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[33] **Japan**
[31] **43/43811**

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[54] VEHICLE-DRIVING GAME

7 Claims, 9 Drawing Figs.

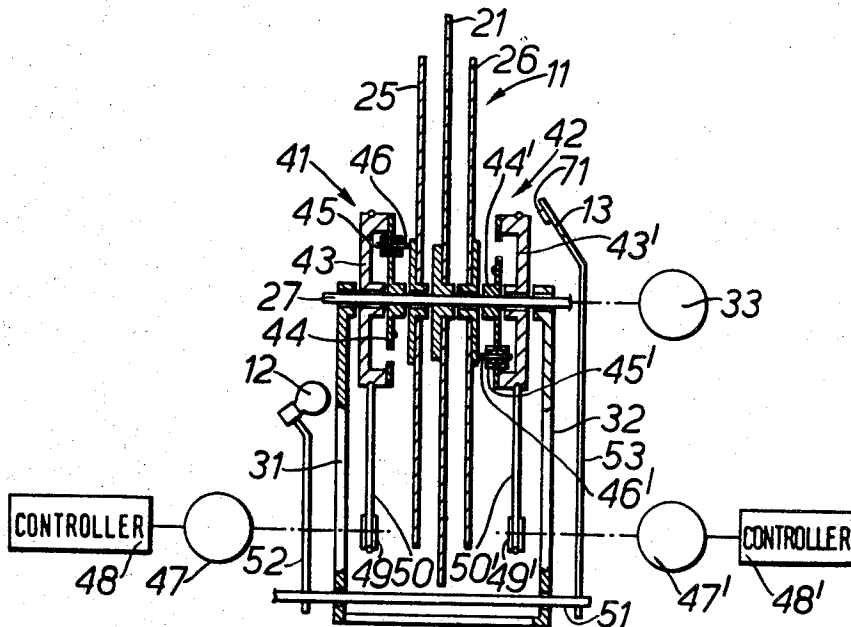
[52] U.S. Cl..... 273/1,
35/11
[51] Int. Cl..... A63f 9/14
[50] Field of Search..... 273/1 (E),
1 (R); 85/11

