

Dec. 2, 1969

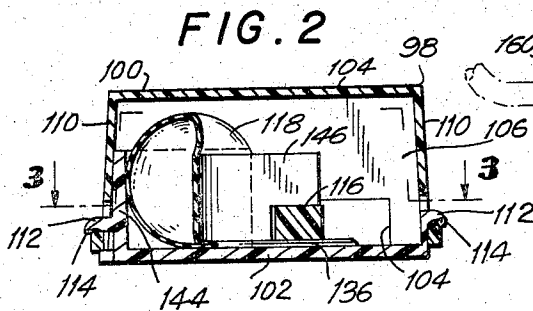
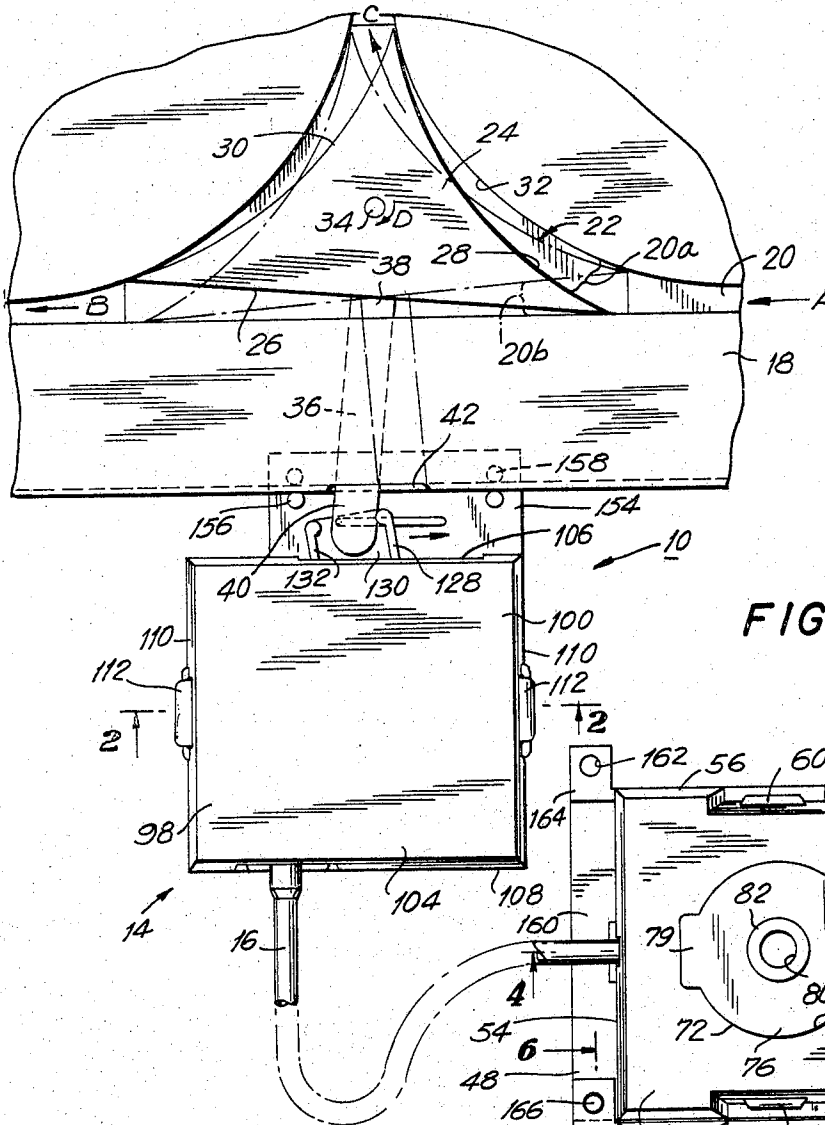
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3,481,067

