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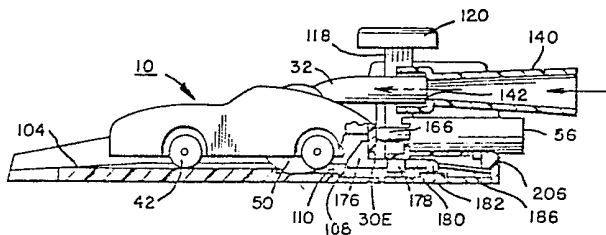
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(54) **Launcher for toy vehicle**

(57) The launcher comprises a spring-loaded plunger 166, a latch 176 engageable with rear wall 30E of a toy vehicle 10 so as to maintain the

plunger in its cocked position, and means 120, 118 for releasing the latch. A mouthpiece 140 registers with nozzle 32 of the vehicle for imparting energy *via* an air turbine to the inertia wheel drive of the vehicle.

FIG. 14



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FIG. 1

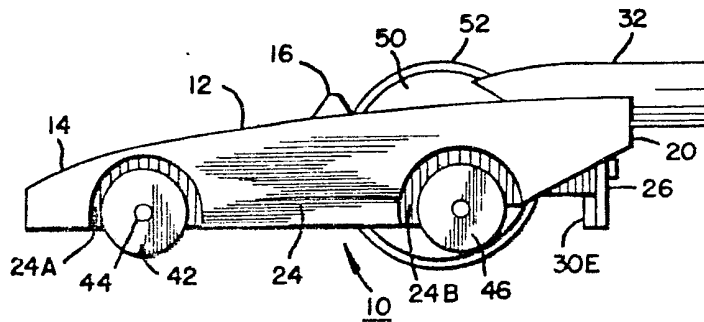


FIG. 4

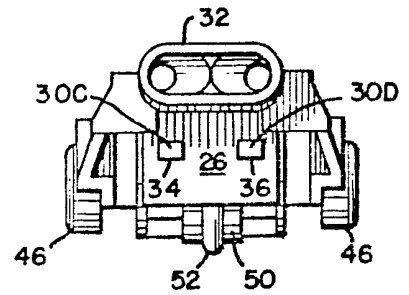


FIG. 2

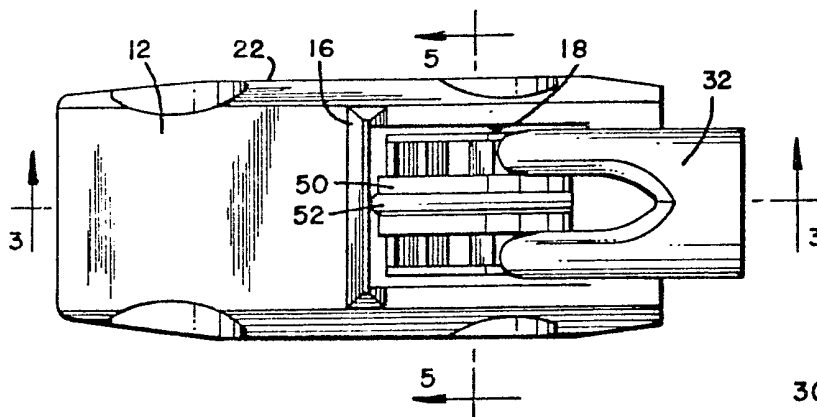


FIG. 5

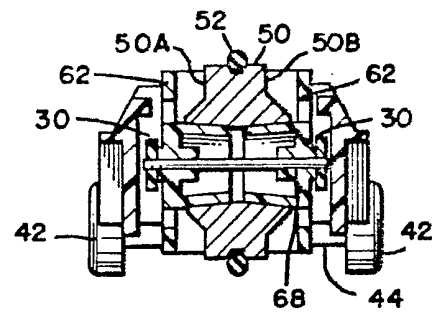


FIG. 3

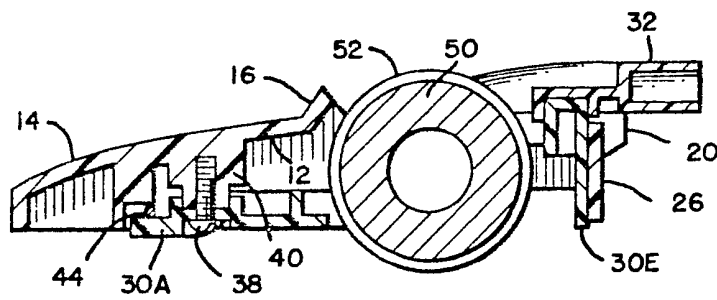


FIG. 6

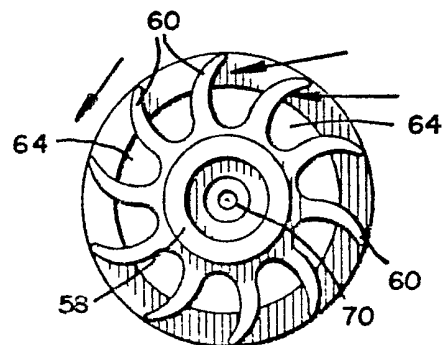


FIG. 7

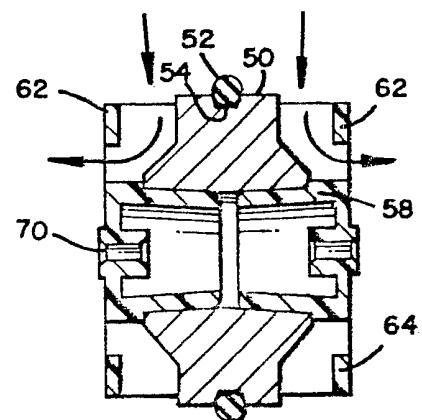


FIG. 8

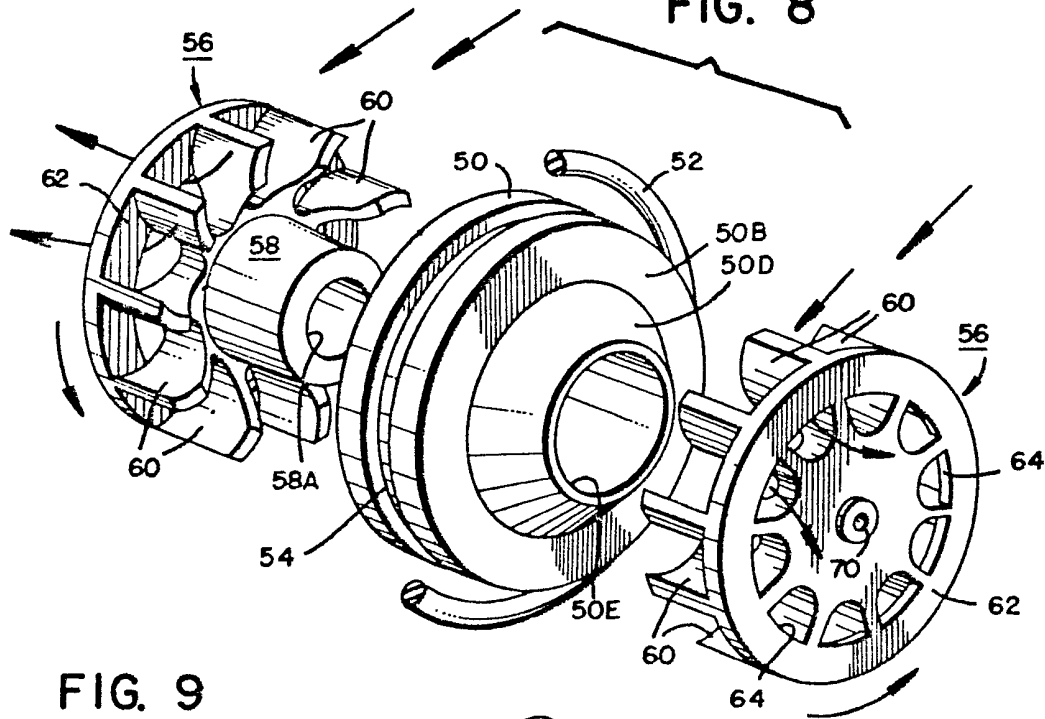


FIG. 9

