Feb. 14, 1939. W. E. BARRETT 2,146,708

STEERING MECHANISM FOR TOYS

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FIG. 1

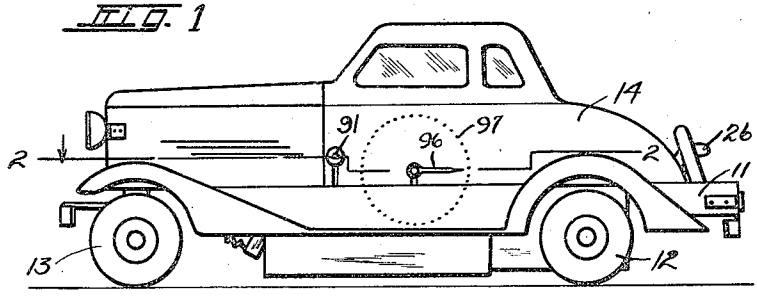


FIG. 2.

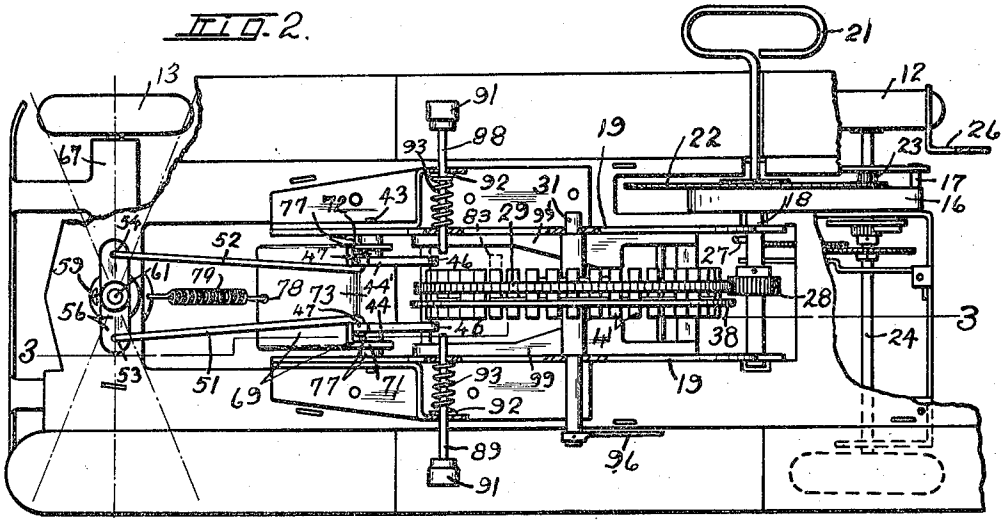


FIG. 3.

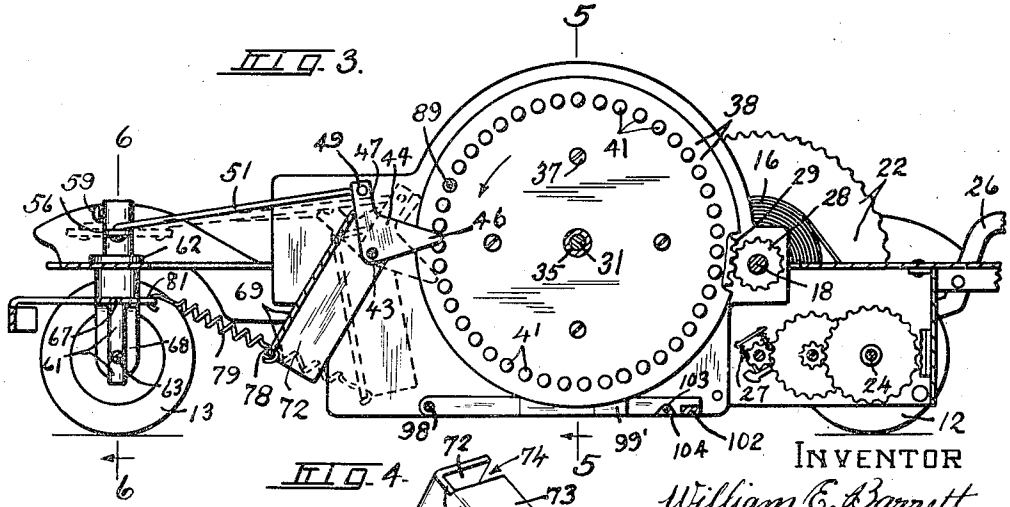
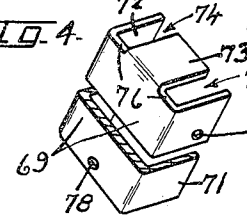


FIG. 4.



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FIG. 5.

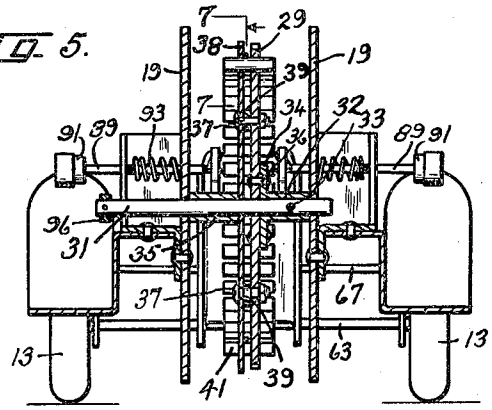


FIG. 6.

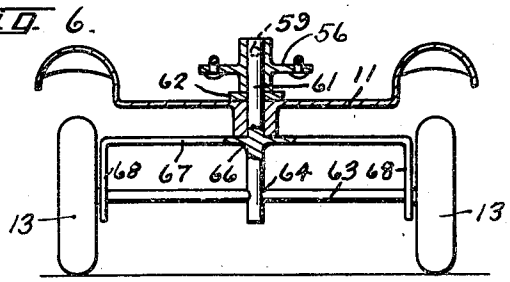


FIG. 7.

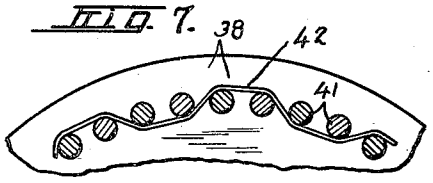


FIG. 8.