PNEUMATIC REMOTE CONTROL ASSEMBLY

Filed Feb. 17, 1967

2 Sheets-Sheet 1



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FIG. 3

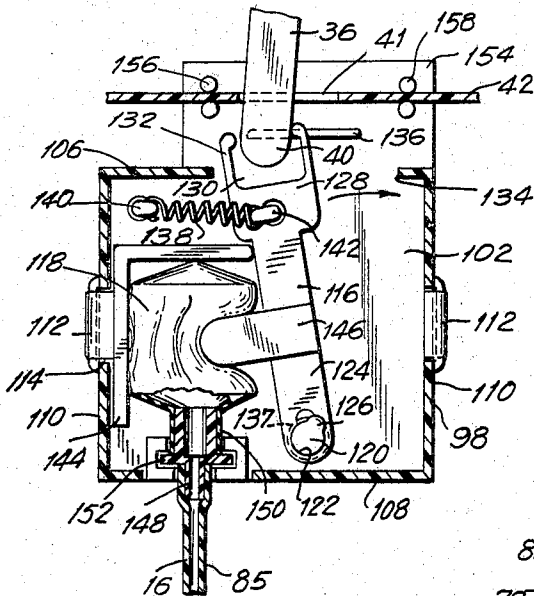


FIG. 6

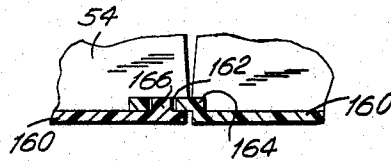


FIG. 4

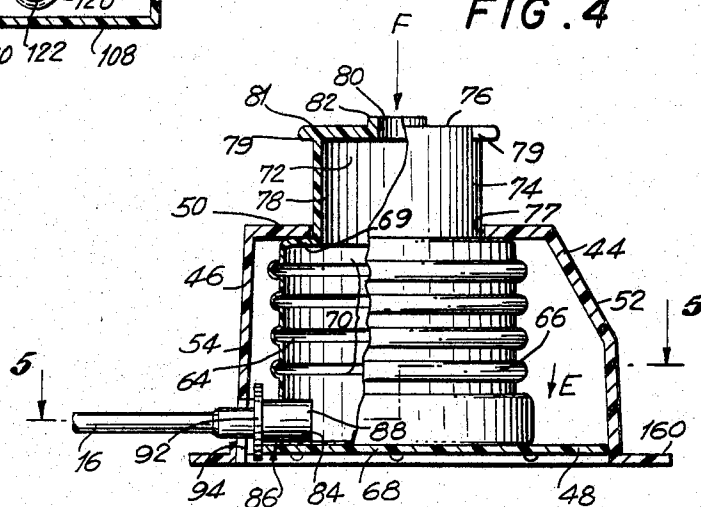
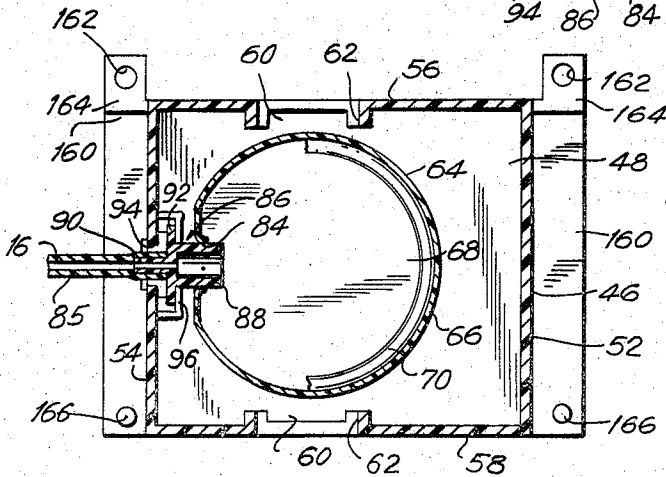


FIG. 5



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PNEUMATIC REMOTE CONTROL ASSEMBLY
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10 Claims

ABSTRACT OF THE DISCLOSURE

A pneumatic remote control assembly for enabling a player to selectively operate the track switching mechanism of a toy road-racing set. The assembly includes a remote control switch which has a pivoted cradle adapted to engage a lever of the switching mechanism. The cradle swings between two positions, to one of which it is spring biased and to the other one of which it is brought by the expansion of a closed air bulb within the control switch.

It is the primary object of the present invention to provide a remote control assembly for actuating a track switching mechanism which is a component of the track for a miniature road-racing set. Such road-racing sets, including miniature racing cars and the tracks for these cars, are presently extremely popular as playthings and as hobby items for both children and adults. It is desired that the pneumatic remote control assembly be such that it can be marketed at a relatively low cost and be capable of manufacture by mass production techniques using readily-available component parts. The assembly should be simple in structure, easy to operate, efficient in use and able to withstand long hours of play.