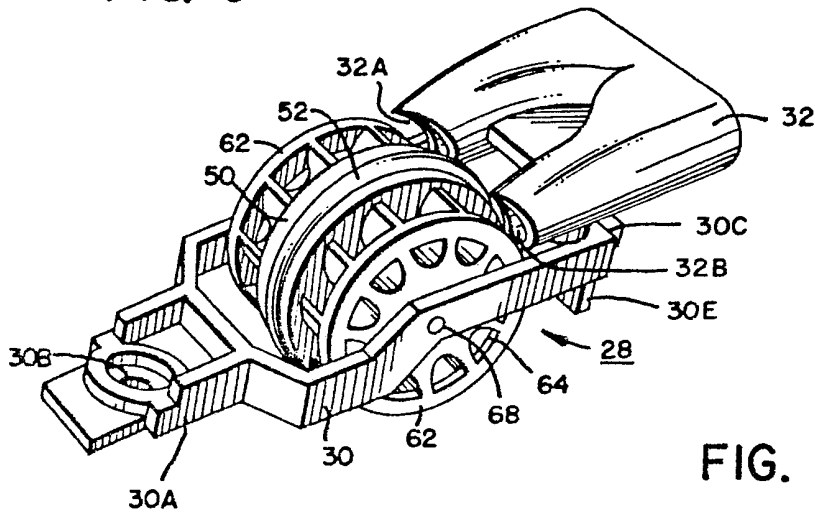


FIG. 19

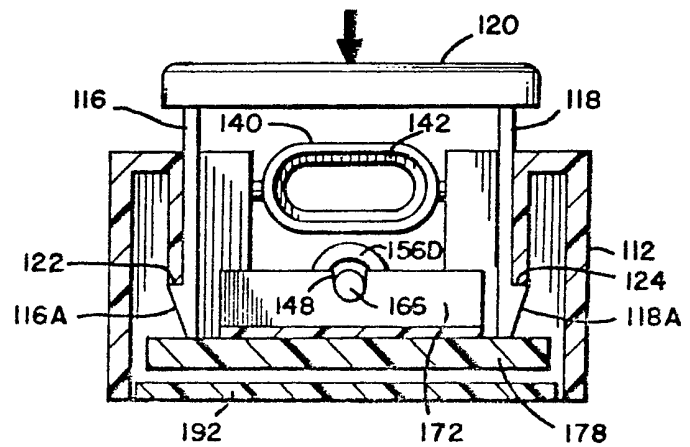


FIG. 10

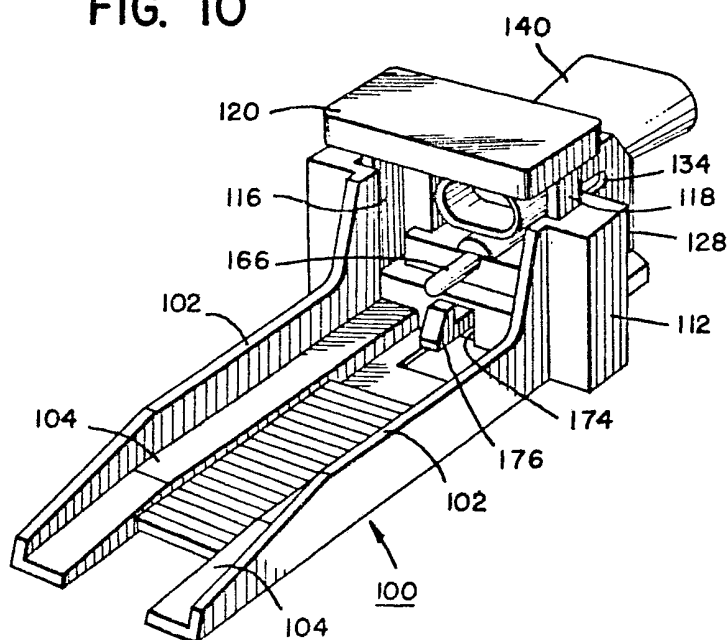


FIG. 12

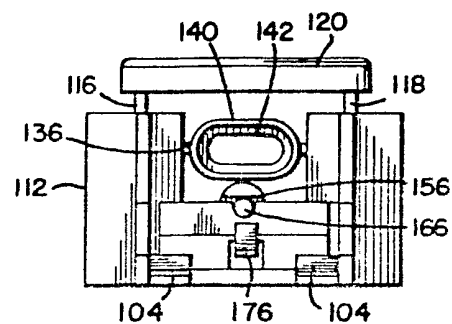


FIG. 13

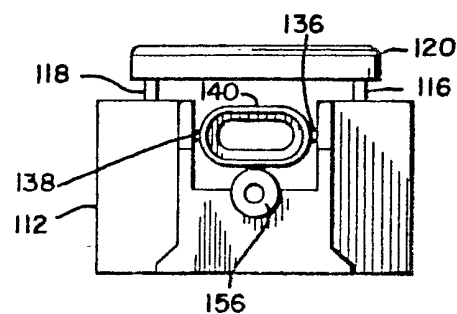


FIG. 11

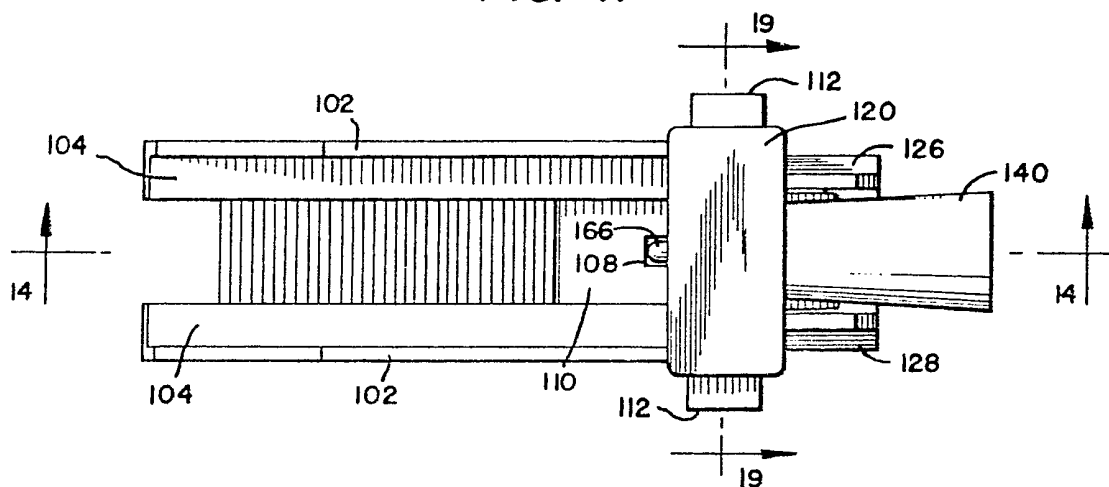
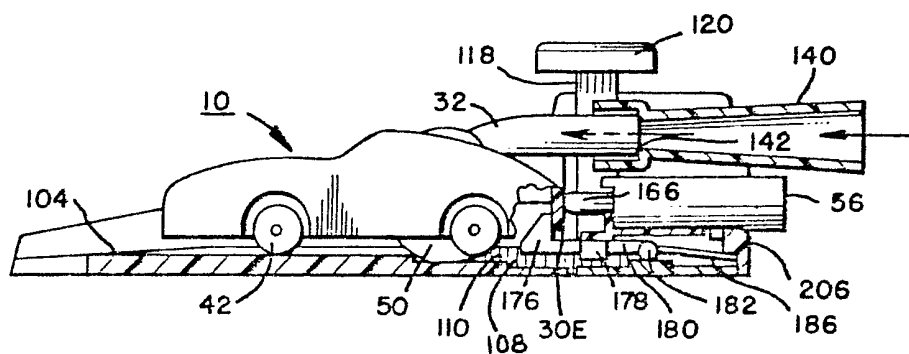
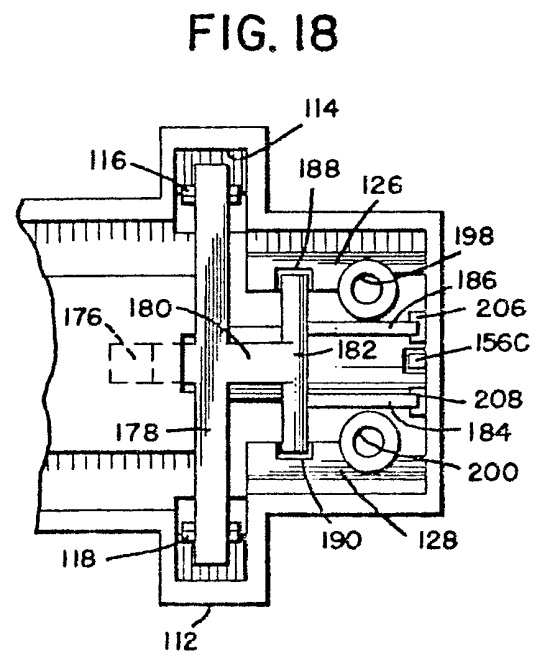
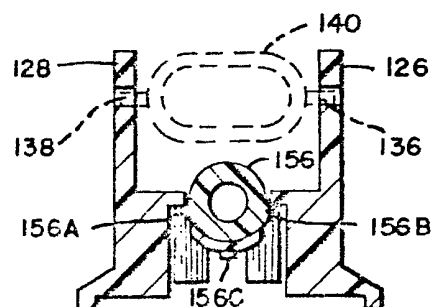
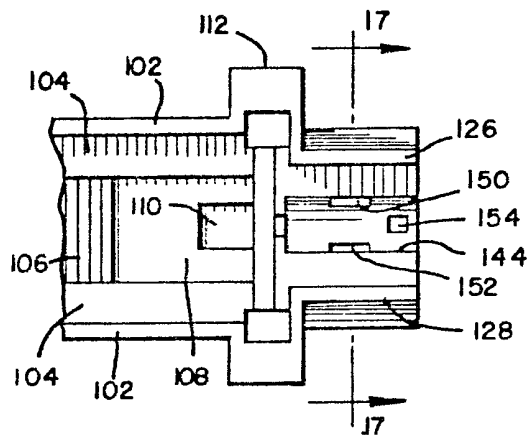
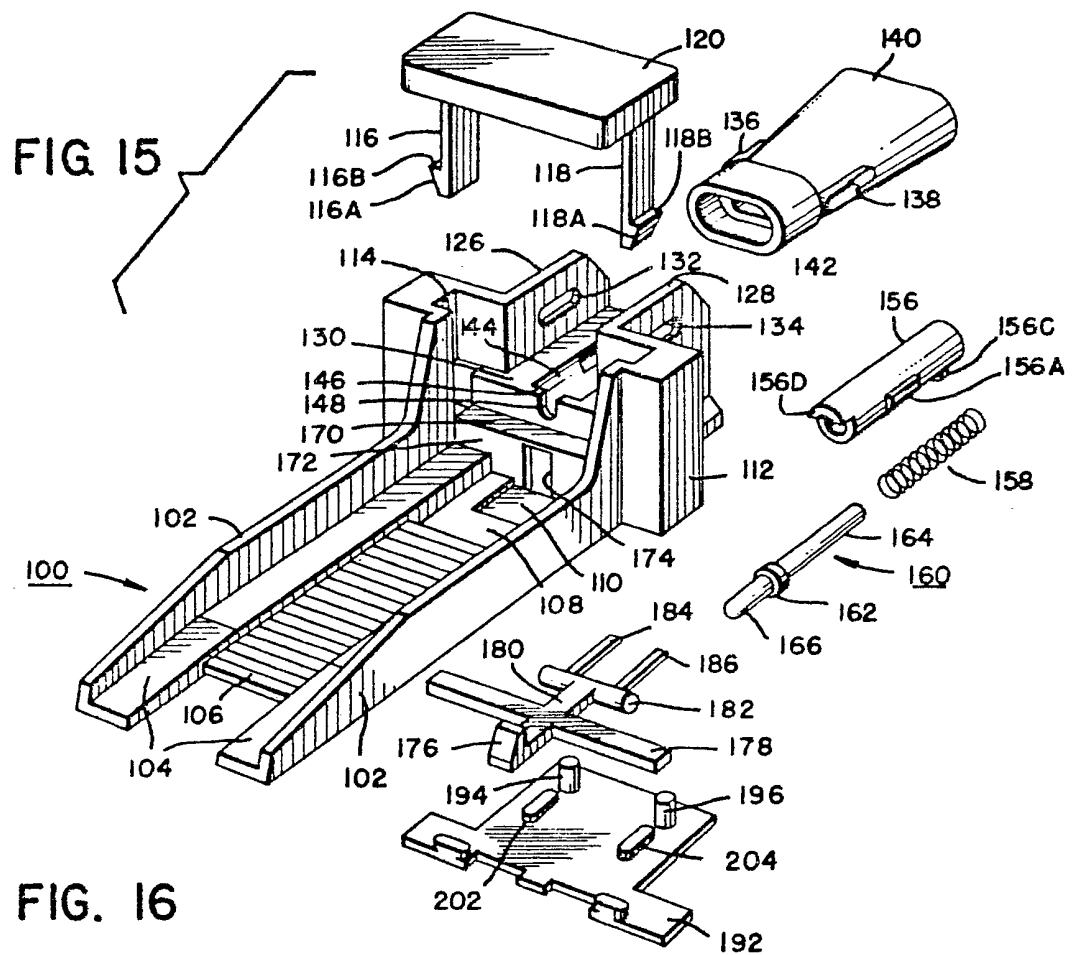