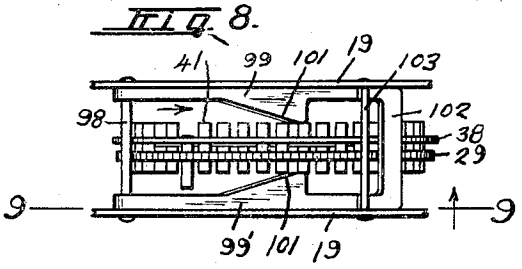


FIG. 9.

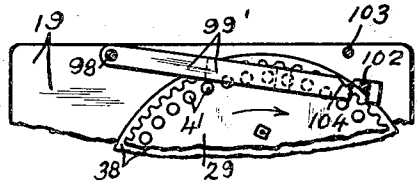
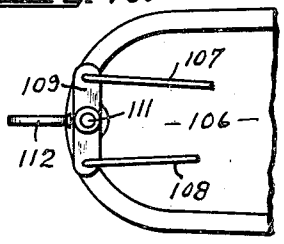


FIG. 10.



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FIG. 11.

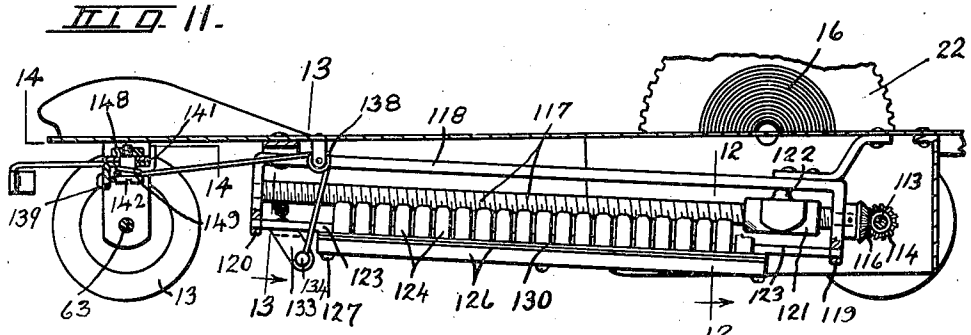


FIG. 12.

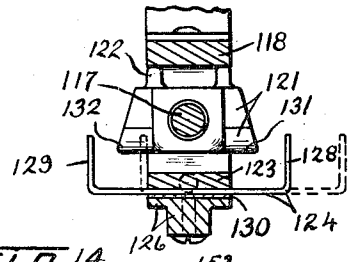


FIG. 13.

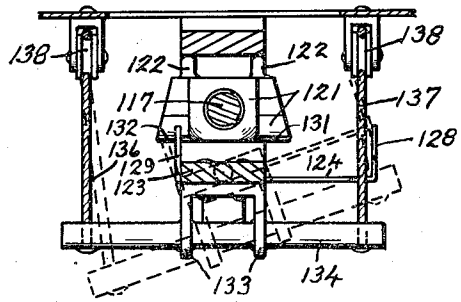


FIG. 14.

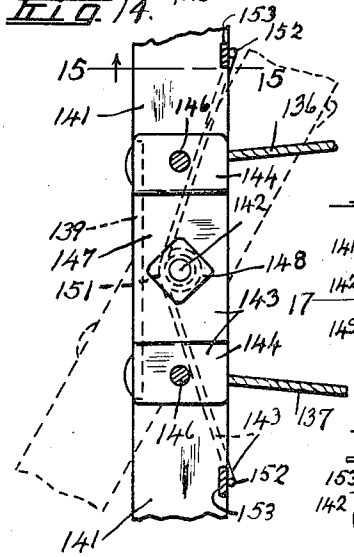


FIG. 15.

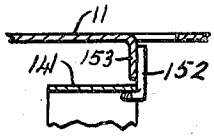


FIG. 16.

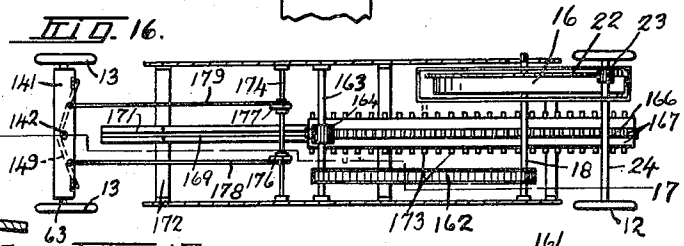


FIG. 17.

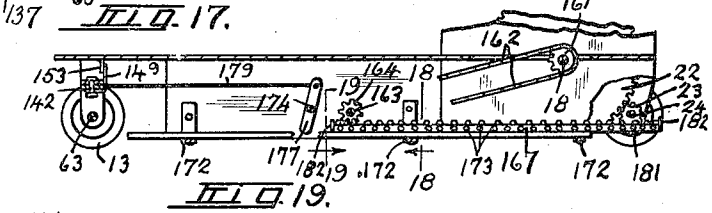


FIG. 18.

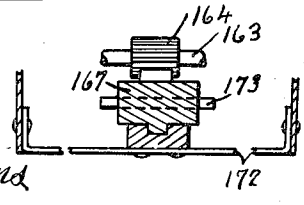
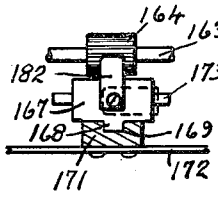


FIG. 19.



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UNITED STATES PATENT OFFICE

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STEERING MECHANISM FOR TOYS

William E. Barrett, Syracuse, N. Y.

Application September 2, 1936, Serial No. 99,103

20 Claims. (Cl. 46—213)

My invention relates to an automatic steering mechanism for power driven toys such as toy automobiles, tractors, tanks, aeroplanes and boats.

An object of my invention is to provide a steering mechanism for a toy which may be set by a child to cause the toy to travel a predetermined desired course.

Another object of my invention is to provide an automatic steering mechanism for a toy which includes a plurality of manually operable stations or stops adapted to be selectively adjusted to cause the top to travel a predetermined desired course during its operation.

A further object of my invention is to provide an automatic steering mechanism for a toy capable of being operated by a child in the home, whereby the child may cause the toy, by proper and selective adjustment of stops, to travel a selected predetermined course around or between chairs or other obstructions, and may cause the toy, if desired, to return to its original starting position.

My invention further contemplates the provision of an automatic steering mechanism for a toy whereby a child may, prior to the operation of the toy, select any desired course which may include a path of travel around and between obstructions, and by setting suitable stops cause the toy to turn at the proper points to avoid the obstructions and to thus travel the desired contemplated course.

