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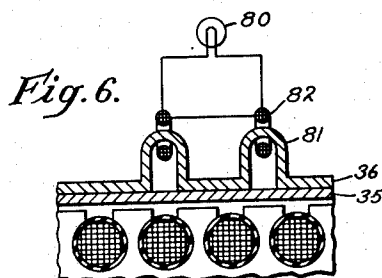
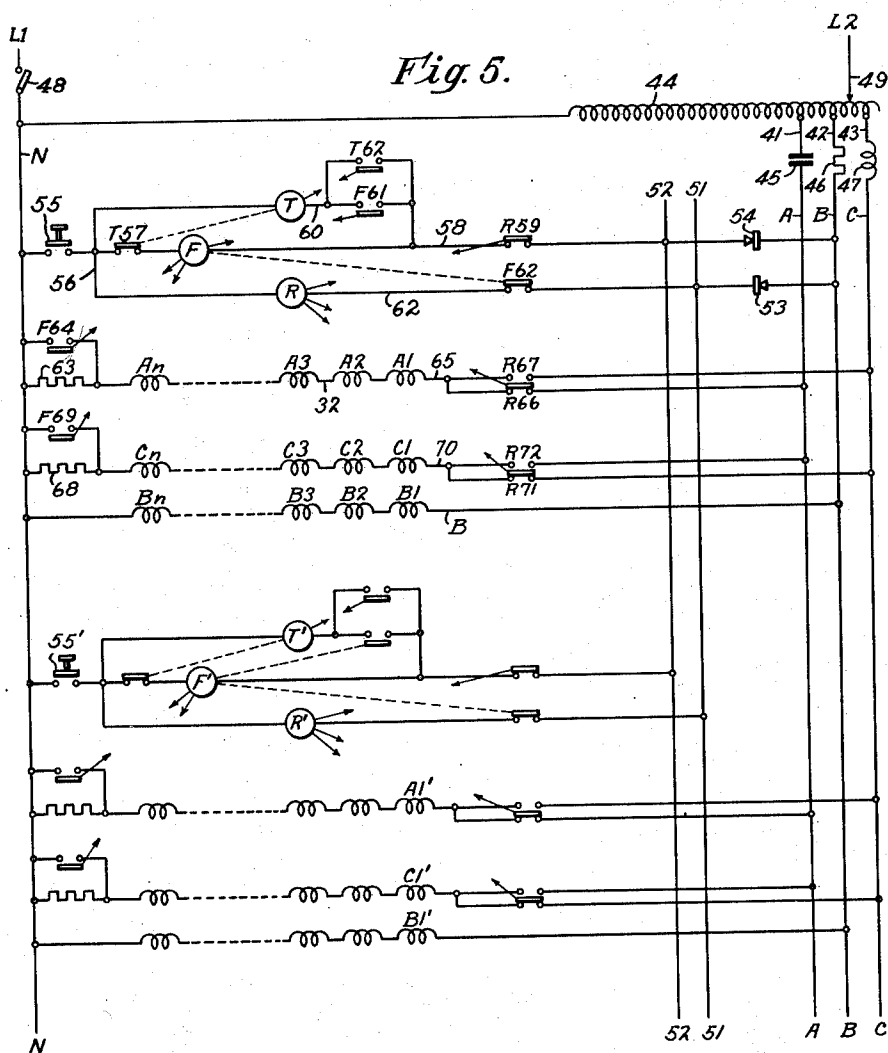
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LINEAR MOTOR RACING GAME

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WITNESSES:

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LINEAR MOTOR RACING GAME

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19 Claims. (Cl. 273—86)

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My invention relates to linear-motor game-devices, involving improvements in the art of linear motors and in the art of game-devices.

An object of my invention is to provide a racing-game in which each operator may substantially instantaneously control his racing-car by means of an on-or-off control-device which is associated with a chance-means which will cause an on-position of the control-device either to accelerate or retard his car. A timing-means is provided for limiting the time during which any car can be accelerated beyond its normal operating-speed, so that the game consists in each operator trying to win the race by making the best use of the control-device at his disposal, under these circumstances.

A further object of my invention is to provide a game-device of the class just described, in which a plurality of racing-cars constitute the moving elements of a plurality of linear motors, there being a separate linear-motor drive for each car, and a separate linear-motor control, under the chance-dominated control of a separate operator for each car.

