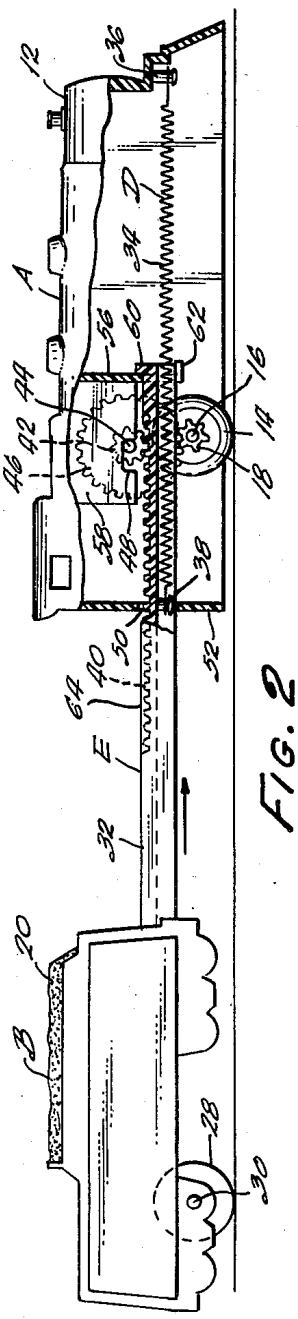

FIG. 2

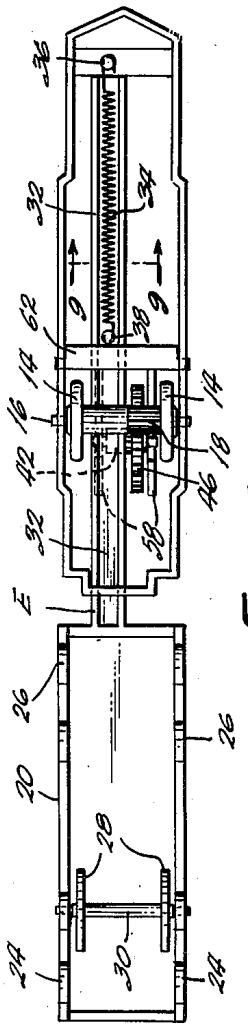

FIG. 3

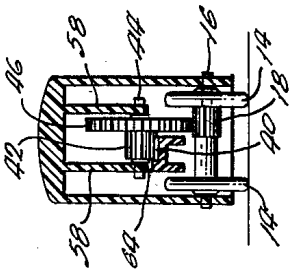

FIG. 4

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SPRING DRIVEN TANDEM VEHICLE TOY

