

Feb. 4, 1941.

P. GARMS ET AL

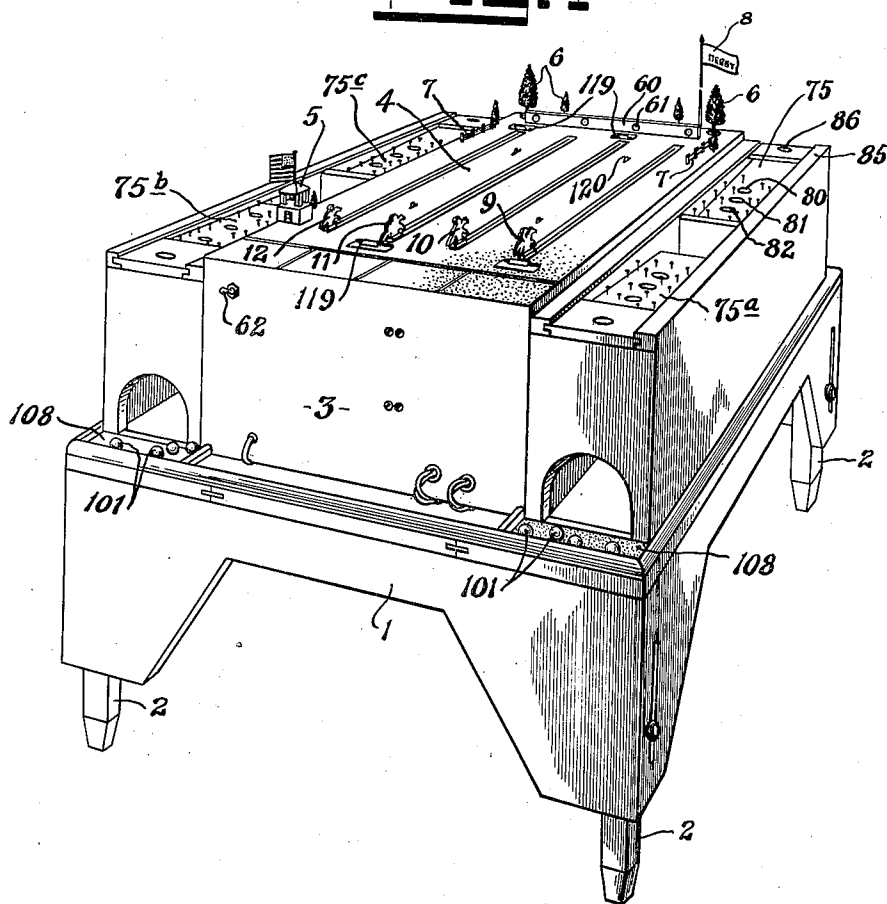
2,230,563

RACING GAME

Filed May 13, 1938

8 Sheets-Sheet 1

FIG. 1



BY

INVENTORS
Preston S. Millar
Peter Garms

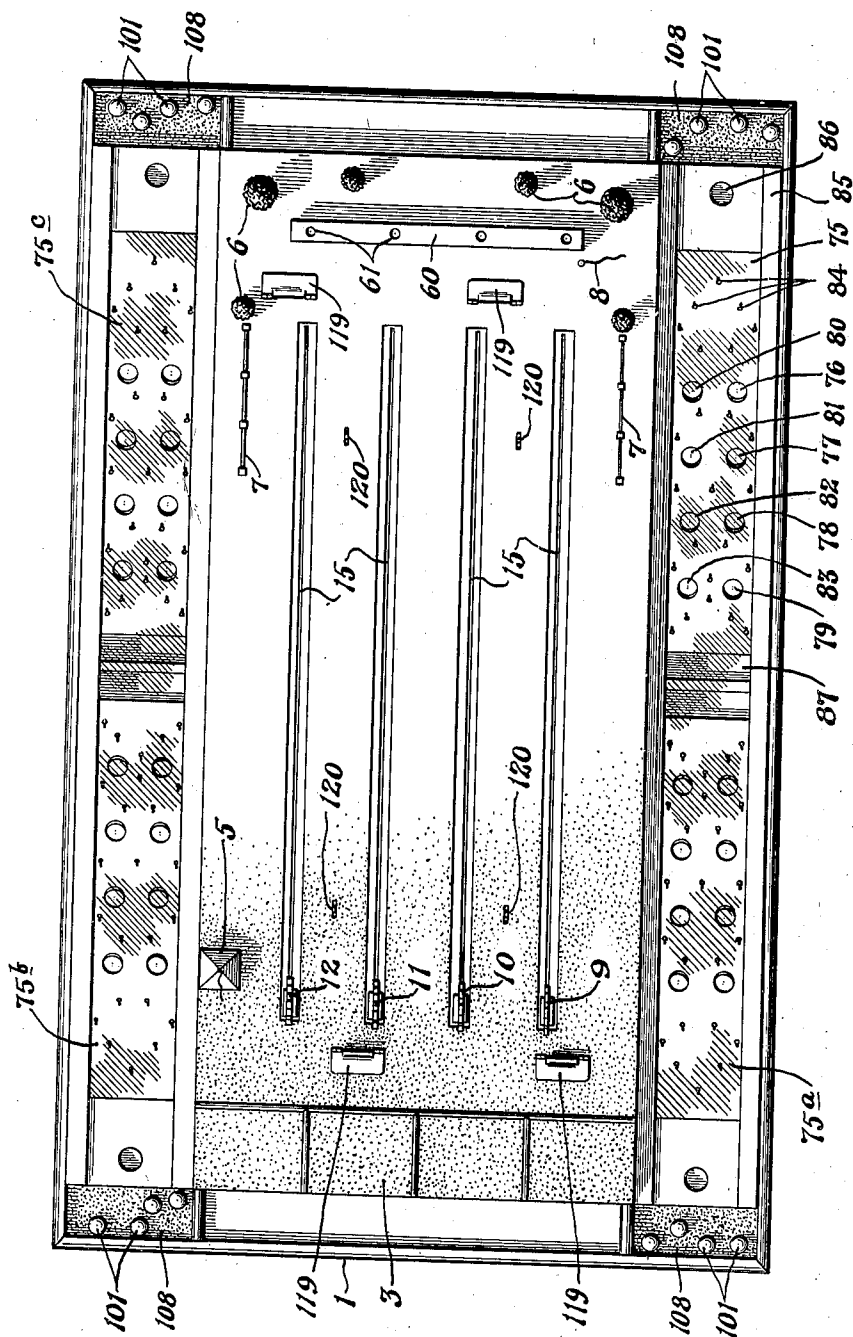
James B. Smith
ATTORNEY.

0111

RACING GAME

8 Sheets-Sheet 2

Filed May 13, 1938



INVENTORS
BY *Preston S. Millar*
Peter Garms
John S. Smith
their ATTORNEY.

Feb. 4, 1941.

