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[54] LAP COUNTER FOR TOY VEHICLES

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Related U.S. Application Data

[63] Continuation of Ser. No. 812,736, Apr. 2, 1969, abandoned.

[52] **U.S. Cl.** .....**235/98 B,** 235/1 C, 273/86 B, 235/142

[51] **Int. Cl.** **B61l 1/16,** G06m 1/08

[58] **Field of Search** .....235/98 R, 98 B, 99 R, 1 C, 235/91 R, 91 A, 133; 273/86 R, 86 B

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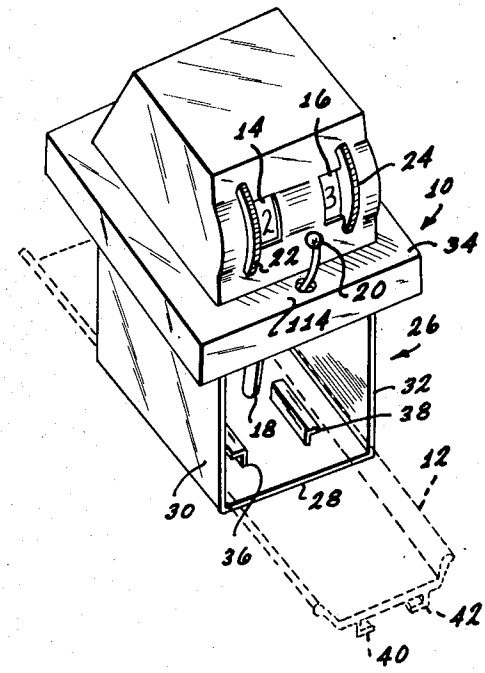
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[57] **ABSTRACT**

A device for placement on a toy racing track to count the number of laps traversed by a toy vehicle, comprising a spring loaded lever extending into the path of the vehicle that advances counting wheels which display the count. The deflection of the lever by the toy vehicle winds the spring, and the advance of a counting wheel occurs only on the return of the lever, so that the counting wheels do not receive the shock of a fast vehicle hitting the lever. The lever directly advances both a digit wheel and a 10-counting wheel, the digit wheel having a depression that allows a ratchet on the lever to engage the ten-counting wheel once in each revolution of the digit wheel.

