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SE Federation TARGET TOY WITH ELECTRICAL TARGET HIT INDICATING MEANS

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SELF-PROPELLED TARGET TOY WITH ELECTRICAL TARGET HIT INDICATING MEANS

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The invention relates generally to target toys. More particularly, the invention relates to target toys which, when struck, respond by discharging a return projectile or missile or by performing some other activity. The invention also relates to self-propelled target toys.

Although certain target toys of the past were capable of discharging a missile in response to the striking of a particular area or target, such toys were generally of very simple construction and were not capable of firing a return missile except in one pre-arranged direction. Moreover, the target areas of such previous toys were generally arranged so that missile discharging operation of the toy occurred only if the target area was struck from a single general direction. Consequently, as the operating mechanisms of such previous target toys were generally operable to discharge a missile only in a pre-arranged direction after being struck from a single general direction, there was no thought of including in such toys a target area adapted for being struck from more than one general direction, or any capability for sensing the direction from which the target area was struck, or for subsequently causing the firing of a return missile in that direction. The incorporation of such heretofore absent features in a target toy will obviously provide many long hours of fascinating activity for children of all ages.

Accordingly, the principal object of the invention is the provision of a novel target toy. Another principal object of the invention is the provision of a target toy which includes a target area adapted to be struck from at least two general directions, which is capable of sensing the direction from which struck, and which is thereafter operable to perform one or more actions which are determined by the direction from which the target area is struck. Still another principal object of the invention is the provision of a self-propelled target toy capable of automatically turning to, and then advancing in, the general direction from which struck.

Another object of the invention is the provision of a fancifully designed target toy intended to resemble an extinct or imaginary monster or creature. Still another object of the invention is the provision of a self-propelling target toy which, in addition to performing some activity in response to being struck, is operable to circumvent objects in its path. A still further object of the invention is the provision of a target toy capable of producing, in response to the occurrence of a pre-arranged event, a sound effect having a repetitive variation in tone.

Still other objects and advantages of the invention will become apparent by reference to the following description and accompanying drawings of one embodiment of the invention.

In the drawings:

FIGURE 1 is a perspective view of a toy embodying various of the features of the invention;

FIGURE 2 is a partial elevation, with certain parts broken away and with certain parts shown in section, of the major portion of the interior operating mechanism incoroporated in the toy shown in FIGURE 1;

FIGURE 3 is a partially broken away view taken generally along line 3—3 of FIGURE 2;

FIGURE 4 is a fragmentary plan view, with certain parts in section, showing the lower portion of the operating mechanism;

FIGURE 5 is a fragmentary sectional view taken generally along line 5—5 of FIGURE 4;

FIGURE 6 is a fragmentary sectional view taken generally along line 6—6 of FIGURE 2;

FIGURE 7 is a fragmentary view illustrating the arrangement for controlling the reversal of the direction of rotation of one of the drive wheels as compared to the other of the drive wheels;

FIGURE 8 is a fragmentary sectional view taken along line 8—8 of FIGURE 2;

FIGURE 9 is a perspective view of one of the missiles which is adapted to be discharged from the toy;

FIGURE 10 is a partially broken away perspective view of the cam element in the control mechanism;

FIGURE 11 is a perspective view of a portion of the missile storage and feeding mechanism;

FIGURE 12 is a diagrammatic view showing the electrical control circuit incorporated in the toy;

FIGURE 13 is a fragmentary sectional view taken generally along line 13—13 of FIGURE 1; and

FIGURE 14 is a fragmentary sectional view taken generally along line 14—14 of FIGURE 1.

The toy shown in FIGURE 1 represents one embodiment of the invention disclosed herein and takes the form of a fanciful creature or monster 19 including a main body 21 incorporating a pair of arms 23 and a pair of legs 25. Supported by the main body 21 is a head 27 including a pair of eyes 29, a mouth defined by a pair of jaws 31, and an element which simulates a tongue 33 and extends movable from the mouth. Projecting outwardly from the main body 21 is a pivotally mounted tail section 35 including a two-sided target 37. Situated on the back of the monster is a pod 39 from which one or more missiles 41 can be discharged from the toy.

Contained within the main body 21 of the monster, as shown in FIGURE 2, is a drive mechanism or propelling means 43 adapted for propelling the monster along the supporting surface, a missile launching or projecting mechanism 45 having associated therewith a missile storage and feeding mechanism 47, and a control mechanism 49 which includes a control circuit 51 shown in FIGURE 12 and which regulates the operation of the drive mechanism 43 and, when appropriate, operates the missile storage and feeding mechanism 47 and the missile launching mechanism 45. In this regard, the control mechanism 49 operates, incident to striking of the target 37 on the tail section 35 to sense the general direction from which the target was struck and then to cause the discharge of one of the missiles 41 in that general direction. Striking of an obstacle by the tongue 33 of the monster also serves to actuate the control mechanism 49 so as to effect operation of the drive mechanism 43 to avoid the obstacle and permit continued movement of the monster. In addition, actuation of the control mechanism 49 also serves to operate a mechanism or means 52 (see FIGURE 3) for producing a sound effect in simulation of growling or roaring by the monster, which sound effect has a varying, repetitive tone.

The main body 21 is carried on an interior main frame or support means 53 (see FIGURE 2) which includes an upwardly and rearwardly inclined base plate 55, a top plate 57 connected to the base plate 55 in spaced relation thereto by a front plate 59 and by two rearwardly located posts or frame members 61 and 63. Depending rearwardly of the base plate 55 is a sub-frame 65 to which the tail section 35, at least partially, is pivotally attached.

Although various arrangements can be used for supporting the monster, the disclosed construction includes a pair of forwardly located, spaced drive wheels 67 and 69...
3. (see FIGURES 3 and 4) which also constitute a part of the drive mechanism 43, and a rearwardly located caster wheel 71 (see FIGURE 2) carried by the subframe 65. The drive mechanism 43 is attached to the frame 53 and, in addition to the front drive wheels 67 and 69, includes a reversible electric drive motor 73 (see FIGURES 3 and 4), a speed-reducing gear train 75 inter-connecting the drive motor 73 to the drive wheels 67 and 69, and means 77 (see FIGURES 4, 5 and 7) whereby the rotation of the drive wheels can be reversed as compared to the direction of rotation of the other of the drive wheels.