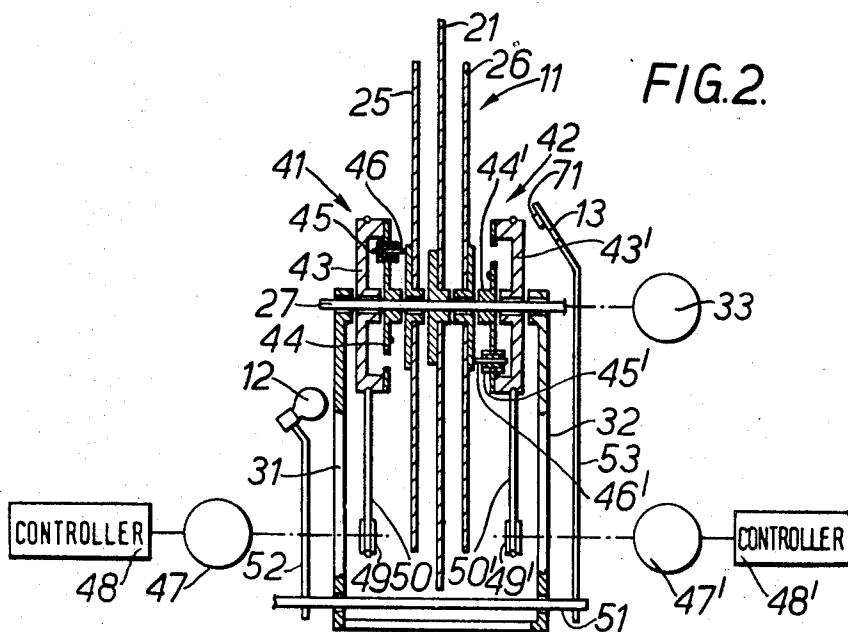
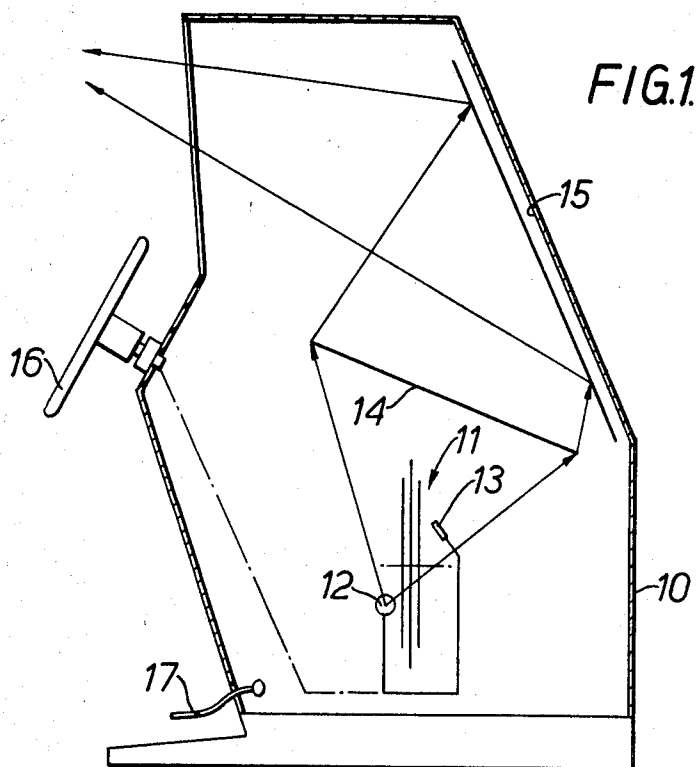
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ABSTRACT: A vehicle-driving game where the street, a first group of cars and a second group of cars are pictured on separate transparent discs. A lamp behind the discs superimposes all three images, and additionally the image of a drive-controlled car, on a screen in front of the driver. Each of the three discs is separately driven, the speed of the road-bearing disc being controlled by the driver, and the speed of the two car-bearing discs being controlled by a differential gear mechanism between the road disc and each of the car discs, and a programmed control motor for each car disc. The image on the screen shows two groups of cars, each moving at a speed independent of the other group but determined through the differential by the relative speed of the roadway and the programmed controller. A photosensitive element on the driver-controlled car controls a circuit to a sounder which sounds when the image of one of the cars on one of the discs overlaps that of the driver-controlled car and blocks the light rays from the lamp.





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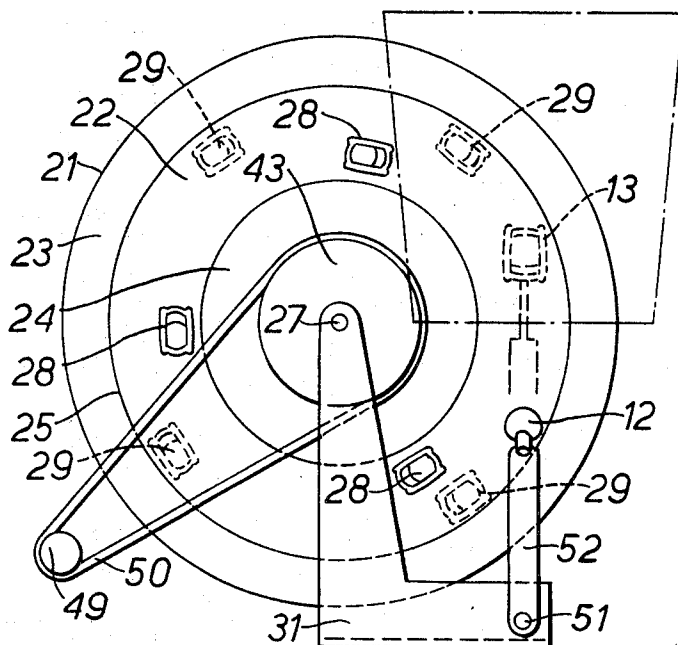


FIG. 3.

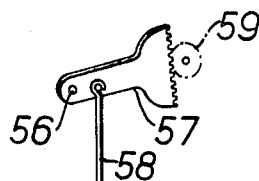


FIG. 4.

