This invention relates to impact toys and more particularly to an impact reaction toy in which the toy provides a reactionary force or movement of one of its parts in response to an impact force applied to another of its parts.

More specifically, this toy provides an impact reaction device in the form of a dart, a doll, or other forms, which, when manually or otherwise projected against a surface for impact therewith, reacts by ejecting or projecting a portion thereof in a direction opposite to the direction of projection. In a new and improved dart form, the invention provides a pair of members telescopically interlocked, the inner member being biased outwardly by a spring means and the inner member being released in response to an impact force applied to the outer member for projection outwardly of the outer member by the spring means. In a dart form, or optionally, an animal form, the head, or other parts of the body, is detached and ejected from the remainder of the body in response to an impact force applied to the body. In a further embodiment, in the form of a top, the outer member is caused to rotate by either a spring wound motor or optionally a string wound around the top in a well known manner and upon impact with a floor or other surface upon which it is dropped or thrown, the inner member is ejected from the outer member after being rotated by the outer member whereby both members spin on the impact surface in a top-like fashion.

In this manner, a part of the toy may be caused to separate therefrom in response to dropping, throwing, or projecting the toy against a surface whereby a dart, when projected against a target upon impact with the target causes the inner member to project rearwardly toward the projector, a dart or figure of any desired configuration is caused to come apart when thrown against a wall or the floor and the top separates to provide a pair of discrete spinning tops separating in reaction to the impact force thereagainst.

To provide greater versatility in play, a suction cup means may be removable or otherwise secured to the impact end of the toy whereby the impact portion of the toy is retained on the impact surface while the ejected portion is ejected therefrom in reaction to the impact. This invention further provides improved means whereby the suction cup is operative to adhere to the impact surface even though the toy is projected at an angle in which the suction surface of the cup would not normally, squarely contact the surface.

It is therefore an object of this invention to provide a new and improved impact reaction toy which, in response to an impact against one of its parts causes another of its parts to be separated and ejected therefrom.

It is another object of this invention to provide a new and improved impact reaction toy which is manually latchable to releasably secure parts thereof together and automatically unlatchable in response to the impact of the toy with a surface for ejection of one of the parts from the other of the parts by a spring means contained within one of the parts.

A further object of this invention is to provide a suction cup means on one of the parts for retention thereof when the other is ejected therefrom and new and improved means for securing the suction cup means to the member for improved adherence to the impact surface when contacted thereby.

A still further object of this invention is to provide a new and improved impact reaction toy which, in the form of a top, and rotated either manually or by a power drive means, causes the toy to rotate or spin about its axis and, in response to impact against one part thereof, causes the other part to separate therefrom, while spinning, and to be ejected therefrom for forming a pair of discrete spinning tops.

Another object of this invention is to provide a new and improved impact reaction toy which is economical to manufacture and capable of mass production.

These and other objects of this invention will be more apparent from the following detailed description, drawings and appended claims.

In the drawings:

FIG. 1 is a vertical cross-sectional view, as taken substantially along the center line of the toy, with parts shown in elevation;

FIG. 2 is a vertical cross-sectional view, as taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view, similar to FIG. 1, with parts thereof shown in another operative position;

FIG. 4 is a fragmentary cross-sectional view, similar to the left portion of FIGS. 1 and 3, illustrating parts thereof in a different impact position;

FIG. 5 is a vertical cross-sectional view, as taken substantially along the center of another embodiment of this invention, with portions thereof shown in elevation;

FIG. 6 is a diagrammatic view, in reduced scale, illustrating the embodiment of FIG. 5 in operative impact and reaction positions;

FIG. 7 is a perspective view, in elevation, of the third embodiment of this invention;

FIG. 8 is a plan view thereof, in elevation, with a spring power drive means thereof removed for greater clarity;

FIG. 9 is a vertical cross-sectional view, as taken substantially along the line 9—9 of FIG. 8;

FIG. 10 is a fragmentary view, similar to a portion of FIG. 9, illustrating a changed position of parts thereof; and

FIG. 11 is a diagrammatic perspective view, illustrating impact and reaction positions of parts of the third embodiment.

Referring in detail to the drawings, and particularly to FIGS. 1 to 4, inclusive, there is shown by way of illustration, but not of limitation, a first embodiment, designed and constructed in accordance with this invention and generally designated by the numeral 10. Additional embodiments are illustrated in the ensuing figures, a second embodiment being illustrated in FIGS. 5 and 6 and a third embodiment being illustrated in FIGS. 7 through 11 inclusive, which are illustrated as examples within the scope of the invention and in which parts are referred to by like numbers and distinguished therefrom by being primed.