More particularly, the drive wheels 67 and 69 are journaled on respective studs 79 and 81 (see FIGURE 3) projecting from respective depending flanged portions 83 and 85 (see FIGURES 2 and 5) of the base plate 80, each drive wheel including an outer tread having three angularly spaced lugs which are positioned to cause side to side wobble of the monster during movement. The inner side of each of the drive wheels 67 and 69 is recessed and provided with respective internal gear formations 87 and 89 (see FIGURES 2 and 5). In addition, the recess in the inner side of the drive wheel 69 on the right side of the monster, as seen from the rear of the monster, is also formed with an external gear formation 91 (see FIGURE 5) which is concentric with the internal gear formation 89 thereof.

The left and right drive wheels 67 and 69 are respectively driven by a pair of spaced pinions 93 and 95 (see FIGURES 2 and 5) carried by a cross shaft 97 which is journaled at its left end in a flange 99 projecting upwardly from the base plate 80. At the other or right end, the cross shaft 97 extends through a vertically elongated slot (not shown) in an upstanding flange portion 100 of the base plate, and is vertically shiftable to selectively engage the pinion 95 with either of the internal and external gear formations 89 and 91 associated with the right drive wheel 69, thereby permitting reversal of the direction of rotation of the right drive wheel 69 as compared to the left drive wheel 67, through the operation of a moveable bracket or slide 101. More specifically, the slide 101 includes, as seen best in FIGURE 5, an elongated slot 103 through which the cross shaft 97 passes. At is forward end, the slot 103 is positioned so as to locate the pinion 95 in engagement with the internal gear formation 89, thereby effecting rotation of both drive wheels in the same direction. At its rearward end, the slot 103 is depressed so that when the slide 101 is shifted forward, the cross shaft 97 moves rearwardly with respect to the slot 103 and is consequently disengaged from the internal gear formation 89 and subsequently engaged with the external gear formation 91 so as to rotate the right drive wheel 69 in the opposite direction from the left drive wheel 67.

The slide 101 is forwardly and rearwardly shiftable by a bell crank lever 105 (see FIGURES 3 and 5) in a guide-way formed by two extensions 107 on the base plate and the flange portion 100. The bell crank lever 105 is pivotally connected to the slide 101, is pivotally mounted on the base plate 80, and is biased by a spring 109 (see FIGURE 7) so as to locate the slide 101 in its rearwardmost position. The spring 109 also serves to maintain the lever 105 in engagement with a part 111 of a cam element 113 included in the control mechanism 49, which part 111 serves to actuate the lever 105 to shift the slide 101 forwardly and rearwardly.

The cross shaft 97 carrying the pinions 93 and 95 is driven by the motor 73 through the speed reducing gear train 75 which includes a pinion 114 (see FIGURE 4) carried by the cross shaft 97, and, as seen also in FIGURES 2 and 4, a series of first, second, third, and fourth gear and pinion assemblies 115, 117, 119, and 121 rotationally mounted on a sub-frame 123 attached to the frame 53. The drive motor 73 is also mounted on the sub-frame 123 in position so that the out-put pinion 125 thereof is in engagement with the fourth gear and pinion assembly 121.

The missile launching mechanism 45 is carried by the frame 53 so as to permit the discharging of missiles 41 from the pod 39 on the back of the monster. While various mechanisms can be used to discharge various kinds of missiles, the disclosed construction is designed for launching a saucer type missile and it will be best seen in FIGURE 9. More specifically, the missile 41 is fabricated of light plastic and includes a central hub 131, a series of propeller type vanes 133 extending radially from the hub, and a peripheral skirt or ring 135 inter-connecting the vanes 133. Included in the hub 131 is a diametrical slot 137 and a pair of arcuate, inclined tracks 139 leading to the slot 137. In operation, when rotary movement is imparted to the missile 41, the angle of the vanes 133 causes the missile to rise and sail away from the monster.

Rotary movement is imparted to the missile 41 by the launching mechanism 45 which, as shown best in FIGURE 2, includes a rotatable firing shaft 145 adapted for receiving missiles 41 and imparting rotary movement thereto, a power spring 147 which is tensioned and then released so as to rapidly rotate the firing shaft 145, and clutch means 149 connectable with the control mechanism 49 so as to effect tensioning of the power spring 147.

More specifically, as shown best in FIGURE 2, the firing shaft 145 is journaled in an elongated bracket 151 which depends from the top plate 57, projecting perpendicularly through the top plate in forwardly inclined relation so that, when a missile is fired, a forward component as well as a vertical component is imparted to the travel of the missile. Included at the upper end of the firing shaft 145 is a head 153 including a pair of oppositely extending wings 155 which are engageable with the slot 137 in the hub 131 of the missile 41 so as to impart rotary movement to the missile incident to rotary movement of the firing shaft. The beforementioned inclined tracks 139 in the hub of the missile serve to guide the wings 155 into engagement in the slot 137.

Adjacent its lower end, the firing shaft 145 is connected to one end of an inelastic flexible cord or wire 157 which is adapted to be wound upon the firing shaft incident to counterclockwise rotation thereof as seen in FIGURE 3. Connected to the other end of the cord 157 is one end of the power spring 147 which, in the disclosed construction, is a coil spring. At its other end, the power spring 147 is connected to a bracket 159 projecting forwardly of the front plate 59. When the cord 157 is wound around the firing shaft 145, the power spring 147 is tensioned and energy is stored therein for discharging the missile.

The firing shaft 145 is rotatably driven so as to wind the cord 157 thereon by means of a pinion 161 mounted adjacent the lower end of the firing shaft in position for engagement with a gear 163 having a peripheral tooth formation which is interrupted along a portion of the periphery so as to disengage the pinion 161 and thereby permit free rotation of the firing shaft 145 by the energy previously stored in the power spring 147. The gear 163 is mounted on an arbor 165 which is journaled, at its lower end, about the top of a shaft 167 which carries the cam element 113. At its upper end, the arbor 165 is journaled in the top plate 57.

