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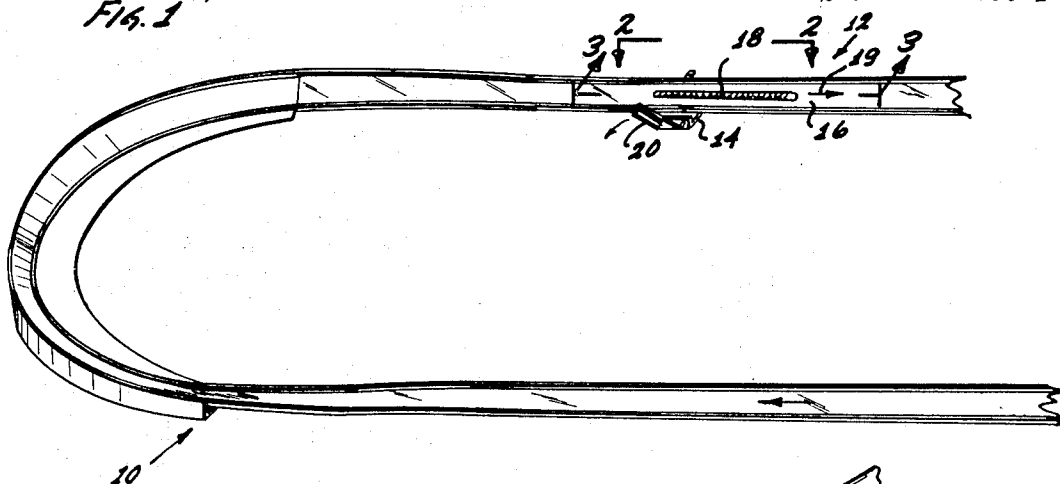
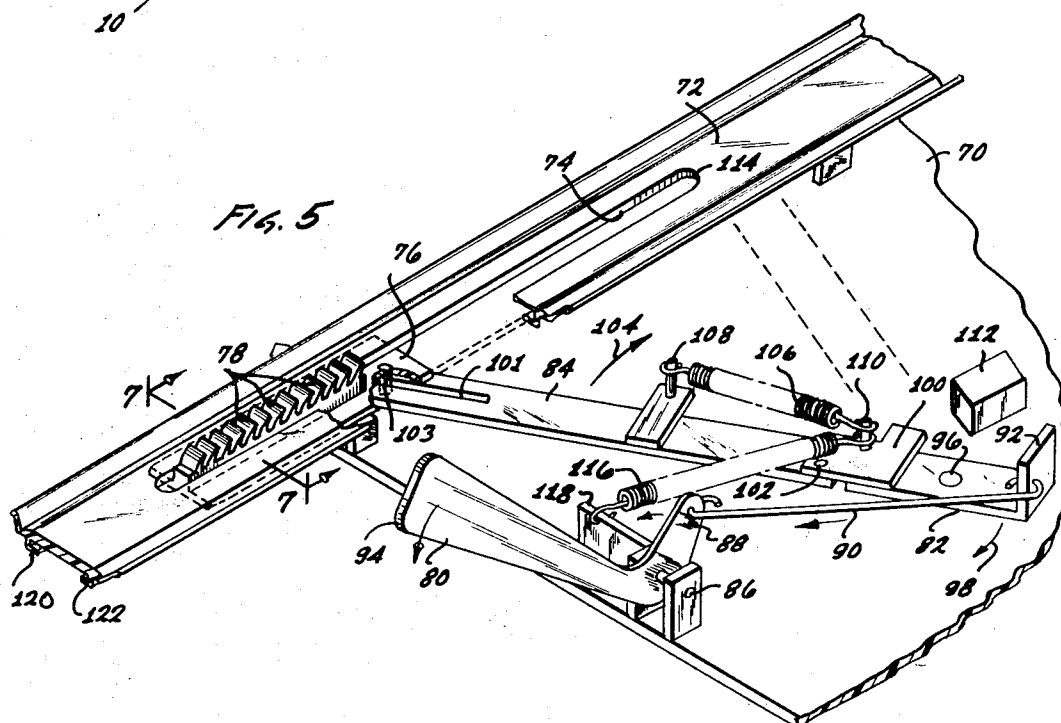
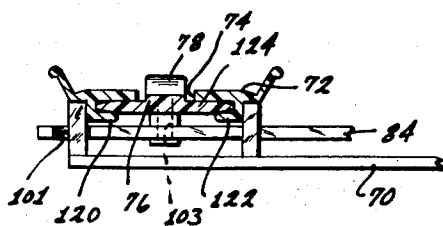
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3,548,534