P. GARMS ET AL

2,230,563

RACING GAME

Filed May 13, 1938

8 Sheets-Sheet 3

Fig. 3

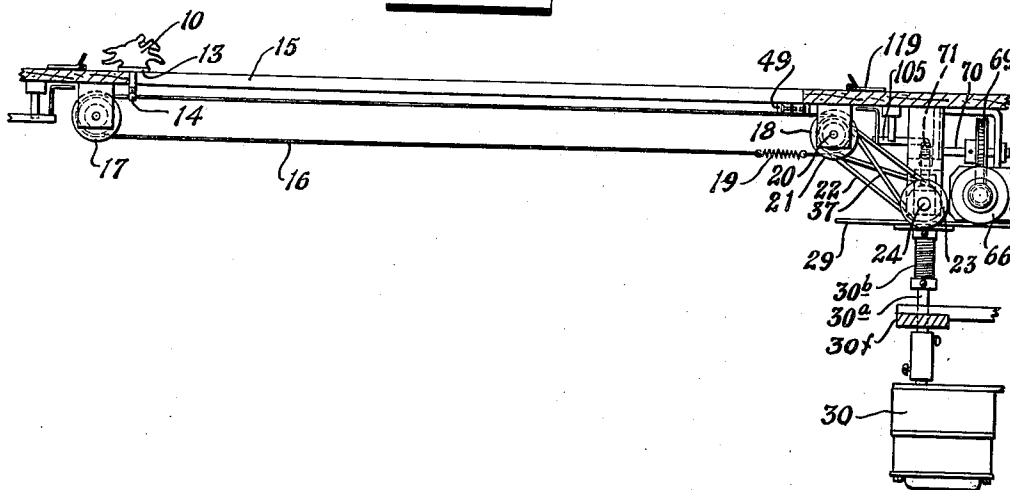
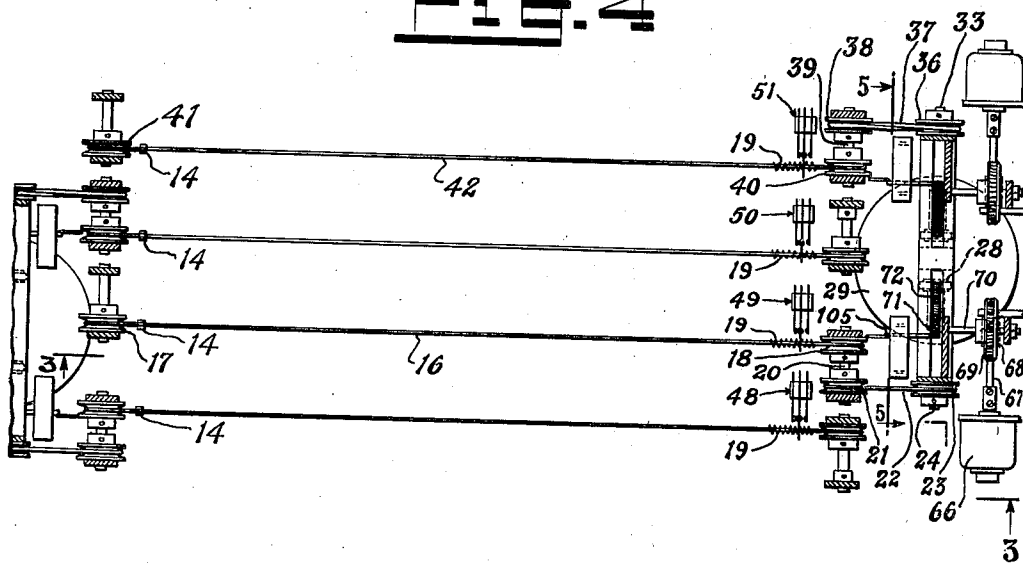


Fig. 4



INVENTORS
Preston S. Millar
Peter Garms
BY *[Signature]*
ATTORNEY.

Feb. 4, 1941.

P. GARMS ET AL

2,230,563

RACING GAME

Filed May 13, 1938

8 Sheets-Sheet 4

FIG. 5

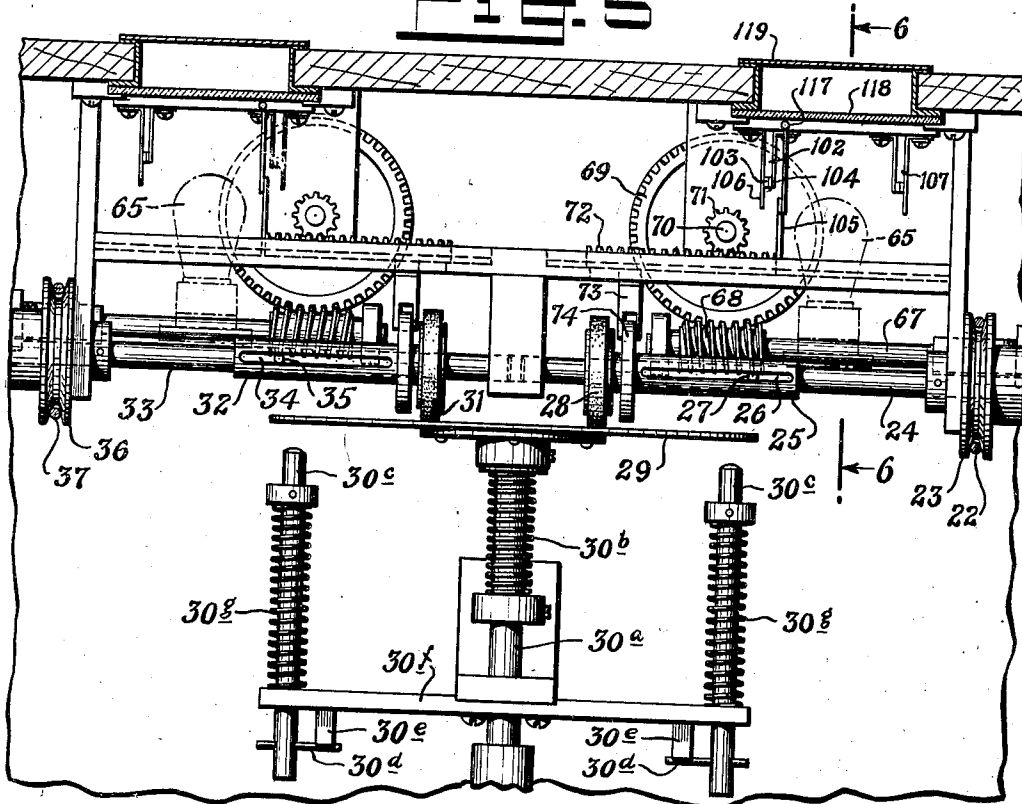
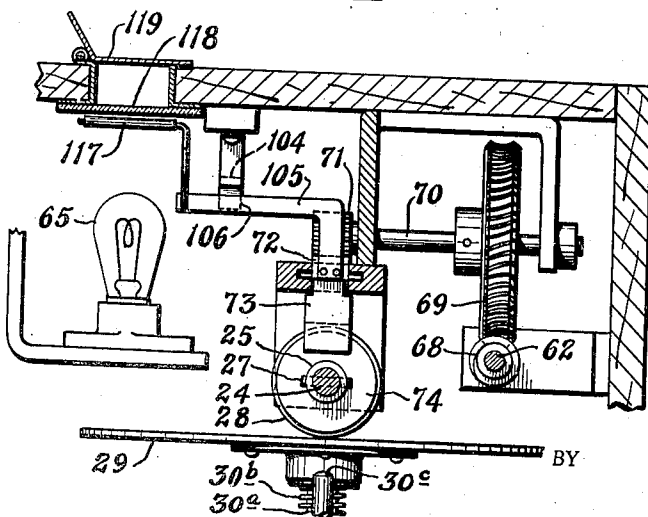


FIG. 6



INVENTORS
Preston J. Millar
Peter Garms
BY *[Signature]*
ATTORNEY.

Feb. 4, 1941.