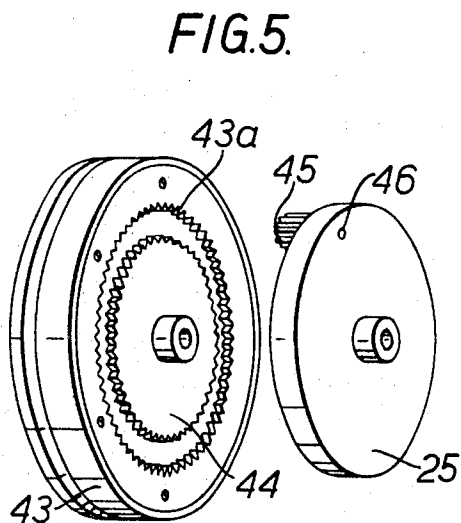


FIG. 5.

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FIG. 6.

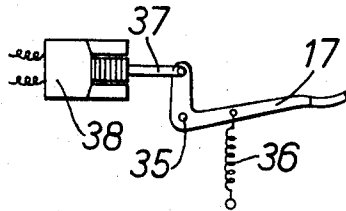


FIG. 7.

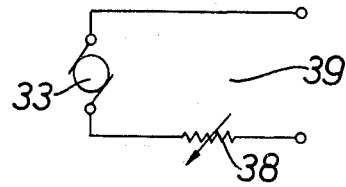


FIG. 8.

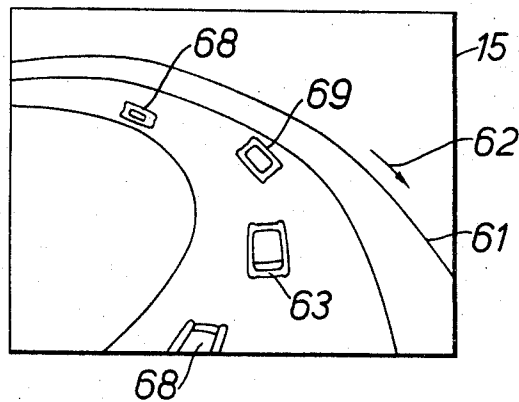
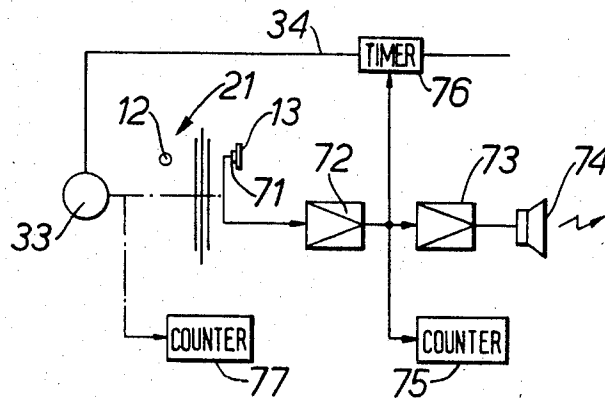


FIG. 9.



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VEHICLE-DRIVING GAME

This invention relates to a vehicle-driving game in which the player controls the running of a miniature model vehicle by handing a steering wheel and regulating an accelerator pedal as if he were driving a real vehicle such as an automobile.

In one well-known vehicle-driving game of this type, a figure simulating a serpentine street is drawn on the outer surface of an endless belt driven in a predetermined direction, and a model miniature vehicle such as an automobile (to be referred to as a car) is disposed on the outer surface of the belt in such a manner as to be movable relative to the endless belt. A steering wheel provided on the front panel of the casing of the game is connected by a suitable mechanism to the front wheels of the car, so that the player of the game can control the running direction of the car. As the endless belt is driven, the model car appears as if it were running along the street drawn on the outer surface of the belt. Since the street runs serpentine, the player must control the car so that it properly follows the street.

In this type of vehicle-driving game, however, there is on the street a single car to be driven by the player. It would be more amusing to be able to drive one's own car, with many other cars running on the same street, passing them ahead or letting them pass one's own driving car ahead.

Accordingly, the primary object of the invention is to provide a vehicle-driving game in which the player can drive his own car with many other cars running alongside his own at various speeds.