Rotational movement is imparted to the arbor 165 by the before mentioned clutch means 149 which constitutes a one way clutch and which includes a clutch face 169 on the cam element 113 and a mating clutch member 171. The clutch member 171 is keyed to the arbor 165 to afford rotation of the arbor incident to rotation of the clutch member 171 and to provide movement of the clutch member axially of the arbor between a position of driven engagement with the clutch face 169 and a normally disengaged position in spaced relation to the clutch face 169.

The clutch member 171 is normally held in disengaged relation to the clutch face 169 by the action of a control
beam 173 and a biasing spring 175. More specifically, the control beam 173 constitutes an elongated member which is engaged in an external annular groove 177 in the clutch member 171 and which, at its forward end, is pivotally supported by the front plate 59. At its rearward end, the control beam 173 is connected to one end of the biasing spring 175 which serves to urge the rearward portion of the control beam upwardly. As will be later explained, the rearward portion of the control beam 173 is also engageable by the control mechanism 49 to connect the clutch member 171 with the clutch face 169 on the cam element 113.

Also illustrated in the disclosed construction is an arrangement for re-engaging the gear 163 with the pinion 161 after disconnection of the clutch means 149 so that, when the clutch member 171 is again connected to the clutch face 169 to cause rotation of the arbor 165, the firing shaft 145 will immediately start to rotate, thereby winding up the cord 157 and storing energy in the power spring 147. More specifically, as seen in FIGURES 2 and 3, the arrangement includes a lug 179 fixed to the arbor 165 at the end thereof projecting above the top plate 57, and a leaf spring 181 attached to the top plate 57 in position, as seen best in FIGURE 3, for bearing against one side of the pinion 191 when the pinion 191 is disconnected from the clutch face 169, so as to effect such rotation of the arbor 165 as will re-engage the gear 163 with the pinion 161.

Closely associated with the missile launching mechanism 45 is the missile storage and feeding mechanism 47, which mechanism serves to position the missiles on the firing head 153 to permit missile firing operation in response to each of several strikings of the target, without requiring reloading of the导弹 with missiles. More particularly, the missile storage and feeding mechanism 47 comprises the before mentioned pod 39 which serves as a storage chamber, a missile lifter 191 which is adapted for supporting several missiles 41 in the pod 39 and for successively locating the missiles in firing position on the head 153 of the firing shaft 145, and an arrangement or means 193 for actuating the missile lifter 191.

More specifically, the missile lifter 191 constitutes a vertically elongated rod of generally T-shaped formation including a cross bar 195 and a stem 197. The missile lifter 191 is supported by sliding engagement of the cross bar 195 through a slot 199 in the top plate 57 and through a similar slot 201 in a bracket 203 extending from the bracket 201. At its forward end, the firing shaft 145. At its upper end, the missile lifter 191 includes a transversely extending head 205 which is disposed in surrounding relation to the upper part of the firing shaft 145 in position to engage the hub 131 of the lowermost missile 41 located on the firing shaft.

Incremental actuation or elevation of the missile lifter 191, to locate successively the uppermost missile 41 in position for firing engagement with the head 153 on the firing shaft 145, is provided by a lifting rod 207 which is successively engageable with the teeth of a serrated segment 209 of the stem 197 adjacent the lower end of the missile lifter 191.

The lifting rod 207 is a resilient member which is fixed at its forward end to the front plate 59 and, at its rearward end, is positioned for engagement with a cam 211 carried by the arbor 165. The cam 211 includes, along a portion of its periphery, an inclined camming surface 213 which engages the rearward end of the lifting rod 207 to cause elevational movement thereof to a tensioned position, which movement is effective to raise the missile lifter 191 by an amount corresponding to the distance between adjacent teeth in the serrated segment 209, which distance corresponds to the thickness of the hub 131 of the missile 41. The inclined camming surface 213 is dimensioned such that elevation of the missile lifter 191 is fully accomplished prior to disengagement of the gear 163 from the pinion 161, which disengagement, as already explained, results in the discharge of a missile.

The missile lifter 191 is releasably retained in position after each elevation thereof by the lifting rod 207 by a detent arrangement including, on an upper portion of the stem 197, a series of detents 215 which are spaced apart from each other at a distance corresponding to the thickness of the hub 131 of the missile 41, and a spring 217 which is fixed to the top plate 57 in position for releasable engagement with any one of the detents 215. Thus, in operation, initial raising of the missile lifter 191, resulting from rotation of the cam 211, effects initial elevation of the missile lifter 191 and disengagement of the spring 217 from one of the detents 215. Continued rotation of the cam 211 effects further elevation of the missile lifter 191 by the lifting rod 207 through a total distance equal to the thickness of the hub 131 of the missile 41 so that the spring 217 becomes engaged in the next lower detent 215. Further continued rotation of the cam 211 results in disengagement thereof from the lifting rod 207, thereby permitting the lifting rod to return to its normal, unengaged position in lifting engagement with the next lower tooth in the serrated segment 209.

Associated with the missile storage and feeding mechanism 47 is a switch 219 which is connected to a switch body 221 which, as seen in FIGURES 2 and 8, is pivotally mounted between a pair of posts 223 projecting from the base plate 55. Extending rearwardly of the switch body 221 are a pair of normally engaged contact members 225 and 227 with the end of contact member 225 projecting beyond the contact member 227, as seen in FIGURE 2, and in position for engagement with a non-electrically conductive pin 229 projecting from the frame member 61. As a result, when the switch body 221 is pivoted in the clockwise direction, as seen in FIGURE 2, the contact member 225 is disengaged from the contact member 227 thereby halting operation of the toy.

As also shown in FIGURE 2, the switch body 221 is biased for rotation in the clockwise direction, by a suitable spring 231, so as to open the circuit 51. Restraint against the action of the spring 231 is provided by an actuator lever 233 pivotally mounted on a tab 235 (see FIGURE 8) extending from the base plate 55, and by a control arm 237 extending from the switch body 221.

More specifically, projecting forwardly of the switch body 221 is an extension 239 (see FIGURES 2 and 8) which is positioned between the bifurcated fingers of one leg 241 of the actuator lever 233. The other or upwardly projecting leg 243 of the actuator lever includes a head 245 which normally rides against the cross bar 195 of the missile lifter 191, thereby preventing clockwise rotation of the switch body 221. However, as the missile lifter 191 moves to its uppermost position, i.e., a position locating the remaining single missile on the head 153 of the firing shaft 145, the head 245 of the actuator lever 233 rides off the bottom of the cross bar 195, thereby freeing the actuator lever for counterclockwise rotation, as seen in FIGURE 8.