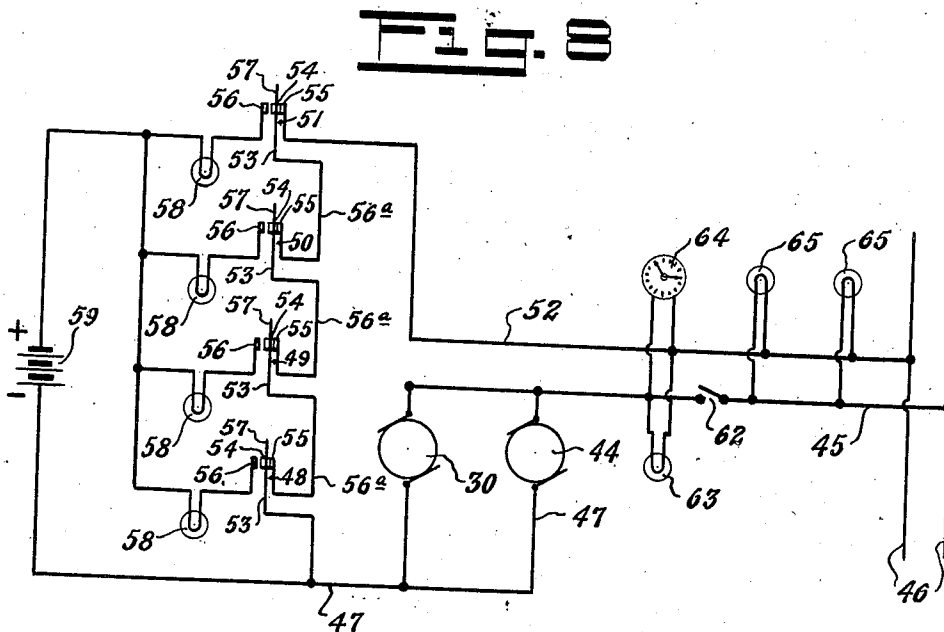
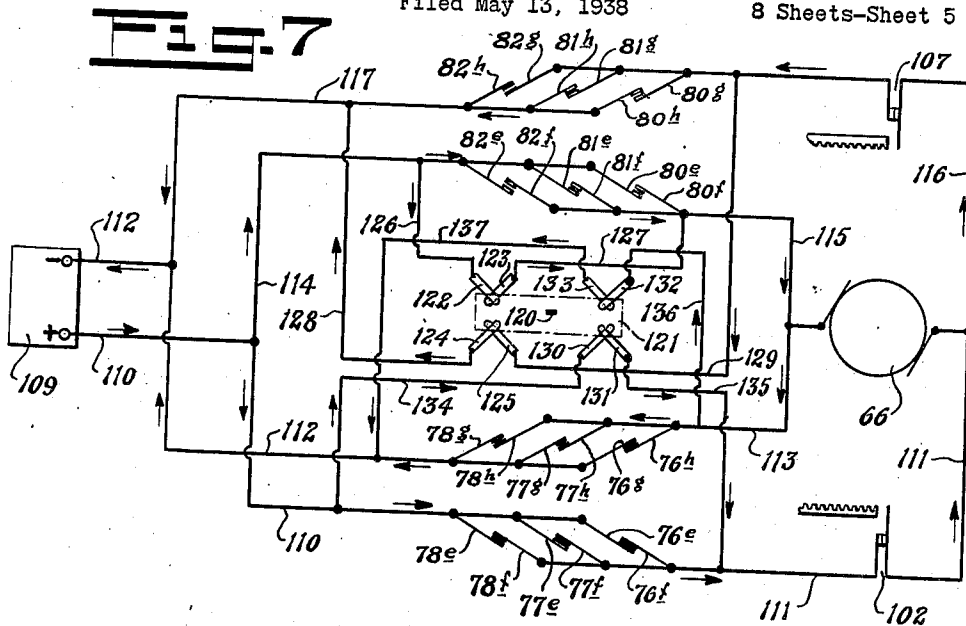
P. GARMS ET AL

2,230,563

RACING GAME

Filed May 13, 1938

8 Sheets-Sheet 5



INVENTORS
Preston S. Muller
Peter Garms
 BY *Am S. Brody*
 ATTORNEY.

問

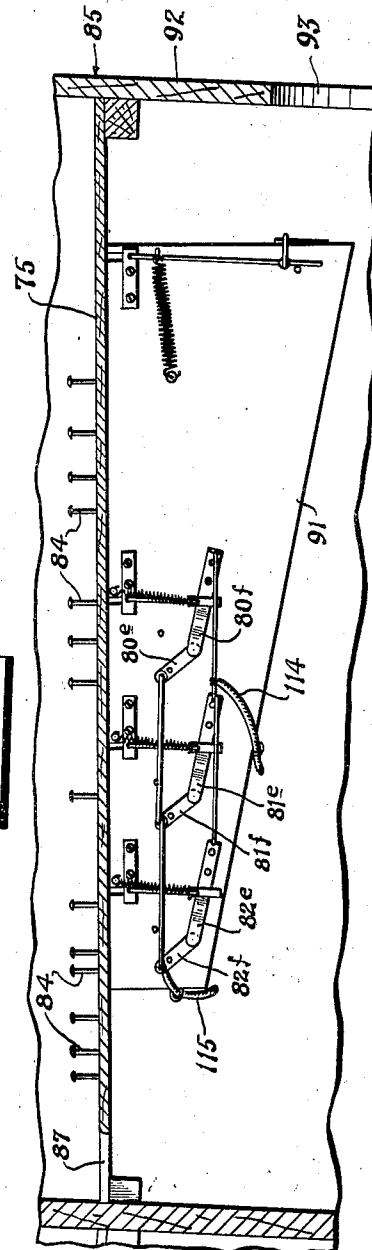
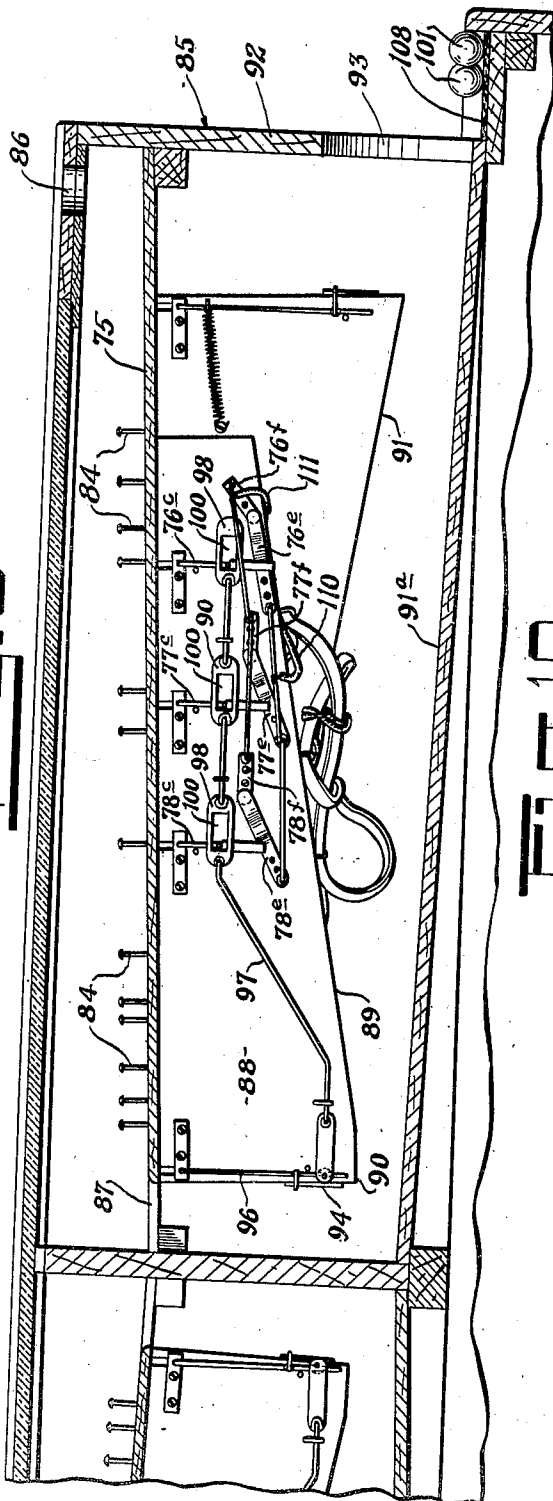
01 11 11

INVENTORS
Preston S. Millar
Peter Garms

BY 
 Their ATTORNEY.

BY 
 Their ATTORNEY.

BY 
 Their ATTORNEY.



Feb. 4, 1941.