Another object of the invention is to provide such a vehicle-driving game as aforesaid in which the player can change the speed and/or direction of his own car, avoiding collision with any of the other running cars.

Suppose that you are driving an automobile on a street. To you the automobile you are driving appears to be standing motionless while the street itself appears as if it were running in the direction opposite to the running direction of your car. If there is another car running at the same speed as your car, that car appears to you as if it also were standing motionless like yours. If that other car is running faster than yours, it appears to you as if it were running ahead of you at a speed equal to the difference between the actual speeds of the two cars. On the contrary, if that other car is running more slowly than your car, it appears as if it were running backwardly at a speed equal to the difference between the speeds of the two cars. As you speed up, the speed of the apparent movement of the street increases. Under the condition, if the speed of that other car remains unchanged, that other car appears as if it were slowing down.

With another car running in the same direction as, and at a speed different from, your car, if you change the running direction of your car, you can pass the other car ahead or let it pass yours ahead.

The device of the invention is based on the above principle and comprises a screen; means for projecting onto the screen an image of a car the player of the game is supposed to be driving, an image of a street or road which appears as if it were running relative to the car, and images of many other cars which appear as if they were also running on the street; means operated by the player to change the speed of movement of the image of the street and, consequently, that of the apparent movement of the image of the car the player is driving; means operated by the player to change the running direction of the car the player is driving; and means for periodically changing the running speed of the other cars.

The game of the invention may be played in such a manner as to compete for the least number of collisions that have occurred between the car the player is driving and the other cars. The arrangement may also be such that whenever a collision has occurred, the car the player is driving is stopped for a predetermined period of time (actually, the movement of the street is stopped), and the game may be played in such a manner as to compete for the longest distance the car has covered for a predetermined period of time (actually, the longest distance of movement of the street).

In one embodiment, the device of the invention comprises a rotary disc on which a figure of a street is circumferentially and endlessly drawn, and one or more additional rotary discs on which figures of many vehicles are drawn. These rotary discs are mounted side by side on a common shaft which is rotated by a motor. The rotational speed of the former disc can be varied by means of an accelerator the player of the game controls, and the latter discs are rotated at a speed corresponding to the difference between a periodically changing rotational speed and the speed of the former disc. A model miniature car is provided, which is moved by means of a steering wheel to be handled by the player of the game relative to the figure of the street drawn on the former rotary disc, with the figures of many other vehicles being drawn on the latter rotary discs. A screen is provided, on which the image of the model car and the image of part of the rotary discs including some of the other cars, and the image of part of the street are projected. These images on the screen are reflected by a plane mirror to be seen by the player standing in front of the mirror.

If the rotational speed of the former disc on which the figure of the street is drawn is smaller than the above-mentioned periodically changing rotational speed, the car the player is driving appears as if it were running at a speed lower than the speeds of the other cars. On the contrary, if the rotational speed of the former disc is greater than the periodically changing rotational speed, the car the player is driving appears as if it were running at a speed higher than those of the other cars. Thus, the player of the game can drive his car, avoiding collision with any of the other cars by changing the speed and/or the direction of his car.

The invention will be clearly understood by reading the following description of one embodiment of the invention with reference to the accompanying drawings, wherein:

FIG. 1 is a schematic side view of the device of the invention;

FIG. 2 is a side view, partly in vertical section, of the multirotary disc mechanism shown in FIG. 1;

FIG. 3 is a front view of FIG. 2;

FIG. 4 is a perspective view of a mechanism for moving the model car and the lamp used in the device of FIG. 1;

FIG. 5 is a perspective view of the differential gear means used in the device of FIG. 1;

FIG. 6 is a side view, partly in vertical section, of the accelerator pedal means used in the device of FIG. 1;

FIG. 7 is a diagram of a circuit for varying the apparent speed of the model car;

FIG. 8 is a front view of the mirror used in the device of FIG. 1, on which the images of the cars and street drawn on the rotary discs of the multirotary disc mechanism are projected to be seen by the player of the game; and

FIG. 9 is a diagram of a circuit for measuring the distance the model car the player is driving has run and the number of collisions it has made with the other cars, and for making a sound when a collision occurs between the model car the player is driving and any of the other cars.