It is a further object of the present invention to provide a remote control assembly of the character described wherein the operating gaseous medium is air and the pneumatic system is normally vented to the atmosphere, this being efficient and simple and enabling the assembly to transmit air pressure and return to its "normal" or initial condition speedily.

It is another object of the present invention to provide a remote control assembly of the character described which is pneumatically operated and is energized by the hand of the player, thereby eliminating the use of electricity, including alternating current or direct current cells, and by such elimination being safer, not subject to period replacement and more economical in use.

It is yet another object of the present invention to provide a remote control assembly of the character described that is so arranged and constructed that small pin-hole leaks in the pneumatic system, which are bound to occur after many hours of rough play as by small children, have little effect on the continued operability of the system.

In general and in accordance with the present invention, there is provided a pneumatic remote control assembly especially adapted to operate a track switching mechanism. Such mechanisms are common components of road-racing sets which commonly include a track layout defining a racecourse and one or more miniature powered racing cars adapted to run over the racecourse. To introduce elements of variety and skill into the racing of miniature powered racing cars, the road-racing set is provided with a track having a turnoff and a track switch is situated at the turnoff enabling the player to determine the route of his car either "straight ahead" or through the turnoff and along a different "road." The track switch usually has a projecting actuating lever which when set in one position directs the car along one "road" and

when set in another position, its actuated position, directs the car along an alternate "road."

The remote control assembly of the present invention includes two pneumatically interconnected units, a remote control switch and a remote control station. The control station includes a housing having a flat base adapted to be situated on any flat surface. A relatively large air bellows is located within the housing and by the resiliency of its wall is normally expanded. A plunger is attached to the uppermost end of the bellows and is slidably mounted in the housing so that depression of the plunger contacts the bellows. The plunger has a head external to the housing which is to be pressed downwardly by the hand of the player. An aperture is formed in the plunger head and functions as a vent to atmosphere for the bellows; this aperture is closed by the hand of the player when he applies his hand to the plunger, thereby temporarily forming a closed-air system.

The remote control switch, the second unit of the pneumatic remote control assembly, includes a housing having a base adapted to be situated on any flat surface. An air bulb is located within the housing and is pneumatically connected to the air bellows within the control station by an elongated flexible air conduit which runs between the housings of the respective units. A cradle is pivotally mounted in the housing and is adapted to engage the lever of the track switching mechanism. The cradle is mounted to swing between two positions and in so doing swings the lever of the track switching mechanism between its two positions. The cradle is urged by a spring to one of its positions, an initial position, this corresponding to the normal or idle position of the tracking switching mechanism. The previously mentioned bulb is caged between a wall of the housing and the cradle and is squeezed therebetween in the initial position of the cradle. When the bulb is expanded by air under pressure emanating from the control station, the bulb expands, overcoming the biasing force of the spring and moving the cradle, and thus the track switching mechanism, to its actuated position. Upon removal of the hand of the player from the control station, air evacuates from the bulb under the biasing force of the spring and the cradle returns to its initial position.

The above brief description, as well as further objects, features and advantages of the present invention, will be more fully appreciated by reference to the following detailed description of a presently preferred, but nonetheless illustrative embodiment in accordance with the present invention, when taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a top plan view of the pneumatic remote control assembly of the present invention, including the remote control station and the remote control switch, the latter being engaged to the lever of a track switching mechanism which is part of the track layout for a road-racing set;

FIG. 2 is a cross sectional view of the remote control switch taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is a cross sectional view of the remote control switch taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is a cross sectional view of the remote control station taken substantially along the line 4—4 of FIG. 1;

FIG. 5 is a cross sectional view of the remote control station taken substantially along the line 5—5 of FIG. 4; and

FIG. 6 is a fragmentary cross sectional view taken substantially along the line 6—6 of FIG. 5.