P. GARMS ET AL

2,230,563

RACING GAME

Filed May 13, 1938

8 Sheets-Sheet 7

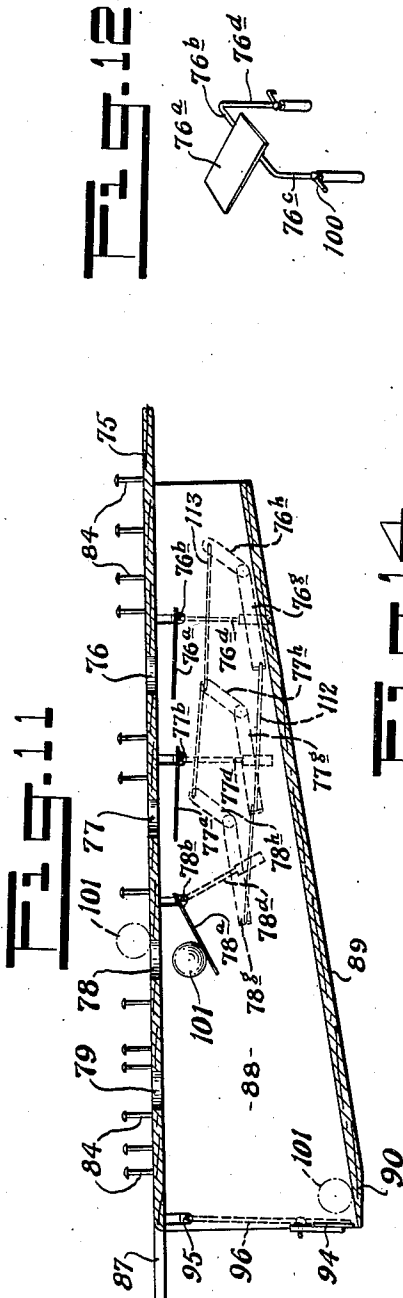


FIG. 12

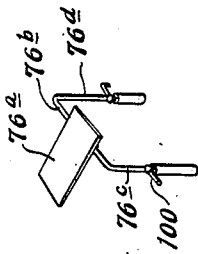
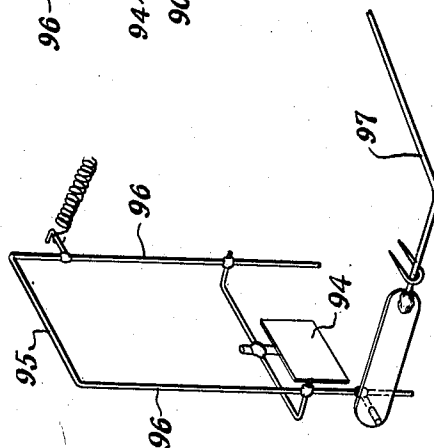


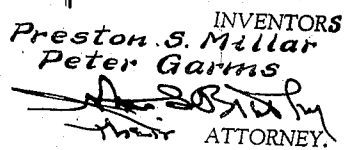
FIG. 13



2,230,563

Filed May 13, 1938

8 Sheets-Sheet 8



UNITED STATES PATENT OFFICE

2,230,563

RACING GAME

Peter Garms, Huntington, and Preston S. Millar,
Scarsdale, N. Y.

Application May 13, 1938, Serial No. 207,706

6 Claims. (Cl. 273—86)

This invention relates to a new and useful improvement in racing games, its object being to simulate as closely as possible an actual race. Heretofore, games of this character have lacked realism because the contestants have not moved continuously from start to finish, and it has not been possible to vary their speed as in an actual race. In the game of this invention the contestants move continuously as in an actual race, and their speeds, which normally are identical, can be altered by the players to produce a winner.

The game is applicable to the racing of horses, yachts, dogs, bicycles, and the like. For the purposes of this application a form of game simulating a horse-race has been selected. This is illustrated in the drawings, of which:

Figure 1 is a general view in perspective of the game;

Figure 2 is a plan view;

Figure 3 is a view, partly in section, taken along the line 3—3 of Figure 4, and in the direction indicated by the arrows;

Figure 4 is a plan view of the operating mechanism beneath the tracks;

Figure 5 is an elevation of part of the operating mechanism of Figure 4 taken on the line 5—5 of Figure 4 and viewed as indicated by the arrows;

Figure 6 is a view of the same mechanism, partly in section, on the line 6—6 of Figure 5 and viewed as indicated by the arrows;

Figure 7 is a diagrammatic illustration of a circuit arrangement through which the speed-changing mechanisms are operated;

Figure 8 is a similar diagrammatic illustration of a circuit through which the normal uniform speed of the horses is obtained;

Figure 9 is a side view of the mechanism, by means of which the players alter the speed of the horses;

Figure 10 is a view of another part of the same mechanism;

Figures 11–15, inclusive, are detailed views of various parts of the mechanism of Figure 9;

Figures 16 and 17 illustrate a modified form for imparting uniform and different speeds to the horses;

Figure 18 is a diagrammatic illustration of an electric circuit for use with a modified form of mechanism shown in Figures 16 and 17; and

Figure 19 is a modified form of the controlling mechanism of Figure 9, which may be used with the mechanism of Figures 16 and 17.

As shown in Figure 1, the game consists of a

low bench 1, provided with adjustable legs 2, so that it can be leveled in case the floor or other supporting surface slopes or is uneven. Upon this platform is a box-like housing 3, on the top of which is laid out the race-track 4, which is preferably covered with green baize, or other suitable material to simulate as closely as possible the closely-clipped grass of a track. Realism may be carried to any desired extent through the addition of miniature accessories, such as the starter's stand 5, trees 6, fences 7, flag-pole 8.

In the form of game shown there are four horses, 9, 10, 11, 12, cut or molded from any suitable light material, each of which is mounted upon a small base 13, from the under side of which projects a pin or fin 14. For each of the contesting horses, the track 4 is provided with a slot 15, through which pin 14 projects downwardly. By suitable mechanism connected to pin 14, each of the horses can be moved along its slot 15 from the starting to the finish line.

These mechanisms are of such a nature that, normally, they will cause all the horses to move along the track at exactly the same speed, which, preferably, should be such that the race will be completed in about the same time as a real horse-race, say, three minutes. However, the speed of each horse can be retarded or accelerated, so that a horse may complete the race in, say, two minutes, or take as much as four minutes. This alteration in the speed of each horse is brought about by the players and may be made a matter of chance or skill, or a combination of both. In the form being described, this feature is a matter of chance. Although the speed may be varied as just indicated, each horse moves continuously and does not stop until the race is over. This feature adds greatly to its realism and in this respect this game differs from other racing games.

The mechanism for imparting continuous motion to each horse is contained within the central part of the housing 3. Immediately below the slot 15, along which horse 10 moves, is positioned a belt 16, which passes over a pair of pulleys 17 and 18, respectively positioned beyond the respective ends of the slot. Pin 14 of horse 9, which, as already explained, projects through the slot, is attached to this belt. The ends of this belt are connected together by means of a small coil spring 19, which maintains sufficient tension to prevent the belt from slipping upon the pulleys during the operation of the mecha-

nism, but permits it to slip if the horse is moved by hand.

The pulley 18 is attached to a shaft 20, which also carries another fixed pulley 21. Pulley 21 is connected by a belt 22 to another pulley 23 on a shaft 24.

Upon shaft 24 is loosely mounted a sleeve 25 (Fig. 5) provided with a longitudinal slot 26. A pin 27 projecting from shaft 24 rides in this slot so that, although sleeve 25 can slide to assume various positions upon the shaft 24, any rotation of sleeve 25 will be imparted to shaft 24. Upon sleeve 25 is mounted a friction wheel 28, the edge of which is adapted to engage with the surface of friction disk 29 mounted upon the shaft 30a of a synchronous motor 30. This forms a friction drive, by means of which belt 16, and, consequently, horse 10 attached thereto, will be moved along the track more or less rapidly, depending upon the position of friction wheel 28 upon friction disk 29. The nearer friction wheel 28 is to the center of friction disk 29, the slower will the belt and horse 9 move. Motor 30 is connected, of course, to any suitable source of alternating current.

