

- [54] **DIRECTION SEEKING TOY VEHICLE**
- [76] Inventor: **Jesse Gulley, Jr.**, 1140 S. Keeler, Chicago, Ill. 60624
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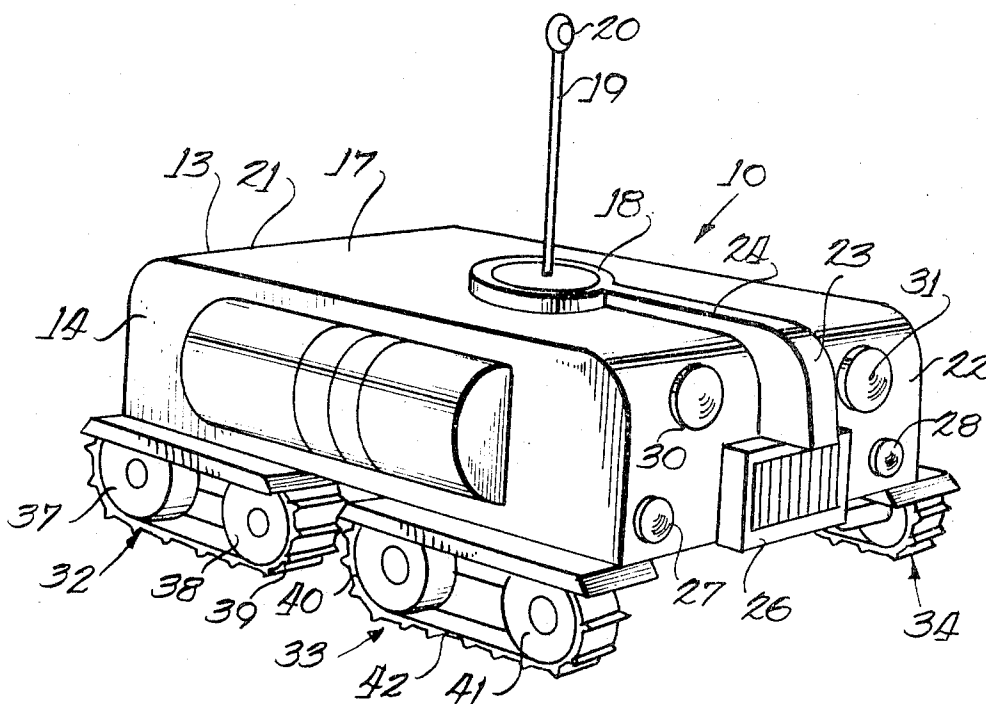