16 Claims, 6 Drawing Figures



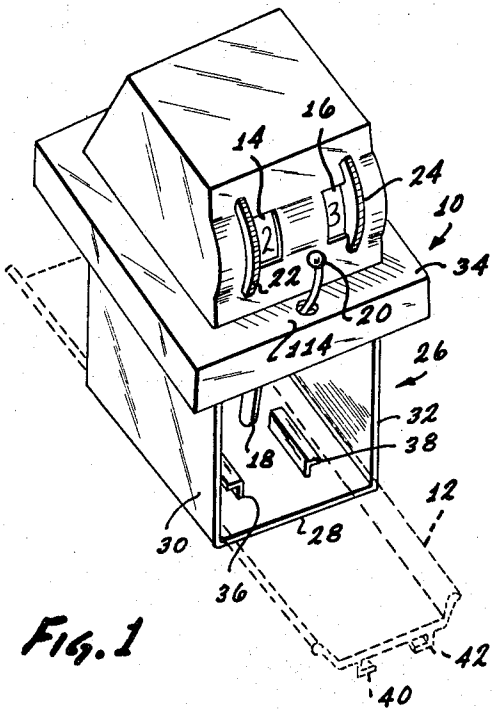


Fig. 1

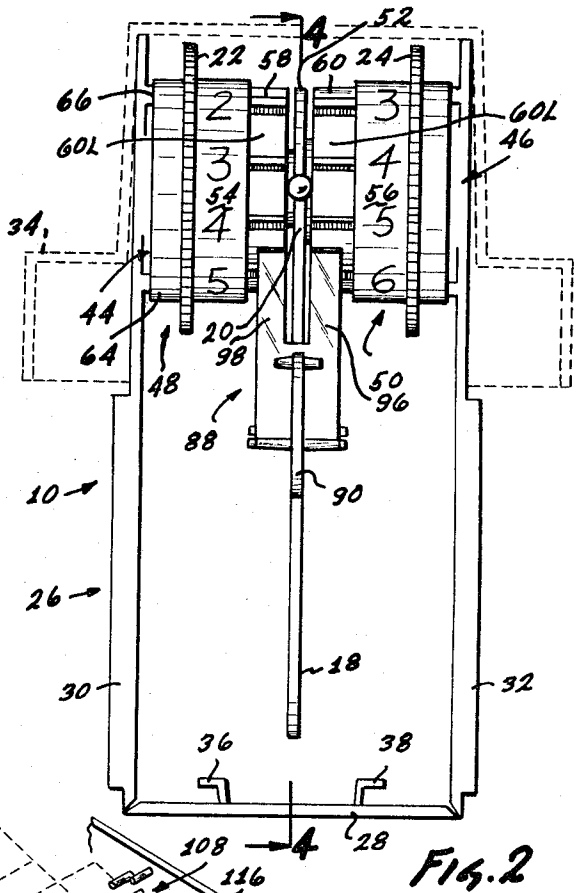


Fig. 2

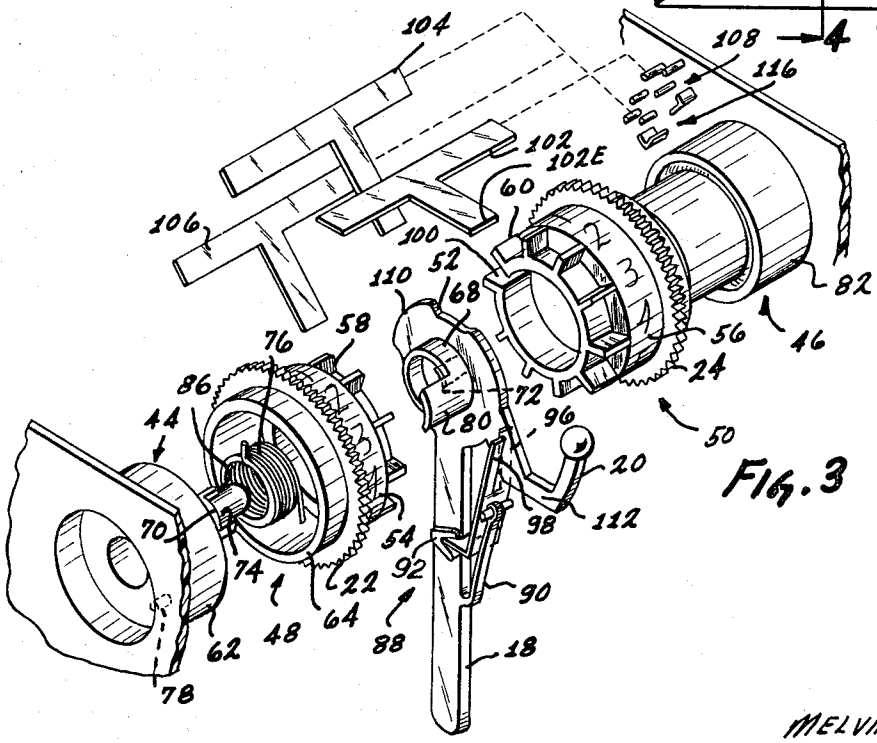


Fig. 3

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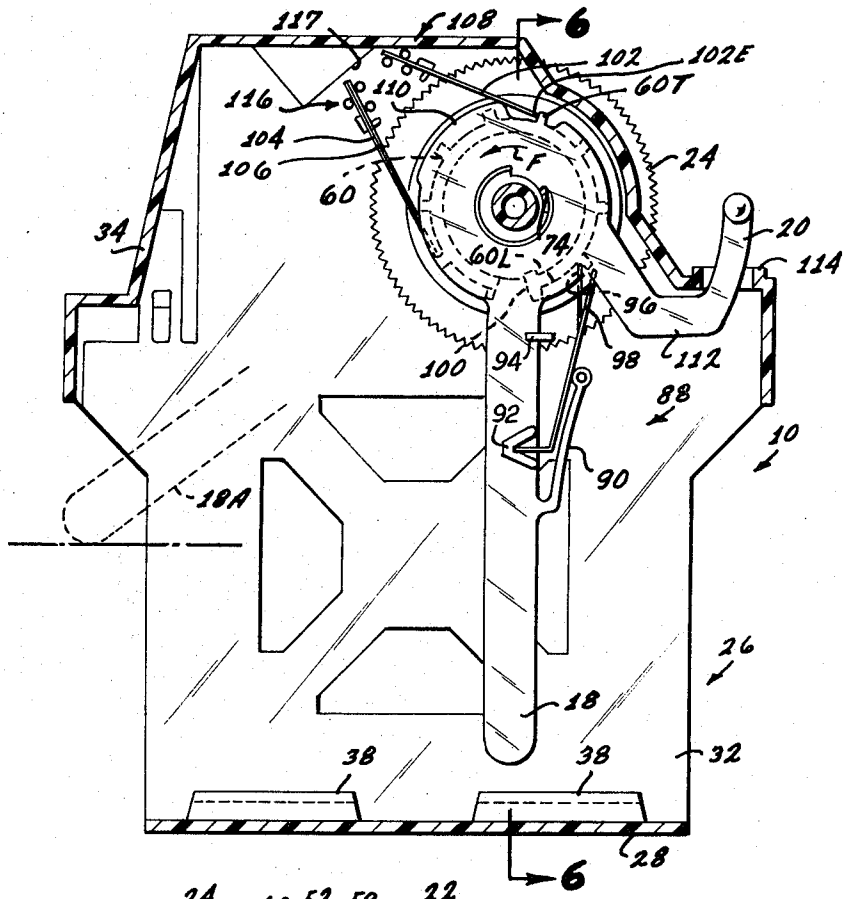


FIG. 4

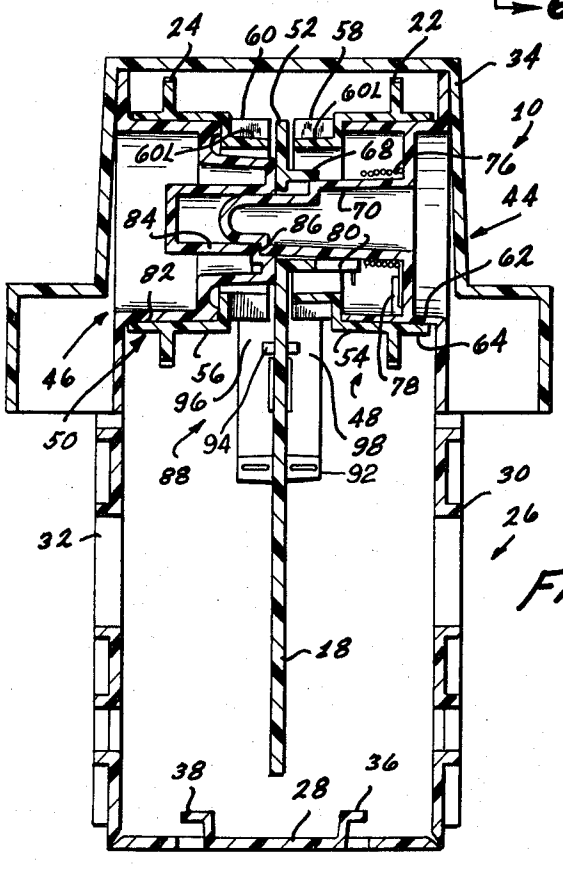
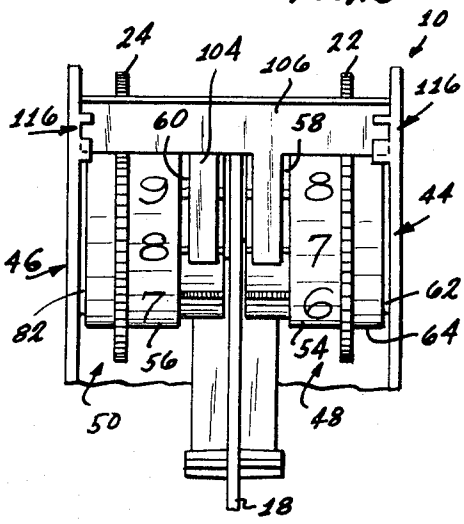


FIG. 6

FIG. 5



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LAP COUNTER FOR TOY VEHICLES

This is a continuation of U.S. Ser. No. 812,736, filed Apr. 2, 1969, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to counting mechanisms.