Synchronous motor 30 may also supply the motive power for a similar driving mechanism for horse 12 consisting of friction wheel 31 upon sleeve 32, loosely mounted on a shaft 33, the sleeve being longitudinally slotted, as shown at 34, so that it can slide upon shaft 33, but is caused to rotate with shaft 33 through the agency of pin 35 riding in slot 34. A pulley 36 attached to shaft 33 and belt 37 transmits power to pulley 38, and shaft 39. This shaft is also provided with pulley 40 positioned beyond the end of the slot 15 in which horse 12 moves, and, with pulley 41 positioned beyond the other end of the same slot, carries belt 42 to which is attached horse 12 by means of its projecting pin 14. It will, therefore, be evident that since synchronous motor 30 provides the motive power for both horses 10 and 12, these horses will be moved at exactly the same speed if the friction wheels 28 and 31 of their respective driving mechanisms are positioned equi-distant from the center of friction disk 29.

Similar mechanisms for driving horses 9 and 11 are also provided. If desired, these mechanisms may also derive their motive power from the synchronous motor 30 through friction disk 29, but in the form of the device shown it was considered more convenient to provide for them a second synchronous motor 44 identical with synchronous motor 30 connected to the same source of electricity. All of the other parts of the driving mechanisms for those two horses are identical with those already described; therefore, if the friction wheels of these driving mechanisms are positioned at equal distances from the center of the friction disk, and, if this distance also corresponds exactly to the positions of friction wheels 28 and 31 previously described, then all four horses will be caused to move along the track at exactly the same speed. It follows that if all of the horses start simultaneously, the operation of these mechanisms would cause them to finish simultaneously; or, in other words, to run a "dead heat."

It will also be evident that if any one of the friction wheels is at a different distance from the center of its friction disk than the other, that horse will move slower or faster than the others, depending upon whether its friction wheel

is nearer or farther away from the center of its friction disk.

To insure adequate contact between the friction disk on each synchronous motor shaft and the friction wheels engaging therewith, the friction disk is preferably slidably mounted upon the motor shaft and spring pressed against the friction wheels. For example, as shown in Figure 5, friction disk 29 is mounted on motor shaft 30a so that it can move longitudinally of the shaft and is forced against friction wheels 28 and 31 by a spring 38b of adequate strength to insure that the contact between the friction disk and the friction wheels will be sufficient to cause the disk to rotate the wheels without slippage. However, the pressure should not be so great as to offer serious resistance to the radial movement of the friction wheels across the face of the friction disk, as already described.

Since there may be a slight difference in diameter between the friction wheels 28 and 31, it is also desirable that the mounting of the friction disk 29 upon its shaft 30a be of such a nature that the friction disk may tilt slightly out of its normal plane of rotation so as to automatically contact with both friction wheels in spite of such difference. Such a mounting may take any one of several well-known forms, which it is not necessary to illustrate or describe. To insure adequate contact between the friction disk and the friction wheels, which for one reason or another is not automatically effected by the above arrangement, there are provided plungers 39c, one on each side of the motor shaft 30a and in the plane of the path of travel of friction wheels 28 and 31 radially across the friction disk. Normally, these are held out of contact with the friction disk 29, as shown in Figure 5, but, if needed, either one or both may be caused to press against the friction disk to supplement spring 38b in forcing the disk against the friction wheels. This is accomplished by swinging plunger 39c around until the short cross-arm 39d is released from its rest 39e upon bracket 39f affixed to any suitable part of the device so that the end of the plunger can make contact with the friction disk under the urge of its light spring 39g. If the contacting end 39h of plunger 39c is rounded, as shown, the friction between it and the rotating friction disk will not be so great as to affect the speed of rotation of the disk.

The electrical circuit for synchronous motors 30 and 44, as shown in Figure 8, may consist of a wire 45 leading from a source of current 46 to one side of each of the motors 30 and 44. The other side of each of these motors is connected to a wire 47, which runs to a series of switches equal in number to the number of horses, in this case, four, 48, 49, 50 and 51, from the last of which, 51, a wire 52 returns to the source of current 46.

Each of the switches 48—51 consists of a movable conducting arm 53 provided with a double contact 54, and two other contacts 55 and 56, with which contact 54 is engageable. Contact 55 of each switch is connected by a wire 55a to arm 53 of the following switch, with the exception of contact 55 of the last switch 51 which, as already stated, is connected by a wire 52 to the source of current 46. Normally, contact 54 70 of each switch is in contact with the corresponding contact 56 of the same switch, so that there is, normally, a closed circuit through these switches. However, if contact 54 of any one of these switches is moved away from the corre-

sponding contact 55, the circuit will be opened at that switch. The switches 48—51 are, respectively, positioned on housing 3 adjacent the finish line of the track so that upon the arrival of a horse at the finish line, the corresponding switch arm 53 may be moved by the horse to separate contact 54 carried thereby from contact 55, thereby breaking the synchronous motor circuit and causing all of the horses to stop immediately wherever they may be upon the track. For example, assuming that switches 48—51 are associated with horses 9—12, respectively, in the order named, if horse 9 arrives at the finish line first, it will cause the motor circuit to be broken at switch 48.

This operation of each switch may be effected by providing switch arm 54 with an extension 57 so positioned that it will be engaged by pin 14 projecting downwardly from each horse just as the horse reaches the finish line.

The other contact 56 of each switch is so positioned that when the contact between contacts 54 and 55 is thus broken, contact will be made between contacts 54 and 56. Each of these contacts 56 is in series with a light 58 and also a battery 59, or other suitable source of electricity as shown in Figure 8. This circuit terminates at arm 53 of switch 48.

From the above it will be evident that if horse 9, for example, reaches the finish line first, breaking the connection between contacts 54 and 55 of switch 48 and causing contact 54 to engage with contact 56 of the same switch, not only will the circuit of the synchronous motors 30 and 34 be broken, but light 58 connected to contact 56 of switch 48 will be illuminated, which advises the players that the race is over and has been won by horse 9. Lights 58 may be contained within a housing positioned beyond the finish line, as shown in Figure 1, and having four openings 61 in alinement with the four slots 15 through which the illumination of each of the lights can be observed.

The synchronous motor circuit is also provided with a manually-operated switch 62. When this switch is closed the motors will begin to rotate and the horses to move. To indicate that this switch has been closed and the race started, a red light 63 may be connected across wires 45 and 52, the light being housed preferably in the starter's stand 5, alongside the starting line of the track. If desired, an electric clock 64 may be similarly connected, by means of which the time of the race may be determined. Two additional lights 65 are also similarly connected across this circuit, but between the source of electricity and switch 62, for a purpose which will be hereinafter described.

As already generally explained, if any one of the friction wheels is at a different distance than the others from the center of its friction disk, the horse which is propelled by that particular friction wheel will move faster or slower than the others. Mechanism for thus changing the position of each friction wheel upon its friction disk is provided so that continual "dead heats" can be avoided and the race won by one or the other of the horses, although an occasional "dead heat" may be run by two or more of the horses, as in a real race.

In the form of game shown there are four of such mechanisms since there are four horses. They are identical, therefore a description of the means for varying the speed of horses 10 will suf-

fice. This mechanism is shown in Figs. 3, 4 and 5. It consists of a small motor 66 adapted to rotate in either direction, upon the shaft 67 of which is a worm gear 68. This gear meshes with a pinion 69 upon a shaft 70, which also carries a small pinion 71, which meshes with a rack 72 held in suitable guides so as to be parallel to shaft 24 and slidable longitudinally in a plane parallel to that of friction disk 29. Rack 72 is provided with a forked arm 73, which engages a collar 74 attached to frictional wheel 28 or to sleeve 25 upon which friction wheel 28 is mounted. By this mechanism if motor 66 is rotated in one direction, friction wheel 28 will be moved by rack 72 toward the center of friction disk 29 and the speed of horse 10 reduced, whereas, if the motor is rotated in the other direction, friction wheel 28 will be moved by rack 72 towards the edge of friction disk 29, and the speed of horse 10 will be increased.