FIG. 14





SPECIFICATION

Launcher for toy vehicle

Background of the invention

1. Field of the invention

5 The present invention relates to a self-propelled toy vehicle having a flywheel therein which is driven in rotation to store energy by an air stream applied by the user through a mouthpiece, and a launcher for such vehicles.

10 2. Description of the prior art

Toy vehicles have long been popular with young children and have taken many forms through the years, some of which have been powered by air, or utilize a gyroscopic effect, or
 15 both. U.S. Pat. No. 3,613,303 shows the use of an air balloon to provide air to drive a turbine which, in turn, drives a gear train which drives a ground-engaging drive wheel of the vehicle. The user blows up and places the filled balloon in
 20 communication with a conduit leading to the turbine. The force of the air leaving the balloon diminishes quickly as the balloon deflates, and the balloon itself causes drag to the forward movement of the vehicle. U.S. Patent No.
 25 3,650,067 shows gyroscopic toy vehicles wherein a flywheel is driven to rotate and store kinetic energy for propelling the vehicle and maintaining gyroscopic stability. U.S. Patent No. 3,621,607 discloses a self-propelled toy vehicle
 30 havin a flywheel type traction wheel which is driven in rotation by a string wound upon an axle shaft supporting the flywheel. U.S. Patent No. 3,789,540 discloses a compressed air propelled toy vehicle and launching system wherein a toy
 35 vehicle having an internal, air driven flywheel is placed on a launcher while the flywheel is driven to rotate by a jet of air supplied from a pump on the launching mechanism. When the flywheel is rotating at a high enough kinetic energy level, the
 40 vehicle is ejected or released from the launching structure and is propelled by the energy stored in the flywheel as the vehicle moves over a playing surface. U.S. Patent No. 4,324,063 discloses a self-propelled toy motor vehicle having fore and
 45 aft wheel means for supporting the body of the vehicle for rolling movement on a playing surface, the aft wheel being relatively heavy so as to act as a flywheel and includes a plurality of generally radial air vanes extending laterally outward on
 50 opposite sides for causing the wheel to rotate in response to a stream of air applied through a mouthpiece by the user blowing into the mouthpiece. When the vehicle is placed on a playing surface after the wheel is spinning, the
 55 vehicle is self-propelled until the kinetic energy stored in the flywheel is expended. The flywheel and vanes spin inside a wheel housing, developing a whistling sound resembling a jet-powered vehicle.

60 A shortcoming of prior air-turbine driven toy vehicles, including the most pertinent self-propelled vehicle shown in U.S. Patent No. 4,324,063, is that the extremely low efficiency of

the air turbine greatly limits the use of the toy by
 65 small children, say five- or six-year-olds, the age group with which toy vehicles of this type should find the most enjoyment. An air turbine assembly consisting of a plurality of generally radially
 70 extending vanes disposed between a pair of circular sidewalls is very ineffective in converting to kinetic energy the energy contained in an airstream, the conversion efficiency typically being of the order of only 2%. Considering the
 75 limited lung capacity of a five-year-old child which can sustain only one-half P.S.I. pressure for one second, the child is unable, even with multiple separate breaths, to impart sufficient
 80 rotational speed to the air-driven fly-wheel to propel the vehicle a sufficient distance to be exciting or entertaining. Tests have shown that unless the air-turbine has an efficiency of at least 10%, an air turbine-driven vehicle is an
 unacceptable toy for four and five-year-olds.

In using the toy vehicle disclosed in Patent No.
 85 4,324,063, the user holds the mouthpiece to his mouth and blows into it, and when enough rotational speed and kinetic energy has been developed in the rotating flywheel, the vehicle is
 90 simply placed on a playing surface whereupon it is propelled forwardly by a traction tire on the flywheel contacting the playing surface. During the transit time from the user's mouth to the
 95 playing surface, which may be relatively long considering the limited dexterity of a young child, a significant fraction of the stored energy is dissipated, thus limiting the distance the car will be propelled before the energy stored in the
 flywheel is expended.

Objects of the invention

100 It is an object of the present invention to provide an improved toy motor vehicle of the type including a flywheel motor therein used for storage of kinetic energy to provide self-propulsion for the vehicle when released on a
 105 playing surface.

Still another object of the present invention is to provide an improved toy vehicle of the character described wherein the energy contained in a stream of air received from a mouthpiece by a
 110 person blowing into the mouthpiece is more efficiently converted to kinetic energy than in prior art vehicles of similar character so as to propel the vehicle a greater distance over a playing surface.

Yet another object of the invention is to provide an improved toy vehicle of the character described in which improved efficiency is achieved with a relatively simple, low-cost
 115 construction.

Still another object of the present invention is to provide an improved launching apparatus for a
 120 toy vehicle of the character described wherein a mouthpiece mounted on the launcher communicates with a mouthpiece provided on the vehicle body so that a person may blow into the
 125 launcher mouthpiece to rotate a flywheel mounted internally of the vehicle, and wherein a spring-loaded plunger is activated upon release of

the vehicle from the launcher for imparting substantial starting forward movement to the vehicle before its rotating flywheel is brought into contact with a playing surface.

5 Brief summary of the invention

The foregoing and other objects of the invention are accomplished in an improved self-propelled toy vehicle having at least three wheels for supporting the body of the vehicle for rolling movement on a playing surface. A plurality of air vanes are provided on opposite sides of a relatively heavy traction wheel for rotating the traction wheel in response to a stream of air which is applied through a nozzle mounted on the body of the vehicle. The outer end of the nozzle is adapted to receive the breath of a person directly or from a cooperating mouthpiece mounted on associated launching apparatus, and the nozzle directs air into the path of the vanes for rotating the wheel which acts as a flywheel to store kinetic energy for propelling the vehicle over a playing surface when placed thereon. Each set of vanes is enclosed by the traction wheel and a circular outside wall having a plurality of apertures therethrough, each of which communicates with a respective cavity defined by adjacent vanes, which cooperate with inclined surfaces on opposite sides of the traction wheel to change the direction of the stream of air impinging on the vanes so as to exit from the apertures, resulting in an increase in the efficiency of conversion to kinetic energy of the energy in the air stream.