Still another object of my invention is to provide an automatic steering mechanism for a toy wherein suitable spaced stops are provided, the distance between adjacent stops representing a predetermined portion of the travel of the toy, the stops being capable of being selectively set and being interconnected with the steering element of the toy in a manner such that the toy may be caused to make right or left-hand turns at the desired points in the travel of the toy, whereby the toy may be caused to travel a selected predetermined path.

My invention further contemplates the provision of an automatic steering mechanism for a toy whereby two children may play with the toy at opposite ends of a room or in adjacent connecting rooms and cause the toy to travel any desired course from one child, around and between obstructions, to the other child and then, upon the second child reversing the mechanism, cause the toy to reverse its direction of travel and return to the first child.

More specifically, my invention contemplates the provision of a novel automatic steering mechanism for a toy, for example, a toy automobile of the spring motor or other power driven type, the automatic steering mechanism including an element driven by the spring motor, which, in cooperation with suitable spaced selectively operable stops, causes the front wheels of the toy to be turned right or left and after each turn to automatically center themselves in accordance with the setting of the stops, whereby the toy may be set, prior to its operation, to travel a predetermined selected course.

Other objects and advantages of my invention will be more apparent from the following description when taken in connection with the accompanying drawings, in which:

Figure 1 is a side elevation showing a toy in which my novel automatic steering mechanism may be mounted.

Figure 2 is a view taken on the line 2—2 of Figure 1 with the body of the toy automobile, illustrated in Figure 1, removed, showing a top plan view of my novel automatic steering mechanism.

Figure 3 is a view taken on the line 3—3 of Figure 2.

Figure 4 is a perspective view of a portion of Figure 2, showing the plate through which, by cooperation with other elements, the wheels of the toy are straightened after each turn is completed so as to cause the toy to travel in a straight line.

Figure 5 is a view taken on the line 5—5 of Figure 3.

Figure 6 is a view taken on the line 6—6 of Figure 3.

Figure 7 is a view taken on the line 7—7 of Figure 5.

Figure 8 is an enlarged view of a portion of Figure 2 taken with the toy in inverted position.

Figure 9 is a view taken on the line 9—9 of Figure 8.

Figure 10 is a view illustrating how my novel automatic steering mechanism may be arranged to operate the rudder of a toy boat.

Figure 11 is a view similar to Figure 3, showing a modified form of the novel automatic steering mechanism illustrated in Figures 1 to 9, inclusive.

Figure 12 is a view taken on the line 12—12 of Figure 11.

Figure 13 is a view taken on the line 13—13 of Figure 11.

Figure 14 is a view taken on the line 14—14 of Figure 11.

Figure 15 is a view taken on the line 15—15 of Figure 14.

Figure 16 is a view similar to Figure 2, showing another modified form of my novel automatic steering mechanism.

Figure 17 is a view taken on the line 17—17 of Figure 16.

Figure 18 is a view taken on the line 18—18 of Figure 17.

Figure 19 is a view taken on the line 19—19 of Figure 18.

While I have illustrated my novel automatic steering mechanism as being mounted in a toy automobile, it will be apparent that it is adapted to other uses such as in the various toys mentioned above. The toy automobile, shown herein, has the usual frame 11, rear wheels 12, front wheels 13 and car body 14. As is usual in this type of toy automobile, a spring motor, adapted to be manually tensioned, is used to propel the toy. However, if desired, other types of motors may be used such as an electric motor adapted to be driven by current supplied from a battery. The spring motor consists of a flat, wound, ribbon spring 16 which has one end anchored to the frame of the toy through a stud and a suitable plate secured to the car frame, as indicated at 17. The other end of the spring is anchored to a main shaft 18. The shaft 18 is suitably journaled in side plates 19 carried in the frame of the toy and has extending therefrom a key 21 by which, upon rotation of the key and shaft, the spring 16 may be tensioned.

Rigidly mounted on the main shaft 18 is a large gear 22 which meshes with a pinion 23 rigidly mounted on the rear axle 24 of the automobile. The rear wheels 12 are non-rotatably mounted on the axle 24 so that rotation of the large gear 22 drives the rear wheels through the pinion 23. A releasable brake element 26, pivoted to the frame in the usual manner in toy automobiles of this character, is adapted to engage one of the rear wheels 12 so as to prevent the rear wheels from turning and retain the spring 16 in a tensioned condition after it has been wound. After the spring has been properly tensioned and it is desired to place the toy in operation, the brake element 26 may be released which enables the tension spring 16 to drive the toy through the gears 22 and 23 and the rear wheels 12. As is usual in toy automobiles of this character, to prevent the toy from being propelled too rapidly when the spring is highly tensioned and to cause the automobile to operate at a more or less uniform rate of speed, a governor is used. This governor, generally indicated by the numeral 27, may be of any suitable type not necessary to be shown or described in detail herein since the construction and operation of a governor suitable for use are well known in the art to which this invention applies.

Mounted on the shaft 18 and rotatable therewith is a pinion 28 which meshes with a large gear 29. The gear 29 is rigidly mounted on a shaft 31 suitably journaled in the side plates 19. As shown more clearly in Figure 5, the gear 29 is rigidly secured to the shaft through a collar 32 secured to the shaft by a pin 33. A flange 34 on the collar 32 is secured to the gear 29 through rivets 36. The collar 32 also serves to space the gear 29 from the side plate 19. Secured to the gear 29 by means of nut and bolt assemblies 37 is a disk 38. The disk is spaced from the gear 29 by washers 39. A collar 35 serves to space the disk from the other side plate 19. The ratio of the teeth of the pinion 28 to the gear 29 is chosen so that the large gear 29 will make a single complete rotation during the normal travel of the automobile determined by the capabilities of the spring 16. That is, when the spring 16 has been fully tensioned and the brake 26 released to cause the spring to propel the automobile, the ratio of the gears 28 and 29 to each other is chosen such that when the spring is completely untensioned the gear 29 will have rotated through one complete revolution.

