

May 27, 1947.

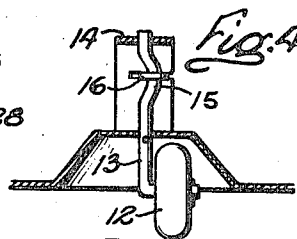
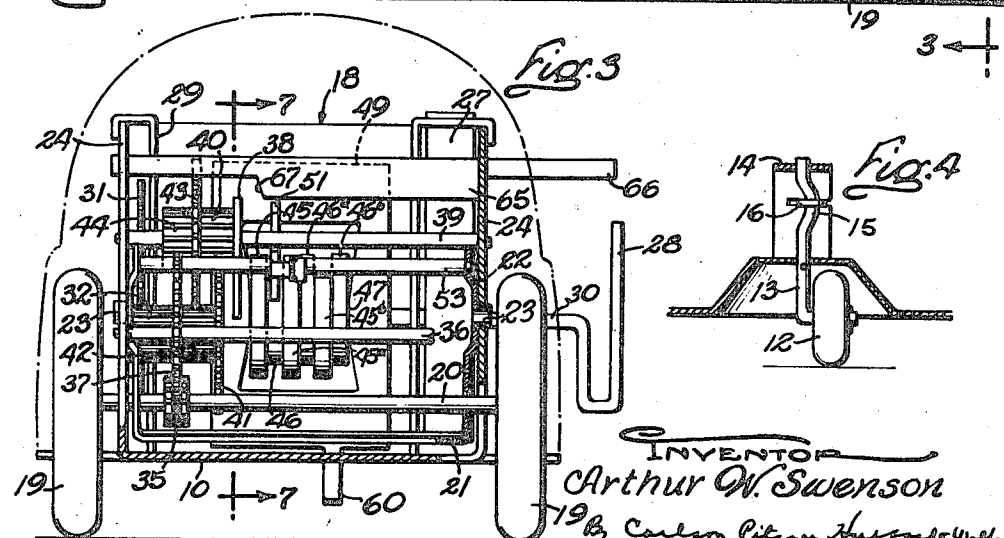
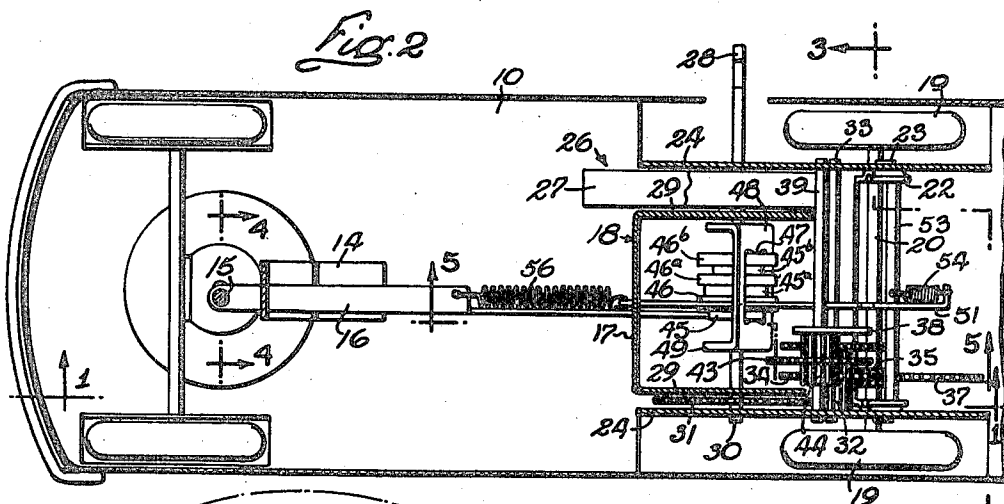
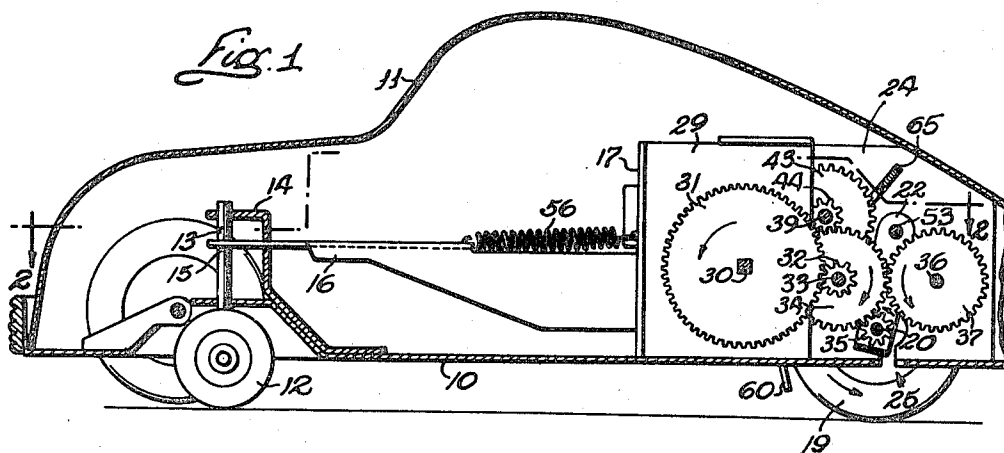
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2,421,041

