



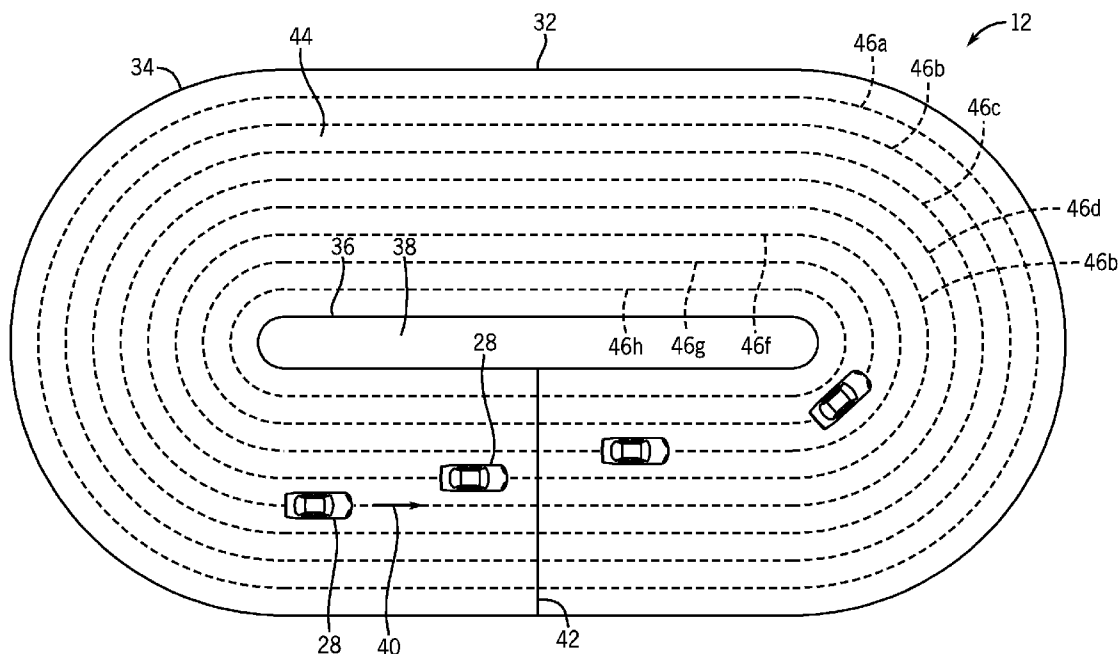
US 20110034254A1

(19) **United States**(12) **Patent Application Publication**
Toler(10) **Pub. No.: US 2011/0034254 A1**(43) **Pub. Date: Feb. 10, 2011**(54) **WIRELESS ENERGY TRANSFER FOR
ARCADE RACING GAME****Publication Classification**(75) Inventor: **Michael D. Toler**, Pulaski, WI (US)(51) **Int. Cl.**
A63F 9/14 (2006.01)(52) **U.S. Cl.** **463/61**

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MILWAUKEE, WI 53202 (US)(57) **ABSTRACT**(73) Assignee: **Bay Tek Games, Inc.**, Pulaski, WI
(US)

An arcade racing game includes a plurality of vehicles that move along a race track and derive power from the race track. The race track includes a series of concentric power supply coils embedded beneath the top surface of the race track. Each of the power supply coils receives a supply of power. Each vehicle operating on the race track includes a pickup coil that inductively receives current from the power supply coils. The induced voltage in the pickup coil is used to charge an internal power storage device and a drive motor within the vehicle.