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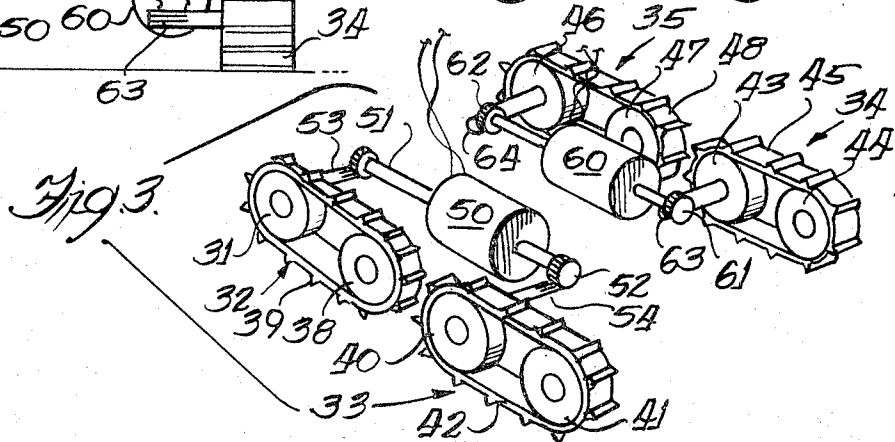
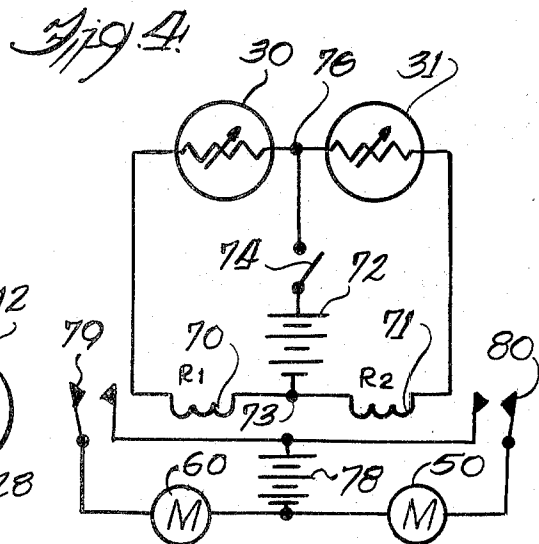
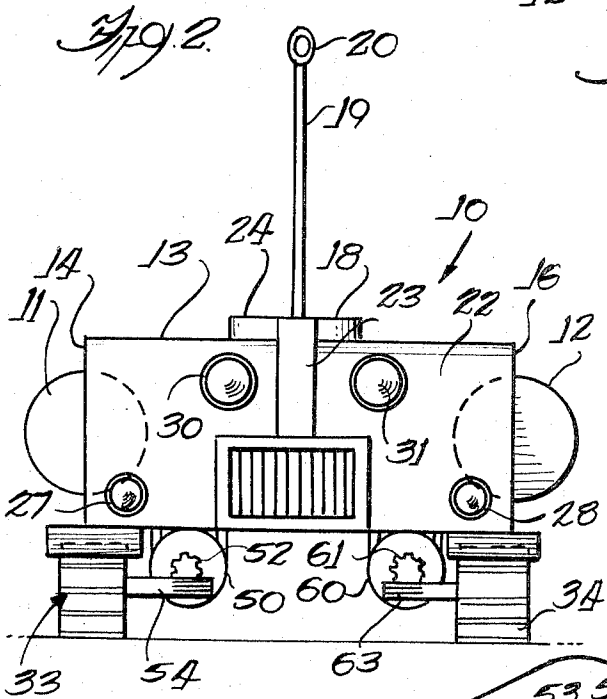
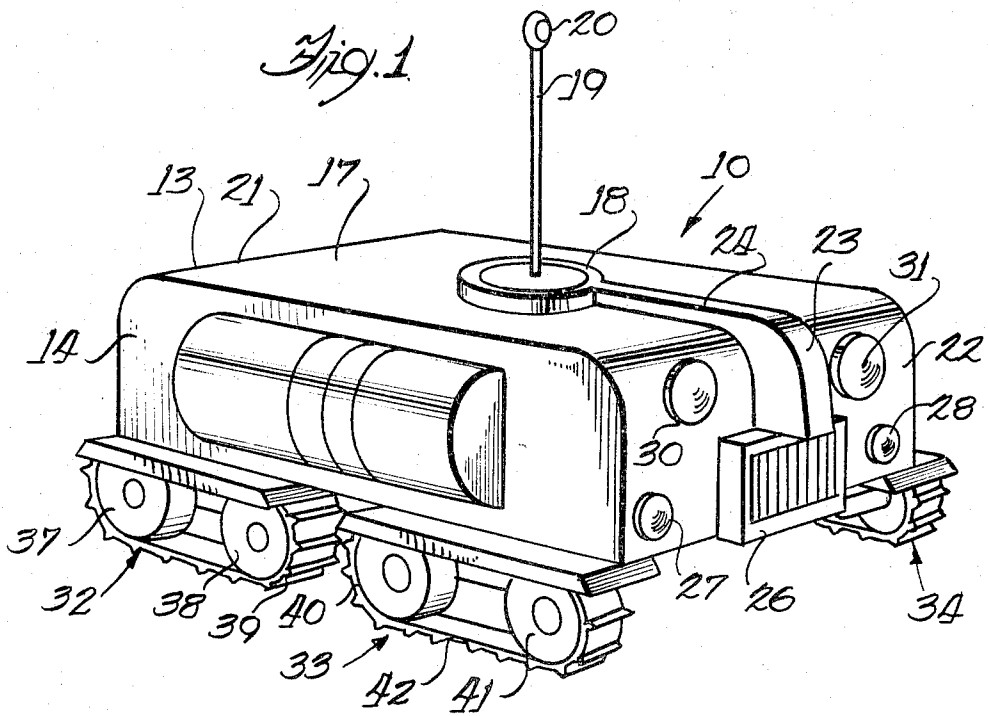
Primary Examiner—Antonio F. Guida
 Assistant Examiner—J. Q. Lever

