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MECHANICALLY PROPELLED TOY WITH AUTOMATIC REVERSAL IN THE OPPOSITE DIRECTION

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Fig.1.

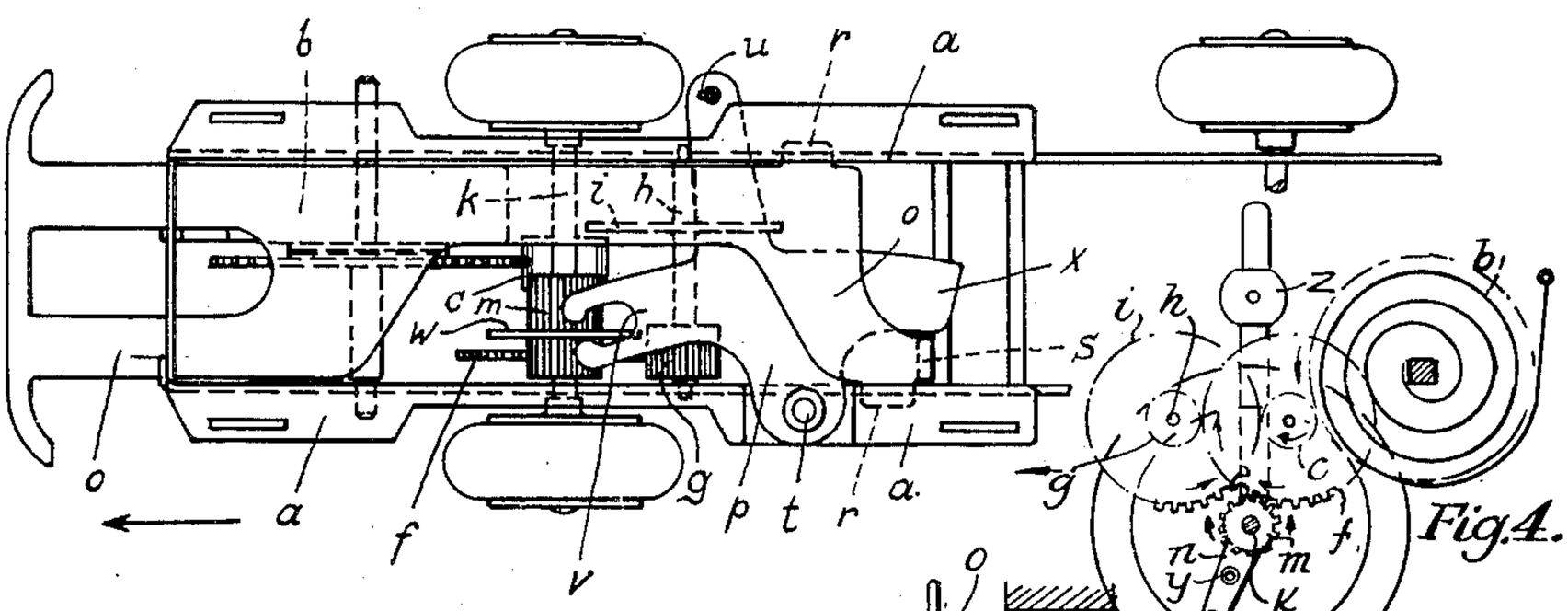


Fig.4.

Fig.2.