The ultimate position of the friction wheel 28 depends upon the length of time motor 66 is permitted to rotate. The longer it rotates, the nearer friction wheel 28 will be moved to the edge or the center of friction disk 29, and the greater will be the acceleration or slowing up in speed of horse 10. Both the direction of rotation of motor 25 and the duration of this rotation is controlled by mechanism manipulated by the player of horse 10, who endeavors, naturally, to increase the speed of his horse as much as possible. Here, however, the element of chance enters in because his efforts to speed up his horse may result in causing it to go slower.

The mechanism operated by the player of horse 10 for varying the position of friction wheel 28 with respect to the center of friction disk 29 through the operation of motor 66 (and which is duplicated for each of the other horses, 10, 11 and 12), consists of a sloping run-way 75 provided with a number of apertures 76, 77, 78 and 79, and 80, 81, 82 and 83 (see Fig. 2) in any desired arrangement, guarded by a number of upwardly projecting pins 84 arranged in any desired pattern. This run-way is, preferably, enclosed within a housing 85 adjacent the track 4, and is preferably provided with a transparent top except at the outer end which is provided with an opening 86 of approximately the same size as that of apertures 76—83. The lower end of run-way 75 also terminates short of the end of housing 85, the width of the space 87 being approximately the same or greater than the diameter of the openings in the run-way.

Openings 76—79 open into a chute 88 (Fig. 9) having an inclined bottom 89, the lower end 90 of which is open. A similar chute 91 is provided beneath openings 80—83. Both of these chutes 88 and 91 may be enclosed in housing 85, the bottom of which is inclined towards end 92, where there is an opening 93.

Beneath each opening 76—78 is a trigger plate which normally obstructs it. These trigger plates are numbered 76a—78a, corresponding with the respective openings 76—78. Each trigger plate is attached to a shaft 76b—78b, respectively, rotatably supported in and projecting through the sides of chute 88. To the respective ends of each shaft are attached two depending insulated switch arms 76c—78c and 76d—78d, respectively. Also mounted upon opposite sides of chute 88 are sets of fixed contacts 76f—78f and 76h—78h, respectively, and spring contacts 76e—78e and 76g—78g, respectively, adapted to engage the cor-

responding fixed contacts, but normally out of contact therewith. The spring contacts on each side of the enclosure are electrically connected together as are the corresponding fixed contacts, and each pair of fixed and spring contacts on the respective sides of the enclosure is connected in series with the respective sides of the circuit of motor 66; consequently, the circuit of motor 66 may be broken or closed on both sides simultaneously through these contacts on each side of the housing.

As shown in Figure 11, when trigger plates 76a—78a are in their normal position obstructing openings 76—78, switch arms 76c—78c and 76d—78d are so positioned that the contacts just described are open, whereas if a trigger plate is swung down (see plate 78a in Fig. 11), the corresponding switch arms will be swung also, as shown in Figs. 11 and 14, and, since these arms press upon the corresponding spring contacts upon the two sides of the enclosure, these contacts will be forced into engagement with the corresponding fixed contacts to close the circuit of motor 66, which engagement will be maintained as long as the switch arms remain in the swung position.

To swing the switch arms back into normal position to effect the opening of the motor circuit, the open end 90 of chute 88 is provided with a swinging gate 94 suspended from shaft 95 by arms 96. To the gate 94 is pivotally attached a lever 97 provided with switching plates 98, one for each trigger plate. Each of these switch plates is provided with an opening or slot 99 and is so positioned that a pin 100 on each of switch arms 76c—78c projects into the slot in the corresponding switching plate. The slot 99 is so positioned that when gate 94 is closed, as it normally is, and switch arms 76c—78c are in their normal position, the pins will rest substantially against the left ends of slots 99, as shown in Fig. 9. This slot is of such a length that any of the switch arms can be swung to the right by its trigger plate to close the corresponding contacts, whereupon the pin 100 comes to rest substantially against the right end of slot 99, as shown in Fig. 14. Whenever gate 94 is swung open, the lever 97 will be pulled to the left, with the result that any switch arm which has been turning to the right will be swung to the left again into its normal position, as shown in Figure 15, and the corresponding contacts will be opened, breaking the circuit to the motor 66.

Motor 66 will rotate as long as the contacts are closed. The longer motor 66 rotates, the greater the displacement of friction wheel 28 will be from the position it occupied before motor 66 was energized.

As already stated, openings 80, 81 and 82 in runway 75 open into chute 91 similar to chute 88. This chute 91 is equipped with a control mechanism for motor 66 similar to that just described, but its switch contacts are included in a circuit to motor 66 which will cause the motor to rotate in the opposite direction. For the purposes of this description, it will be assumed that the circuit controlled through openings 76, 77 and 78 will cause motor 66 to rotate so as to move friction wheels 28 outwardly and the circuit controlled through openings 80, 81 and 82 will cause it to rotate in the reverse direction to move friction wheel 28 inwardly.

These speed control devices described are operated by the player of horse 10. The player drops a ball 101 through opening 86 in the top

of housing 85. The ball runs down the run-way 75, striking some of the pins 84 and possibly falling through opening 78, as shown in Fig. 11. It then strikes trigger plate 78a below this opening, tilting it, and, consequently, swinging switch arms 78c and 78d so that they cause the spring contacts 78e and 78g to engage with their respective fixed contacts 78f and 78h, as shown in Fig. 14. This closes both sides of the circuit to motor 66, which starts to rotate. The ball then falls into the bottom of chute 88 and rolls towards the open end 90 thereof. Upon reaching the end the ball strikes gate 94, swinging it outwardly, as shown in Fig. 15, so that the lever 97 is pulled to the left. This, as described above, will move switch arms 78e and 78d back into their neutral position, whereupon spring contacts 78e and 78g will separate from fixed contacts 78f and 78h and the rotation of motor 66 will cease. Therefore, the duration of rotation of motor 66 will be equal to the time which has elapsed between the falling of the ball from trigger plate 78a and its operation of gate 94. It follows that, since opening 78 in the runway is the nearest to gate 94, of the three openings 76, 77 and 78, the minimum duration of rotation of motor 66 has been secured, and consequently the minimum displacement outwardly of friction wheel 28, and the minimum acceleration of horse 10.

If another ball, dropped through opening 86 by the player, also happens to fall through opening 78, an additional acceleration of horse 10 of the same amount will result. If the ball happens to fall through opening 77 instead, acceleration of horse 10 will still result, but to a greater amount, since the distance traveled by the ball before striking gate 92 will be greater. The maximum acceleration results from the falling of the ball through opening 71, from which leads the longest path to gate 94.

It may be that the ball will fail to enter any of the openings in the run-way, in which case it will ultimately fall through opening 87 beyond the end of the run-way, and cause no change in the speed of horse 10.

If the ball should happen to fall through any one of the other series of openings 80, 81 or 82, the speed of horse 10 will be reduced, depending upon the distance of the opening from the gate 94 in the other chute 91. Since it is quite impossible for the player to control the course of the ball once he has dropped it through opening 86, it is entirely a matter of chance whether he increases or decreases the speed of horse 10.