Notwithstanding rotational freedom of the actuator lever 233 when the missile lifter 191 is in its uppermost position, the switch body 221 is repositioned to engage the switch body 221 in a counterclockwise, as seen in FIGURE 2, to open the circuit 51, by the before mentioned control arm 237. As best seen in FIGURE 8, the control arm extends from the switch body 221 and is generally of inverted U-shape to prevent interference with the cam element 113. The free end of the control arm 237 rides on a camming edge (see FIGURE 10) of the cam element 113. As seen best in FIGURE 10, the camming edge 247 includes a
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3 notch 249 which permits dropping of the control arm 237, thereby permitting clockwise pivoting of the switch body 221, as seen in FIGURE 2, and opening of the circuit 51. However, the notch 249 is positioned on the cam element 113 so that opening of the circuit 51 does not occur until after firing of the missile.

After the last missile is discharged, the "missile shut-off" switch 219 can be re-closed by placing one or more missiles on the firing shaft 145 and depressing the missile lifter 146 sufficiently to re-engage the cross bar 195 with the head 245 of the actuator lever 233. In this regard, the head 245 of the actuator lever 233 includes a camming edge 251 (see FIGURES 8 and 11) inclined downwardly toward the cross bar 195 so as to facilitate clockwise rocking, as seen in FIGURE 6, of the actuator lever 233 incident to depression of the missile lifter 191.

Such clockwise rocking of the actuator lever serves to pivot the switch body 221 counterclockwise, as seen in FIGURE 2, against the action of the spring 231, thereby raising the control arm 237 from the notch 249 and permitting re-engagement of the contact numbers 225 and 227.

As already pointed out, the control mechanism 49 serves to operate the drive mechanism 43, the missile storage and feeding mechanism 47, the missile launching mechanism 45, and the sound producing mechanism 52. The control mechanism 49 includes a control motor 261 (see FIGURES 4 and 6) which drives the before mentioned cam element 113, a directional sensing mechanism 253 (see FIGURE 3) whereby the drive mechanism 43 is variably controlled depending upon the direction from which the target 37 is hit, and the control circuit 51 which is integrated with the cam element 113 and sensing mechanism 253.

As shown best in FIGURES 4 and 6, the control motor 261 is mounted on a sub-frame 263 which is suitably secured to the underside of the base plate 55. The cam element 113 is driven by the control motor 261 through a gear train 265 which includes first, second, and third gear and pinion assemblies 267, 269, and 271 respectively, which assemblies are journaled between the sub-frame 263 and the base plate 55.

In turn, the third gear and pinion assembly 271 is engaged with a gear 273 secured to the shaft 167 which carries the cam element 113. The shaft 167 is journaled in the base plate 55, in an aperture in the sub-frame 263, and in an aperture in the bottom of a U-shaped bracket 275 (see FIGURE 2) secured to the underside of the sub-frame 263.

The cam element 113, as best seen in FIGURE 10, includes on its bottom surface the before mentioned part 111 which serves to actuate the slide 101 to effect reversal of the direction of one of the drive wheels as compared to the other of the drive wheels. Along a lower edge, the cam element 113 includes a camming edge 277 including a recess 279, which camming edge functions to prevent de-energizing of the control motor 261 prior to one complete operational cycle. The cam element 113 also includes, adjacent the top thereof, the before mentioned clutch face 169 and the upper camming edge 247 which functions in co-operation with the "missile shut-off" switch 219. Also incorporated in the cam element 113 is a cam track 281 including a lug 283 which serves, as will be explained, to permit halting of the operation of the control motor 261, and a pair of vertically adjacent, upper and lower camming surfaces 285 and 287, the function of which will also be later explained.

The control circuit 51, as shown best in FIGURE 12, includes, the already mentioned "missile shut-off" switch 219, a manual "off-on" switch 291 located for projection of the switch button 293 (see FIGURE 1) through the side of the main body 21, and a pair of batteries 295 (see FIGURE 2) disposed in a battery vault 297 which is accessible through the bottom wall of the main body. From the batteries 295, as seen best in FIGURE 12, one lead 296 extends to control the motor 261 which in turn, is connected through leads 303 and 305 through a master switch 307 to the "missile shut-off" switch 219. Thus, when the "missile shut-off" switch 219, and the master switch 307 are closed, the control motor 261 is energized.

The drive motor 73 is connected by leads 309 and 311 leading to a reversing switch 313 which, in turn, is connected by leads 315 and 317 connected respectively to the "missile shut-off" switch 219 and to the batteries 255. The reversing switch 313 is normally disposed to energize the drive motor 73 so as to propel the monster forwardly, and accordingly, the monster is propelled forwardly along the supporting surface whenever the manual "off-on" switch 291 and "missile shut-off" switch 219 are closed. Also included in the control circuit 51 is a normally open switch 291 which is hereinafter referred to as the "tongue" switch and which is disposed in parallel with the master switch 307. The "tongue" switch 319 is operably capable by the tongue 35 incident to the hitting of an obstacle, thereby affording circumventing movement of the monster.

Considering now the master switch 307, this switch is normally open and includes, as seen best in FIGURE 2, a switch body 325 having a pair of forwardly extending, generally parallel, contact blades 327 and 329 which are engageable incident to closure of the master switch 307 in engagement with an actuator bar 331. More specifically, the actuator bar 331 is pivotally mounted on a bracket 333 on the base plate 55 and normally rests on the top surface of the contact blades 327. The actuator bar 331 is depressed to engage the contact blades 327 and 329 either by rotation of the cam element 113, as will be explained, or by operation of one of two inverted channel-shaped control members or levers 337 and 339 (see especially FIGURE 3) which are disposed in adjacent parallel relation to each other and constitute a part of the direction sensing mechanism 253.