A further object is to provide an improved stationary primary member for a linear motor, having angle-irons acting as lateral pole-face extensions.

A more specific object of my invention is to provide a chance-responsive control-means, for selecting either one of two eventualities, by means of two relay-circuits, each receiving a succession of impulses, the impulses alternating with each other, so that, when the operator attempts to make a choice between the two eventualities, his choice depends upon which relay-circuit happens to have a voltage-impulse in it at the moment when the operator completes the circuit.

A more specific object of my invention is to provide a racing-game of the chance-dominated linear-motor type, in which there is an inductively energized electric light in each car, so that the brilliance of the light will afford a visual indication of the amount of energy which is operative on each car at each instant. As a part of this object of the invention, I provide each car with a flat armature-plate having one or more inwardly bent portions, and winding-means carried by said one or more inwardly bent portions for constituting a source of induced voltage within the car.

With the foregoing and other objects in view, my invention consists in the apparatus, combinations, systems, circuits, parts and methods of design and operation, hereinafter described and claimed, and illustrated in the accompanying drawing, wherein

Figure 1 is a fragmentary plan-view of a portion of a two-track racing-game embodying my invention, showing one of the racing-cars in position in its raceway, with the top part of

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the car broken away to show a horizontal sectional view on the section-plane I—I in Fig. 2,

Fig. 2 is a longitudinal sectional view on the section-plane II—II in Fig. 1,

Fig. 3 is a transverse sectional view on the section-plane III—III in Fig. 1,

Fig. 4 is a fragmentary view similar to Fig. 3, showing a modification,

Fig. 5 is an across-the-line diagrammatic view of circuits and apparatus illustrative of the electrical control part of my invention, and

Fig. 6 is a fragmentary vertical longitudinal sectional view of a portion of a racing-car, illustrating the means for energizing an electric light in the car.

As shown in Figs. 1, 2 and 3, I provide a racing-game in which there are a plurality of raceways 1 and 2. In the illustrative form of embodiment of my invention, a rigid channeled race-track structure is provided having a flat base 3 and a plurality of vertical ribs 4, 5 and 6 upstanding therefrom, with two thin insulating track-floor plates 7 and 8 supported, at an intermediate level, between the pairs of adjacent vertical ribs 4, 5 and 5, 6, so that the upwardly projecting portions of the ribs 4, 5 and 6, above the track-floors 7 and 8, constitute lateral guides for defining a separate raceway for each racing-car.

There is a separate racing-car for each of the plurality of raceways 1 and 2. As these cars are all alike, a description of one will suffice for all. As shown, each car is composed of a light car-body 10 which is supported on wheels 11 and 12, the front wheels 12 being preferably pivoted on a steering-bar 13 pivoted at 14. The rear end of the steering-bar 13 is biased to its normal straight-forward position by means of a spring 15, while the front end of the steering-bar 13 is forked at 16 and provided with two small lateral pilot-wheels 17 which engage the respective sides of the raceway in which the car is located, to steer the car around the curves of the track. The rear end of the car 10 is also preferably provided with two laterally directed wheels 18 for preventing any portion of the car from rubbing against the sidewalls of its raceway.

In the preferred form of embodiment of my invention, as illustrated, each racing-car 10 constitutes the movable element of a separate linear-motor assembly. Each linear-motor assembly has a stator-element 20 which is disposed immediately underneath the track-floor 7 or 8 for its particular raceway. Each stator-element comprises an elongated magnetizable member 21 which is separated from its associated racing-car 10 by an airgap 22 within which the track-floor 7 or 8 is located. The magnetizable member 21 comprises at least one, and preferably two, flanged members such as angle-irons 23, with one of their flange-sides 24 disposed flat up against

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the associated track-floor 7 or 8, and with their other flange or flanges extending downwardly, in back-to-back relation if there are two angle-irons 23, as shown. These two angle-irons 23 may constitute all of the magnetizable member 21 of the stator-element 20, as shown in Fig. 4, but preferably, as shown in Fig. 3, the magnetizable member 21 also includes a stack of magnetizable laminations 26 which lie between the downwardly extending vertical flanges 25 of the two angle-irons 23. In either event, the two horizontal flanges 24 of these angle-irons, which are the airgap-bordering sides of the magnetizable member 21, constitute lateral pole-face extensions for the centrally disposed vertical flanges 25 of the two angle-irons 23, in Fig. 4, or for these two vertical flanges 25 and the airgap-bordering edges 27 of the stack of laminations 26, in the form shown in Fig. 3.