(21) Appl. No.: **12/537,285**(22) Filed: **Aug. 7, 2009**

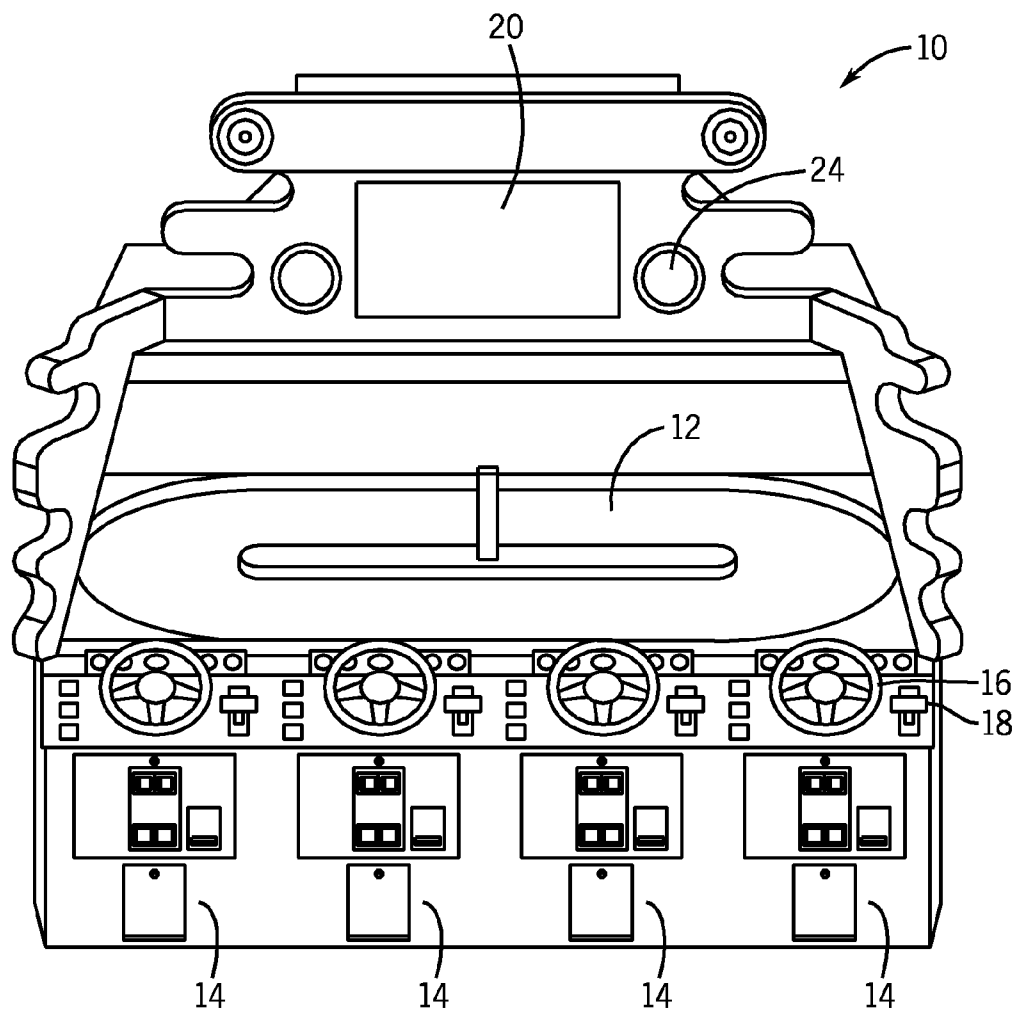


FIG. 1

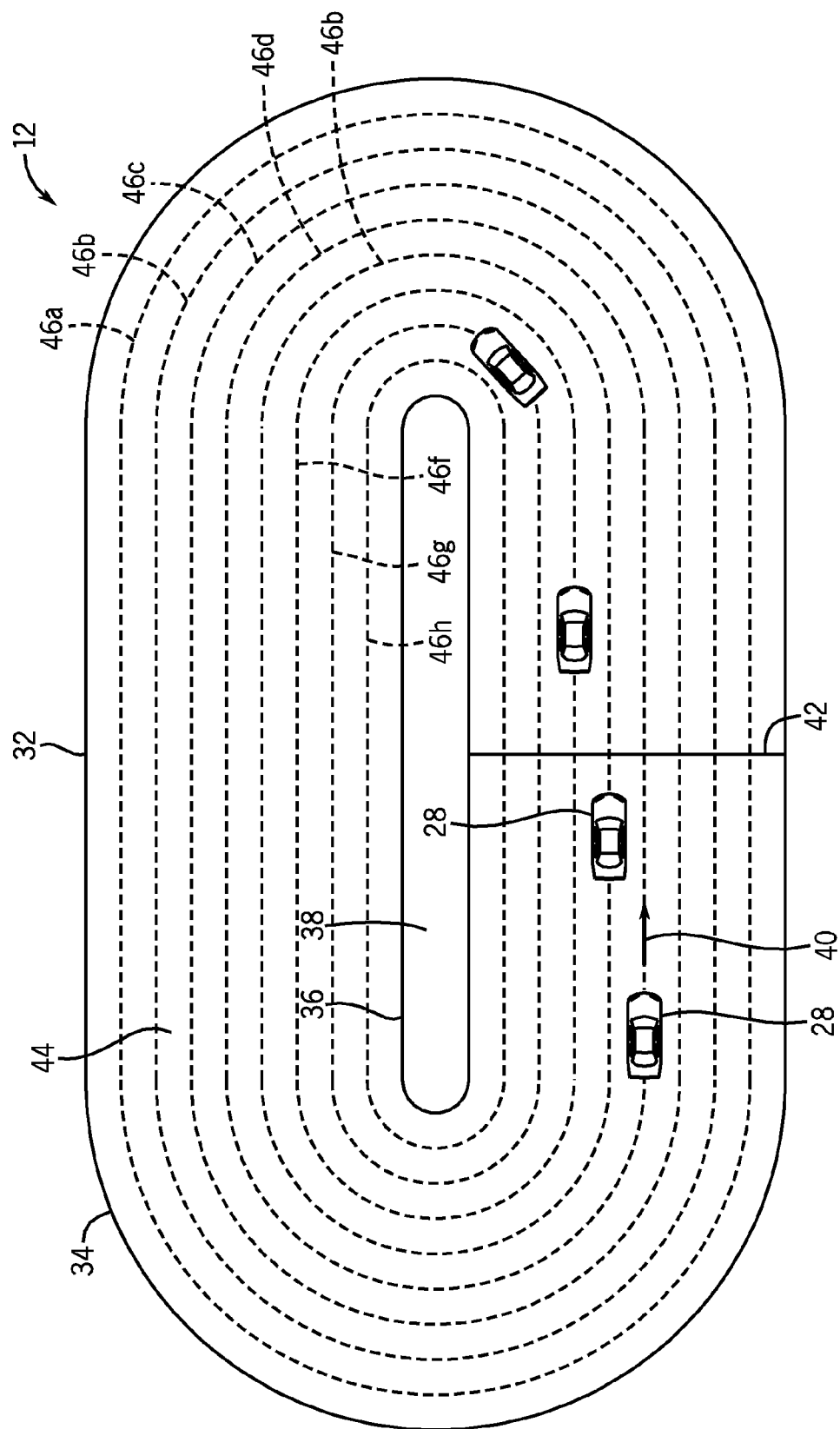
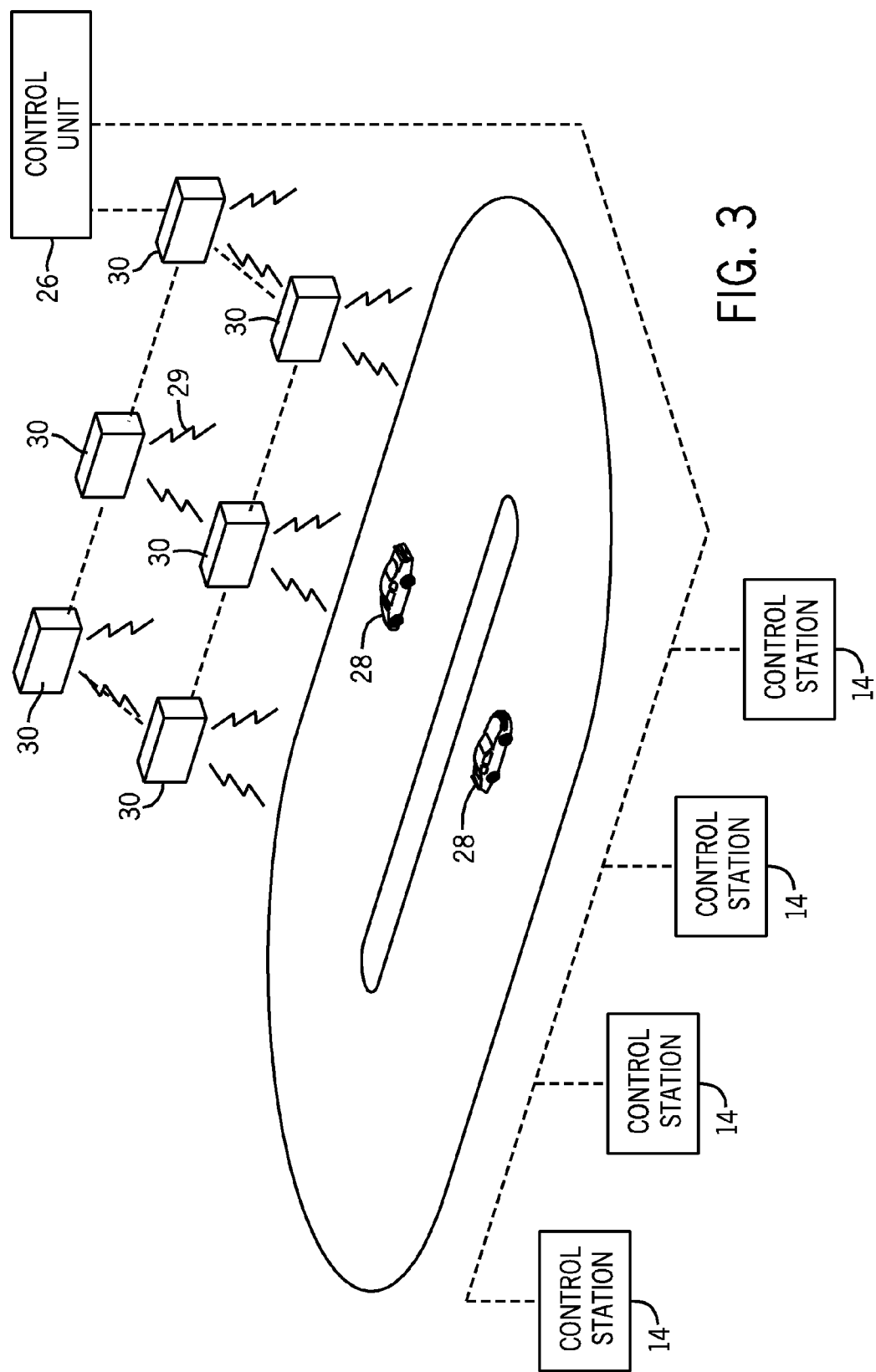