The vehicle may be used alone or with a launcher which enhances the speed and distance of travel of the vehicle. The launcher includes means for releasably holding the vehicle with its drive wheel disengaged from a supporting surface so as to be free to rotate, and for imparting initial forward motion to the vehicle before allowing the drivewheel to engage a high-traction surface on the launcher. The launcher and vehicle comprise a hand-holdable unit that can be conveniently held up to the mouth of the user for blowing into the outer end of a mouthpiece mounted on the aft end of the launcher, the inner end of which receives a vehicle-mounted nozzle, and can then be placed on the playing surface for convenient release and launching of the vehicle.

Description of the drawings

Figure 1 is a side plan view of a toy motor vehicle constructed in accordance with the features of the present invention;

Figure 2 is a top plan view of the toy vehicle of Figure 1;

Figure 3 is a sectional side view taken along line 3—3 of Figure 2;

Figure 4 is a rear plan view of the toy vehicle of Figure 1;

Figure 5 is a vertical sectional view taken along line 5—5 of Figure 2;

Figure 6 is a plan view of the left side air turbine of the drive wheel for the toy vehicle;

Figure 7 is a cutaway view of the air

turbine/flywheel assembly showing the flow of air into and from the turbine;

Figure 8 is an exploded view of the air turbine/flywheel assembly;

Figure 9 is a perspective view of the chassis assembly of the toy vehicle of Figure 1;

Figure 10 is a perspective view of a presently preferred embodiment of a launcher for use with the toy vehicle of Figures 1 through 9;

Figure 11 is a top plan view of the launcher of Figure 1;

Figure 12 is a front view of the launcher;

Figure 13 is a back view of the launcher;

Figure 14 is a side sectional view taken along line 14—14 of Figure 11;

Figure 15 is an exploded view of the launcher of Figure 10;

Figure 16 is a partial top view of the base of the launcher of Figure 10;

Figure 17 is an enlarged sectional view taken along line 17—17 of Figure 16;

Figure 18 is a bottom view of the base of the launcher, enlarged to show the construction of the latch spring; and

Figure 19 is a cross-sectional view taken along line 19—19 of Figure 11 enlarged to show the latch release.

Description of a preferred embodiment

Referring now more particularly to the drawings, in Figure 1 is illustrated an improved self-propelled toy motor vehicle constructed in accordance with the features of the present invention. The vehicle is referred to generally by the reference numeral 10 and includes an elongated, streamlined, hollow body 12, preferably formed of molded high impact plastic material and including a forwardly and downwardly sloping top wall 14 having a raised windshield 16 on the rear end portion of the wall. The top wall has a generally rectangular opening 18 aft of windshield 16 which extends substantially to the aft end 20 of the vehicle. The vehicle body includes a pair of integral opposite sidewalls 22 and 24 and an integral rear wall 26. The underside of the vehicle body is generally open to receive a chassis referred to generally by the reference numeral 28 in Figure 9. The chassis consists of a one-piece, generally rectangular frame 30, preferably formed of molded plastic material, and includes a forward projection 30A having a screw-receiving aperture 30B formed therein disposed on the longitudinal axis of the frame and a pair of rearwardly projecting tabs 30C and 30D, seen in Figure 4. A longitudinally aligned nozzle 32 is mounted on the rear end wall 30E of the chassis and projects outwardly thereof, to provide an inlet surface to receive the lips and mouth of a person for blowing a breath of air forwardly into the hollow body of the vehicle when used without the launcher. As best seen in Figure 3, the chassis is maintained in assembled relationship within the hollow vehicle body by the rearwardly projecting tabs 30C and 30D extending into and engaged by cooperating

apertures 34 and 36 formed in rear wall 26 of the vehicle body and a single screw 38 extending through opening 30B in forward projection 30A and threaded into a boss 40 formed on the interior of top wall 12.

The vehicle body also includes wheel wells in sidewalls 22 and 24 near the front end of the body, one of which is seen at 24A in Figure 1, for accommodating a pair of front wheels 42 mounted on a transverse axle 44. The axle is supported in recesses formed at the lower edge of the two sidewalls in which the axle is received with a free fit, and is further secured by forward projection 30A of the chassis frame. The front axle is free to float in a lateral direction to prevent binding of the freely rotating front wheels. At an aft end portion of the vehicle body, another pair of wheel wells, one of which is seen at 24B in Figure 1, are provided for accommodating a pair of rear wheels 46; these wheels, since they do not serve to support the vehicle body, except during initial acceleration when the vehicle is mounted in the launcher, but are provided only to give the vehicle a realistic appearance, do not rotate and thus are simply mounted on the vehicle body with a stud or other securing means (not shown).

At a rearward end portion of the vehicle slightly forward of the rear wheels 46, there is provided a single, relatively heavy flywheel-like traction wheel 50 having a rubber traction tyre 52 received in a peripheral groove 54 in the center thereof for drivingly engaging the floor or other playing surface on which the vehicle is placed. The traction wheel 50 is relatively heavy or dense, preferably being formed of nickel-plated brass, and serves as a flywheel to store kinetic energy used for propelling the vehicle whenever the wheel is rotating at a relatively high speed and the vehicle then placed and released on a playing surface. Traction wheel 50 is desirably formed on a screw machine from brass rod, and when accurately machined does not require balancing to perform satisfactorily in the toy vehicle. As seen in Figures 5, 7, 8, flywheel 50 has parallel side surfaces 50A and 50B extending inwardly from its periphery, and then flare downwardly and outwardly with a conical shape to provide sloping surfaces 50C and 50D which terminate substantially at a relatively large axial center opening 50E.

The flywheel 50 is driven by a pair of turbine assemblies 56 mounted on opposite sides of the flywheel, each comprising a single molded plastic piece including a cylindrical boss 58 dimensioned to be received with a press fit in opening 50E of flywheel 50, a plurality of generally radially extending air vanes 60 having curved outer end portions adapted to receive a propelling air stream and contoured at their inner edges to match the contour of the mating surface of flywheel 50, and an outside circular end wall 62 having a like plurality of generally U-shaped apertures 64 formed therein, each communicating with, and of the same shape as the cavity defined by that portion of adjacent

vanes lying within a circle defined by the radial extremities of the apertures. The flywheel 50 and its associated air turbines is mounted within the chassis 28 on a transversely extending axle 68 which spans between the side members of frame 30 and extends through openings 70 of comparable size formed at the center of end walls 56. The openings 70 are considerably smaller than a central opening 58A in the boss 58 so that there is minimal bearing contact of the flywheel/turbine assembly with the axle, the contact being only near the extremities of the axle adjacent the side members 30 of chassis 28. When the chassis is mounted in the vehicle body as earlier described, the traction tyre 52 is centrally aligned on a longitudinally extending, vertical center plane of the vehicle body.