2. Description of the Prior Art

An entertaining accessory for toy tract vehicles is a counter for counting the number of laps traversed by a vehicle. A number of counting mechanisms can be used that are actuated by the vehicle, but which require an auxiliary power source. For example, a vehicle can release a previously wound clockwork in steps or close a switch that electrically advances a counter. However, such mechanisms are generally relatively complex and expensive, and are inconvenient in that they require occasional winding or replacement of batteries. Counting mechanisms which are powered solely by the vehicle must cope with the fact that the vehicles may pass at a wide variety of speeds. A counting mechanism which can be advanced by a slow moving vehicle may be damaged or may make two or more counts when struck by a fast moving vehicle.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the present invention is to provide a counter which is simple, economical and reliable.

Another object is to provide a simple counter for operation by toy vehicles, which can reliably count slow and fast moving vehicles.

In accordance with the present invention, a counter is provided which is advanced by a spring biased lever. The lever can be cocked, or moved back, by a toy vehicle, and is returned to its original position by a spring. Only during the spring return does the lever advance the count, so that the force applied to cock the lever, which varies with the speed of the vehicle, is not transmitted directly to the rest of the counting mechanism.

In one embodiment of the invention, the lever carries two pawls that advance two counting wheels, one being a single digit wheel indicating digits 0 through 9 and the other being a multi-digit wheel indicating tens of digits. The pawl that advances the multi-digit wheel is held away from it most of the time by portions of the single digit wheel. However, when the single digit wheel moves to "9," and will next come back to "0," a recess in it arrives at a position to release the multi-digit pawl to allow it to advance the multi-digit wheel at the next operation of the lever. Of course, additional counting wheels can be provided to enable higher counts to be made.

The novel features of the invention are set forth with particularity in the appended claims. The invention will be best understood from the following description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a lap counter constructed in accordance with the invention;

FIG. 2 is a front view of the counter of FIG. 1, with the top cover shown in phantom lines;

FIG. 3 is a partial exploded view of the counter of FIG. 1;

FIG. 4 is a sectional side view taken on the line 4—4 of FIG. 2;

FIG. 5 is a partial rear view of the counter of FIG. 1; and

FIG. 6 is a sectional rear view taken on the line 5—5 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. 1, the counter includes a housing 10 which can receive a track 12 that carries toy vehicles, the housing having windows 14, 16 that display a count of the number of laps traversed by a vehicle up to 99. A count is registered when a vehicle strikes a lever actuating means 18 and pivots it back and upwardly until the vehicle passes under it and continues along the track. A child may reset the count to zero by pressing down on a knob 20 that is attached to the lever and turning discs 22, 24 until a zero count is displayed.

As also shown in the other figures, the housing includes a stand 26 formed by a base 28 and two side walls 30, 32, and by a cover 34 that fits over the stand. The stand is integral, with a narrow portion at either side of the base forming a living hinge between the base and sides to simplify molding and construction. Pairs of brackets 36, 38 on the base can receive channel members 40, 42 on the track 12 to retain the track in place. The cover 34 holds the upper ends of two side walls together.

The two side walls 30, 32 have bearing assemblies 44, 46 formed at their upper ends. A pair of drum assemblies 48, 50 are held between the bearing assemblies and the upper end 52 of the lever 18 is positioned between the drum assemblies. Each drum assembly 48, 50 has a number wheel 54, 56 on it for recording counts with each number wheel having numbers for displaying one digit of a count through the cover windows, a disc 22, 24 which can be manually turned to reset the count to zero or some other member, and a ratchet wheel 58, 60 which enables advancement of the number wheels by the lever 18.