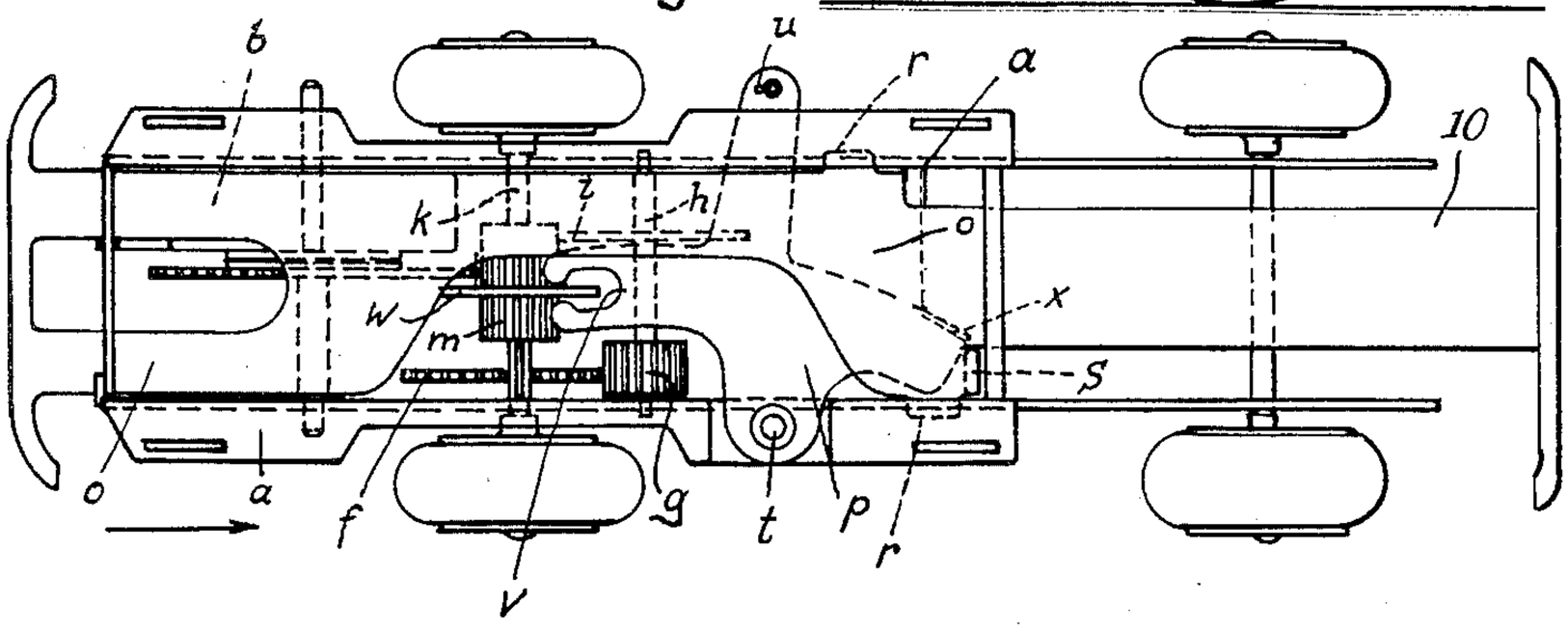
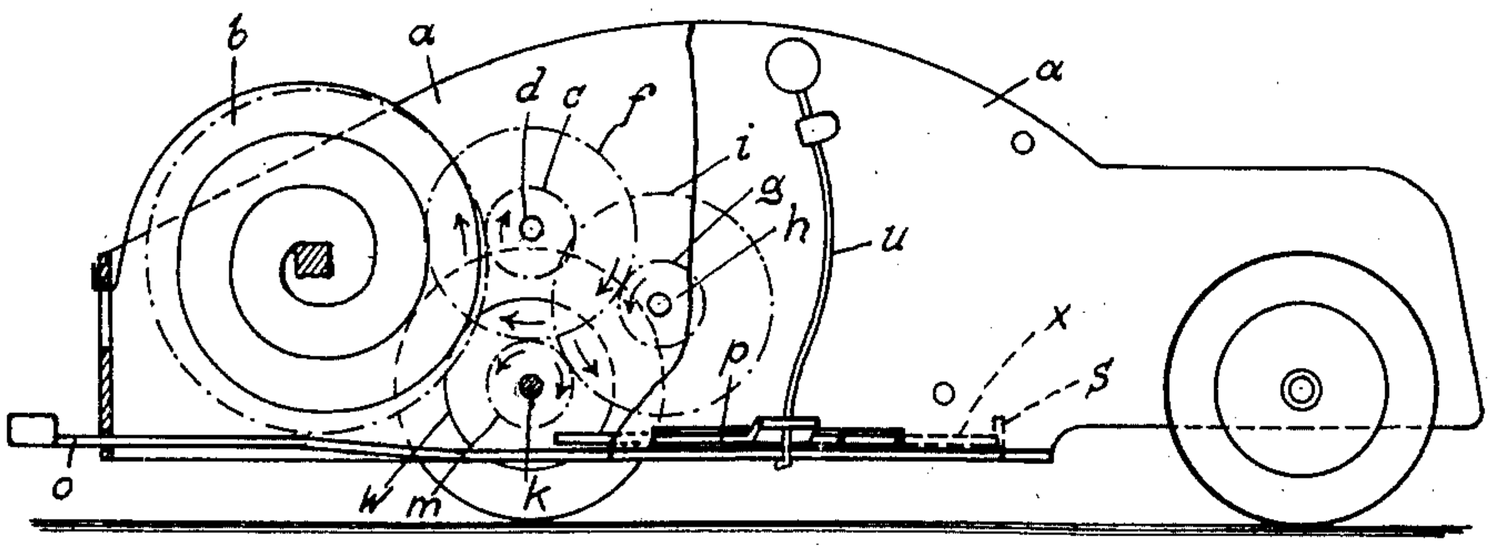


Fig.3.



