PATENT SPECIFICATION

Convention Date (Germany): Aug. 31, 1938. **526,822**

Application Date (In United Kingdom): March 20, 1939. No. 8795/39.

Complete Specification Accepted: Sept. 26, 1940.

COMPLETE SPECIFICATION

Improvements in and relating to Motor-driven Travelling Toys

I, ERNST VÖLK, of German nationality, personally responsible partner of the firm JOHANN DISTLER KOMMANDITGESELLSCHAFT BLECHSPIELWARENFABRIK, of Dammstrasse 7, Nürnberg—W, Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention has for its object to provide power-driven travelling toys of all kinds with change-speed mechanism for enabling the toy to travel forwardly at different speeds and also to travel rearwardly, the said change-speed mechanism being very simple and cheap and being operated with the greatest ease. With this object in view, the invention consists in this that the drive is transmitted to the driven axle of the toy through the intermediary of a drive pinion which is slidable on the said axle and coacts with a driving wheel, in such a manner that the drive pinion can be adjusted radially across the face of the driving wheel on either side of the centre thereof, so as to engage the driving wheel at different distances from the centre thereof.

In carrying out the invention, the driving wheel may be in the form of a friction disc and the drive pinion may be constructed as a friction roller, the drive being in this case transmitted frictionally. A more reliable, slip-free drive is obtained by constructing the drive pinion as a toothed wheel which is adapted to engage a plurality of coaxial rings of teeth on the driving wheel, the distance between the respective rings of teeth being greater than the width of the drive pinion, so as to avoid the risk of the pinion engaging two rings of teeth simultaneously and also to provide a free-wheel position between each gear change.

Whereas the friction drive enables the speed to be varied continuously, it is preferable to employ a toothed driving wheel and toothed pinion, notwithstanding that the latter construction only permits the speed to be varied in steps, for instance three steps, since it is usually sufficient to provide three forward speeds and a single slow reverse speed. The drive pinion may be maintained in its adjusted position by means of an embossed member which snaps resiliently into notches or depressions provided in a fixed part of the toy.

Any suitable control means for effecting the adjustment of the drive pinion on the driven axle, usually the rear axle, may be employed, the type of control device employed being adapted to the particular construction of the toy. In the case of toy locomotives, for instance, an upwardly or laterally extending swinging lever will be provided at a place where it is readily accessible while the toy is travelling. For toy motor cars, a setting device is employed which can be operated by means of a control handle which extends rearwardly out of the usual instrument board. This control handle is journalled in the instrument board and in a bearing member below the instrument board, the crank extending through a slot in the forwardly and upwardly inclined arm of a two-armed control lever which is pivoted on the floor of the vehicle and the rear arm of which terminates in a fork which straddles the drive pinion and engages the hub thereof loosely from below, the said arm being provided with a tongue forming the embossed member which maintains the drive pinion in its adjusted position. This simple, cheap and easily operated control device requires only a single swinging movement of the control handle without any lateral displacement thereof for adjusting the change speed mechanism to different speeds.

In the accompanying drawing the new change-speed mechanism is illustrated by way of example as applied to a toy motor car. Fig. 1 shows a part longitudinal section on the line E—F of Fig. 2, of a toy motor car provided with the improved change-speed mechanism,

Fig. 2 is a top plan view, partly in section on the line A—B of Fig. 1,

Fig. 3 shows a section of the setting notches on the line C—D of Fig. 1, viewed in the direction of the arrow,

Fig. 4 shows a bottom plan view and Fig. 5 a side elevation, partly in vertical

section of a drive pinion constructed as a spur wheel and the way it is driven by a disc wheel with several rings of teeth.