The first embodiment 10, illustrated in FIGS. 1 through 4, inclusive, is in the form of a dart which is adapted to be manually or otherwise projected against a surface 11 for impact thereagainst and comprises an outer member 12 forming an impact member and an inner member 13 telescopingly fitting therein and forming a reaction member. The member 13 is releasably latched to the outer member 12 and responsive to the impact force of the member 12 against the surface 11 for unlatching the member 13 from the member 12 for ejection thereof by a spring means 14 housed within the member 12. By this means, as the dart 10 is projected against the surface 11 for impact there-
with, the inner member 13 is ejected therefrom in a reverse direction, in reaction to the impact.

The outer member 12 comprises a tubular body 16 having a closed end 17, an open end 18 and a bayonet slot 19 extending through the wall of the body 16 adjacent to the open end 18 and having its entrance slot portion 21 communicating with the open end.

The bayonet slot 19 includes a circumferentially enlarged portion 22 forming a shoulder 23 adjacent the open end 18 and spaced inwardly therefrom and a cam surface 24 opposing the shoulder 23 and spaced therefrom and sloping towards an opposite edge 25 forming one side of the entrance slot 21.

The inner member 13 includes a cylindrical shank 27 slidably insertable within the interior 28 of the body 12 and is provided with an external protuberance 29 adjacent to its inner end 31 and spaced therefrom. The protuberance 29 is dimensioned to slidingly fit within the groove 21 of the bayonet slot 19 for insertion of the shank 27 within the interior 28 of the member 12.

The spring means 4 in the form of a coiled spring 32, is disposed within the interior 28 of the body 12 and having the end 33 bearing against the closed end 17 and an opposite end 34 engageable with the inner end 31 of the member 13 when the shank thereof is inserted into the member 12. The length of the spring 32 is such that the spring is compressed when the member 13 is inserted into the body 12 and rotated to latch the protuberance 29 in the bayonet slot 19 against the shoulder 23 and latch the member 13 to the member 12, the shank 27 is inserted into the member 12 with the protuberance 29 aligned with the entrance slot 21 whereby the member 13 may be extended into the member 12 until the protuberance 29 extends beyond the shoulder 23. Manual rotation of the member 13 relative to the member 12 rotates the member 13 in a clockwise direction (or the member 12 in a counterclockwise direction) to align the protuberance 29 with the shoulder 23, whereupon release of the member 13 permits the spring 32 to bias the protuberance 29 into engagement with the shoulder 23 to latch the member 13 to the member 12. In this position, the inner end 36 of the protuberance is spaced appreciably from the cam surface 24 and is unaffected thereby.

As previously mentioned, the dart 10 is manually or otherwise projected against the impact surface 11, which may take the form of a wall, extending outwardly through the entrance slot 21. The spring 32 is preferably preloaded so as to yield to the inertial force of the member 13 to be further compressed thereby. Engagement of the end 36 of the protuberance 29 with the cam surface 24 causes the end 36 to ride along the cam surface 24 in a direction towards the slot side 26 to rotate the member 13 relative to the body 12 in a direction contrary to the rotation to latch the bodies together, whereby, the protuberance 29 is aligned with the entrance slot 21 of the bayonet slot 19 and the spring 32 is freed to bias the member 13 outwardly of the member 12 with the protuberance 29 extending outwardly through the entrance slot 21. The end coil 33 of the spring 32 is preferably appreciably larger than the rest of the coils thereof and has a tight fit with the interior 28 of the body 11 whereby the spring 32 is retained in the body after expansion. During the impact, the inertia of the coils of the spring 32 also tends to compress the spring.

The body 12 is preferably, but not necessarily, provided with a suction cup member 38, of a resilient material such as rubber, neoprene, or the like, having a suction surface 39, the peripheral edge 41 of which is contacted by the surface 11 when the dart 10 is directed thereon, as previously described. By this means, the member 12 is secured to the surface 11, in the event that such security is desired, as in the use of a target for impact surface. The impact force against the surface 11 causes the suction cup 38 to flatten out with its peripheral edge 41 in contact with the surface and a vacuum effected to hold a cup 38 on the surface.