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MECHANICALLY PROPELLED TOY WITH AUTOMATIC REVERSAL IN THE OPPOSITE DIRECTION

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10 Claims. (Cl. 46—212)

My invention relates to a mechanically propelled toy with automatic reversal in the opposite direction.

Mechanically propelled toys which, on meeting an obstacle in the direction of travel, are reversed in the opposite direction, are known. Furthermore mechanically propelled toys are known which are either controlled by hand or automatically in the position to move forward with varying speeds in the same direction of travel. This latter effect is mostly produced by a supplementary gear being inserted in the driving mechanism which itself consumes energy. In this way, a considerable portion of the driving energy is lost.

The invention has as its object an improvement of these known mechanically propelled toys and it is a further object in true imitation of actual practice, to allow a mechanically propelled toy and in particular an imitation of a motor vehicle, to carry out the backward movement much more slowly than the forward movement, so that excess force for pulling or up-hill running is at disposal. Here the switching-in of the backward travel can be effected by meeting with an obstacle, or also by hand. An important feature of the invention as compared with known mechanically propelled toys is, however, the automatic switching in of gearing spindles which permit the whole spring force to be made available for the drive of the mechanically propelled toy. By the use of the invention, therefore, a mechanically propelled toy can be made to carry out more slowly the rearward travel than the forward travel, whilst the switching over from slow to rapid working is to take place automatically. The means used for overcoming the difficulties arising in this are also objects of the invention.

The known mechanically propelled toys with automatic reversal of the running direction into the opposite direction work for a good reason for both directions with the same comparatively high running speed. The reason of this is that it is necessary to use for the reversing process on meeting with the obstacle, the force of the moved mass of the running toy. If consequently the speed did not reach a certain value, then the acceleration force and the reversing process on meeting with the obstacle is either not carried out at all or takes place only imperfectly. Thus, for example, the slow running can be switched out, whilst the force inherent to the mechanically propelled toy does not suffice to switch in the rapid running differently directed, thus the spring mechanism runs down without any outwardly visible effect.

These drawbacks are overcome by the invention according to which a supplementary source of energy of suitable character is charged on the switching in of the slow running, the energy of which is released by a slight movement of the switch lever switching in the rapid running, thus reliably producing the desired change-over.

The invention will be more fully explained with reference to two embodiments which are shown diagrammatically on the accompanying drawing.

Fig. 1 shows the underneath view of a mechanically propelled toy with the mechanism in position for slow running.

Fig. 2 is the underneath view of a slight modification of the same toy after the reversing mechanism has been operated.

Fig. 3 is a side view of the embodiment shown in Figs. 1 and 2, and

Fig. 4 shows diagrammatically the essential parts of a modified embodiment of the toy shown in Figs. 1–3.

Referring now to Figs. 1–3 of the drawing is shown a coiled spring *b* carried in the mechanism frame *a* and the driving wheel of which is in permanent engagement through a spur-wheel *c*, with a spindle *d*. The spindle *d* carries at one end a larger toothed wheel *f* which continuously meshes with the spur-wheel *g* of a gear spindle *h*. A gear spindle *h* carries at one end a toothed wheel *i*. In the mechanism frame *a* there is also carried a pair of driven wheels and a pair of running wheels. The pair of driven wheels is rigidly keyed on to an axle *k* which carries a switch spur-gear *m* which is slidably keyed to said axle between said driven wheels. As may be gathered from the drawing, this spur-wheel, by sliding on the axle *k* can be brought into engagement either with the toothed wheel *f* or with the toothed wheel *i* of the gear spindle *h*. In this manner, there is produced on the one hand a more powerful slow running which can be used for the backward travel of the toy, whilst on the other hand, there is provided by means of the toothed wheel *i* an oppositely directed rapid movement of the axle *k*, for driving the toy forward.