Rotation of the cam element 113 is operable to depress the actuator bar 331 by reason of a follower 341 (see FIGURE 2) which projects from the actuator bar and is normally engaged in the recess 279 in the lower camming edge 277 of the cam element 113. As a result, when the control motor 261 is energized, either by the master switch 307 or by the "tongue" switch 319, the engagement of the follower 341 with the rotating cam element 113 results in movement of the follower out of the recess 279 accompanying depression of the actuator bar 331 which is effective either to close the master switch 307 or to retain the master switch 307 in an inoperative condition. However, when one operational cycle of the control mechanism 49 is completed, the follower 341 rides into the recess 279, thereby effecting opening of the master switch 307 and halting of the operation of the control motor 261.

Turning now to the control levers 337 and 339, each of the control levers is mounted on a common pivot 343 (see FIGURE 3) supported by a pair of spaced brackets 345 on a rearwardly extending portion 347 of the base plate 55. Each of the control levers 337 and 339 is biased for counterclockwise rotation, as seen in FIGURE 2, about the pivot 343 by respective springs 349 and 351. At their forward ends, each of the control levers 337 and 339 includes respective extensions 355 and 357 which are adapted, in part, to depress the actuator bar 331, and thereby close the master switch 307 so as to energize the control motor 261 when the control levers pivot counterclockwise, as seen in FIGURE 2. Each of the extensions 355 and 357 is also irregularly formed to provide respective first legs 359 and 361 engageable with the track 281 of the cam element 113 and respective second legs 363 and 365 engageable with the control beam 173 so as to depress the control beam against the action of the spring 175, thereby engaging the clutch member 171 with the clutch face 169 to effect operation of the missile storage and feeding mechanism 47 and the missile launching mechanism 45.
The control levers 337 and 339 are restrained against the action of the respective springs 349 and 351 by a tail member 367 which is pivotally attached to the rearward surface of the rearward extremity of the control levers 337 and 339, and which moves pivotally with the tail section 35 incident to striking of the target 37. In this last regard, the tail section 35 is mounted, as shown in FIGURE 2, on a sub-frame 369 which is pivotally attached to the main frame 53. More specifically, a pivot 361 and bracket or bridge 371 is secured to the rearward portion 347 of the base plate 55 and, as shown in FIGURE 2, is connected by a pivot 373 to the tail member 367 which forms a part of the tail section sub-frame 369. In addition, a lower member 377 of the tail section sub-frame 369 is pivotally attached, in vertical alignment with the pivot 373, as shown at 379, to the sub-frame 65 of the main frame 53.

The tail section 35 is normally maintained in a centralized position, with the tail member 367 engaging both of the control levers 337 and 339 by suitable means which, in the disclosed construction, takes the form of a leaf spring 381. At its forward end, the leaf spring 381 is anchored to a post 383 projecting from the rearward base plate portion 347 rearwardly of the control lever blasing springs 349 and 351. Rearwardly from the post 383, the leaf spring 381 extends through a narrow slot 385 in an upright flange 387 projecting from the rearward base plate portion 347. At its rearward extremity, the leaf spring 381 is retained in a vertical slot 391 in a vertical member 391 of the sub-frame 369.

Thus, after pivoting of the tail section 35 in response to striking of the target 37, the leaf spring 381 tends to return the tail section to a normal, central position.

When the target 37 is struck from the right side, i.e., when looking toward the monster from the rear, the tail section 35 pivots in the clockwise direction, as seen in FIGURE 5, thereby swinging the tail member 367 out of engagement with the left control lever 337. As a result, the left control lever 337 immediately pivots in the counterclockwise direction, as seen in FIGURE 2, under the action of the spring 349, thereby closing the master switch 387 and energizing the control motor 261. At the same time, the clutch member 171 is engaged with the clutch face 169 of the cam element 113 to disengagingly power the missile storage and feeding mechanism 47 and the missile launching mechanism 45. Return movement of the tail section 35 to its normal central position, under the action of the leaf spring 381, is prevented until such time as the control lever 337 pivots back into level adjacent relation to the other control lever 339.

In this last regard, the control lever 337 is returned to its normal position, to permit subsequent de-energizing of the control motor 261 and to permit return of the tail section 35 to its centralized position, by action of the lug 283 on the cam element 113. In this connection, as the cam element is rotated by the control motor 261 in the clockwise direction, as seen in FIGURE 3, the lug 283 comes into engagement with the control lever leg 337 and pivoting the control lever in the counterclockwise direction, as seen in FIGURE 2. When the left control lever 337 is level with the other or right control lever 339, the tail member 367 is swung into overlying relation thereto by the action of the leaf spring 381, thereby placing the tail section 35 and the control lever 337 in their normal position in readiness for further striking of the target 37.

Striking of the target on the left side causes a similar sequence of actions including counterclockwise pivoting as seen in FIGURE 2, of the right control lever 339 to effect closing of the master switch 387 and energizing of the control motor 261, and to effect coupling of the clutch means 149. Subsequently, the lug 283 on the cam element 113 engages the control lever leg 361 and serves to disengage the clutch means 149 and to permit de-energizing of the control circuit 51, together with restoration of the tail section 35 to its central position, by pivoting the right control lever 339 in the clockwise direction to its normal position.

The reversing switch 313 which, together with the before-mentioned means 77 for changing the rotational, direction of the right drive wheel 69 relative to the left drive wheel 67, serves to control the directional movement of the monster. More specifically, the reversing switch 313 operates to control the direction of rotation of the drive motor 73 by controlling the polarity of the electric current supplied to the drive motor. Normally, as already pointed out, the reversing switch 313 is disposed to power the drive motor when the "off-on" switch 291 and the "missile shut-off" switch 219 are closed so as to propel the monster forwardly. However, during operation of the control motor 261, the reversing switch 313 is actuated to provide for a period of rearward movement of the monster.

Still more specifically, actuation of the reversing switch 313 is controlled by selective engagement of a cam follower 395 (see FIGURES 3 and 4) with the pair of vertically spaced, adjacent camming surfaces 285 and 287 on the cam element 113. As will be explained, the upper camming surfaces 285 and 287 constitutes a peripheral projection from the cam element 113 along a length sufficient to obtain a desired amount of rearward-drive operation of the drive motor. In addition, the camming surfaces 285 and 287 are dimensioned to effect reversal of the direction of rotation of the drive motor 73 in co-ordination with the operation of the peering switch 217 for reversing the direction of the right drive wheel 69 as compared to the left drive wheel 67. The camming surfaces 285 and 287 are located so that the change in the direction of travel of the monster is completed before firing action of the missile launching mechanism 45.