MOVING APPARATUS FOR A VEHICLE TOY

Filed Dec. 23, 1968

2 Sheets-Sheet 1



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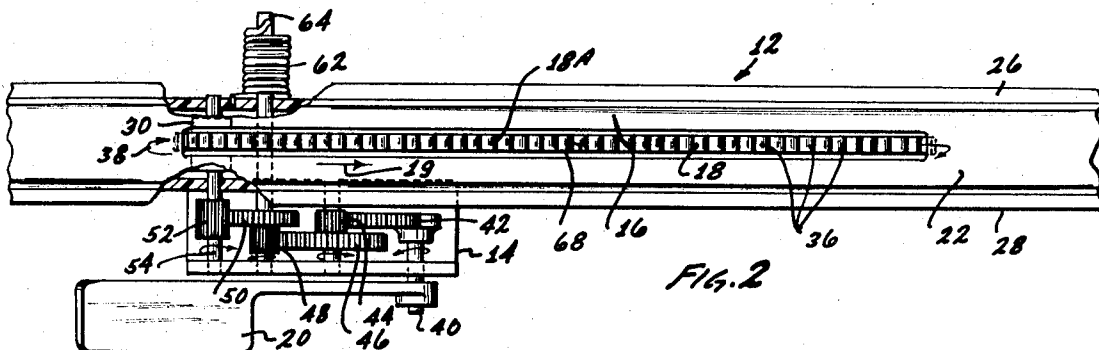
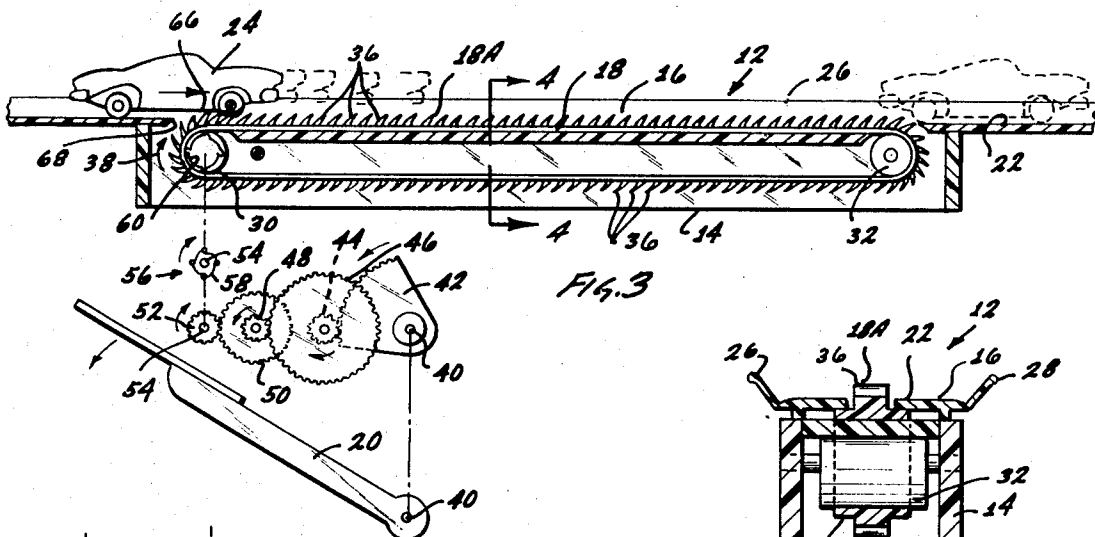
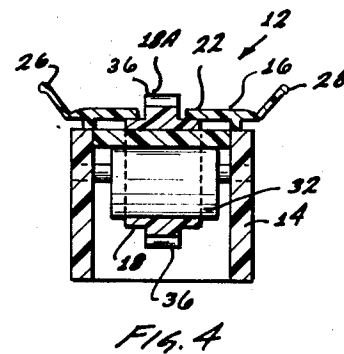
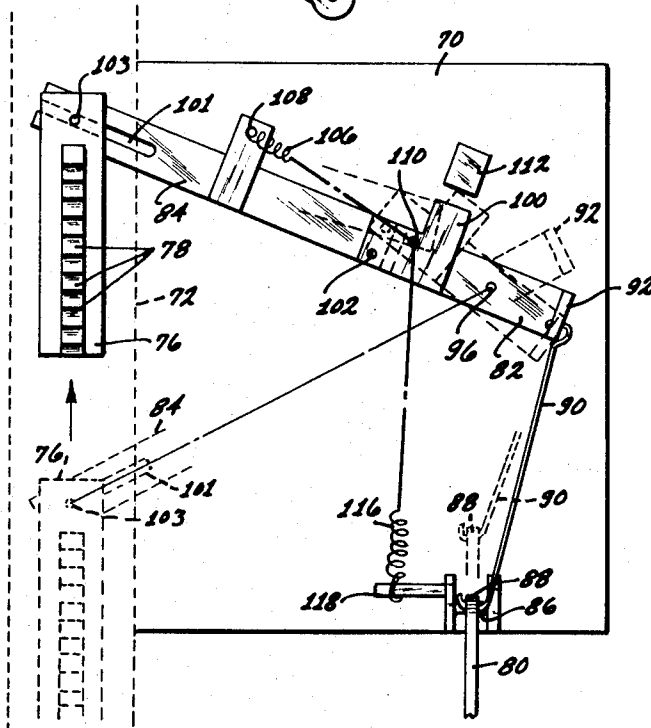