To secure the suction cup 38 to the body 12, an extension 42 of reduced diameter is formed on the closed end 17 and having an enlarged end or head 43 residing within an enlarged portion 48 of a blind bore 46 of the cup member. The bore 46 and its enlarged portion 44 are preferably a projection 42 to which the reduced portion 42 and the enlarged head 43, respectively, provide a relatively loose fit therewith. As best seen in FIG. 4, a very effective adhering contact of the peripheral surface 41 with the impact surface 11 is achieved in the event that the dart is not projected or thrown in a true perpendicular to the surface 11. More specifically, in the event that the dart 10 is projected towards the surface 11 at an angle other than a true perpendicular to the surface 11, the fit between the extension 42 and its head 43, with the bore 46 and enlarged portion 44, respectively, is preferably loose enough so that the cup member 38 may pivot relative to the extension 42 and thereby seek a peripheral contact with the surface 11.

Referring more particularly to FIGS. 5 and 6, a second embodiment 100 of this invention is illustrated which generally simulates a human figure. In the instant embodiment, an outer member 120 is embedded within, or optionally formed integral with, an enlarged body 51 having an outer configuration generally simulating a human body, wherein the closed end 17' is formed integrally with the blind end of a bore 52 formed in the body 51 for impact with the impact surface 11. The closed end 17' includes a wall, extending outwardly in the form of a blunt portion 54' which is removably and loosely secured, as described relative to the first embodiment. The suction cup member 38' generally simulates the feet or shoes of the figure 19' and may be additionally externally painted or otherwise marked to effect such an appearance.

The member 12' further includes an open end 18' and a bayonet slot 19' extending through a wall of the tubular body 12', adjacent to the open end 18' and spaced therefrom and having an effective latching shoulder 23' and a cam surface 24' for latching and unlatching the inner member 13' and co-acting with a protrusion 29' of the shank portion 27' thereof insertable within the tubular member 12'.

In this embodiment, the member 13' includes an enlarged outer end 53 having a general configuration resembling a head of the human figure 106'.

In operation, the embodiment 100 is generally similar to that of the embodiment 10, whereby the member 13' is insertable within the member 12', by insertion of the shank 27' therein with the protuberance 29' aligned with the entrance slot 21' of the bayonet slot, and the member 13' being rotated relative to the member 12' when the protuberance is insertable sufficiently for contact with the shoulder 23' for protuberance 29' is aligned with the entrance slot 21' of the bayonet slot, and the member 13' being rotated relative to the member 12' when the protuberance is insertable sufficiently for contact with the shoulder 23' for protuberance 29' is aligned with the entrance slot 21' of the bayonet slot, and the member 13' being rotated relative to the member 12' when the protuberance is insertable sufficiently for contact with the shoulder 23' for protuberance 29' is aligned with the entrance slot 21' of the bayonet slot, and the member 13' being rotated relative to the member 12' when the protuberance is insertable sufficiently for contact with the shoulder 23' for protuberance 29' is aligned with the entrance slot 21' of the bayonet slot, and the member 13' being rotated relative to the member 12' when the protuberance is insertable sufficiently for contact with the shoulder 23' for protuberance 29' is aligned with the entrance slot 21' of the bayonet slot, and the member 13' being rotated relative to the member 12' when the protuberance is insertable sufficiently for contact with the shoulder 23' for protuberance 29' is aligned with the entrance slot 21' of the bayonet slot, and the member 13' being rotated relative to the member 12' when the protuberance is insertable sufficiently for contact with the shoulder 23' for protuberance 29' is aligned with the entrance slot 21' of the bayonet slot, and the member 13' being rotated relative to the member 12' when the protuberance is insertable sufficiently for contact with the shoulder 23' for protuberance 29' is aligned with the entrance slot 21' of the bayonet slot, and the member 13' being rotated relative to the member 12' when the protuberance is insertable sufficiently for contact with the shoulder 23' for protuberanc
ber 13' to intertially extend the shank 27' further inwardly of the body 12', bringing protuberance 29' into contact with the cam surface 24' to thereby rotate member 13' in a direction to align the protuberance with the entrance slot 21', whereby the spring 33' is freed to eject the body 13' away from the body 12'—51. Diagrammatically illustrated in FIG. 6, the solid arrowed line 54 designates the direction of travel of the embodiment 10' towards the surface 11' and the dotted arrowed line 56 designates the travel of the member 13' as it is ejected away from the member 12' in reaction to the impact force against the surface 11. Again, as in the first embodiment, the inertia of the coils of the spring 32' provides additional inertia with respect to the spring in response to the impact. The suction cup 38' may be optionally replaced by a rigid or non-rigid, relatively heavy base, if preferred, to achieve a more solid impact.

Referring more particularly to FIGS. 7 through 11, inclusive, a third embodiment of this invention is illustrated wherein an impact reaction toy 19' is in the form of a top. The top 19' includes a pair of discrete tops 60 and 61 which are locked together while a spinning force is applied thereto and separable in reaction to an impact force against the end of one of the tops so as to unlatch and eject the other of the tops away therefrom while spinning and resulting in spinning of both tops on the impact surface. The top 60 includes a tubular body 62 similar to the outer bodies, 12 and 12' and having a closed end 17', an opposed open end 18' and a bayonet slot 19' extending through the wall of the tubular member 62 adjacent to the open end 18' and spaced therefrom, similar to the bayonet slots 19' and 19' of the previous embodiments. The top 61 includes a shank 27' constituting an inner member, similar to the members 13 and 13', and provided with a protuberance 29' co-acte with the shoulder 23' and the cam surface 24' for respectively and selectively latching and unlatching the top 61 to the top 60.

The top 60 includes a conical skirt member 63 cemented or otherwise secured to the lower end 17' of the tubular body 62, as at 64. The upper peripheral edge 66 of the conical portion 63 is provided with a plurality of peripherally spaced, upstanding tabs 67 forming spaces 68 therebetween for receiving tabular tabs 69 of a conical skirt portion 71 forming a portion of the top 61 for keying the conical portions 63 and 71 when the protuberance 29' is in a shoulder-abutting position. A spring means, in the form of a coil spring 32', is disposed within the member 62 for biasing the shank 27' outwardly of the body 62 when the protuberance 29' is removed from the shoulder 23' as a result of the inertial reaction of the top 61, in response to an impact force against the top 68, and the protuberance 29' contacts the cam surface 24' to align the protuberance with the entrance slot 21' of the bayonet slot.

The top 19', in operation, may be spun in the well known manner, i.e., wrapping a string on the outer surface of the conical portion 63 and spinning the top by holding the free end of the string (not shown) when the top is thrown towards the floor or other impact surface upon which it is desired to spin the top. Preferably, however, the top 19' is spun by a power drive means detachably secured to an opposite end 72 of the top 61.

The power drive means 75 includes a tubular body 76 in which a torque spring 77 is enclosed. The spring 77 includes one end 78 engaging a recess of the tubular member 76 and a free end 79 disposed in a plurality of through slots 81 formed in the wall of the top 61. A plurality of tapered arcuate grooves 83 are formed in the upper surface of the wall end engageable by a spring-biased detent 84 disposed within the tubular member 76 and extending outwardly thereof. Each groove 83 is provided with the detent 83 whereby rotation of the body 76, when disposed over the end 72, in a direction indicated by the arrowed line 87 causes the detents 84 to abut the ends 86 of the groove 83, whereas rotation of the body 76 in an opposite direction causes the detents 84 to ride upwardly and outwardly of the grooves.

In this manner, the spring 77 may be wound by engaging the free end 79 in one of the holes 81 and rotating the body 76 in a direction contrary to the arrowed line 87. Upon release of the body 76, the spring bias causes the end 84 to abut an adjacent shoulder 86 to hold the spring 77 in a wound condition.

When the spring 77 has been wound sufficiently, the member 75 may be held between two fingers of a hand while the thumb is directed on the end 72 extending upwardly and outwardly thereof to separate the member 75 from the top 19'. It will be noted that the detent 84 is withdrawn away from the shoulder 86 before the spring end 79 is withdrawn from the hole 81, whereby the top 61 receives the torque forces of the spring 77 as soon as the detent 84 is removed therefrom and is thereby rotated by the spring 77. The rotational force of the top 61 is translated into a rotational force of the top 60 in the same direction, by the engagement of the tabs 69 with the tabs 67. By virtue of the keying thereof, rotational forces are applied to both tops 60 and 61 simultaneously.

As the top 19' drops towards the impact surface, that is, the floor 11, an impact load is directed against the end 17' and, in reaction, the inertia of the coils of the spring 32' and the shank 27' of the top 61 compresses the spring 32' and disengages the protuberance 29' from the shoulder 23' and into contact with the cam surface 24' to align the protuberance with the entrance slot 21' thereby permitting the spring 32' to eject the shank 27' and thereby the top 61, in a reversed direction and away from the top 60, as best seen in FIG. 11. A momentum of rotative force is carried by the top 61 whereupon it continues to spin its end 88 when it is supported on the surface 11 due to gravity drop of the top 61 towards the surface. The ends 86 and 89 of the shank 27' and the closed end 17', respectively, are preferably conical, as illustrated, for improved spinning top action.

The inner and outer members of each of the embodiments are easily formed, molded, die-cast or otherwise formed of a relatively-rigid high impact material, such as plastics or the like, whereas the cup members 38, 39, may be formed of rubber, neoprene, or the like, whereby the discrete parts may be easily and economically mass produced.

While I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and methods.

What I claim as new and desire to secure by Letters Patent is:

1. An impact reaction toy comprising: a tubular body having a closed end, an open end and means defining a bayonet slot extending through the wall of the body adjacent to said open end; a second body having an end slidingly telescopically fitting said tubular body and having a protuberance thereon adjacent to said end and engageable with said bayonet slot for latching said second body relative said tubular body; spring means in said tubular body and bearing against said end of said second body for biasing said body outwardly of said tubular body; said second body being inertially responsive to an impact force directed against said closed end of said tubular body for moving inwardly relative to said tubular body and contrary to said bias of said spring means; and cam means on said tubular body and engageable with said second body in response to said inward movement thereof for rotating said second body so as to align said protuberance
with an open portion of said bayonet slot for unlatching said second body and permitting said second body to be biased outwardly of said tubular body by said spring means.

2. An impact reaction toy comprising: a pair of elongated bodies, one of said bodies being hollow and having a closed impact end, an opposite open end, and means defining a bayonet slot adjacent to said open end and communicating therewith, said slot including a shoulder spaced from said open end and a cam surface opposing said shoulder; the other of said bodies having an end detachably telescopically fitting said body one and having a protuberance extending from said end and engageable with said shoulder in response to said rotation of other body relative to said one in one direction for retaining said other body in said one body; and spring means in said one of said bodies and having one end bearing against said closed end and another end bearing against said end of said other body for biasing said other body outwardly of said one body, said other body being inertially responsive to external impact force directed against said closed end of said one body to move inwardly and linearly relative to said one body so as to disengage said protuberance from said shoulder for engagement with said cam surface, said cam surface being angular so as to direct said protuberance into a circular path around the axis of said other body for rotating said other body in an opposite direction for aligning said protuberance with said shoulder for retaining said second body shank in said body and being inertially responsive to an impact force applied against the exterior of said closed end of said hollow body for disengaging said protuberance from said shoulder and engaging said protuberance with said cam surface for rotating said second body so as to rotate said second body in an opposite direction so as to align said protuberance with said open slot for spring propulsion of said second body outwardly of said hollow body.

6. A toy, as defined in claim 2, including a first conical flange circumjacent said hollow body; a second conical flange circumjacent said other body; key means for keying said conical flanges against rotation relative to each other in one direction; and power drive means for rotation of said other body in said one direction so as to rotate both of said bodies, said conical flanges being axially separable in response to said movement of said other body outwardly of said one body whereby each said body continues to rotate for providing a centrifugal force to each body to balance said bodies in upright spinning fashion on said impact surface.

7. A toy, as defined in claim 6, wherein said other body includes: an opposite end, said conical flange thereof is intermediate of said ends, and means defining a plurality of spaced, arcuate grooves and a plurality of spaced apertures on said flange; and said power drive means comprises: a tubular body positionable circumjacent to said opposing end of said other body; a coil spring in said tubular body and having one end anchored in said power drive tubular body and another end engageable in one of said apertures; and a yieldable detent in said tubular body and engageable with one of said grooves, said detent being yieldable in response to rotation of said tubular body in one direction for winding said spring and preventing rotation of said tubular body relative to said other body in an opposite direction, said detent being disengaged from the groove prior to disengagement of said other end of said spring from an aperture when removing said tubular body from said other body opposite end whereby the preload of the spring is translated into a rotation of said hollow and second bodies for applying a centrifugal force to each.

References Cited in the file of this patent

UNITED STATES PATENTS

1,407,825 Stewart et al. .......... Feb. 28, 1922
1,841,198 Murray ......... Jan. 12, 1932
1,842,922 Von Frantzius ......... Jan. 26, 1932
2,264,807 Mull ......... Dec. 2, 1941
2,284,320 Stevens .......... Oct. 11, 1941
2,657,498 Gustine .......... Nov. 3, 1953
2,683,037 Ruczyinski ......... July 6, 1954
2,930,161 Hellman .......... Mar. 29, 1960