Filed Aug. 11, 1949 2 SHEETS—SHEET 2

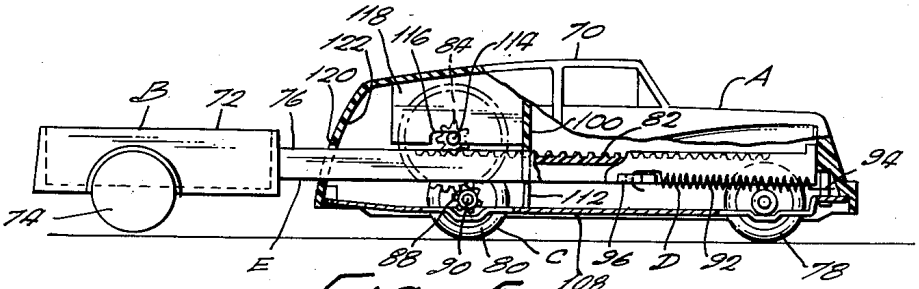

FIG. 5

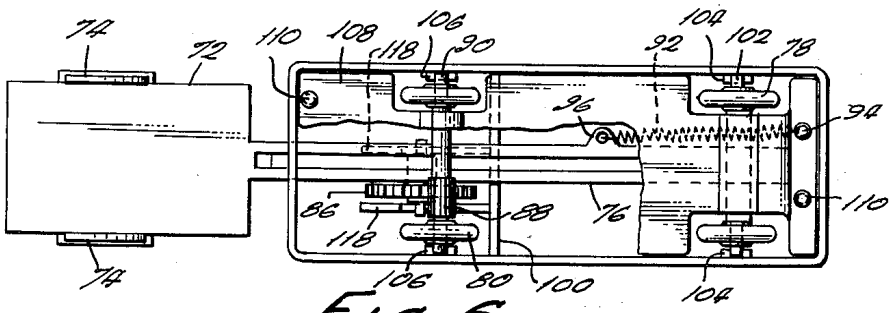

FIG. 6

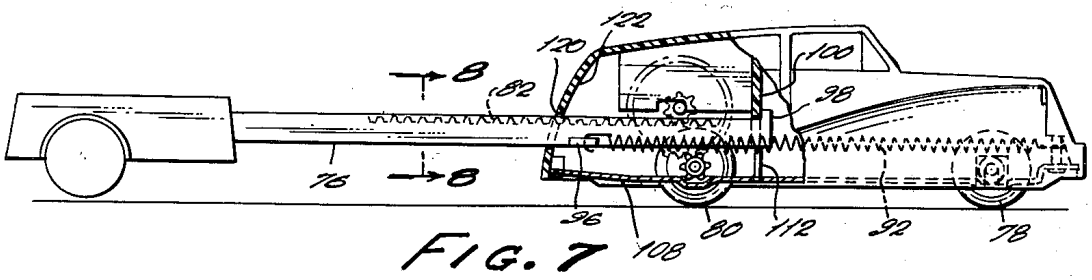

FIG. 7

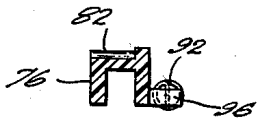

FIG. 8

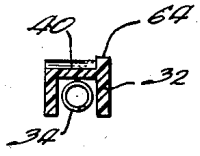

FIG. 9

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SPRING DRIVEN TANDEM VEHICLE TOY

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Application August 11, 1949, Serial No. 109,746

17 Claims. (Cl. 46—206)

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This invention relates to toys, especially vehicle toys, and more particularly to a tandem vehicle toy such as a locomotive and tender, or an auto and trailer.

The primary object of the invention is to generally improve vehicle toys. A more particular object is to provide a vehicle toy simulating two vehicles so related in appearance as to fit naturally in tandem. Another object is to provide a vehicle toy driven by a spring motor, which may be wound or tensioned without the use of a winding key. A more specific object is to provide such a toy in which the two tandem vehicles are variably spaced over a range of spacing, the propulsion spring being tensioned when the vehicles are moved to one end of the range.

Still further objects are to provide such a toy which is simple in construction; which may be made and sold inexpensively; which is readily and quickly tensioned to operate the same; and which affords free-wheeling or coasting of the toy after the vehicles have moved to one end of the range and the propulsion spring has been unwound.

To accomplish the foregoing objects, and other more specific objects which will hereinafter appear, my invention resides in the toy elements and their relation one to another, as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings, in which:

Fig. 1 is a partially sectioned side elevation of a locomotive and tender toy embodying features of my invention;

Fig. 2 is a similar view showing the relation of the parts when the vehicles have been pulled apart to tension the spring;

Fig. 3 is a bottom plan view;

Fig. 4 is a transverse section taken approximately in the plane of the line 4—4 of Fig. 1;

Fig. 5 is a partially sectioned elevation of a modified toy simulating an auto and trailer;

Fig. 6 is a bottom plan view of the toy;

Fig. 7 is a partially sectioned elevation similar to Fig. 5 but showing the auto and trailer pulled apart to tension the propulsion spring;

Fig. 8 is a fragmentary section taken in the plane of the line 8—8 of Fig. 7; and

Fig. 9 is a fragmentary section taken approximately in the plane to the line 9—9 of Fig. 3.

The invention is illustrated in two forms. In Figs. 1 through 4 the tandem vehicles represent a toy steam locomotive and its coal tender. In Figs. 5 through 8 the tandem vehicles simulate an auto and a small open trailer drawn thereby.

