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Divnick

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(54) **DEVICE FOR COLLECTING AND PLAYING WITH CIRCULAR AND SPHERICAL OBJECTS WITH LAUNCHING RAMPS THEREON**

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(58) **Field of Classification Search** 446/8, 446/11; 453/18, 39; 194/344, 350, 352
See application file for complete search history.

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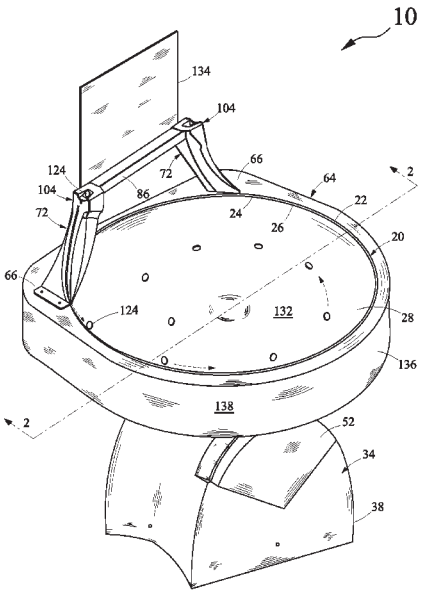
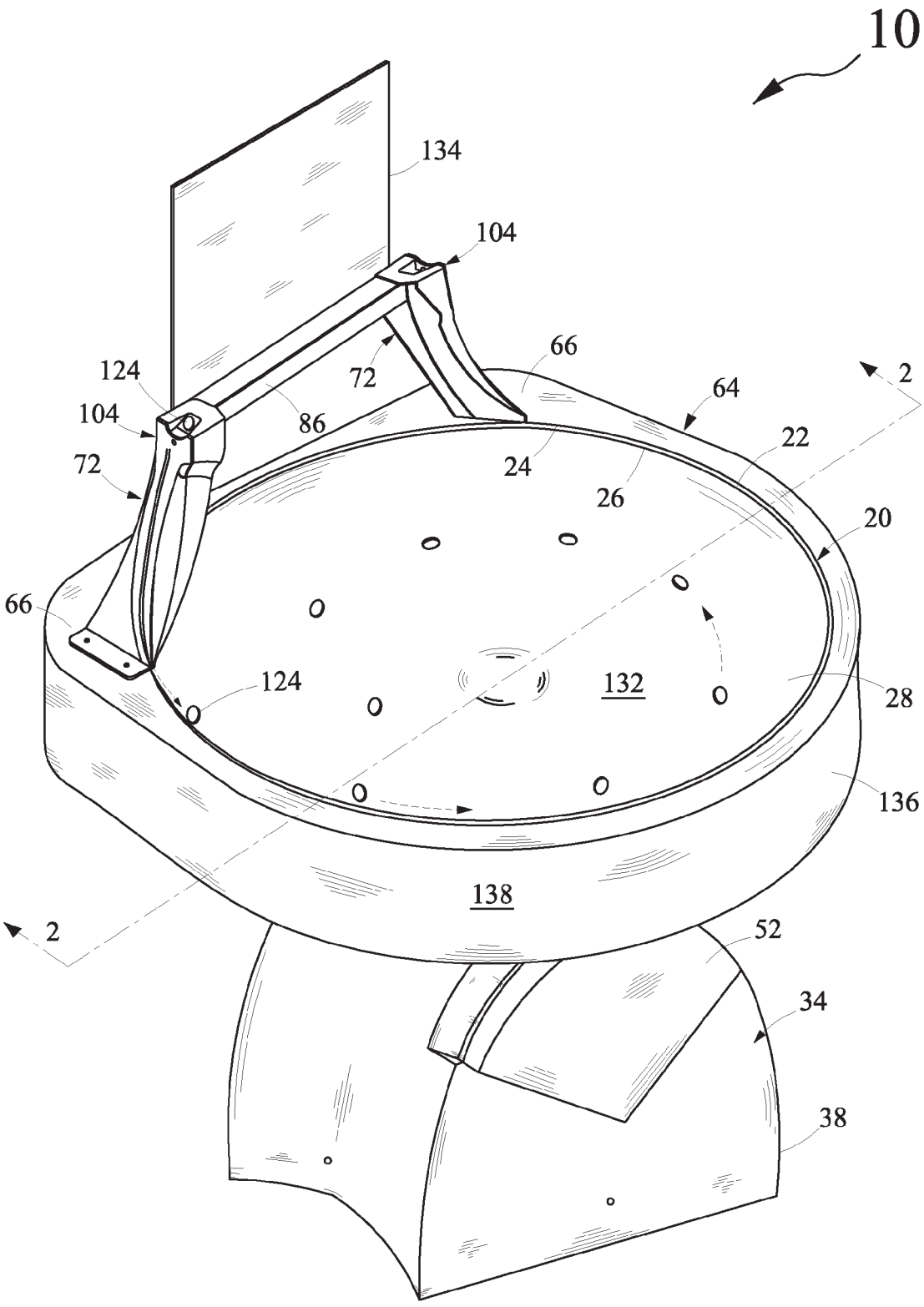
(57) **ABSTRACT**

