Dec. 21, 1954 H. MÜLLER 2,697,306

MOTOR-DRIVEN TOY VEHICLE

Filed April 16, 1951 4 Sheets-Sheet 1

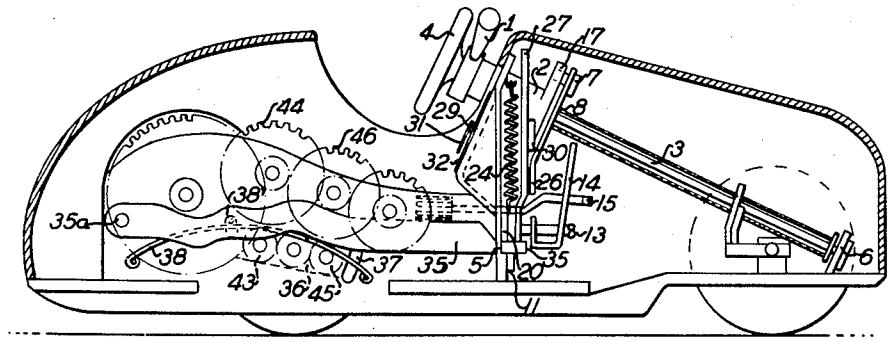


FIG. 1

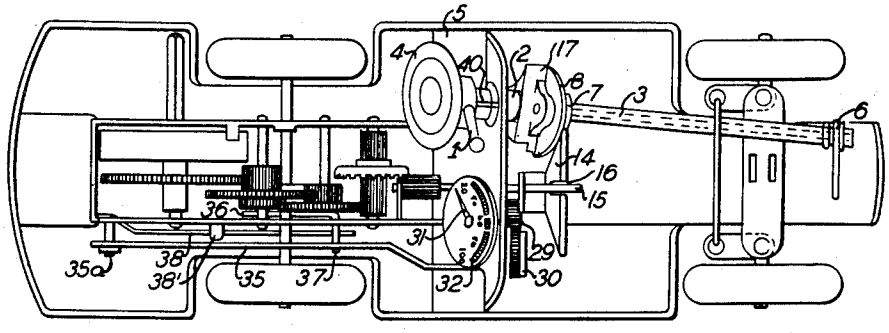


FIG. 2

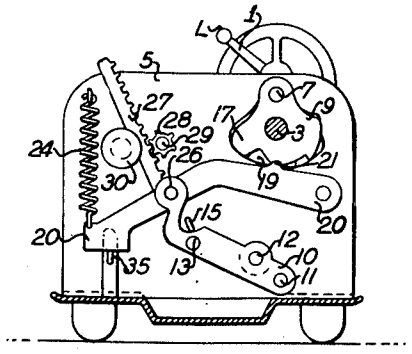


FIG. 3

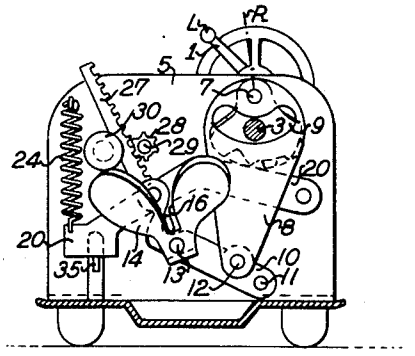


FIG. 4

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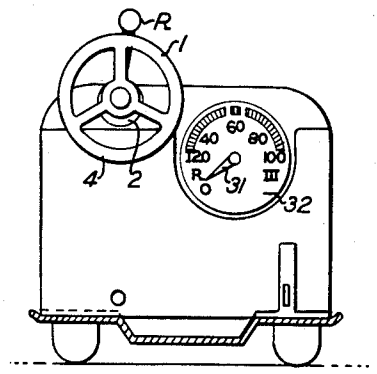