Around the periphery of the gear 29 are located at spaced regular intervals, a plurality of apertures which register with corresponding apertures formed in the disk 38. Mounted in each pair of registering apertures, formed respectively in the gear 29 and in the disk 38, is a pin or push rod 41. Each of the push rods 41 is appreciably longer than the distance between the gear 29 and the disk 38 so that when the push rods are centrally located with respect to the gear and the disk, they protrude at each end an equal distance beyond the outer faces, respectively, of the gear and the disk, as shown in the drawings. As more clearly appears from Figure 7, a spring 42 lying between the gear and the disk extends around and between the push rods, throughout the complete circumference of the gear, so as to frictionally, although releasably, retain the push rods in the centrally located position with respect to the gear 29 and the disk 38.

Mounted on a rod 43, carried in the side plates 19, are a pair of bell cranks 44 and 44', each having an arm 46 and an arm 47. Each of the bell cranks is loosely mounted on the rod 43 and has an aperture 49 near the end of arms 47 thereof adapted to receive a tie rod. The tie rods 51 and 52 are connected, respectively, at 53 and 54 to the opposite ends of a steering element 56. The steering element 56 has a hub, as shown more clearly in Figure 6, and is rigidly secured by a pin 59 to a vertical shaft 61. The shaft 61 extends through a boss formed as a part of the frame 11 with respect to which the shaft may be freely rotated. A collar 62 serves to space the hub of the steering element from the boss of the frame. The shaft is rigidly secured to the front axle 63 of the truck, as indicated at 64, and, at 66, is rigidly secured to a cross brace 67 which has depending arms 68 apertured to receive the front axle 63. The front wheels of the toy are loosely mounted on the front axle 63.

On the rod 43 is loosely mounted a plate 69. The plate 69 has depending legs 71 and 72 through which the apertures 70 for receiving the rod 43 extend. The rearward portion of the plate 69 has a depending part 73 on either side of which is provided a slot 74, forming edges 76, adapted to engage the arms 47 of the bell cranks 44 and 44'. Suitable spacers 77 are provided along the rod 43 to space the legs 71 and 72 of the plate 69 from the side plates 19 and to space the depending legs 71 and 72 from the bell cranks 44 and 44'. The depending part 73 of the plate 69 lies between bell cranks and serves to space them from each other. An aperture 78 is provided in the forward end of the plate 69 for receiving a spring 79, the other end of which is secured, at 81, to the cross brace 67.

The bell cranks 44 and 44' are spaced apart a distance sufficient that when the push rods 41 are centrally located with respect to the gear 29 and the disk 38, the gear and the disk may rotate

freely without the ends of the push rods striking the bell cranks. However, this spacing is such and the position in which the arms 46 of the bell cranks extend is such that when one of the push rods lies out of its normal central position, as illustrated for example at 83 in Figure 2, the arm 46 of one of the bell cranks 44 or 44' will lie in the path of movement of the end of the displaced push rod. When the gear and disk have been rotated to a position such, for example, that the push rod 83 strikes the end 46 of the bell crank 44', the bell crank 44' will be rotated downward or in a clockwise direction about the rod 43, as viewed in Figure 3, causing the tie rod 52 to be pulled rearwardly and thereby cause the steering element 56 to rotate in a clockwise direction, as viewed in Figure 2. When the steering element 56 is rotated in a clockwise direction, the forward wheels 13 of the toy are turned so that the automobile is steered to the right. Immediately after the push rod 83 has rotated to a position such that it is out of engagement with the rearward end of the arm 46 of the bell crank 44', the spring 79, which is continually urging the plate 69 in a clockwise direction, as viewed in Figure 3, causes the plate to be moved in that direction. The edge 76 of the plate 69 then pushes on the arm 47 of the bell crank 44' and restores the bell crank 44' to its normal position. Restoration of the bell crank 44' to its normal position restores the bell crank 44, which has been displaced forwardly by the movement of the steering element 56, to its normal position. The above described action restores the forward wheels 13 of the toy to their normal straightened position. It will be appreciated that a left-hand turn is made when a push rod has been displaced from its centrally located position in an opposite direction from that indicated by the position of the push rod 83. With a push rod in this displaced position it will strike the bell crank 44 and cause the steering element to rotate in a counterclockwise direction, as viewed in Figure 2.

When one of the push rods, such as the push rod 83, has been moved out of its centrally located position, the automobile is turned through a predetermined angle. This angle, for example, may be made 10 or 15 degrees, more or less, depending upon the length of time during which the arm 46 of the bell crank is in engagement with the push rod. The interval of engagement may be readily varied by varying the length of the arms 46 of the bell cranks 44 and 44'. When two adjacent push rods are displaced in the same direction from their normal centrally located position, the automobile will make a turn through an angle approximately double the amount of that when only one push rod is in displaced position, so that the toy will turn through an angle of approximately 20 to 30 degrees. It will, therefore, be apparent that the automobile may be caused to turn, within reasonable limits, through any desired angle. It will now be appreciated that the toy may be caused to travel a predetermined selected course and will make right- and left-hand turns through the desired angle all in accordance with the position at which the push rods have been set.

In playing with the toy, the child will naturally become familiar with the approximate distance through which the toy will travel during the time when successive push rods pass the ends of the bell cranks, that is, the distance of travel represented by the spacing of adjacent push rods. The child will then be able to set the push rods so that the toy will make right or left-hand turns at the desired time and through the proper angle to avoid striking furniture or other obstacles adjacent the path which the child desires the toy to travel. However, in usual practice, the toy may be set more accurately by moving the toy over the desired course, while under manual control although under the power of the spring motor, and when the toy reaches an obstacle set the proper push rod or rods for causing the toy to steer to avoid the obstacle. That is, the child may tension the spring and while holding his hand on the automobile permit it to drive the toy and move it through the path he desires it to take. At each turn which he desires the toy to make, the child will push the proper push rod which, at that point in the rotation of the gear and disk, is adjacent the bell crank. After the toy has been moved through the desired course under manual control and the push rods are in the desired positions, he may retension the spring, return the toy to the starting position and cause the automobile to travel the course which has been previously mapped out.

In order to facilitate the setting of the push rods, I have provided a pair of push rod operating elements 88 and 89, each having a suitable finger piece 91. The push rod operating elements extend through apertures formed in the frame and the side plates 19 into a position such that the ends thereof may be pushed into engagement with the ends of the push rods as they are successively presented to such action upon rotation of the gear. A pin 92 is rigidly secured to each of the operating elements 88 and 89 and a spring 93 is interposed between each of the pins and the side plates 19 to restore the operating elements 88 and 89 to their normal positions after they have been operated. By means of the operating elements 88 and 89, the machine may be set while it is on the floor without turning it up side down each time a push rod is to be displaced. It will be observed that the push rod operating element, opposite the one which is actuated to set a push rod, is engaged by the end of the push rod being displaced so as to limit the movement of the push rod.