TOY VEHICLE

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

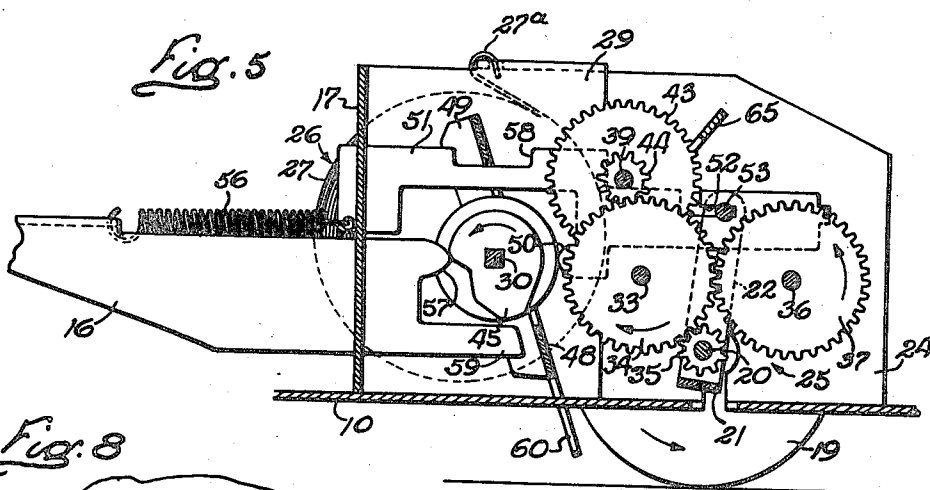


Fig. 8

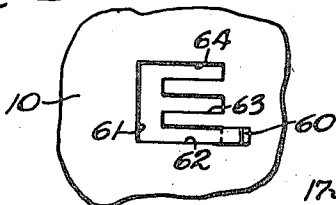


Fig. 6

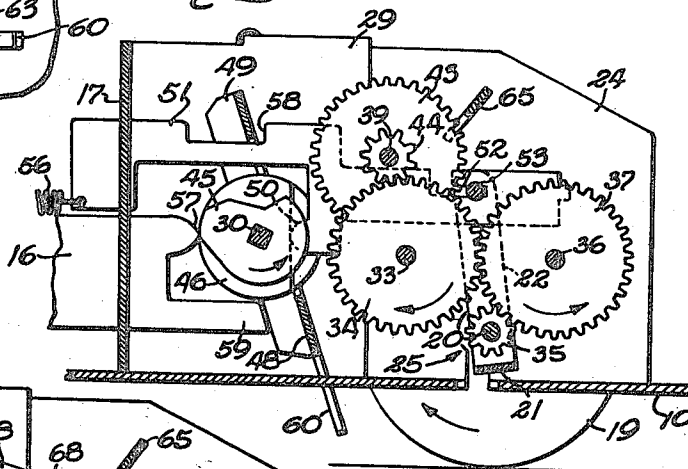
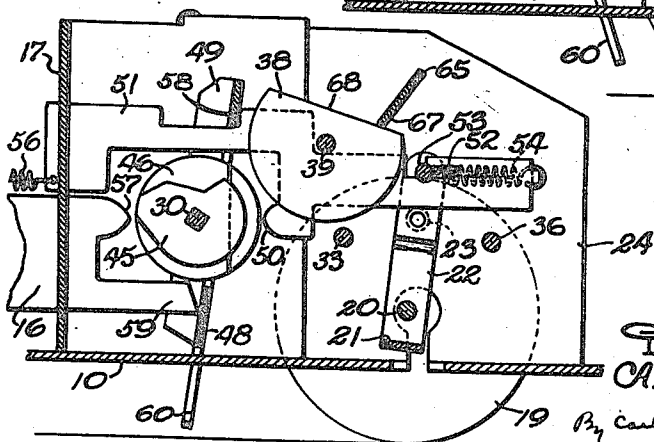


Fig. 7



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UNITED STATES PATENT OFFICE

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TOY VEHICLE

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12 Claims. (Cl. 46-213)

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This invention relates generally to wheeled toys and has more particular reference to a self-propelled toy vehicle of the type disclosed in my Patent No. 2,172,416 and upon which the present invention is an improvement.

A general object is to provide a toy vehicle of the above character which is simplified in construction and operation and is capable of being manufactured at low cost, largely from sheet metal stampings.

Another object is to provide a novel cam actuated reversing clutch for connecting an axle of the vehicle to a unidirectionally rotatable shaft on the vehicle frame.

A further object is to provide for operation of the vehicle in a plurality of different paths determined by the selection of different cams mounted on the vehicle frame.

The invention also resides in the novel arrangement of the cams, their followers, and the clutch parts to simplify their structure and facilitate the selection of the different cams.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a sectional view of a toy vehicle embodying the novel features of the present invention, the section being taken along the line 1-1 of Fig. 2.

Fig. 2 is a plane section taken along the line 2-2 of Fig. 1.

Figs. 3, 4, and 5 are sections taken respectively along the lines 3-3, 4-4, and 5-5 of Fig. 2.

Figs. 6 and 7 are sectional views similar to Fig. 5, showing the parts in different positions.

Fig. 8 is a fragmentary bottom view of a part of the vehicle frame.

