

March 11, 1969

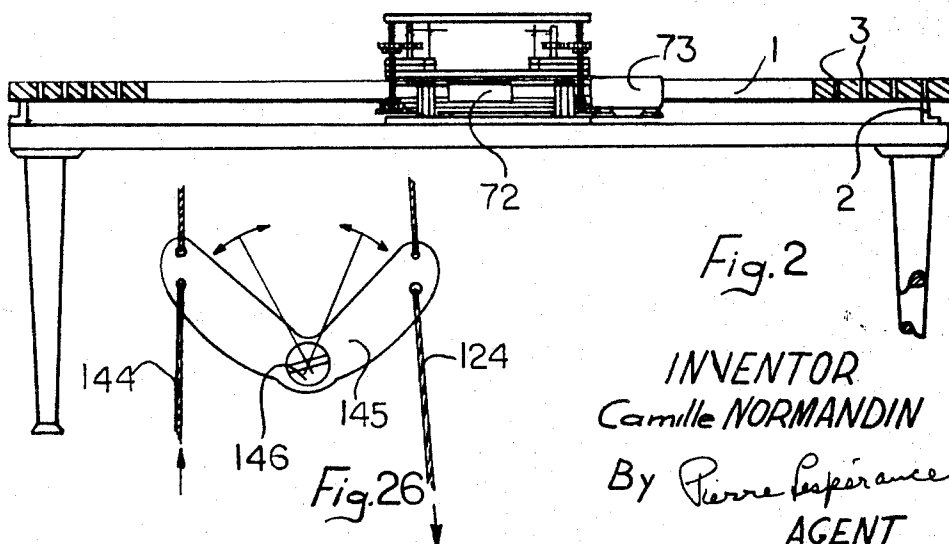
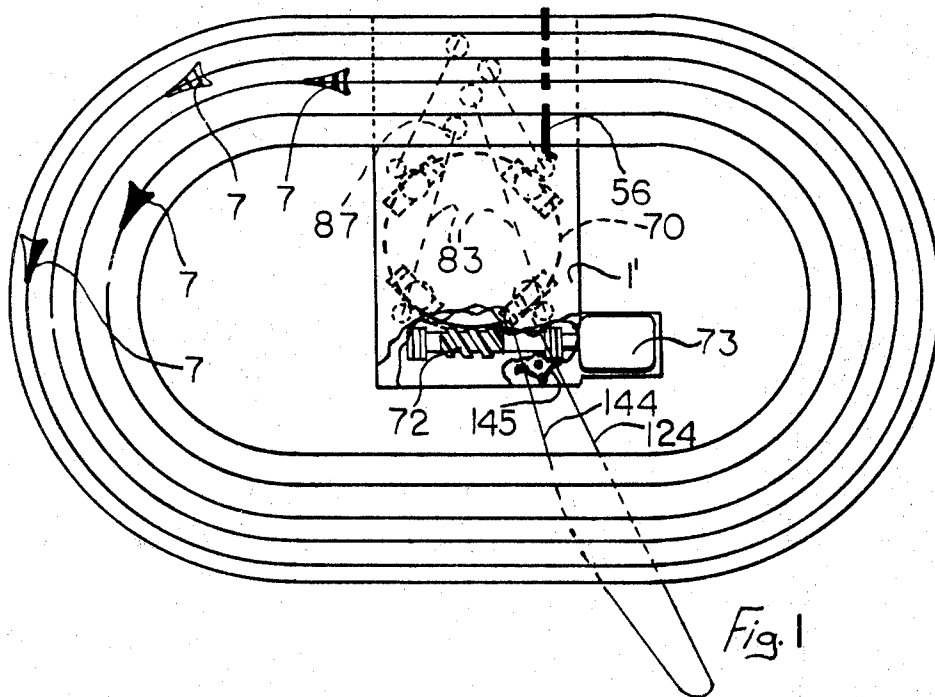
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 1 of 15



INVENTOR
Camille NORMANDIN
By Pierre Lesperance
AGENT

March 11, 1969

C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 2 of 15

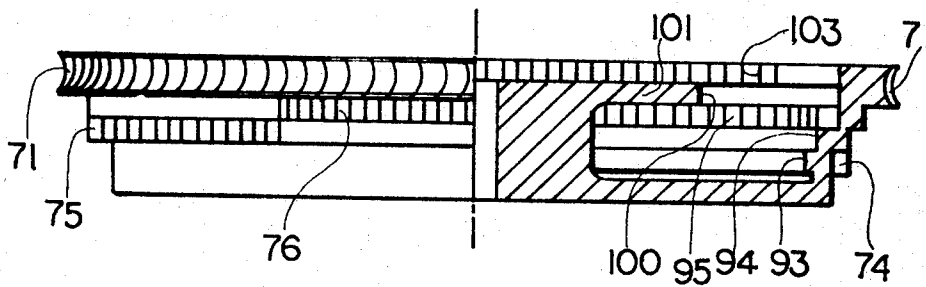


Fig. 4

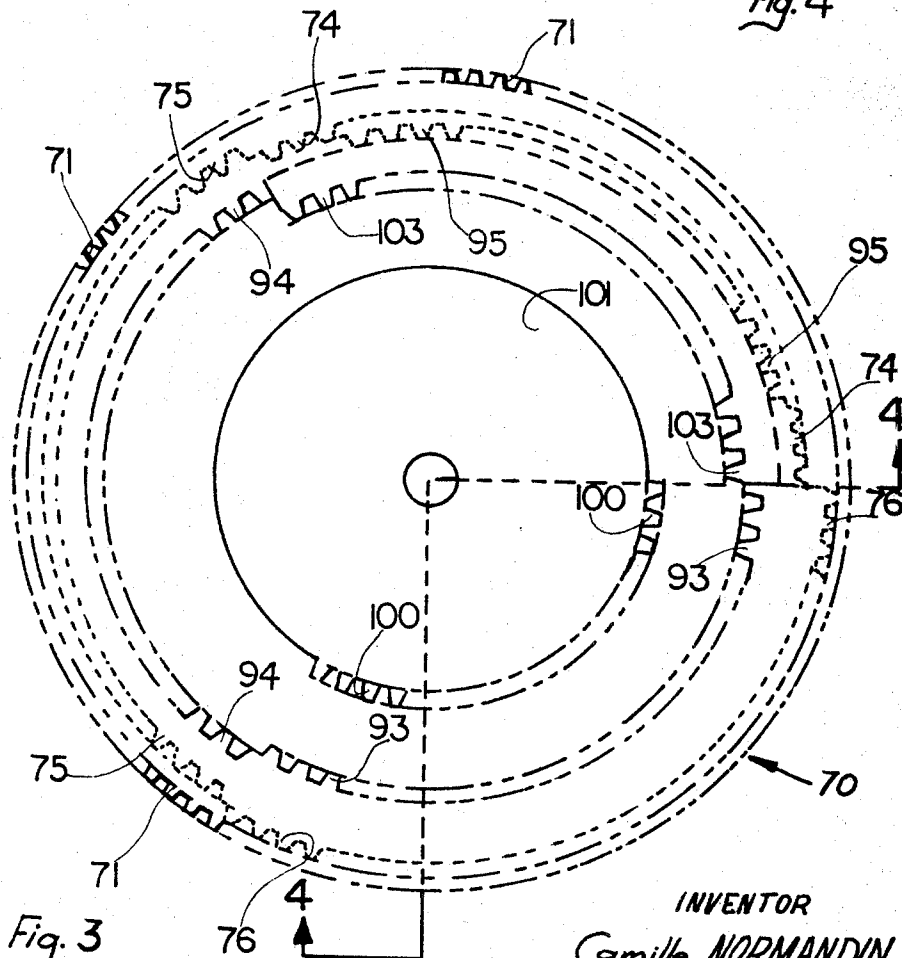


Fig. 3

INVENTOR
Camille NORMANDIN
By Pierre Laspérenes
AGENT

March 11, 1969

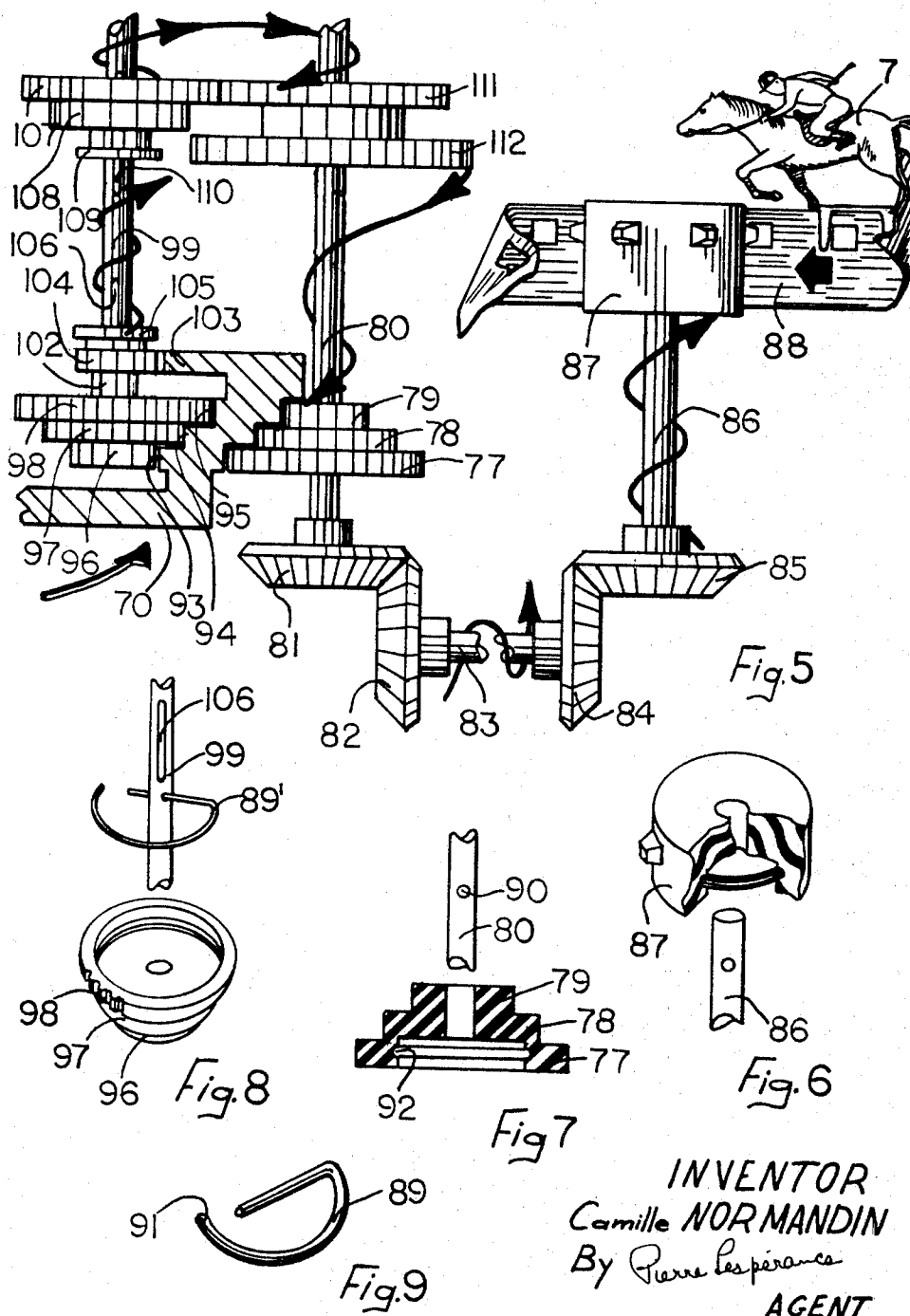
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 3 of 15