Suitable means are also provided for facilitating the selection of the push rods to be operated if it is desired to set the toy to travel a desired course by estimate rather than by actually moving the toy over the desired course under manual control during the setting of the push rods as described above. On one end of the shaft 31 is secured an indicating arm 96 and on the outside of the car body are provided a plurality of marks 97, indicating the position of the push rods. The marks may, if desired, be numbered to indicate feet of travel of the toy.

Assume that the position of the indicating arm 96, shown in Figure 1, is the starting position when the spring is fully tensioned. It will be appreciated that if it is desired to cause the automobile to make a turn after it has travelled a distance from the starting position measured by the spacing of, for example, four push rods, the child will lift the rear wheels off the floor and permit them, together with the gear 29 and the disk 38, to rotate until the indicating arm 96 has moved to the fourth mark 97 on the car body, after which the desired one of the operating elements 88 or 89 may be pushed in to move the desired push rod from its centrally located position. After the first push rod has been

set, the rear wheels may again be permitted to rotate to the next position where a turn of the automobile in one direction or the other is desired, and another push rod set by pushing inward on one of the operating elements 88 and 89. In this manner, the gear 29 and the disk 38 may be rotated, while the wheels are off the floor, until the spring is completely untensioned and the push rods have been positioned as desired to cause the automobile to travel the desired course. After the push rods have been positioned, the spring may be retensioned and the automobile will travel the course for which it has been set.

In Figures 8 and 9, which are views looking at the bottom of the toy, I have shown a means by which, if desired, the push rods may be all returned to their centrally located position automatically. Secured in the side plates 19 is a rod 98 upon which are pivotally mounted arms 99 and 99'. The arms 99 and 99' have cam portions 101 and a crosspiece 102 connecting the arms. A pin 103 is secured in the side plates 19 and normally supports the arms 99 and 99' in the position shown in Figure 3, in which position the pin 103 is in engagement with notches 104 formed in the arms 99 and 99'. When the toy is inverted, the arms 99 and 99' pivot about the rod 98 so that the arms lie in the position indicated in Figure 9, with the cross piece 102 resting on the disk 38 which, it will be noted, is slightly larger in diameter than the gear 29. When the spring is tensioned while the toy is right side up and permitted to unwind while the toy is off the floor and in an inverted position, the push rods will strike the cam portions 101 of the arms 99 and 99' as the gear 29 and the disk 38 rotate and be automatically centered.

In Figure 10, I have illustrated how my automatic steering mechanism may be applied to a toy boat, generally indicated by the numeral 106. The tie rods 107 and 108 correspond to the tie rods 51 and 52 and are connected to a steering element 109 whcih is rigidly connected to a shaft 111. The shaft 111 is adapted to be rotated by the tie rods 107 and 108 through the steering element 109 and is rigidly connected to the rudder 112 of the toy boat. It will, of course, be understood that the boat is equipped with propelling means of any suitable character and that the tie rods are operated in a manner similar to that described above.

In Figures 11 to 15, inclusive, I have shown a modification of my invention wherein the spring motor 16 drives the gear 22 which, in turn, drives a pinion mounted on the rear axle 113. The rear axle 113 has a bevel gear 114 mounted thereon which meshes with a bevel gear 116 rigidly mounted on a shaft 117. A saddle 118 has depending arms 119 and 120 in which the shaft 117 is suitably journaled so that it may be rotated by means of bevel gears 114 and 116. The shaft 117 is threaded throughout its length to receive a driven cam element 121. The cam element has projections 122 which are in engagement with and ride along the lower surface of the saddle 118. When the shaft 117 is rotated, the cam element 121 is caused to advance along the shaft 117. It will be understood that the travel of the cam element is such that the spring is completely untensioned when the cam element has moved from one end of the shaft 117 to the other.

Pivoted or cradled in the lower end of the depending arms 119 and 120 of the saddle 118 is a plate 123. A plurality of push rods or stops 124 are mounted on the plate 123 and are retained in position by a T-shaped retaining plate 126 held in position by means of screws 127 which extend into the plate 123. A piece of friction material 130 is interposed between the retaining plate and the bottom surfaces of the stops 124 so that when the stops are placed in the desired position, they will not accidentally slide out of position. Each of the stops 124, at the ends thereof, has upwardly extending arms 128 and 129 which, at their upper extremities, may be slightly rounded. The driven cam element has cam portions 131 and 132 which lie above the plate 123 and extend beyond the side edges thereof, as shown more clearly in Figure 12.

The stops 124 are capable of being moved, as indicated in Figure 12, so that the upper extremities of the arms 128 and 129 lie in the path of movement of the driven cam element 121. When either the cam portion 131 or the cam portion 132 strikes, respectively, either the extremity of the arm 128 or the extremity of the arm 129, the plate 123, together with the entire stop assembly, pivots or cradles in the depending arms 119 and 120 of the saddle 118, as shown more clearly in Figure 13. Pivotal movement of the plate 123 causes operation of the steering mechanism now to be described.

While the steering mechanism per se may be similar to that shown in the first form of my invention, I have shown a modified form of steering mechanism adapted to be operated by the cradling movements of the plate 123 in the saddle 118. Rigidly secured to and depending from the forward end of the plate 123 are a pair of arms 133. A rod 134 extends through the arms, as more clearly shown in Figure 13, and protrudes beyond the arms an equal distance on opposite sides of a center line through the axis of the plate 123. Secured to the opposite ends of the rod 134 are a pair of cables 136 and 137 which extend upwardly from their points of attachment to the rod 134 and are then passed over pulleys 138 suspended from the lower side of a portion of the frame of the toy. The other ends of the cables extend forwardly and are secured to a depending portion 139 of a cross member 141 which is similar to the cross member 67 of the structure shown in Figures 1 to 9, inclusive. The cross member has depending portions which are secured to the front axle 63 of the toy.