Accordingly, when the target 37 is struck from the right side, the left control member 337 is released to close the master switch 397, thereby driving the cam element 113 clockwise, as seen in FIGURE 3. As a result of such movement, the upper camming surface 285 initially operates to change the direction of rotation of the drive motor 73, thereby initially causing the monster to retreat. After a predetermined length of retreat, the upper camming surface 285 serves to effect reversal of the direction of rotation of the drive motor and, at the same time, the part 111 of the cam element 113 serves to displace the slide 101 forwardly, thereby reversing the direction of rotation of the right drive wheel 69 as compared to the left drive wheel 67. As a result, the right drive wheel 69 rotates in the rearward direction, while the left drive wheel 67 rotates in the forward direction, thereby turning the monster to the right. After the monster has turned about 90 degrees, the part 111 permits return rearward movement of the slide 101, thereby effecting forward rotation of both drive wheels. The monster then advances forwardly and fires one of the missiles.

On the other hand, when the target 37 is hit from the left, the tail section 35 is pivoted so as to release the right control lever 339 for control of the motor 261 as seen in FIGURE 2. Such rotation also pivots the reversing switch 313 in the counterclockwise direction so that the follower 395 engages the lower camming surface 287. As a consequence, the direction of rotation of the drive motor 73 is initially reversed, causing the monster to retreat. Subsequently, the part 111 of the cam element 113 serves to move the slide 101 forwardly, thereby
reversing the direction of rotation of the right drive wheel 69 as compared to the left drive wheel 67. As a result, the right drive wheel 69 rotates in the forward direction, while the left drive wheel 67 turns in the rearward direction, thereby turning the monster to the left. When the monster has turned approximately 90 degrees, the part 111 permits rearward shifting of the slide under the action of the springs 109, so that both drive wheels will again rotate in the same direction. At the same time, the configuration of the lower camming surface 287 serves to actuate the reversing switch 313 to reverse the direction of rotation of the drive motor 73 so that the monster now moves forwardly in the general direction from which it struck.

Operation of the reversing switch 313 in the above explained manner, is facilitated by the disclosed construction, which construction includes a mounting block 401 (see FIGURE 3) which is pivotally rockable about the pivot 343 carrying the control levers 337 and 339. At its forward end, the mounting block 401 includes a projection 403 which extends under the right control lever 339 to effect counterclockwise rotation of the mounting block, as seen in FIGURE 2, incident to counterclockwise rotation of the right control lever. As also shown in FIGURE 3, the right control lever 339 includes an ear 405 which projects under the mounting block 401 to cause clockwise rotation thereof, as seen in FIGURE 2, incident to clockwise rotation of the right control lever.

Pivotedly mounted about a stud 407 projecting from the mounting block 401 is an insulator block 409 from which the cam follower 395 extends. Secured to the insulator block 409 are a pair of spaced, parallel contact blades 411 and 413 which extend forwardly and rearwardly from the insulator block. Projecting upwardly from the mounting block 401, forwardly of the insulator block 409, and between the contact blades 411 and 413, is a first contact post 415 which is connected to the lead 315 connected to the "missile shoot-off" switch 319. Also projecting upwardly from the mounting block 401, between the contact blades 411 and 413, but rearwardly of the insulator block 409, is a second contact post 417 which is connected to the lead 317 connected to the batteries 295. The contact posts 415 and 417 are arranged, so that the contact post 415 is normally in engagement with the contact blade 411 and so that the contact post 417 is normally in engagement with the contact blade 413. However, by reason of the pivotal mounting of the insulator block 409 and the configuration of the camming surfaces 285 and 287 engaged by the cam follower 395, the insulator block, and hence the contact blades carried thereon, are pivotable to reverse the connection of the posts 415 and 417 to the blades 411 and 413.

As already mentioned, the sound producing mechanism 52 is operable to produce a sound effect having a repetitive variation in tone. More specifically, the sound producing mechanism includes a sounding box 421 (see FIGURES 3 and 4) having one wall which constitutes a diaphragm 423 and which is constructed of suitable material, such as fish paper. Also forming a part of the sounding box 421 is a second wall 425 which is hinged to the remainder of the sounding box and is movable relative thereto so as to vary the tone produced by the mechanism.

Sound producing operation is provided by engagement of an elongated vibrator 427 against the diaphragm 423. More specifically, the vibrator is secured at its forward end to the sounding box 421 and includes a central V-shaped portion 429 adapted to strike the diaphragm 423. At its rearward end, the vibrator is disposed for engagement by a rotatably mounted ratchet wheel 431 which constitutes one part of means for actuating the sound producing mechanism 52. The ratchet wheel 431 is carried by a shaft 433 which is suitably journaled, as in the top plate 57 and in the base plate 55, and which at its lower end, carries a pinion 435 (see FIGURE 6) in engagement with the gear and pinion assembly 267 in the gear train 265 connecting the control motor 261 to the cam element 113. Accordingly, when the control motor is energized, the initial rotary movement of the cam element 113, occurring in response to powering of the control motor 261 by reason of the closing of the movement 425 of the sounding box 421, to vary the tone produced incident to striking of the diaphragm 423 by the vibrator 427, is afforded through a link or bar 437 (see FIGURE 3) which, at its forward end, is loosely connected to the free end of the moving wall 425, and which, at its rearward end, is pivotally and eccentrically attached to the shaft 433. As a result, for each complete rotation of the ratchet wheel 431, the movable wall 435 is caused to open and close once, while the vibrator 427 is continually struck against the diaphragm 423. The resulting sound effect, including a change in pitch or tone resulting from opening and closing of the movable wall 425, provides a very fascinating effect in simulation of a roar or growl associated with the monster.