Fig. 6

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MOVING APPARATUS FOR A VEHICLE TOY
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Filed Dec. 23, 1968, Ser. No. 786,034

Int. Cl. A63f 9/14; B61b 13/12

U.S. Cl. 46—1

11 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for propelling a toy vehicle so it can then coast around a track, comprising a carriage with projections for engaging a vehicle and a mechanism for thrusting the carriage downpath to accelerate the vehicle. The projections extend with downpath directional components to enable a vehicle to move over them for engagement therewith, when the carriage is stationary, while allowing the projections to then push the vehicle when the carriage is thrust downpath.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to toy vehicles and to apparatus for moving toy vehicles.

Description of the prior art

Unpowered toy vehicles may be moved along a path by initially pushing them by hand or allowing them to initially move down an incline. These methods require a child to repeatedly handle the vehicle after each "run" along its path, to push it or to again place it at the top of an incline. Repeated handling can be annoying and it tends to destroy the entertaining illusion of vehicles moving by themselves.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the present invention is to provide simple and economical apparatus for accelerating toy vehicles.

Another object is to provide apparatus for propelling toy vehicles smoothly to a high final speed.

In accordance with the present invention, propelling apparatus is provided for accelerating a toy vehicle along a track. The apparatus includes a carriage mounted for movement parallel to the track, the carriage having means for engaging the vehicle, and a mechanism for thrusting the carriage in a downpath direction.

In one embodiment of the invention, the carriage comprises a belt with an upper side that extends along the bottom of the track. The belt has numerous projections that are angled upward and with a downpath component. If the toy vehicle approaches the belt with even a small velocity when the belt is stationary, the vehicle rides over one or a few of the projections. When the belt is suddenly rotated so the upper side moves downpath, the projections firmly engage the vehicle to move it downpath. The belt is rotated by a manually operated lever that is coupled to the belt by a speed increasing gear train.

In a second embodiment of the invention, the carriage is an elongated member that extends along the bottom of the track. As in the first embodiment, the member has numerous projections that extend upward and downpath, so the toy vehicle can ride over one or a few of them. The carriage then can be thrust downpath to catapult the vehicle, but at the end of the stroke, the carriage suddenly stops. The toy vehicle can ride over the remaining projections until it reaches the rest of the track, to thereafter coast a long distance.

The mechanism for propelling the vehicle in the second

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embodiment of the invention comprises a series of three levers. A first lever is designed for manual pressing to pivot the second lever. The third lever has one end pivotally mounted on the second, and an opposite end engaged with the carriage to propel it. A spring connects the second and third levers to cause them to rotate together, while allowing the second lever to rotate ahead of the third lever. When the first and second levers are pivoted suddenly, the spring stores the energy to release it smoothly to the third lever so it pivots in a manner to smoothly accelerate the vehicle.