FIG. 5

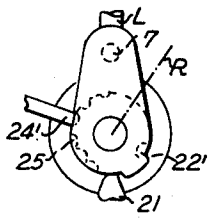


FIG. 15

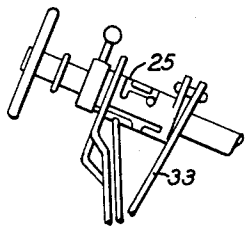


FIG. 14

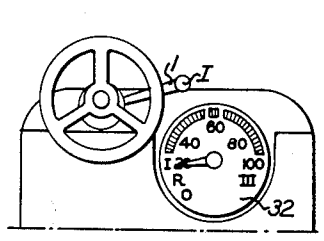


FIG. 6

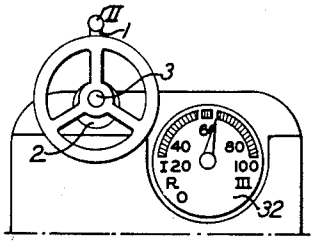


FIG. 7

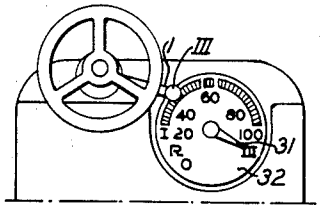


FIG. 8

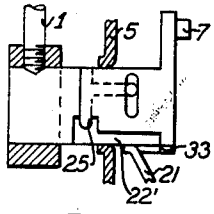


FIG. 16

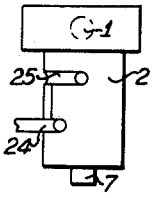


FIG. 17

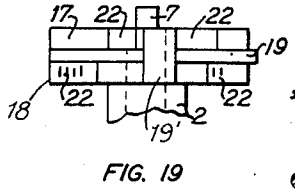


FIG. 19

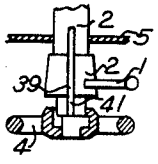


FIG. 22

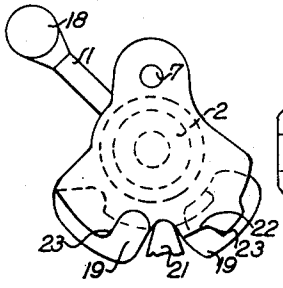


FIG. 20

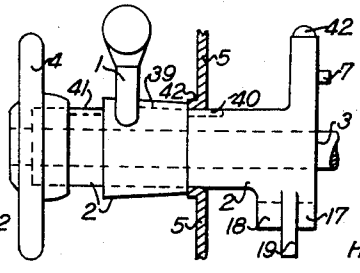


FIG. 21

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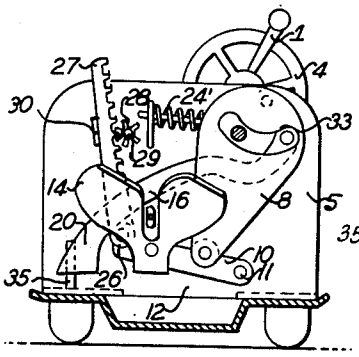