[57] **ABSTRACT**
 The embodiment of the invention disclosed herein is directed to an electrically operated direction seeking toy vehicle powered by a self contained battery unit either containing a single or a multiplicity of dry cell batteries therein. The direction seeking toy vehicle has a body member formed of sides, top, posterior aspect and an anterior aspect. The configuration of these components are arranged to give the general appearance of a particular type of vehicle, such as moon rover, or toy mutt, or the like. Drive wheel means are rotatably secured to the body member and arranged to transport the body member in both a turning and straight line maneuvering direction. The drive wheels

may include a plurality of rotative wheels which are arranged in groups to have a tractor belt of resilient material wrapped about selected ones of the groups of the drive wheels. By energizing the desired groups of drive wheels with the drive motor means the direction of travel, either straight line or turning, is accomplished. When both drive motor means associated with each side of the drive wheel means are energized, this energization being of substantially the same energy level to effect substantially the same rate of motor rotation, the drive wheels will cause the body member to move forwardly in a straight line. Variations in motor speed with respect to one motor of one side of the vehicle with respect to the other motor on the other side of the vehicle will cause the vehicle to turn. Relay means are secured within the vehicle interior and are utilized to have a relay coil associated therewith connected in series with an electrically operated photo electric cell. The photo electric cell is of the type which has a relatively high electrical resistance when no light beam is directed to impinge upon the cell. However, impingement of light on the cell causes it to change its electrical resistance to a substantially low resistance, thereby allowing the series connected relay coil to be energized. Energization of the relay coil will cause actuation of its associated movable relay contact to energize the desired one of a pair of battery operated electric motors. The photo cells associated with the body member are located at the anterior aspect of the vehicle and are spaced apart by means of a longitudinally directed divider member so that a light beam directed toward the vehicle from one side or the other side thereof will not interfere with operation of the photo electric cell not intended to be energized fully.

5 Claims, 4 Drawing Figures





DIRECTION SEEKING TOY VEHICLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to improvements in structures and apparatus used primarily in the field of remote controlled vehicle devices, and more particularly to remote controlled direction seeking toys, and its combination in such structures and apparatus to provide substantial useful improvements over existing direction seeking toys commonly used for such things as, for example, remote control transport device and the like. However, it will be understood that while this invention is directed particularly to devices used in the field of remote controlled toys, the specific device disclosed herein can be used in other allied fields such as remote control lawn mower devices and the like.

2. Description of the Prior Art

Heretofore, the construction and interconnection of the components which go into making up remote control operated direction seeking vehicles have required substantial skills in manufacturing as well as requiring substantial amounts of manufacturing costs and techniques. Prior proposals relating to self propelled remote controlled direction seeking devices and similar devices have involved complex electronic steering mechanisms which required the attention of an operator while under propulsion. Many times, these types of remote control devices required a radio transmitter and telemetering signaling units to effect directional changes of the self propelled device. This type of prior art device is not entirely ineffective or undesirable when it comes of certain kinds of operations, but it is a relatively expensive and complicated means of achieving the function of direction seeking of a remote control device.

Other types of prior art remotely controlled power drive vehicles include a first remotely controlled servo mechanism to control the steering apparatus of the vehicle and a second remote control servo mechanism to control other devices such as throttling, or the like. This type of system is also relatively expensive and complicated to manufacture.

Still another type of prior art remote control power drive unit is the type which utilizes a source of compressed air to control the steering of the vehicle and utilizes other means to control the speed of the vehicle. These other types of prior art devices utilize a method of controlling both the steering and the motor throttling from an alternating current source by directing the positive half cycles of the alternating current source to the motor control and the negative half cycles of the alternating current source to the steering solenoid. This method employs separate control means for the two current portions of the alternating current voltage. The same result can be obtained however by providing independent polarity battery sources.

Yet another type of prior art remote control power driven vehicle is the type which utilizes a method of steering a model automobile by actuating a motor reverse mechanism which causes a gear to engage a steering quadrant to cause the car wheel to turn from one incremental position to another incremental position. This again, as mentioned above, is a relatively complicated and expensive means of providing steering for a

remotely controlled driven vehicle, particularly of the type intended to be used as a toy.