FIG. 2



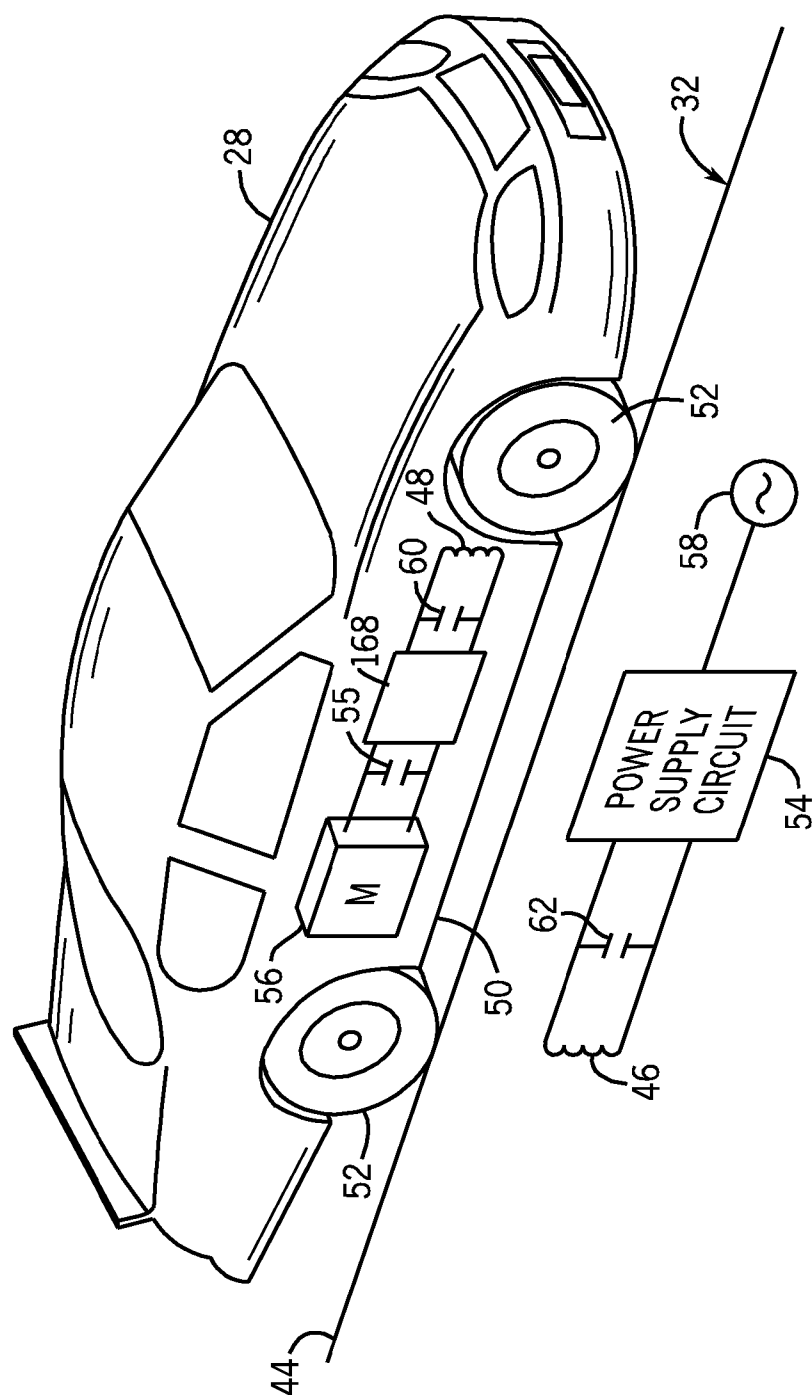


FIG. 4

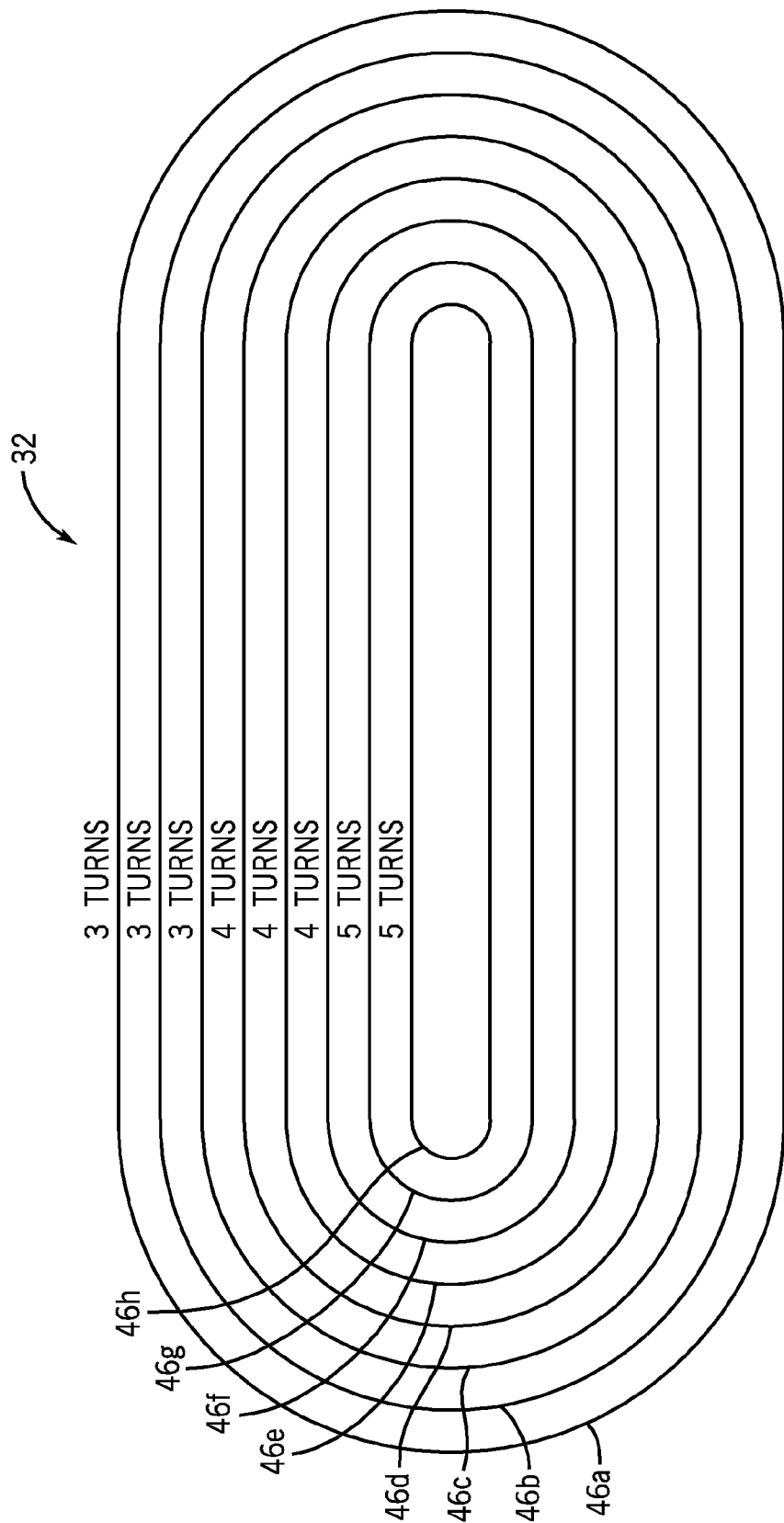
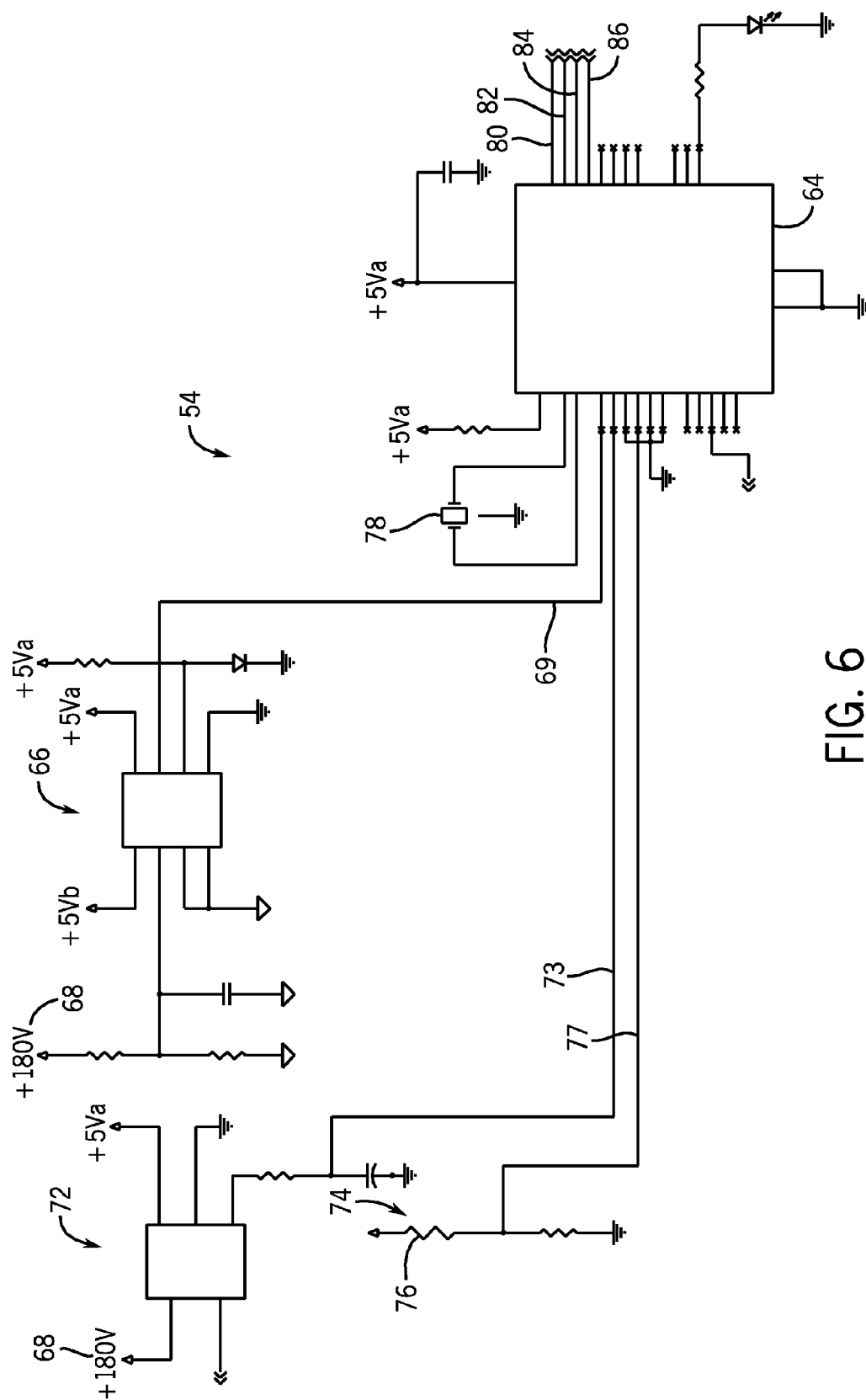