Disclosed is a device for collecting and/or playing with circular and spherical objects. The device comprises: a base comprising an open top portion and a closed bottom portion; an open top main body comprising a rim portion, and a circular portion extending downwardly and inwardly from the rim portion to an aperture concentric with the rim portion and coupling with the open top portion of the base; a flange extending horizontally and outwardly about the rim portion; and at least one launching ramp mounted on the flange. Due to the mounting of the launching ramps on the flange the device is capable of accommodating the launching ramps outside the rim portion, that is, outside the outer circumference of the circular portion. Such an accommodation of the launching ramps provides the entire surface of the circular portion as a rolling surface for the circular and spherical objects.

20 Claims, 7 Drawing Sheets

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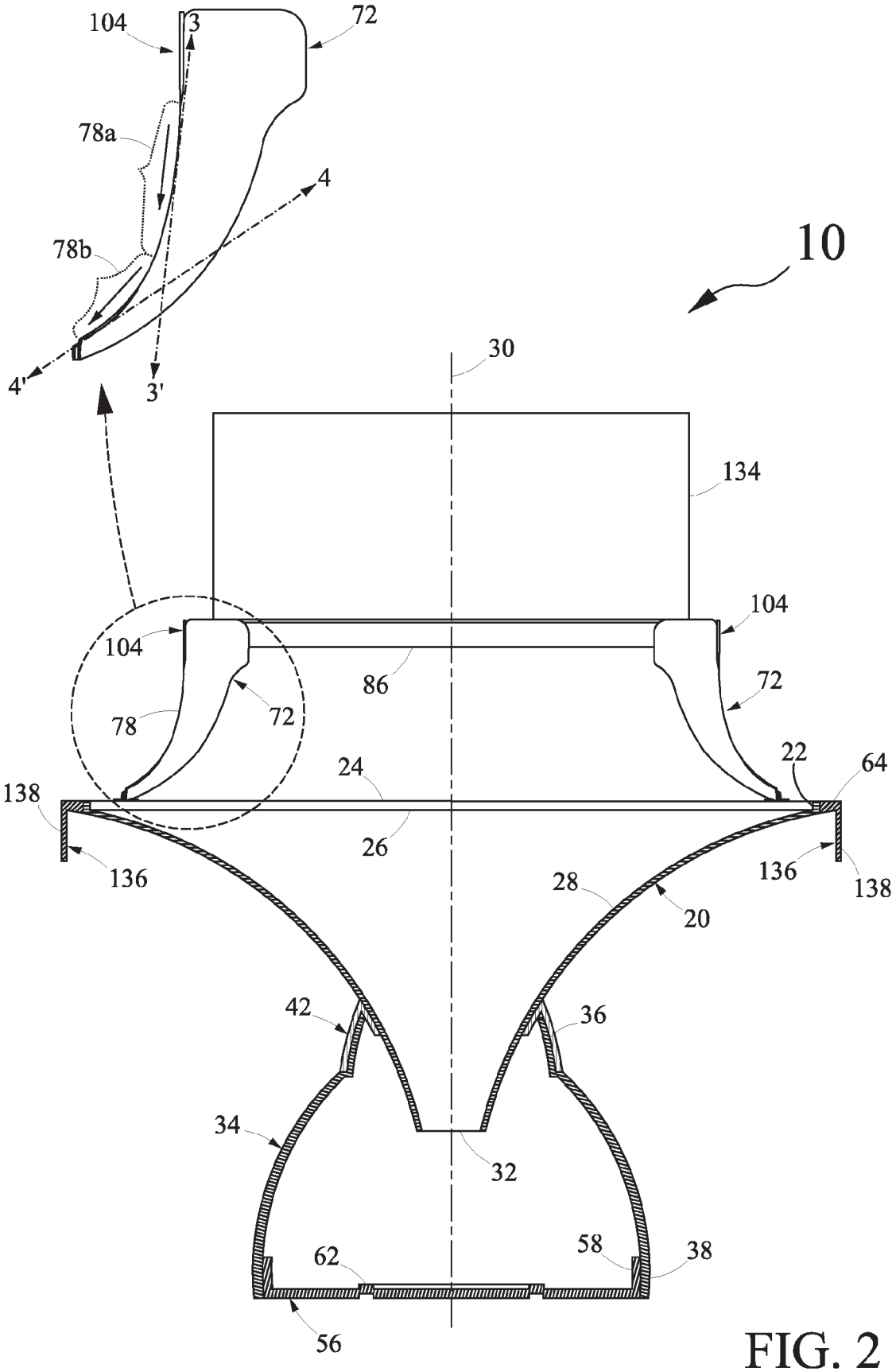
52
34
38

FIG. 1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3
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3'
30
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86
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58
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56

FIG. 2

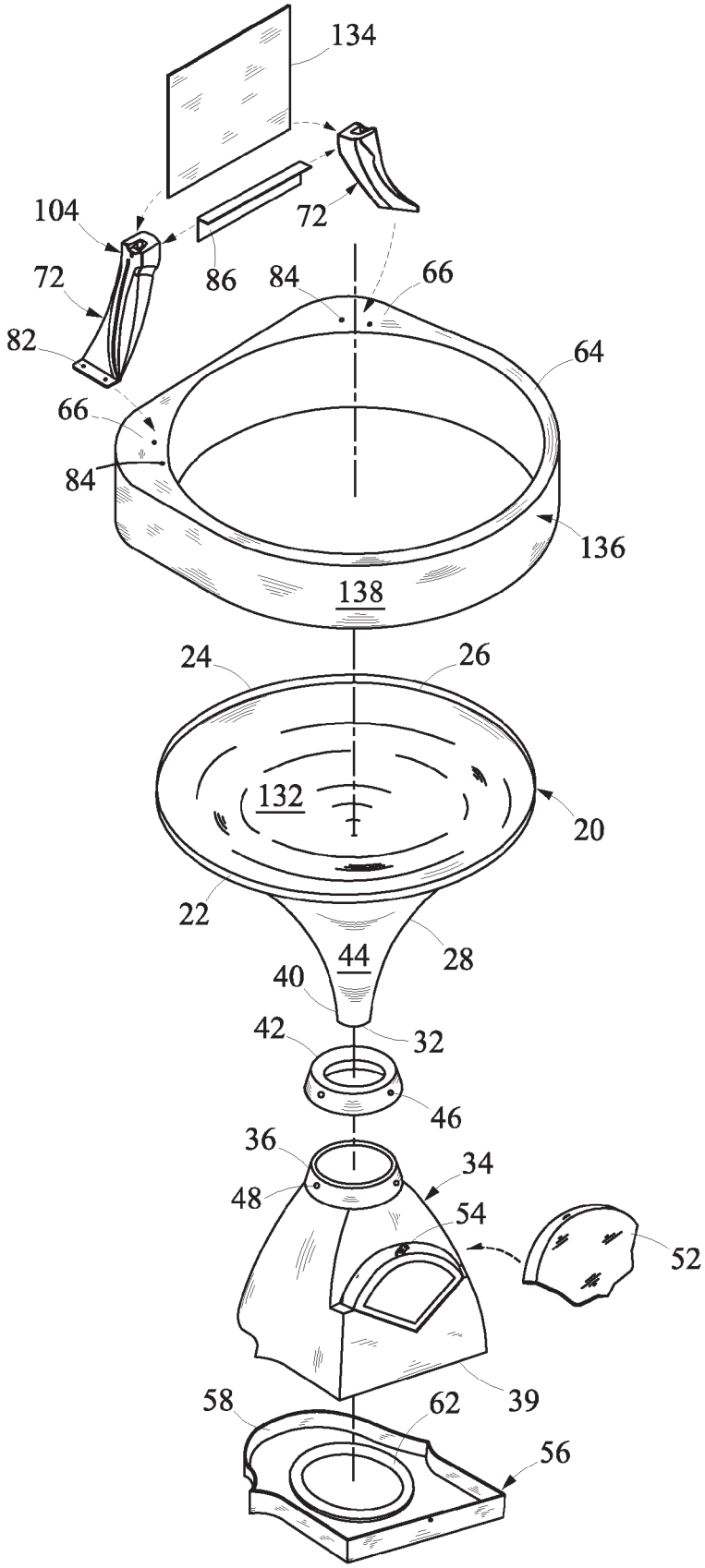