The magnetizable member 21 of the stator-element 20 has its top wall-portion, or airgap-side, notched or slotted at regular intervals, as shown at 30, and a polyphase winding 31 is associated with said notches or slots 30. By way of illustration, I have shown the polyphase winding 31 as a three-phase winding; the successive phases of which are lettered A, B and C, and the successive coils of which are distinguished by numerals following the letter-designation of the phase, such as the coils A1, A2, A3 . . . An, for phase A. These coils are provided in successive slots or notches 30, and preferably, according to my invention, each coil lies in a plane which is transverse to the direction of elongation of the elongated flanged magnetizable element 21, after the manner of a Gramme-ring winding, with the distinction, however, that Gramme-ring windings have not been provided, heretofore, on a magnetizable core having projecting side-flanges 24 to provide lateral pole-face extensions for the magnetizable core.

I have found that this particular disposition and arrangement of the winding 31 on the magnetizable member 21 is particularly necessary and desirable in a racing-game device in which there are a plurality of racing-tracks disposed close together, alongside of each other, so that there is not very much lateral room for the windings 31. If the winding-coils had been disposed horizontally, with one coil-side in one slot 30, and another coil-side in another slot 30, further along the magnetizable member 21, as in ordinary modern construction, the superposed layers of the end-winding portions of the coils would require too much lateral width, alongside of the longitudinally extending magnetizable member 21, to make it possible for the several raceways 1 and 2 to be disposed up close alongside of each other. Thus, the provision of the transverse, or Gramme-ring, type of coils provides a distinct advantage in reducing the lateral space occupied by the winding, on either side of the magnetizable element 21, and the provision of the laterally directed pole-face flanges 24 still further reduces the lateral space-requirements of the winding, because the lateral sides of the winding lie beneath or back of the horizontal flanges 24, so that the winding does not require any extra lateral width, over and above the transverse width of the airgap 22. My novel flanged Gramme-ring structure also results in a much shorter length of winding-wire.

With the illustrated form of construction of the polyphase winding 31 and the flanged elongated magnetizable member 21, the successive

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coils, such as A1, A2, etc., of the same phase, may be serially connected together by means of a single conductor 32 which can be run along either side of the stator-element 20.

The stator-element 20, as just described, thus constitutes a flat or developed primary member of a polyphase induction motor, in which a travelling magnetic wave is established, as is inherent in linear-motor constructions.

Each racing-car 10 constitutes the secondary member, or movable element, of its own linear-motor assembly. The bottom of each car is flat, and is disposed with only a small clearance above the track-floor 7 or 8 as the case may be, so as to provide the moving-element terminal of the airgap 22 of the linear-motor. The bottom or airgap-side of each car 10 includes a flat conducting plate 35, which is surmounted by a flat magnetizable armature-plate 36, for completing the magnetic circuit of the linear-motor, as will be obvious, while the conducting bottom-plate 35 acts as an eddy-current member, or short-circuited induction-member, in which currents are induced by the travelling magnetic field of the stator-element 20.

Any suitable polyphase source may be used, having any desired number of phases. By way of illustration, I have shown, in Fig. 5, a split-phase three-phase system in which a three-phase line A, B, C is energized from taps 41, 42 and 43 of an autotransformer 44, through a capacitor 45, a resistor 46 and an inductor 47, respectively. The autotransformer 44 is energized, through a switch 48, from a single-phase line L1, L2, through an adjustable primary-tap 49.

The control for my linear motors requires a double-circuit electric-supply means for making available two sets of intermittent voltage-impulses, which are provided in two relay-buses 51 and 52. While any one of several means might be used for energizing these relay-buses 51 and 52, I have chosen to illustrate a simple means whereby two rectifiers 53 and 54, connected in opposite polarities, are used to energize these relay-buses 51 and 52 from a suitable single-phase source, such as any one of the phases, say phase B, of the polyphase supply A, B, C. In this manner, the relay-bus 51 is provided with a succession of positive half-wave voltage-impulses, whereas the relay-bus 52 is provided with a series of negative half-wave voltage-impulses, in such manner that the voltage-impulses in one relay-bus occur during moments when there are substantially no voltage-impulses impressed upon the other relay bus.