FIG. 9

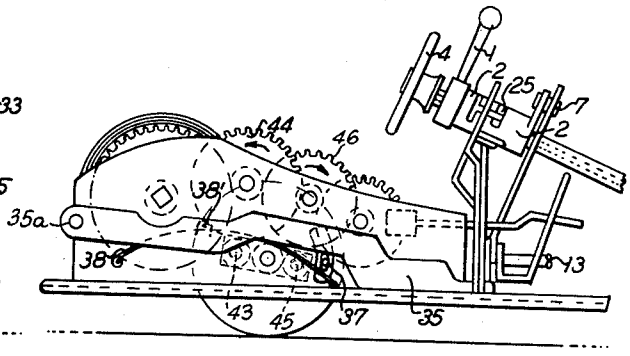


FIG. 10

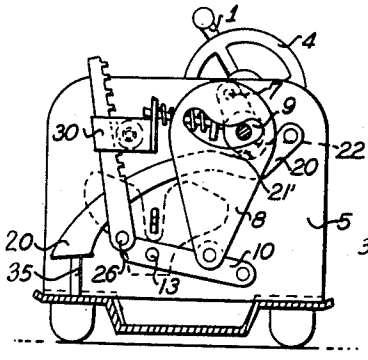


FIG. 11

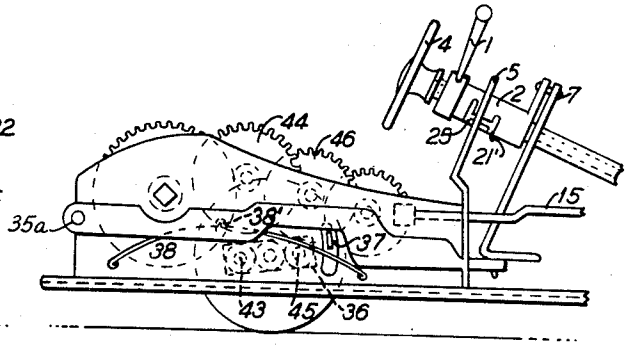


FIG. 12

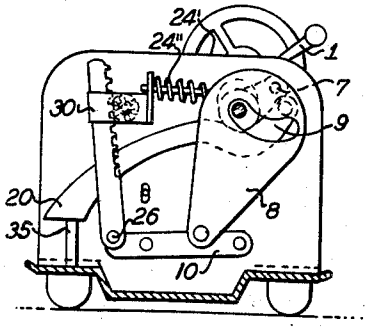


FIG. 13

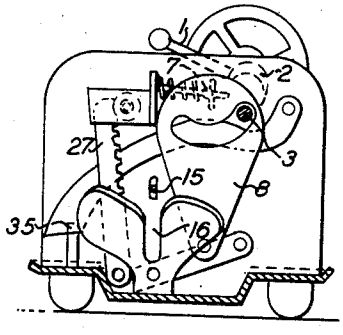


FIG. 18

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MOTOR-DRIVEN TOY VEHICLE

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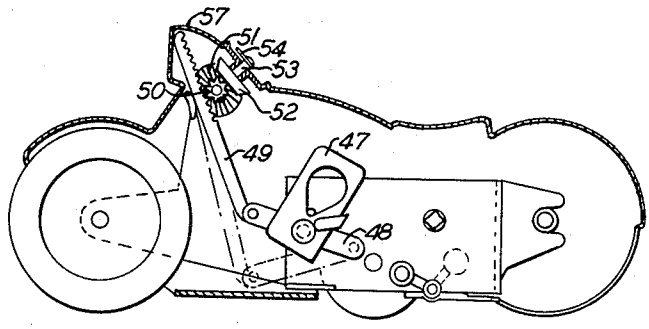


FIG. 23

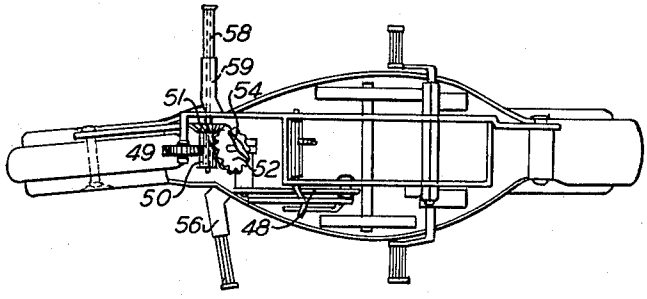


FIG. 24

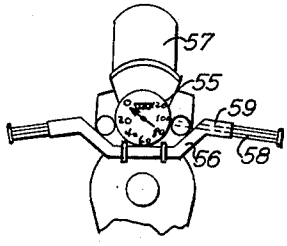


FIG 25

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ATTORNEYS

United States Patent Office 2,697,306
Patented Dec. 21, 1954

2,697,306

MOTOR-DRIVEN TOY VEHICLE

Heinrich Müller, Nurnberg, Germany

Application April 16, 1951, Serial No. 221,148

Claims priority, application Germany November 11, 1950

6 Claims. (Cl. 46—206)

The invention relates to a toy vehicle such as toy motor cars, toy motor cycles and the like provided with shifting means for speed changing or for changing the driving direction or both for speed changing as well as for changing the driving direction, and intends increasing the playing and teaching effect by indicating and thereby explaining the speed change and the appertaining traveling speed to the playing child.

According to the invention, therefore, a toy vehicle is furnished with a tachometer-like speed indicating device provided with an adjustable pointer, preferably also with marks designating idle or astern running, said indicating device being adjustable in dependency of the shifting means for speed changing and/or for changing the driving direction. This indicating device is provided with marks designating the adjusted speeds. Besides, it comprises preferably indications of suitably miles per hour relating to the speeds corresponding to the respective adjustment with the full scale motor car. The indicating device may be arranged on an imitation of the instrument board of a toy motor car or on the handle bar imitation of a toy motor cycle.