Referring now in detail to the drawings, first to FIG. 1, there is schematically shown a housing 10 enclosing a multirotary disc mechanism generally designated by 11 and including three rotary discs 21, 25 and 26 made of a transparent material, and a lamp 12 and a model miniature car 13 at the opposite sides of the mechanism 11. As will be described later in detail, the lamp and the model car are moved by the player of the game in ganged relation. The housing 10 also encloses a screen 14 above the mechanism 11 and the mirror 15 above the screen 14. The light from the lamp 12 passes through part of the discs 21, 25 and 26 and the model car 13 to reach the screen 14, so that the images of the figures on the discs and the model car are projected on the screen, and then reflected by the mirror 15 to be seen by a player of the game standing in front of the housing 10.

A steering wheel 16 is provided on the front panel of the housing 10, and below the wheel there is provided an accelerator pedal 17 to be stepped on by the player. It will be

easily seen that as the player standing in front of the housing 10 and looking at the mirror 15 handles the steering wheel 16 and controls the pressure and the pedal 17 as if he were driving an automobile.

Turning to FIGS. 2 and 3 which show the multirotary disc mechanism 11 in detail, the disc 21 is divided into three concentric annular areas 22, 23 and 24. The central annular area 22 is supposed to be a street and the outer and inner annular areas 23 and 24, the opposite sides of the street. Suitable figures or pictures depicting a street and street sides are drawn on these areas of the disc 21. In the illustrated embodiment, the street on the central annular area 23 of the disc 21 has two lanes. The other two discs 25 and 26 are provided to correspond to the two lanes on the disc 21.

The three discs 21, 25 and 26 are vertically mounted on a common horizontal shaft 27. The disc 21 is secured to the shaft 27 for simultaneous rotation therewith, while the other two discs are loosely mounted on the shaft 27 for free rotation relative thereto. On the disc 25 there are drawn a plurality of figures of vehicles such as automobiles 28 (to be referred to simply as cars) within that annular area which corresponds to the inner lane of the street on the disc, while on the disc 26 there are drawn a plurality of figures of vehicles such as automobiles 29 (to be referred to simply as cars) within that annular area which corresponds to the outer lane of the street on the disc 21.

The shaft 27 is rotatably supported by a pair of bearings 31 and 32 and is driven by a motor 33. The rotational speed of the motor 33 can be varied by the accelerator pedal 17. As shown in detail in FIG. 6, the pedal 17 is pivoted at 35 and biased counterclockwise by a coil spring 36. The pedal 17 is connected by a link 37 to a carbon rheostat 38 which includes a plurality of piled carbon plates so that variation of the pressure on the carbon plates results in the variation of the electrical resistance of the rheostat. The arrangement is such that as the pedal is stepped on, it is rotated clockwise about the pivot 35 so as to decrease the resistance of the rheostat 38. As shown in FIG. 7 the rheostat 38 is connected in series with the motor 33 between a pair of source terminals 39. Thus, the more the pedal 17 is stepped on, the more the speed of the motor increases, and as the pressure on the pedal is released, the speed of the motor decreases. As the rotational speed of the motor 33 changes, the rotational speed of the disc 21 changes, so that it appears as if the speed of the car 13 on the screen changed.

The discs 25 and 26 are associated with differential gear mechanisms 41 and 42, respectively. The differential gear mechanism 41 comprises a pulley 43 rotatably mounted on the shaft 27 and having an internal gear 43a formed therein, a gear 44 secured to the shaft for simultaneous rotation therewith, and an output gear 45 meshing with the gears 43a and 44 and rotatably support on a pin 46 secured to the disc 25. A motor 47 rotates a pulley 49, the rotation of which is transmitted to the pulley 43 by means of an endless belt 50. The pulley 43 is rotated in the direction opposite to that of the shaft 27. The rotational speed of the motor 47 is automatically and periodically varied by a suitable controller 48.