March 11, 1969

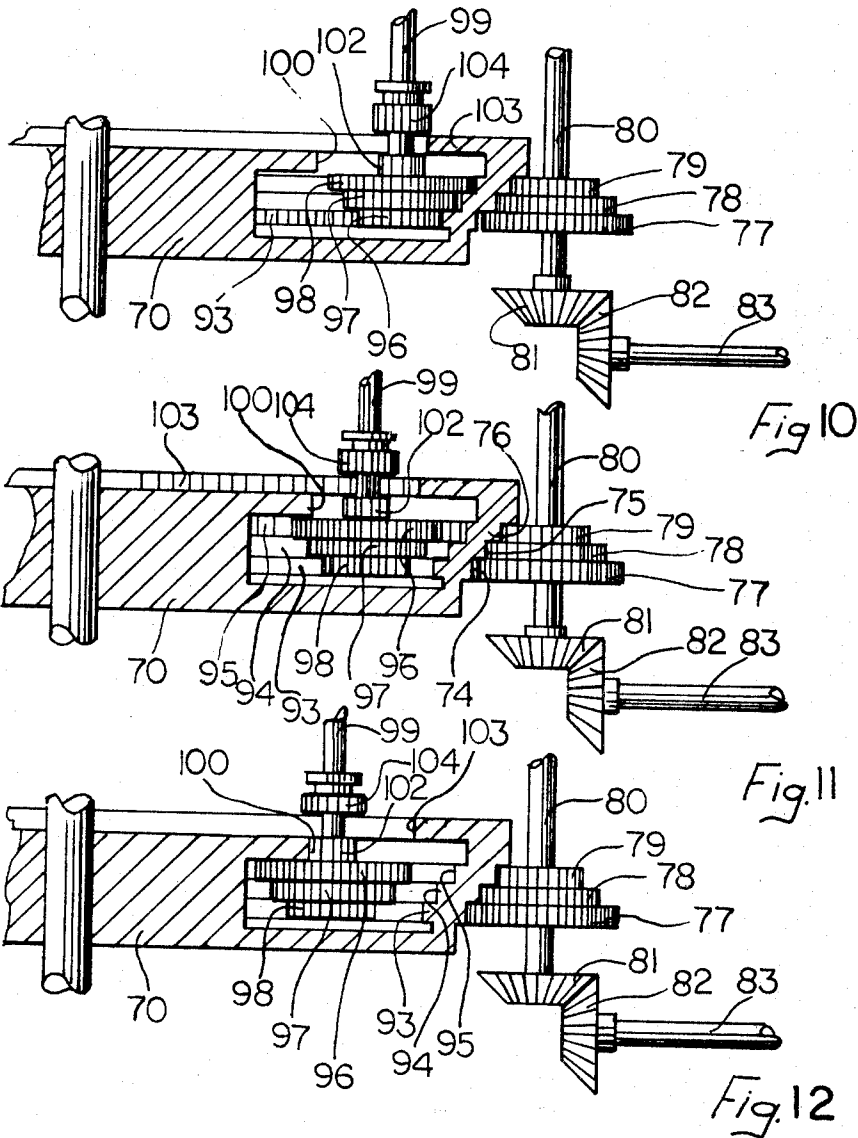
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 4 of 15



INVENTOR
Camille NORMANDIN
By *Pierre Leprieux*
AGENT

March 11, 1969

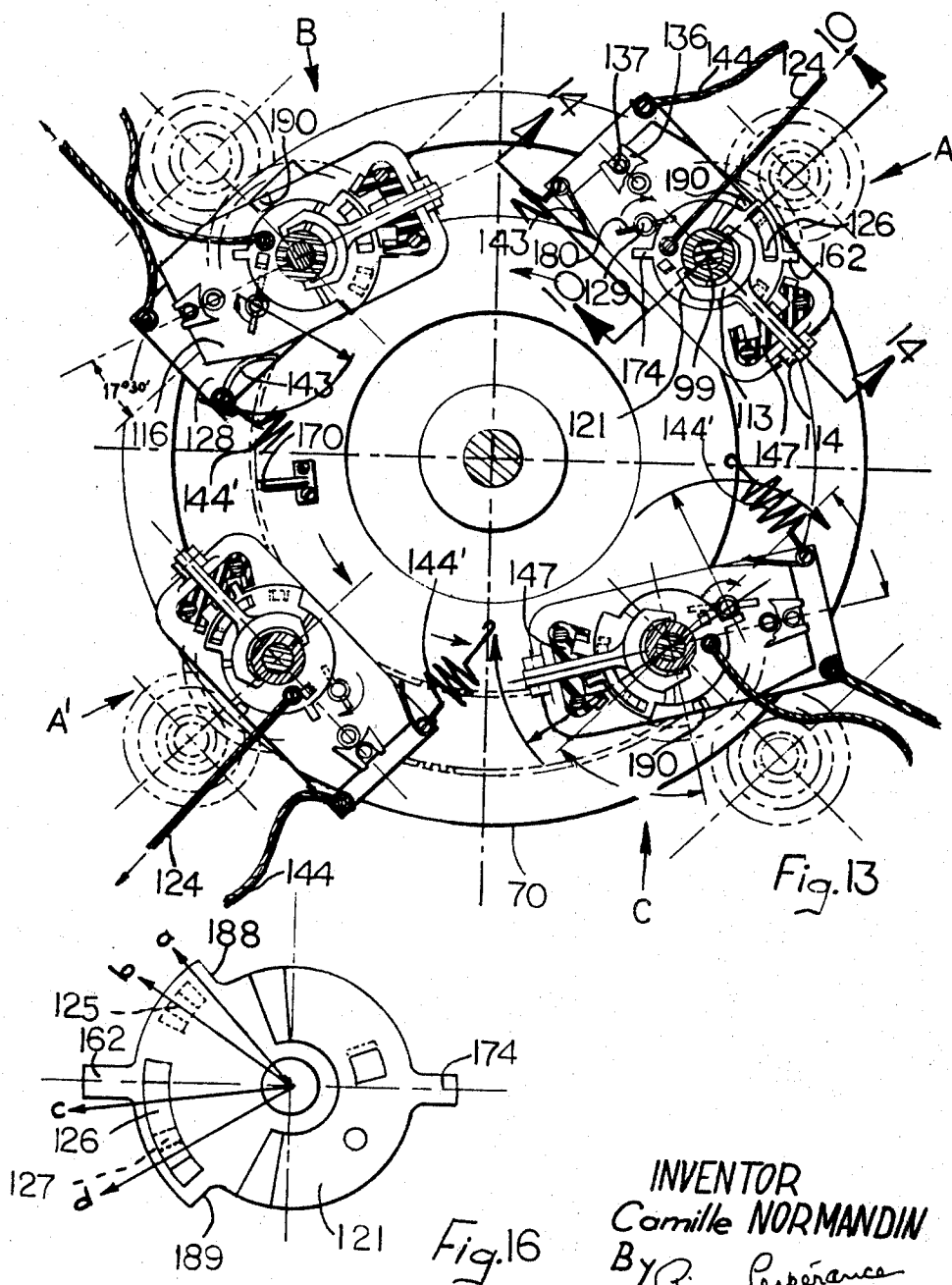
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 5 of 15



INVENTOR
 Camille NORMANDIN
 By *Pierre Desperance*
 AGENT

March 11, 1969

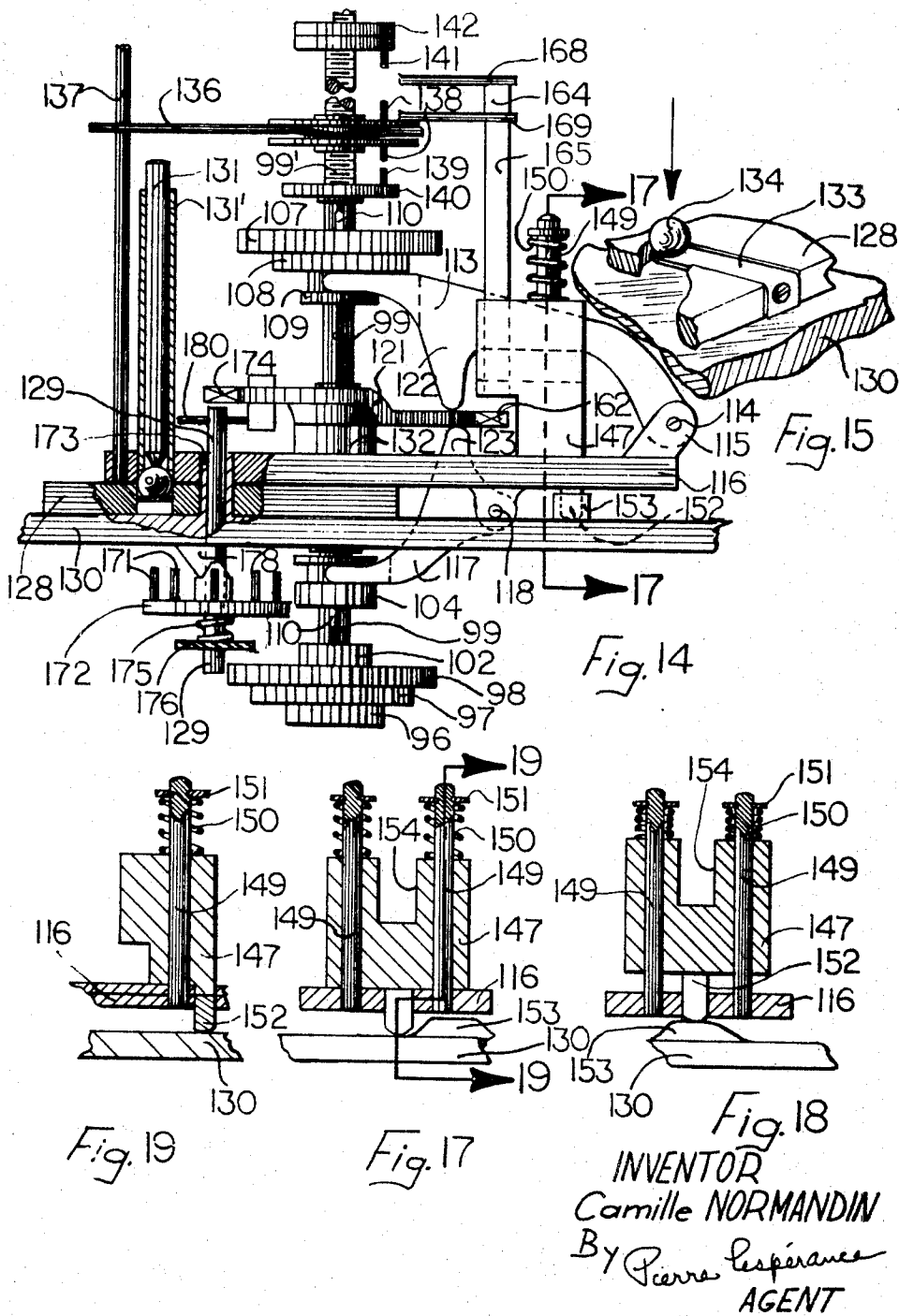
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 6 of 15



March 11, 1969

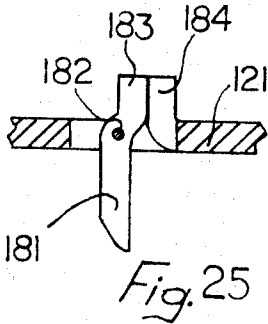
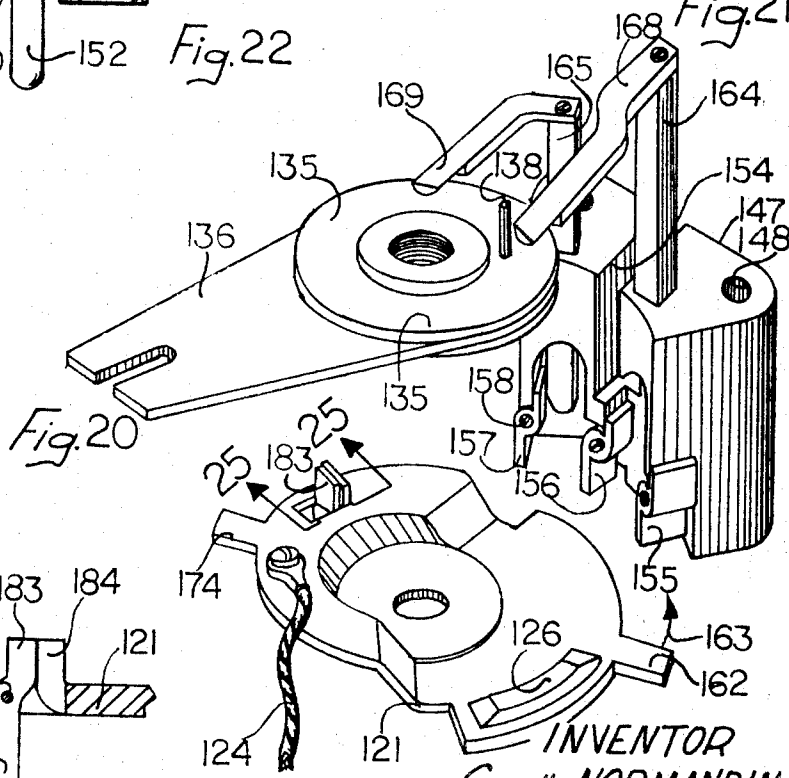
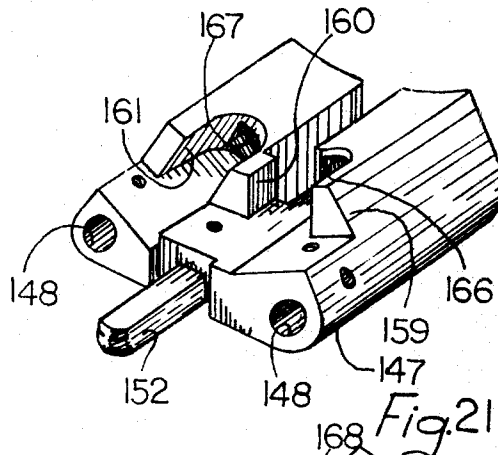
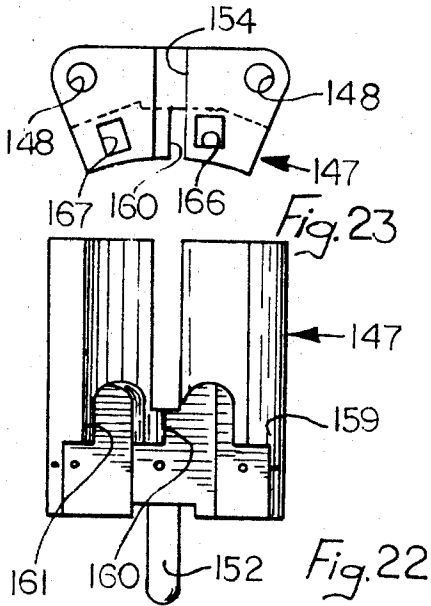
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 7 of 15