FIG. 5



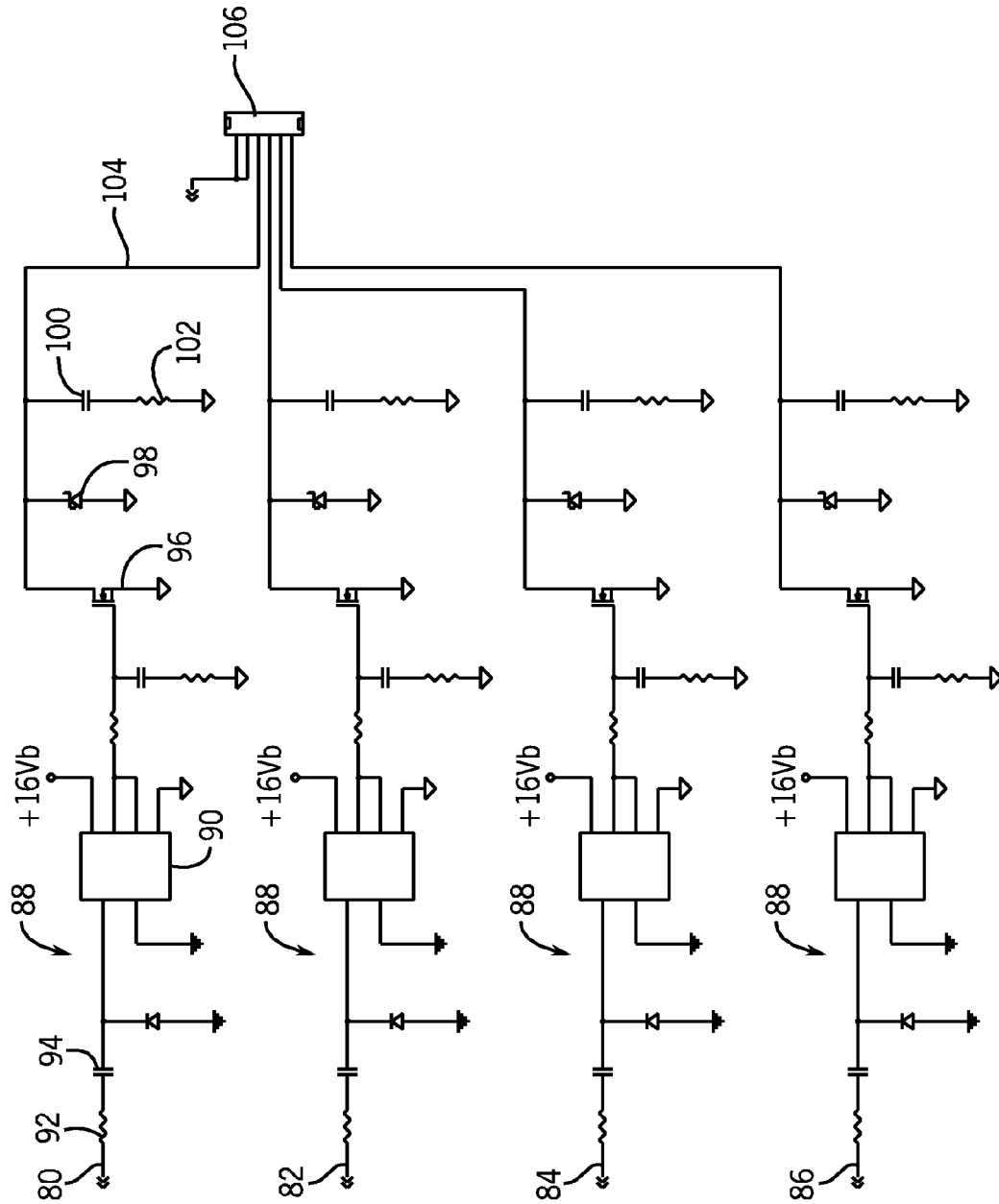


FIG. 7

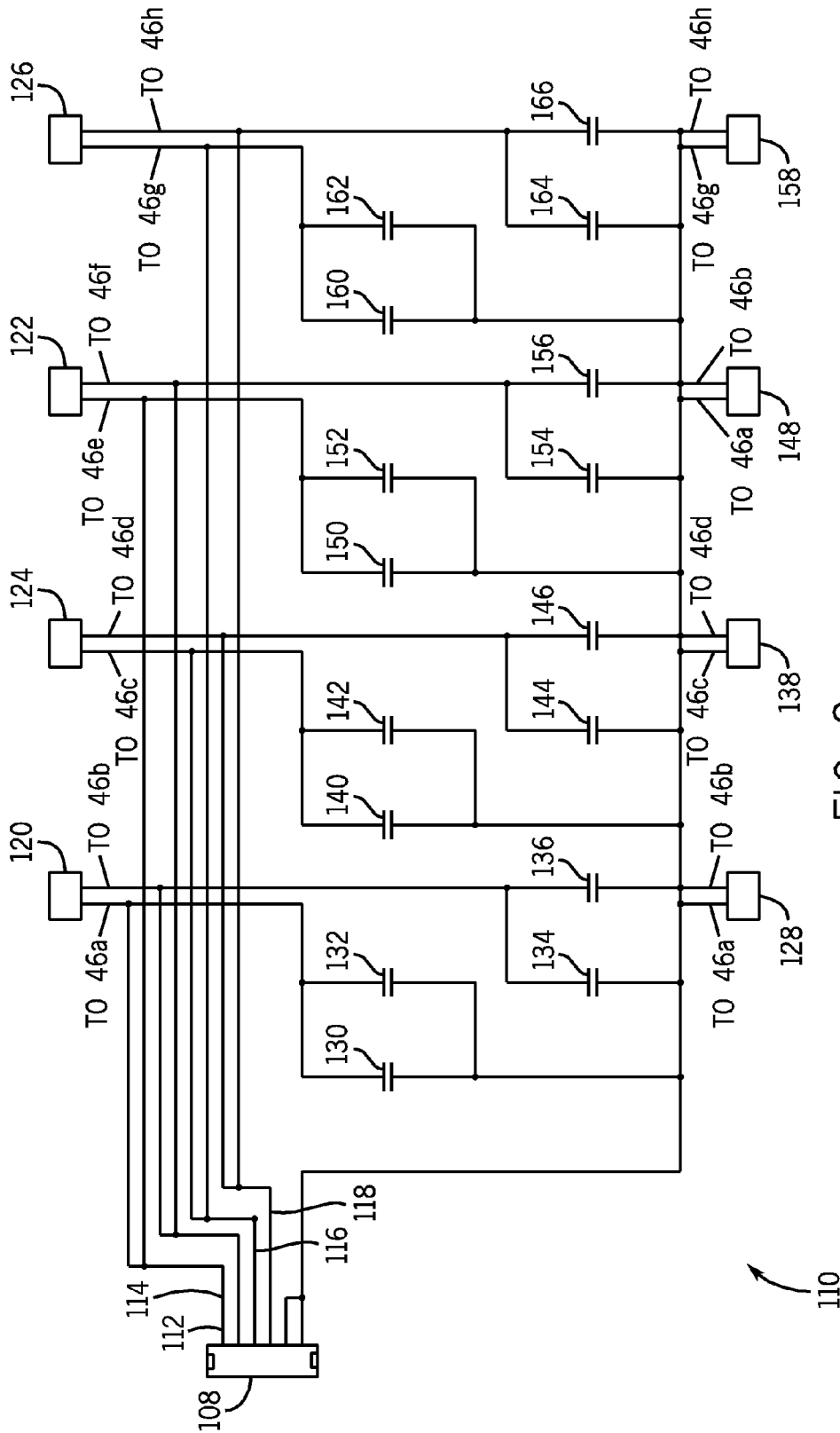


FIG. 8

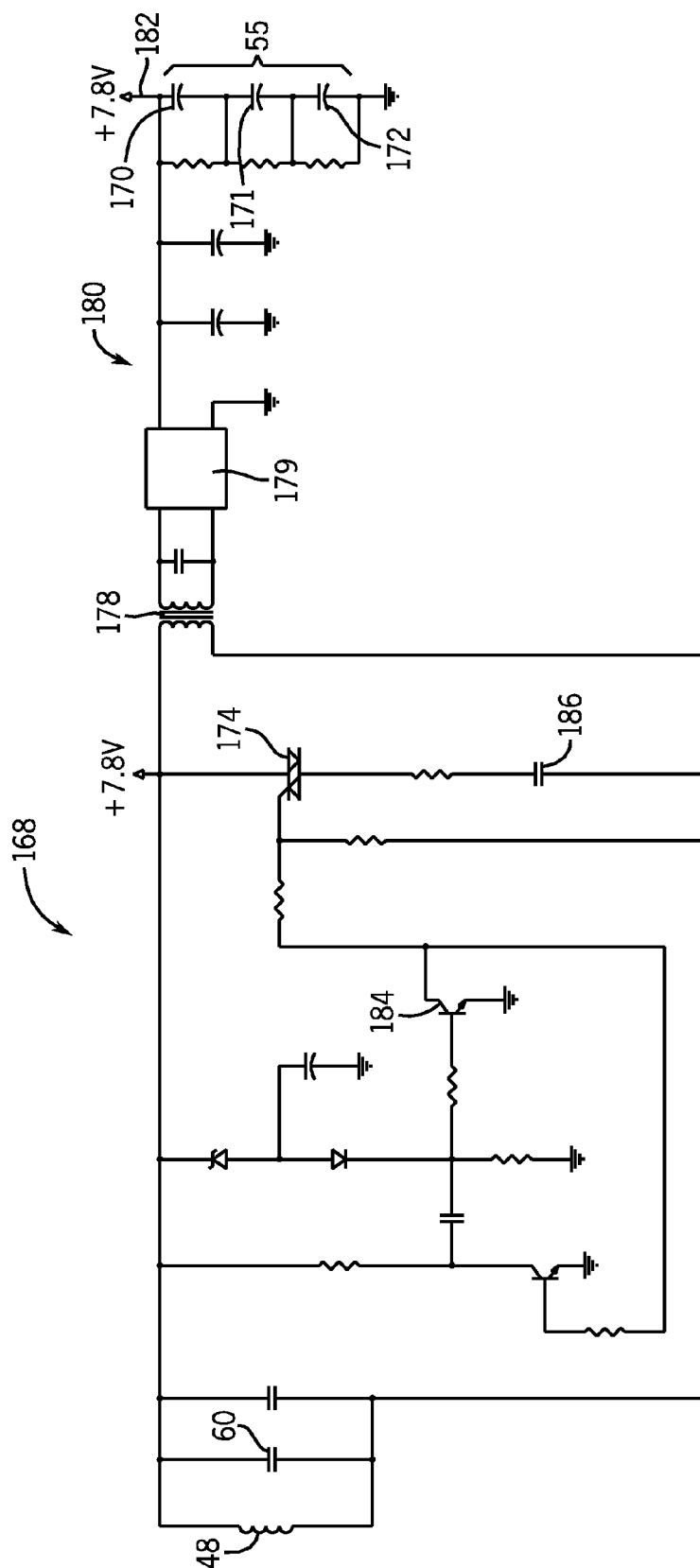


FIG. 9

WIRELESS ENERGY TRANSFER FOR ARCADE RACING GAME

BACKGROUND OF THE INVENTION

[0001] The present disclosure generally relates to an amusement game in which several players operate remote-controlled game objects, such as vehicles. The game may be coin-operated, but otherwise unattended. More specifically, the present disclosure relates to a wireless energy transfer arrangement that allows each of the vehicles to travel along the race track without being in physical contact with the race track yet receive power from the race track.

[0002] Presently, many different types of amusement games that include player-controlled moveable game objects, such as race cars, are available. One commercially available and successful amusement game is shown in U.S. Pat. No. 7,402,106. In the amusement game shown and described in the '106 patent, a series of cars are directed along a play field by players positioned at one of a plurality of control stations. In the amusement game shown in the '106 patent, each of the vehicles includes an internal battery that powers a drive motor within the vehicle as well as control circuitry that receives commands from each of the players operating the amusement game. Although the internal battery for each of the vehicles can be recharged, the stored power supply for each of the vehicles can become depleted, which results in interruption in game play.

[0003] Other systems, such as shown in U.S. Pat. Nos. 5,868,076 and 6,044,767 disclose track and vehicle systems in which the track includes a series of electrified strips. The electrified strips contact metal pads contained on the bottom of the vehicle such that energy is transferred from the track to the vehicle. In such a system, the vehicle no longer needs to include internal batteries.

[0004] However, the system of using electrified strips along the play surface and contacts on the bottom of the vehicle can restrict the movement of the vehicle across the track, since the contact pads of the vehicle must at all times be in contact with one of the electrified strips.

[0005] Therefore, it is desired to provide a race track that provides electric power to the vehicles yet does not inhibit the movement of the vehicle along the race track.

SUMMARY OF THE INVENTION

[0006] The present disclosure generally relates to an arcade racing game that includes a series of vehicles that move along a race track under player control. More specifically, the present disclosure relates to an arcade racing game that includes a wireless energy transfer system that induces voltage within each of the vehicles such that the vehicles operate without any internal power supply.