Obviously, if it should happen that horse 10 is accelerated several times in succession, friction wheel 28 might be carried completely off friction disk 29 by the repeated movement of rack 72 in one direction. To prevent this a circuit breaker 102 is provided in the circuit of motor 66 in the form of two contacts 103 and 104, normally in engagement with each other, but adapted to be separated whenever friction wheel 28 approaches the edge of friction disk 29. Projecting from sleeve 25 which carries friction wheel 28, is an insulated arm 105 which, as the friction wheel moves towards the edge of friction disk 29, approaches a finger 106 projecting from contact 103 of circuit breaker 102. Arm 105 is so positioned that shortly before friction wheel 28 would reach the edge of friction disk 29, it will engage finger 106, and, upon a slight additional outward movement of friction wheel 28, separate contacts 103 and 104, breaking the circuit to motor 66. When this has occurred, the falling of a ball

through one of the accelerating openings 76, 77 or 78, will have no effect upon the motor 66, friction wheel 28, or horse 10. However, if the ball falls through one of the openings 80, 81 or 82, thus closing the other circuit to motor 66, friction wheel 28 will be moved towards the center of friction disk 29 to a greater or less distance, and the control of motor circuit 66 by passage of a ball through an accelerating opening is re-established. A similar circuit-breaker 107 operated by the same arm 105, or one similar thereto, is provided to limit the possible movement of friction wheel 28 towards the center of friction disk 29. It operates in the same way as circuit-breaker 102 described above, and consequently requires no further description here.

As stated, similar speed changing mechanisms are provided for each of the other horses 10, 11 and 12. The run-ways of these are shown in Figure 2 at 75a, 75b and 75c, but the associated mechanisms are not shown since each of them is similar to that above described. It will be noted that the run-ways are so arranged that the four players can stand or sit adjacent to the corners of the game. Each is provided with a number of balls 101, which he can drop into his particular run-way and which are returned to him as soon as they have passed through the mechanism, emerging from the opening 93, into the tray 103.

An electrical circuit for motor 66 is shown in Figure 8 in which the motor 66, fixed contacts 76e-78e and 76h-78h, spring contacts 76e-78e and 76g-78g, and circuit-breaker 102, will be noted. Also shown are the equivalent contacts 80e-82e, 80f-82f, 80g-82g and 80h-82h, which are controlled through openings 80-82, as described above, but not heretofore mentioned by number. The source of electrical energy is shown as a battery 109 from which a wire 110 leads to contacts 76e-78e. Another wire 111 leads from contacts 76f-78f, through circuit-breaker 102 to motor 66. A wire 112 runs from the other side of the battery 109 to contacts 76g-78g and a wire 113 runs from contacts 76h-78h to the other side of motor 66. As heretofore explained, this circuit serves to rotate motor 66 in the direction required to move friction wheel 28 away from the center of friction disk 29. A similar circuit rotating motor 66 in the opposite direction is indicated by wires 114, 115, 116 and 117, contacts 80e-82e, 80f-82f, 80g-82g, 80h-82h and circuit-breaker 107. The direction of current flow in each of these circuits is indicated by the arrows. Similar currents are provided for the other similar mechanisms for the other horses.

In order that all the contestants can start a race upon even terms, means is provided for establishing friction wheel 28, which drives horse 10, and the other three similar friction wheels, which drive horses 10, 11 and 12 at equivalent positions upon the synchronously-driven friction disks. For friction wheel 28, this device consists of an arm 117 projecting from rack 72, and extending slightly below the underside of track 4. Directly above this arm is a glass-covered opening 118 in the track normally covered by a hinged cover 113. For convenience this is positioned behind the starting position of horse 10, as shown in Figure 2, where it may be readily seen by the player of horse 10. One of the lights 65 is positioned below arm 117 so that a shadow of this arm will be thrown upon window 118. Window 118 is provided with a cross-hair so positioned

that when the shadow of arm 117 coincides with the cross-hair, friction wheel 28 will be positioned substantially midway between the center and edge of friction disk 29, which is the preferred arrangement for starting the race.

The shadow of arm 117 can be caused to coincide with the cross-hair by rotating motor 66 in one way or the other to operate the rack which carries arm 117 and which also moves friction wheel 28. To make this adjustment, a manual switch lever 120 is provided positioned so that it can be conveniently operated by player 10, as shown, for example, in Figure 2. Switch lever 120 passes through track 4 and is attached to a rock plate 121 beneath the track in such a way that rocking lever 120 forward and backward will also rock plate 121. Beneath one end plate 121 are positioned two pairs of contacts 122, 123 and 124, 125; contact 122 is connected to wire 114 from battery 109 by wire 126; contact 123 is connected by wire 127 to wire 115 which runs to one side of motor 66. Contact 124 of the other pair of contacts connects with the other side of battery 109 through wire 128 and wire 117. Contact 125 connects with the other side of motor 66 through wire 129 and wire 116; these two pairs of contacts, it will be noted, are on opposite sides of a circuit from battery 10 to the motor 66 and return. Also, these pairs of contacts are so arranged with respect to each other and to plate 121 that if the left-end (shown in Figure 7) of plate 121 is rocked downwardly by means of switch lever 120, both sides of the circuit will be closed and current will flow therethrough as indicated by the arrows.

Similarly arranged beneath the other end of plate 121 are two similar pairs of contacts 130-131 and 132-133. Contact 130 is connected to battery 109, by wires 134 and 119. Its associated contact 131 is connected to one side of motor 66 by wires 135 and 113. Contact 132 is connected to the other side of motor 66 by wires 113 and 136. Associated contact 133 is connected to the other side of the battery by wires 137 and 112. If plate 121 is rocked in the opposite direction contacts 130, 131 and 132 will be closed and a circuit completed to motor 66 in which current will flow in the direction opposite to that of the circuit described above, to cause motor 66 to rotate in the opposite direction also. Therefore, by rocking plate 121 by means of lever 120, motor 66 may be made to rotate, first in one direction and then in the other, and friction wheel 28 to move inwardly and outwardly across friction disk 29, until the shadow of arm 117 coincides with the cross-hair on glass 118. When this occurs, the mechanism controlling horse 10 is properly adjusted for the beginning of the race.

A similar switch arm controlling similar switches in similar circuits are provided for each of the other players so that each of them by causing the shadow of an arm similar to arm 117 to coincide with the cross-hair in a window similar to window 118, can position the friction wheel by means of which his horse is driven in exactly the equivalent position to that of friction wheel 28, so that at the start of the race all of the horses will move at exactly the same speed, which identical rate of movement will be maintained until increased or decreased through the operation of the speed-altering mechanism hereinbefore described, by the passage of a ball or balls through one or another of the openings in the run-ways.

Each horse may be positioned at the starting

line simply by grasping it by the hand wherever upon the track it may be, and moving it to the starting position. As already explained, spring coupling of the belt by which the horse is moved is such as to permit this manual placement of each horse without otherwise disturbing the positive driving action of the belt.

The race is started by throwing switch 62, which starts the rotation of synchronous motors 30 and 44, at which time red light 63 is also illuminated. The race is ended when a horse reaches the finish line. This is indicated by the illumination of one of the lights 58 and the immediate stopping of all the horses by the opening of one of the switches 48-51. Red light 63, however, continues to glow to indicate that the synchronous motor circuit is still otherwise closed, and that the motors will again resume rotation as soon as the winning horse is moved from its position at the finish line. Before the next race is begun, switch 62 will, in consequence, be opened so that the horses can be moved back and left standing at the starting line until the beginning of the next race. Before this race is begun the friction wheels will be adjusted as above explained by the operation of the switch lever 120 to readjust the speed altering mechanisms so that all the horses will start and move at the same speed until this condition is disturbed by the activities of the players.

In a modified form of this invention, the speed-varying motors, their associated mechanisms and circuits are omitted. The synchronous motor or motors and their circuits are retained and combined with constant and variable speed mechanisms, one for each horse. One of these, for controlling horse 10, is shown in Figures 16-19. The synchronous motor 30 is connected by gearing 138 and 139 to a shaft 140 to which are fixed three friction wheels 141, 142 and 143 of different diameters. Another shaft 144 parallel to shaft 140 carries a sleeve 145 slidable upon, but turnable with, the shaft by means of a longitudinal slot 146 in which rides a pin 147 projecting from the shaft 144. On sleeve 145 are affixed three friction wheels 147-148-149, complementary to and engageable with friction wheels 141, 142 and 143 so as to provide three different turning ratios between shafts 140 and 144. For example, friction wheels 147 and 141 may be of the same diameter so that when they are engaged, as shown in Figure 16, the two shafts will turn at the same speed. Friction wheel 149 may be one-half the diameter of friction wheel 142, so that when they are engaged shaft 144 will turn twice as fast as shaft 140. Similarly, friction wheel 148 may be twice the diameter of friction wheel 143. Other ratios and a greater or less number of sets of friction wheels may be used of course.