INVENTOR
Camille NORMANDIN
By Pierre Espérance
AGENT

March 11, 1969

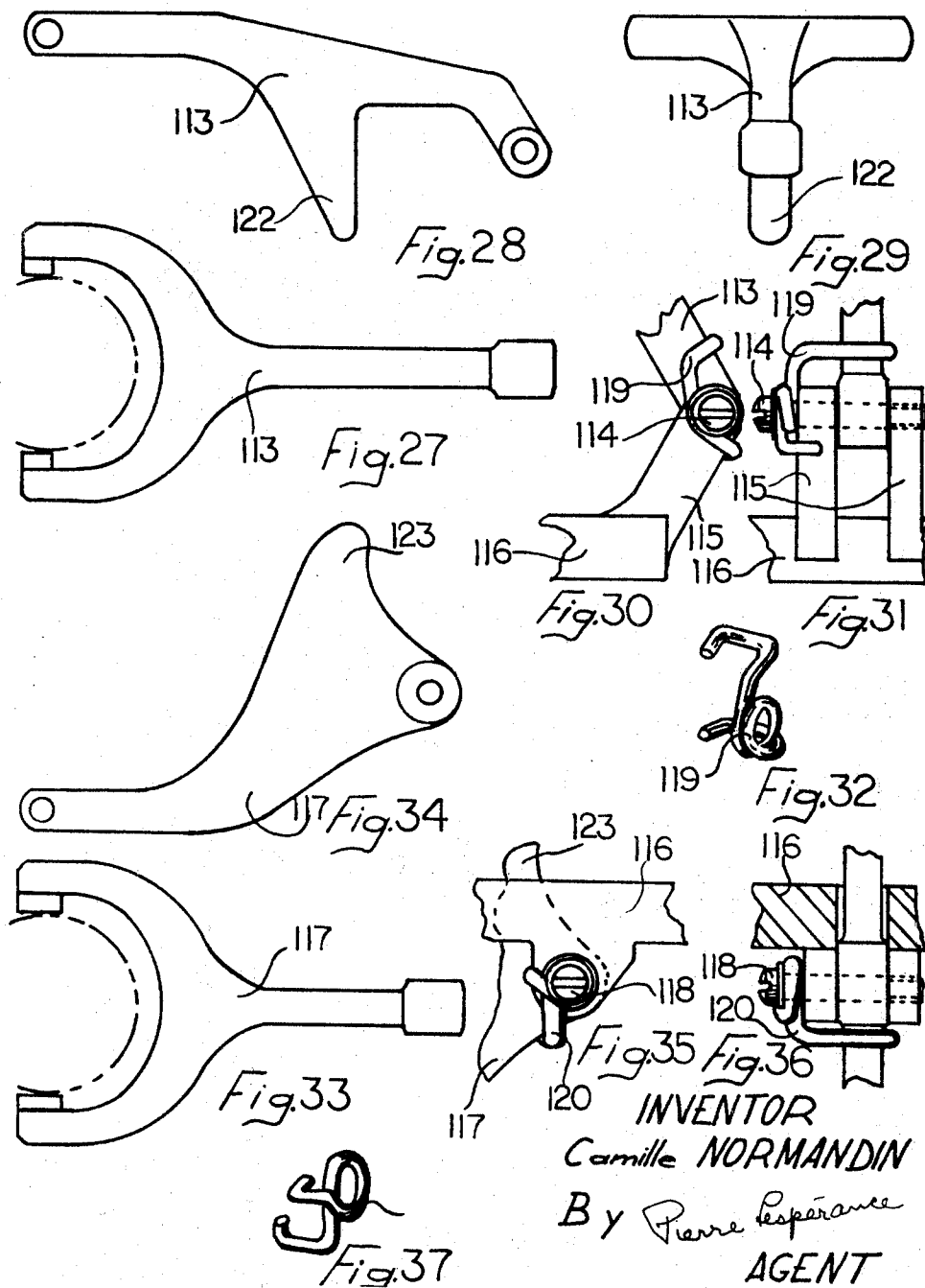
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 8 of 15



March 11, 1969

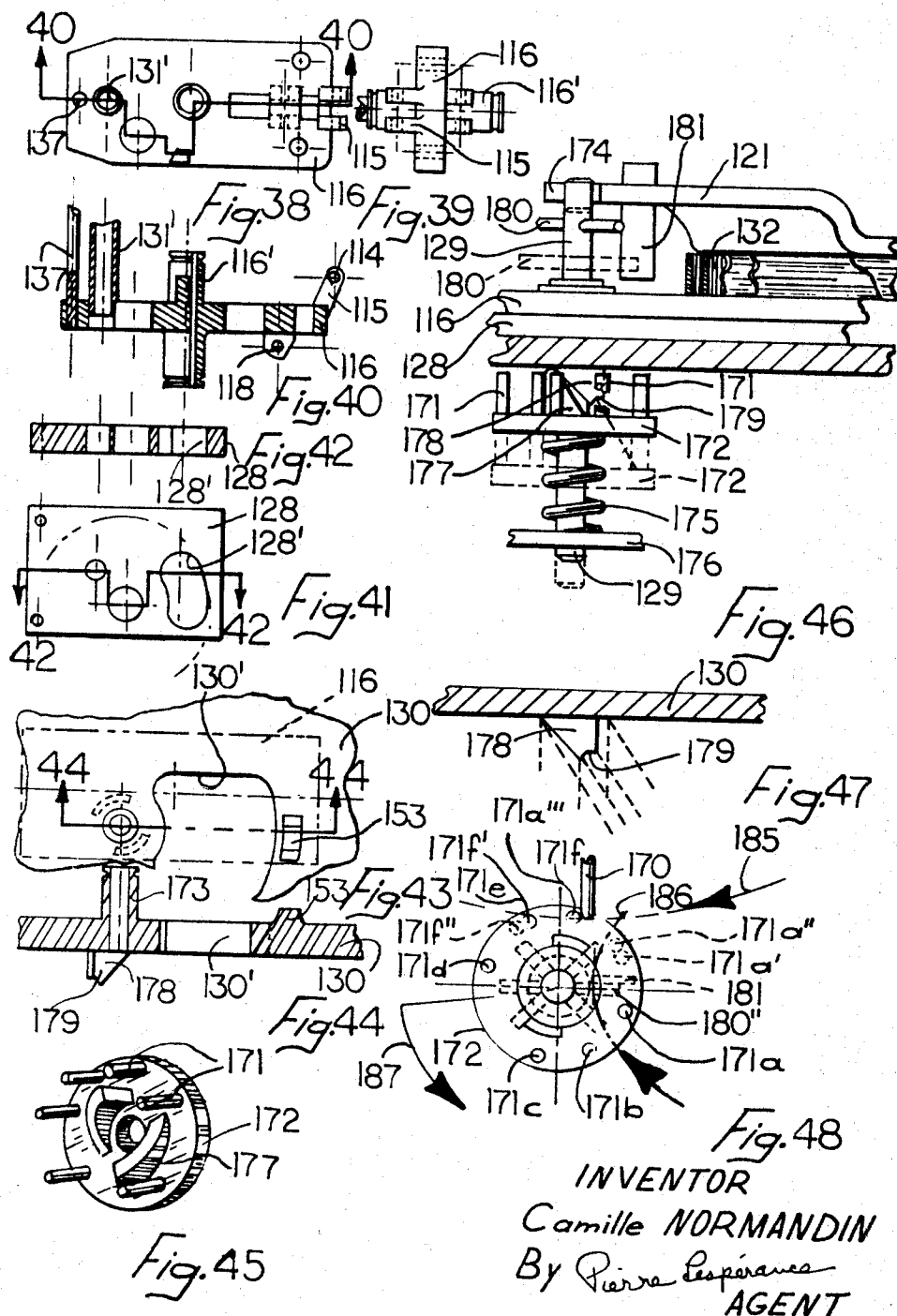
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 9 of 15



March 11, 1969

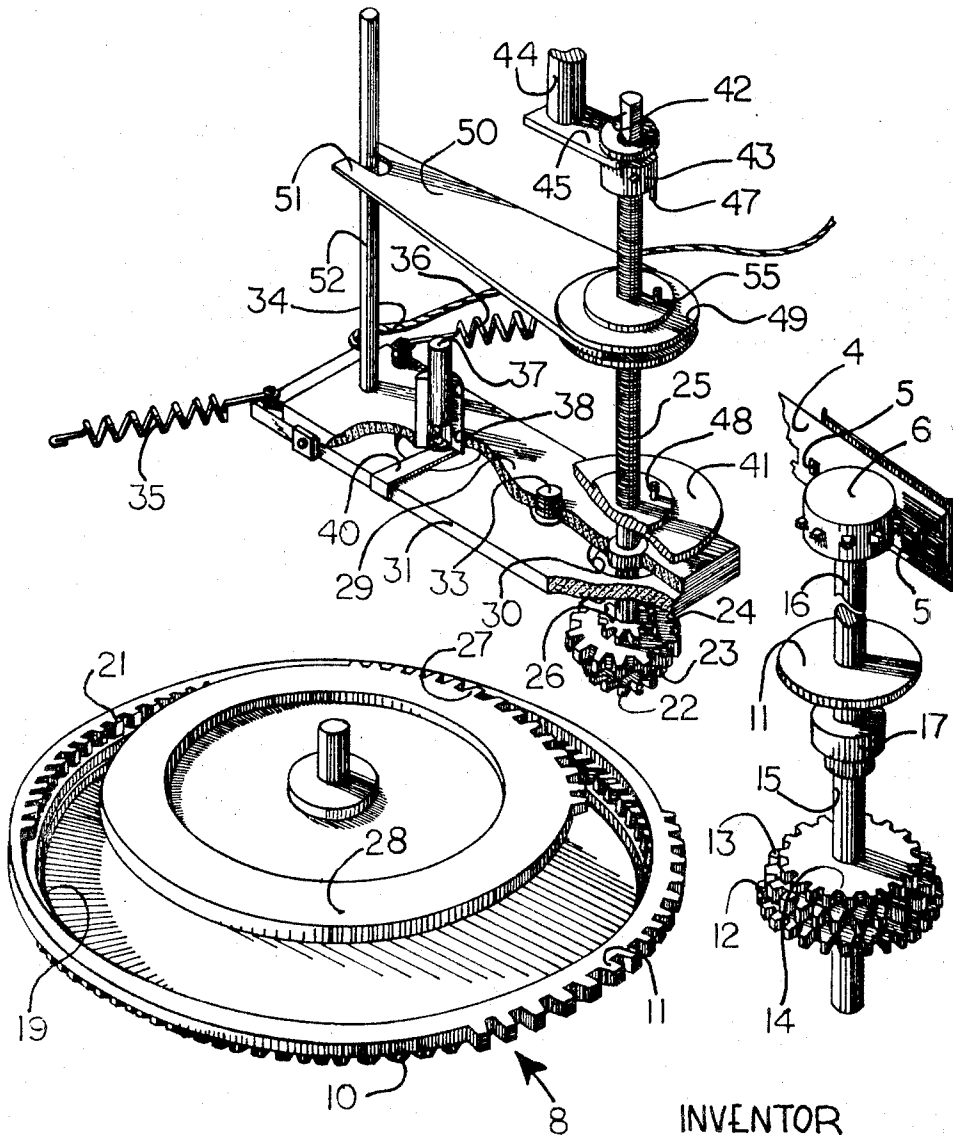
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 11 of 15



INVENTOR

Camille Normandin

By *Pierre Desperance*

Agent

March 11, 1969

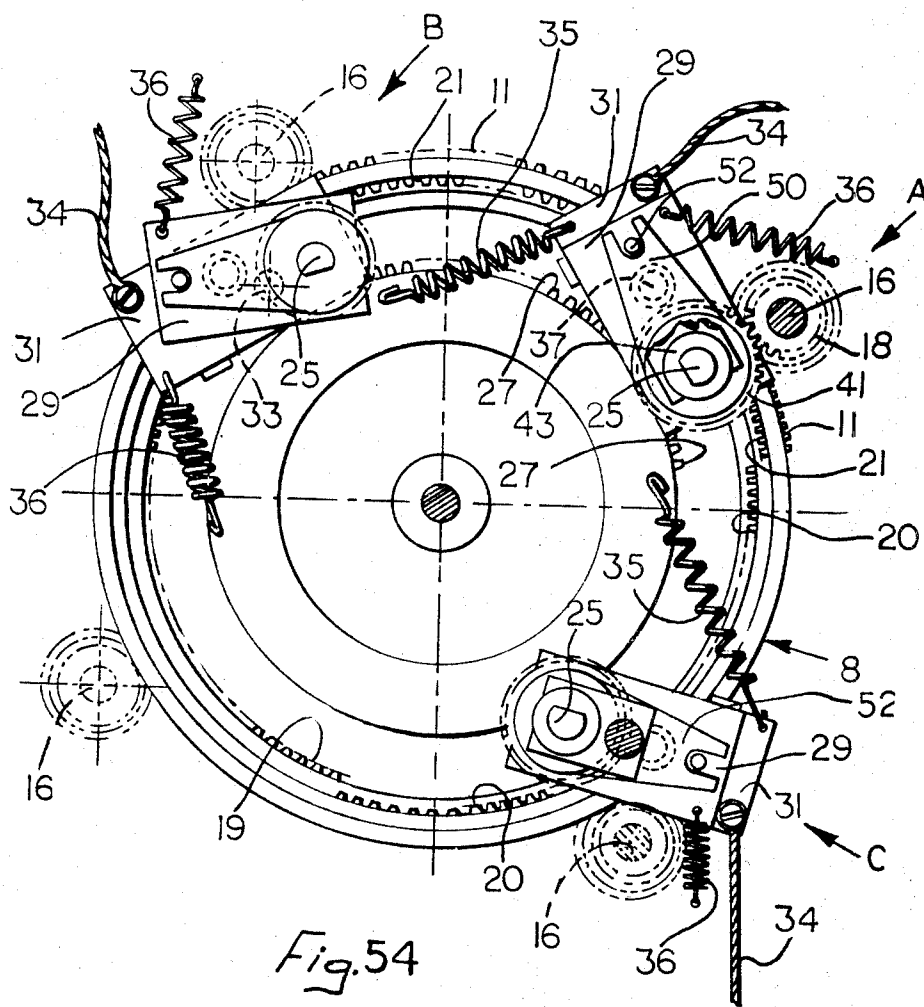
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 12 of 15