Another feature of the invention consists therein that a leverage may be controlled by the hand shifting lever serving to actuate the normal shifting means, said leverage gradually turning the shaft of the indicating device corresponding to the adjustment of the shifting lever, such as by a rack and pinion gear, thereby adjusting the pointer to the respective speed mark as the case may be.

According to another favourable feature of the invention a leverage is used consisting of two rocking levers pivotally connected with each other, the one of which may be moved by the hand shifting lever rotatable around the shaft of the steering wheel or a shaft arranged near the said shaft, while the other engages the rack meshing with a pinion attached to the shaft of the pointer. The rack moves to and fro and simultaneously oscillates whereby said rack or preferably its edge opposite the toothing slides along a guiding element such as a roller.

The invention has different important advantages, it facilitates the course of play because it can no longer happen that erroneously the playing child shifts incorrectly as it may be seen at a glance which speed is desired. Up to now, toy vehicles had the disadvantage that after a certain time of playing the child did not know what speed was adjusted and that the child must ascertain the new shifting position by trying. Furthermore the invention has the advantage that comprehension is inspired by the child during playing such that to each gear a certain normal speed appertains which must be obtained by a good driver. Even by the fact that indications relating to the speed in miles per hour as from regulations in addition to the speed indications on the dial of the indication device the child becomes attentive to the questions of the travelling speed which could not happen up to now when playing.

The drawing shows embodiments of the invention schematically and by way of example.

Fig. 1 is a longitudinal section through a toy motor car,

Fig. 2 is a plan view of Fig. 1 the casing of the toy being removed.

Fig. 3 is a front view of the wall supporting the shaft of the steering wheel.

Fig. 4 is a similar front view but showing certain other elements.

Fig. 5 is a rear view of this wall provided with the indicating means, the shifting lever being adjusted to astern running,

Fig. 6 is a similar rear view, the shifting lever being adjusted to starting gear ahead running,

Fig. 7 is a similar rear view, the shifting lever being adjusted to second gear,

Fig. 8 shows a similar rear view, the shifting lever being adjusted to third gear,

Fig. 9 is a front view of the supporting wall of another embodiment,

Fig. 10 is a side view of Fig. 9.

Fig. 11 is a similar front view as shown in Fig. 9 the hand shifting lever being adjusted to starting gear ahead running,

Fig. 12 is another side view the toothed wheel adjusting lever being adjusted to ahead running,

Fig. 13 is a front view, the hand shifting lever being adjusted to second gear,

Fig. 14 is a side view of the shaft of the steering wheel provided with a guiding sleeve,

Fig. 15 is a front view of Fig. 14,

Fig. 16 is a side view of the guiding sleeve in an enlarged scale.

Fig. 17 is a plan view of the guiding sleeve in an enlarged scale.

Fig. 18 is a front view of the supporting wall the hand shifting lever being adjusted to third gear,

Fig. 19 is a plan view of the guiding sleeve with cam tracks.

Fig. 20 is a front view of Fig. 19 in an enlarged scale,

Fig. 21 is a side view of Fig. 20,

Fig. 22 is a plan view of Fig. 21 in a smaller scale,

Fig. 23 is a longitudinal section through a toy motor cycle.

Fig. 24 is a plan view of Fig. 3, the upper portion of the casing being removed and

Fig. 25 is a view of the handle bar, seen from the seat of the driver.

The hand shifting lever **1** provided with a guiding sleeve **2** is attached to the shaft **3** of the steering wheel **4**, that is, it may be handled within the reach of the steering wheel **4**. The shaft **3** is solidly supported on the one hand by the sleeve **2** which is itself rotatably supported by the wall **5**, and, on the other hand, by a bearing **6**.

The guiding sleeve **2** is shiftable on the shaft **3** in the axial direction as well as rotatable in opposite directions. The hand shifting lever **1** is formed like a handle and is radially arranged with respect to the shaft.

According to the embodiment shown in Figs. 1 to 8 and 19–22 a lever **8** is pivoted to the guiding sleeve by the eccentrically arranged pivot **7**, the other end of said lever being pivotally connected with an arm **10** by means of a pivot **12**. The arm **10** is pivoted to a fixed part of the vehicle at **11**. The shaft of the steering wheel passes through the lever arm **8** which, for this purpose, is provided with an elongated opening **9**. To the free end of the arm **10** the regulator pendulum **14** is rockably attached by means of a pivot **13**, said pendulum coacting by means of its slot **16** with a regulator crank **15** in a manner known per se. The more the pendulum **14** engages into the region in which the crank **15** moves the slower the driving spring motor runs down while the highest running down speed results if the pendulum **14** does not engage the crank **15** at all.