Other, more sophisticated, remote control mechanisms are utilized for controlling such things as power driven lawn mowers, and the like. These lawn mowers can travel a path about the area of grass to be cut automatically or travel a path controlled by a remote transmitter held by the user. While these relatively sophisticated lawn mower remote control mechanisms are at present somewhat complicated, they can be constructed to utilize some of the rather simple and more direct aspects of this invention.

SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to provide a new and useful electrically operated direction seeking toy vehicle which substantially completely overcomes all of the above mentioned disadvantages associated with prior art structures, but which does not in any way detract from the practical aspects and use of such device. Particularly of interest is that the remote control vehicle of this invention is extremely simple and inexpensive to manufacture while maintaining a high degree of efficiency and reliability when in use.

A feature of this invention is the provision of an improved and novel electrically operated direction seeking toy vehicle which has a body member having sides, top, posterior aspect, and anterior aspects to form a general appearance of a particular type of vehicle, such as a moon rover, or the like. Drive wheel means are rotatively secured to the body of the vehicle and arranged to transport the vehicle in both a turning and straight line maneuvering. The drive wheels are geared to drive motor devices and there are independent drive motor devices associated with each side of the vehicle so that the drive wheels on one side of the vehicle can be energized independent of the drive wheels of the other side of the motor vehicle, thereby effecting a turning maneuver for the vehicle. A relay device is associated with each of the drive motor devices and is electrically connected in series with a photo electric cell. The photo electric cells associated with the pair of relays are located at the anterior aspect of the vehicle and placed on opposite sides of a longitudinally disposed divider member. The longitudinally disposed divider member maintains the photo electric cells substantially separate so that light beams from a flash light, or the like, will effect one photo electric cell more than the other photo electric cell when the light beam is directed toward the vehicle from any angle other than straight ahead. When light is directed toward the vehicle directly along the frontal axis both photo electric cells are equally energized and the motor vehicle will maneuver forwardly in a straight line.

Another important feature of this invention is to provide an improved and novel electrically operated direction seeking toy vehicle wherein the anterior aspect of the toy vehicle has the longitudinally disposed divider member thereof extending outwardly to the forward most part of the anterior aspect to ensure that the spaced apart electrical photo cells are operated substantially operated independently from one another when light beams from a flash light is directed toward the toy vehicle from an angle on either side of straight dead ahead.

Another important feature of this invention is the provision of an improved and novel electrically operated direction seeking toy vehicle wherein the drive wheel mechanisms of the vehicle are formed of a pair of independent drive wheel units, one associated with each side of the vehicle and which drive wheel units turn at the same speed to effect straight line maneuvering and which drive units turn at different speeds to effect the turning maneuver of the vehicle.

Another feature of this invention is to provide an improved and novel electrically operated direction seeking toy vehicle wherein each of the drive wheel units include a pair of front and rear tractor drive units. Each of the tractor drive units has a pair of wheels and a resilient gripping tractor belt member passing over the wheels to provide a gripping surface for climbing over rough terrain and the like.

Another important feature of this invention is to provide an improved and novel electrically operated direction seeking toy vehicle wherein the drive motors associated with the vehicle are independently energized electrically operated battery motors which are coupled to the associated pair of front and rear tractor drive units.

Another important feature of this invention is to provide an improved and novel electrically operated direction seeking toy vehicle wherein the battery powered drive units each include a double ended drive shaft extending in opposite directions from the motor housing, each end of the drive shafts having a gear coupling to engage with the gear connection associated with the tractor drive units. The front and rear tractor drive units therefore include gear shafts extending inwardly of the vehicle body to engage with the gear coupling of the double ended drive shaft extending from the motor housing.

Another important feature of this invention is to provide an improved and novel electrically operated direction seeking toy vehicle wherein the relay devices associated with the photo electric cells each include independent relay coil and associated independent movable relay contacts, with these contacts being electrically connected in circuit with the drive motors, and the relay coil being electrically connected in series with the photo electric cells.