INVENTOR

Camille Normandin

By Pierre Laspérance
Agent

March 11, 1969

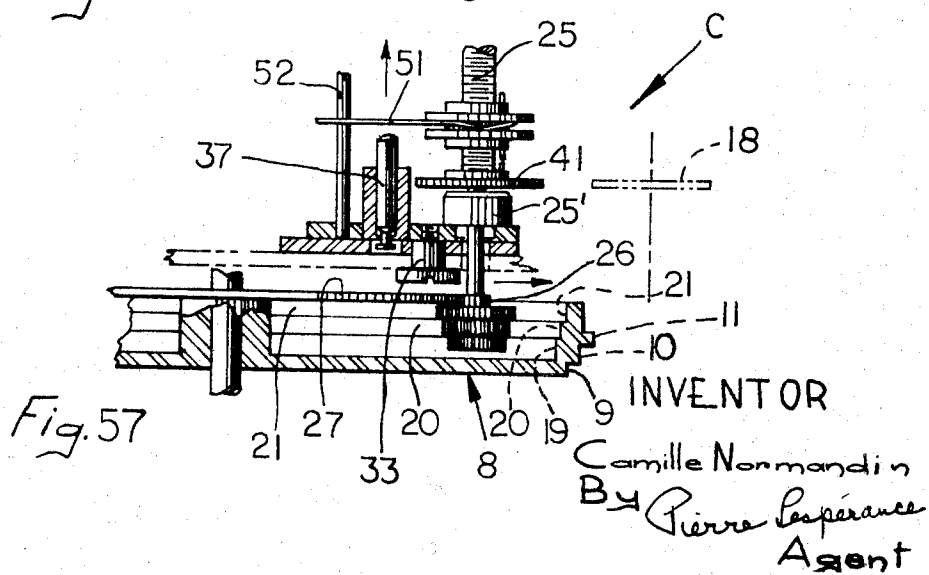
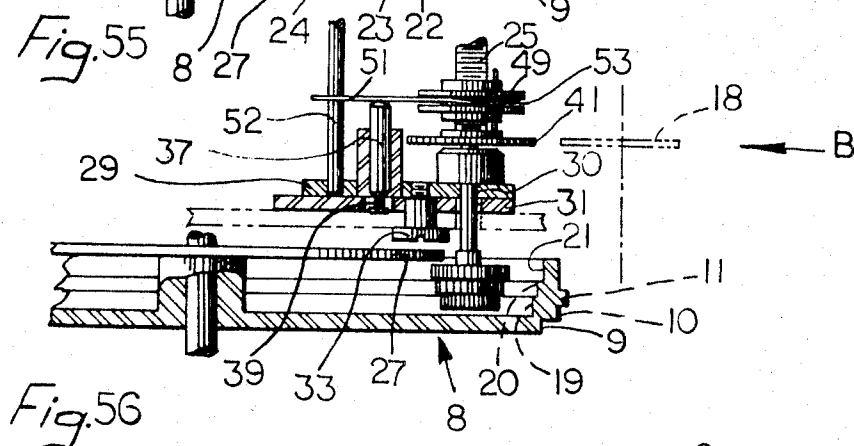
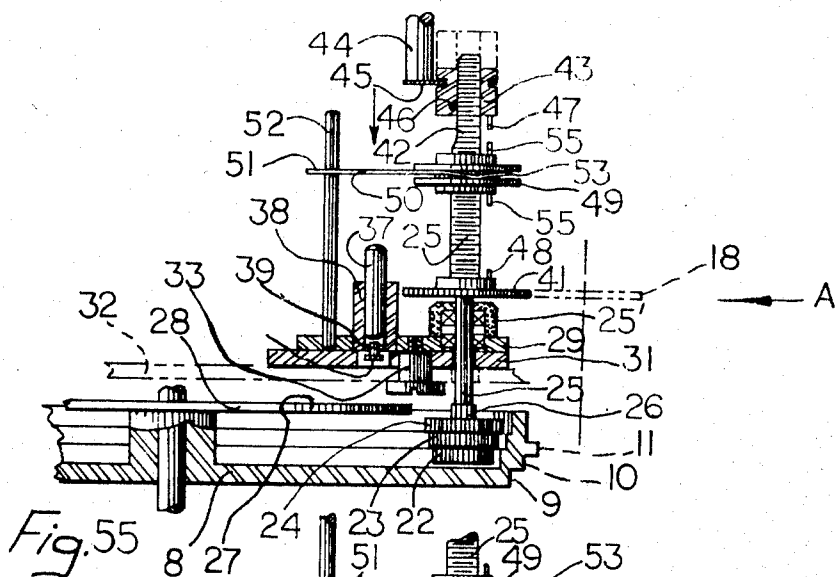
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 13 of 15



March 11, 1969

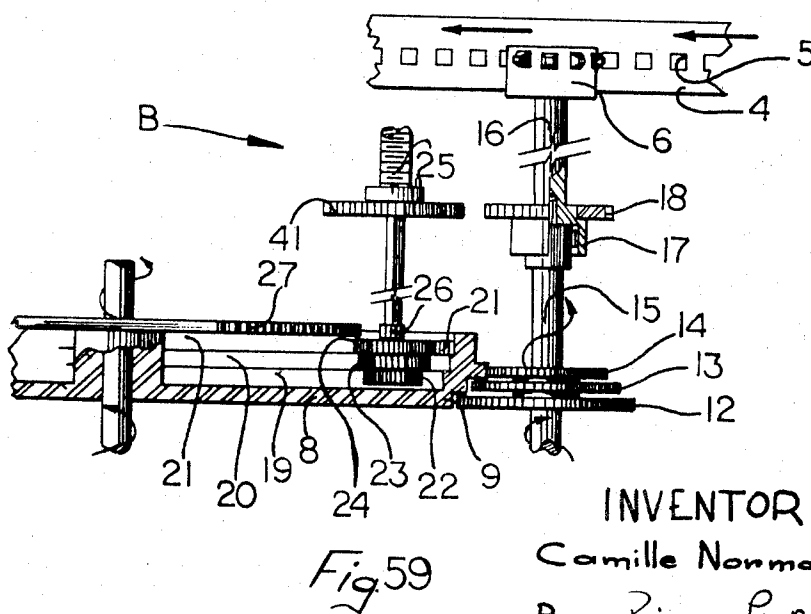
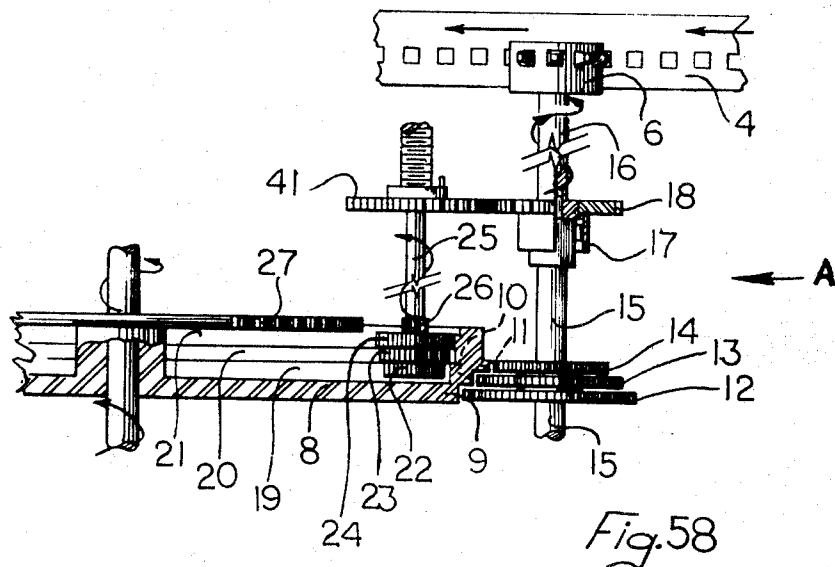
C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 14 of 15



INVENTOR
Camille Nonmandin
By Pierre Bépérance
Agent

March 11, 1969

C. NORMANDIN

3,432,167

RACING GAME WITH POWER ACCUMULATING MEANS

Filed Nov. 17, 1966

Sheet 15 of 15

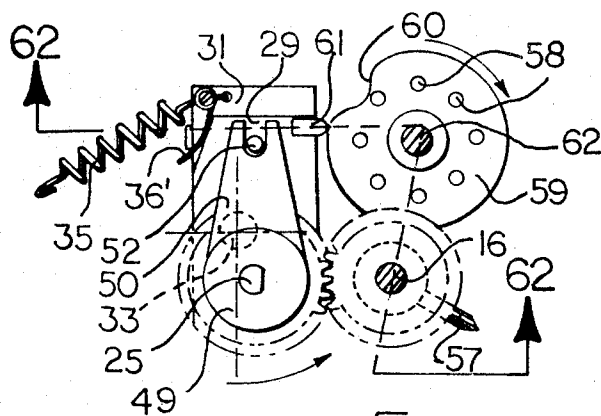


Fig. 60

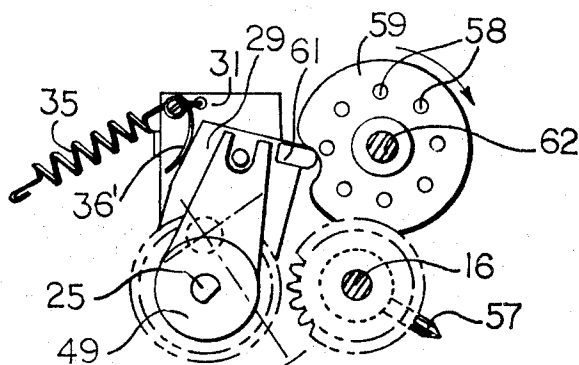


Fig. 61

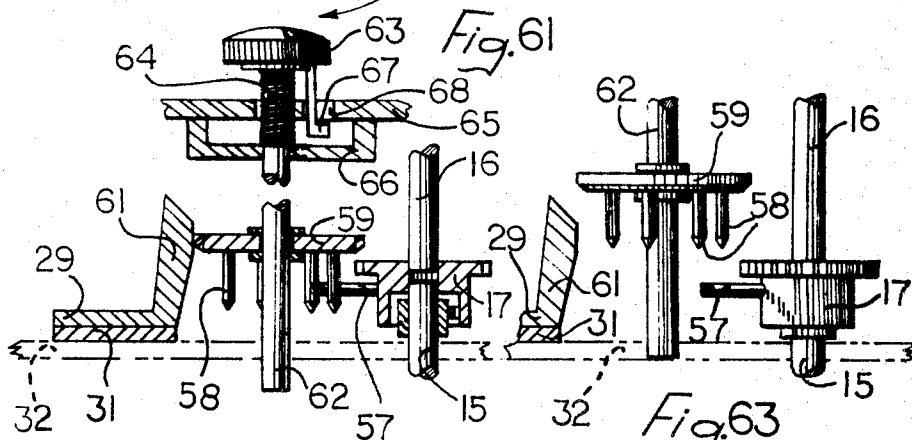


Fig. 62

Fig. 63

INVENTOR
Camille Normandin
By Pierre Leprieux

Agent

1

3,432,167 RACING GAME WITH POWER ACCUMULATING MEANS

Camille Normandin, 301 Roy St.,
Sorel, Quebec, Canada

Filed Nov. 17, 1966, Ser. No. 595,126

U.S. Cl. 273-86

Int. Cl. A63f 9/14

18 Claims

ABSTRACT OF THE DISCLOSURE

This invention concerns a racing game in which the different racers are independently and individually controlled by competing players, means being provided to move the racers at at least two different sets of speeds, there being provided different speeds in each set, the speeds of one set being higher than the speeds of the other set, the racers, when running at said higher speeds, expending a reserve of energy which, when spent causes automatic slowing down of the racers to the lower set of speeds, the racers capable of accumulating energy only when running at said lower set of speeds.