In Fig. 5, a common return-circuit or neutral-bus N is provided for both the polyphase linear-motor currents and the intermittent control-circuit currents. The several buses N, 52, 51, A, B and C are common to all of the linear-motor assemblies, but each assembly has its own individual control-equipment and its own individual polyphase energizing-connections. As the equipment and connections for each of the linear-motor devices are identical, a description of one will suffice for all, and primes will be used to distinguish the second equipment.

While I have shown only two linear-motor equipments and controls, and only two raceways 1 and 2, it will be understood that any desired number of raceways may be provided, with an individual equipment for each.

As shown in Fig. 5, the control for each linear-motor assembly consists of a pushbutton 55, which is connected between the neutral bus N

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and a conductor 56. Each control-equipment also includes a "forward" relay F, a "reverse" relay R and a timing relay T. In each case, the operating coil of the relay is designated by a letter corresponding to the relay-designation, while the several contact-members which are carried by these relays are distinguished by the relay-letter, followed by a distinguishing number, and the mechanical interconnection between each relay-coil and its associated contacts is also indicated by means of arrows or broken lines, which are intended as a conventional symbol for indicating these mechanical connections between the relay-parts.

From the conductor 56 in Fig. 5, a relay-circuit continues, through a back-contact T57 of the timer T, to the operating or control-coil F of the forward-relay F, and thence to a conductor 58. The circuit continues from the conductor 58, through a back-contact R59 of the reverse relay R, to the relay-bus 52.

A second circuit is also provided, from the conductor 56, through the operating or control-coil T of the timing relay T, and thence to a conductor 60, which is connected to the conductor 58 through two parallel circles, one containing a make-contact F61 of the forward relay F, and the other containing a make-contact T62 of the timer T.

A third relay-circuit is provided from the conductor 56, including the operating or control coil R of the reversing relay R, and thence to a conductor 62, which connects to the back-contact F62 of the forward relay F, and thence to the relay-bus 51.

The polyphase linear-motor connections are shown, in Fig. 5, as comprising three separate circuits for the three different phases. The phase-A connections start with the neutral bus N, and include a resistor 63 which is shunted by the make-contact F64 of the forward relay F. The resistor 63 energizes the phase-A winding-coils A_n to A₁, from which the circuit continues, through a conductor 65. The conductor 65 is normally connected to the phase-A supply-bus A by means of a back-contact R66 of the reversing relay R, but it may also be connected to the phase-C bus C by means of a make-contact R67 of the reversing relay R. The phase-C circuit of the linear motor starts with a resistor 68 which is shunted by a make-contact F69 of the forward relay F. The resistor 68 completes a circuit from the neutral bus N to the coils C_n to C₁ of the motor, and thence to a conductor 70. The conductor 70 is normally connected to the phase-C bus C through the back-contact R71 of the reversing relay R, but it may be connected to the phase-A bus A through a make-contact R72 of the reversing relay R. The phase-B coils B_n to B₁ of the linear motor are directly connected between the neutral bus N and the phase-B bus B of the polyphase supply, as shown in Fig. 5.

In the operation of my device, the race is started by the closure of the starting-switch 48, which energizes the entire equipment. At the start, each linear motor is provided with a moderate polyphase energization in the "forward" phase-sequence, so that all of the racing-cars 10 are started in the forward direction, so as to run at a moderate speed, or with a moderate driving-force applied thereto, the degree of energization being limited by the two resistors 63 and 68 in the A-phase and C-phase, respectively, of the motor. To win the race, each operator must manipulate his own control pushbutton 55,

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so as to try to accelerate his racing-car as much as possible, but when the operator depresses his control-button 55, he does not know whether a positive voltage-impulse will be present in the relay-bus 51, or whether a negative voltage-impulse will be present in the relay-bus 52, at the first instant of contact of the pushbutton 55. It is thus a matter of chance, whether the "reverse" relay R will pick up, in response to the positive-impulse bus 51, or whether the "forward" relay F will pick up, in response to the negative-impulse bus 52.