The drum assembly 48 is rotatably mounted on the outer bearing surface 62 of the bearing assembly 44, with a flange portion 64 on the drum assembly abutting a raised portion 66 on the side wall. The upper end 52 of the lever has a central bearing portion 68 that is rotatably mounted on a shaft 70 of the bearing assembly 44. However, a finger 72 on the lever is engaged in a slot 74 on the shaft to limit lever pivoting between a position pointing straight down, or vertically, and a position about 50° rearwardly therefrom. A coil spring 76 disposed about the shaft 70 has one end engaged with a boss 78 on the bearing assembly and another end engaged with a pin 80 on the lever. The spring is preloaded so it biases the lever forwardly toward the vertical position. The other drum assembly 50 is rotatably mounted on an outer bearing surface 82 of the bearing assembly 46. A tubular portion 84 of the bearing assembly 46 extends to a ledge 86 on the shaft 70 of the opposite assembly.

The advancement of the count at every oscillation of the lever 18 is accomplished by means of a pawl assembly 88 that is mounted on the lever 18. The pawl assembly is a stiff steel plate held by retainer means 92 and an arm 90 on the lever, the arm 90 being elastic to urge the pawl assembly against ratchet wheels 54, 56. Another retainer means 94 on the lever can limit the movement of the pawl assembly toward the wheels. An outer end of the pawl assembly is divided into two pawl portions or pawls 96 and 98 which can engage the ratchet wheels, 58, 60, respectively. As best shown in FIG. 4, the arm 90 of the lever biases the pawl assembly to urge both pawls 96, 98 into engagement with their respective ratchet wheels. However, pawl 96 is bent toward its ratchet wheel 60 so it generally engages a land surface 60L extending between teeth of the ratchet wheel to hold back the pawl assembly and prevent the other pawl 98 from engaging its ratchet wheel 58.

At one position of the ratchet wheel 60, the pawl 96 enters a recess 100 formed in the ratchet wheel 60. This allows the pawl 96 to deflect toward the wheel 60 so the other pawl 98 engages its ratchet wheel 58. At this position of the wheel 60, both ratchets 96, 98 are engaged with their ratchet wheels, so an oscillation of the lever causes both ratchet wheels to be turned. The recess 100 is positioned so that the pawl 96 falls into it only as the number wheel 56 displays a "9" through the housing window 16: i.e., immediately prior to wheel 56 turning to "0." Of course, the next oscillation of the lever 18 turns wheel 56 to display "0" while the number wheel 54 displays the next higher digit on it.

When the lever 18 pivots backward, under the force of a toy vehicle, the pawl 96 rides over a ratchet tooth on wheel 60. When the lever then pivots forward toward its original position under the force of spring 76, the pawl engages a tooth and advances it by one-tenth of a revolution. While the pawls are

sufficient to incrementally drive the ratchet wheels, means must be provided to prevent excessive forward rotation of the ratchet wheels, such as an advancement of more than one-tenth turn as the lever returns toward the vertical. A forward retainer **102** mounted on the housing serves to prevent such excessive forward rotation. Means must also be provided to prevent reverse rotation of the ratchet wheels. Such reverse rotation can occur by the dragging force of the pawls as they are pivoted backward by a toy vehicle, even though the pawls do not positively engage the ratchets during such pivoting. A pair of reverse retainers **104**, **106** mounted on the housing serve to prevent such reverse rotation. A more complete description of the forward and reverse retainers will be given below.

The forward retainer is a flat member of spring material having a T shape, with opposite ends of the cross part held in a holding boss group **108** on each side of the housing. The stem of the T-shaped retainer extends to the ratchet wheels **58**, **60** and is wide enough to engage both wheels. As best shown in FIG. **4**, the retainer **102** is biased to a position to engage a tooth **60T** of ratchet wheel **60** to prevent forward rotation of the wheel in the direction of arrow F, so long as the lever **18** is vertical. However, when the lever is moved partially toward its rearward position **18A**, a protuberance **110** on the upper end of the lever lifts the retainer **102** clear of the ratchet tooth **60T**. As the lever begins to return toward the vertical, the pawl **96** engages a tooth and advances the wheel **60** by one-tenth of a turn. During about three-quarters of the return movement of the lever **18**, the lever protuberance **110** deflects the retainer **102** upward. Only after the tooth **60T** has passed under the leading edge **102E** of the retainer, does the lever protuberance **110** allow the retainer to move down and abut the next tooth. The same retaining action applies to the other wheel **58**. Thus, the forward retainer **102** prevents any forward wheel rotation except when the lever is pushed back.