To the end of the arm **10** a rack **27** is pivoted by means of the pivot **26**, said rack meshing with a pinion **28** fixed to a shaft **29**. During its to and fro and simultaneously rocking movement the rack **27** is guided by a guiding member which may consist of a roller **30**. At the other side of the supporting wall pointer **31** of an indicating device **32** is attached to the shaft **29**, said device being provided with marks indicating the different gears for idle running, the gear for astern running, and ahead running position. In the embodiment shown in the drawings the reference figures O, R, I, II and III indicate these positions. Besides, the dial of the indicating device may be provided with marks indicating the traveling speed in miles per hour as to be seen from Figs. 5–8, the velocity marks being preferably so chosen that the speed indicating number neighbouring the respective gear indication

corresponds approximately to the traveling velocity with which a full scale original motor car would run if the respective gear were selected.

As already mentioned the guiding sleeve **2** also operates the rods for shifting from ahead running to astern running and vice versa, and for adjusting idle running. For this purpose a rocking lever **20** is provided with a cam **21** coacting with two cam tracks **17** and **18** provided on the guiding sleeve **2**. These tracks are separated from each other by a radially projecting web **19** (Figs. 19, 20) so that an undesired sliding over of the cam **21** from one track to the other is positively prevented. The web **19**, however, is interrupted near about its middle so that the cam **21** may pass through the gap **19'** formed thereby so that said cam may be brought from the one cam track to the other. For this purpose it is only necessary to shift the guiding sleeve **2** carrying the cam tracks in its axial direction. The mentioned gap is arranged suchwise that longitudinal shifting of the sleeve **2** is only possible when adjusted to idle running.

If the rocking lever **20** which is influenced by a return spring **24** is rocked downwardly it presses onto the front end of a lever **35** pivoted to the frame of the vehicle by means of the bolt **35***a*. The lever **35** thereby lowers the arm **37** of the wheel carrier **36** by engaging its forwardly bent over portion. The arm **37** is returned to its initial position by a spring **38**. Consequently, corresponding to the position of the rocking lever **20** the toothed wheel **43** meshes with the gear wheel **44** (Fig. 10) so that the vehicle runs rearwardly or the toothed wheel **45** engages the toothed wheel **46** (Fig. 12) so that the vehicle runs forwardly. In the intermediate position, that is, if neither the wheel **43** nor the wheel **45** meshes with its corresponding gear wheel the idle running position has been selected. The return spring **24** simultaneously secures returning of the rocking lever **20** into its upper initial position and holds the cam **21** always in sliding contact with the cam tracks **17, 18** even if the toothed wheels **43, 44** or **45, 46** respectively should not disengage automatically.

The cam tracks **17, 18** (Fig. 19) are suitably provided with grooves **22** checking the guiding sleeve **2** and the rocking lever **20** in the adjusted position. The cam **21** of the rocking lever **20** is pressed into these grooves by the action of the spring **24**. Besides, abutments **23** (Fig. 20) are provided engaging the cam **21** of the rocking lever **20** if the guiding sleeve **2** rotates to and fro thereby limiting the rocking movement of the hand shifting lever **1**.