A shaft 142, which may take the form of a headed bolt, extends through the under side of the cross member 141 and the cross member pivots with respect to this bolt. A U-shaped plate 143 has its upwardly extending portions 144 riveted to the lower side of a portion of the frame of the toy, as indicated at 146, and has its central portion 147 facing upon the upper side of cross member 141. The bolt 142 passes through the U-shaped plate and a nut 148, threaded on the end of the bolt, retains the assembly so that the cross member 141 may pivot with respect to the U-shaped plate 143. A spring 149 is coiled around the lower end of the bolt 142 below the cross member 141, as indicated at 151, and has its ends extending across the front of the toy beneath the cross member. The extremities of the spring 149 are turned upwardly, as indicated at 152, and these upwardly turned portions normally engage the rearward side edge of the cross member and downwardly turned portions 153 which are part of the frame 11 of the toy. The downwardly turned portions 153 of the frame constitute stops for limiting the movement of the spring.

When one of the cables 136 or 137 is pulled rearward by reason of the cradling movement of the plate 123 in its saddle, the cross member 141 is pivoted about the bolt 142 in a clockwise or counterclockwise direction depending upon the direction of the cradling action of the plate 123. When the cross member pivots, for example, in a clockwise direction to cause the toy to make a right turn, as indicated in dotted lines in Figure 14, the upper end of the spring, as viewed in Figure 14, is carried by the cross member away from the depending portion 153 of the frame. As soon as the cam member 121 has ridden past the displaced stop which has caused the plate 123 to cradle, the spring 149 will restore the cross member 141 to its normal centered position, in which position the front wheels of the car are straight and will restore the plate 123 to its normal centered position in its saddle through the cables.

It will now be understood that although the structure of the toy described in this modification is somewhat different than that of the structure shown in Figures 1 to 9, inclusive, the mechanism is adapted to accomplish the same general result. The stops 124 are shifted either right or left from their normal centered position with respect to the axis of the plate 123 in accordance with the path of movement which it is desired that the toy shall travel. As the driven cam element 121 moves along the shaft 117, the cam portions 131 and 132 thereof engage, one by one, the upstanding arms 128 and 129 of the stops 124, and the plate 123 is thereby successively rocked in its saddle 118. Depending upon whether the stop which engages the driven cam element 121, is in a right turning position or a left turning position, the front wheels of the toy will be turned by the pull exerted on either of the cables 136 or 137 to cause the toy to turn right or left in accordance with the setting of the stops. As soon as the desired turn has been made, the spring 149 will restore the front wheels to a straightened condition until the driven cam element, in the course of its travel along the shaft 118, strikes the next displaced stop.

It will be understood that the stops may be set either by causing the toy to travel over the desired course under manual control and setting the stops as the turns are reached in accordance with the position of the cam driven element, or they may be set by estimate as described in connection with the structure of Figures 1 to 9, inclusive. It will be particularly noted that the stops in this modification are more accessible than in the first structure described because they are located in a horizontal plane below the car body. It is, therefore, possible to set the stops while the driven cam element is stationary, that is, when setting the stops by estimate, the child may invert the toy and when he wishes the toy to turn right at approximately the distance from the starting point which he estimates will be about reached when the cam driven element is over the fourth stop, that stop is readily accessible without untensioning the spring motor as is necessary when setting the stops in the case of the first modification. It will further be understood that the toy may be caused to make a small or large angle turn. Of two or more adjacent stops are displaced in the same direction from their normal centered position, the toy will be caused to make a sharp turn and, if desired, by displacing a number of successive stops in the same direction, it is possible to cause the toy to travel in a circle.

In Figures 16 to 19, inclusive, I have shown another modification of my invention. The spring 16, through gears 22 and 23, drives the rear axle 24 upon which the rear wheels 12 are mounted. On the shaft 18 is mounted a sprocket 161 which is connected by a suitable chain 162 to a sprocket mounted on a shaft 163 journaled in the frame of the toy. A pinion 164 rigidly mounted on the shaft 163 engages the teeth 166 of a rack 167. The lower face of the rack 167 has a longitudinally extending projecting guide 168 which fits in a groove 169 formed in a track member 171. The track 171 is carried by brackets 172 suspended from the frame of the toy. The rack is made of a length such that it moves substantially its entire length during the unwinding of the spring. Suitable pins or push rods 173 extend through apertures formed in the sides of the rack 167 and project, when in their centrally located position, an equal distance on each side of the rack. Loosely pivoted on a cross rod 174, secured in the frame of the toy, are a pair of pivot arms 176 and 177. To the upper ends of the pivot arms are secured a pair of cables 178 and 179 which are secured to the front cross member of the toy in the same manner as in the modification shown in Figures 11 to 15, inclusive. The steering mechanism per se of this modification is the same as that described in connection with the structure shown in Figures 11 to 15.

The operation of the toy above described is essentially the same as that of the structures described in the first two forms of my invention. It will be understood that the spring motor, in addition to propelling the vehicle, drives the chain 162 which, in turn, through the pinion 164, drives the rack 167. When the rack is moved and certain of the push rods 173 are displaced from their normal centrally located position, the displaced push rods will strike either the pivot arm 176 or the pivot arm 177, depending upon whether they are in a right or left-hand turning position. The pivot arms 176 and 17, through the cables, will then cause the toy to be turned in accordance with the setting of the push rods. The spring 149, after the toy has completed its turn, will straighten up the wheels and restore the pivot arms 176 and 177 to their normal positions.

In this modification of my invention, I have shown a means whereby, after the toy has travelled through a previously set course, the mechanism may be reversed, the spring retensioned and the toy caused to retrace its course and return to its starting position. This is accomplished by providing means for enabling the rack 167 to be readily removed from the toy and reversed end for end. When thus reversed and the toy starts to retrace its course where it made a right-hand turn due to the displacement of, for example, the third push rod 181 from the end of the rack it will, when retracing its course, make a left-hand turn, the push rod 181 then being the third push rod from the beginning of the rack. It will be appreciated that removal of the rack and the reversal of it end for end causes a complete reversal of the location of the displaced push rods so that the toy will retrace its course and return to its starting position.

To facilitate removal of the rack from the track 171, the ends of the rack are provided with pivoted stops 182. When it is desired to remove the rack from the toy, the stops may be readily pivoted to the dotted line position shown in Figure 19 after which the rack may be slid rearwardly out of its track, reversed and slid back

into position. After the rack has been replaced, the stops 182 may be returned to their normal vertical positions shown in Figure 19.