While the gears 43 and 44 are being rotated in the opposite directions at the same circumferential speed, the output gear 45 simply rotates about the pin 46 and does not revolve around the shaft 27. As a result, no relative positional change occurs among the pulley 43, gears 44 and 45. However, when the controller 48 causes the rotational speed of the gear 43a to change, so that there occurs a difference between the rotational speeds of the gears 43a and 44, the gear 45 (the pin 46) revolves around the shaft 27 at a speed corresponding to the difference between the speeds of the two gears 43a and 44 and in the same direction as the rotational direction of that one of the gears 43a and 44 the rotational speed of which is greater than that of the other. The revolution of the gear 45 around the shaft 27 causes the disc 25 to rotate about the shaft 27. If the rotational speed of the gear 43a is greater than that of the gear 44, the disc 25 rotates about the shaft 27 in the

direction opposite to that of the disc 21 at a speed corresponding to the difference between the rotational speeds of the gears 43a and 44. As a result, the cars 28 on the inner lane of the street 22 appears as if they were running faster than the car 13 the player is driving. On the contrary, if the rotational speed of the gear 44 is greater than that of the gear 43, the disc 25 rotates in the same direction as, and faster than, the disc 21. As a result, the cars 28 appear as if they were running at a lower speed than the car the player is driving.

The other differential gear mechanism 42 is of the same construction as the mechanism 41 just described above, so that corresponding parts are designated by the same reference numerals with a dash (') attached thereto. A motor 47' for driving the mechanism 42 is controlled by a controller 48' similar to the controller 48. Preferably, the degree of change of the rotational speed of the motor 47' as well as the cycle of the change is set different from those of the motor 47. It will be easily seen that upon revolution of the gear 45' (the pin 46') around the shaft 27, the cars 29 on the outer lane of the street appear as if they were running faster or more slowly than the car 13.

In place of the two motors 47 and 47', a single motor may suffice, the output of which may be transmitted to the pulleys 43 and 43' through the separate controllers 48 and 48'.

As previously mentioned, the lamp 12 and the model car 13 are moved in a ganged relation to each other. The lamp 12 is fixed to an arm 52 which is in turn secured to a shaft 51 for simultaneous movement therewith, and the car 13 is supported by a rod 54 secured to an arm 52. The arm 52 is also secured to the shaft 51 for simultaneous movement therewith. A sector gear 57 rotatable about a pin 56 is pivotally connected by a lever 58 to the shaft 51. A pinion gear 59 secured to the column of the steering wheel 16 meshes with the sector gear 57. When the steering wheel is rotated in either direction, the sector gear 57 is rotated thereby rotating the shaft 51. As a result, the levers 52 and 53 are tilted toward either side thereby moving right and left the lamps 12 and the model car 13 at the same time. Thus, as the model car 13 is moved right and left relative to the disc 21, the car 13 appears on the mirror 15 as if it changed from one of the lanes on the street to the other.

Instead of moving the lamp 12 and the model car 13 relative to the multirotary disc mechanism 11, the arrangement may also be such that the mechanism 11 is moved relative to the lamp 12 and the model car 13 by means of the steering wheel 16. If the area on the discs that can be illuminated by the lamp 12 is that which is enclosed by dash and dot lines in FIG. 3, the image the player of the game sees on the mirror 15 is like that shown in FIG. 8. Suppose that in FIG. 8, the image 61 of the disc 21 is moving in the direction of an arrow 62. Even if the model car 13 actually remains motionless, its image 63 on the mirror 15 appears as if it were running in the opposite direction, that is, forwardly in FIG. 8. Under the condition, if the model car 13 is moved right or left by turning the steering wheel 16, its image 63 moves right or left on the image of the street, thereby changing its course from one of the lanes to the other. If the player changes the pressure on the pedal 17, the rotational speed of the disc 21 changes, with a resulting change in the apparent running speed of his driving car 13. The other cars 28 and 29 drawn on the discs 25 and 26 appear on the mirror 15 as the images 68 and 69, respectively. As previously mentioned, the controllers 48 and 48' change the apparent running speed of the cars 68 and 69 independently of the car 63 the player is driving. Therefore, the player must handle the steering wheel 16 and/or operates the accelerator 17 so that the car 63 does not collide with any of the other cars 68 and 69. When his car has collided with any one of the other cars, that is, actually the image 63 overlaps any one of the images 68 and 69, the light beam hitting on the model car 13 must have been intercepted by the figure of a car 28 or 29 on the disc 25 or 26. Therefore, a photosensitive element 71 such as a *cds* element, a phototransistor, etc. is provided on the model car 13. When the light beam entering the element 71 is

intercepted by the figure of a car 28 or 29, an amplifier 72 connected to the element 71 produces an output which is amplified by another amplifier 73 to cause a loud speaker 74 to produce a sound simulating that produced by a collision between vehicles.