The change-over from slow to rapid running is effected by means of a slide *o* and a further switching element *p*. The slide *o* is carried for example by means of lugs *r* in slots of the sides of the mechanism frame and by means of an upwardly bent nose piece *s* adapted to engage the switching element *p*. This switching element *p*

is shown on the drawing by way of example as a cross shaped switching lever which is oscillatably carried at *t* on the under side of the mechanism frame. Its opposite end is under the influence of a spring *u* which tends to oscillate the whole switching lever clockwise (Figs. 1 and 2). A further arm *v* of the switching lever embraces in the form of a fork, a guide disc *w* provided on the switching spur-wheel *m*. A fourth arm *x*, engaging with the nose piece *s* of the slide *o*, of the switching lever *p* is so shaped that the end of this arm *x* can serve as guide camming surface for the nose piece *s*.

The method of operation of the arrangement is as follows: Suppose the device according to Figure 1 is adjusted for slow running and strikes an obstacle. The actuating slide *o* at this time is in the position shown in Fig. 1 and is drawn out until it is clamped by its nose piece *s* between the one side *a* of the mechanism frame and the arm *x* of the switching lever *p*. The clamping effect is here attained by the tension of the spring *u*. A slight impact of the actuating slide *o* made for example at its end in the form of a push rod, then suffices to shift the nose piece *s* so far to the right that the energy stored up in the spring *u* effects the further operating movement, that is, the drawing in of the actuating slide *o* into the device. Here the actuating lever *p* oscillates about its bearing *t* and the lever arm *v* shifts the spur-wheel *m* on the guide disc *w* along the axle *k*. The slow running gear train through the pair of toothed wheels *f*, *m*, is thus disconnected and the rapid running train is connected through the pair of toothed wheels *m*, *i*. The parts of the device are then in the position shown in Fig. 2.

The change-over from rapid to slow running can then be effected either by hand, as by drawing out the actuating slide *o*, or by means of a push rod **10** (Fig. 2) which may be provided at the opposite end of the mechanically propelled toy, which may be a continuation of the operating slide *o*. The acceleration force arising on the rapid forward movement of the propelled toy will then on hitting against an obstacle be sufficient to shift the actuating slide *o* so far to the left that the binding position of the nose piece *s* between the arm *x* of the switching lever *p* and the side *a* of the mechanism frame is reached. As a subsidiary effect there is here attained a damping of the running energy as the force of the spring *u* must be overcome. The braking of the vehicle thereby attained protects it from damage by striking too energetically against the obstacle. If the change-over to slow running takes place by hand, then there are here no difficulties at all. The nose piece *s* slides along the end serving as a guide curve of the arm *x* and thus oscillates the switching lever *p* with fresh tensioning of the spring *u*. At the same time, the moving backward of the actuating spur-wheel *m* is attained by means of the lever arm *v* so that in this way there is again obtained the coupling of the toothed wheels *f* and *m*.

The example according to Fig. 4 shows that a spring is not absolutely necessary as the source of energy for the shifting. In this embodiment the running axle *k* is carried in a loop or stirrup *n* which is oscillatable at *y*. The spring drum *b* drives a spur-wheel *c* the spindle of which acts by means of the toothed wheel *f* on the actuating spur-wheel *m* of the running axle firmly keyed thereon. The toothed wheel *f* engages as in the first embodiment, with a spur-wheel *g* of a gear spindle *h* which by its toothed wheel *i* can impart to the actuating spur-wheel *m* and with it to the running axle *k* a rapid oppositely directed movement. The loop *n* is at one end under the influence of the actuating slide *o* and is extended upward into a weight lever *z* which can also serve as actuating lever.

The arrangement operates as follows: The slow running switched in in Fig. 4 moves the travelling toy in the direction of the arrow. If the actuating slide *o* meets with an obstacle it oscillates even with the slightest force of acceleration, the lever *n* so that the weight lever *z* which preferably consists with the lever *n* of one piece swings to the left and effects the switching over process by its excess weight. The spur-wheel *m* is then in positive connection with the toothed wheel *i* and transmits to this an oppositely directed rapid driving course. In this embodiment also the change-over from the rapid to the slow movement can be attained either by hand or automatically by a suitable lengthening of the actuating slide *o* to one side of the mechanically propelled toy.

The embodiment shown naturally permits a large number of alterations without altering the effect striven for. Thus, for example, the lever arm *v* according to Figs. 1 to 3 need not embrace a guide disc *w* but could engage with a finger in a groove of the driving member *m* and which is provided in this driving member *m* itself or on the side thereof. Furthermore, it would not be necessary for the nose piece *s* to run on the end of the arm *x* but this nose piece *s* could have the shape of a pin which engages in a correspondingly shaped slot of the arm *x*. Furthermore, the slide *o* could have the form of a switch rod or be shaped in any other way. Assuming that the spur-wheel *m* is fitted firmly on the running axle *k*, this axle could be carried longitudinally movable against the pressure of a spring. The spring would here take over the task of the energy accumulator according to the invention so that the spring *u* can be dispensed with.