The present invention relates to a game and, more particularly, to a racing game conceived to simulate what happens in a foot race, bicycle race or horse race when it is necessary to conserve energy for a sprint and/or a strong finish.

An object of the invention resides in the provision of a racing game of the character described, in which the players must use judgment and skill to determine the best time to place the racers in energy-accumulating position in order to run the racers at the maximum overall speed during the race.

Another object of the present invention resides in the provision of a racing game of the character described, in which one or more of the racers can be placed on automatic racing whereby a player can match this skill against these automatically run racers.

Another object of the present invention resides in the provision of means in a racing game of the character described, to adjust the racing capability of the individual racers in order to establish odds for the race.

Another object of the present invention resides in a racing game of the character described, in which mechanism is included to establish sprints during which the racers may run at a still higher set of speeds, but at only certain intervals during the race.

Another object of the present invention resides in the provision of means controlled by the players to cause the racers to make sprints of different speeds depending on the accumulated amount of reserve energy, and while the racers expend their reserve of energy at normal rate in order to obtain a bonus or at a faster than normal rate.

Another object of the present invention resides in the provision of a racing game of the character described, in which the means to obtain the aforementioned objects may be mechanical or electrical, or both mechanical and electrical.

The foregoing and other important objects of the present invention will become more apparent during the following disclosure and by referring to the drawings, in which:

FIGURE 1 is a schematic top plan view of the racing track in accordance with a first embodiment of the invention;

FIGURE 2 is a cross-section of the racing track of the first embodiment;

FIGURE 3 is a top plan view of the main driving gear wheel of the first embodiment;

2

FIGURE 4 is a cross-section taken along line 4—4 of FIGURE 3;

FIGURE 5 is a partial cross-section of the main drive gear wheel, together with the transmission from said gear wheel to one racer, the transmission being in a position for making a sprint;

FIGURE 6 is a perspective view, partially in cross-section; of the driving sprocket and part of the shaft therefor;

FIGURE 7 is a cross-section of slow driving pinion assembly;

FIGURE 8 is a perspective view together with its driving shaft of the normal drive pinion assembly;

FIGURE 9 is a perspective view of the spring used for making the overriding clutch in the pinions of FIGURES 7 and 8;

FIGURES 10, 11 and 12 are partial cross-sections of the main drive gear and of the two pinion assemblies, and showing the three positions of the normal drive pinions, said cross-sections corresponding to that of FIGURE 5 and FIGURE 10 being a cross-section taken along line 10—10 of FIGURE 13;

FIGURE 13 is a plan section of the four accumulator assemblies associated with the main drive gear wheel shown in top plan view, each accumulator assembly associated with one racer;

FIGURE 14 is a cross-section taken along line 14—14 of FIGURE 13, but the main drive gear wheel being absent;

FIGURE 15 is a partial perspective of the interlock assembly of FIGURE 14;

FIGURE 16 is a top plan view of the sprint cam and which appears in FIGURES 13, 14 and 24;

FIGURE 17 is a cross-section taken along line 17—17 of FIGURE 14;

FIGURE 18 is a similar cross-section, but in another position of the elements;

FIGURE 19 is a cross-section taken along line 19—19 of FIGURE 17;

FIGURE 20 is a perspective view of a mirror image of the sprint block together with part of the accumulator assembly;

FIGURE 21 is a perspective view of a mirror image of the sprint block looking at the bottom and inner faces thereof;

FIGURE 22 is an elevation of the sprint block;

FIGURE 23 is a top plan view of the sprint block;

FIGURE 24 is a perspective view of a mirror image of the sprint cam plate shown in FIGURE 13;

FIGURE 25 is a partial section taken along line 25—25 of FIGURE 24;

FIGURE 26, shown on the sheet of drawings containing FIGURES 1 and 2, is a plan view of the lever arrangement allowing pulling of one rope at a time of the sprint rope and the accumulator rope;

FIGURE 27 is a top plan view of the top fork for the sprint assembly;

FIGURE 28 is a side elevation of the fork of FIGURE 27;

FIGURE 29 is a back end elevation of the fork of FIGURE 27;

FIGURE 30 is a partial side elevation of the pivot of FIGURE 27;

FIGURE 31 is a back end elevation of the part of FIGURE 30;

FIGURE 32 is a perspective view of the spring use in the pivot of FIGURE 30;

FIGURE 33 is a top plan view of the lower fork of the sprint assembly;

FIGURE 34 is a side elevation of the fork of FIGURE 33;

3

FIGURE 35 is a partial side view of the fork of FIGURE 33 showing its pivot arrangement;

FIGURE 36 is a cross-section of the parts of FIGURE 35;

FIGURE 37 is a perspective view of the spring used in the pivot of FIGURE 35;

FIGURE 38 is a top plan view of the upper plate of the accumulator assembly;

FIGURE 39 is an end view of the upper plate of FIGURE 38;

FIGURE 40 is a longitudinal section taken along line 40—40 of FIGURE 38;

FIGURE 41 is a top plan view of the lower plate of the accumulator assembly;

FIGURE 42 is a longitudinal section taken along line 42—42 of FIGURE 41;

FIGURE 43 is a top plan view of a portion of the main frame plate in the region of the accumulator assembly;

FIGURE 44 is a longitudinal section taken along line 44—44 of FIGURE 43;

FIGURE 45 is a perspective view of a combined ratchet wheel and cam;

FIGURE 46 is a partial elevation of some of the elements of the sprint and accumulator assemblies;

FIGURE 47 is a cross-section of the main frame plate in the region of the accumulator assembly showing one of the cams working in association with the cams on ratchet wheel of FIGURE 45;

FIGURE 48 is a top plan view of the ratchet wheel and showing its operation;

FIGURES 49, 50, 51 and 52 are cross-sections similar to that of FIGURE 14, but with some elements removed and showing the main drive gear wheel, these figures showing the four different positions of the sprint assembly;

FIGURE 53 is an exploded perspective view of a second simpler embodiment in accordance with the invention showing the main drive gear wheel, the accumulator assembly together with the transmission mechanism;

FIGURE 54 is a top plan view of the main drive gear and of three accumulator and driving assemblies associated with said main drive gear and each driving and controlling a racer;

FIGURES 55, 56 and 57 are cross-sections of the main drive gear wheel and accumulator assemblies in three different positions of said accumulator assemblies;

FIGURES 58 and 59 are cross-sections of substantially right angles to the cross-sections of FIGURES 55 to 57 showing two different positions of the accumulator assemblies;

FIGURES 60 and 61 are plan sections of the accumulator assemblies associated with a mechanism for automatic control of a racer between a low and a high set of speeds;

FIGURE 62 is a partial section taken along line 62—62 of FIGURE 60; and

FIGURE 63 is a partial section similar of that of FIGURE 62 but in another position, in which the automatic drive is disengaged.

Referring now particularly to the drawings in which like reference characters indicate like elements throughout, the second simpler embodiment illustrated in FIGURES 53 to 63 inclusive, will first be described.

In both embodiments, there is provided a race track 1 shown in FIGURES 1 and 2, consisting of a board which may be supported on legs 2 and which may have an oval shape and any other desired shape. Said race track is provided with a plurality of parallel slits 3, each corresponding to the pathway of a racer. In each slit 3 is disposed a flexible band 4, partially shown in FIGURE 53, having perforations 5 similar to a movie film engageable by the teeth of a driving sprocket 6 which

4

causes displacement of the endless band 4 within its slit 3.

Each band 4 is fitted with the representation of a racer, such as a horse, as shown at 7 in FIGURE 5. The figurine 7 may be removably clipped on the endless band 4. Each band 4 is driven by its sprocket 6, and all the sprockets are in turn driven by a mechanism housed underneath a portion of the race track 1 in accordance with the second embodiment.

Referring to FIGURE 53, the driving mechanism comprises a common main driving wheel 8 driven at a constant speed of rotation by any suitable means such as an electric motor driving a worm meshing with external gear teeth (not shown) on the gear wheel 8, as in the embodiment shown in FIGURE 1.

Gear wheel 8 has on the outside three gear sectors 9, 10 and 11 of increasing diameter and each extending through one-third of a circle so that one sector ends where the next sector of the series starts. The gear sectors 9, 10 and 11 therefore come in successive engagement with the respective pinions 12, 13 and 14 of decreasing diameter and all secured to a common shaft 15. Said shaft 15 drives the shaft 16 of the sprocket 6 through an over-riding clutch 17, whereby shaft 16 may be driven at higher speed than shaft 15.

Shaft 16 is provided with a gear wheel 18. Sprocket 6 has an internal friction clutch whereby the racer or horse 7, together with its band 4, may be stopped by hand or otherwise while the driving mechanism is operating.

Main gear 8 has furthermore three internal gear sectors 19, 20 and 21 of progressively increasing diameter and each extending through one-third of a circle and such that one sector ends where the next sector of the series starts.

Gear sectors 19, 20 and 21 are adapted to come successively in meshing engagement with the respective pinions 22, 23 and 24 of progressively increasing diameter and all mounted on a common shaft 25.

An additional smaller diameter accumulator pinion 26 is mounted on shaft 25 on top of pinion 24 and is free of any engagement with the main gear 8 when the pinions 22, 23 and 24 are in engagement with gear sectors 19, 20 and 21.

However, upon bodily displacement of the pinions 22, 23 and 24, pinion 26 comes into engagement with an accumulator gear sector 27 formed for about one-third of the periphery of a central flange 28 integral with gear wheel 8. Accumulator gear sector 27 is preferably disposed opposite gear sector 11, as shown in FIGURE 54, said gear sector giving the highest of the "slow" speeds. Sector 27 is also preferably disposed opposite internal gear sector 19, which is the highest of the "normal" speeds, although sector 27 could be disposed opposite sector 21, the lowest "normal" speed, as shown in FIGURE 54.

Shaft 25 carrying pinions 22, 23, 24 and 26 is journaled at 25' in an upper plate 29 and freely passes through a hole 30 of a lower plate 31 and also through a hole of the framework plate 32 of the machine (see FIGURES 55 to 57), said plate 32 overlying gear wheel 8 and underlying plates 29 and 31.

The plates 29 and 31 are of rectangular shape, are superposed and are bodily pivotable as a unit about a pivot screw 33 secured to the framework plate 32.

This pivot pin 33 is spaced from shaft 25. Thus, by pivoting the upper plate 29 about pivot pin 33, the gears 22, 23 and 24 may be made to engage or disengage the associated gear sectors 19, 20 and 21, as shown in FIGURES 55 and 56 and may also be further pivoted inwardly so that the accumulator pinion 26 will engage the accumulator gear sector 27, as shown in FIGURE 57.

This movement is effected by means of a draw rope 34 attached to the lower plate 31 and controlled by the player.

Upon release of rope 34 which corresponds to a rein

for a horse, a tension coil spring 35 also attached to the lower plate 31 and to the framework, will pivot the lower plate 31 so that pinions 22, 23, 24 will normally be in contact with internal gear sectors 19, 20, 21.

Plate 29 is also pivotable with respect to the lower plate 31 about pivot pin 33 under action of a tension coil spring 36 attached to the upper plate and to the framework. However, the coil spring 36 has less strength than coil spring 35 so that when the two plates 29 and 31 are interlocked, the coil spring 35 will move the assembly of the two plates 29 and 31 against the action of spring 36.

There is provided, as above-mentioned, an interlock between the two plates 29 and 31. Said interlock includes an upright plunger 37 freely displaceable in a bushing 38 secured to the upper plate 29 and resting at its lower end on a stud 39 upstanding from the outer end of a leaf spring 40 carried by the lower plate 31.

Each spring 40 normally maintains stud 39 against the weight of plunger 37 in a position extending into a hole made in the upper plate 29 so as to lock the two plates 29 and 31 against relative pivotal movement. However, upon downward movement of plunger 37, the stud 39 is pushed downwardly so as to clear the upper plate 29, as shown in FIGURE 56, whereupon the upper plate may pivot with respect to lower plate 31 under action of coil spring 36.

A gear wheel 41 is secured to shaft 25 above upper plate 29 at the level of gear wheel 18 on shaft 16 so as to mesh with the same when pinions 22, 23, 24 are in meshing engagement with internal gear sectors 19, 20, 21, as shown in the position of FIGURE 55.

The part of the shaft 25 above gear wheel 41 is threaded and is provided at its upper end with a flattened portion 42 slidably engaged by a head 43 which is rotatable along with shaft 25, but which may be vertically adjusted, as shown by its position in dotted line in FIGURE 55, by means of a setting screw 44 screwed within the top framework plate of the mechanism housing, not shown, and provided at its lower end with a fork 45, rotatably engaging a groove made at the periphery of head 43, so as to allow rotation of the head 43 with respect to the fork but maintaining the head at the desired level.

Head 43 is slidable over the thread of shaft 25 and carries a ball 46 engaging with the flat 42 to prevent rotation of head 43 with respect to shaft 25. Head 43 has downwardly extending pin 47 while gear wheel 41 has an upwardly extending pin 48.

Intermediate the head 43 and gear wheel 41, there is screwed on shaft 25 a cursor wheel 49 having a double flange between which is rotatable a cursor arm 50 having a forked outer end 51 engaging a rod 52 forming a cursor arm guide which is secured to the top plate 29 in upright position.