In both forms the toy comprises a first simulated vehicle A, a second simulated vehicle B, propulsion wheels C on one of the vehicles, a spring D geared to the wheels C to propel the same, and means E so connecting the vehicles A and B in tandem that the spacing therebetween may be varied over a range of spacing from the closed position shown in Fig. 1 or 5 to the open position shown in Fig. 2 or 7. The arrangement is such that the propulsion spring D is tensioned when the vehicles are spaced at one end of the range. When the toy is released the spring propels the toy, and during said propulsion causes the vehicles to be moved to a spacing at the other end of the range. In the particular toys here illustrated the spring is a pull spring, and it is most conveniently tensioned by pulling the vehicles apart to the extended position shown in Figs. 2 and 7, the release of the spring as it propels the vehicles causing them to be drawn together to the closed positions shown in Figs. 1 and 5. The gearing is preferably arranged to permit the coasting or free wheeling of the toy after the spring is unwound.

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Referring now to Figs. 1 through 4 of the drawing, the vehicle A simulates a steam locomotive. The body 12 of the locomotive may be molded out of suitable plastic, and may be ornamented with considerable detail simulating the various accessories on such a locomotive, as well as a series of pilot wheels and driving wheels with steam chest, etc. These do not appear on the drawing because the locomotive is shown in section, and also in order to simplify the drawing. Although many driving wheels may be non-rotatably simulated on the outside of the molded piece, the locomotive really rides on two rotatable rubber wheels 14 carried on a shaft 16 journalled in the side walls of the body 12. The shaft 16 includes a pinion 18 which may be molded integrally therewith.

The simulated coal tender 20 may also be molded out of suitable plastic material. It includes simulated coal at 22, and simulated wheeled trucks 24 and 26. However, the tender actually rides on a pair of rotatable wheels 28 carried on an axle 30 journalled in the side walls of the body 20. The body 20 is preferably closed at the top and open at the bottom, and is so designed that it may be molded in a simple two-part mold.

The connecting means E consists of a horizontal bar 32 which extends slidably in longitudinal direction through the vehicle A. The bar 32 is rigidly connected to the forward end of the vehicle B, and in the present case is made of plastic

and is molded integrally with the vehicle body 20. The bar 32 is preferably channel-shaped to lighten the same, while retaining adequate cross-section for rigidity and strength. The spring 34 is connected at one end to a pin 36 in the locomotive body A, and is connected at its other end to a pin 38 in the bar 32. The spring extends collaterally of the bar and preferably is disposed in the hollow channel, as will be seen from inspection of Figs. 1, 3 and 9 of the drawing. The pins 38 and 36 may be molded integrally with the respective portions of the toy, and the ends may be headed or riveted later, as shown, by the application of heat after placing the spring in position.

The top surface of the bar 32 is provided with rack teeth 40. These mesh with a pinion 42 on an intermediate shaft 44 carrying a gear 46. The gear 46 meshes with the pinion 18 previously referred to.

It will thus be evident that a train of gearing is provided between the propulsion spring 34 and the propulsion wheels 14 whereby contraction of the spring after it has been tensioned causes rotation of the wheels. More specifically, to wind the toy the locomotive and tender are simply pulled apart as shown in Fig. 2, and released, whereupon the spring pulls the rack forwardly and thus propels the tandem toy on a floor, table, or other surface. As the toy runs along, the spring draws the tender toward the locomotive until the parts assume the closed position shown in Fig. 1. Thereafter the toy may coast or free-wheel, and for this purpose the intermediate shaft 44 is mounted in elongated or slotted bearings shown at 48. Such an arrangement is already known, the parts being so disposed that the gears are engaged when the spring pulls the rack forwardly, and being automatically disengaged to permit coasting of the vehicle when the rack comes to a stop. The arrangement is also of advantage because the gears disengage when the tender is being pulled away from the locomotive to wind the toy, so that the wheels 14 may rest on a table or remain stationary while pulling the tender rearwardly.