The toy automobile shown in the drawings includes a frame 10 formed as a generally flat sheet metal stamping and supporting a body 11. Preferably the front of the frame is supported by a single wheel 12 on the lower end of a vertical shaft 13 journaled at spaced points in the frame and in a bracket 14. Intermediate its ends, the shaft is bent to form a crank 15 pivotally connected to the forward end of a bar 16 guided for endwise reciprocation in the bracket 14 and in the closed end 17 of a U-shaped member 18 secured to and upstanding from the frame 10.

The rear end of the frame is supported by wheels 19 fast on opposite ends of an axle 20 which is mounted on the frame for bodily movement longitudinally thereof to engage one or the other of two clutches later to be described and operable to connect the axle to a unidirectionally

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rotatable shaft on the vehicle frame. A pivotal mounting is employed herein comprising a U-shaped cradle 21 having upstanding legs 22 formed with trunnions 23 intermediate their ends and projecting into pivot holes in parallel bent up sides 24 of the frame 10.

The axle is driven from a motor 26 mounted on the frame ahead of the axle and operating through speed increasing gearing and a reversing clutch 25. The motor shown comprises a spring 27 wound by a hand crank 28 and disposed adjacent one side 24 of the frame. One end of the spring is anchored at 27^a on the frame, and the other end is connected to a squared shaft 30 of the motor, which projects transversely of the vehicle and is journaled in the frame sides 24 and in the rearwardly projecting legs 29 of the U-shaped member 18. Between the plates 24 and 29 on its other end, the shaft 30 carries a spur gear 31 meshing with a pinion 32 on a shaft 33 which is journaled at opposite ends in the frame sides 24 and carries a gear 34. The latter is adapted to mesh with a pinion 35 on the axle 20 when the axle-carrying cradle 25 is swung forwardly from the vertical position as shown in Figs. 1 and 5. With the clutch formed by the gears 34 and 35 thus engaged, the parts will rotate in the directions of the arrows in Figs. 1 and 5 and the vehicle will be propelled forwardly.