The flywheel 50 is driven to rotate at a relatively high speed by impingement on the vanes 60 of a high velocity air stream from the nozzle 32. The forward end of the nozzle structure 32 is divided into a pair of spaced apart outlet openings 32A and 32B disposed on opposite sides of the flywheel 50 and each aligned with a respective turbine for directing streams of air onto the outer curved end portions of the vanes 60 to cause the flywheel 50 to begin rotation when a person's breath is blown into the mouthpiece 32 from the outer end. Air entering the cavity defined by a pair of adjacent vanes is deflected downwardly by the coaction of the shape of the vanes and the conical surface 50D of the flywheel and exits through openings 64 in the sidewall 56. Thus, the turbine utilizes the known principle that energy can be taken out of an air stream only by changing the direction of flow of the air; in the present case the direction is altered by approximately 140° and achieves approximately a five-fold increase in efficiency over that of an air turbine simply having curved vanes without means for changing air direction. More particularly, the described construction provides a conversion efficiency of approximately 10%, adequate to enable a young child to achieve acceptably high rotational speeds to drive the vehicle far enough to maintain the child's interest, with a very cost-effective assembly consisting of only three easily fabricated and assembled parts; namely, the flywheel 50 and the two turbines 56 accurately assemblable with the flywheel by simply pressing them together. The design is much simpler and less expensive to fabricate than the turbine and associated wheel housing of the vehicle disclosed in U.S. Patent No. 4,324,063.

When air is blown onto the turbine vanes 60 from the nozzle 32, the turbines cause the flywheel and traction tyre 52 to begin to rotate rapidly and as this occurs, a whistling sound is generated which resembles the whine of a jet engine. When enough rotational speed and kinetic energy has been developed in the rotating flywheel 50—an older child can achieve rotational speeds approaching 20,000 rpm with three separate breaths—the toy vehicle then may be placed on a playing surface, or released from

suitable launching apparatus (to be described) and the traction tyre 52 upon contact with the surface propels the vehicle in a direction longitudinally of the body 12 until the energy of the flywheel is exhausted.

The toy vehicle resembles in appearance a jet-powered automobile, which may be implemented in a variety of body shapes, and the sound provided by the rotating air turbines provide additional animation for a realistic toy. The vehicle is relatively simple in construction, economical to produce on a mass production basis and has operational features which will maintain the interest of a young child.

Although the child may grasp the vehicle 10, below into the nozzle 32 to impart rapid rotation to the traction wheel, and then place the vehicle on the playing surface, the performance of the vehicle is enhanced and it is therefore preferred to use the vehicle with a launching device, a preferred embodiment of which is illustrated in Figures 10 through 19. The illustrated launcher 100 includes an elongated base structure having a pair of parallel, spaced apart upright sidewalls 102 connected together by a transversely extending bottom wall which forms a pair of tracks 104 adjacent to and integral with their associated sidewalls and a serrated platform 106 disposed between the tracks, the upper surface of which is disposed slightly below the level of tracks 104. The forward end of the serrated platform 106 terminates short of the forward extremities of tracks 104, and as best seen in Figure 15, at its aft end the upper surface of the bottom wall is depressed from tracks 104 even further than the upper surface of the serrated platform, and this surface, in turn, has a generally rectangular depressed area 110 at the aft extremity of the bottom wall. The aft end of sidewalls 104 are flared upwardly, primarily for aesthetic and strength reasons and are integrally joined to an upstanding structure 112 extending transversely of the base and including a channel 114 having closed opposite ends for a portion of its depth, the channel being dimensioned to receive with a sliding fit a pair of tangs 116 and 118 which depend from and are integrally joined to a trigger bar 120. The lower end portion of the outer surface of tangs 116 and 118 is inclined at 116A and 118A, respectively, and above the inclined portion are notched at 116B and 118B, the notches serving to maintain the trigger bar in assembled relationship within channel 114 by extending into respective openings 122 and 124 (Figure 19) formed in the end walls of channel 114 and engaging the upper edge of such openings.

Extending rearwardly from an integral with member 112 are a pair of parallel, spaced apart vertically oriented sidewalls 126 and 128, the outer surfaces of which extend downwardly to the supporting surface, and the inner surfaces of which extend downwardly to and integrally join a platform 130 which is disposed parallel to the supporting surface. The walls 126 and 128 have

respective elongated apertures 132 and 134 extending therethrough for respectively receiving laterally extending projections 136 and 138 from an oval-shaped mouthpiece 140, the apertures being slightly longer than projections 136 and 138 to allow limited longitudinal motion of the mouthpiece relative to the base. The forward end of mouthpiece 140 is dimensioned to receive the nozzle 32 of the toy vehicle 10 and is provided with an interior stop 142 which engages the inlet end of the vehicle nozzle 32 when the vehicle is in latched position on launcher 100.

The platform 130 has an elongated depression 144 of semi-circular shape disposed along the central longitudinal axis of the launcher, equidistant from walls 126 and 128, the depression being partially closed at its forward end by a thin wall 146 having formed therein a centrally disposed semi-circular opening 148 of smaller diameter than the depression 144. As best seen in Figure 16, the semi-circular depression 144 has a pair of elongated slots 150 and 152 formed in opposite sidewalls thereof and a small rectangular aperture 154 at the bottom of the depression near its aft end. The depression 144 is designed to receive a plunger assembly which includes a hollow cylindrical plunger housing 156, a compression spring 158 dimensioned to be freely received within the housing, and a plunger 160 having a shoulder 162 of slightly larger diameter than the spring dividing its length into an aft portion 164 that extends into spring 158 and a forward portion 166 which extends from the housing. The plunger housing 156 is retained in the depression 144 by a pair of oppositely extending ears 156A and 156B formed on its outer surface which snap into slots 152 and 150, respectively, and by a tab 156C extending from its under surface near the aft end and engaging the aperture 154. At its forward end the housing has an overhang 156D which extends over the top of wall 146 and together with the opening in the wall provides an opening through which the forward end 166 of plunger 160 extends and to maintain shoulder 162 of the plunger behind wall 146. In the released condition of the plunger assembly, the extremity of the forward portion 166 of the plunger is positioned in substantially vertical alignment with the forward edge of the area 108 of the bottom wall of the launcher. The plunger extends over a narrow shelf 170 which is integral with wall 146 and extends transversely of member 112 and is slightly shorter than the distance between the inner surfaces of the sidewalls 102.

The aft end of tracks 104 terminate at an integral vertically oriented transversely extending wall 172 which has a rectangular opening 174 therethrough for receiving from the rear side of the wall 172 the latch 176 of a latch assembly including a trigger member 178 which extends equidistantly from either side of a central support member 180 to one end of which the latch is attached and to the other end of which a journal

182 is integrally joined, and from which, in turn, a pair of flat spring members 184 and 186 extend. The latch mechanism is preferably molded as an integral piece from a suitable plastic material, the spring members 184 and 186 being dimensioned to exhibit spring properties. As best seen in Figure 18, the journal 182 is supported at its opposite ends in semi-circular openings 188 and 190 formed in the lower edge of walls 126 and 128, respectively, and trigger member 178 is positioned within channel 114 to be disposed immediately below tangs 116 and 118 of the trigger bar 120. The trigger mechanism is maintained in assembled relationship by a flat cover plate 192 which is secured to the base by a pair of studs 194 and 196 which are received with a press fit in cylindrical openings 198 and 200 formed in the base outboard of the spring members 184 and 186. When the cover plate is in place, a pair of ribs 202 and 204 formed on its inner surface respectively engage the outer edge of Journal 82 and spring elements 184 and 186 are supported by the upper end of respective abutments 206 and 208 formed on the interior surface of the rear wall of the launcher. As best seen in Figure 10, the forward end of latch 176 is positioned in a substantially vertically oriented plane also containing the forward extremity of plunger 166 and the forward edge of the depressed area 108.