Cursor arm 30 is thus prevented from rotation by the guide rod 52 and, therefore, it normally prevents rotation of the cursor wheel 49 during rotation of spindle 25, due to the friction between the two flanges of the wheel 49 and the curved spring-like portion 53 of the arm 50. Thus, rotation of shaft 25 will cause up or down movement of the cursor wheel 49 along shaft or spindle 25 until the upper or lower stop pin 55 carried by the cursor wheel 49, will engage the top pin 47 or the stop pin 48 of head 43 and gear wheel 41 respectively, at the topmost and lowermost limit positions of the range of movement of the cursor wheel 49 along shaft 25.

In these two limit positions, the cursor wheel 49 will be brought into rotation along with shaft 25 and will therefore remain in abutment either with head 43 or with gear wheel 41.

By adjusting the vertical position of head 43, it will be appreciated that the range of up-and-down movement of the cursor wheel 49 may be increased or de-

creased so as to store more or less "energy" in the accumulator system.

When cursor arm 50 moves down, it will finally abut the upper end of plunger 37 which acts as a detent to release the interlock formed by the stud 39 and thereby allows pivotal movement of the upper accumulator plate 29 with respect to the lower accumulator plate 31 under the action of spring 36.

The system operates as follows:

It will be understood that all the mechanism is enclosed in a housing so as to be hidden from view and only the rope 34 is accessible to each player. Each player controls one racer or horse 7. Gear wheel 8 actuates all the recess 7, each racer being associated with an accumulator assembly and driving assembly.

Referring to FIGURE 1, there is provided a starting gate 56 disposed across the race-track 1 and held in position until all the racers or horses 7 abut against the same. It should be remembered that each sprocket 6 is provided with a friction clutch which allows to hold the horses stationary against the starting gate while the shafts 16 of the sprockets are rotating.

At the start of the race, all the accumulators will be charged, that is the cursor wheels 49 will be at their top limit position in engagement with the respective head 43. This can be accomplished by allowing the horses 7 to move once around the track 1 while retained at the slow speeds, as will be later described.

A race may consist of two turns around track 1 corresponding to about ten turns of main gear wheel 8.

The starting gate 56 is removed and the horses start to move along the race-track. The draw ropes 34 being released, the horses will run in their normal range of speed while gradually depleting or using up their reserve of energy.

In this normal range of speed, the accumulator assembly is in position A, as shown in FIGURES 54, 55 and 58. The pinions 22, 23, 24 successively engage the internal gear sectors 19, 20 and 21, thereby rotating shaft 25 and, consequently, gear wheel 41 in a direction to cause gradual lowering of cursor wheel 49, thereby depleting the reserve of energy.

Gear wheel 41 in turn drives gear wheel 18 in opposite direction, which is driven at a faster speed than shaft section 15, thus driving shaft 16 at a high speed, due to the presence of overriding clutch 17. Thus, sprocket 6 drives the associated band 4 within a range of normal speeds, namely: three different speeds in accordance with the ratios of pinions 22, 23, 24 with respect to internal gear sectors 19, 20 and 21.

When the reserve of energy is depleted, that is when gear cursor wheel 49 attains its lower limit position abutting against the gear wheel 41, the cursor arm 50 pushes down on plunger 37, as shown in FIGURE 56, thereby releasing the interlock between the upper and lower accumulator plates 29 and 31 of the accumulator assembly, automatically moving pinions 22, 23 and 24 inwardly out of engagement with the internal gear sectors 19, 20 and 21, as shown at position B in FIGURES 54, 56 and 59. In this position, the external pinions 12, 13 and 14 become active to drive the associated sprocket 6 and horses 7 at a lower range of speeds, meaning that the reserve of energy having been spent, the horse moves automatically at slow speeds.

The inward movement of shaft 25 has caused disengagement of the gear wheels 18 and 41, as shown in FIGURE 56.

To replenish the reserve of energy, the player must pull on draw rope 34. This moves the accumulator assembly to position C, shown in FIGURES 54 and 57. In this position, pinions 22, 23, 24 remain free of engagement with gear sectors 19, 20 and 21 but accumulator pinion 26 meshes with accumulator gear sector 27 and is rotated for one-third of every revolution of the main gear wheel 8. Thus, shaft 25 is rotated in a direction

opposite to its direction of rotation when in position A, whereby the cursor wheel 49 is caused to rise along the threaded portion of shaft 25, thereby accumulating energy.

The rising accumulator wheel releases the plunger 37, allowing stud 39 to interlock the top and bottom accumulator plates 29 and 31. Thus, when a certain amount of energy has been stored in the accumulator, that is when the position of the cursor wheel 49 is sufficiently high to clear the plunger 37, the accumulator assembly may be returned to the normal fast speed range, that is position A, by releasing the draw rope 34.

The player must develop skill in handling his racer; he must not put the mechanism in accumulating position C for too long a time, because no more accumulation of energy takes place when the cursor wheel 49 has reached its upper limit position abutting against head 43. The player must learn to accumulate energy at the most appropriate time, that is when the racer would otherwise run at the highest of the slow speeds, because recuperating gear sector 27 is opposite slow speed gear sector 11. This can be more easily effected by keeping always a reserve of energy in the accumulator system; otherwise, the player would be forced to run his horse on the slowest and intermediate slower of the slow speeds while trying to recuperate.

From the foregoing, it will be noted that it is to the advantage of the player never to allow the accumulator system to become completely run down.

FIGURES 60 to 63 show an automatic cam arrangement that can take over the operation of one or more racers in the absence of a corresponding number of players and still afford competition to the other players.

An actuator arm 57 is secured to the housing of the overriding clutch 17 between shaft 15 and shaft 16 and is engageable with ratchet pins 58 during rotation of shaft 16, said ratchet pins 58 depending downwardly from a cam plate 59 provided with one or more notches 60 at its periphery.

A finger 61, secured to and upstanding from the side of the upper accumulator plate 29, rides on the periphery of cam plate 59 so that, when it engages notch 60, the upper plate 29 will pivot with respect to the lower plate 31 under action of spring 36.

For this purpose, the interlock between the top and bottom accumulator plates 29 and 31 must be disengaged so as to allow free pivotal movement of the top plate 29 and, therefore, the accumulator must be empty, that is the cursor arm 50 must push down on the plunger 37. With this arrangement, the top plate 29 will pivot under the action of the cam wheel 59 to thereby successively run the horses between fast and slow speeds.

Means are provided to manually place the automatic system into and out of operation. For this purpose, the shaft 62 on which the cam plate 59 is secured, is provided at its top end with a manually-operated knob 63 and is surrounded just below knob 63 by a coil spring 64 freely extending, together with shaft 52, through a hole made in framework plate 65.

The lower end of spring 64 abuts against a frame extension 66 through which only the shaft 62 passes.

An L-shaped finger 67 depends from knob 63 and is adapted to extend through an L-shaped notch 68 made in the framework plate 55 so as to engage underneath the same and retain the shaft 52 and also the cam plate 59 in lowered position against the action of spring 64.

Upon rotation of knob 63, L-shaped finger 67 will clear notch 68 and the shaft 62 will be urged into an elevated position with the ratchet pins 58 clearing the actuator arm 57, as shown in FIGURE 63, for the nonautomatic operation of the racer.

FIGURES 60 and 61 show also that upper plate pivoting spring 36 can be replaced by a hair pin spring 36'.

FIGURES 1 to 52 inclusive show the first embodiment of the invention, which is more complex than the second

embodiment just described, provision being made for making sprints, that is for running the racers at a higher set of speeds than the normal speeds for certain times during the race and depending on the state of the accumulator system, it being impossible to make the sprints when the accumulator system is depleted and at certain other times during the race.

A main gear wheel 70, shown in FIGURES 3 and 4, is provided on the outside with concave gear teeth 71 meshing with a worm 72 (see FIG. 1), driven by an electric motor 73.

The outside of gear wheel 70 is provided with three gear sectors 74, 75, 76, of progressively increasing diameter, each extending through one-third of a circle and each sector starting at the end of the next sector.

Gear sectors 74, 75, 76 therefore successively mesh with the three respective pinions 77, 78, 79 (see FIGURE 5) of progressively decreasing diameter and secured to a shaft 80 journaled in the frame of the machine and vertically arranged and provided at its lower end with a bevelled pinion 81 driving bevelled pinion 82, in turn driving through shaft 83, bevelled pinion 84 which drives bevelled pinion 85 secured to the lower end of drive shaft 86, on the upper end of which is mounted a sprocket wheel 87 having a friction clutch therein, whereby the sprocket 87 can be stopped from rotating even when drive shaft 86 is rotating.

Sprocket 87 drives perforated flexible band 88 in a slit 3 of race-track 1 of FIGURE 1. A racer or horse 7 is clipped on each band 88.

With the driving arrangement just described, the entire mechanism can be located in a box 1' inside the race-track 1 proper, as shown in FIGURE 1, so that the race-track 1 will have a minimum height. The three pinions 77, 78 and 79 form an integral unit provided with an overriding clutch, indicated at 89, and simply consisting of a wire having a straight leg extending through a hole 90 of the shaft 80 and a curved portion terminated by a tooth 91 frictionally engaging the inside groove 92 of the pinion assembly and allowing free rotation of the pinion assembly in one direction, while locking the same on the shaft 80 in the other direction. This overriding clutch allows the shaft 80 to rotate at a faster rate than the pinion assembly 77, 78, 79.

Main gear wheel 70 is further provided, as in the first embodiment, with three gear sectors 93, 94, 95, of progressively increasing diameter, and each extending through one-third of a circle, one smaller diameter sector terminating at the start of the next larger diameter sector.

Pinions 96, 97, 98, of progressively increasing diameter, mesh respectively and successively with the gear sectors 93, 94, 95, as in the first embodiment. The pinions 96, 97, 98 form a unit, as shown in FIGURE 8, and is provided with an overriding clutch 89' on the shaft 99 supporting said pinions. Clutch 89' is similar to clutch 89.

Main gear wheel 70 has also a recuperating or accumulator gear sector 100, as in the first embodiment, the teeth of which project outwardly from a central flange 101 of the gear wheel 70 through about one-third of a circle. This gear 100 is adapted to mesh with a pinion 102 keyed to shaft 99. Gear 100 is preferably disposed opposite the highest speed sectors 76 and 93.

An additional gear sector 103 used for sprints, is made on the inside of main gear wheel 70 and extends also for approximately one-third of a circle and serves for the sprint transmission. Gear sector 103 is disposed opposite the lowest normal speed gear sector 95. Gear sector 103 is adapted to mesh with a slidable pinion 104 mounted on shaft 99. Pinion 104 has a flange 105 and a pin which is adapted to slide in a slot 106 of shaft 99 so as to prevent rotation of the pinion with respect to the shaft while allowing up-and-down movement of said pinion on the shaft.

Similarly, top and bottom driving gears 107, 108, of larger and smaller diameters, form a unit provided with a

flange 109 and said unit is slidable on the shaft 99, but is rotated thereby by means of a pin integral with the gear assembly and riding in a slot 110 of the shaft 99.

Gears 107, 108 are adapted to mesh with top and bottom driven gears 111, 112 respectively, which are spaced from one another, and keyed to shaft 80.

In the raised position of gears 107, 108, shown in FIGURE 5, the top gears 107, 111 are in meshing engagement while the bottom gears 108, 112 are out of engagement.

In the lowered position of the gear assembly 107, 108, top gears 107, 111 will be out of engagement while bottom gears 108 and 112 will be in meshing engagement, provided shaft 89 is in the position in FIGURE 5, with pinions 96, 97 and 98 engaging the inside gear sectors 93, 94, 95.

Sprint gear sector 103 is of smaller diameter than the smallest inside gear sector 93. In the position *a—a* of FIGURE 49, there is no multiplication of speed. In this position, the top gear assembly 107, 108 is in lowered position with the bottom gear 180 engaging the bottom gear 112. Also, the sprint gear sector 103 is out of engagement with the slidable pinion 104, the latter being in raised position.

In the position *b—b* of FIGURE 50, the top gear assembly 107, 108 is in lowered position, as in FIGURE 49, but the sprint gear sector 103 is in engagement with the lowered pinion 104. Thus, said lowered pinion drives the shaft 99 at an increased speed with respect to the maximum speed obtainable from gear sector 93 and pinion 96. Thus, position *b—b* corresponds to the position of a first additional speed with respect to the normal maximum speed.

In position *c—c* of FIGURE 51, the top gears 107, 108 are in raised position, thereby driving shaft 80 at a higher speed than in the positions *a—a* and *b—b*. However, the shaft 99 rotates at the same speed as in position *a—a*, slidable pinion 104 being out of engagement with sprint sector 103. Thus, the shaft 99 rotates at the same speed as in normal operation. Thereby, the accumulator will be expended at the same rate as in normal operation, however, with a gain of speed, so this is a bonus speed position.

In position *d—d* of FIGURE 52, the top gear assembly 107, 108 is still in raised position; however, the slidable pinion 104 is in engagement with the sprint sector 103. Thus, this position corresponds to the maximum speed obtainable with the shaft 99 rotating at an increased speed, which results also in a faster rate of expenditure of the accumulated energy.