While the forward retainer **102** prevents accidental forward movement of the ratchet wheels, it could also prevent resetting of the number wheels. The number wheels are reset by turning the discs **22**, **24** in the forward direction. In order to disengage the forward retainer **102** during resetting, a child presses down on the knob **20** which is on the end of a reset arm **112** that extends from the lever. When the knob **20** is even with the surface **114** of the housing cover, the lever **18** is pivoted sufficiently for the protuberance **110** to lift up the retainer **102** and allow forward rotation of the ratchet wheels.

The reverse retainers **104**, **106** are also flat members of spring material having a substantially T shape. Both members have cross portions held in a boss group **116** on each side of the housing, with retainer **104** below and behind retainer **106**. The stem of retainer **104** extends to a ratchet wheel **60** and engages the teeth to prevent reverse rotation of the wheel. However, the retainer **104** rides over the ratchet teeth when the wheel rotates in the forward direction indicated by arrow F. The other reverse retainer **106** prevents reverse rotation of the ratchet wheel **58** in the same way. Retainer **104** is positioned behind retainer **106** so that its more frequent backward deflection is not impeded by retainer **106**. The reverse retainers **104**, **106**, as well as the forward retainer **102**, are held in place in the boss groups **116**, **108**, by members **117** on the housing cover.

The angle through which the lever **18** rotates is about 50°. This angle can be varied, but it should be somewhat more than one-tenth turn, or 36°to assure advancement of a ratchet tooth at each oscillation, and should not be much more than two-tenths turn, or 72° to prevent advancement of the wheels by more than one-tenth turn. The length of the lever is chosen to provide at least the minimum amount of rotation (about 40°) for the minimum size of toy vehicle expected to be counted and to allow the largest size of vehicle to pass under the lever when it is rotated back.

Although particular embodiments of the invention have been described and illustrated herein, it is recognized that modifications and variations may readily occur to those skilled in the art, and consequently, it is intended that the claims be interpreted to cover such modifications and equivalents.

We claim:

1. Apparatus for counting toy vehicles comprising:
a housing including means for receiving a toy vehicle track;
a lever pivotally mounted on said housing for pivoting from a first position in the path of vehicles moving along said track toward a second position normally clear of said vehicles;
a spring coupled to said lever to bias it toward said first position;
first and second ratchet wheels rotatably mounted on said housing;
first and second number wheels connected to said first and second ratchet wheels, respectively, for displaying the digit and the tens multiple digit of a count, respectively;
first and second pawls mounted for operation by said lever for advancing said first and second ratchet wheels respectively, said first pawl and said first ratchet wheel holding said second pawl away from said second ratchet wheel except for when said first number wheel is at the digit **9**.

2. The apparatus described in claim **1**, wherein:
said first and second pawls are connected to move together, and
wherein said first ratchet wheel includes lands between adjacent ones of the teeth thereof, and a recess disposed between two of said teeth.

3. Apparatus for counting comprising:
actuating means including first and second pawl means mounted for movement in first and second direction, said actuating means positioned to receive forces upon an occurrence to be recorded that moves it in said first direction;
means for biasing said actuating means in said second direction; and
first and second ratchet wheels advanced during movement of said actuating means in said second direction by said first and second pawl means, respectively, for recording a count, said first pawl means and said first ratchet wheel holding said second pawl means away from said second ratchet wheel except at a predetermined position of said first ratchet wheel.

4. Apparatus for counting a moving item, comprising:
means for recording counts including first and second number wheels, said first wheel indicating individual counts and said second wheel indicating tens of counts;
ratchet wheel means including first and second ratchet wheels coupled to said first and second number wheels, respectively;
a lever mounted for pivoting in a first direction by forces from said item;
spring means for biasing said lever in a second direction opposite to said first direction;
first and second pawls coupled to said lever for engaging and advancing said first and second ratchet wheels, respectively, during movement of said lever in said second direction; and
means on said first ratchet wheel for preventing engagement of said second pawl with said second ratchet wheel except at a predetermoned rotational position of said first ratchet wheel.

5. The apparatus described in claim **4** including:
retainer means biased toward engagement with said ratchet wheel means to prevent advancement of said wheel means in a direction to increase the count of said means for recording counts; and
means coupled to said lever for holding said retainer means away from engagement with said ratchet wheel means during a first portion of the movement of said lever in said second direction towards return to its original position.