With the reversing mechanism thus described, it is possible for two children to play with the toy at opposite ends of the room or even in a position where they cannot see each other, such as in adjacent or connecting rooms. The children may set the push rods to cause the toy to travel the desired contemplated course between them, around and between obstacles. After the course has been completely mapped out, one child at the beginning of the course, upon tensioning the spring motor, may cause the toy to travel the predetermined course to the second child. The second child may then reverse the rack end for end, as above described, retension the spring motor and cause the toy to retrace its course and return to the first child. It will be appreciated that, if desired, means may be provided in the first two forms of my invention for reversing the push rod carrying elements to enable the above described action.

While I have shown and described various modifications of my invention, it will be apparent that there are a number of ways by which the described result may be accomplished. I have merely shown and described the modifications shown herein by way of illustration and as being probably the most practical ways, from a commercial standpoint, of accomplishing the desired result. It will, however, be apparent that if an electric motor, operated by current supplied from a battery, is substituted for the spring motor shown and described in this application, the steering mechanism for the toy may be operated by current supplied from the battery. For example, a travelling unit may be driven from the rear wheels of the toy in a manner similar to that of the driven cam element or travelling unit of the second form of my invention. The travelling unit would be provided with two contacts electrically connected to the battery which would be adapted to engage, respectively, a series of right and left-hand turning displaceable contacts, movable into and out of the path of movement of the contacts of the travelling unit. The right-hand turning contacts would be electrically connected to an electro-magnet adapted to turn the front wheels right while the left-hand turning contacts would be electrically connected to a second electro-magnet adapted to turn the front wheels left. As the travelling unit passed over the displaced contacts it would, in succession, engage the displaced contacts and complete the circuits from the battery to the electro-magnets, thus causing the toy to travel the course for which the displaceable contacts have been set.

Since various modifications and changes may be made in the structure of my invention without departing from the principle thereof and in the form and relation of parts, I do not desire to be limited to the specific forms shown and described in this application, but include within my invention equivalents of the structure shown and described herein which are within the scope of the appended claims.

I claim:

1. In a toy of the class described, a motor, propelling means operatively connected to said motor for propelling the toy, means for steering the toy comprising a member having a plurality of movable elements constituting stations, a member cooperable with said movable elements, one of said members being driven by the motor of the toy to actuate the other member and steering mechanism operated by the actuated member, said movable elements being selectively and manually movable prior to the operation of the toy so that during operation they will lie in the path of said actuated element to operate said steering mechanism to cause the toy to travel a predetermined course.

2. In a toy of the class described, a motor, propelling means operatively connected to said motor for propelling the toy, a member having a plurality of elements constituting steering stations, said elements being carried by said member and being selectively movable to either one of at least two positions one a neutral position and the other an actuating position, a member cooperable with said elements, one of said members being driven by the motor of the toy to actuate the other member through said elements, said actuated member being actuated when any one of said elements lies in its actuating position during the travel of the toy, and steering means operated by said actuated member for steering the toy as it is being propelled in accordance with the selective setting of said elements.

3. In a toy of the class described, a frame, a motor supported in said frame, propelling means operatively connected to said motor for propelling the toy, a steering member pivoted to the frame and movable about said pivot to steer the toy, a spring operatively connected to said frame and operatively connected to said steering member for operating said steering member and normally causing said toy to travel in a straight line, means for causing said steering member to pivot in either of two directions to cause the toy to turn right or left comprising a member driven by the motor of the toy, a plurality of stops manually movable into and out of the path of movement of said driven member, and means actuated by the engagement of said driven member with one of said stops for causing the steering member to pivot.

4. In a toy of the class described, a frame, a motor supported in said frame, propelling means operatively connected to said motor for propelling the toy, a steering member pivoted to the frame and movable about said pivot to steer the toy, a spring secured to said frame and operatively connected to said steering member for operating said steering member and normally causing said toy to travel in a straight line, means for causing said steering member to pivot in either of two directions to cause the toy to turn right or left comprising a member driven by the motor of the toy, a plurality of stops manually movable into and out of the path of movement of said driven member, and means comprising a pair of bell cranks actuated by the engagement of said driven member with one of said stops for causing the steering member to pivot.

5. In a toy of the class described, a frame, a motor supported in said frame, propelling means operatively connected to said motor for propelling the toy, a steering member pivoted to the frame and movable about said pivot to steer the toy, actuating means for said pivoted steering means, means for operating said actuating means comprising a plurality of manually movable elements constituting steering stations, said manually movable elements being spaced in accordance with a predetermined distance of travel of the toy and being separately and selectively movable to a steering position and a neutral position, means driven by the motor of the toy and connected through said manually movable elements when

in steering position to the actuating means for actuating the same and thereby operating said steering means in one direction or the other whereby the steering means is automatically pivoted in a predetermined selected direction at the desired point during the travel of the toy, and means for straightening up the steering means, said mechanism enabling the toy to be caused to travel any predetermined selected course.

6. In a toy of the class described, a frame, a motor supported in said frame, propelling means operatively connected to said motor for propelling the toy, a steering member pivoted to the frame and movable about said pivot to steer the toy, actuating means for said pivoted steering means, means for operating said actuating means comprising a plurality of manually movable elements constituting steering stations, said manually movable elements being spaced in accordance with a predetermined distance of travel of the toy and being each separately and selectively movable to a right steering position, a left steering position and a neutral position.

7. In a toy of the class described, a frame, a motor supported in said frame, propelling means operatively connected to said motor for propelling the toy, a steering member pivoted to the frame and movable about said pivot to steer the toy, actuating means for said pivoted steering means, means for operating said actuating means comprising a plurality of manually movable elements constituting steering stations, said manually movable elements being spaced in accordance with a predetermined distance of travel of the toy and being each separately and selectively movable from a central neutral position to a right steering position and a left steering position.

8. In a toy of the class described, a frame, a motor supported in said frame, propelling means operatively connected to said motor for propelling the toy, a steering member pivoted to the frame and movable about said pivot to steer the toy, actuating means operatively connected to said pivoted steering means comprising a right turning member and a left turning member, means for operating said actuating means comprising a plurality of manually movable elements constituting steering stations, said manually movable elements being spaced in accordance with a predetermined distance of travel of the toy and being each separately and selectively movable to a right steering position and a left steering position, a driven element operated by the motor of the toy, said driven element being connected through said manually movable elements to said actuating means, said driven element, actuating means and manually movable elements being so constructed and arranged that when one of said manually movable elements is in a right steering position said driven element will cause said right turning member to be actuated to cause the toy to turn right and when one of said manually movable elements is in a left steering position said driven element will cause said left turning member to be actuated to cause the toy to turn left.