Another important feature of this invention is the provision of an improved and novel electrically operated direction seeking toy vehicle wherein a pair of photo electric cells are mounted at the anterior aspect of the vehicle and each cell is placed on opposite sides of the longitudinally disposed divider member, and wherein the longitudinally disposed divider member serves as an isolation device to prevent light rays from an external source, such as a flash light or the like, from effecting both photo electric cells the same when the light beam is directed toward the toy vehicle from an angle displaced on either side of the longitudinally disposed divider member.

Another important feature of this invention is to provide an improved and novel electrically operated direction seeking toy vehicle wherein the pair of independent relays are operated by the pair of spaced apart discrete photo electric cells located at the anterior aspect of the vehicle, and wherein the photo electric cell and associated relay coils are powered by one group of independent battery sources, and wherein the drive motors associated with the tractor drive units are powered

from a second independent set of battery power sources.

Still another important feature of this invention is to provide an improved and novel electrically operated direction seeking toy vehicle wherein the photo cells are of the type which provide a relatively high resistant during the absence of light, thereby maintaining the associated series connected relays in a de-energized state. The photo cells therefore provide a relatively low resistance during the presence of light to maintain the relays in an energized state to effect actuation of their associated movable contacts for energizing the associated battery powered drive motors connected thereto.

Briefly, the electrically operated direction seeking toy vehicle of this invention may be referred to as an electronic mutt which basically resembles a moon roving vehicle whose locomotion is accomplished by a set of tracks similar to those of the tracks on a tank or bulldozer. The moon roving vehicle device is operated by use of miniature battery powered motors, with the control for the actuation of these motors being accomplished by a light sensitive mechanism. Light sensitive operation requires the use of photo cells connected in series with associated relays which, in turn, have their movable contacts connected to the miniature battery operated motors for energizing the same. The direction in which the vehicle travels is governed by the direction in which light is directed toward the anterior aspect of the vehicle. When light is directed dead ahead, the vehicle will move in a straight line toward the light. When light is directed from one side or the other side of the vehicle to the anterior aspect thereof the vehicle will turn toward the light and then move in a straight line toward it.

Many other features and advantages of this invention will be more fully realized and understood from the following detailed description when taken in conjunction with the accompanying drawings wherein like reference numerals throughout the various views of the drawings are intended to designate similar elements or components.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an electrically operated direction seeking toy constructed in accordance with the principles of this invention;

FIG. 2 is a front elevational view of the electronically operated direction seeking toy vehicle as shown in FIG. 1;

FIG. 3 is a fragmentary operating view illustrating only the components necessary to illustrate the operation of the structure within the toy vehicle of FIGS. 1 and 2; and

FIG. 4 is a detailed schematic diagram of the electrical circuit associated with the components mounted within the housing of the toy vehicle of this invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Referring now to FIGS. 1 and 2 there is seen an electrically operated direction seeking toy vehicle constructed in accordance with the principles of this invention and designated generally by reference numeral 10. The electrically operated direction seeking toy vehicle 10 is designed to be powered by self contained batteries within a pair of battery receiving compartments 11 and

12 which are formed on the sides of the vehicle. The vehicle 10 includes a main body member 13 which has the sides 14 and 16 arranged to receive the battery units 11 and 12, respectively, in such a manner as to facilitate simple opening of the battery compartments for inserting or replacing of batteries. For example, the battery housings can be plastic units which snap fits into recesses formed about the upper and lower edges of the battery compartment. To enhance the general appearance of the body member 13 a top wall 17 is provided with a circular unit 18 from which extends an antenna pole 19 and which has a simulated direction seeking device 20 located at the top thereof. The device 20 may be fashioned to simulate any desired component other than a direction seeking device. The posterior aspect of the vehicle 21 is not clearly shown in detail herein but, it will be understood that it can take any desired configuration. The anterior aspect 22 includes a longitudinally disposed divider member 23 which has a top edge portion 24 thereof extending rearwardly to be part of the circular member 18. Also associated with the anterior aspect is a grill like unit 26, and a pair of simulated head lamps or the like 27 and 28. While these simulated head lamps are shown located at their particular position, it will be understood that these devices can in fact be photo electric cells if desired.

The photo electric cells utilized for operation of the direction seeking toy vehicle of this invention are designated generally by reference numerals 30 and 31 located at the anterior aspect of the body 13 and placed on opposite sides of the longitudinally divider member 23. By so orienting the photo electric cells 30 and 31 light beams directed toward the anterior aspect from an angle will affect one cell more than the other thereby causing the associated drive motor to be energized to effect a turning maneuver of the vehicle.