As already explained, the disclosed construction also includes means for sensing the striking of an obstacle by the monster, whereby, in cooperation with the control mechanism 49, the monster is operable to circumvent obstacles. In this regard, the tongue 33 of the monster is movable, upon impact with an obstacle, to close the beforementioned, normally open "tongue" switch 319 which is located proximate to the vowel sound switches 401, 411, and 413 regulating operation of the control motor 261. When the "tongue" switch 319 is closed, the control motor 261 is energized to rotate the cam element 113, thereby effecting closing of the master switch by reason of the engagement of the follower 341 with the lower camming edge 277 of the cam element. Closely following the "tongue" switch 319 effects operation of the drive mechanism 43 in the same manner as when the target 37 is hit from the right, i.e., to cause the monster to initially retreat, then to turn approximately 90 degrees to the right, and to subsequently advance. At the same time, the sound producing mechanism 52 provides the beforementioned roar or growl. However, as the control levers 337 and 339 have not been released, the clutch means 245 remains disengaged and there is no activity of the missile storage and feeding mechanism 47 or of the missile launching mechanism 45.

Considering the construction of the "tongue" switch 319 in greater detail, as best shown in FIGURES 13 and 14, the tongue 33 extends from a cross member 447 which is non-rotatorably supported for linear sliding movement in a pair of closed slots 449 in the sides of the head. Disposed rearwardly of the cross member are a pair of contact elements 451 and 453 which are secured to a bridge piece 455 extending between the sides of the head. More specifically, the contact element 451 is a generally U-shaped piece located with its ends 452 adjacent the sides of the head. The other contact element 453 is fabricated of resilient material, and may also be considered generally U-shaped, including two generally identical end portions 457, each of which is bent away from the supporting bridge piece 455 to include a contact section 459 in adjacent spaces, overlying relation to the adjacent one of the ends 452 of the contact element 451. From the contact section 459, each of the end portions 457 is forwardly re-bent to provide a forward section 461 which is generally parallel to the contact section 459 and which engages the rear of the cross member 447 to bias the tongue 33 outwardly of the head. However, when the tongue 33 engages an obstacle, the cross member 447 is moved rearwardly, thereby causing engagement of at least one of the contact sections 459 with the contact element 451. As a result, the "tongue" switch 319 is closed, and the control motor 261 is energized to cause movement of the monster away from the obstacle. As has already been explained, the initial rotary movement of the cam element 113, occurring in response to powering of the control motor 261 by reason of the closing of the
“tongue” switch 319, serves to depress the actuator bar 311 so as to close the master switch 307, thereby providing for an operational cycle, not including missile feeding and launching action.

The operation of the monster will now be summarized. When the manual “off-on” switch 291 is moved to the "on" position, and when at least one of the missiles 41 is carried by the monster for discharge, thereby retaining the "missile shut-off" switch 219 in a closed condition, the monster is propelled in the forward direction by the drive mechanism 43. If the target 37 on the end of the tail section 35 is struck from the left side, i.e., when looking at the rear of the monster, the tail section 35 is displaced counterclockwise, as seen in Figure 3, from its normal centralized position and the control mechanism 49 functions to initially cause the monster to retreat, then to turn about 90 degrees to the left, then to advance, and then to discharge a missile in the direction of advancement. At the same time, the sound producing mechanism 52 operates to produce the roar or growl noise effect 53.

If the target 37 on the end of the tail section 35 is hit from the right side, the tail section is swung in the clockwise direction, as seen in Figure 3, thereby actuating the control mechanism 49 to initially cause the monster to retreat, then to turn to the right, then to advance, and then to discharge a missile in the direction of advancement. The roar or growl sound effect is also produced.

When the last missile is fired from the pod 39, the “missile shut-off” switch 219 is thereafter opened to halt operation of the toy. Reloading of one or more missiles 41 on the missile lifter 191 effects re-closing of the “missile shut-off” switch 219, accompanied by normal forward movement of the monster.

In the event that the tongue 33 of the monster strikes an obstacle, the "tongue" switch 319 is closed to actuate the control mechanism 49. As a result, the monster initially retreats, then turns to the right, and then advances. At the same time, the roar or growl effect is produced. However, a missile is not launched from the pod 39.

While particular mechanisms have been described in the disclosed embodiment, various changes and modifications can be made in the disclosed construction to obtain various of the advantageous features incorporated in the disclosed monster. For instance, the missile launching mechanism and/or the missile storage and feeding mechanism could be pivotally mounted on the monster so as to turn, independently of the toy as a whole, to the general direction from which the toy was struck and then actuated to discharge a missile. In addition, the obstacle circumvention feature and the sound producing feature can be utilized apart from the missile firing feature, while the missile firing feature can be utilized apart from the circumvention and sound producing features. However, in the disclosed construction, the various features have been integrated in a single mechanism to provide a toy which is extremely attractive and which will provide many hours of fascinating play activity.

Various features of the invention are set forth in the appended claims.

What is claimed is:

1. A toy comprising support means, a target on said support means positioned to be struck from at least two directions, sound producing means on said support means comprising a sounding box including one wall constituting a diaphragm and a second wall hinged to the remainder of said sounding box for movement relative thereto, a vibrator positioned for striking said one wall, and actuating means for causing repeated striking of said vibrator against said one wall of said sounding box and for effecting movement of said second wall relative to the remainder of said sounding box so as to effect variation in the tone of the sound produced by the striking of the vibrator against said one wall, and means on said support means for sensing the striking of and the direction from which said target is struck and, in response to striking of said target, for launching a return missile toward the direction from which said target is struck and for operating said actuating means to effect the production of a sound of varying tone.

2. A toy comprising support means, a target on said support means positioned to be struck from at least two directions, means on said support means for storing a plurality of missiles, means on said support means for individually discharging said missiles from said missile storing means, means on said support means for training said missile discharging means so as to enable missile discharge toward the direction from which said target is struck, and means on said support means for sensing the striking of and direction from which said target is struck, for training said missile discharging means toward the direction from which said target is struck, and for subsequently effecting the discharge of a single missile by said missile discharging means from said missile storage means.

3. A toy comprising support means, means on said support means for propelling said toy along a supporting surface, a target on said support means positioned to be struck from at least two directions, means on said support means for discharging a missile from said toy in the direction of movement of said toy, and means on said support means for sensing the striking of and direction from which said target is struck, for causing operation of said propelling means to effect movement of said toy toward the direction from which said target is struck, and for causing discharging operation of said missile discharging means after initiation of the movement of said toy toward the direction from which said target is struck.