Referring now in detail to the drawings, the pneumatic remote control assembly of the present invention is generally designated by the reference numeral 10, and the same includes a remote control station 12, a remote control switch 14 and an air conduit 16 pneumatically

interconnecting the station 12 and the switch 14. The assembly 10 is adapted to operate any lever and typically operates the lever of a track switching mechanism which is part of the track layout of a miniature road-racing set. A portion of such a set is shown in FIG. 1 and includes a track base 18 in which is formed an elongated continuous slot 20, the same constituting a track for a miniature powered racing car. The slot 20 guides the racing car in its path of movement, and for variety and interest, a turnoff is formed in the track of such a road-racing set. More specifically, as a racing car is moving along the track in the direction indicated by the arrow A, it will come upon a "fork" or turnoff in its track so that a person playing with the road-racing set may cause the racing car to travel along a straight path and follow the track in the direction indicated by the arrow B or may alternately cause the racing car to turn off along the track in the direction indicated by the arrow C.

The route that the racing car will take is determined by the previously mentioned track switching mechanism, designated by the reference numeral 22. The mechanism includes a triangular member 24 having a linear base 26 and opposed concave sides respectively 28, 30. The triangular member 24 sits in a triangular well 32 formed in the track base 18 and is pivoted for limited rocking movement within the well about a pin 34. An actuating lever 36 is fixed at one end 38 to the triangular member 24 and has its other end 40 projecting outwardly from the track base 18 through a small slot 41 in the side wall 42 of the base. (See FIG. 3.) It will be evident that when the triangular member 24 is rocked in the direction D, the side wall 28 and the opposed wall of the well 32 form a slot path 20a guiding the miniature racing car to travel in the direction C, while when the triangular member 24 is rocked in the opposed direction, the linear base 26 of the triangular member and the opposed wall of the well form a slot path 20b guiding the racing car to travel in the direction B. This latter position of the triangular member is shown in dash lines in FIG. 1. Of course, similar movements of the racing car will be caused by proper manipulation of the triangular member 24 when the racing car approaches from opposed directions.

The control station 12 of the pneumatic remote control assembly 10 is shown in FIGS. 1, 4 and 5 and includes a hollow box-like housing 44 which includes a cover 46 and a base 48. The cover 46 includes a top wall 50, a front wall 52, a rear wall 54 and a pair of opposed side walls 56, 58. The base 48 has a pair of opposed lugs 60 which snap into opposed registered slots 62 formed in the lower portions of the side walls 56, 58. As can best be seen in FIG. 4, the bottom of the control station 12 is flat so that the station may be located on any flat surface.

An air bellows 64 of relatively large capacity is situated within the housing 44 of the control station 12 and fills the major portion of the interior of said housing. The bellows is generally cylindrical in shape and has a cylindrical side wall 66, a flat bottom wall 68 which sits on the upper surface of the base 48 of the housing 44 and a top wall 69. The side wall 66 includes a zone 70 of accordian-old configuration whereby the bellows can be folded or contracted by movement thereof parallel to its axis and in the downward direction E and will expand upon movement in a direction opposed to the direction E. The bellows is formed from any resilient self-supporting tough plastic known in the toy field such that the bellows at rest holds itself in its expanded condition, shown in FIG. 4.

A plunger 72 is also a component of the remote control station 12, is of cylindrical configuration and includes a cylindrical side wall 74 and a top wall 76. The plunger is situated immediately above and in contact with the bellows. When the plunger 72 is moved downwardly in the direction F, the bellows will contract; expansion of the bellows will move the plunger in a direction opposed to the direction F.

The plunger 72 is mounted for vertical reciprocal sliding movement in the control station 12. To this end, a large diameter aperture 77 is formed centrally of the top wall 50 of the cover 46 and is of a diameter slightly larger than the outside diameter of the side wall 74 of the plunger. The body of the plunger passes through the aperture 77 and accordingly the plunger can move upwardly and downwardly through the aperture. A pair of diametrically oppositely protruding tabs 79 are formed at the periphery of the top wall 76 of the plunger and the outer edges of the tabs are spaced apart a distance greater than the diameter of the aperture 77. The top wall 76 of the plunger and the tabs 79 constitute the head 81 of the plunger. The tabs 79 are located above the top wall 50 of the cover 46 and thus prevent the plunger from passing completely into the interior of the housing. The tabs and the wall 69 of the bellows constitute stops; the plunger can move between positions wherein the upper wall 69 of the bellows contacts the interior of the top wall 50 and wherein the tabs 79 contact the exterior surface of the top wall. In the bellows' idle position, the top wall of plunger 72 and a major portion of the body of the plunger are exposed externally to the housing 44 and the head 81 of the plunger can be contacted by a hand of a player. Such contact will move the plunger downwardly compressing the bellows. In the contracted position of the bellows, the head 81 of the plunger continues to be exposed externally of the housing.