[0007] The arcade racing game includes a play field, such as a race track, over which one or more vehicles travel during game play. The race track includes a plurality of power supply coils that are positioned beneath the top surface. In one embodiment of the disclosure, the power supply coils are concentric with each other and each extend along the entire length of the race track. The power supply coils are equally spaced from each other from an inner boundary of the race track to an outer boundary of the race track. In one embodiment, the power supply coils positioned near the inner boundary include a larger number of turns of wire as compared to the outer power supply coils. The increased number of turns

of wire in the inner power supply coils allows the inductance of the inner power supply coils to be closer to the inductance of the outer power supply coils.

[0008] A power supply circuit is connected to each of the power supply coils to provide a source of electric power to each of the power supply coils. In one embodiment of the disclosure, the power supply circuit includes multiple driving circuits that each create an output voltage. In one embodiment, the drive circuit creates four output voltages that are successively 90° out of phase. In an embodiment of the disclosure, the race track includes eight power supply coils such that each phase generated by the power supply circuit is connected to two of the power supply coils.

[0009] Each of the vehicles movable along the race track includes a pickup coil contained within the vehicle. When power is supplied to the power supply coils positioned beneath the top surface of the race track, current is induced in the pickup coil of the vehicle when the vehicle is placed on the race track. The induced current from the pickup coil charges an energy storage device and drives an electric drive motor contained within the vehicle. Thus, when the race track is powered, each of the vehicles contained on the race track can be controlled by a player.

[0010] Various other features, objects and advantages of the invention will be made apparent from the following description taken together with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The drawings illustrate the best mode presently contemplated of carrying out the invention. In the drawings:

[0012] FIG. 1 is a front, perspective view of an arcade racing game that utilizes a wireless energy transfer system to power each of the plurality of vehicles;

[0013] FIG. 2 is a top view of the race track showing the position of a plurality of vehicles along the race track and the embedded power supply coils;

[0014] FIG. 3 is a schematic view illustrating the position of a series of sending units relative to the race track and the interaction between the control unit and the plurality of control stations;

[0015] FIG. 4 is a schematic illustration of the inductive coupling between one of the vehicles and the power supply circuit for the race track;

[0016] FIG. 5 is a top view illustrating the position of the inductive coils around the race track and the number of turns in each of the power supply coils;

[0017] FIG. 6 is a schematic illustration of a portion of the power supply circuit;

[0018] FIG. 7 is a schematic of an additional portion of the power supply circuit;

[0019] FIG. 8 is a schematic view of the connection of each of the phases generated by the power supply circuit to one of the power supply coils; and

[0020] FIG. 9 is a schematic illustration of the circuitry contained within each of the vehicles to inductively receive power and store power within the vehicle for driving a motor.

DETAILED DESCRIPTION OF THE INVENTION

[0021] FIG. 1 illustrates a coin-operated, arcade racing game 10. In this game, up to four players race 1/24th scale remote controlled game objects, such as race cars, on a play field 12, such as a race track. Other types of game objects can be operated in the same manner, and many other play fields

and game formats are possible besides racing games. In the embodiment shown in FIG. 1, the play field is a race track made in an oval shape, consisting of two straight sections joined together by two half-round curved sections. Many other track configurations are possible; this shape was chosen to conserve floor space. The play field allows the race cars to include full proportional steering (without slots or other limitations) as well as proportional throttle control. In the embodiment shown in FIG. 1, the arcade racing game 10 includes four control stations 14, each of which includes a steering controller 16 and a speed controller 18 to provide the input from a player to a computer control unit (not shown) to operate the race cars.

[0022] The object of the game is to drive the cars around the oval track as many times as possible during the playing time allowed. Each time a car completes a lap, the player is credited with one lap on the scoring system. The lap counts for the four cars are shown on the computer scoreboard 20. A computer-generated announcer's voice announces the progress of the race throughout speakers 24 and the number of the cars in each position. At the end of the time allowed for the game, the car with the most laps is declared the winner.

[0023] The player controls 14 consist of the steering controller 16 and the speed controller 18, which provide inputs from the control stations 14 to the computer control unit 26, as shown in FIG. 3. In the preferred embodiment, the control signals are sent to the individual vehicles 28 from the control unit 26 by digitally encoded command signals modulated on an infrared (IR) beam 29 sent by the control sending units 30. In the embodiment shown in FIG. 3, six sending units 30 are utilized, although other numbers of units are contemplated. Each of the vehicles 28 is assigned a unique address such that each vehicle responds only to the digitally encoded command signal meant for the vehicle. Specifically, each command signal includes an object address, steering position and throttle position for the vehicle 28. In the embodiment illustrated, each of the vehicles 28 receives the command signal approximately twenty times a second. Other transmission mediums could be utilized for this purpose, such as radio frequency signals, but IR light is relatively inexpensive to generate and has many benefits, including insensitivity to electrical noise.

[0024] Referring now to FIG. 2, the play field 12 is shown with four vehicles 28 positioned at various locations along the play field. In the embodiment illustrated in FIG. 2, the play field 12 is an oval-shaped race track 32 that has an outer peripheral edge 34 and an inner peripheral edge 36. The inner peripheral edge 36 is defined by a center island 38. During game play, each of the individual vehicles 28 moves around the track in the counter-clockwise direction illustrated by arrow 40 past a start/finish line 42.

[0025] The race track 32 has a generally planar, top surface 44 upon which each of the vehicles 28 rest and is driven. In the view shown in FIG. 2, a plurality of power supply coils 46a-46h are shown in dashed lines. The power supply coils 46a-46h are positioned immediately beneath the generally planar top surface 44 and are positioned concentrically around the race track 32. As illustrated in FIG. 2, the plurality of power supply coils 46a-46h are generally equally spaced between the inner peripheral edge 36 and the outer peripheral edge 34. The operation of the power supply coils 46a-46h will be described in much greater detail below. Although eight power supply coils 46a-46h are shown in the embodiment of FIG. 2, it should be understood that various numbers of power

supply coils could be utilized while operating within the scope of the present disclosure.

[0026] During operation of the arcade racing game, electrical power is supplied to each of the power supply coils 46a-46h. The current flowing through each of the coils 46a-46h creates a magnetic field which allows energy to be inductively transferred to each of the vehicles 28 when the vehicles 28 are positioned on the race track 32 between the inner and outer peripheral edges 34, 36. The inductive coupling between the power supply coils 46a-46h and the vehicles 28 allow the vehicles 28 to freely move along the race track 32 while receiving electrical power.

[0027] Referring now to FIG. 4, there is shown a schematic illustration of the wireless energy transfer between the race track 32 and one of the vehicles 28. In the schematic illustration of FIG. 4, the vehicle 28 includes an inductive pickup coil 48 having a series of windings that is positioned slightly above the base 50 of the vehicle 28. The base of the vehicle 50 is spaced above the top surface 44 of the race track 32 by the wheels 52 of the vehicle 28. In this manner, the base of the vehicle 50, and thus the pickup coil 48, is spaced above the top surface 44 of the track 32 and does not physically contact the top surface 44.

[0028] In the schematic illustration of FIG. 4, one of the power supply coils 46 is graphically illustrated. However, as described in FIG. 2, the arcade racing game includes a plurality of concentric power supply coils 46a-46h that are positioned around the race track 32. FIG. 4 illustrates only one of the power supply coils 46 for ease of understanding. The power supply coil 46 is positioned as close as possible to the top surface 44 to enhance the wireless energy transfer.

[0029] In accordance with the present disclosure, a power supply circuit 54 provides a driving voltage to the power supply coil 46. The current applied across the power supply coil 46 creates a magnetic field that induces current within the pickup coil 48 in the vehicle 28 when the pickup coil 48 is positioned close enough to the power supply coil 46. When current is induced in the pickup coil 48, the current charges an energy storage device 55, which in turn provides power to the drive motor 56 which causes the vehicle 28 to move along the race track 32. As illustrated in FIG. 4, the power supply circuit 54 is connected to a source of AC power, such as the electrical mains in most homes and businesses.