A digital counter 75 is provided to count the number of the output signals produced by the amplifier 72 during a predetermined period of time, that is, the time during which the player is allowed to play the game. The result of the counting is indicated. The number of the output signals produced by the amplifier 72 means the number of collisions that have occurred during the play time. Thus, the game can be played to complete for the least number of collisions that have been made during the play time.

The output from the amplifier 72 is also applied to a timer 76, which breaks a line 34 connecting the motor 33 to a source of electric energy for a predetermined relatively short period of time. Another counter 77 is provided to count the number of rotations of the disc 21. This number is supposed to be the distance the car 13 the player is driving has run. Therefore, the more is the number of collisions that have occurred, the oftener the disc 21 and consequently the car 13 will stop and the less will become the number of rotations of the disc 21 and, consequently, the distance the car 13 has run during the play time. Thus, the game can be played to compete for the greatest distance that has been covered during the play time. The rules may be such that if a predetermined distance has been covered during the play time, another play may be enjoyed by the same player.

I claim:

1. A vehicle-driving game, comprising: a multirotary disc mechanism comprising a first rotary disc made of a light-transmitting material, on which a figure of a street is circumferentially drawn, a second rotary disc made of a light-transmitting material, on which a figure of at least one vehicle is drawn in the area corresponding to said figure of a street on said first rotary disc; a differential gear means including an input rotary member adapted to be rotated in the direction opposite to the rotational direction of said first rotary disc, the rotational speed of said input gear being automatically varied, an output rotary member associated with said input rotary member and having an axis adapted to be revolved around the axis of said first rotary disc at a speed corresponding to the difference between the rotational speeds of said first rotary disc and said input rotary member and in the same direction as

that one of said first rotary disc and said input rotary member the rotational speed of which is greater; and means for connecting said axis of said output rotary member to said second rotary disc so that upon revolution of said axis said second rotary disc is rotated; a lamp; a model vehicle; means for supporting said lamp and said model vehicle at the opposite sides of said multirotary disc mechanism; means for moving said model relative to said first rotary disc crosswise of said figure of a street drawn thereon; means including a screen on which the image of said model vehicle and the image of said figure of a street and said at least one vehicle on said first and second rotary discs are projected so as to be seen by the player of said game; and means operated by the player to change the rotational speed of said first rotary disc.

2. The vehicle-driving game of claim 1, wherein said multirotary disc mechanism comprises a first rotary disc made of a light-transmitting material, on which a figure of a street having a plurality of lanes is drawn, and a plurality of second rotary discs made of a light-transmitting material, on each of which a figure of at least one vehicle is drawn in the area corresponding to one of said lanes of the street on said first rotary disc, and wherein said differential gear means is provided for each one of said second discs.

3. The vehicle-driving game of claim 1, wherein said model vehicle is provided with a photosensitive element adapted to receive the light emitted by said lamp and produce an output signal when said light is intercepted by said figure of a vehicle on said second rotary disc.

4. The vehicle-driving game of claim 3, further including means operable in response to said signal to produce a sound similar to that produced upon collision of vehicles.

5. The vehicle-driving game of claim 3, further including means operable in response to said signal to stop the rotation of said first rotary disc for a predetermined relatively short period of time.

6. The vehicle-driving game of claim 5, further including means for counting the number of rotations of said first rotary disc for a predetermined period of time and indicating the counted number as the distance that said model vehicle has run.

7. The vehicle-driving game of claim 3, further including means for counting the number of signals produced by said photosensitive element during a predetermined period of time and indicating the counted number.

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