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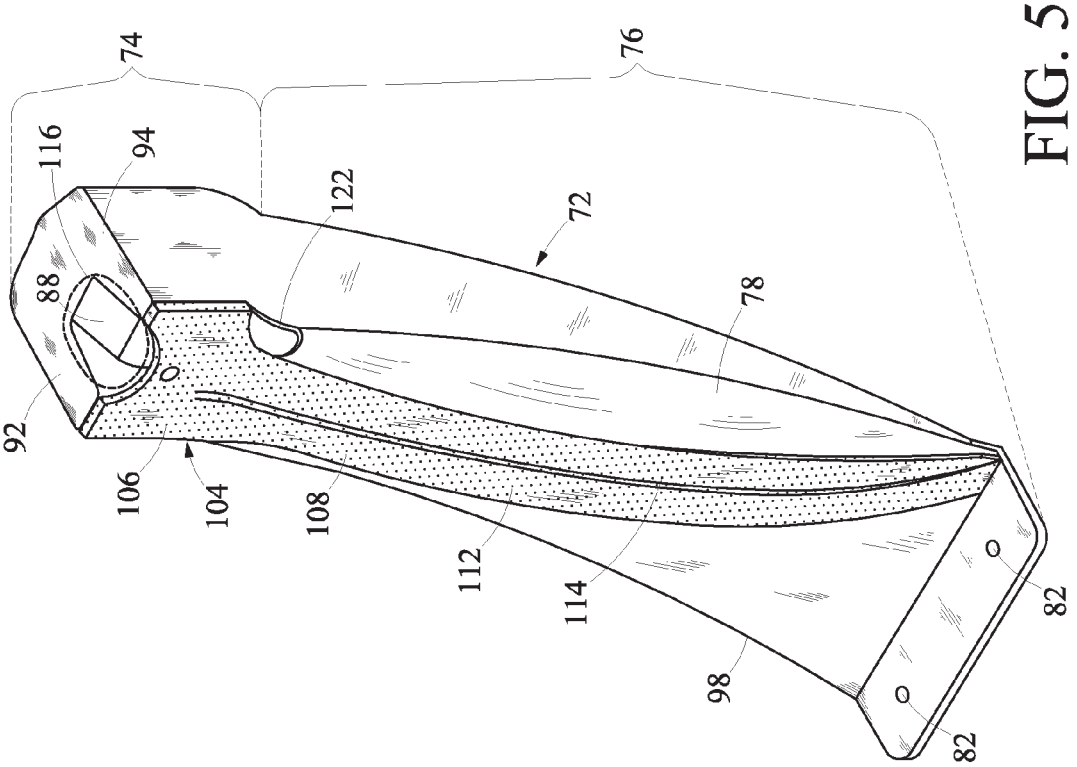
FIG. 3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76
116
94
122
72
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98
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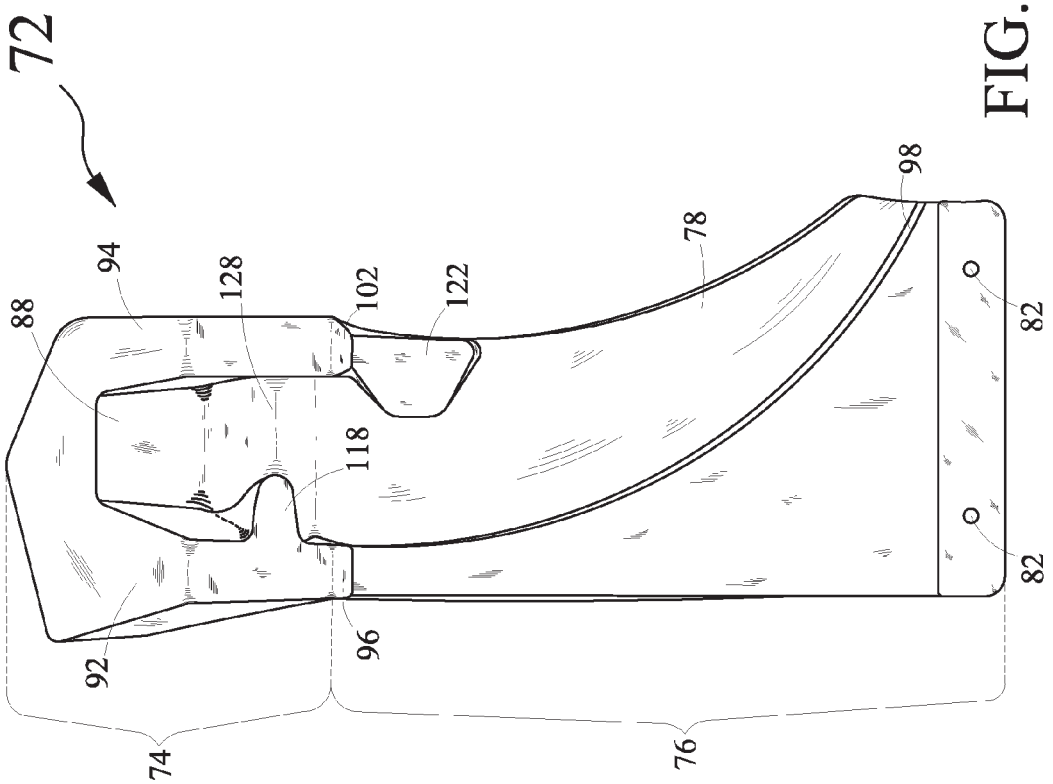
82