Desirably, the plunger is formed as a single piece with the bellows 64 and the interior of the plunger 72 and the interior of the bellows 66 combine to form a large air chamber 78.

An air vent is pneumatically connected to the air chamber 78 and to this end, an aperture 80 is formed in the top wall 76 and is surrounded by a circular flange 82. Said air vent normally maintains the chamber 78 at atmospheric pressure.

The air conduit 16 pneumatically connects the remote control station 12 to the remote control switch 14. The air conduit 16 constitutes an elongated flexible tube 85 formed from a conventional tough plastic. On one of its ends, the air conduit has a plug 86. The plug includes a hollow sleeve 88 which frictionally fits into an exit port 84 in the side wall of the bellows 66, a sleeve 90 over which the end of the tube 85 is forced, and a positioning collar 92. The sleeve 90 and the overlying end of the tube pass through a small aperture 94 in the rear wall 54 and the retaining collar 92 is captured between the interior surface of the rear wall 54 and a pair of upstanding walls 96 rising from the base 48.

The remote control switch 14 is shown in FIGS. 1, 2 and 3 and the switch includes a housing 98 which is a hollow box-like structure and which includes a cover 100 and a base 102. The cover includes a flat top wall 104, a front wall 106, a rear wall 108 and a pair of opposed parallel side walls 110. The base has a pair of opposed lugs 112 which fit into registered slots 114 in the side walls 110, similar to the manner in which the lugs 60 snap into the slots 62 in the remote control station 12.

The remote control switch 14 further includes an elongated lever 116 of the third class. The lever is driven by an air bulb 118 also located within the station 12. The lever 116 is mounted for rotative movement between two positions, one of these being considered an initial or an idle position, and the second of these being considered an actuated position. To this end, a pin 120 is carried by the base 102 and passes through an aperture 122 in an interior end 124 of the lever 116. The aperture 122 is of keyhole configuration and the pin 120 has an overhanging tooth 126, this arrangement permitting assembly of the arm on the pin, and thereafter the tooth 126 preventing the arm from being slid off the pin. The other end of the lever 116 constitutes a cradle 128 which engages the extending end 40 of the track switching mechanism lever

36. The cradle includes a depressed bed 130 surrounded on three sides by a retaining wall 132. The lever end 40 rides on the bed 130 and is retained in proper position by the retaining wall 132. An opening 134 in the front wall 106 permits movement of the cradle. A raised linear ridge 136 carried by the base 102 and a raised boss 137 surrounding the base of the pin 120 are situated beneath the path of the lever so that the lever rides on the ridge and boss and does not frictionally engage the remainder of the internal surface of the base 102.

Means biases the lever 116 and thus the cradle 128 to its initial position. To this end, a coil spring 138 under tension has one of its ends fixed to a pillar 140 which rises from the base 102 and has its other end engaging a hook 142 carried by the lever 116 adjacent the cradle 128. The coil spring urges the lever to rotate in a counterclock direction as seen in FIGS. 1 and 3, which would bring the triangular member 24 to a position in which a miniature racing car proceeding in the direction A would make a right turn in the direction C. The orientation of the triangular member so positioned is illustrated in full lines in FIG. 1.

The mentioned air bulb 118 is substantially cylindrical in fully expanded shape and is caged within the remote control switch 14 by an L-shaped wall 144 which rises from the base 102 and is contracted by a pressure arm 146 extending toward it from the lever 116. As best seen in FIG. 2, the arms has a height which is a major portion of the diameter of the air bulb 118. In the initial position of the lever 116, the pressure arm 146 protrudes deeply into the cylindrical outline of the air bulb 118 and in so doing collapses the bulb to a substantial extent so that it contains a relatively small amount of air. A comparison of the configurations of the bulb 118 and the bellows 64 indicates that the volume of air which can be expelled by the bellows is substantially greater than the volume defined by the air bulb, even when the latter is fully expanded.