In the embodiment according to Figs. 1 to 8 and 19 to 22 respectively the position L of the hand shifting lever **1** shown in Fig. 3 corresponds to the idle running position. In this position the running down of the spring motor is retarded by the pendulum in the highest degree. If the hand shifting lever **1** is brought into the position R according to Fig. 5 the toothed wheels **43** and **44** mesh with each other (Fig. 10) as soon as the rocking lever **20** is moved by the respective cam track. Simultaneously the arm **10** is rocked that is the position of the pendulum **14** is changed so that the spring motor runs down somewhat faster. Besides, the rack **27** is shifted thereby causing the pointer **31** to advance from "O" to "R." When shifting to the starting ahead gear the hand shifting lever **1** must pass the idle running position (Fig. 4). The corresponding movement of the rocking lever **20** causes the engagement of the wheels **45** and **46** (Fig. 10). Further the regulating pendulum **14** is displaced by the arm **10** so that the spring motor runs down somewhat faster. The pointer **31** has been moved by the rack **27** from "R" to "I." For shifting to the second gear the hand shifting lever **1** is first brought into the idle running position "L" and is then axially shifted in the sleeve **2** on the shaft **3** the cam **21** hereby passing the gap of the leg **19** and being caused to coact with the other cam track **17**. If after the longitudinal movement the hand shifting lever **1** is rocked into the position II according to Fig. 7 the second ahead gear is adjusted, the engagement of the wheels **45, 46** being maintained, while the pendulum **14** releases the crank **15** still further so that the spring motor may run down still faster. Simultaneously the pointer **31** has moved from "I" to "II." When adjusting the third ahead gear according to Fig. 8 the hand shifting lever **1** is to be moved again over the idle running position to the other side around the shaft **3**, whereby the pendulum **14** entirely releases the crank **15** thereby adjusting the fastest running down of the spring motor and therefore the highest traveling velocity. The pointer **31** has the position indicated by "III."

For the purpose that the idle running position of the guiding sleeve **2** that is of the hand shifting lever **1** becomes quickly visible and the playing child is enabled to quickly adjust the position of the guiding sleeve for longitudinal shifting it is recommended to provide marks **39, 40**, and **41** (Fig. 21) on the guiding sleeve **2** and a counter mark **42** on the supporting wall **5**. Only if these marks align the idle running position and therefore the possibility to longitudinally shift the sleeve **2** is given.

The embodiment according to Figs. 9–18 differs from the embodiment described above preferably whereby the H-like guiding of the shifting lever **1** and its guiding sleeve **2** provides another controlling means. In this case the sleeve **2** is provided with a H-like recess or opening **25** engaged by a pin **24'** (Fig. 9) being under the action of a spring **24''** and arranged on the supporting wall **5**. The cam **21'** of the rocking lever **20** may jump into recesses **22'** of the guiding sleeve **2**. The astern running and the idle running are controlled by a nose **33** (Fig. 16) coacting with the cam **21'** when the sleeve **2** is correspondingly shifted in the longitudinal direction.

While in the embodiment described before the hand shifting lever has an inclined position in the idle running position (Fig. 3) it may also be arranged nearly vertically as to be seen in the embodiment shown in Figs. 9–18.

Of course the invention may also be used if the spring motor is not controlled by a pendulum but in any other way, such as by toothed gears, a friction gear or the like. In this case the arm **10** of the leverage brakes or releases the respective controlling device.

The invention is not restricted to toy motor cars but may also be employed in connection with toy motor cycles as illustrated in Figs. 23 to 25 in which only the parts essential for the drive are fully shown by sake of clearness.

The regulator **47** adjusting the running down of the spring motor and therewith the traveling velocity may be adjusted by means of a rocking arm **48** pivoted to a rack **49** meshing with a pinion **50**. To the shaft of this pinion a bevel wheel **51** is fixed driving the counter-wheel **52** the axle **53** of which bears the pointer **54** of the indicating device **55** arranged preferably on the handle bar **56**, suitably on the controlling head or, with special advantage, on the rear side of the search light casing **57**.

In the embodiment illustrated the pinion **50** may be rotated by the shaft **59** to which it is fixed and which may be rotated in opposite direction by means of the handle **58**. The rotation of the pinion **50** is transmitted, on the one hand, to the dial **54** over the bevel gearing **51** and, on the other hand, to the regulator **47** over the rack **49**.

The rocking lever **48** may also be controlled by a hand shifting lever which may be a handle of the handle bar **56** and may be formed as a rotatable handle **58** of the handle bar as to be seen from the embodiment shown in the drawings. The rotation of this handle may be transmitted in any suitable way to the rocking lever **48**, such as by an intermediate rod engaging the rocking lever and being influenced by an arm radially projecting from the axis **59** of the rotatable handle. The movement of the hand shifting lever may also be transmitted to the rocking lever **48** by a Bowden-drawn cord or in any other suitable manner. Instead of a rack a spindle provided with a nut may be used, if desired, the nut being attached to the rocking lever. However it is also possible to transmit the rotation of the axis **59** of the handle to the rocking lever **48** by means of a crank rod the one end of which being connected with the mentioned lever and the other end with the pinion.