Referring to Figs. 1 to 3, there is mounted on the floor *a* of the motor car a casing *b* for the spring-actuated driving mechanism which is wound up by means of the winding shaft *c*. Through the shaft *c* being turned in the clockwise direction the spring *d* is tensioned, which in expanding drives the winding wheel *f* in the counter-clockwise direction. The wheel *f* engages a pinion *g* which together with the larger gear wheel *h* turns in the clockwise direction on the shaft *i*. The gear wheel *h* drives the pinion *m* which is fixed on the shaft *k*, and with it the friction wheel *n* fixed on it, in the counter-clockwise direction. The disc is pressed downwards by a compression spring 13. From the winding up shaft *c* to the friction disc shaft *k* the transmission ratio is a step up one. The further step up transmission to the governor and the governor itself are not shown. The friction roller *o* of soft rubber or the like, which according to the invention is slidable on the rectangular rear wheel axle *p* with its hub *q* projecting on both sides, is thus turned in the forward running direction together with the rear wheels *r*, as long as it is under that side of the friction disc *n*, which is to the right when viewed from the rear. It is however turned in the backward running direction together with the rear wheels, as soon as, viewed from the rear, it is slid beyond the friction disc centre to the left, as viewed from the rear.

The hub *q* of the friction roller is embraced from below with lateral clearance or loosely by a fork *s* which is formed by bending from the rear end of a two-armed lever *t*, *u*. This two-armed lever is pivoted to the bottom *a* of the motor car by means of a hollow rivet *x*, preferably in front of the supporting wall *v* of the usual instrument board *w*. In the instrument board and in a forwardly disposed, bottom bearing *y* there is journalled so as to be inclined downwards towards the front a cranked control shaft *z*, from which extends freely backwards from the instrument board the control handle 5. The crank pin 6 extends through the slot 7 of the upwardly and forwardly bent front end u^1 of the front lever arm *u*.

From the rearward lever arm *t* a tongue 8 is cut, in the rear end of which the catch 9 is formed by embossing. This tongue is bent up in such a manner that it seeks to press its catch against the bottom edge 10 of a securing plate 11 and into the notches 1^1, 2^1, 3^1, 4^1 thereof.

In this arrangement the control device operates in the following manner:

With the two-armed control lever *t*, *u* in the middle position, as shown in full lines in Fig. 2, the motor car will travel forward at the slowest speed, as the friction roller *o* is not displaced far to the right from the friction disc centre, as seen from the rear. In this position the friction roller is held by the catch snapping into the notch 3^1. With the inner friction disc circle 3 the friction disc *n* drives the friction roller *o* slowly. The motor car will travel at its slowest first speed.

By rocking the control handle 5 to the right, a corresponding rocking of the crank pin 6 and the front lever arm *u* to the left will be effected. The rear lever arm *t* will move to the right and will slide the friction roller under the middle driving circe 2. In this position the catch 9 snaps into the notch 2^1. The motor car will travel at the second speed.

Through a further rocking of the control handle 5 to the right the friction roller *o* can be brought under the outer driving circle 1. The catch will snap into the notch 1^1. This position is shown in Fig. 2 in broken lines. The motor car will travel at the quickest or third speed.

By rocking the control handle 5 to the left, the friction roller can be slid beyond the centre of the friction wheel *n* to the left. As shown in Figure 2 it is displaced to the left up to the driving circle 3. The catch has snapped into the notch 4^1. The friction roller will be turned in the reverse direction and the motor car will travel backwards at the same speed, at which it travelled forwards in the first speed. It is now in reverse.

It was stated above that the gear casing *b* is fixed to the bottom *a* of the motor car. In this case it is advisable to effect the gear change when the spring-actuated mechanism is running down, that is to say when the friction disc is rotating, while the motor car is still held in the hand or rests on its front wheels and the still raised rear wheels are lightly braked with the fingers. Only a certain amount of skill is necessary, however, to effect a gear change from one speed to another while the car is travelling, as the control handle 5 is readily accessible. This feature that the speed change can be conveniently effected in the hand as well as when the toy is travelling constitutes a great improvement on all travelling toys with speed change, which have hitherto become known.

The driving mechanism casing *b* can however also be made so as to hinge up about a rear shaft 14. A helical spring 15 wrapped round this shaft has one of its

ends, 16, hooked in under the bottom *a* and its other end 17 is bent over and bears against the back of the casing the arrangement being such that the spring tends to press the friction disc on the friction roller. In addition the friction disc is loaded by the whole weight of the spring mechanism. It is thus possible, when the driving mechanism is hinged up from the bottom and has not yet been wound up, to set the catch 9 to any required position and by lowering the driving mechanism to allow the corresponding notch to come down on to the set catch. The driving mechanism is thereupon wound up and the motor car, after being placed on the floor, is caused to travel by releasing the driving mechanism. The driving mechanism can also be inclined downwards to the rear so as to enable the body work of the motor car to be given the modern streamline form.