Shaft 144 is provided with a pulley 150, which is connected to pulley 21 on shaft 20 by means of belt 151. Since belt 16 passes around pulley 18 also on shaft 20 and is the driving belt for horse 10, motion can be imparted to horse 10 by synchronous motor 30, the rate of motion depending upon which pair of friction wheels is in engagement.

In the form of game shown it is assumed that the normal speed of horse 10 should be that obtained by the engagement of friction wheels 141 and 147; therefore, the sliding friction wheels on shaft 144 are so arranged that normally these two friction wheels will be maintained in engagement. The means shown for effecting this

consists of two springs 152 and 153 surrounding shaft 144 and pressing against the respective ends of sleeve 145. These springs will normally maintain friction wheels 141 and 147 in engagement, but will permit them to be disengaged, and one or the other set of friction wheels engaged.

The means shown for shifting the friction wheels (see Figure 17) consists of a double-acting solenoid 154 having two opposed coils 155 and 156 and a common armature 157 to which is swingably attached a lever 158 pivoted to some suitable stationary support as at 159, and engaging a collar 160 on sleeve 145. When coil 155 of the solenoid is energized, the lever 158 will be swung in one direction disengaging friction wheels 141 and 147 and engaging friction wheels 142 and 149 to effect a speeding-up of shaft 144, and when the other coil 156 of the solenoid is energized, lever 158 will be swung in the other direction to engage friction wheels 143 and 148, thereby effecting a reduction in the turning speed of shaft 144 to one-half that of shaft 140. When the current to the solenoid is cut off, spring 152 or 153 automatically move sleeve 145 back to its normal position to cause the engagement of friction wheels 141 and 147. In this way, the speed of horse 10 can be abruptly increased or decreased for the period during which the solenoid is energized and may then be caused to resume its normal speed.

The energizing of solenoid 154 may be controlled by the player in the manner already described; that is to say, by dropping balls through opening 86 upon run-way 75, which balls, if they happen to drop through one or another of the apertures 76-78 or 80-83 cause trigger plates 76a-78a or 80a-83a to swing, thereby closing one or another of the pairs of contacts, positioned upon opposite sides of chutes 88 and 91, as previously described. These chutes and associated switching mechanisms remain unchanged with the exception that, preferably, the internal engagement of each chute is such that the belts will all travel the same distance, after falling through any one of the apertures in run-way 75, and will cause one or another of the solenoids to remain energized for the same length of time. This will produce a definite gain or loss by horse 10, say one length, in its position with respect to the other horses. This is provided for by providing additional partitions 161 in each chute beneath the trigger plates, as shown in Figure 19, which will guide each base over an indirect path of the same length to the discharge end of the chute irrespective of which aperture it has dropped through.

The circuits for operating the modified speed control mechanisms just described are shown in Figure 18. They are substantially identical with the two outside circuits of Fig. 7, heretofore described, and have been given the same reference numerals. The only differences are that one circuit includes coil 155 of the solenoid 154 and the other circuit includes coil 156 of the solenoid instead of both running to a motor 66 and also circuit-breakers 102 and 107 are omitted, since they are not needed. The same sets of contacts 76e-79e, 76f-79f, 76g-79g, 76h-79h are in one circuit, and the other sets 80e-83e, 80f-83f, 80g-83g and 80h-83h are in the other circuit.

Each of the other horses 9, 11 and 12 are associated with a similar mechanism and circuit. If desired, all of these may be operated from a single synchronous motor 30 by connecting them

to the motor shaft by gears similar to 148, 149, or two identical motors may be used, one for a pair of horses, or individual motors for each horse.

Since normally friction wheels 141 and 147 of each mechanism are in engagement, no preliminary adjustment before a race is started is required beyond positioning the horses at the starting line. When switch 62 is closed, they will all move at the same speed until this condition is upset by the falling of a ball through one of the apertures in a run-way resulting in the energizing of one of the solenoid coils and in the abrupt doubling or halving of the speed of the corresponding horse.

When the ball emerges from its chute, thereby breaking the circuit, the horse will again resume its normal speed.

In both forms of the game described it will be noted that all of the horses move continually, but are subject to alterations in speed brought about by the players. In the first such alterations in speed are maintained until the player causes another alteration. In the second form the alteration continues only for a short time, whereupon the horse resumes its normal speed.

Although the several sets of contacts which effect such speed changes have been shown in a definite arrangement, it will be evident that any pair of either set may be shifted to the other circuit at any time so that it can be made impossible for any player to work out reliably the results to be expected from the passage of a ball through any particular aperture.

It will be evident also that various changes in construction and mechanical arrangement are possible and even the use of other apparatus.

We claim:

1. A racing game which includes a race course, a plurality of racers movable over said course, driving means including a rotatable friction disk, means connecting said driving means and said racers adapted to move said racers continuously along said course at the same speed which includes a friction wheel for each racer engaging with said disk so as to be rotatable thereby, means for adjusting said friction wheel with respect to said disk so as to increase or reduce the speed of rotation of said wheel with respect to that of said disk, means controlled by chance for operating said adjusting means, manually-operated means for initiating the action of said operating means, and connecting means between said disk and said racer for moving said racer over said course at a speed determined by the adjustment of said disk.

2. A racing game which includes a race course, a plurality of racers movable over said course, means for moving each racer over said course consisting of two groups of friction wheels, each wheel of one group being engageable with a different wheel of the other group, means for rotating the friction wheels of one group at a substantially constant speed, means controlled by

chance for causing a friction wheel of one group to engage with its complementary wheel of the other group, manually-operated means for initiating the action of said last-mentioned means, and means connecting a racer and said second group of friction wheels for moving said racer over said course.

3. A racing game which includes a race course, a plurality of racers movable over said course, driving means operable at an unvarying speed, means connecting said driving means and said racers adapted to move said racers continuously along said course at a constant speed, means for adjusting said connecting means so as to increase or reduce, as determined by chance, the speed of each racer with respect to said constant speed independently of the other racers without affecting the speed of said driving means, and manually-actuated means for operating said speed-varying means.

4. A racing game which includes a race course, a plurality of racers movable over said course, driving means operable at an unvarying speed, means connecting said driving means and said racers adapted to move all said racers continuously along said course at the same speed, and manually-actuated means for adjusting said connecting means so as to increase or reduce, as determined by chance, the speed of each racer with respect to said same speed independently of the other racers without affecting the speed of said driving means and to then automatically return said racer to its previous speed.

5. A racing game which includes a race course, a plurality of racers movable over said course, driving means operable at an unvarying speed, means connecting said driving means and said racers adapted to move said racers continuously along said course at the same and a constant speed, means for adjusting said connecting means so as to increase or reduce, as determined by chance, the speed of each racer with respect to said constant speed independently of the other racers without affecting the speed of said driving means, and manually-operated means for initiating the action of said speed-varying means.

6. A racing game which includes a race course, a plurality of racers movable over said course, driving means operable at an unvarying speed, means connecting said driving means and said racers adapted to move said racers continuously along said course at the same and a constant speed, means for adjusting said connecting means so as to increase or reduce, as determined by chance, the speed of each racer with respect to said constant speed independently of the other racers without affecting the speed of said driving means, and manually-operated means for initiating the action of said speed-varying means without controlling its speed-changing effect.

PETER GARMS.

PRESTON S. MILLAR.