9. In a toy of the class described, a frame, a motor supported in said frame, propelling means for propelling said toy, a steering member pivoted to the frame of the toy and adapted to lie in a straight steering position, a right steering position or a left steering position, a spring for normally causing said pivoted member to lie in its straight steering position, and means operated from the motor of the toy for moving said steering member to a right steering position or a left steering position.

10. In a toy of the class described, a frame, a motor supported in said frame, propelling means for propelling said toy, a steering member pivoted to the frame of the toy and adapted to lie in a straight steering position, a right steering position or a left steering position, a spring for normally causing said pivoted member to lie in its straight steering position, and means operated from the motor of the toy for moving said steering member to a right steering position or a left steering position, said means including a plurality of movable stops selectively movable to cause the toy to travel any selective course during its travel.

11. In a toy of the class described, a motor, propelling means for the toy operated from said motor, means including a pivoted steering member and mechanism operated by the motor of the toy for actuating said pivoted steering member for causing the toy to travel any selected predetermined course, and means for reversing said mechanism to enable two children to play with the toy at opposite ends of the room or in adjacent rooms whereby after the mechanism has been set to cause the toy to travel from the first child to the second child the second child may reverse the mechanism and cause the toy to travel back to the first child.

12. In a toy of the class described, a frame, a motor supported in said frame, propelling means for propelling the toy from said motor, means operated by the motor for steering the toy comprising a plurality of movable stops selectively movable to at least one steering position and a neutral position, and means carried by the frame of the toy for causing, if desired, all of the stops to return to a neutral position during the operation of the motor.

13. In a toy of the class described, a frame, a motor supported in said frame, propelling means operatively connected to said motor for propelling the toy, a steering member pivoted to the frame and movable about said pivot to steer the toy, actuating means operatively connected to said pivoted steering member comprising a right turning member and a left turning member, means for operating said actuating means comprising a gear driven by the motor of the toy, a plurality of movable stops carried by said gear and movable from a central neutral position to either a right steering position or a left steering position, said stops when lying in a right steering position being adapted to actuate said right steering member during rotation of said gear and said stops when lying in a left turning position being adapted to actuate said left turning member during rotation of said gear, and a spring operatively connected to said steering member for normally causing the toy to travel in a straight line.

14. In a toy of the class described, a frame, a motor supported in said frame, propelling means operatively connected to said motor for propelling the toy, steering means for the toy, means driven by the motor of the toy for actuating said steering means, said means comprising a plurality of stops located within the frame of the toy and hidden from view thereby, and finger operated means extending outside of the frame of the toy and adapted to be selectively manually actuated to move said stops.

15. In a toy of the class described having means including a motor for propelling the toy over a substantially level surface, a steering

member having a right steering position, a left steering position and a straight steering position, mechanism operated from the motor of the toy for actuating said steering member, said mechanism including a plurality of selectively movable stops movable to positions such that the steering member is actuated to make right and left turns in accordance with the path of travel over which it is desired that the toy shall move, and means in connection with said mechanism for enabling the toy when it has completed its travel to be reset without disturbing the position of said stops to cause the toy to retrace its course and thereby enable two children at opposite ends of a room or in adjacent rooms to play with the toy and cause the toy to travel back and forth between them.

16. In a toy of the class described having means including a motor for propelling the toy over a substantially level surface, steering means for the toy and means for operating said steering means to cause the toy to turn right or left in accordance with a predetermined desired course, said means comprising a rack actuated from the motor of the toy and adapted to be moved thereby longitudinally of the toy, a plurality of stops carried by said rack adapted to be moved to a right steering position, a left steering position and a neutral position, said stops as the rack is moved engaging said steering means to cause the steering means to turn the toy right or left in accordance with the setting of the stops.

17. In a toy of the class described having means including a motor for propelling the toy, steering means for the toy and means for operating said steering means to cause the toy to turn right or left in accordance with a predetermined desired course, said means comprising a rack actuated from the motor of the toy and adapted to be moved thereby longitudinally of the toy, a plurality of stops carried by said rack adapted to be moved to a right steering position, a left steering position and a neutral position, said stops as the rack is moved engaging said steering means to cause the steering means to turn the toy right or left in accordance with the setting of the stops, and a spring for straightening said steering means to cause the toy normally to travel in a straight line.

18. In a toy of the class described having means including a motor for propelling the toy, steering means for the toy and means for operating said steering means to cause the toy to turn right or left in accordance with a predetermined desired course, said means comprising a rack actuated from the motor of the toy and adapted to be moved thereby longitudinally of the toy, a plurality of stops carried by said rack adapted to be moved to a right steering position, a left steering position and a neutral position, said stops as the rack is moved engaging said steering means to cause the steering means to turn the toy right or left in accordance with the setting of the stops, a spring for straightening said steering means to cause the toy normally to travel in a straight line, and means enabling said rack to be reversed end for end to enable the toy when it has completed its travel to be reset without disturbing the position of said stops to cause the toy to retrace its course to thereby enable two children at opposite ends of the room in or adjacent rooms to play with the toy and cause the toy to travel back and forth between them.

19. In a toy of the class described having means including a motor for propelling the toy, a rockable member carried by the frame of the toy, a plurality of stops carried by said rockable member, a cam element driven from the motor of the toy and movable in a path adjacent said stops, said stops being displaceable so as to be engaged by the cam as it moves to thereby pivot said rockable member into either a right steering position or a left steering position, and steering means actuated by the pivoting of said rockable member for steering the toy in accordance with the setting of said stops.

20. In a toy of the class described, a motor, propelling means operatively connected to the motor for propelling the toy, steering means, and means for operating said steering means, said last mentioned means including a plurality of manually movable elements each adjustable to a plurality of positions and arranged so that the operator may contemplate substantially any desired course around and between obstructions, pre-set said movable elements in accordance with said desired course and then operate said toy so as to cause the toy to travel said course, each of said movable elements when moved by the operator from one position to another position causing a deviation in the course over which the toy will travel, and the number of possible courses being equal to the limit of the permutations and combinations of the positions of said movable elements.

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