If the reversing relay R picks up, it reverses the phase-sequence of the polyphase motor-energization, at the reversing contacts R66, R67 and R71, R72, thus developing a motor-driving force tending to drive the racing-car in the backward direction. As soon as the car commences to retard, as a result of the energization of the reversing relay R, the operator, of course, releases the pushbutton 55 as soon as he can, after which the reversing relay R drops out and restores the original connections.

If, however, the "forward" relay F picks up, its contacts F64 and F69 cut out the resistors 63 and 68, thus increasing the amount of voltage which is effectively applied to the polyphase windings of the linear motor. Since a phase-splitting means is utilized to obtain a polyphase source, the phase-differences between the three polyphase phases A, B and C is dependent somewhat upon the amount of load-impedance which is connected to the several phases A, B and C, and hence the cutting out of the resistors 63 and 68 will also have some phase-shifting effect, in addition to increasing the effective voltage which is applied to the motor. The phase-splitter design is preferably such that the best approach to a symmetrical three-phase system is obtained during the operating-conditions when the resistors 63 and 68 of one or more of the linear-motor combinations are cut out, so that the picking up of the "forward" relay F not only increases the effective motor-voltage, but which also makes the power-supply to the motor more nearly a balanced three-phase supply, so that both effects contribute to cause a stronger forward-driving force to be applied to the associated racing-car 10.

If it were possible to do so, an operator who once succeeded in energizing the forward-relay F of his control-apparatus would thereafter keep his pushbutton 55 depressed for the rest of the race, so that the outcome of the race would not depend upon the skill or judgment of the operator. To prevent this, and to make an interesting game, I have provided a timing relay T which is energized only whenever the forward-relay F is energized, or rather, which is energized in response to the energization of the forward relay F, because the forward relay F picks up its make-contact F61 in the energizing-circuit of the timing relay T. The timing relay T then picks up, within a suitable small time, and its back-contact T57 deenergizes the forward relay F, causing the latter to start to drop out. At the same time, the timing relay closes an auxiliary holding-circuit T62 for maintaining the energization of the timing relay T after the opening of the contact F61 of the forward relay. When the forward relay F drops out, it opens its contacts F64 and F69, which thus reinsert the resistances 63 and 68 in the motor-circuits, thus restoring the initial operating-conditions. The timer relay T remains energized, however, as long as the opera-

tor keeps his pushbutton 55 depressed, so that the operator is forced to release the pushbutton 55, and to try over again, for a favorable chance at energizing the forward-relay F, while being very quick to release the reversing relay R, if he chances to energize that relay, in order to win the race. The outcome of the race is thus dependent upon the quickness and skill and good judgment of the several operators.

The forward and reverse relays F and R are quickly acting or substantially instantaneous-pickup relays, which may pick up within 0.003 second. The dropout-times of these relays are somewhat longer, so that the time during which either relay remains energized can never be substantially instantaneous, but must have some small finite duration. In addition, the time during which the forward relay F remains energized is dependent not only on the dropout-time of the forward relay, but also on the time required for the timing relay T to pick up and open its back-contact T57. This pickup-time of the timing relay T may be anything which may be required, in any particular game-device. In one form of game-device which I have built, the accelerating force which operates on the light racing-car 10 is very great, when the forward relay is energized, so that an extremely short period of time will give that racing car a strong lead over the competitive cars, so that the timing-relay T which I have used in that particular equipment was a high-speed instantaneous relay similar to the forward and reverse relays F and R, although I am not limited, of course, to this particular design of the timing means.

Some means should be provided, for causing only one of the forward and reverse relays F and R to pick up at any one time, so that both will not be energized at once. One means for bringing about this result is shown in the drawing, wherein a very short pickup-time is provided for each of the relays F and R, and either relay, when it picks up, will quickly de-energize the relay-circuit of the other relay, through the back-contacts F62 and R59, respectively.