In the particular toy here shown the bearings 48 are open at the bottom, the shaft 44 being retained in position by the rack disposed therebeneath. The bar 32 passes slidably through a mating rectangular opening 50 in the rear wall 52 of the locomotive. It is further guided by a mating rectangular opening 54 (Fig. 1) in a transverse wall 56 molded integrally with the locomotive body. The bearings 48 may be, and in the present case are, formed at the lower edges of a pair of bearing walls 58 also molded integrally with the body. These walls are spaced relatively closely together just outside the gear 46 on one side and the pinion 42 on the other, thereby holding the intermediate shaft against axial movement. The intermediate gear 46 is disposed alongside the bar 32, and is large enough in radius so that its lower portion comes beneath the bar and engages the pinion 18.

The toy is preferably provided with stop means to limit the extent to which the bar may be pulled when separating the tandem vehicles. In the present case the forward end of the bar is provided with an upstanding stop 60 which takes effect when it reaches the transverse wall 56, as is shown in Fig. 2.

To assemble the toy the axle 30 with the wheels 28 is added to the tender by springing the side walls of the tender apart. The intermediate shaft 44 with its pinion and gear is dropped loosely into position while holding the toy upside-down. The bar 32 is inserted through the opening 50, it being tilted at an angle to permit the stop 60 to pass through the opening. The bar is then slid all the way forward, whereupon the spring is readily added and the pins 36 and 38 may be headed by the application of a heated tool. The side walls of the locomotive body may then be sprung apart to add two remaining pieces, one being the axle 16 with the propulsion wheels, and the other being a strip 62 which is disposed immediately beneath the bar 32, and which acts to close the lower open side of the rectangular guide notch or opening 54 in the lower edge of wall 56.

The rack teeth 40 preferably do not extend all the way across the top of the bar 32. They extend partway across the bar, as is shown in Figs. 4 and 9, thus leaving a smooth top wall at 64, this being of advantage to make possible smooth sliding movement through the openings 50 and 54 previously referred to, that is, to avoid catching by the teeth.

Referring now to Figs. 5 through 8 of the drawing, the forward toy A is molded of plastic, and in this case simulates an auto having a body 70. The rear vehicle B simulates a small open-topped trailer 72 hitched behind the auto 70. The trailer has simulated wheels 74 which may be made rotatable, but which, in the particular case here shown, are non-rotatable, being molded integrally with the trailer and the bar 76. The auto 70 is provided with forward wheels 78, as well as rear propulsion wheels 80. Since the auto has four running wheels and is considerably heavier than the trailer, the simulated non-rotatable wheels 74 may be drawn along with negligible friction, and indeed may normally be spaced upward slightly from the table or floor on which the toy is running. However, at slightly greater expense the trailer may also be provided with rotatable wheels, as in the case of the coal tender previously described.

In many ways the mechanism of this toy is similar to that previously described, the bar 76 being a horizontal bar which passes slidably in longitudinal direction through the auto body 70. A part of the top surface of the bar is provided with rack teeth 82. These mesh with a pinion 84 which rotates a large diameter gear 86 which is disposed alongside the bar 76, and the lower teeth of which engage a pinion 88 on rear axle 90 disposed beneath the bar. Axle 90 carries the propulsion wheels 80, and so a train of step-up gearing is provided between the propulsion spring 92 and the wheels 80.

As before, the propulsion spring is a pull spring and is disposed collaterally of and is connected to the bar 76. However, in the present case the spring is not disposed within the channel. Instead the spring is located alongside the bar, the forward end being connected to a pin 94 molded integrally with the body of the toy auto, and the rear end being connected to an apertured ear 96 molded on one side of the bar 76. Thus the spring may be pulled from the contracted position shown in Fig. 5 to the extended position shown in Fig. 7. The forward end of bar 76 is provided with a stop projection 98 (Fig. 7) which bears against a transverse wall 100, thus preventing the bar from being pulled entirely out of the auto.