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 track layout with accelerating apparatus constructed in accordance with the invention;

FIG. 2 is a partially sectional plan view taken on the line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 1;

FIG. 4 is a sectional view taken on the line 4—4 of FIG. 3;

FIG. 5 is a perspective view of accelerating apparatus constructed in accordance with another embodiment of the invention;

FIG. 6 is a plan view of the apparatus of FIG. 5; and
FIG. 7 is a sectional view taken on the line 7—7 of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a portion of a track layout 10 for guiding toy vehicles. The layout is generally formed by several track sections connected in series, and may include loops, curves, and other interesting portions. In accordance with the invention, vehicle moving apparatus 12 is provided which includes a frame 14 that carries a short track section 16 connected in series with the track layout. The moving apparatus comprises a carriage in the form of a belt 18 with an upper surface that extends along the track 16. A lever 20 designed for manual operation is coupled through a speed increasing gear train to the belt 18 to rapidly rotate it so that the upper side of the belt moves downpath in the direction of arrow 19. When a vehicle is positioned on the belt 18, operation of the lever 20 causes the belt to move the vehicle rapidly downpath so that it can continue to move along the rest of the track layout. For small track layouts, the toy vehicle may be thrust with sufficient speed to coast entirely around the layout until it again reaches the frame 14.

As shown in FIGS. 2, 3 and 4, the track 16 includes an upper track surface 22 with side portions along which the wheels of a toy vehicle 24 can roll. Guard rails 26 and 28 on either side of the track prevent the vehicle from rolling off the roadway. The belt 18 extends between two pulleys 30 and 32 spaced along the length of the track, so that the upper side 18A of the belt lies immediately under the path of the vehicle. The belt carries a multiplicity of projecting members 36 which extend with a directional component away from the belt, and also with a directional component which is forward with respect to belt rotation in the direction of arrow 38. Thus, the projections on the upper side 18A of the belt extend with an upward and a downpath component. The projections extend into the path of the vehicle 24 so that they can engage the underside of the vehicle. The projections are flexible so that they can be bent down somewhat by the vehicle to aid in vehicle movement over them. Thus,

if a vehicle approaches the frame with even a moderate speed, it will pass over several of the projections 36 before it is stopped. The projections act as overrunning vehicle engaging means in that they allow a vehicle to run downpath over them, yet they can engage a vehicle to propel it downpath. The projections do not have to be made flexible to accomplish this, although a flexible construction or an ability to pivot to a lower height facilitates the movement of vehicles over them.

The lever 20 which is depressed to rotate the belt, is fixed to a shaft 40 that is rotatably mounted on the frame. A gear sector 42 is also fixed to the shaft. The gear sector drives a gear train comprising a first pinion 44, first gear 46, second pinion 48, second gear 50, and third pinion 52. The pinion 52 is mounted on a shaft 54 that is coupled through a ratchet mechanism 56 to the pulley 30. The ratchet mechanism comprises a wheel 58 with teeth pivotally mounted on it which can engage ledges on the inside 60 of the pulley 30. When the lever 20 is pressed down, the ratchet wheel 58 turns in a clockwise direction (as seen in FIG. 3) so that it engages the ledges 60 to rotate the pulley 30, and thereby rotate the belt 18 in the clockwise direction of arrow 38.

After the lever 20 has been pushed down, a spring 62 which is connected to the shaft 64 on which the second pinion 48 and gear 50 are mounted, rotates the gear train in the opposite direction. This causes the lever 20 to move back up to its original position. However, the ratchet wheel 58 does not engage the ledges 60 in the pulley 30 during counterclockwise rotation, so that the belt does not rotate in the opposite direction when the lever is moved back up. This allows a child to slowly push the lever 20 to advance a vehicle to a predetermined position, such as halfway along the upper belt portion 18A. Then he can let the lever spring up again to prepare for a swift lever-depressing stroke that rapidly propels the vehicle.