An interesting item of detail is provided, as shown in Fig. 6, by placing a small electric light 80 on each car, and energizing the same by an induced-voltage means within the car. A very convenient form of embodiment for this induced-voltage means, within the car, is shown in Fig. 6 wherein the flat armature-plate 36 is provided with one or more portions which are bent inwardly, toward the inside of the car, as shown at 81, and winding-means 82 are carried by these one or more inwardly bent portions 81, for constituting the induced-voltage means for energizing the light 80, as shown in Fig. 6. The brilliance of the light 80 depends upon the nature of energization of the linear-motor driving-means for that car, being different according to whether the car has its normal, moderately powered, forward-drive energization, without either of the relays F or R in play, or whether the motor has increased-voltage energization as a result of an actuation of the forward relay F, or whether the motor has a reverse-phase-sequence energization as a result of an operation of the reversing relay R. The brilliance of the light 80 thus affords each operator with a visual indication of the performance of his car, thus adding increased interest, as well as a spectacular display, to the game-device.

While I have illustrated my invention in a preferred form of embodiment, with very little

in the way of concrete suggestions as to alternative constructions or procedures, I wish it to be understood that I am not limited to my specific illustrations, and I desire that the appended claims shall be accorded the broadest interpretation consistent with their language.

I claim as my invention:

1. In a game-device, a movable element which is to be moved, means for normally moving said movable element in a predetermined manner, accelerating means for temporarily causing said movable element to move at an accelerated speed, decelerating means for causing said movable element to move at a reduced speed, an on-or-off two-position switching means under the substantially instantaneous control of an operator, chance-means for causing the on-condition of said switching-means to actuate either the accelerating means or the decelerating means, and timing-means for limiting the time to any one operating-period of the accelerating means to a small part of the total time during which said movable element is to be moved.

2. The invention as defined in claim 1, characterized by said chance-means comprising two relay-circuits, double-circuit electric-supply means for making available two sets of intermittent voltage-impulses for the respective relay-circuits, one set for each relay-circuit, in such manner that the voltage-impulses of one set occur during moments when there are substantially no voltage-impulses in the other set, said switching-means, in its on-condition, simultaneously connecting both of said relay-circuits to said double-circuit electric-supply means, said accelerating means and said decelerating means including relay-devices having their respective control-means in the respective relay-circuits.

3. The invention as defined in claim 1, characterized by said chance-means comprising two relay-circuits, double-circuit electric-supply means for making available two sets of intermittent voltage-impulses for the respective relay-circuits, one set for each relay-circuit, in such manner that the voltage-impulses of one set occur during moments when there are substantially no voltage-impulses in the other set, said switching-means, in its on-condition, simultaneously connecting both of said relay-circuits to said double-circuit electric-supply means, said accelerating means and said decelerating means including relay-devices having their respective control-means in the respective relay-circuits, and each relay-device having a quickly operated circuit-breaking means in the other relay-circuit.

4. The invention as defined in claim 1, characterized by said chance-means comprising two relay-circuits, double-circuit electric-supply means for making available two sets of intermittent voltage-impulses for the respective relay-circuits, one set for each relay-circuit, in such manner that the voltage-impulses of one set occur during moments when there are substantially no voltage-impulses in the other set, said switching-means, in its on-condition, simultaneously connecting both of said relay-circuits to said double-circuit electric-supply means, said accelerating means and said decelerating means including relay-devices having their respective control-means in the respective relay-circuits, said timing-means including a relay-means having its control-means operated only when said accelerating means is operated, and having a circuit-controlling means for bringing about a deenergization of the accelerating-mechanism.

5. A chance-device for selecting either one of two eventualities, comprising, in combination, two relay-circuits, double-circuit electric-supply means for making available two sets of intermittent voltage-impulses for the respective relay-circuits, one set for each relay-circuit, in such manner that the voltage-impulses of one set occur during moments when there are substantially no voltage-impulses in the other set, a circuit-completing control-device for simultaneously connecting both of said relay-circuits to said double-circuit electric-supply means, and a separate relay-device for each of the two eventualities, said relay-devices having their respective control-means in the respective relay-circuits.

6. A chance-device for selecting either one of two eventualities, comprising, in combination, two relay-circuits, double-circuit electric-supply means for making available two sets of intermittent voltage-impulses for the respective relay-circuits, one set for each relay-circuit, in such manner that the voltage-impulses of one set occur during moments when there are substantially no voltage-impulses in the other set, a circuit-completing control-device for simultaneously connecting both of said relay-circuits to said double-circuit electric-supply means, and a separate relay-device for each of the two eventualities, said relay-devices having their respective control-means in the respective relay-circuits, and each relay-device having a quickly operated circuit-breaking means in the other relay-circuit.