Drive wheel means are rotatably secured to the body member 11 and arranged to transport the body member in both turning and straight line maneuvering directions. The drive wheel means includes a plurality of individual tractors units 32, 33, 34 and 35 as best seen in FIG. 3. Each of the tractor units includes a pair of wheels which are engaged with a resiliently associated tractor gripping belt member. For example, the tractor unit 32 has a pair of wheels 37 and 38 wrapped by a tractor resilient member 39. Similarly, the tractor drive unit 33 has a pair of wheels 40 and 41 wrapped by a resilient tractor belt or tractor unit 42. Also the tractor drive unit 34 includes a pair of drive wheels 43 and 44 which are wrapped by a resilient tractor belt 45. In like manner, the tractor drive head 35 is provided with a pair of drive wheels 46 and 47 which are wrapped about by a resilient tractor belt unit 48. While this particular configuration of tractor drive wheels and tractor drive belts is shown, it will be understood that other drive wheel configurations may be utilized.

The tractor drive units 32 and 33 are driven by a miniature battery operated electric motor 50 which has the double ended gear shafts 51 and 52 thereof engaging correspondingly fashioned gear shaft members 53 and 54, respectively, of the tractor drive units 32 and 33. Therefore only the drive wheels 37 and 40 while wheels 38 and 41 are idler wheels and driven as a result of traction with the resilient tractor belts 39 and 42.

A second drive motor 60 is provided with a double ended shaft having gear ends 61 and 62 associated

therewith for engaging with correspondingly shaped gear shafts 63 and 64, respectively, substantially in the same manner as with regard to the drive motor 50. Energization of the both the drive motors 50 and 60 simultaneously will cause all four tractor drive units 32, 33, 34 and 35 to rotate thereby transporting the direction seeking toy vehicle in a straight line forward.

To better understand the method of selective energization of drive motors 50 and 60 reference is now made to FIG. 4 which illustrates the electrical configuration of the device. Here a pair of relays 70 and 71 are connected in electrical series with their associated photo electric cells 30 and 31, respectively. A separate battery source 72 has the negative end terminal thereof connected to a circuit point 73 intermediate the relays 70 and 71. The positive terminal of the battery source is connected to a switching device 74 and to an intermediate terminal 76 located between the photo electric cells 30 and 31. Upon closure of the switches 74 the circuit is initially energized with regard to the photo sensing portion thereof. A second battery source 78 has the negative terminal thereof connected to one side of both of the motors 50 and 60 and the positive side thereof connected to the other line of the motors 50 and 60 through movable contacts 79 and 80, these contacts being associated with the relay coils 70 and 71, respectively. The photo electric cells 30 and 31 are of the type which provide a relatively high resistance when no light impinges thereupon, and a relatively low resistance when light is directed on the photo cell. Therefore with no light on the photo cell the photo cell has relatively high resistance, and relay coils 70 and 71 are de-energized and their associated movable contacts 79 and 80 are open. However, when light impinges upon the photo cells they become relatively low resistance elements in the circuit hence providing means for effecting energization of the series connected relay coils. This action will then cause their associated movable contacts to close thereby energizing the motors 50 and 60. Closure of only one side of the relay contacts by directing a light beam from one side or the other of the device will cause turning of the top vehicle. It will be understood that the photo electric cell 30 located on one side of the vehicle will be associated with the drive motor mechanism on the other side of the vehicle so that the vehicle will turn in the proper direction. Similarly, the photo electric cell 31 will be associated with the drive motor 50 so that the vehicle will turn in the other direction.

While a single specific embodiment of this invention has been illustrated herein it will be understood that variations and modifications may be effected without departing from the novel concepts of this invention. For example, changes in styling of the direction seeking motor vehicle as well as changes in size, shape, and position of components may be made without departing from the novel concepts as set forth herein.