The vehicle moving apparatus is generally operated only after the vehicle 20, which has been coasting along the track, reaches the frame. Even if the vehicle is moving slowly, it will generally pass over at least one of the projections 36 so that they firmly engage the vehicle. A child can then place his thumb on the lever 30 and press it down with a sudden sharp stroke. The gear train multiplies the speed and distance so that the belt 18 rotates a substantial distance by reason of a relatively short stroke of the lever 20. As the belt rotates, the upper portion 18A thereof rapidly accelerates the vehicle 24 to move it at a high final speed. The vehicle can then coast along the rest of the track. In many cases, the final speed of propulsion by the vehicle moving mechanism is sufficient to allow the vehicle to coast entirely around the track layout.

The length of the upper portion 18A of the belt and gear train are preferably constructed so that a complete downward stroke of the lever 20 rotates the belt by slightly more than one-half its length. This allows the vehicle to leave the belt while the belt is still moving. Such a construction can prevent the necessity for the vehicle to move downpath over some of the projections 36, which would slow it. However, the orientation of the projections with downpath directional components and their flexibility enables the vehicle to pass over them without excessive slowing once it has been accelerated to a high speed. This is helpful, because in some cases a child may push the lever 20 at a somewhat slower speed at the very bottom of the stroke than at the middle, so that the vehicle is moving faster than the belt and may have to ride over several projections.

The vehicle 24 is preferably provided with an underside that includes an engaging portion 66 that extends with downward and up-path directional components. This facilitates engagement of the belt projection 36 with the vehicle to propel it. The engaging portion 66 of the vehicle lies above the level of the vehicle wheels so it normally does not bear on the track. The belt projections

36 extend through a slot 68 in the track 16 so that they are at a high enough level to engage the portion 66 of the vehicle.

FIGS. 5, 6, and 7 illustrate another embodiment of the invention which can be used for accelerating the toy vehicles. This apparatus comprises a frame 70 having a track portion 72 which is placed in series with a track layout in the same manner as the embodiment described above. The track portion 72 has a slot 74 extending along its center, and a carriage 76 is mounted for reciprocal movement along the slot. The carriage has a plurality of projecting members 78 that extend with down-path and upward directional components. This enables toy vehicles to ride over one or several projections, while enabling the projections to firmly engage the vehicle to propel it downpath.

An operating mechanism for propelling the carriage 76 comprises a set of three levers 80, 82 and 84. A first lever 80 is pivotally mounted at 86 on the frame, and has an operating end 94 that is adapted to receive manual forces that press it down to pivot the lever. The lever 80 has another end 88 that is tied by a link 90 to an end 92 of the second lever 82. Downward movement of the operating end 94 of the first lever causes it to pivot the second lever 82 in the direction of arrow 98 about a pivot axis 96. The axis 96 is substantially perpendicular to the plane of the track portion 72. A coupling plate 100 that is fixed to the second lever carries a pivot 102 for pivotally connecting it to the third lever 84. When the second lever 82 rotates in the direction of arrow 98, the third lever 84 tends to rotate in the direction of arrow 104. However, the pivotal coupling at 102 between the second and third levers allows the third lever to lag behind the second.

A spring 106 extends between a post 108 on the third lever and a post 110 on the connecting plate of the second lever. The spring tends to pivot the third lever along with the second, but allows the third lever to lag behind. If the first lever 80 is pushed down suddenly, so that the second lever 82 pivots suddenly, the third lever 84 tends to rotate, but its motion is not abrupt. Large energy impulses imparted to the first lever 80 are stored by the spring 106 and released at a more uniform rate to the third lever. This aids in smooth acceleration of the carriage 76, and tends to provide a more constant acceleration to the vehicle. The stresses on the carriage and vehicles are thereby reduced, which reduces the likelihood of breakage, while the vehicle is continually accelerated to a high speed. In those cases where the lever 80 may be rotated with an initial high speed but with a final speed which is less than maximum, the spring coupling to the third lever tends to convert this to a constantly increasing speed.

The third lever 84 is coupled to the carriage 76 by engagement of the walls of a slot 101 in the lever with a pin 103 on the carriage. The slot 101 extends along the outer end of the third lever. The pin 103 depends downwardly from the carriage near its downpath end. The third lever 84 propels the carriage at a maximum final speed which is substantially greater than the maximum speed of the first lever at its outer end 94. This is due to the large lever arm distance between the second lever pivot point 96 and the outer end of the third lever. The speed is even greater because of the angle of more than 90° between the slot 101 and the direction of carriage motion near the end of its path, and because of the coupling by spring 106 of the second and third levers.