4. A toy comprising support means, means on said support means for propelling said toy along a supporting surface, a target on said support means positioned to be struck from at least two directions, means on said support means for discharging a missile from said toy in the direction of movement of said toy, means on said support means for producing a sound effect having a repetitive variation in tone, means on said support means for sensing the striking of and direction from which said target is struck, for causing operation of said propelling means to cause said toy to initially retreat, then to turn toward the direction from which said target is struck, and then to advance, for causing discharging operation of said missile discharging means after initiation of the advance of said toy toward the direction from which said target is struck, and for effecting operation of said propelling means to cause said toy to initially retreat, then to turn, and to advance.

5. A toy comprising a frame, a pair of spaced drive wheels on said frame for supporting said toy on, and for propelling said toy along, a supporting surface, a motor on said frame, means on said frame for operating said motor and for connecting said motor to said drive wheels in a manner affording selective reversal of the direction of rotation of both of said drive wheels and of one of said drive wheels as compared to the other of said drive wheels, a target on said frame positioned to be struck from at least two directions, means on said frame for discharging a missile from said toy in the direction of movement of said toy, and means on said frame for sensing the striking of and direction from which said target is struck, for controlling said operating and connecting means so as to cause said toy to turn toward the direction from which said target was struck, and then to advance in said direction, and for subsequently causing missile discharging operation of said missile discharging means.

6. A self-propellable target toy comprising a frame, a wheel means on said frame for supporting said toy on, and for propelling said toy along, a supporting surface, an electric motor on said frame, means on said frame connecting said electrical motor to said wheel means in a
manner to afford driving of said toy in a plurality of directions, a target on said frame positioned to be struck from at least two directions, means on said frame for discharging a missile from said toy in the direction of movement of said toy, and means on said frame for sensing the striking of said direction from which said target is struck, for controlling the operation of said wheel means so as to initially cause said toy to move rearwardly, then to turn toward the direction from which said target was struck, and then to advance in said direction, and for subsequently causing missile discharging operation of said missile discharging means.

7. A self-propellable toy comprising a frame, a pair of spaced drive wheels on said frame for supporting said toy on, and for propelling said toy along, a supporting surface a motor on said frame, means on said frame for operating said motor and for connecting said motor to said drive wheels in a manner affording selective reversal of the direction of rotation of both of said drive wheels and of one of said drive wheels as compared to the other of said drive wheels, a target on said frame positioned to be struck from at least two directions, means on said frame for discharging a missile from said toy in the direction of movement of said toy, means on said frame for sensing the striking and direction from which said target is struck for controlling said operating and connecting means so as to cause said toy to turn toward the direction from which said target was struck, then to advance in said direction, and for subsequently causing missile discharging operation of said missile discharge means, and means on said frame for sensing the striking by the toy of an obstacle, said obstacle sensing means being operable to control said operating and connecting means so as to cause said toy to initially retreat, to turn, and then to again advance.

8. A self-propellable finger toy comprising a frame, a simulated tail movably mounted on said frame, said tail including a target positioned to be struck from either of two opposed sides, a pair of spaced drive wheels on said frame for supporting said toy on, and for propelling said toy along, a supporting surface, a source of electrical energy a first electrical motor on said frame, means on said frame for connecting said first motor to said drive wheels in a manner affording reversal of the direction of rotation of both of said drive wheels as compared to the other of said drive wheels, a second electrical motor on said frame, first switch means on said frame for the incident to the movement of said tail in response to the striking of said target for connecting said second motor to said power source, a cam driven by said second motor, said cam being operable to actuate said means connecting said first motor and said drive wheels so as to cause reversal of the direction of rotation of one of said drive wheels as compared to the other of said drive wheels, and second switch means positioned for operable engagement by said cam to reversibly connect said first motor to said power source, said second switch means being normally positioned to engage one portion of said cam to reversibly control the operation of said first motor to effect, in co-operation with the actuation by said cam of said means connecting said first motor and said drive wheels and incident to rotation of said cam, rearward movement of said toy, followed by turning of said toy in one direction, and subsequent advancing movement in a new direction, and being positionable, incident to the movement of said tail occurring in response to the striking of said target from a direction opposite to the movement of said tail, to engage one portion of said cam to reversibly control the operation of said first motor to effect, in co-operation with the actuation by said cam of said means connecting said first motor and said drive wheels and incident to rotation of said cam, rearward movement of said toy, followed by turning of said toy in the direction opposite to said one direction, and subsequent advancing movement in a direction opposite to said new direction, a simulated head carried by said frame, a simulated tongue element carried by said head, said tongue element being movable to engage with an obstacle, third switch means operable incident to the movement of said tongue to connect said second motor to said power source thereby, incident to rotation of said cam, also effecting energizing of said first motor as an incident to the normal engagement of said second switch means with said one portion of said cam and actuation of said means connecting said first motor and said drive wheels so as to effect rearward movement of said toy, followed by turning of said toy in said one direction, and subsequent advancement of said toy in said new direction, means on said frame for containing a plurality of missiles, means on said frame for singly discharging the missiles from said missile containing means, sound producing means on said frame, and means for connecting said missile discharging means and said sound producing means to said second motor incident to the movement of said tail occurring in response to the striking of said target so as to effect the discharge of one of the missiles and the production of sound.

10. A toy comprising support means, a target mounted on said support means so that said target can be moved in more than one direction when struck from different directions, means on said support means for sensing from which direction said target is struck, missile-launching means on said support means, means for moving said missile-launching means in response to said sensing means to train said missile-launching means toward the direction from which the target is struck, and means for actuating said missile-launching means to launch a return missile toward the direction from which said target is struck.

11. A toy comprising support means, means on said support means for propelling said toy along a supporting surface, a relatively movable target on said support means...
in position to be struck from at least two substantially different directions, said target being mounted to respond to a striking blow thereon by moving in the direction of the force thus applied, means on said support means for sensing the direction from which said target is struck, and means on said support means connected to said propelling means and operable to actuate said propelling means so as to drive said toy toward the direction from which said target is struck simulating attack in the direction from which the target was struck.

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