The catch can also be set between two notches. It will then, through the edge 10 resting on it, keep the driving mechanism casing raised to such an extent that the friction disc will not be in contact with the friction roller and will run idle, when the driving mechanism is running down. Stationary idle running will thus be brought about.

In Figs. 4 and 5 the friction roller *o* is replaced by a spur wheel o^1 and the friction disc *n* by a crown wheel n^1 with bottom rings of teeth 1^{11}, 2^{11}, 3^{11}. The distances 12 from one ring of teeth to another must be so much greater than the width of the spur wheel o^1 that the latter will not be driven, when being radially slid through these intermediate spaces.

By leaving the catch set between two rings of teeth, stationary idle running will thus again result, whether the casing *b* is fixed on the bottom *a* or can be hinged up from it. The entire crowd wheel with its rings of teeth and its driving pinion *m* can be very cheaply produced by the die-casting process as a single die-cast body of light metal or by the injection and pressing process from artificial resin.

The control device is shown only by way of example in a toy motor car with spring-actuated mechanism, so as to show the great simplicity of the control mechanism to be set in motion by the operating handle in accordance with the invention. The pinion which is slidable below a friction disc or below a crown wheel with rings of teeth on a wheel-driving axle but cannot turn on the latter, can however, as already stated, also be used without modification for electrically driven toy trackless or rail vehicles.

For operating the arrangement according to the invention neither any knowledge of the driving and control device nor any practice or skill is required. Any child can easily rock the single control handle. It can even take hold of the control handle, while the vehicle is in motion, and rock the handle in order optionally to vary the mode of travel.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A change-speed mechanism for power driven travelling toy, so as to enable the toy to travel forwardly at different speeds and also to travel rearwardly, characterised by the feature that the drive is transmitted to the driven axle of the toy through the intermediary of a drive pinion which is slidable on the said axle and coacts with a driving wheel, in such a manner that the drive pinion can be adjusted radially across the face of the driving wheel on either side of the centre thereof, so as to engage the driving wheel at different distances from the centre thereof.

2. A change-speed mechanism for power driven travelling toys as claimed in claim 1, characterised by the feature that the drive pinion is constructed as a toothed wheel which is adapted to engage a plurality of coaxial rings of teeth on the driving wheel, the drive pinion being displaceable beyond the centre of the driving wheel for reverse running.

3. A change-speed mechanism for power driven travelling toys as claimed in claim 1, characterised by the feature that the driving wheel comprises a friction disc and the driving pinion is constructed as a friction roller.

4. A change-speed mechanism for power driven travelling toys as claimed in any of the preceding claims, characterised by the feature that the drive pinion is maintained in its adjusted position by means of a catch member which snaps into notches or depressions which are provided in a fixed part of the toy and are spaced to correspond to the different radial distances from the centre of the driving wheel into which the drive pinion is required to be moved.

5. A change-speed mechanism for power driven travelling toys as claimed in any of the preceding claims, more particularly for toy motor cars, characterised by the feature that the drive pinion is shifted by means of a control handle which extends rearwardly out of the usual instrument board.

6. A change-speed mechanism for power driven travelling toys as claimed in claim

4 or 5, characterised by feature that the control handle forms a continuation of a crank control shaft which is journalled at an inclination in the instrument board and in a bearing provided below the instrument board, the crank extending through a slot in the forwardly and upwardly inclined arm of a two-armed control lever pivoted on the bottom of the motor car, the rearwardly extending arm of which lever terminates in a fork which straddles the drive pinion and engages a hub thereof loosely from below, the said arm being provided with a tongue forming a catch for engaging in the notches.

7. A change-speed mechanism for power driven travellings toys as claimed in any of claims 1 to 6, characterised by the feature that the driving mechanism casing is arranged to hinge upwards in opposition to the action of a spring about a rear shaft, so that the settings of the drive pinion can also be effected, when the casing is hinged up, without the driving mechanism having been previously wound up or set in motion.