Gear assembly 107, 108 is moved up and down by a top fork 113 engaging the flange 109 and pivoted at 114 to a bracket 115 secured to the top plate 116 of the accumulator assembly. The lower slidable pinion 104 is moved up and down by a bottom fork 117 rotatably engageable with the flange 105 of pinion 104 and pivoted at its other end at 118 to the underside of top plate 116 of the accumulator assembly.

The pivots 114 and 118 are provided with springs 119 and 120 respectively (see FIGURES 30, 31, 32, 35, 36, 37) urging the fork 113 in downward position and the fork 117 in upward position, so as to normally maintain the gears 107, 108 in lowered position and slidable pinion 104 in raised position respectively, which is position *a—a* of FIGURE 49.

A cam plate, more particularly shown in FIGURES 13, 14, 16, 24 and also in FIGURES 49 to 52 and generally indicated at 121, is mounted in a horizontal position for adjusted rotation about shaft 99 so as to take four positions engaging the inwardly extending fingers 122, 123 of the top and bottom forks 113, 117 respectively so as to position said forks in the four respective positions shown in FIGURES 49, 50, 51 and 52.

Cam plate 121 may be rotated to take four positions by means of a draw rope 124 attached thereto and di-

rectly accessible to the player, as shown in FIGURE 13. Cam plate 121 in its rotated position in which zone *a* of FIGURE 16 is opposite the fingers 122 and 123 of the forks 113 and 114, corresponds to the position *a—a* of FIGURE 49, the fingers of said forks directly contacting the top and bottom surfaces of the cam plate 121.

In the rotated position of cam 121 wherein zone *b* thereof is opposite fingers 122, 123, the finger 123 engages a bottom boss 125 of the cam plate, thereby lowering fork 117, which corresponds to position *b—b* shown in FIGURE 50.

When the cam plate 121 is rotated to a third position in which zone *c* is engaged by the fingers 122, 123, the finger 122 is raised by the top boss 126 of the cam plate. This position corresponds to position *c—c* of FIGURE 51. Finally, when the cam plate 121 is rotated so that its zone *d* is opposite the fingers 122–123, the top finger 122 still engages the top boss 126 while the bottom finger 123 engages a boss 127 at the underface of the cam plate, whereby both forks 113, 117 are pivoted outwardly corresponding to the position *d—d* of FIGURE 52.

A coil spring 132, shown in FIGURES 14 and 46, normally returns the cam plate 121 in the position *a—a* (FIG. 49), in which the fingers 122–123 are opposite zone *a* of the cam, as shown in FIGURE 16.

The cam can be rotated by draw rope 124 to the positions *b—b*, *c—c* or *d—d* only under certain conditions, that is depending on the state of charging of the accumulator system and for certain portions of the rotational cycle of the main gear wheel 70.

The accumulator system is similar to that of the first embodiment: apart from the top plate 116, there is a bottom accumulator plate 128 positioned underneath the top plate 115 and both plates are pivoted horizontally about pivot pin 129 so as to move with respect to the frame plate 130.

There is an interlock system comprising plunger 131 guided in tube 131' secured to top plate 116, and a spring detent, the leaf spring 133 of which is secured to the bottom accumulator plate 128 and has at its free end a steel ball 134 normally engaging between the two plates 116, 128 to lock the same together, but releasing these two plates for relative pivotal movement thereof under downward movement of plunger 131.

Shaft 99 is journaled in bushing 116' of top plate 116 (FIGURE 40) and can move freely in opening 128' of bottom plate 128 (FIGURE 41), and in notch 130' of framework plate 130 (FIGURE 43). Bushing 116' serves also as a pivot for cam plate 121 and as anchor for the inner end of return spring 132.

The shaft 99 has an upper threaded portion 99' on which is screwed a cursor wheel 135 having two spaced flanges between which is located the inner end of a cursor arm 136, the outer end of which is forked and is guided by guide pin 137 secured in upright position to the top accumulator plate 116.

As in the first embodiment, cursor wheel 135 has two oppositely directed pins 138 adapted to engage respectively the bottom pin 139 of wheel 140 secured to shaft 99 and pin 141 of head 142 secured to the top of shaft 99. As in the first embodiment, said head may be level-adjusted to establish odds, if so desired.

As in the first embodiment, when the cursor wheel 135 abuts against the head 142, it starts to rotate with the shaft and thus remains in upper limit position. Inversely, when the cursor wheel 135 abuts against the top wheel 138, it starts to rotate with the shaft and, therefore, remains in its lower limit position. In this lower limit position, the cursor arm 136 moves plunger 131 downwardly, thereby releasing the interlock between the two accumulator plates 116, 128 to automatically move the normal speed pinions 96, 97, 98 out of engagement with the inside gear sectors 93, 94, 95 of main gear wheel 70, upper plate 116 being rotated inwardly relative to

lower plate 128 by spring 143, of main gear wheel 70, whereby the horses 7 are then only driven directly by the outside low speed pinions 77, 78, 79 through outside gear sectors 74, 75, 76 of main gear wheel 70.

As in the previous embodiment, a draw rope, or rein 144 is attached to the bottom plate 128 of the accumulator assembly at the end of plate 128 opposite shaft 99 with respect to pivot pin 129, so that, upon a pull exerted by the rein 144, the assembly of the top plate 116 and bottom plate 128, will pivot about pin 129 against the return action of tension spring 144', so as to engage the recuperating pinion 102 with the recuperating gear sector 100.

The outer end of rein 144 together with the outer end of draw rope 124 for the cam plate 121, are accessible to the player; but to prevent the player from pulling on both draw ropes simultaneously, the draw ropes are attached as shown in FIGURE 26 on the first sheet of drawings, to the opposite ends of a crank 145 pivoted intermediate its end at 146 on the framework of the machine.

A block 147, shown in FIGURES 20 to 23, is provided with vertical through bores 148 for guided up-and-down movement on pins 149 secured to the top plate 116 of the recuperator assembly, as shown in FIGURES 14 and 17 to 19. The block 147 is mounted at the end of the top plate 116 opposite pivot pin 129 with respect to cam plate 121. Block 147 is biased downwardly by means of coil springs 150 surrounding the guide pins 149 and abutting against the top of the block 147 and against lock rings 151 secured to the top of the guide pins. Block 147 has a central downwardly extending finger 152 passing through a hole made in the top plate 116 and engaging framework plate 130 in the normal lowered position of block 147, shown in FIGURES 17 and 19; however, upon pivoting movement of the plate 116 inwardly so as to engage recuperating pinion 102 with recuperating gear sector 100, finger 152 engages and is raised by cam boss 153 upstanding from framework plate 130, as shown in FIGURE 18. Thus, the entire block 147 is raised.

Block 147 has a central groove 154 for the free passage of top fork 113. It has furthermore at its face facing the cam plate 121 three gates 155, 156, and 157 pivoted intermediate their ends about pivot screws 158, which are radially disposed with respect to the axis of cam plate 121 and lie in a plane just above said cam plate.

The top leaves of the gates 155, 156, and 157 are adapted to abut associated flanges 159, 160, 161 integral with block 147, in the down vertical position of the bottom leaves of said gates, so as to prevent further anticlockwise rotational movement of said gates, as seen in FIGURE 20.

Cam plate 121 has a finger 162 projecting from the periphery thereof and adapted to successively engage the bottom leaves of gates 155, 156, and 157 upon rotation of the cam plate 121 in the direction of arrow 163, as shown in FIGURE 24. Thus, finger 162 will successively pivot the gates 155, 156, 157 in a clockwise direction, whereby the gates will allow free passage of finger 162 until it attains a limit position to the left, as seen in FIGURE 20, of the last gate 157.

The position of finger 162 to the left of the last gate 157 outside block 147 corresponds to the position *d* of the cam plate 121. The position of cam plate 121 shown in FIGURE 24 with respect to the first gate 155 of FIGURE 20 corresponds to position *a* of the cam plate. In this position, finger 162 is on the outside of gate 155.

Positions *b* and *c* of the cam plate correspond to the positions of finger 162 between gates 155 and 156 and between gates 156 and 157 respectively.

The cam plate is locked in either one of these intermediate positions *b* and *c* or in the initial position *a*, depending on the degree of accumulated energy in the recuperator system, that is on the level of cursor wheel 135.

A first square rod 164 and a second square rod 165, which is longer than the first rod 164, are respectively inserted in upright position for slidable movement within

respective square through bores 166, 167 made in block 147.

Horizontal arms 168, 169 are secured to the upper end of rods 164, 165 respectively and overlap cursor wheel 135.

In the lower limit position of the cursor wheel 135, all gates 155, 156, 157 are locked in cam finger-blocking position by the lower ends of the rods 164, 165 engaging the top leaves of gates 156, 157 and the bottom leaf of gate 155.

Raising of cursor wheel 135 will first cause the first rod 164 to clear the bottom leaf of the first gate 155, whereby the latter is released, and allows pivoting movement of cam plate 121 until its finger 162 abuts against the bottom leaf of gate 156, the cam plate taking position *b*. Further, raising movement of cursor wheel 135 will raise rod 164 so that it clears the top leaf of gate 156 and the latter is free to pivot in a clockwise direction. However, the third gate 157 is still locked by second rod 165, whereby pivotal movement of cam plate 121 will cause finger 162 to abut against the bottom leaf of the third gate 157, the cam plate 121 taking its position *c*. Further, upward movement of cursor wheel 135 will finally move square rod 165 upwardly so as to release the third gate 157, whereby cam plate can take its final position *d*.

In any one of its intermediate position and in its final position, the cam plate 121 cannot be returned to its original position, because finger 162 will abut against the bottom leaf of any one of the gates 155, 156, 157, and the latter are prevented from rotating in an anticlockwise direction, as seen in FIGURE 20.

In order to allow return movement of the cam plate to its initial position, the entire block 147 must be raised. It is raised upon the accumulator assembly taking its recuperating position with finger 152 of block 147 engaging cam boss 153 to raise the block 147.

In FIGURES 20 and 24, the mirror images of the cam plate 121 and block 147 are illustrated relative to FIGURES 13 and 16 which show the real configuration and relation of these two elements. This is done to more clearly show the operative relationship between the cam plate 121 and block 147.

The cam plate 121 is not only under the control of the level of the accumulator system as previously described, but also is under the control of the operation of the main gear wheel 70. In other words, a sprint can be effected only at certain portions of the rotational cycle of the gear wheel 70.

For this purpose, the gear wheel 70 is provided with a finger 170 secured thereto and shown in FIGURES 13 and 48. Finger 170 is in the path of the pins 171 of a ratchet wheel 172 which is secured to the pivot pin 129 of the accumulator assembly, namely top plate 115 and bottom plate 128 (see FIGURES 14, 46 and 48). Actually, pivot pin 129, which carries ratchet wheel 172, is vertically displaceable within a bushing 173 integral with the frame plate 130 and serving as the actual pivot for the two plates 116, 128.

In the raised position of pivot pin 129, its upper end engages a finger 174 projecting radially outwardly from cam plate 121 so as to constitute a stop preventing said cam plate from rotating to assume its positions *b*, *c* or *d*. However, in the lowered position of pivot pin 129, the latter clears the finger 174 and allows rotation of the cam plate.

Pivot pin 129 is normally maintained in raised position under action of a coil spring 175 (see FIGURES 14 and 46) surrounding the lower end of the pivot pin 129 and abutting against ratchet wheel 172 at its top end and against a framework part 176 rigid with frame plate 130.

As shown in FIGURE 45, ratchet wheel 172 is provided with two diametrically opposed cylindrical cam surfaces 177 upstanding from ratchet wheel 172 and co-axial with its axis of rotation. Similarly, the underside of frame plate 130 is provided with downwardly extending

diametrically opposed cylindrical cam 178 coaxial with the axis of rotation of pivot pin 129 and adapted to coast with cams 177 to lower the pivot pin 129.

As shown in FIGURES 47 and 46, the tip of the cams 178 forms a notch 179 defining an inclined surface immediately adjacent and trailing the main inclined surface of the cam 178 and said notch inclined surface is followed by a horizontal surface merging with the vertical trailing surface of the cam, as clearly shown in FIGURE 47.

The upper end of pivot pin 129 is provided at a level lower than the finger 174 of the cam plate 121 with a transverse pin 180 forming double arms adapted only for certain angular positions of the pivot pin 129, to be in the path of the downwardly extending portion of an abutment lever 181 carried by cam plate 121 adjacent finger 174 thereof.

Abutment lever 180 is more particularly shown in FIGURES 24 and 25 and its relationship with transverse pin 180 is shown in FIGURE 46. Lever 181 is pivoted at 182 intermediate its ends in an opening made in the cam plate 121 and its upper extension 183 is adapted to abut against a bent upwardly extending integral flange 184 of the cam plate 121. Assuming that transverse pin 180 is in the path of abutment lever 181, upon pulling of the cam plate 121 by means of draw rope 124, abutment lever 181 will pivot at 182 to clear transverse pin 180 and cam plate 121 can reach any one of its positions *b*, *c* or *d*. However, cam plate 121, once in one of said last-named positions, cannot return to its normal position *a* without lever 181 engaging pin 180 and causing rotation of pivot pin 129, because lever 181 is prevented from pivoting in clockwise direction, as seen in FIGURE 25.

Lever 181 is in the path of transverse pin 180 independently of the vertical position of pivot pin 129.