A shaft 36 journaled in the frame behind the shaft 33 carries a gear 37 which meshes with the gear 34 so as to be driven in the reverse direction. The gear 37 is disposed at the same height as the gear 34 so that when the axle cradle 25 is swung rearwardly and over-center as shown in Fig. 6, the pinion 35 is brought into mesh with the gear 37, the rear wheels then being driven in a direction to propel the vehicle reversely. When the cradle 25 is disposed in vertical position, the pinion 35 is out of mesh with both gears 34 and 37. By mounting the rear axle for horizontal movement in opposite directions, the frame 10 is supported at the same height in the forward and reverse positions of the clutch parts and a minimum of energy is required to effect the shifting.

In order to govern the speed of the spring motor, an unbalanced wheel 38 loose on a shaft 39 carries a pinion (Fig. 3) 40 meshing with a gear 41 loose on the shaft 33 and fixed to a pinion 42 which meshes with a gear 43 on the shaft 39. The latter gear carries a pinion 44 which in turn meshes with the gear 34 so that the unbalanced wheel is rotated at high speed and acts as a governor.

The steering and drive mechanisms are actuated in timed relation to cause the vehicle to

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traverse any selected one of a plurality of paths determined by the contours of a pair of cams selected from a plurality of pairs 45, 46, 45^a, 46^a, 45^b, and 46^b. Preferably, these are of the open face type and mounted on the squared motor shaft 30 for rotation therewith but adapted to be shifted axially therealong. To this end, the cams are disposed side by side between the ends walls 47 of a recess in a plate 48 whose end portions 49 are bent perpendicularly and pivotally supported on the shaft 30 between the plates 29.

The active cam 46, 46^a, or 46^b controls the shifting of the clutch 25 and operates on a follower 50 rigid with and depending from a flat bar 51 mounted for endwise horizontal movement longitudinally of the vehicle. The forward end of the bar is guided in a slot in the frame plate 17. The rear end is formed with a slot 52 which receives the flattened portion of a rod 53 connecting the upper ends of the legs 22 of the axle cradle 21, the rod thus constituting a guide for the rear end of the follower bar. To hold the rod 53 in the rear end of the slot 52 and the follower 50 yieldably in engagement with the cam 46, a tension spring 54 is extended between the rod and a lug 55 on the rear end of the bar and a second tension spring 56 is stretched between the forward end of the bar and the steering bar 16 previously described. These springs are strong enough to shift the axle cradle 21 forwardly from the position shown in Fig. 6 when permitted by the contour of the active cam 46.

The cams 45 control the steering mechanism and operate through the bar 16 whose rear end 57 is rounded and constitutes the follower of the active steering cam. It is held yieldably in engagement with the cam by the spring 56.

To permit axial shifting of the sets of cams so as to present a different pair to the followers 50 and 57, the cam shifter plate 48 is used as a lever to move the follower bars 16 and 51 and thereby retract the followers away from their cams. For this purpose, the bar 51, which is disposed above the cams, is formed with a shoulder 58 which, when the plate 48 is turned clockwise about the shaft 30 from the inactive position (Figs. 5 and 6) to the active position (Fig. 7), is engaged by the upper part of the plate and moved rearwardly to carry the follower 50 away from its cam 46. In the same motion, the lower part of the plate 48 moves forwardly, engaging the projecting end 59 of the bar 16 to retract the follower 57 away from its cam 45. With the followers thus retracted, the cams may be shifted sidewise to bring a different pair into operative position, after which the cam shifter 48 is turned back to inactive position to allow the followers to again come into engagement with their cams under the action of the springs 54 and 56.