The forward wheels 78 are carried on an axle 102, the ends of which are journalled in bearings

104 formed integrally with the body, the said bearings being open at the bottom. Similarly, the rear axle 90 is journalled in bearings 106 which are open at the bottom. The axles are held upwardly in the open bearings by means of a sheet metal bottom 108. This closes most of the open bottom of the toy, except at the wheels. The bottom is held in position by means of a number of plastic rivets 110 which extend downwardly from and are molded integrally with the toy body, the lower ends of the rivets being spread by heat and pressure after placing the metal bottom in position. A tongue or tab of metal is bent upwardly at 112 from the bottom wall, and forms a support to hold the bar 76 in alignment, the bar being additionally guided by a mating notch in the bottom of the transverse wall 100 previously referred to. The wall 100 is cut away to receive not only the rack bar, but also to clear the spring 92 when fully tensioned.

As before, the intermediate shaft 114 may be received in open elongated or slotted bearings 116 formed at the lower edges of bearing walls 118 molded integrally with the auto body. The intermediate shaft is held upwardly by the rack bar itself.

It will be understood that, as before, the toy is wound by simply pulling the auto and trailer apart from the position shown in Fig. 5 to the position shown in Fig. 7. At this time the wheels may be kept on the floor because of the disengagement of the gear train during the winding operation. When the toy is released it is propelled forward by contraction of the spring, and at the same time the spring gradually pulls the trailer up to the auto. Thereafter the toy may continue coasting or free-wheeling.

To assemble the toy the intermediate shaft is dropped into position; the end of the rack bar is passed at an angle through the opening 120 in the rear wall 122 of the toy auto; the bar is then moved forwardly as far as possible, after which the spring 92 is added, the forward end being slid over the rivet or pin 94. The forward and rear axles are then dropped in position, after which the metal bottom wall 108 is placed over the plastic body, the rivet heads of which are then formed by the application of heat and pressure.

It is believed that the construction, method of assembly, and operation of my new spring driven tandem toys, as well as the advantages thereof, will be apparent from the foregoing detailed description. The toys are comparatively simple and inexpensive to manufacture, and may be sold at low cost. They are suitable for very small children, for there is no need to guard against loss of a winding key. The toy is wound by a simple direct pull, and there is some degree of amusement and mystification because to many people it is not obvious how the toy is motivated and operated. The toys may be made almost wholly out of molded plastic, which lends itself to colorful materials and detailed ornamentation, and avoids sharp or dangerous edges, all at low cost.

It will be understood that while I have shown the propulsion mechanism in the forward vehicle, it might, if desired be provided in the rear vehicle. It will also be understood that while I have illustrated the use of a pull spring, it would be possible to employ a compression spring. Moreover, while I have shown the spring arranged to be tensioned when pulling the vehicles apart, it would be possible to tension the spring by pushing the vehicles together, the vehicles then separating during unwinding of the spring. Moreover, it is not essential that the spring be rectilinear in action, it being possible to employ a spiral or helical spring of known type for the motor, the teeth on the rack then acting primarily to wind the motor by rotating the gear train, rather than by directly pulling the spring.

It will therefore be understood that while I have shown and described my invention in several preferred forms, changes may be made in the structures disclosed without departing from the spirit of the invention as sought to be defined in the following claims.

I claim:

1. A toy comprising a first simulated vehicle, a second simulated vehicle, the two simulated vehicles being so related in appearance as to fit naturally in tandem for normal continuous operation, propulsion wheels on one of said vehicles, a spring in said vehicle geared to said wheels to propel the same, means so connecting said vehicles in tandem that the spacing therebetween may be varied over a range of spacing, and means whereby the spring is tensioned by the act of physically spacing said vehicles at one end of the range, there being no winding key or other such means to tension the spring, the release of the spring as it propels the tandem vehicles causing them to be relatively moved to the other end of the range, and means thereafter affording free-wheeling of the vehicles.