As the two embodiments given as examples and the following particulars show, the invention is not restricted to the details of the drawing and the description. It is embodied when a mechanically propelled toy has different speeds in its two movements oppositely directed and/or the change-over from the slow to the fast speed takes place with the cooperation of the force of a previously loaded source of force.

I claim:—

1. A mechanically propelled toy comprising a power source, driving wheels, gear wheels between said source and said driving wheels for driving said toy in one direction of travel at one speed, gear wheels between said source and said driving wheels for driving said toy in another direction at a different speed and means for alternatively connecting said gear wheels to said source.

2. A mechanically propelled toy comprising a power source, driving wheels, gear wheels between said source and said driving wheels for driving said toy in one direction of travel at one speed, gear wheels between said source and said driving wheels for driving said toy in another direction at a different speed means separate from said first power source for alternatively connecting said gear wheels to said source, said means comprising movable connecting means, actuating means for moving said connecting means to establish said alternate connections.

3. A mechanically propelled toy comprising a

power source, driving wheels having an axle, gear wheels between said source and said driving wheels for driving said toy in one direction of travel at one speed, gear wheels between said source and said driving wheels for driving said toy in another direction at a different speed and means comprising a movable gear on said axle, said last named gear alternatively connecting said other gears to said source of power to drive said axle.

4. A mechanically propelled toy comprising a power source, driving wheels having an axle, gear wheels between said source and said driving wheels for driving said toy in one direction of travel at one speed, gear wheels between said source and said driving wheels for driving said toy in another direction at a different speed, a movable driving axle gear for alternatively connecting one or the other of said gear wheels to said source and an auxiliary means for moving the said axle gear from one to the other of said gear wheels.

5. A mechanically propelled toy comprising a power source, driving wheels having an axle, gear wheels between said source and said driving wheels for driving said toy in one direction of travel at one speed, gear wheels between said source and said driving wheels for driving said toy in another direction at a different speed, a movable driving axle gear for alternatively connecting one or the other of said gear wheels to said source, an auxiliary means for moving the said axle gear from one to the other of said gear wheels and means for initiating the change from one connection to the other which is completed by the said auxiliary power source.

6. A mechanically propelled toy comprising a power source, driving wheels having an axle, gear wheels between said source and said driving wheels for driving said toy in one direction of travel at one speed, gear wheels between said source and said driving wheels for driving said toy in another direction at a different speed, a movable driving axle gear for alternatively connecting one or the other of said gear wheels to said source, an auxiliary means for moving the said axle gear from one to the other of said gear wheels and means comprising a rod for initiating the change from one connection to the other which is completed by the said auxiliary power source.

7. A mechanically propelled toy comprising a power source, driving wheels having an axle, gear wheels between said source and said driving wheels for driving said toy in one direction of travel at one speed, gear wheels between said source and said driving wheels for driving said toy in another direction at a different speed, a movable driving axle gear for alternatively connecting one or the other of said gear wheels to said source, an auxiliary means for moving the said axle gear from one to the other of said gear wheels and means comprising a lever for initiating the change from one connection to the other which is completed by the said auxiliary power source.

8. A mechanically propelled toy comprising a power source, driving wheels having an axle, gear wheels between said source and said driving wheels for driving said toy in one direction of travel at one speed, gear wheels between said source and said driving wheels for driving said toy in another direction at a different speed a movable driving axle gear for alternatively connecting one or the other of said gear wheels to said source and an auxiliary means comprising a spring for moving the said axle gear from one to the other of said gear wheels.

9. A mechanically propelled toy comprising a power source, driving wheels having an axle, gear wheels between said source and said driving wheels for driving said toy in one direction of travel at one speed, gear wheels between said source and said driving wheels for driving said toy in another direction at a different speed, a movable driving axle gear for alternatively connecting one or the other of said gear wheels to said source and auxiliary means comprising a weight for moving the said axle gear from one to the other of said gear wheels.

10. A mechanically propelled toy comprising a power source, driving wheels, gear wheels between said source and said driving wheels for driving said toy in one direction of travel at one speed, gear wheels between said source and said driving wheels for driving said toy in another direction at a different speed, a gear wheel alternatively engageable with one or the other of first two said gear wheels, auxiliary means for moving last said gear wheel and trip mechanism operable by impact of the toy with an obstacle for releasing power in said auxiliary power source.

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