Such actuation of the cam shifter is effected by moving a handle 60 projecting from the bottom of the frame through a cross slot 61 (Fig. 8) communicating with guide slots 62, 63, and 64, corresponding to the different sets of cams. In the position in which the handle 60 is shown, the cams 45 and 46 are active. To render the cams 45^b and 46^b active, the handle is shifted forwardly out of the slot 62, then laterally across the slot 61 and finally reversely into the slot 64.

Starting and stopping of the motor 26 may be effected by laterally shifting a bar 65 which extends transversely of the vehicle and is guided in the frame sides 24. When the end 66 that projects from the side of the vehicle body is pulled outwardly, an end 67 (Fig. 3) on the bar will be

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retracted out of the path of the flattened side 68 on the governor wheel 38 so that the latter is free to turn. However, when the bar is pushed inwardly, the governor wheel is blocked and held against rotation, thereby stopping the motor.

It will be observed that all of the rotary parts of the cam and drive mechanisms turn about shafts extending transversely of the vehicle and parallel to the rear axle. This simplifies the construction and facilitates assembly of the parts and permits the use of open face cams with simple followers slidable longitudinally of the frame in the direction in which the rear axle is shifted bodily for forward or reverse propulsion of the vehicle. The cams may be made of various contours so as to control the steering and reversible drive mechanisms in the proper timed relation to cause the vehicle to traverse any desired pattern. In addition, the selection of different patterns is facilitated by the cam shifting arrangement described.

I claim as my invention:

1. A toy vehicle having, in combination, a frame, a pair of rear drive wheels, a rear axle supporting said wheels and mounted on said frame for bodily movement longitudinally of the vehicle, at least one steering wheel supporting the forward end of said frame, a vertical shaft on the front of said frame connected to said steering wheel to actuate the latter, a power driven shaft mounted on said frame and extending transversely thereof, cams rotatable with said power driven shaft, followers for said cams mounted on said frame for movement longitudinally thereof, one being connected to said vertical shaft to rock the latter and steer the vehicle and the other being connected to said axle to shift the latter between two positions, and a drive connection between said power shaft and said axle including a reversing clutch operable to drive said axle in opposite directions respectively when the axle is disposed in said two positions.

2. A toy vehicle having, in combination, a motor, drive mechanism operable by said motor for propelling the vehicle, a clutch device in said drive mechanism operable to cause forward or reverse movement of the vehicle under power of said motor, mechanism for steering the vehicle, an actuating member for said clutch device, an actuating member for said steering mechanism, a cam shaft driven by said motor, a plurality of sets of cams on said shaft, each set including a cam adapted to operate one actuating member and a cam adapted to operate the other actuating member, and manually operable means for operatively associating said sets of cams with said actuating members selectively and one set at a time.

3. A toy vehicle having, in combination, a motor, drive mechanism operable by said motor for propelling the vehicle, a clutch device included in said drive mechanism operable selectively to cause forward or reverse movement of the vehicle under power of said motor, a cam shaft driven by said motor, a plurality of cams on said shaft, an actuating member for said clutch device including a cam follower, and means manually operable to associate said cams selectively with said follower and thereby render the selected cam only operable in successive revolutions of said shaft.

4. A toy vehicle having, in combination, a motor, drive mechanism operable by said motor for propelling the vehicle, a clutch device included in said drive mechanism operable selectively to

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cause forward or reverse movement of the vehicle under power of said motor, an actuating member for said clutch device, a plurality of control devices for said actuating member each adapted to effect a different sequence of operations of the clutch device, and selectively operable means for associating said control devices individually with said actuating mechanism.

5. A toy vehicle having, in combination, a motor, drive mechanism including a clutch device selectively operable to effect forward or reverse movement of the vehicle by said motor, a member shiftable endwise to selectively operate said clutch device, a second member shiftable endwise to steer the vehicle, cam followers on adjacent ends of said members, a cam shaft disposed between the cam followers, a plurality of sets of cams mounted on said shaft for rotation therewith and for sliding movement longitudinally of the shaft, each set including a pair of cams adapted to cooperate with the respective shiftable members, an element manually operable to slide said cams along the shaft, and guide means cooperating with said element to insure accurate alinement of the cams of each set with the respective members.