2. A toy comprising a first simulated vehicle, a second simulated vehicle, the two simulated vehicles being so related in appearance as to fit naturally in tandem for normal continuous operation, propulsion wheels on one of said vehicles, a spring in said vehicle geared to said wheels to propel the same, means so connecting said vehicles in tandem that the spacing therebetween may be varied over a range of spacing, and means whereby the spring is tensioned by the act of physically pulling said vehicles apart, there being no winding key or other such means to tension the spring, the release of said spring as it propels the tandem vehicles causing them to be drawn together and means thereafter affording free-wheeling of the vehicles.

3. A toy comprising a first simulated vehicle, a second simulated vehicle arranged in tandem, the two simulated vehicles being so related as to fit naturally in tandem for normal continuous operation, propulsion wheels on the forward vehicle, a spring in the forward vehicle geared to said wheels to propel the same, means so connecting said vehicles that the spacing therebetween may be varied over a range of spacing, and means whereby the spring is tensioned by the act of physically pulling said vehicles apart, there being no winding key or other such means to tension the spring, the release of said spring as it propels the tandem vehicles causing them to be drawn together, and means thereafter affording free-wheeling of the vehicles.

4. A toy comprising a first simulated vehicle, a second simulated vehicle disposed behind the first, propulsion wheels on one of the vehicles, a horizontal bar connected to one vehicle and extending slidably in longitudinal direction for a substantial distance comparable to the length of the vehicles through the other vehicle, a spring operating to normally move the vehicles together, said bar having gear teeth meshing with a train of step-up gearing leading to the propulsion wheels.

5. A toy comprising a first simulated vehicle, a

second simulated vehicle disposed behind the first, propulsion wheels on one of the vehicles, a horizontal bar connected to one vehicle and extending slidably in longitudinal direction for a substantial distance comparable to the length of the vehicles through the other vehicle, a spring operating to normally move the vehicles together, said bar having gear teeth meshing with a train of step-up gearing leading to the propulsion wheels, said gear train including a shaft in slotted bearings so disposed that the gearing is disengaged as the vehicles are pulled apart to tension the spring, the gearing being engaged and the toy being propelled forwardly when released, said vehicles being drawn together, as the toy runs forwardly, the aforesaid slotted bearings affording free wheeling after the rear vehicle has been drawn up to the forward vehicle, and said bar having stop means to limit the extent to which it may be pulled out of the forward vehicle when tensioning the spring.

6. A toy comprising a first simulated vehicle, a second simulated vehicle disposed behind the first, propulsion wheels on one of the vehicles, a horizontal bar rigidly connected to one vehicle and extending slidably in longitudinal direction through the other vehicle, a spring extending collaterally of the bar in the latter vehicle and so connected to the bar as to normally move the rear vehicle up to the forward vehicle, said bar having gear teeth meshing with a train of step-up gearing leading to the propulsion wheels.

7. A toy comprising a first simulated vehicle, a second simulated vehicle disposed behind the first, propulsion wheels on one of the vehicles, a horizontal bar rigidly connected to one vehicle and extending slidably in longitudinal direction through the other vehicle, a spring extending collaterally of the bar in the latter vehicle and so connected to the bar as to normally move the rear vehicle up to the forward vehicle, said bar having gear teeth meshing with a train of step-up gearing leading to the propulsion wheels, said gear train including a shaft in slotted bearings so disposed that the gearing is disengaged as the vehicles are pulled apart to tension the spring, the gearing being engaged and the toy being propelled forwardly when released, said vehicles being drawn together as the toy runs forwardly, the aforesaid slotted bearings affording free-wheeling after the rear vehicle has been drawn up to the forward vehicle, and said bar having stop means to limit the extent to which it may be pulled out of the forward vehicle when tensioning the spring.

8. A toy comprising a first simulated vehicle, a second simulated vehicle disposed behind the first, propulsion wheels on the forward vehicle, a horizontal bar rigidly connected to the forward end of the rear vehicle and extending slidably in longitudinal direction for a substantial distance comparable to the length of the vehicles through the forward vehicle, a spring so arranged as to normally pull the rear vehicle up to the forward vehicle, said bar having gear teeth meshing with a train of step-up gearing leading to the propulsion wheels.