7. A chance-device for selecting either one of two eventualities, comprising, in combination, two relay-circuits, double-circuit electric-supply means for making available a set of intermittent positive voltage-impulses for one relay-circuit and a set of negative voltage-impulses for the other relay-circuit, in such manner that the voltage-impulses of one set occur during moments when there are substantially no voltage-impulses in the other set, a circuit-completing control-device for simultaneously connecting both of said relay-circuits to said double-circuit electric-supply means, and a separate relay-device for each of the two eventualities, said relay-devices having their respective control-means in the respective relay-circuits.

8. A chance-device for selecting either one of two eventualities, one of which is desired, and the other of which is undesired, said chance-device comprising, in combination, two relay-circuits, double-circuit electric-supply means for making available two sets of intermittent voltage-impulses for the respective relay-circuits, one set for each relay-circuit, in such manner that the voltage-impulses of one set occur during moments when there are substantially no voltage-impulses in the other set, a circuit-completing control-device for simultaneously connecting both of said relay-circuits to said double-circuit electric-supply means, a separate relay-device for each of the two eventualities, said relay-devices having their respective control-means in the respective relay-circuits, and a timing relay-means having its control-means operated only when said desired-eventuality relay-device is operated, and having a circuit-controlling means for bringing about a deenergization of the desired-eventuality relay-device.

9. A chance-device for selecting either one of two eventualities, one of which is desired, and the other of which is undesired, said chance-device comprising, in combination, a separate relay-device for each of the two eventualities, an on-or-

off two-position switching-means under the substantially instantaneous control of an operator, chance-means for causing the on-condition of said switching-means to actuate either the desired-eventuality relay-device or the undesired-eventuality relay-device, and a timing relay-means having its control-means operated only when said desired-eventuality relay-device is operated, and having a circuit-controlling means for bringing about a deenergization of the desired-eventuality relay-device.

10. A racing-game, comprising a plurality of movable racing-elements, a separate raceway for each, a separate drive-means and control-means for each of the movable racing-elements, each drive-means and control-means comprising, in combination, normal driving means for normally moving its own movable racing-element in a predetermined manner, accelerating means for temporarily causing said movable element to move at an accelerated speed, decelerating means for causing said movable element to move at a reduced speed, an on-or-off two-position switching-means under the substantially instantaneous control of an operator in charge of that particular racing-element, chance-means for causing the on-condition of said switching-means to actuate either the accelerating means or the decelerating means for that racing-element, and timing-means for limiting the time of any one operating-period of the accelerating means to a small part of the total time during which said movable element is to be moved.

11. In a game-device, a movable element which is to be desirably moved in a forward direction, forward-drive means for imparting a normal forward moving-force to said movable element, accelerating means for temporarily imparting an increased forward driving-force for accelerating said movable element, reverse-drive means for imparting a reversed driving-force to said movable element, an on-or-off two-position switching-means under the substantially instantaneous control of an operator, chance-means for causing the on-condition of said switching-means to actuate either the accelerating means or the reverse-drive means, and timing-means for limiting the time of any one operating-period of the accelerating means to a small part of the total time during which said movable element is to be moved.

12. The invention as defined in claim 10, characterized by the combination including the normal driving means, the accelerating means, and the decelerating means for each movable racing-element comprising a linear-motor having a stator-element disposed along the path to be traversed by its own moving racing-element for driving the same, said stator-element comprising an elongated flanged magnetizable element having a flat flange-side which is separated from that particular movable racing-element by an airgap, the airgap-side of said elongated flanged magnetizable element having notches, and a polyphase winding comprising a plurality of coils disposed in successive notches, each coil lying in a plane transverse to the direction of elongation of said elongated magnetizable element, after the manner of a Gramme-ring winding, each racing-element being the secondary member of its own linear-motor.