The construction of the launcher 100 now having described, reference is now made to Figure 14 for a description of how it functions in the launching of toy vehicle 10. Preparatory to launch, the vehicle is backed into the launcher causing the lower edge of the back wall 30E of the vehicle to cam downward the inclined forward edge of the latch 176 while at the same time the outer surface of back wall 30E urges the plunger 166 into the plunger housing 156 to compress the enclosed spring 158. During this process the latch 176 is moved downwardly against the spring action of flat springs 184 and 186, and when the vehicle back wall 30E has ridden over the upper edge of the latch, the latch snaps back and its rearward edge engages the inner surface of the back wall 30E. At the same time, the inlet end of the vehicle nozzle 32 enters the forward or outlet end of the launcher mouthpiece 140, the dimensions of the vehicle and launcher being so interrelated that when the vehicle is in latched position the aft extremity of vehicle nozzle 32 closely approaches the interior stop 142 of the launcher mouthpiece, and the traction tyre 52 is positioned above and slightly out of contact with the area 110 of the bottom wall of the launcher, just aft of the serrated platform 106.

In use, the launcher with the vehicle latched thereon is hand-held to the mouth of the user, the slight pressure applied to the inlet end of mouthpiece 140 by the lips of the user causing the mouthpiece to move forwardly in the elongated slots 132 and 134 to force the stop 142 into essentially air tight engagement with the inlet end of vehicle mouthpiece 32. Thus, when

air is blown through the air conduit including mouthpiece 140 and nozzle 32 onto the air turbine, the turbines 56 cause the flywheel 50 and traction tyre 52 to begin to rotate. When enough rotational speed and kinetic energy has been developed in the rotating flywheel 50, signified by the pitch of the whistling sound generated by the air discharging from the openings 64 in the end walls of the turbines, the launcher 100 then is placed on a playing surface and the trigger bar 120 smartly depressed, causing the lower ends of tangs 116 and 118 to force trigger member 178 downwardly against the spring action of flat springs 186 and 184 and disengaging latch 176 from the rear wall 30E of the vehicle. Release of the latch also releases the plunger 166, the energy stored in the compressed spring imparting substantial starting forward movement to the vehicle just as the traction tyre 52 is brought into contact with the serrated platform 106, the serrations minimizing slippage between the traction tyre and the launcher and promoting a fast start and conservation of the kinetic energy stored in the rotating flywheel. The vehicle is stabilized during launch by the front wheels 42 engaging tracks 104, which are slightly inclined at the forward end to provide a smooth and efficient transition of the traction tyre from the serrated platform 106 to the playing surface on which the vehicle will run its course and during which the vehicle is stabilized by the gyroscopic effect of the relatively heavy, rapidly rotating flywheel 50.

Although the described launcher is designed and dimensioned to be used in conjunction with the described toy vehicle 10, it can be used to impart substantial forward movement to other kinds of toy vehicles that have a width so that its wheels will be supported on the tracks 104 and is provided with a rear wall having a configuration to engage the plunger 156 and to be engaged by the latch 146. That is, the vehicle need not be air-powered or otherwise self-propelled to realize the forward thrust afforded by the latch and plunger arrangement.

It is important to note that the arming of the plunger can only be effectively achieved if the vehicle or other device to be launched has a wall or similar structure that is engageable on one surface on the plunger and on the opposite surface by the hook of the latch; this aspect, together with the closeness of the vertical spacing between the latch and the plunger and the small diameter of the plunger and its rounded forward end, essentially precludes the use of the spring loaded plunger by itself to launch objects other than a wheeled vehicle, such as a pencil or similar missile. The trigger bar 120 serves no function unless the hook of latch 176 is engaging the object to be launched and urges it against the spring loaded plunger, with the consequence that in order to launch a pencil or similar object the child would have to grasp the base of the launcher in one hand, engage the forward end of plunger 166 with one end of the pencil and force

the plunger rearwardly against the action of the compression spring, and then let go of the pencil, a procedure difficult even for an adult, and even then accomplishing a harmless launch. Thus,

- 5 because of the arrangement and coaction of the latch and plunger, the launcher is safe when used for its intended purpose and will also frustrate an inquisitive child's attempt to use it otherwise.
- 10 Although the present invention has been described with reference to a single illustrated embodiment each of a toy vehicle and a launcher therefor, it should be understood that numerous modifications and changes to each or both can be devised by those skilled in the art that will fall
- 15 within the spirit and scope of the principles of this invention as set forth in the following claims.

Claims

1. A launcher for a toy motor vehicle having wheel means fore and aft for supporting a vehicle
- 20 body for rolling movement on a playing surface, said body including a generally vertically disposed transverse aft end wall having a lower edge spaced above the playing surface-engaging portion of the aft wheel means, said launcher
- 25 comprising:

- an elongated base, positionable on a playing surface, having front and aft ends and including a pair of parallel spaced apart tracks extending from the aft to the front end
- 30 of the base, restraining side rail means disposed along the outer edges of said tracks, and an upstanding wall member disposed at the aft end and transversely of said tracks,

- 35 spring-loaded plunger means supported on and projecting forwardly from said upstanding wall member and vertically displaced from said tracks so as to be engageable by and urged rearwardly against the spring by the
- 40 outer surface of the aft end wall of the toy vehicle,

- latch means supported on and projecting forwardly from said upstanding wall member and vertically disposed between said base
- 45 and said plunger means and adapted to releasably engage the inner surface of the lower edge of the aft end wall of the toy vehicle so as to maintain the said plunger means in loaded condition, and

- 50 trigger means supported on said upstanding wall and operative when actuated to disengage said latch means from said aft end wall of the toy vehicle whereby to cause said spring-loaded plunger means to propel
- 55 the toy vehicle forwardly along said tracks and onto a playing surface.

2. A launcher for a toy vehicle according to claim 1, wherein said plunger means and said latch means are disposed in a common vertical
- 60 plane disposed along the longitudinal center line of said base.

3. A launcher for a toy vehicle according to claim 1, wherein said trigger means includes a trigger bar disposed above said upstanding wall

- 65 and transversely of said base for convenient actuation of said trigger means.