The conduit 16 is connected by a plug 148 to the nozzle 150 of the bulb, the construction of the plug 148 being similar to the construction of the plug 86 and the plug 148 also having a retaining collar 152 which serves to hold the plug in place in the remote control switch. The bulb 118, the conduit 16 and the bellows 64 and plunger 72 comprise the air system of the pneumatic remote control assembly 10. The vent 80 serves to open the air system to the atmosphere so that the pressure within the system is atmospheric when the various components are in their initial positions.

Turning then briefly to the operation of the assembly, the same in its initial or idle position is illustrated in the drawings. The bellows 64 is expanded due to the resiliency of its walls and the bellows holds the plunger 72 in elevated position with the head 81 exposed for operation. The coil spring 138 biases the lever 116 and thus the cradle 128 to a counterclockwise position, the cradle engaging the track switching mechanism lever 36 and bringing the lever 36 to one of the latter's two positions. The pressure arm 146 constricts the air bulb 118 to a relatively small internal volume.

When the player desires to operate the pneumatic control assembly 10 in order to operate the track switching mechanism 22, he simply presses downwardly on the head 81 of the plunger 72 and simultaneously covers the vent 80 with his finger or with the palm of his hand. In so doing, he closes, that is, seals the pneumatic air system and depression of the plunger contracts the bellows causing air to be expelled from the bellows 66 and to travel along the air conduit 16 into the air bulb 118 to expand the latter. Thus, the vent hole functions as a valve keeping the air system at atmospheric pressure when the assembly is not being operated and keeping the air system at an elevated pressure when the assembly is operated by the player's hand. Since the hand of player can exert

considerable force on the plunger, the bulb 118 is forced to expand overcoming the biasing force of the coil spring 138 and acting upon the pressure arm 146 to swing the lever 116 clockwise as seen in FIG. 1. In so doing, the cradle moves the track switching mechanism lever 36 to its actuated position.

The lever 116 is retained in its actuated position until the hand of the player is removed from the plunger. Thereupon, the vent 80 is clear to again connect the air system to atmosphere so that the bulb 118 is immediately collapsed by the action of the coil spring 138 swinging the lever 116 counterclockwise as seen in FIG. 1 so that the pressure arm 146 contracts the bulb. Since the vent is opened to atmosphere, the lever returns to its initial position quite rapidly and brings with it the track switching mechanism to its initial position also rapidly. If no such vent were provided, and the return movement of the lever waited upon the expansion of the bellows 64, the return movement would be considerably slower. Still further, since the volume of air which the depression of the plunger can cause to be delivered by the air bellows to the air bulb 118 is considerably greater than the maximum volume of the air bulb, any small pin hole leaks which occur in the air system, which may sometimes happen after long hours of rough play by young children, will not prevent the system from operating properly because sufficient air flows to pass through the leak and at the same time to expand the bulb 118. Further, since air is the pneumatic medium and this air is usually at atmospheric pressure, there is no tendency for the air system to leak as would be the case with a liquid system.

As an additional feature of the invention, means is provided to connect the remote control switch 14 to a section of the track base 18. Said means comprises an extension 154 of the base 102 which projects in a direction toward the track base 18 and said extension carries two pairs of upstanding pins, a first set 156 and a second set 158 spaced from the first set. To attach the track base to the switch 14, the track base is located with its side wall 42 between the pins of each pair of pins and with the slot 41 located between the pairs of pins. (See FIG. 6.) The pairs of pins frictionally grip the side wall and serve to removably attach the extension and thus the switch 14 to the track base 18 as desired.

In operating a road-racing set having a track switching mechanism operated by the pneumatic remote control assembly of the present invention, the player will achieve a sense of realism since the control switch is adjacent the track and the control station is remote therefrom, much in the same way as are the switches and controls for these switches used in railroad systems.

Still another feature of the present invention comprises means to interengage two or more of the control stations 12 to form a battery of such stations. Each control switch of such a battery is a component of a different assembly 10 and operates a different track switching mechanism 22. Each control station 12 has a pair of parallel co-extensive flanges 160, these flanges being fixed to the lower peripheries of the front wall 52 and the rear wall 54 of the housing 44. Each flange 160 has an aperture 162 on a common end thereof, this aperture being at a portion of the flange which is at an elevated level as at 164. (See FIG. 6.) Each flange 160 at its other end carries a pin 166 of a diameter to fit into the aperture 162. As seen in FIGS. 1 and 6, the apertures in the flanges of one control station 12 are passed through the pins 166 on the flanges of a different remote control station 12', thereby to removably interlock the stations 12, 12'. Of course any number of control stations can be interlocked in file formation into batteries of stations if so desired.