6. Apparatus for counting, comprising:
first and second means for displaying digits of a count;
first and second ratchet wheel means coupled to said first and second means for displaying digits, respectively;

actuating means including a lever mounted for pivoting in a first direction by an item to be counted and spring means for pivoting said lever in an opposite second direction; and

first and second pawl means oriented for advancing said ratchet wheel means during movement of said lever in said second direction, said first pawl means and said first ratchet wheel means holding said second pawl means away from said second ratchet wheel means except at a predetermined position of said first ratchet wheel means.

7. Apparatus for counting toy vehicles comprising:

a housing including means for receiving a toy vehicle track;

a lever pivotally mounted on said housing for pivoting from a first position in the path of vehicle along said track toward a second position normally clear of said vehicles;

a spring coupled to said lever to bias it toward said first position;

a first ratchet wheel rotatably mounted on said housing; a number wheel connected to said ratchet wheel to display a count;

a second ratchet wheel rotatably mounted on said housing;

a second number wheel connected to said second ratchet wheel to display a digit of a count;

a first pawl connected to said lever and biased to a position adjacent to said first ratchet wheel, said first pawl oriented to engage a tooth on said first ratchet wheel and move it during pivoting of said lever from said second position to said first position and to ride over a tooth on said first ratchet wheel during pivoting of said lever from said first position towards said second position;

a second pawl coupled to said lever for advancing said second ratchet wheel; and

means responsive to the angular position of said first ratchet wheel for engaging and disengaging said second pawl from said second ratchet wheel.

8. The apparatus described in claim 7 wherein:

said means for engaging and disengaging said second pawl comprises means for holding said first and second pawls together in movement toward and away from said second ratchet wheel, and a recess between only predetermined ratchet teeth of said first ratchet wheel for permitting a large movement of said first pawl toward said first ratchet wheel to enable said second pawl to engage a tooth on said second ratchet wheel.

9. The apparatus described in claim 7 including:

a forward retainer spring biased toward engagement with said first ratchet wheel to prevent forward rotation; and

retainer engaging means on said lever for deflecting said forward retainer away from engagement with said first ratchet wheel at a lever position between said first and second lever positions.

10. A toy vehicle counter comprising:

a base;

holding means on said base for holding a toy vehicle guiding track to guide a toy vehicle over said base;

a counter and means holding said counter above said base and over a track thereon;

a counter actuating lever pivotally mounted adjacent said counter for swinging in the direction of movement of a vehicle on said track and extending downwardly into the path of movement of a toy vehicle moving along said track; and

means for actuating said counter in response to pivotal movement of said lever to thereby register the passage of a toy vehicle therepast.

11. A toy vehicle counter as defined in claim 10 including spring means urging said lever to said downwardly extending position.

12. A toy vehicle counter as defined in claim 10 wherein said holding means comprises means for frictionally releasably holding a track section on said base.

13. A toy vehicle counter as defined in claim 10 wherein said means holding said counter above said base comprises a pair of spaced upstanding members on said base, said holding means being arranged to hold said track to extend between said members;

a housing supported over said base by said members, said counter being positioned in said housing.

14. A toy vehicle counter as defined in claim 13 wherein said lever is pivoted to said housing and extends downwardly between said members.

15. A toy vehicle counter comprising:

a base;

holding means on said base for holding a toy vehicle guiding track to guide a toy vehicle over said base;

a counter and means holding said counter above said base and over a track thereon;

a counter actuating lever pivotally mounted adjacent said counter for swinging in the direction of movement of a vehicle on said track and extending downwardly into the path of movement of a toy vehicle moving along said track; and

means for actuating said counter in response to pivotal movement of said lever to thereby register the passage of a toy vehicle therepast;

said counter having at least one rotatable wheel bearing sequential numbers thereon and a manually accessible peripheral portion, and manually actuable release means for releasing said wheel for manual presetting thereof by engagement with said peripheral portion.

16. A toy vehicle counter as defined in claim 15 including a housing in which said counter is positioned; said peripheral portion and said release means extending to the exterior of said housing.

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