Ratchet wheel 172, as shown in FIGURE 48, has six ratchet pins 171 disposed in two groups of three, the pins in each group being equally spaced and the endmost pins of the adjacent groups having a greater spacing.

The curved line 185 together with the associated arrow indicates the path of finger 170 secured to the main gear wheel 70 during rotation of the latter in the region of the ratchet wheel 172.

The six ratchet pins are indicated at 171*a*, 171*b*, 171*c*, 171*d*, 171*e*, 171*f*, and 191. In the position of the ratchet wheel shown in FIGURE 48, the ratchet pins 171 are shown in full line. The corresponding position of transverse pin 180 is shown by reference numeral 180. Said transverse pin 180 just clears the abutment lever 181, to go beyond said lever, the path of which is indicated at 186.

Finger 170 moving in accordance with arrow 185 will rotate the ratchet wheel 172 in the direction of arrow 187, such that, for instance, pin 171*f* will move to position 171*f'*, which corresponds to the position in which the tip of cam 177 just clears the tip of cam 178, whereby the ratchet wheel 172 will continue to rotate to a small degree until position 171*f''*, due to the tip of cam 177 sliding along the inclined surface of the notch 179 of cam 178.

In the position 171*f''*, the tip of cam 177 engages the horizontal surface of the notch 179 of cam 178 and the ratchet wheel remains in this position.

The pin at position 171*f''* just clears the path of finger 174. In this position of the ratchet wheel, the transverse pin 180 has taken position 180'' in the path of abutment lever 181.

In the position 180'', the pivot pin 129 is in lowered position clearing finger 174 of cam plate 121, so that the latter may be pivoted for making a sprint. Upon pivoting of cam plate 121 to position *b*, abutment lever 181 clears transverse pin 180 by pivoting at 182 and moves on the bottom side of transverse pin 180 at position 180'', as seen from FIGURE 48. However, as soon as the cam plate 121 is released by releasing draw rope 124, its coil spring 132 will return the cam plate to its position *a*

and, in so doing, the abutment lever 181 will engage transverse pin 180 at position 180'' and turn the ratchet wheel 172 in accordance with arrow 187, so that its next pin 171*a*, now at position 171*a'*, will move to position 171*a''*, which corresponds to the original position of pin 171*f*, and will be in the path of the finger 170 during the next rotation of the main gear wheel 170.

During this movement, the two cooperating cams 178, 179 disengage from each other so that the pivot pin 129 takes its raised position in the path of the finger 174 of the cam plate 121. Thus, the cam plate 121 can no longer be rotated by draw rope 124 to effect a sprint.

Successive passage of the finger 174 at each turn of main gear wheel 70 will rotate the ratchet wheel 172 step by step until ratchet pin 171*d* is at position 171*a* and the cycle will be repeated, whereby it will be still again possible to effect a sprint, the pivot pin 129 having again been lowered to clear the finger 174 of the cam plate 121.

From the foregoing, it is seen that a sprint may be effected only during certain portions of the race, and only one sprint may be effected, because once cam plate 121 has finally been returned to its position *a*, it will automatically turn the ratchet wheel 172 so that it will no longer be possible to make another sprint until another further portion in the race corresponding to half a rotation of the ratchet wheel.

It is most important for the player to foresee the portion of the race when it is possible to accomplish a sprint and keep his accumulator in a condition so as to obtain the most of the sprint period, that is have his accumulator sufficiently charged or loaded so that the cam plate may rotate to position *d* (position *d*—*d* of FIGURE 52).

Once the reserve in the accumulator has been expended, it is no longer possible to continue the sprint. In addition, the player must place the mechanism in a recuperating position, thereby he must absolutely release the cam plate due to the arrangement of FIGURE 26.

FIGURE 13 shows the accumulator systems in positions A, A' and B and C while expending reserve energy, when the energy reserve is spent and when recuperating energy respectively. FIGURE 13 also shows at position A cam plate 121 in position *a*, the latter cannot be rotated by draw rope 124, because pivot pin 129 is in raised position in the path of cam plate finger 174.

In position A', pivot pin 129 is lowered and cam plate in sprint position *c*.

In position B, cam plate 121 is in maximum sprint position *d*.

In position C, block 147 is raised and thus allows return movement of cam plate 121 to its position *a* under action of cam return spring 132. Pin 129 is then in lowered position and is rotated by lever 181 so as to raise thereby locking cam plate 121 in position *a*. Cam plate 121 has shoulders 188, 189 (FIG. 16) engaging stops, one being shown at 190 in FIGURE 13, determining positions *a* and *d* of the cam plate.

The system in accordance with the first embodiment may be provided with a system for establishing odds as illustrated in the second embodiment and also with the automatic system for some of the horses or racers described in connection with FIGURES 60 to 63 of the simpler embodiment.

The number and arrangement of speed sequences may be varied together and also specific mechanisms such as the number of ratchet pins 171 on cam wheel 172.

While preferred embodiments in accordance with the invention have been illustrated and described, it is understood that various modifications may be resorted to without departing from the scope of the appended claims.

What I claim is:

1. A racing game comprising, in combination, a plurality of tracks, racers movable along the respective tracks, and for each racer, first power means to move said

racer at a lower speed, second power means to move said racer at a higher speed, means to make said first and second power means exclusively operative, means for accumulating operative time of said second power means, chargeable only when said first power means are operative, means to allow operation of said second power means only when operative time is accumulated, and means to automatically render said second power means inoperative and to make said first power means operative, operable upon depletion of said accumulated operative time.

2. A racing game comprising, in combination, a plurality of tracks, racers movable along the respective tracks and for each racer, first power means to cyclically move said racer through a first set of lower speeds, second power means to cyclically move said racer through a second set of higher speeds, means to make said first and said second power means exclusively operative, means for accumulating operative time of said second power means, chargeable only when said first power means are operative, and governing the operative time of said second power means in proportion to the time they have been charged by the operation of said first power means.

3. A racing game as claimed in claim 2, wherein said means for accumulating operative time are manually-operated.

4. A racing game as claimed in claim 2, further including means to limit the operative time capable of being accumulated by said accumulating means, and means to adjust said limiting means so that different racers may accumulate different amounts of operative time.

5. A racing game as claimed in claim 1, further including means to automatically and alternately make said first and second power means operative and manually controlled means to render said automatic means operative or inoperative.

6. A racing game as claimed in claim 2, further including third power means to move said racer through a third set of still higher speeds, manually-operated means to make said third power means operative and means to prevent operation of said third power means for certain portions of the race and to permit operation of said third power means for other portions of the race.

7. A racing game as claimed in claim 6, further including means to make said third power means inoperative upon the accumulated operative time of said second power means becoming depleted.

8. A racing game as claimed in claim 7, further including means operative upon operation of said last-named means to again allow operation of said third power means only after another permitted portion of the race has been reached.

9. A racing game as claimed in claim 7, further including additional means controlled by the amount of operative time of said second power means accumulated in said accumulating means to allow operation of said third power means at one or the other of said still higher speeds upon operation of said manually-operated means to make said third power means operative.

10. A racing game comprising, in combination, a plurality of tracks, racers movable along the respective tracks, a constant speed, main drive wheel of cup shape having external and internal sets of gear sectors, of different diameters, the gear sectors in each set terminating at the start of another gear sector of said set, the sum of the gear sectors of each set extending through the entire periphery of the wheel, the gear sectors of each set being at different levels, said wheel having a recuperating gear sector extending radially outwardly and spaced radially inwardly from said internal gear sectors and at a different level than the latter, and for each racer, a first pinion assembly permanently meshing with said external gear sectors, an overriding clutch in said external pinion assembly, a first shaft on which said first gear pinion assembly is mounted with the intermediary of said overriding clutch, a transmission between said shaft and

said racer, a second pinion assembly, a second shaft on which said second pinion assembly is secured, two superposed accumulator plates pivoted intermediate their ends one to the other and on a fixed point relative to the shaft of said main drive wheel, said second shaft journaled in the upper accumulator plate and free of the lower accumulator plate, manually-operated means connected to said lower accumulator plate to pivot the same about its pivot, a spring detent interlocking said upper and lower accumulator plates for bodily pivotal movement, spring means normally maintaining said accumulator plates in a position in which said second shaft and second pinion assembly are in a first position with said second pinion assembly in meshing engagement with said internal gear sectors, gear wheels mounted on said first and second shafts and in meshing engagement in said first position of said second shaft, whereby said second shaft drives said first shaft at a higher set of speeds than the speeds obtainable from the first pinion assembly, said second shaft having a threaded upper portion, a cursor wheel screwed on said threaded upper portion, a cursor arm frictionally carried by said cursor wheel, an upright guide rod secured to said upper accumulator plate and engageable with said cursor arm to prevent rotation thereof while allowing movement thereof along with said cursor wheel on said threaded shaft portion, said cursor arm normally preventing rotation of said cursor wheel during rotation of said threaded shaft portion, so as to cause movement of said cursor wheel along said threaded shaft portion, abutment, members at the ends of said threaded shaft portion engageable with said cursor wheel in its two limit positions along said threaded shaft portion to cause rotation of said cursor wheel with said threaded shaft portion, said cursor arm and cursor wheel assembly in one of its limit positions along said threaded shaft portion engageable with said spring detent to release the interlock between said upper and lower accumulator plates, spring means between said upper and lower accumulator plates urging pivotal movement of said upper accumulator plate and movement of said second shaft into a second position in which said second pinion assembly is disengaged from said internal gear sectors, rotation of said second shaft by said second pinion assembly in said first position causing movement of said cursor wheel and cursor arm assembly in a direction along said threaded shaft to disengage said spring detent, operation of said manual means pivoting said upper and lower accumulator plates in a position in which said second pinion assembly is in a third position engaging with said recuperating gear sector to rotate said second shaft in a direction causing movement of said cursor wheel and cursor arm assembly along said threaded shaft portion in a direction away from spring detent and causing said upper and lower accumulator plates to again become interlocked.

11. A racing game as claimed in claim 10, further including manually-operated means to adjust the longitudinal position of at least one of said abutment means on said threaded portion of said second shaft, to thereby vary the amount of possible movement of said cursor wheel along said threaded shaft portion.

12. A racing game as claimed in claim 10, wherein said transmission means include an endless perforated flexible band, said racer mounted on said band, each track including a slit made in a table and in which said band is displaceable, a sprocket wheel engageable with the perforations of said band to displace the same in said slit, and a friction clutch in said sprocket wheel to stop rotation of said sprocket wheel despite operation of said main drive wheel.

13. A racing game as claimed in claim 10, further including a ratchet wheel driven step by step by said transmission means, manual means to place this ratchet wheel in operative and in inoperative position, said ratchet wheel provided with a cam-shaped periphery, a finger carried by said upper accumulator plate and engageable with the

17

cam-shaped periphery of said ratchet wheel to alternately move said second pinion assembly between said first and said second positions.

14. A racing game as claimed in claim 10, further including selective gear means between said first and second shaft to vary the gear ratio between said two shafts depending upon the position of said selective gear means, second manually-operated means to change the position of said selective gear means to increase the speed of rotation of said first shaft by said second shaft when said second shaft is in its first position with said second pinion assembly engaging the internal gear sectors of said main drive wheel, and means operated by said main drive wheel to prevent operation of said manual means during certain portions of the race and allow operation of said manual means during certain other portions of said race.

15. A racing game as claimed in claim 14, wherein said second manually-operated means include a pivotally mounted cam plate, bosses at different angular positions thereon, a fork pivoted on said upper accumulator plate engageable with said cam plate and bosses thereon to be actuated thereby and in engagement with said selective gear means to displace the same and change the gear ratio between said first and second shafts, depending on the position of said fork, said cam plate having an abutment finger protruding therefrom, a spindle mounted for movement between positions in and out of the path of said finger for preventing and allowing rotating movement of said cam plate respectively and a ratchet wheel operable by rotation of said main gear wheel to move said spindle between said two positions.

16. A racing game as claimed in claim 15, further including a second finger protruding from said cam plate, a block mounted on said top accumulator plate having

18

gates in the path of said second finger of said cam plate to stop said cam plate at different angular positions, rods mounted in said block for movement between a position blocking said gates and a position releasing said gates, arms depending from said rods and engageable with said cursor wheel, whereby the position of said cursor wheel determines the locking and unlocking positions of said rods with respect to said gates.

17. A racing game as claimed in claim 16, further including means to raise said block with respect to said upper accumulator plate to clear the gates out of the path of said second finger and operable only in the position of said upper accumulator plate corresponding to the third position of said second shaft.

18. A racing game as claimed in claim 14, further including a slidable pinion keyed to said second shaft, an additional internal gear sector on said gear wheel, a second fork for moving said slidable pinion into and out of engagement with said additional internal gear sector, said fork pivoted on said upper accumulator plate, and additional bosses on said cam plate engageable with said second fork to move the latter and consequently said slidable pinion into and out of engagement with said additional gear sector.

References Cited

UNITED STATES PATENTS

1,778,038	10/1930	Parke	104—61
2,141,777	12/1938	Watling	273—86
3,204,963	9/1965	Caputi	273—86
3,297,323	1/1967	Gibson	273—86

RICHARD C. PINKHAM, *Primary Examiner.*

THOMAS ZACK, *Assistant Examiner.*