4. A launcher for a toy motor vehicle having a body and spaced apart front wheels and a single
- 70 aft wheel centered on the longitudinal center line of said body mounted for rotation on an axis transverse of said body for supporting the vehicle for rolling movement on a playing surface, said aft wheel including air turbine means for causing said wheel to rotate in response to a stream of air
- 75 applied thereto through a nozzle mounted on an aft end portion of the vehicle body and having an inlet and an outlet, said vehicle body including a generally vertically disposed aft end wall having a lower edge spaced above the playing surface-
- 80 engaging portion of said aft wheel, said launcher comprising:

- an elongated base, positionable on a playing surface, including a bottom wall having front and aft ends, a pair of tracks extending from
- 85 aft to front along the opposite side edges of said bottom wall and spaced apart to receive the spaced apart front wheels of the toy vehicle, and an upstanding wall member disposed at the aft end and transversely of said tracks,

- 90 spring-loaded plunger means supported on and projecting forwardly from said upstanding wall member and vertically displaced from said bottom wall so as to be engageable by and urged rearwardly against the spring by the outer surface of the aft end wall of the toy vehicle,

- latch means supported on and projecting forwardly from said upstanding wall member and vertically disposed between said bottom wall and said plunger means and adapted to releasably engage the inner surface of the
- 100 lower edge of the aft end wall of the toy vehicle so as to maintain the said plunger means in loaded condition,

- a mouthpiece supported on said upstanding wall having an outlet positioned to receive the inlet of the nozzle mounted on the vehicle when the said vehicle is latched by
- 110 said latch means for directing a stream of air through the vehicle-mounted nozzle and onto the air turbine means of said vehicle for rotating said aft wheel in a forward direction when air is blown into said second mouthpiece, and

- 115 trigger means supported on said upstanding wall and operative when actuated to disengage said latch means from said aft end wall of the toy vehicle whereby to cause said spring-loaded plunger means to propel the toy vehicle forwardly along said tracks and onto a playing surface.

5. A launcher for a toy vehicle according to claim 4, wherein said plunger means and said latch means are disposed in a common vertical
- 125 plane disposed along the longitudinal center line of said base.

6. A launcher for a toy vehicle according to claim 4, wherein said trigger means includes a

trigger bar disposed above said upstanding wall and transversely of said base for convenient actuation of said trigger means.

7. A launcher for a toy vehicle according to claim 6, wherein said mouthpiece is horizontally disposed along the longitudinal center line of said base and vertically positioned between said plunger means and said trigger bar.

8. A launcher for a toy vehicle according to claim 4, wherein at least a first portion of the upper surface of the bottom wall near the aft end of said base is vertically displaced from said latch means by a distance such that when the vehicle is latched by said latch means the aft wheel of the vehicle is out of contact with the said first portion for allowing the said aft wheel to freely rotate when the vehicle is latched to the launcher.

9. A launcher for a toy vehicle according to claim 8, wherein at least a second portion of the upper surface of the bottom wall of said base forwardly of said first portion is vertically displaced from said latch means by a smaller distance than said first portion such that when the vehicle is released by actuation of said latch means and propelled forwardly by said plunger means the said aft wheel engages the said second portion of the upper surface of said bottom wall.

10. A launcher for a toy vehicle according to claim 9, wherein the said second portion of the upper surface of said bottom wall is transversely serrated for enhancing frictional engagement between the aft wheel of the vehicle and the said second portion.

11. A wheeled turbine-powered toy vehicle and launcher combination comprising:

a) a toy vehicle having a body, spaced apart front wheels and an aft drive wheel centered on the longitudinal centerline of said body mounted for rotation on an axis transverse of said body for supporting the vehicle for rolling movement on a playing surface, said aft drive wheel including an energy storing flywheel and air turbine means for causing said flywheel to rotate in response to a stream of air applied thereto through a nozzle mounted on an aft end portion of the vehicle body and having an inlet and an outlet, said vehicle body having a generally vertically disposed aft end wall having a lower edge spaced above the playing surface-engaging portion of said aft wheel; and

b) a launcher including means for supporting and releasably latching said toy vehicle in a predetermined position on the launcher, said launcher with the toy vehicle latched thereto being positionable on a playing surface for launching of the toy vehicle, a mouthpiece having an outlet positioned to receive the inlet of said nozzle when the said vehicle is latched to the launcher and an inlet into which a user may blow air to cause said air-turbine means to rotate, and trigger means operative when actuated to release said latching means and allow said vehicle to be

propelled forwardly first by said aft wheel engaging said supporting means and then said playing surface.

12. The combination according to claim 11, wherein said launcher further includes a spring-loaded plunger mounted on said launcher including a spring adapted to be compressed upon front to rear movement of the plunger when the vehicle is latched to the launcher and to be released upon actuation of said trigger means for propelling the vehicle forwardly.

13. The combination according to claim 11, wherein the supporting and latching means of said launcher comprise:

an elongated base including a bottom wall having forward and aft ends, a pair of tracks extending along the opposite side edges of said bottom wall spaced apart a distance to receive thereon the front wheels of said toy vehicle, and an upstanding wall member disposed at the aft end and transversely of said bottom wall, spring-loaded plunger means supported on and projecting forwardly from said upstanding wall member and vertically displaced from said bottom wall so as to be engageable by and urged rearwardly against the spring by the outer surface of the aft end wall of the toy vehicle.

latch means supported on and projecting forwardly from said upstanding wall member and vertically disposed between said bottom wall and said plunger means and adapted to releasably engage the inner surface of the lower edge of the aft end wall of the toy vehicle so as to maintain the said plunger means in loaded condition, and trigger means supported on said upstanding wall and operative when actuated to disengage said latch means from said aft end wall of the toy vehicle whereby to cause said spring-loaded plunger means to propel the toy vehicle forwardly along said tracks and onto a playing surface.

14. The combination according to claim 13, wherein said plunger means and said latch means are positioned in a common vertical plane disposed along the longitudinal center line of said base.

15. The combination according to claim 13, wherein said trigger means includes a trigger bar disposed above said upstanding wall and transversely of said base for convenient actuation of said trigger means.

16. The combination according to claim 15, wherein said mouthpiece is horizontally disposed along the longitudinal center line of said base and vertically positioned between said plunger means and said trigger bar.

17. The combination according to claim 13, wherein at least a first portion of the upper surface of the bottom wall near the aft end of said base is vertically displaced from said latched means by a distance such that when the vehicle is latched by said latch means the aft wheel of the

vehicle is out of contact with the said first portion for allowing the said aft wheel to freely rotate when the vehicle is latched to the launcher.

- 5 18. The combination according to claim 17, wherein at least a second portion of the upper surface of the bottom wall of said base forwardly of said first portion is vertically displaced from said latch means by a smaller distance than said first portion such that when the vehicle is released
- 10 by actuation of said latch means and propelled forwardly by said plunger means the said aft wheel engages the said second portion of the upper surface of said bottom wall.

19. The combination according to claim 18,

- 15 wherein the said second portion of the upper surface of said bottom wall is transversely serrated for enhancing frictional engagement between the aft wheel of the vehicle and the said second portion.

20 20. A launcher for a toy motor vehicle substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

25 21. A wheeled turbine-powered toy vehicle and launcher combination substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.