8. The improved change-speed mechanisms for power driven travelling toys, substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 20th day of March, 1939.
MARKS & CLERK.

Printed for His Majesty's Stationery Office, by the Courier Printers.

Fig. 1

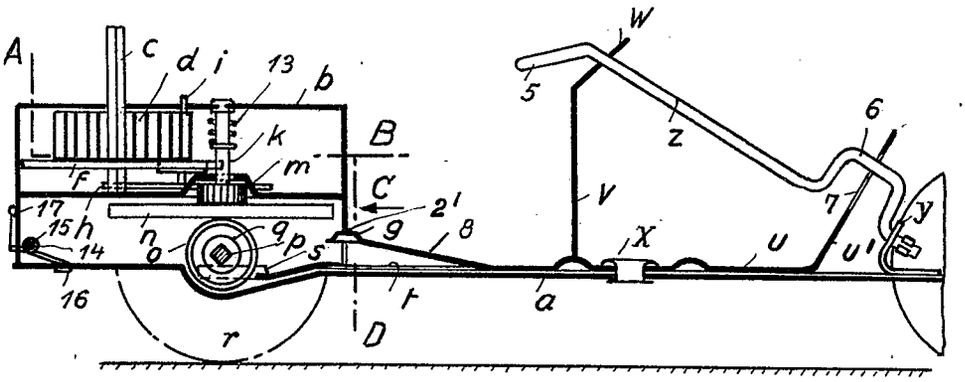
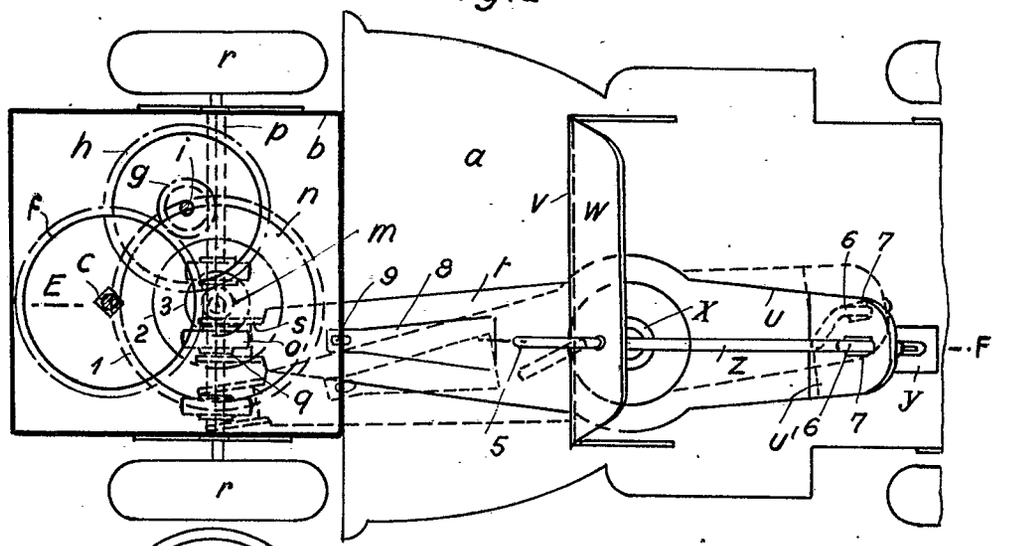


Fig. 2



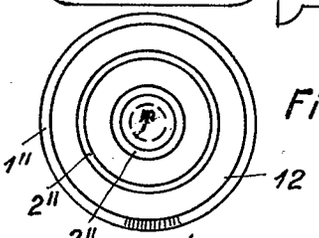


Fig. 4

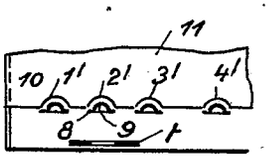


Fig. 3

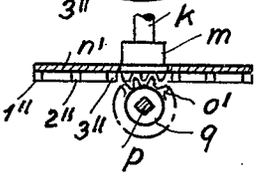


Fig. 5

Malby & Sons, Photo-Litho.