In each case the hand of the indicating device is adjusted in dependency of the speed adjusting.

Having thus particularly described the nature of my invention and the manner in what the same is to be performed, what I wish to have covered by Letters Patent is:

1. A toy vehicle adapted to be driven by a motor comprising in combination with the body of the toy vehicle a shifting means adapted to adjust the traveling velocity and the traveling direction; an indicating device having the outer appearance of a tachometer arranged on the body of the toy vehicle and provided with marks indicating the traveling speeds and traveling directions, a pointer, pivotally mounted on said device and being adapted to be adjusted to any of said marks, a shaft

bearing said pointer, a hand operated shifting lever rotatably supported by the body of the vehicle to adjust the said shifting means, a shaft arranged in the body of the vehicle to which said shifting lever is attached, a sleeve supported by the last mentioned shaft, two rocking levers pivotally connected with each other the one of which being eccentrically pivoted to said sleeve, and a rack and pinion gear the rack of which being engaged by the other of said rocking levers and the pinion being coupled with the said shaft of the pointer and adapted to turn it in correspondence with the movement of said shifting lever.

2. A toy vehicle adapted to be driven by a motor comprising in combination with the body of the toy vehicle a shifting means adapted to adjust the traveling velocity and the traveling direction; an indicating device having the outer appearance of a tachometer arranged on the body of the toy vehicle and provided with marks indicating the traveling speeds and traveling directions, a pointer pivotally mounted on said device and being adapted to be adjusted to any of said marks, a shaft bearing said pointer, a hand operated shifting lever rotatably supported by the body of the vehicle to adjust the said shifting means, two rocking levers pivotally connected with each other, the one of which being connected with, and moved by said shifting lever, and a rack and pinion gear the rack of which being pivoted to the one end of the other of said rocking levers and the pinion being coupled with the said shaft of the pointer and adapted to turn it in correspondence with the movement of said shifting lever, the other end of said other rocking lever being pivoted to the body of the vehicle and the pivoted connection of said rocking levers being provided between the pivotal connections of the said other rocking lever with the rack and the body of the vehicle respectively.

3. In a motor driven toy vehicle with means for changing the velocity of travel by a hand operated shifting means, in combination, an indicating device having the appearance of a tachometer provided with marks indicating the traveling speeds and a shaft having a pointer disposed to move over indicating marks on the tachometer on the front end and a toothed wheel on the rear end, and means operatively connected with said shifting means and the toothed wheel to operate the pointer upon operation of the shifting means.

4. In a motor driven toy vehicle with means for changing the velocity and the direction of travel by a hand operated shifting means, in combination, an indicating device having the appearance of a tachometer arranged on a body of the vehicle and provided with marks indicating the traveling speeds and the traveling direction, and a shaft with a pointer disposed to move over indicating marks on the tachometer on one end and a toothed wheel on the other end, and means including a toothed rack operatively connected with said shifting means and the toothed wheel to operate the pointer upon operation of the shifting means due to a movement of the toothed rack meshing with the toothed wheel.

5. In a toy motor cycle having a driving motor, a rotatable handle bar, and means for changing the speed of the motor, in combination, an indicating device having the appearance of a tachometer mounted adjacent the rotatable handle bar of the motor cycle and provided with marks indicating the traveling speed, a shaft having a pointer on the front end movable over the said marks and a bevel gear on its rear end, a second bevel gear secured on the rotatable handle bar and meshing with the first-mentioned bevel gear to operatively connect the pointer with the rotatable handle bar, and means on the rotatable handle bar operatively connected with the speed changing means for adjusting said speed changing means in response to the rotation of the rotatable handle bar.

6. In a toy motor cycle having a casing, a driving motor, a rotatable handle bar, and means for changing the speed of the motor, in combination, an indicating device having the appearance of a tachometer arranged adjacent the casing for the motor cycle and provided with marks indicating the traveling speed and a shaft having a pointer on its front end movable over the said marks and a bevel gear on its rear end, a second bevel gear secured on the handle bar to operatively connect the pointer with the handle bar, a pinion secured on said rotatable handle bar to be rotatable therewith, and a toothed rack in engagement with said pinion and pivotally connected to the speed regulator, the rotation of the rotatable handle bar causing simultaneous operation of the pointer and the speed changing means.

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