FIG. 5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102
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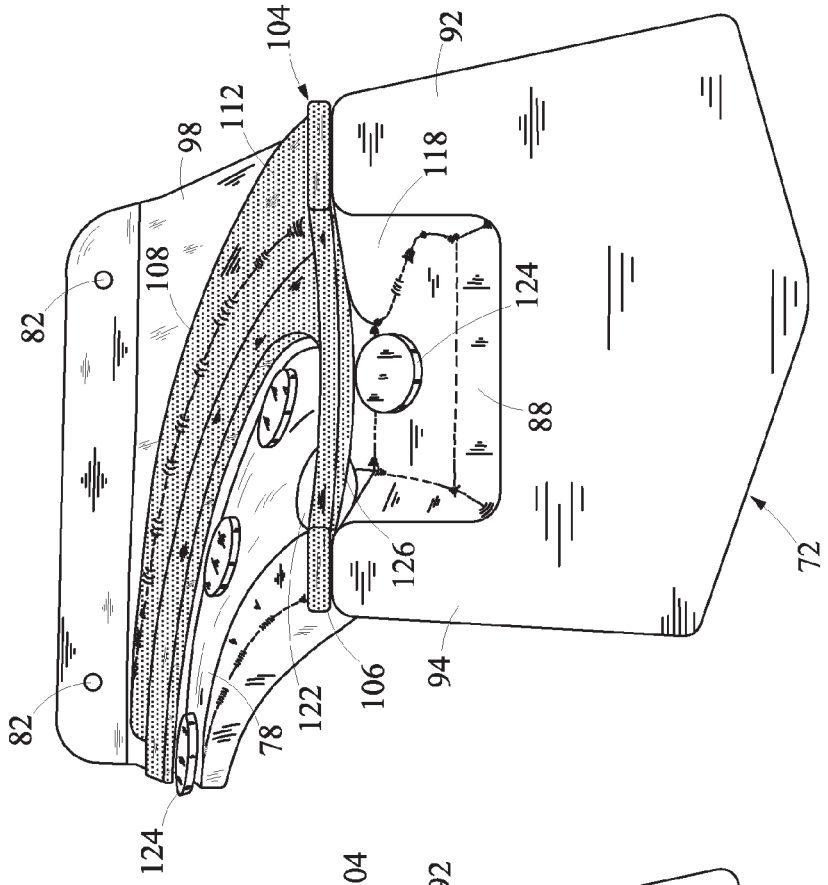
74
76