[0030] The details of the operation of the power supply circuit 54 and the drive circuitry within the vehicle 28 will be described in greater detail below. However, as can be understood in FIG. 4, the inductive coupling between the power supply coil 46 and the pickup coil 48 allows energy to be transferred wirelessly from the race track 32 to the vehicle 28. As a result of the wireless energy transfer, the vehicle 28 does not need to include any internal power supply, such as a battery, or any electrical contacts extending between the vehicle 28 and the race track 32.

[0031] In the embodiment shown in FIG. 4, the vehicle 28 includes a tuning capacitor 60 while each of the power supply coils 46 is also coupled to a similar tuning capacitor 62. The tuning capacitors 60, 62 allow for the optimization of the power transfer since the tuned resonant frequency is determined by the reciprocal of $2\pi\sqrt{LC}$. Thus, since the inductance of the pickup coil 48 and the power supply coil 46 are fixed, the tuning capacitors 60, 62 can be utilized to match the frequency for the systems. In the embodiment illustrated in FIG. 4, the tuning capacitor 60, 62 are utilized to adjust the

tuned resonant frequency to approximately 31 kHz, although other frequencies are contemplated as being within the scope of the present disclosure.

[0032] As described above, the tuned resonant frequency is dependent upon the inductance of each of the power supply coils. As shown in FIG. 5, the power supply coils 46a-46h each have a different length around the track. Specifically, the length of the outermost power supply coil 46a is much longer than the length of the innermost power supply coil 46h. In order to more closely match the inductance of the individual power supply coils, the innermost power supply coil 46h has five turns of wire. Specifically, the power supply coil 46h includes a strand of copper wire that makes five complete loops along the path shown in FIG. 5. Proceeding radially outward, the second power supply coil 46g also includes five turns. Power supply coils 46f, 46e and 46d all include four turns, while the three outermost power supply coils 46c, 46b and 46a include three turns. In this manner, the length of the wire in each of the coils are more closely matched to create inductance values in the same general range. Although the number of turns of wire for each of the power supply coils 46a-46h is shown in FIG. 5, it should be understood that different numbers of turns could be utilized while operating within the scope of the present disclosure.

[0033] FIG. 6 illustrates details of a first portion of the power supply circuit 54 shown in FIG. 4 as driving each of the power supply coils 46. Although a specific implementation of the power supply circuit 54 is shown, it should be understood that various other circuit configurations could be utilized while operating within the scope of the present disclosure. In the embodiment shown in FIG. 6, the power supply circuit 54 is centered around a controller 64, such as a microprocessor. The controller 64 has a series of input pins and output pins as is conventional. It should be understood that many of the connections for the controller 64 are not shown or described in detail since these connections are conventional and form no part of the present disclosure.

[0034] In the embodiment shown in FIG. 6, an over voltage sensing circuit 66 is connected between the power supply voltage 68 and an input pin 69 for the controller 64. The over voltage circuit 68 includes an opto-isolation circuit 70 that prevents the direct application of the power supply to the controller 64.

[0035] In addition to the over voltage circuit 66, the power supply circuit 54 also includes a current sensing circuit 72 that is also connected to the power supply voltage 68. The current sensing circuit supplies a signal to the controller 64 along line 73 upon an over current condition.

[0036] In the embodiment illustrated, the power supply circuit 54 includes a temperature sensor 74 having a thermistor 76. The temperature sensing circuit 74 provides a signal to the controller along line 77 upon an overheating condition.

[0037] An oscillator 78 provides a timing signal to the controller 64 as is conventional.

[0038] The controller 64 is a microprocessor that is operable to generate four separate output drive signals along output lines 80, 82, 84 and 86. In the preferred embodiment, the output signals along the output lines 80-86 are alternating current voltage signals that are offset from each other by 90°. Thus, the first output waveform along line 80 has a 0° phase shift. The second output signal along output line 82 is shifted 90°. The output signal along the third output line 84 is shifted 180°, while the fourth output signal along line 86 is shifted

270° relative to the first signal along line 80. In this manner, the four output voltage signals from the controller 64 are shifted 90° from each other, the benefits of which will be described in greater detail below.

[0039] Referring now to FIG. 7, each of the output lines 80-86 are connected to drive circuit 88. Since each of the output voltages along lines 80-86 are identical other than the 90° phase shift, the drive circuits 88 shown in FIG. 7 are identical. In the drive circuit 88 coupled to the output line 80, an opto-coupler 90 receives the output voltage signal after the voltage signal passes through a resistor 92 and capacitor 94. From the opto-coupler 90, the voltage passes through a drive transistor 96. A diode 98 prevents reverse conducting while the combination of capacitor 100 and resistor 102 provides voltage protection to prevent parasitic resonance. As illustrated in FIG. 7, the output of the drive circuit along line 104 is provided to a jumper 106.

[0040] Referring now to FIG. 8, the jumper 106 (FIG. 7) is connected to a similar jumper 108 of a capacitor board 110. The individual voltages leaving the jumper 108 are present on the output lines 112, 114, 116 and 118. As described previously, the voltage on line 112 is 0° out of phase, while the voltage on line 114 is 90° out of phase, the voltage on line 116 180° out of phase and the voltage on line 118 270° out of phase.

[0041] The voltage on line 112 is fed to pin 1 of terminal 120 and pin 1 of terminal 122. Likewise, the voltage on line 114 is fed to pin 2 of terminal 120 and pin 2 of terminal 122. The voltage on line 116 is fed to pin 1 of terminal 124 and pin 1 of terminal 126. Finally, the fourth output voltage on line 118 is fed to pin 2 of terminal 124 and pin 2 of terminal 126.

[0042] Referring now to FIGS. 5 and 8, the outermost coil 46a is connected between pin 1 of terminal 120 and pin 1 of terminal 128. As illustrated in FIG. 8, a pair of tuning capacitors 130 and 132 are positioned in parallel with the power supply coil 46a. The pair of tuning capacitors 130, 132 create a tank circuit with the inductive power supply coil 46a. The size of the tuning capacitors 130, 132 are selected to tune the resonance frequency of the supply coil 46a to approximately 31 kHz.

[0043] The second outermost supply coil 46b is connected across pin 2 of the terminal 120 and pin 2 of the terminal 128. As previously described, pin 2 of terminal 120 is connected to the second power line 114 which is 90° out of phase relative to the voltage on power line 112. A similar pair of tuning capacitors 134 and 136 are connected in parallel with the supply coil 46b to tune the resonant frequency.

[0044] The next power supply coil 46c is connected across pin 1 of terminal 124 and pin 1 of terminal 138. Tuning capacitors 140 and 142 are connected in parallel with the supply coil 46c. Supply coil 46c is connected to the third power supply line 116, which is 180° out of phase relative to the power supply line 112.

[0045] The fourth power supply coil 46d is connected across pin 2 of terminal 124 and pin 2 of terminal 138. Tuning capacitors 144 and 146 are connected in parallel with the power supply coil 46d. Power supply coil 46d is connected to the fourth power supply line 118 such that the voltage on the power supply coil 46d is 270° out of phase.

[0046] The fifth power supply coil 46e is connected across terminal 122 and pin 1 of terminal 148. Tuning capacitors 150, 152 are connected in parallel with the power supply coil 46e. Power supply coil 46e is connected to the first power

supply line 112, which is 0° out of phase. Thus, the first power supply coil 46a and the fifth power supply coil 46e are in phase with each other.

[0047] The sixth power supply coil 46f is connected across pin 2 of terminal 122 and pin 2 of terminal 148. Tuning capacitors 154 and 156 are connected in parallel with the sixth power supply coil 46f. Coil 46f is connected to the second power supply line 114 such that the sixth power supply coil 46f is in phase with the second power supply coil 46b.

[0048] The seventh power supply coil 46g is connected across pin 1 of terminal 126 and pin 1 of terminal 258. Tuning capacitors 160 and 162 are positioned in parallel with the seventh power supply coil 46g. Power supply coil 46g receives voltage that is in phase with the voltage supplied to the third power supply coil 46c. Finally, power supply coil 46h is connected across pin 2 of terminal 126 and pin 2 of terminal 158. Tuning capacitors 164 and 166 are connected in parallel with the eighth power supply coil 46h. The voltage supplied to power supply coil 46h is in phase with the voltage supplied to the fourth power supply coil 46d.