Having thus described the invention, what is claimed is:

1. An electrically operated direction seeking toy vehicle to be powered by self contained battery means, comprising in combination:

a body member having spaced apart sides, a top, a posterior, aspect, and an anterior aspect, forming an outer configuration to give the general appearance of a particular type of vehicle being designed to travel over various kinds of terrains such as

rocks or grass and the like, said anterior aspect of said body member including a longitudinally disposed divider member extending forwardly of the forwardmost part of said anterior aspect;

drive wheel means rotatably secured to said body member and arranged to transport said body member in both turning and straight line maneuvering, said drive wheel means being formed of a pair of independent drive wheel units, one drive wheel unit associated with each side of said body member, each of said drive wheel units including a pair of front and rear tractor drive wheel units, each tractor drive unit including a pair of independent wheel members and a resilient gripping tractor belt passing over each of said pair of independent wheel members to effect simultaneous rotation thereof, each of said drive wheel units being operated to rotate at the same speed for effecting straight line travel of said direction seeking toy vehicle, and each of said drive wheel units being operated at different speeds with respect to one another to effect a turning action of said direction seeking toy vehicle, said turning maneuvering action being effected as a result of an external light control signal to be directed toward the direction seeking toy vehicle;

drive motor means coupled to said drive wheel means to transfer motive power thereto when said drive motor means is electrically energized, said drive motor means including a pair of independently energized electric battery powered drive motor units, each of said battery powered drive motor units being coupled to its associated said front and rear tractor drive units to provide means for driving said tractor drive units at a speed which is proportional to the speed of rotation of their associated battery powered motor drive unit;

relay means secured within said interior portion of said body member and arranged to be energized by self contained battery means when they are positioned within said body member in suitable receiving brackets;

photo electric responsive means secured to said anterior aspect of said body member to be receptive of external light beam energy which is directed toward said anterior aspect of said body member; and

said battery powered drive motor units each is formed so as to include a double ended shaft extending in opposite directions from a drive motor housing, each end of said double ended shaft having a gear connection coupled to each one of said front and rear tractor drive units, said front and rear tractor drive units including a gear shaft extending inwardly of said body member, with said gear shafts of one set of front and rear tractor drive units facing the gear shafts of the tractor drive units being coupled to the double ended gear shafts of the associated drive motor units;

whereby the direction of travel of said direction seek-

ing toy is controlled in response to the direction from which external light beams impinge upon the anterior aspect of said body member, such that a light beam directed in alignment with said longitudinally disposed divider member will cause said direction seeking toy vehicle to travel forwardly in a straight line whereas a light beam directed toward said anterior aspect from one side or the other side of said longitudinally directed divider member will cause said direction seeking toy vehicle to turn toward the direction of the light source.

2. The electrically operated direction seeking toy vehicle to be powered by self contained battery means, as set forth in claim 1, further characterized by said relay means comprising a pair of independent relay coils which are associated with independent movable relay contacts, each of said independent movable contacts being actuated to a circuit closed condition upon energization of their associated said relay coil, this energization being effective as a result of actuation of energization of said photo electric responsive means geared to the anterior aspect of said body member.

3. The electrically operated direction seeking toy vehicle to be powered by self contained battery means, as set forth in claim 2, further characterized by said photo electric responsive means comprising a pair of spaced apart discrete photo electric cells, said pair of spaced apart discrete photo electric cells being mounted on said anterior aspect on opposite sides of said longitudinally disposed divider member, said longitudinally disposed divider member serving to isolate one of said photo electric cell from the other of said photo electric cell so that the direction of a light beam directed toward the anterior aspect of said body member can be detected easily without passing interference from one said photo cell to the other.

4. The electrically operated direction seeking toy vehicle to be powered by self contained battery means, as set forth in claim 3, further characterized by said pair of independent relay means being operated by said pair of spaced apart discrete photo electric cells and adapted to be energized by means of a separate battery power unit when the associated photo electric cell changes its electrical state to effect such energization.

5. The electrically operated direction seeking toy vehicle to be powered by self contained battery means, as set forth in claim 4, further characterized by said photo electric cells being of the type which provide a relatively high electrical resistance condition during the absence of light beams, thereby maintaining said relay coil in a de-energized condition, and wherein said photo electric cells provide a relatively low electrical resistance condition during the presence of light beams, thereby maintaining said relay coil energized to effect actuation of its associated movable contacts for energizing its associated battery power drive unit, thereby providing means for effecting motivation of the direction seeking toy vehicle.

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