6. A toy vehicle having, in combination, a motor, drive mechanism operable by the motor to propel the vehicle selectively, mechanism for steering the vehicle, a plurality of pairs of cams rotated by said motor about a common axis and axially shiftable, followers yieldably urged into engagement with the cams of a selected pair on diametrically opposite sides thereof and respectively connected to said steering and drive mechanisms, and a lever fulcrumed on said axis and operable when swung out of a normally inactive position to engage said followers and move the latter away from their cams during shifting of the cams to bring another pair into operative position.

7. A toy vehicle having, in combination, a motor, drive mechanism operable by the motor to propel the vehicle selectively, mechanism for steering the vehicle, a plurality of pairs of cams rotated by said motor about a common axis and axially shiftable, followers engageable with the cams of one pair and connected to said steering and drive mechanisms to actuate the latter selectively, and means mounted on said vehicle for movement relative thereto to retract said followers from the active cams and permit free shifting of the cams to bring another pair into active position.

8. A toy vehicle having, in combination, a motor, drive mechanism operable by the motor to propel the vehicle selectively, a plurality of cams rotated by said motor about a common axis and axially shiftable, a follower yieldably urged into engagement with one of said cams and connected to said drive mechanism, and means mounted on the vehicle and movable relative thereto to move said follower away from the active cam during shifting of the cams to bring another cam into operative position.

9. A toy vehicle having, in combination, a motor, drive mechanism operable by the motor to propel the vehicle selectively, mechanism for steering the vehicle, a plurality of pairs of cams rotated by said motor about a common axis and axially shiftable, followers yieldably urged into engagement with the cams of a selected pair on diametrically opposite sides thereof and respectively connected to said steering and drive mechanisms, and a single device swingable about said

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axis to retract said followers away from the active cams and shiftable along the axis to move the cams axially and bring a new set into operative association with respect to said followers.

10. A toy vehicle having, in combination, a motor, drive mechanism operated by the motor to propel the vehicle, a plurality of cams rotated by said motor about and spaced along a common axis, a follower engageable with a selected one of said cams and movable to adjust said drive mechanism and thereby control the vehicle motion, and a single manually operable member mounted on said vehicle for movement longitudinally of the vehicle to retract said follower away from the active cam and then transversely of the vehicle to bring the follower and another of the cams into operative association.

11. A toy vehicle having, in combination, a motor, drive mechanism operated by the motor to propel the vehicle, a plurality of cams rotated by said motor about a common axis and shiftable along the axis, a follower engageable with a selected one of said cams and movable to adjust said drive mechanism and thereby control the vehicle motion, and a single manually operable member mounted on said vehicle for movement along one path to retract said follower away from the active cam and then in a transverse direction to bring another of the cams into operative association with said follower.

12. A toy vehicle having, in combination, a frame, a member mounted on said frame to swing about a horizontal axis extending transversely of the vehicle, said member being swingable back and forth between two opposite drive positions through an intermediate neutral position, an axle journaled on said member parallel to said axis, ground-engaging wheels fast on opposite ends of said axle, a pinion fast on said axle, gears rotatably mounted on said frame and adapted to mesh with said pinion when said member is in the respective first mentioned positions, said gears and pinion being spaced apart so as to be disengaged when the member is in said neutral position, motor driven means on said frame rotating said gears in opposite directions, a horizontal cross-shaft mounted on said frame and continuously rotated by said motor driven means, an open face cam on said shaft rotatable in a vertical plane, and a follower bearing against the periphery of said cam and mounted on said frame for endwise reciprocation longitudinally thereof, said follower being connected to said member for moving the latter to said drive and neutral positions, said cam having three angularly spaced peripheral surfaces thereon spaced from said shaft to actuate said follower and hold said pinion in mesh with one of said gears, out of mesh with both of the gears, and in mesh with the other gear in successive portions of the cam revolution.

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