13. The invention as defined in claim 11, characterized by the combination including said forward-drive means, said accelerating means, and said reverse-drive means comprising a linear-

motor having a stator-element disposed along the path to be traversed by said movable element for driving the same, said stator-element comprising an elongated flanged magnetizable element having a flat flange-side which is separated from the movable element by an airgap, the airgap-side of said elongated flanged magnetizable element having notches, and a polyphase winding comprising a plurality of coils disposed in successive notches, each coil lying in a plane transverse to the direction of elongation of said elongated flanged magnetizable element, after the manner of a Gramme-ring-winding, said movable element being the secondary member of the linear-motor.

14. A linear-motor comprising a movable element, and a runway therefor, said linear-motor having a stator-element disposed along the path to be traversed by said movable element for driving the same, said stator-element comprising an elongated flanged magnetizable element having a flat flange-side which is separated from the movable element by an airgap, the airgap-side of said elongated flanged magnetizable element having notches, and a polyphase winding comprising a plurality of coils disposed in successive notches, each coil lying in a plane transverse to the direction of elongation of said elongated flanged magnetizable element, after the manner of Gramme-ring winding, said movable element being the secondary member of the linear-motor.

15. The invention as defined in claim 14, characterized by said stator-element including a stack of magnetizable laminations lying against a flat flange-side at an angle to the flange-side which borders the airgap, whereby said flange-side which borders the airgap constitutes a lateral pole-face extension of the airgap-bordering edges of the laminations.

16. A racing-game, comprising a plurality of movable racing-elements, a separate raceway for each, a separate linear-motor drive-means for each of the movable racing-elements, each linear-motor-drive means having a stator-element disposed along the path to be traversed by its own moving racing-element for driving the same, said stator-element comprising an elongated magnetizable member which is separated from that particular movable racing-element by an airgap, the airgap-side of said elongated magnetizable element having notches, and a polyphase winding comprising a plurality of coils disposed in said notches, each racing-element being the secondary member of its own linear-motor drive-means, in combination with a source of polyphase power for all of the linear-motor drive-means, a common starting-means for simultaneously applying moderate power, in the forward-driving phase-sequence, to all of the linear-motor drive-means, and a separate control-means for each of the linear-motor drive-means, each control-means comprising an on-or-off control-device under the substantially instantaneous control of an operator for that particular movable racing-element, chance-means for causing the on-condition of each control-device either to apply increased power to the associated linear-motor drive-means in the forward-driving phase-sequence or to reverse the phase-sequence of the power applied to said linear-motor drive-means, and timing-means for limiting the time during which an operator may prolong any single application of increased power to his linear-motor drive-means.

17. A racing-game, comprising a plurality of

movable racing-elements, a separate raceway for each, a separate linear-motor drive-means for each of the movable racing-elements, each linear-motor drive-means having a stator-element disposed along the path to be traversed by its own moving racing-element for driving the same, said stator-element comprising an elongated magnetizable member which is separated from that particular movable racing-element by an airgap,

the airgap-side of said elongated magnetizable element having notches, and a polyphase winding comprising a plurality of coils disposed in said notches, each racing-element being the secondary member of its own linear-motor drive-means, in combination with a source of polyphase power for all linear-motor drive-means, a common starting-means for simultaneously applying moderate power, in the forward-driving phase-sequence, to all of the linear-motor drive-means, and a separate control-means for each of the linear-motor drive-means, each control-means comprising an on-or-off control-device under the substantially instantaneous control of an operator for that particular movable racing-element, chance-means for causing the on-condition of each control-device either to apply increased power to the associated linear-motor drive-means in the forward-driving phase-sequence or to so change the energization of said linear-motor drive-means as to reduce the speed of the associated movable racing-element, and timing-means for limiting the time during which an operator may prolong any single application of increased power to his linear-motor drive-means.

18. The invention as defined in claim 17, characterized by each movable racing-element carrying an electric light and having induced-voltage means for energizing said electric light, whereby the increased brilliance of said light will afford visual evidence of the existence of increased-power conditions.

19. The invention as defined in claim 17, characterized by each movable racing-element carrying an electric light and having induced-voltage means for energizing said electric light, whereby the increased brilliance of said light will afford visual evidence of the existence of increased-power conditions, the airgap-side of each movable racing-element including a flat armature-plate having one or more inwardly bent portions, and winding-means carried by said one or more inwardly bent portions for constituting said induced-voltage means.

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