What is claimed is:

1. A toy component comprising a pneumatically operated remote control assembly for enabling a player to operate a track switching mechanism of a road-racing

set, the mechanism being operated by a lever, the assembly including

- (a) a control station having a housing including a base adapted to be stationed on a flat surface, an air bellows located within the housing, and a plunger mounted on the housing for movement between an initial position allowing the bellows to expand and a position contracting the bellows, a portion of the plunger being exposed for contact by the hand of the player,
 - (b) a control switch separate from and engageable to the mechanism, the switch having a housing including a base adapted to be stationed on a flat surface, a cradle, means on the cradle for engaging the lever of the track switching mechanism, the cradle being mounted for movement between an initial position and an actuated position, means biasing the cradle to its initial position, and an air bulb caged in contracted condition between a wall of the housing and the cradle in its initial position, the bulb upon expansion moving the cradle, and thus the lever, to its actuated position against the force of the biasing means, and
 - (c) an elongated flexible air conduit pneumatically connecting the bellows to the bulb and running between the housings, whereby when the plunger is moved by the hand of the player to contract the bellows, air from the bellows is transmitted along the air conduit to the bulb to expand the same, moving the cradle to its actuated position, the cradle carrying the lever to an actuated position to operate the track switching mechanism.
2. A pneumatically operated remote control assembly as set forth in claim 1 wherein the bellows, conduit and bulb form an air system, and valve means retains the system at atmospheric pressure when the plunger and cradle are in their initial positions.
3. A pneumatically operated remote control assembly as set forth in claim 2 wherein the valve means constitutes an air vent formed in the plunger and in communication with the air system, the vent being positioned to be closed by the player's hand when his hand contacts the plunger.
4. A pneumatically operated remote control assembly as set forth in claim 1 wherein the control switch includes means detachably connecting the switch housing to the road-racing set adjacent the track switching mechanism.
5. A pneumatically operated remote control assembly as set forth in claim 2 wherein the air bellows is capable of exhausting a volume of air greater than the capacity of the air bulb thereby to insure full expansion of the bulb notwithstanding small leaks in the air system.
6. A pneumatically operated remote control assembly as set forth in claim 1 wherein the plunger and the bellows are formed in one piece and combine to define an

air cavity, the conduit being pneumatically connected to the air cavity.

7. A pneumatically operated remote control assembly as set forth in claim 1 wherein the plunger has a portion in contact with the air bellows and slidably reciprocates through an aperture in the housing, the plunger including stops determining the limits of its movement, each of said stops being carried by the plunger, one of the stops being internal of the housing and the other stop being external of the housing.

8. A pneumatically operated remote control assembly as set forth in claim 1 wherein each control station carries means for detachably coupling itself to other control stations whereby to form two or more control stations into a battery of stations.

9. A pneumatically operated remote control assembly as set forth in claim 8 wherein the coupling means includes a pair of parallel co-extensive flanges, a pair of pins carried by the flanges at one set of common ends thereof and a pair of apertures carried by the flanges at the other set of common ends thereof, the apertures being dimensioned to receive the pins.

10. A toy component comprising a pneumatically operated remote control assembly for operating a road-racing set track switching mechanism with a lever, including

- (a) a control station having a housing, an air bellows carried by the housing, and a plunger mounted on the housing for movement to a position contracting the bellows, a portion of the plunger being exposed for contact by the hand of an operator,
- (b) a control switch separate from and engageable to the mechanism, the switch having a housing, a cradle mounted for movement between a first and a second position, means on the cradle for engaging the lever, and an air bulb engaging the cradle and upon expansion moving the cradle to one of its positions, and
- (c) an air conduit pneumatically connecting the bellows to the bulb, whereby when the plunger is moved by the hand of the operator to contract the bellows, air from the bellows is transmitted along the air conduit to the bulb to expand the same, moving the cradle to said one of its positions.

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U.S. Cl. X.R.

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