When the first lever 80 is pressed down, the carriage 76 is moved rapidly downtrack until it reaches the end of the slot 74. In order to prevent excessive elongation of spring 106, which might result in damage to the carriage when it is suddenly stopped, a lever stop 112 is mounted on the frame. The connecting plate 100 of the second lever abuts the stop 112 after the second lever has been pivoted to a predetermined maximum angle. Another stop 114 is provided at the end of the slot 74 to stop the

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carriage 76. Generally, a hard push on the first lever 80 will cause the second lever 82 to be pivoted until the plate 100 reaches the stop 112. The third lever will continue to move the carriage downpath until the carriage strikes the other stop 114. The vehicle will have sufficient velocity to continue moving downpath over the rest of the projections 78 on the carriage. The orientation of the projections 78 with downpath components enables the vehicles to move over them with a minimum of slowing. In order to return the mechanism to its initial state for another operation, a return spring 116 is provided which is connected between a bracket 118 on the frame and the post 110 on the second lever.

As shown in FIG. 7, the track 72 includes an under portion which has a pair of members 120 and 122 on either side that form channels. These channel members generally extend throughout the entire length of the track layout for enabling the connection of track members to each other. Normally, a short connecting plate is inserted into the channels at each end of a pair of adjoining track sections, to hold the sections together. In this embodiment of the invention, the carriage 76 is provided with a slide 124 that runs along the channels formed by the members 120 and 122.

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 impelling a toy vehicle along a trackway comprising:

a base having thereon a section of trackway having a wheel engaging upper surface and side walls, defining a path of movement for a toy vehicle;

a vehicle impelling member mounted for movement parallel to said path and having an engaging element thereon projecting into said path for engaging a vehicle on said trackway;

a manually operable actuating member movably mounted on said base; and

motion amplifying drive means drivingly connecting said actuating member to said impelling member whereby a relatively short movement manually imparted to said actuating member moves said impelling member rapidly along said trackway for a greater distance to impel a vehicle, in engagement with said engaging element, along said trackway at relatively high speed.

2. Apparatus as defined in claim 1 wherein said impelling member is mounted for movement below said trackway surface;

a longitudinal slot through said surface, said engaging element extending upwardly through said slot into said path.

3. Apparatus as defined in claim 1 wherein said engaging element is resiliently movable out of said path of engagement with a vehicle moving therepast in one direction along said path but restrained against movement out of said path when moving in said one direction and impelling a vehicle along said path.

4. Apparatus as defined in claim 1 wherein said motion amplifying drive means comprises a lever having a pivotal connection to said base;

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means drivingly connecting said actuating member to said lever at a position a relatively short distance from said pivotal connection; and

means connecting said impelling member to said lever a relatively short distance from said pivotal connection.

5. Apparatus as defined in claim 1 including stop means on said trackway for limiting movement of said impelling member in at least one direction.

6. Apparatus as defined in claim 2 wherein said trackway defines a downwardly facing channel below said surface, said impelling member being slidably mounted in said channel.

7. Apparatus as defined in claim 1 including means at each end of said section of trackway for connecting similar sections of trackway thereto in alignment therewith.

8. Apparatus as defined in claim 4 wherein said means connecting said impelling member to said lever comprises means for varying the effective length of said lever from said pivotal connection to its point of connection to said impelling member.

9. Apparatus as defined in claim 4 wherein said lever, between said pivotal connection and said impelling member, comprises two pivotally joined lever sections and resilient means normally holding said sections in relatively fixed relation to function normally as a single rigid lever but being yieldable to permit relative pivotal movement between said sections in at least one direction in response to shock loads.

10. Apparatus as defined in claim 2 wherein said impelling member comprises an endless belt means below said trackway and having an upper run below said slot; said endless belt being provided with a plurality of said engaging elements thereon.

11. Apparatus as defined in claim 10 wherein said motion amplifying drive means comprises a gear train; said actuating member being drivingly connected to a first gear of said train and a last gear of said train being connected, through a one-way clutch, to a rotary member drivingly engaging said endless belt.

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U.S. Cl. X.R.

46—206; 104—162; 273—86

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,548,534 Dated December 22, 1970

Inventor(s) JANOS BENY et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 4, line 8, "short" should read

---greater---

Signed and sealed this 30th day of
March, 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents