The invention is a yo-yo that includes movable shuttles that a user can quickly reposition between predetermined set points in order to adjust the yo-yo’s responsiveness. Repositioning of the shuttles is accomplished via a cam surface connected to a rotatable dial. Preferably, the yo-yo also includes readily visible indicia associated with the shuttle’s positioning apparatus so that a user can easily set and/or ascertain the yo-yo’s responsiveness setting.
YO-YO HAVING QUICKLY-ADJUSTABLE RESPONSIVENESS

This application claims the benefit of U.S. Provisional application No. 61/224,143 filed on Jul. 9, 2009, and wherein said application is hereby incorporated herein by reference.

FIELD OF THE INVENTION

The invention is in the field of user-manipulated toys. More particularly, the invention is a yo-yo that includes unique features that enable a user to quickly and easily adjust the yo-yo’s responsiveness. In the preferred embodiment, each of the yo-yo’s side portions has a center-located shuttle that may be engaged by the yo-yo’s tether and adjustably positioned by a user to one of a number of predetermined positions. Movement of the shuttle is accomplished via a large side-located dial and a cam surface.

BACKGROUND OF THE INVENTION

Most yo-yos are in the form of two disk-shaped side portions that are rigidly connected to each other by some type of axle structure. The axle structure may be an assembly of multiple parts, or merely be in the form of a dowel or a riveted pin, and may be made of metal and/or wood and/or plastic. In many modern yo-yos, the axle structure includes a center-located bearing or a member that is rotatable on an elongated axle member.

The axle structure also forms an anchor for one end of a string-type tether. An end-located loop portion of the tether is positioned so that it encircles a center portion of the axle structure. The free end of the tether is usually tied to create a second loop portion that can be placed about one of a user’s fingers to thereby secure the yo-yo to the user.

When the tether is wound about the axle structure and the yo-yo is released or thrown from the user’s hand, the yo-yo will begin to rapidly spin as it moves away from the user’s hand and the tether unwinds from the axle structure. Once the tether is fully unwound, the yo-yo may “sleep” at the end of the tether, whereby the yo-yo continues to spin without the tether rewinding on the axle structure. Once the yo-yo is sleeping, there are a number of tricks, such as “walk the dog,” that a person can perform with the spinning yo-yo. A sleeping yo-yo is also often used to perform tricks where the spinning yo-yo is temporarily placed upon a portion of the tether intermediate of the tether’s two ends.

At the completion of most yo-yo tricks, the user will make a rapid tug/jerk on the tether. This will result in a brief tightening of the tether, which is then automatically followed by a temporary slackening of the tether. Once the tether goes slack, the tether’s twist will cause one or more portions of the tether located proximate the axle structure to move, and thereby contact a spinning portion of the yo-yo. Once contact has occurred, the tether portion can become snagged on, or otherwise engaged to, a spinning portion of the yo-yo in a manner whereby the tether winds about the axle structure. Winding of the tether on the axle structure causes the yo-yo to return to the user’s hand.

There are three crucial performance characteristics of a yo-yo that enable a user to perform yo-yo tricks. The yo-yo must be capable of sleeping for an extended period of time, it should return on command, and it should be smooth on the tether.

Concerning a yo-yo’s sleep time, the longer the yo-yo can be made to sleep, the more time the user will have to complete any particular yo-yo trick that requires the use of a sleeping yo-yo. It is well known that by minimizing friction in the yo-yo’s components, one can maximize the yo-yo’s sleep time. Also, a heavy yo-yo will usually sleep longer than a light one. Furthermore, it is known that whenever the tether even slightly rubs against a spinning portion of the yo-yo, the created friction will reduce the yo-yo’s sleep time.

For a yo-yo to return on command, the structure and design of the yo-yo must be such that when the user causes the tether to briefly go slack, a portion of the tether can engage a spinning portion of the yo-yo in a manner that causes the yo-yo to return to the user’s hand. A yo-yo’s responsiveness is hereby defined as the ease with which one can cause the yo-yo to return on command. Responsiveness is also commonly defined by how sensitive the yo-yo is to any contact between the tether and a spinning portion of the yo-yo when the yo-yo is sleeping. A yo-yo can be considered too responsive if the yo-yo returns to the user’s hand without the user knowingly causing, or wanting, said return to occur. When such an inadvertent return does occur, the performance of a yo-yo trick will usually be cut short and thereby ruined.

One of the main factors that affects a yo-yo’s ability to return on command is the distance the tether has to travel before it engages one of the yo-yo’s side portions. This distance is usually associated with the width of the yo-yo’s string gap. A yo-yo’s string gap is the area between the yo-yo’s two side portions, and is normally measured proximate the yo-yo’s axle structure. Since the tether will have to travel a distance approximately equal to one-half of the width of the yo-yo’s string gap before it engages a side portion, a yo-yo that has a wide string gap will usually be more difficult to get to return on command.

Another factor that affects a yo-yo’s ability to return on command is the design of the tether-facing surface of each of the yo-yo’s side portions. The tether-facing surface of a side portion is the surface that faces a portion of the tether when said tether is extending straight out from the yo-yo’s axle structure. To make a yo-yo more responsive and therefore easier to return on command, particular engagement adaptations, such as raised ribs, will usually be located on the tether-facing surface of both of the yo-yo’s side portions.

Additionally, a yo-yo’s ability to return on command is highly influenced by the yo-yo’s weight. In order for the tether to wind about the axle structure, the tether must engage one of the yo-yo’s side portions with sufficient strength whereby the tether will move with said side portion and wrap about the axle structure. If there is only a weak engagement, once the weight of the yo-yo is applied to said engagement, the engagement may give way and allow the side portion to slide past the tether. As a result, the greater a yo-yo’s weight, the greater the strength of engagement between the tether and a side portion in order to have the yo-yo return on command.

Concerning a yo-yo’s ability to be smooth on the tether, this refers to a yo-yo’s ability, when it is sleeping at the end of the tether, to be temporarily placed on a medial portion of the tether without the tether snagging on a spinning portion of the yo-yo. An example of a trick that requires a yo-yo to be
smooth on the tether is “man on the trapeze.” The ability of a yo-yo to be smooth on the tether is favored when the yo-yo’s responsiveness is low.

[0014] One important consideration involved in the design/performance of a yo-yo is the wear rate of the yo-yo’s tether and the portions of the yo-yo that engage said tether. Wear occurs whenever the tether contacts a spinning portion of the yo-yo. While it is easy to replace a tether, replacement of the structure that engages the tether is usually impossible. Once significant wear occurs in the yo-yo’s structure, the yo-yo’s performance degrades and the yo-yo eventually becomes unusable.

[0015] The design of a yo-yo typically involves trade-offs. A yo-yo having physical attributes that make it smooth on the tether, such as a wide string gap and a less aggressive tether engagement surface, will normally make the yo-yo less responsive. A very responsive yo-yo, with a narrow string gap and aggressive tether engagement surfaces, may only sleep for a relatively short period of time and will usually not be smooth on the tether.

[0016] It is not unknown in the prior art to provide ways for a user to change a yo-yo’s physical characteristics to thereby change the yo-yo’s performance characteristics. The most common method is to provide the yo-yo with structure that enables a user to change the width of the yo-yo’s string gap. By increasing the width of said gap, one makes the yo-yo less responsive and thereby smoother on the tether.

[0017] In most conventional yo-yo’s, adjustable string gap is accomplished via the yo-yo’s axle structure. Both of the yo-yo’s side portions are normally threadedly engaged to the axle structure whereby a user can rotate one of the yo-yo’s side portions relative to the other to thereby change the width of the string gap. However, repeated relative movements of the yo-yo’s side portions can wear out the adjustment apparatus. In addition, this form of adjustment is extremely ineffectual whereby a yo-yo may require multiple repetitions of the adjustment process before the yo-yo exhibits the desired level of responsiveness. Furthermore, a basic adjustable string gap yo-yo does not allow a user to change the responsiveness of a yo-yo without changing its string gap.

[0018] McAvoy teaches in U.S. Pat. No. 5,254,027 a different method for changing a yo-yo’s characteristics. He makes use of a moveable stopper disk in each side portion. The stopper disk has a tether-facing surface that is flat, smooth and is designed to continually contact the tether. By changing the position of the stopper disks, a user can change the yo-yo’s responsiveness. However, the fasteners that push on the stopper disks do not provide a positive engagement for bi-directional movement of the disks. In addition, the contact between the stopper disks and the tether can cause a decrease in the yo-yo’s sleep time and an increase in tether wear. Furthermore, a user may have to spend a significant amount of time trying to adjust the stopper disks to achieve a desired change in the yo-yo’s responsiveness.

[0019] U.S. Pat. No. 7,192,330 teaches a yo-yo in which each side portion features a center-located shuttle that has a tether-engagement surface and that is user-positionable via a threaded adjustment nut. By rotating the nut, a user finely positions the shuttle relative to the tether. However, there are situations where the fine adjustment nature of that apparatus is not needed and where a user may want to more quickly change the yo-yo’s responsiveness between multiple preset shuttle positions.

[0020] Most prior art yo-yos have designs that limit their versatility. For example, a beginning yo-yo player will pick a highly responsive yo-yo to ensure that it will be easy to get the yo-yo to return on command. A more experienced player wishing to perform string tricks in which smoothness on the tether is desirable will normally choose a less responsive yo-yo with a wide string gap. While prior art adjustable yo-yos attempt to satisfy the needs of both beginners and more experienced players, there is a need for an adjustable yo-yo that can be adjusted quickly and simply.

SUMMARY OF THE INVENTION

[0021] The invention is an improved yo-yo that includes unique features that enable a user to quickly and easily adjust the yo-yo’s responsiveness. In the preferred embodiment, each of the yo-yo’s two side portions includes a movable shuttle secured by a user-actuated positioning apparatus. The shuttle has a tether engagement surface that a user can move closer to, or further away from, the yo-yo’s tether to thereby change the yo-yo’s responsiveness.

[0022] In the preferred embodiment, the positioning of a side portion’s shuttle is accomplished by a user turning an easily grasping center-located dial to one of a plurality of preset locations. As the dial is rotated from one position to another, a cam surface located on the dial’s back surface interacts with a plurality of engagement fingers secured to a spring-biased retaining plate that is attached to, and moves with, the shuttle. As the fingers move from one portion of the cam surface to another, the associated shuttle is caused to move closer to, or further away from, the yo-yo’s tether. When the shuttle is positioned closer to the tether, this reduces the distance the tether has to travel before it contacts one of the yo-yo’s side portions. When the shuttle is positioned further away from the tether, this effectively increases the width of the yo-yo’s string gap.

[0023] Preferably, each of the yo-yo’s side portions also includes readily visible indicia associated with the shuttle positioning apparatus. The indicia facilitates a user’s ability to set the yo-yo’s responsiveness and to ascertain the yo-yo’s responsiveness setting.

[0024] Furthermore, a yo-yo in accordance with the invention provides a second, related method of changing the yo-yo’s responsiveness via replacement of the yo-yo’s shuttles. In the invention, a user has the ability to replace one set of shuttles having a first configuration of tether engagement surfaces with a second set of shuttles having a second configuration of tether engagement surfaces. For example, a first set of shuttles may feature very aggressive tether engagement surfaces that have large raised ribs with ninety-degree edges. A second set of shuttles may feature less aggressive tether engagement surfaces that have small raised ribs with rounded, radiused edges. By taking a yo-yo that has the first set of shuttles installed and replacing the shuttles with the above-described second set of shuttles, a user can significantly decrease the yo-yo’s responsiveness and make it a better performer for string tricks. Furthermore, a user can replace a shuttle once its tether engagement surface has become worn.

[0025] In addition, a yo-yo in accordance with the invention can also include structure to enable a conventional form of adjustable string gap for changing the yo-yo’s responsiveness. The yo-yo’s side portions are preferably relatively rotatable and are threadedly engaged to the axle structure whereby rotation of one side portion relative to the other side portion
causes the side portions to move closer together or further apart, depending on the direction of relative rotation.

[0026] A yo-yo in accordance with the invention can optionally, but preferably, also feature easily removable weight rings. A user then has the ability to modify the yo-yo’s weight, and thereby, to some extent sleep time and responsiveness, through substitution of one set of weight rings for another set having a different weight. The user can then position the shuttles to compensate, if necessary, for changes created through substitution of one set of weight rings for another. For example, if a user installs heavier weight rings in an effort to improve the yo-yo’s sleep time, the user can recapture the yo-yo’s previous level of responsiveness by positioning the shuttles closer to the tether.

[0027] The use of movable shuttles that are operatively engaged to a user-rotatable dial via a cam surface enables the user to quickly adjust the shuttle position between multiple preset settings. Since the yo-yo features a number of ways of adjusting its responsiveness, a user can adjust the yo-yo using a first adjustment method and then employ a different adjustment method to compensate for shortcomings associated with the first adjustment method. As a result, a yo-yo in accordance with the invention is ideal for use by players of any skill level and for the performance of an almost unlimited range of yo-yo tricks.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] FIG. 1 is a front view of a yo-yo in accordance with the invention, with the right-hand portion of the yo-yo shown in cross-section.

[0029] FIG. 2 is a side view of the yo-yo shown in FIG. 1, taken at the plane labeled 2-2 in FIG. 1.

[0030] FIG. 3 is a front view of the yo-yo shown in FIG. 1, with the right-hand portion shown in exploded fashion.

[0031] FIG. 4 is a first perspective view of the yo-yo shown in FIG. 1, with the right-hand portion shown in exploded fashion.

[0032] FIG. 5 is a second perspective view of the yo-yo shown in FIG. 1 taken approximately 60 degrees from the view shown in FIG. 4, with the right-hand portion shown in exploded fashion.

[0033] FIG. 6 is a perspective, magnified view of the inwardly-facing surface of the positioning dial of the yo-yo shown in FIG. 1.

[0034] FIG. 7 is a front view similar to FIG. 1 but shows the same yo-yo at a point when the yo-yo’s shuttles are positioned closer to the yo-yo’s tether than is shown in FIG. 1.

[0035] FIG. 8 shows the outwardly-facing surface of a second embodiment of a positioning dial in accordance with the invention.

[0036] FIG. 9 is a perspective view of the inwardly-facing surface of the dial shown in FIG. 8.

DETAILED DESCRIPTION OF THE DRAWINGS

[0037] Looking now to the drawings in greater detail, wherein like reference numerals refer to like parts throughout the several figures, there is indicated by the numeral 1 a yo-yo in accordance with the invention.

[0038] The yo-yo 1 includes first and second side portions 2 that are preferably identical to each other and that are connected together via an axle structure 4. The area between the two side portions forms a string gap 5. A string-type tether 6 extends into said string gap and includes a loop portion 8 that encircles a center portion of the axle structure. The tether’s distal end (not shown) will normally be tied to create a loop that enables a temporary securement of said end to one of a user’s fingers.

[0039] The axle structure 4 is preferably an assemblage of parts that includes an axle pin 10 (note FIG. 3) and a ball bearing unit 12. The axle pin is preferably in the form of a straight metal rod that has exterior threads 14 at each end.

[0040] The ball bearing unit 12 is preferably conventional in design and comprises an inner race 16, an outer race 20 and a plurality of ball bearings 22 located between the races whereby relative rotation of the races is enabled. The inner race 16 defines a center thru-bore 18 through which the axle pin extends. It should be noted that other types of rotatable units or members can be used in lieu of the ball bearing unit shown. The ball bearing unit is not required when the yo-yo’s tether is attached directly to the axle pin, or to a structure fixedly secured to said pin, or to an equivalent structure that connects the side portions together.

[0041] Each side portion 2 preferably includes a spacer 23, a shuttle 24, a body member 25, at least one spring 26, a retainer plate 27, at least one positioning pin 28, a hex nut 29, a position dial 30, a positioning lens 31 and an optional weight ring 32. FIGS. 3-5 show exploded views in which all of the noted parts of a side portion are readily visible.

[0042] The spacer 23 is preferably a rigid member that has an outwardly-extending medially-locating flange 34, a center-located thru-bore 36, a tubular first end portion 38 having a shoulder 39, and a tubular second end portion 40. The spacer’s flange 34 is designed to be received within a complementary cavity 42 in the body member.

[0043] The shuttle 24 includes a head portion 44, three legs 50, and a thru-bore 52 that extends through the center of said head portion. The front surface 46 of the head portion is designed for contacting said tether and is therefore referred to herein as a tether engagement surface. The head portion’s rear surface 48 faces outwardly, away from the tether and wherein said legs 50 extend outwardly from spaced-apart locations on said surface 48. While three legs are shown, a greater or lesser number of legs may be employed. One should note that each of the shuttle’s legs includes a bore 56 (note FIG. 4) that has an opening 58. The bore is tapped to have helical threads 60.

[0044] To facilitate the return of the yo-yo, the tether engagement surface 46 of each shuttle preferably includes a starburst pattern of raised ribs 54 (note FIG. 5). The ribs function to enhance the ability of surface 46 to snag/engage a portion of the tether when a portion of said tether contacts said surface at a time when the user is causing the yo-yo to return. Alternatively, surface 46 may be featureless or it may have other forms of adaptations to facilitate tether engagement. For example, instead of raised ribs, surface 46 may have an array of indentations, spaced pads/protrusions, or movable ribs, or be made of a material, such as rubber, that has a relatively high coefficient of friction. Preferably, both of the yo-yo’s shuttles 24 will have identical surfaces 46.

[0045] In the preferred embodiment, the shuttle 24 is a unitary part and is preferably made of a rigid, or substantially rigid, plastic material. Alternatively, the shuttle can be made of other materials, including metal, wood or rubber and/or be a composite or assemblage of rigid and/or non-rigid parts.

[0046] The body member 25 is disk-shaped and is preferably made of a rigid, or substantially rigid material such as a hard plastic, metal, or a hard rubber, or be a composite or assemblage of rigid, semi-rigid or flexible materials. Located
at the center of the body member is a thru-bore 62. Located radially-outwardly from said thru-bore 62 are three apertures/thru-holes 64.

[0047] Located in the body member’s inwardly-facing surface 66 are two circular concentric cavities 42 and 68 (note FIG. 5) with thru-bore 62 extending through the center of cavity 42. Cavity 68 is sized to receive the head portion 44 of the shuttle while the shuttles legs extend through apertures 64 located in the rear wall 69 of the cavity. The depth of cavity 68 is preferably such that portion 44 of the shuttle can be fully received within said cavity whereby the shuttle’s tether engagement surface 46 can preferably be co-planar with, or recessed in, the adjacent inwardly-facing surface 66 of the body member. Preferably, the amount of recess should enable any of the shuttle’s tether engagement members, such as the raised ribs 54, to be located so that they do not protrude outwardly beyond a plane formed by the adjacent surface 66.

[0048] As can be seen in FIG. 4, the body member includes an outwardly-facing surface 70 and an outwardly-extendng nipple portion 71 surrounded by said surface. The apertures 64 extend through surface 70 and are aligned with three semi-circular grooves 72 in the nipple portion. The body member’s thru-bore 62 extends through the center of said nipple portion. Proximate the distal end of the nipple portion, the thru-bore expands and takes the form of a hexagonally-shaped cavity 73.

[0049] The nipple portion 71 is located at the center of an outwardly-facing cavity 74 that has a circular sidewall 75. A groove 76 is located in said sidewall and extends almost completely about said cavity. The groove is interrupted by a tab 77 that projects inwardly toward a center of said cavity.

[0050] Sized to contact the body member proximate each aperture 64 are three coil springs 26. Each spring is in the form of a cylinder that has a center thru-hole 80 that has a diameter greater than the diameter of the apertures 64. In the preferred embodiment, the springs are preferably made of a plastic or metal material. Partial three coil springs are shown, a greater or lesser number may be employed. In addition, while springs 26 are preferably coil springs, other types of springs or spring-like members, such as Marcel springs and wave washers may be used as springs 26. The springs are captured by the retainer plate 27.

[0051] Retainer plate 27 is preferably in the form of a disk that has a center-located thru-bore 81 and three other evenly-spaced-apart thru-bores 82 located radially-outwardly of the thru-bore 81. Thru-bore 81 is designed to slidably receive the body member’s nipple portion 71. Each of the thru-bores 82 has a large diameter outwardly-facing portion 84.

[0052] The outwardly-facing surface 86 of the retainer plate includes a plurality of outwardly-extendng elongated fingers 88 that are also herein referred to as engagement members since they function to engage a cam surface, as will be described shortly. While three fingers 88 are shown, a greater or lesser number of fingers may be employed. In addition, while engagement members in the form of fingers are shown, the engagement members may have a different form or shape that is functionally equivalent to the fingers shown.

[0053] The positioning pins 28 are designed to extend through the thru-bores 82 of the retainer plate. One end of each pin is in the form of a head portion 92 that is sized and shaped to be rotated using a tool and to be received with portion 84 of one of the plate’s thru-bores 82. The other end of each pin includes exterior threads 90 that are designed to threadedly engage the threaded thru-bore 56 in one of the shuttle’s legs 50. The number of pins 28 and thru-bores 82 preferably match the number of legs of the shuttle.

[0054] The Hex nut 29 functions to secure the side portion 2 to the axle pin and features a thru-bore 94 that includes threads 96 complementary to threads 14 of the axle pin. The nut preferably has a size and shape that enables it to be non-rotatably received within cavity 73 of the body member’s nipple portion. It should be noted that nuts of other shapes may be employed, whereby said cavity 73 would preferably be shaped to match the shape of the nut. Hex nut 29 is preferably made of a metal or plastic material and preferably includes a resilient element (not shown) that can lockably engage the threads 14.

[0055] Located adjacent the retainer plate 27 is the position dial 30. The position dial is in the form of a disk that has an outwardly-protruding center portion 98, an inwardly-facing surface 100 and an outwardly-facing surface 102.

[0056] Surface 100 includes a multi-level circular cam surface 103 (note FIG. 6) that includes a plurality of low ramps 104 (three in the embodiment shown), an equal number of medium height ramps 106, and an equal number of tall ramps 108. Each of the low ramps comprises an angled climbing portion 110 that ends at a drop 111. Each of the medium height ramps comprises an angled climbing portion 114 that leads to a drop 117. Each of the tall ramps comprises an angled climbing portion 118 that leads to a drop 119. Located between angled portion 110 and drop 111 is a low plateau 112. A higher plateau 116 is located between angled portion 114 and drop 115. A still higher plateau 120 is located between angled portion 114 and drop 115. Relative to the cam surface, height is measured from a low point of the surface, at plateau 112, with plateau 116 being at a greater height, and so on.

[0057] While three sets of ramps with adjacent plateaus at different levels are shown since the yo-yo 1 preferably has three responsiveness settings, a greater or lesser number of ramps with adjacent plateaus may be employed, with the number dependent on the number of desired responsiveness settings. A cam surface having a different shape and/or number of plateaus may alternatively be employed. While the fingers 88 are shown secured to the retainer plate, and the cam surface is located on the dial, the positions of these elements can be reversed whereby said fingers can instead be secured to the dial while the cam surface would be located on the retainer plate.

[0058] The position dial features a plurality of indentations 122 in the dial’s center portion 98. These indentations facilitate a user’s ability to grasp and turn the dial with the fingers of one hand.

[0059] On the dial’s surface 102 outwardly of portion 98 are indicia 123 (note FIG. 4) in the form of a repeating set of numerals. Each numeral refers to one of the predetermined responsiveness settings of the yo-yo.

[0060] Adjacent the position dial is the positioning lens 31. The lens is ring-shaped and features a peripheral ridge 124 that has a slot 126. Located at the center of the lens is a large center hole 127 that has a diameter less than the diameter of the positioning dial and through which the portion 98 of the position dial extends.

[0061] The lens also includes an outwardly-facing surface 128 and an inwardly-facing surface 129. Located in the outwardly-facing surface 128 of the lens is at least one rectangular aperture 130 that forms a window. When the yo-yo is in
an assembled state, a portion of the indicia 123 will be viewable through the aperture 130.  

The lens 31 may also feature an outwardly-extendable lip 131 that includes an endless groove 132. Preferably, said groove is in the shape of a ‘C’ when viewed in cross-section. 

Secured to the positioning lens 31 is an optional weight ring 32. The periphery 134 of the weight ring includes a ridge 136 sized to fit into groove 132 in a snap-fit type of engagement that securely and releasably locks the weight ring to the side portion. The weight ring may be made of any material and functions to add weight to the side portion. 

When a yo-yo 1 is assembled, the ball bearing unit 12 is first centered on the axle pin 10, with said pin extending through the bearing’s center opening 18. Next, each side portion is assembled. 

The first step in assembling one of the side portions 2 is to place the spacer 23 into the body member’s cavity 42 whereby the spacer’s end portion 40 fits into the thru-bore 62. Next, the hex nut 29 is placed into the body member’s cavity 73. Then, a shuttle 24 is inserted into cavity 68 of the body member, with the ends of the shuttle’s legs fitting into, and through, the apertures 64. The shuttle is preferably inserted until its head portion 44 is at least partially located within the body member’s cavity 68 and a portion of its legs extend along the grooves 72 in the body member’s nipple portion 71. 

In the next step, the springs 26 are placed onto the shuttle’s legs where they are partially received in the grooves 72 in the body member’s nipple portion. The retainer plate 27 is then placed atop the springs whereby it slightly compresses said springs. The positioning pins 28 are inserted through the plate’s thru-bores 82 and threaded into the threaded bores 56 in the shuttle’s legs until the head portions 92 of the pins are received in the portion 84 of the thru-bores. At this point, the shuttle and retainer plate form a single unit that is movably secured to the body member and is biased by the springs in an outward direction. It should be noted that as an alternative to the pins 28, the shuttle can be secured to the retainer plate using other conventional methods, such as a snap-fit engagement between the shuttle’s legs and portions of said plate. 

The position dial 30 is then placed against the inwards-facing surface 129 of the positioning lens 31, with the center portion 98 of the position dial extending through the center hole 127 in the lens. To secure the dial and the lens to the body member 25, the lens is positioned so that the lens’ slot 126 is aligned with the tab 77 in the body member. Next, the lens is pushed toward the body member whereby the lens’ ridge 124 is tightly received within the groove 76 in the body member, preferably via a snap-fit secure engagement. Once tab 77 is located in slot 126, the lens will be incapable of rotating relative to the body member while the dial will be rotatably secured to the side portion. 

It should be noted that as the lens was inserted into the body member, the outwardly-extend soft fingers 88 of the retainer plate contacted the ramps, or plateaus, of the position dial, thereby causing the dial to be operationally connected to the shuttle and the shuttle to be positioned dependent on which ramps, or plateaus, the fingers contacted. 

If a user desires to add the weight ring 32 to the side portion, said ring is placed into the lens with the weight ring’s ridge 136 received into the groove 132 in the lens. Pressure is then applied to the weight ring whereby it will snap into the groove and thereby be secured to the yo-yo. 

Lastly, the side portion is placed over the end of the axle pin until said pin extends through thru-bore 62 in the body member and contacts the hex nut 29. The side portion is rotated to thereby thread said nut onto the pin and secure the side portion in place. It should be noted that the spacer’s end portion 38 and shoulder 39 contact the inner race of the bearing, while the bearing’s outer race does not contact the spacer or either of the body members. As a result, said outer race may spin freely relative to, and independently of, the yo-yo’s side portions. 

Disassembly of the yo-yo can be accomplished by reversing the previously described method of assembly. One should note that the weight rings 32 can be removed, and replacements installed, without a full disassembly of the yo-yo. 

Once the yo-yo 1 is in an assembled condition, a user can adjust the yo-yo’s responsiveness in a number of ways. However, the primary adjustment mechanism is through adjustment of the position dial 30 of each side portion whereby rotation of the dial causes a longitudinal movement of the shuttle via movement of the finger’s 88 on the dial’s cam surface 103. 

When the position dial is located so that the yo-yo is set to its first responsiveness setting shown in FIG. 1, a portion of the indicia 123, preferably the numeral ‘1’, will be visible through the aperture 130 in the dial and each of the finger portions 88 will be resting on a different one of the plateaus 112. It should be noted that when the yo-yo’s responsiveness is set to one of its predetermined settings, all of the fingers 88 will be contacting the same height plateau associated with that particular responsiveness setting. 

Should the user then rotate the dial 30 in a clockwise direction, the fingers 88 will move off the plateaus 112 and onto the angled climbing surface 110 of the adjacent ramps 104. Further turning of the dial causes the fingers to travel up the angled surface of said ramps until they reach the ends of the ramps, whereby said fingers then drop down onto the plateaus 116 located between ramps 104 and 106. Preferably, the action of the fingers 88 dropping off the ramps and onto the adjacent plateaus will cause an audible clicking sound to provide an audible indication to the user of a change in response setting. Since plateaus 110 are higher than plateaus 112, the fingers 88 will be positioned inwardly of their position when they were contacting plateaux 112. Since the fingers move the retaining plate that moves with the shuttle, the inward displacement of the fingers will have caused a similar inward movement of the shuttle, whereby said shuttle is moved into the yo-yo’s string gap and its tether engagement surface 46 will be located closer to the tether. The yo-yo is thereby set to its second responsiveness level whereby the tether will have less distance to travel in order to engage one of the ribs 54 of the shuttles. Once the fingers are on plateaus 116, the portion of the indicia 123 associated with the second setting, preferably the numeral ‘2’, will be visible through the lens’ window 130. 

To place the yo-yo into an even higher level of responsiveness, the dial is again rotated in a clockwise direction whereby the fingers 88 slide onto the angled climbing surfaces 114 of ramps 106 and then drop onto the plateaus 120 located between ramps 106 and 108. Since the plateaus 120 are higher than the plateaus 116, the shuttle will now be located closer to the tether whereby the yo-yo’s responsiveness is at a very high level. By comparing FIG. 7 to FIG. 1, one can see that the right-hand shuttle has traveled a considerable
distance into the string gap as the user has rotated the dial 30. With all of the fingers 88 now located on the plateaus 120, the portion of the indicia 123 associated with that shuttle position/yo-yo responsiveness setting, preferably the numeral ‘3’, will be visible and centered in the window 130.

[0076] If the user continues to rotate the dial 30 in the same clockwise direction, the fingers 88 will slide onto the angled climbing surfaces 108 of ramps 118. Climbing said surfaces and then drop onto the plateaus 112. After the fingers drop onto the plateaus 112, the shuttle returns back to its original, first position shown in FIG. 1 and the yo-yo’s responsiveness would be back at its first predetermined responsiveness setting.

[0077] It should be noted that it only requires a one-hundred-twenty degree rotation of the dial 30 to move change the yo-yo’s responsiveness from its minimum shown in FIG. 1 to its maximum shown in FIG. 3. If one were to rotate the dial 30 for a full turn, the shuttle would make three cycles from its inward-most position to its outward-most position. This facilitates a user’s ability to rapidly and precisely change the yo-yo’s responsiveness.

[0078] FIGS. 8 and 9 show front and rear views respectively of an alternate embodiment of a position dial 200. In dial 200, which can directly replace dial 30 in yo-yo 1, the dial’s rear surface 202 includes a cam surface 203 that has three ramps 204, with each ramp having an angled surface 206 intercepted by fifteen plateaus 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221 and 222. As shown, the plateaus of each ramp are evenly spaced apart, with each of said plateaus of a ramp being at a greater height than the preceding plateau as one progresses from the low end 224 of the ramp to the ramp’s high end 226.

[0079] When dial 200 is used in yo-yo 1 in place of dial 30, the associated side portion’s fingers 88 will contact the dial’s cam surface 203, with each of said fingers on the same height segment of a different one of said ramps. The front face 230 of dial 200 includes indicia 232 in the form of three sets of numerals, with each set being composed of the numbers “1” through “15.” In this manner, a user can turn the dial 200 until any number from 1 through 15 is shown in the window 130 in the lens, thereby signifying that the yo-yo’s fingers 88 are all contacting the same height plateau associated with said number. When the dial is rotated whereby a different one of the indicia numbers are visible through the lens’ window 130, the shuttle associated with the dial being moved is positioned at a different predetermined distance away from the yo-yo’s tether, thereby causing the yo-yo to have a different responsiveness at each predetermined responsiveness setting. Since the dial 200 has plateaus at fifteen different heights, the indicia comprises fifteen numbers in sequence and the yo-yo would have fifteen different predetermined responsiveness settings.

[0080] For example, as a user rotates the dial 200 in a clockwise direction from its first predetermined position wherein each of the fingers 88 is resting on a different plateau 208, the fingers 88 slide on the adjacent angled surface 206 and move onto the next higher plateau 209. As the fingers moved on the cam surface there was a corresponding movement of the connected shuttle toward the tether. Once the fingers are all on plateaus 209, the yo-yo would be in its second predetermined responsiveness setting. If one were to rotate the dial 200 in a clockwise direction, the fingers would slide off plateaus 209 and back onto the angled ramp surface 206, which they would climb until they all moved onto a plateau 210. The yo-yo would then be in its third predetermined responsiveness setting. This same process could be repeated for each of the next twelve settings. Further rotation of the dial would cause the fingers to slide off the end of the ramps and onto the plateau 210 of the next, adjacent ramp where the same process could begin again.

[0081] As noted previously, the yo-yo 1 optionally, but preferably, includes secondary methods for affecting its responsiveness and/or changing its performance related physical characteristics.

[0082] Firstly, a user can replace the yo-yo’s shuttles 24 with another set of similar shuttles that have a different tether engagement surface. Replaceable shuttles also allow a user to restore a yo-yo’s performance by replacing parts that have become worn through engagement with the tether.

[0083] Secondly, a user can replace the yo-yo’s weight rings with another set of weight rings of a different weight. Using heavier weight rings may make the yo-yo harder to return, but would enable the yo-yo to sleep for a longer period of time.

[0084] Thirdly, a user can change the yo-yo’s string gap via rotation of one side portion 2 relative to the other side portion 2. This causes a repositioning of the side portions on the axle pin due to the threaded engagement between each side portion’s nut 29 and said pin.

[0085] It should also be noted that the system taught herein for quickly and easily adjusting the position of a side portion’s shuttle can be employed with other types of yo-yos than the one shown. For example, the system can facilitate tether engagement in yo-yos having other types of axle structures, or shapes of side portions. Furthermore, while the yo-yo shown employs a movable shuttle in both side portions, it is within the scope of the invention to employ a movable shuttle in accordance with the invention in only one side portion whereby the other side portion may include a movible shuttle that operates in a different manner, such as in accordance with U.S. Pat. No. 7,192,330, or may instead have a fixed tether engagement surface that has, or does not have, any particular type or form of tether engagement adaptations.

[0086] The preferred embodiments of the invention disclosed herein have been discussed for the purpose of familiarizing the reader with the novel aspects of the invention. Although preferred embodiments of the invention have been shown and described, many changes, modifications and substitutions may be made by one having ordinary skill in the art without necessarily departing from the spirit and scope of the invention as described in the following claims.

We claim:

1. A yo-yo comprising:

   a. first and second side portions secured together in a spaced-apart relation by an axle structure, and wherein a string gap is located between said side portions;
   b. a tether at least partially located in said string gap and secured to a portion of said axle structure; and
   c. wherein said side portion comprises a body member, a shuttle and a shuttle positioning dial, wherein said body member has an inward-facing surface that faces said string gap and an outward-facing surface that faces away from said string gap, wherein said shuttle includes a portion that faces said string gap and has a tether engagement surface capable of engaging said tether, wherein said shuttle is movably secured to said body member, wherein said dial is rotatably secured to said body member and is operatively connected to said
shuttle via a multi-level cam surface in a manner whereby rotation of said dial in a first direction for a predetermined distance can cause said shuttle to move from a first predetermined position to a second predetermined position, wherein when said shuttle is in said first predetermined position, said tether engagement surface of said shuttle will be located a first distance from a center of said string gap, wherein when said shuttle is in said second predetermined position, said shuttle’s tether engagement surface will be located a second distance from said center of said string gap and wherein said first and second distances are non-equal.

2. The yo-yo of claim 1 wherein said shuttle and said dial are operatively connected together via said cam surface and an engagement member, wherein said cam surface includes first and second plateaus, wherein said first plateau has a different height than said second plateau, wherein when said shuttle is in said first predetermined position, said engagement member will be contacting said first plateau, and wherein when said shuttle is in said second predetermined position, said engagement member will be contacting said second plateau.

3. The yo-yo of claim 2 wherein said cam surface is connected to said dial, and wherein said engagement member is connected to said shuttle.

4. The yo-yo of claim 2 wherein when said engagement member is contacting said first plateau and said dial is rotated in said first direction for said predetermined distance, said engagement member will slide on said cam surface whereby said engagement member will slide off said first plateau and onto a first angled ramp surface whereby said engagement member will then slide on said ramp surface and then move onto said second plateau.

5. The yo-yo of claim 4 wherein when said engagement member moves onto said second plateau, it does so by dropping down to said second plateau whereby an audible sound is created that is capable of alerting a user that said shuttle has moved to its second predetermined position.

6. The yo-yo of claim 1 wherein said shuttle is connected to a retainer that functions to secure said shuttle to said body member, and wherein said shuttle and said retainer are spring-biased in a direction away from said string gap.

7. The yo-yo of claim 1 wherein said shuttle has a plurality of legs that extend in a direction away from the shuttle’s tether engagement surface and pass through apertures in said body member, and wherein at least one of said legs is connected to a retainer that functions to secure said shuttle to said body member.

8. The yo-yo of claim 1 wherein said first side portion includes indicia visible to a user and that function in combination with said dial to provide a user with an indication that said shuttle is in one of a plurality of predetermined positions.

9. The yo-yo of claim 8 wherein said first side portion also includes a member that is secured to said body member and functions to hold said dial to said body member, wherein said member that secures said dial includes an aperture, wherein said indicia are located on said dial and wherein a portion of said indicia is visible through said aperture.

10. The yo-yo of claim 1 wherein said tether engagement surface of said shuttle includes adaptations that facilitate a snagging engagement between said surface and said tether.

11. The yo-yo of claim 1 wherein said first side portion further includes a removable weight ring operatively connected to said body member.

12. The yo-yo of claim 1 wherein said first and second side portions are substantially identical.

13. The yo-yo of claim 1 wherein when said shuttle is in said second predetermined position, said dial can be rotated a predetermined distance in said first direction and thereby cause said shuttle to return to its first predetermined position.

14. A yo-yo comprising: first and second side portions secured together in a spaced-apart relation by an axle structure; a tether secured to a portion of said axle structure; and wherein said first side portion comprises a body member, a shuttle and a shuttle positioning dial, wherein said body member has an inwardly-facing surface that faces toward said second side portion, wherein said shuttle has a portion that can be positioned against said inwardly-facing surface of said body member and includes a tether engagement surface capable of engaging said tether, wherein said shuttle is movably secured to said body member, wherein said dial is rotatably secured to said body member and located whereby it is accessible to a user, wherein said dial is operatively connected to said shuttle via an engagement member that travels on a cam surface whereby when the shuttle is in a first predetermined position whereby its tether engagement surface is a first distance away from said second side portion, said engagement member will be located at a predetermined first position on said cam surface, wherein when the shuttle is moved to a second predetermined position via a rotation of said dial, said shuttle’s tether engagement surface will be located at a second distance away from said second side portion and said engagement member will be located at a predetermined second position on said cam surface whereby movement of said engagement member on said cam surface causes said first distance to differ from said second distance.

15. The yo-yo of claim 14 wherein said first side portion includes indicia that is visible to a user and functions in combination with said dial to provide a user with an indication of a responsiveness setting of said yo-yo determined by the position of said shuttle.

16. A yo-yo comprising: first and second side portions secured together in a spaced-apart relation by an axle structure; a tether secured to a portion of said axle structure; and wherein said first side portion comprises a body member, a shuttle, a retainer and a dial, wherein said body member has an inwardly-facing surface that faces said second side portion, wherein said shuttle is movably secured to said body member by said retainer and has a tether engagement surface capable of engaging said tether, wherein said dial is rotatably secured to said body member and is operatively connected to said shuttle in a manner whereby a predetermined amount of rotation of said dial in a first direction causes a movement of said retainer that causes a repositioning of said shuttle between a first predetermined position and a second predetermined position, and wherein when said shuttle is in its second predetermined position, the shuttle’s tether engagement surface is located closer to said second side portion than when the shuttle is in its first predetermined position.

17. The yo-yo of claim 16 wherein said shuttle also includes at least one leg that extends in a direction away from...
said tether, and wherein said leg passes through an aperture in said body member and is connected to said retainer.

18. The yo-yo of claim 16 wherein said first side portion also comprises a member that is secured to said body member and functions to hold said dial to said body member.

19. The yo-yo of claim 16 wherein said first side portion includes indicia positioned and viewable to a user in a manner whereby when said shuttle is in its first predetermined position, a user can ascertain via said indicia that said shuttle is in said first predetermined position, and wherein when said dial is rotated so that said shuttle is in said second predetermined position, said user can ascertain via said indicia that said shuttle is not in said first predetermined position.

20. The yo-yo of claim 16 wherein said retainer is spring-biased in a direction away from said second side portion.

21. The yo-yo of claim 16 wherein said dial is operatively connected to said shuttle via a cam surface that features a plurality of plateaus of different heights, wherein when said shuttle is in said first predetermined position, an engagement member operatively connected to said retainer will be contacting a first of said plateaus, and wherein when said shuttle is in said second predetermined position, said engagement member will be contacting a second of said plateaus wherein said second plateau has a different height than said first plateau.

22. The yo-yo of claim 16 wherein when said shuttle is in said second predetermined position, continued rotation of said dial in said first direction can cause said shuttle to return to said first predetermined position.