[0049] As described previously, the length of wire in each of the coils 46a-46h vary, which results in a different value for the inductance of each coil. Since the inductance of each coil is different, the tuning capacitors shown in FIG. 8 are utilized to generate a common resonant frequency. As described, the resonant frequency is the reciprocal of $2\pi\sqrt{LC}$ where L is the inductance and C is the value of the tuning capacitors. As can be understood by the above equation, changing the value of the tuning capacitors allows the resonant frequency for each power supply coil to be matched.

[0050] As can be understood in the discussion of FIG. 8, the power supply circuit of the present disclosure includes four separate driving circuits that create voltages each 90° out of phase. The four separate driving circuits are used to power the eight coils shown in FIG. 5. Although four separate driving circuits are disclosed, it should be understood that eight driving circuits could be utilized while operating within the scope of the present disclosure. In such an embodiment, the phase of each coil would be 45° out of phase instead of the 90° out of phase previously described.

[0051] Referring now to FIG. 9, there is shown the internal power transfer circuit 168 for the vehicle 28 shown in FIG. 4. As illustrated in FIG. 9, the power transfer circuit 168 includes the pickup coil 48 and the tuning capacitor 60. As described previously, the tuning capacitor 60 creates a tank circuit with the pickup coil 48 and is used to configure the tank circuit to have a resonant frequency of approximately 31 kHz.

[0052] When the vehicle is positioned on the track and power is supplied to the series of power supply coils, current is induced within the pickup coil 48. The current across the pickup coil is received at the primary winding of the transformer 178. The secondary side of the transformer 178 is connected to an isolation circuit 179 which in turn feeds the power storage device 55. In the embodiment shown in FIG. 9, the power storage device 55 includes three individual capacitors 170, 171 and 172. Although the embodiment shown in FIG. 9 includes three separate capacitors 170-172, it should be understood that the storage device 55 could be replaced by a single capacitor while operating within the scope of the present disclosure.

[0053] The voltage stored by the energy storage device 55 is particularly useful when the motor of the race car requires a sudden increase in current, such as during acceleration. The

stored energy across the series of capacitors 170-172 allows the motor to draw an increased current value during acceleration.

[0054] The control circuit 168 shown in FIG. 9 further includes an over voltage protection circuit. Specifically, when the voltage across the primary winding of the transformer 178 exceeds 7.5 volts, current is applied to the base of transistor 184, which causes transistor 184 to turn on, which in turn turns on triac 174. When triac 174 is turned on, capacitor 186 is connected in parallel with tuning capacitor 60. The size of capacitor 186 is selected such that when tuning capacitor 186 is in parallel with capacitor 60, the resonant frequency for the tank circuit drops from approximately 31 Hz to 15 kHz. This change in resonance frequency generally decouples the power transfer circuit 168 from the voltage supply circuit within the track, thus resulting in a drastic reduction in induced voltage. In this manner, the drive circuit 168 limits the amount of voltage across transformer 178.

[0055] As can be understood by the above description of the drawing figures, the arcade racing game of the present disclosure allows power to be induced in the vehicles without any direct physical induction between the vehicle and the race track. Further, the inductive coupling between the vehicles and the race track allows each vehicle to be operated without any electrical contacts or internal battery. Thus, each of the vehicles is freely movable along the race track without any requirements for physical contact between the race car and the race track.

[0056] Although the embodiments shown in the figures illustrate a racing game having a series of race cars, it is contemplated that the various other types of amusement games could be utilized while operating with the description of the present disclosure. As an example, as contemplated by other games, such as soccer, hockey, horse racing or similar games in which a player controls the movement of a game object along a play field could be utilized while operating within the scope of the present disclosure. In each of these alternate embodiments, the game object would include a pickup coil while the play field would include the concentric power supply coils. The disclosure of the present invention is not meant to be limiting as to the type of amusement games possible, but rather is meant to be illustrative of currently contemplated amusement games that could operate within the scope of the present disclosure.

I claim:

1. An arcade racing game comprising:

a play field having a plurality of power supply coils positioned beneath a top surface;

a power supply circuit connected to the plurality of power supply coils to provide a source of electric power to each of the power supply coils; and

at least one remotely operated vehicle movable along the play field, the vehicle including a pickup coil contained within the vehicle and an electric drive motor coupled to the pickup coil,

wherein when the vehicle is positioned on the playfield, the pickup coil is inductively coupled to at least one of the plurality of power supply coils such that electricity is induced in the pickup coil to power the drive motor.

2. The arcade racing game of claim 1 wherein the power supply coils are concentrically positioned beneath the top surface.

3. The arcade racing game of claim 2 wherein the power supply circuit generates a plurality of power signals, wherein each of the power signals are provided to different power supply coils.

4. The arcade racing game of claim 3 wherein the power signals are each phase shifted relative to the other power signals.

5. The arcade racing game of claim 3 wherein the play field includes eight power supply coils and the power supply circuit generates four power signals, wherein each of the four power signals are connected to two of the power supply coils.

6. The arcade racing game of claim 1 wherein the vehicle includes a tuning capacitor coupled to the pickup coil to tune the resonant frequency of the vehicle.

7. The arcade racing game of claim 4 wherein the power supply circuit includes a tuning capacitor coupled to each of the power supply coils such that a resonant frequency of each power supply coil and the associated tuning capacitor can be selected.

8. The arcade game of claim 1 wherein the vehicle further comprises an energy storage device positioned between the pickup coil and the drive motor to store electricity from the pickup coil and power the drive motor.

9. The arcade game of claim 4 wherein the power supply circuit includes a control unit that controls the phase of each of the power signals.

10. The arcade game of claim 2 wherein each of the power supply coils includes a plurality of loops of wire.

11. The arcade game of claim 10 wherein the power supply coils are concentric with each other and the outermost coils have a smaller number of loops of wire relative to the innermost coils.

12. The arcade racing game of claim 1 wherein the pickup coil is positioned above the top surface of the play field such that the pickup coil does not touch the top surface.

13. An arcade racing game, comprising:

a plurality of control stations each having a steering controller and a speed controller;

a track having a top surface that defines a race course, the track having a plurality of concentric power supply coils positioned beneath the top surface;

a power supply circuit connected to each of the plurality of power supply coils to supply electric power to the power supply coils;

a plurality of vehicles movable along the race course, wherein each of the vehicles includes a pickup coil, an energy storage device and a drive motor,

wherein the pickup coil of each vehicle is inductively coupled to the power supply coils when the vehicle is positioned on the track such that electricity is induced in the pickup coils when electric power is supplied to the power supply coils.

14. The arcade racing game of claim 13 wherein the track extends between an inner boundary and an outer boundary, wherein the power supply coils are equally spaced between the inner boundary and the outer boundary.

15. The arcade racing game of claim 14 wherein the pickup coil is inductively coupled to different power supply coils as the vehicle moves between the inner and outer boundaries.

16. The arcade game of claim 13 further comprising a control unit that generates control signals to each of the vehicles based upon the position of the steering controller and the speed controller of each of the control stations.

17. The arcade racing game of claim 13 wherein the power supply circuit generates a plurality of power signals, wherein each of the power signals are provided to different power supply coils.

18. The arcade racing game of claim 17 wherein the power signals are each phase shifted relative to the other power signals.

19. The arcade racing game of claim 13 wherein the vehicle includes a tuning capacitor coupled to the pickup coil, wherein the tuning capacitor is selected to tune a resonant frequency of the vehicle.

20. The arcade racing game of claim 19 wherein the power supply circuit includes a tuning capacitor coupled to each of the power supply coils, wherein the tuning capacitor is selected to tune the resonant frequency of each of the power supply coils such that tuning frequency of each of the power supply coils and the associated tuning capacitor is generally matched.

* * * * *