9. A toy comprising a first simulated vehicle, a second simulated vehicle disposed behind the first, propulsion wheels on the forward vehicle, a horizontal bar rigidly connected to the forward end of the rear vehicle and extending slidably in longitudinal direction for a substantial distance comparable to the length of the vehicles through the forward vehicle, a spring so arranged as to normally pull the rear vehicle up to the forward vehicle, said bar having gear teeth meshing with a train of step-up gearing leading to the propulsion wheels, said gear train including a shaft in slotted bearings so disposed that the gearing is disengaged as the vehicles are pulled apart to tension the spring, the gearing being engaged and the toy being propelled forwardly when released, said vehicles being drawn together as the toy runs forwardly, the aforesaid slotted bearings affording free wheeling after the rear vehicle has been drawn up to the forward vehicle, and said bar having stop means to limit the extent to which it may be pulled out of the forward vehicle when tensioning the spring.

10. A toy comprising a first simulated vehicle, a second simulated vehicle disposed behind the first, propulsion wheels on the forward vehicle, a horizontal bar connected to the forward end of the rear vehicle and extending slidably in longitudinal direction for a substantial distance comparable to the length of the vehicles through the forward vehicle, a spring extending collaterally of the bar and operating between the forward vehicle and the bar in such manner as to normally move the rear vehicle up to the forward vehicle, said bar having gear teeth meshing with a train of step-up gearing leading to the propulsion wheels.

11. A toy comprising a first simulated vehicle, a second simulated vehicle disposed behind the first, propulsion wheels on the forward vehicle, a horizontal bar connected to the forward end of the rear vehicle and extending slidably in longitudinal direction through the forward vehicle, a spring extending collaterally of the bar and operating between the forward vehicle and the bar in such manner as to normally move the rear vehicle up to the forward vehicle, said bar having gear teeth meshing with a train of step-up gearing leading to the propulsion wheels, said gear train including a shaft in slotted bearings so disposed that the gearing is disengaged as the vehicles are pulled apart to tension the spring, the gearing being engaged and the toy being propelled forwardly when released, said vehicles being drawn together as the toy runs forwardly, the aforesaid slotted bearings affording free-wheeling after the rear vehicle has been drawn up to the forward vehicle, and said bar having stop means to limit the extent to which it may be pulled out of the forward vehicle when tensioning the spring.

12. A toy comprising a first simulated vehicle, a second simulated vehicle disposed behind the first, propulsion wheels on one of the vehicles, a horizontal bar connected to one vehicle and extending slidably in longitudinal direction through the other vehicle, a spring operating to normally move the vehicles together, said bar having gear teeth on its top surface, a shaft and pinion disposed above the bar and meshing with said gear teeth, another shaft and pinion for the propulsion wheels disposed below the bar, and a relatively large diameter gear on the upper shaft alongside the bar, said gear being so large in diameter as to mesh with the pinion below the bar.

13. A toy comprising a first simulated vehicle, a second simulated vehicle disposed behind the first, propulsion wheels on one of the vehicles, a horizontal bar connected to one vehicle and extending slidably in longitudinal direction through the other vehicle, a spring operating to normally move the vehicles together, said bar having gear teeth on its top surface, a shaft and pinion dis-

posed above the bar and meshing with said gear teeth, another shaft and pinion for the propulsion wheels disposed below the bar, and a relatively large diameter gear on the upper shaft alongside the bar, said gear being so large in diameter as to mesh with the pinion below the bar, said toy having bearings for said shafts, the bearings for the upper shaft being open at the bottom, and the bar itself operating to support the upper shaft in its open-bottomed bearings.

14. A toy as defined in claim 8, in which the forward vehicle simulates a steam locomotive and the rear vehicle simulates a coal tender.

15. A toy as defined in claim 8, in which the forward vehicle simulates an auto and the rear vehicle simulates a trailer drawn by an auto.

16. A toy as defined in claim 7, in which the forward vehicle simulates a steam locomotive and the rear vehicle simulates a coal tender.

17. A toy as defined in claim 7, in which the forward vehicle simulates an auto and the rear vehicle simulates a trailer drawn by an auto.

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