FIG. 4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124
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72
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124
82

FIG. 6B

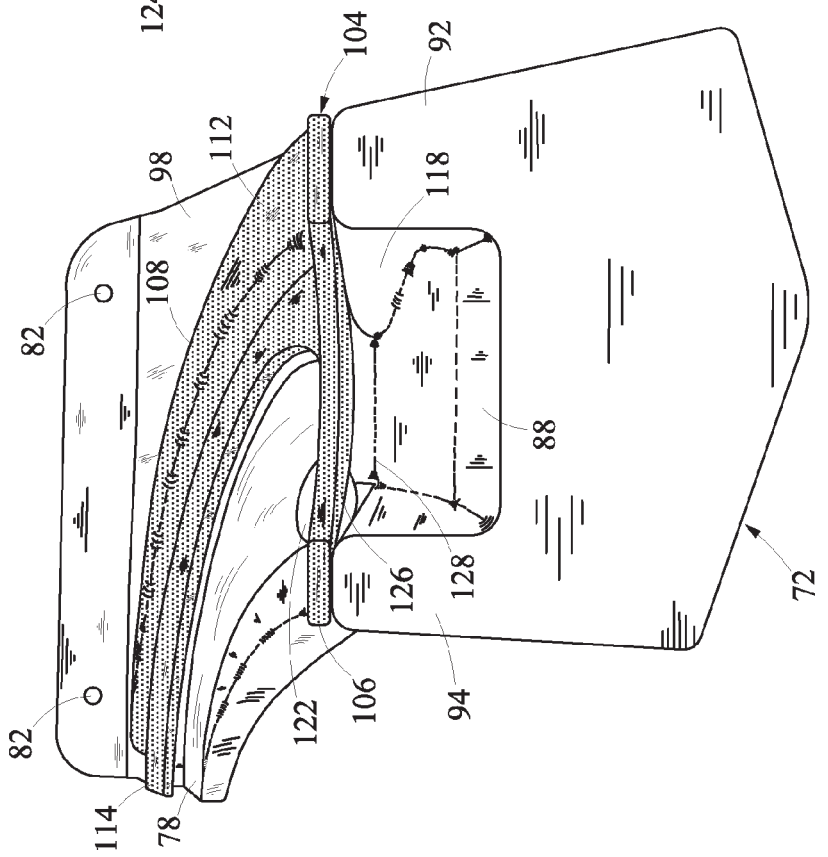
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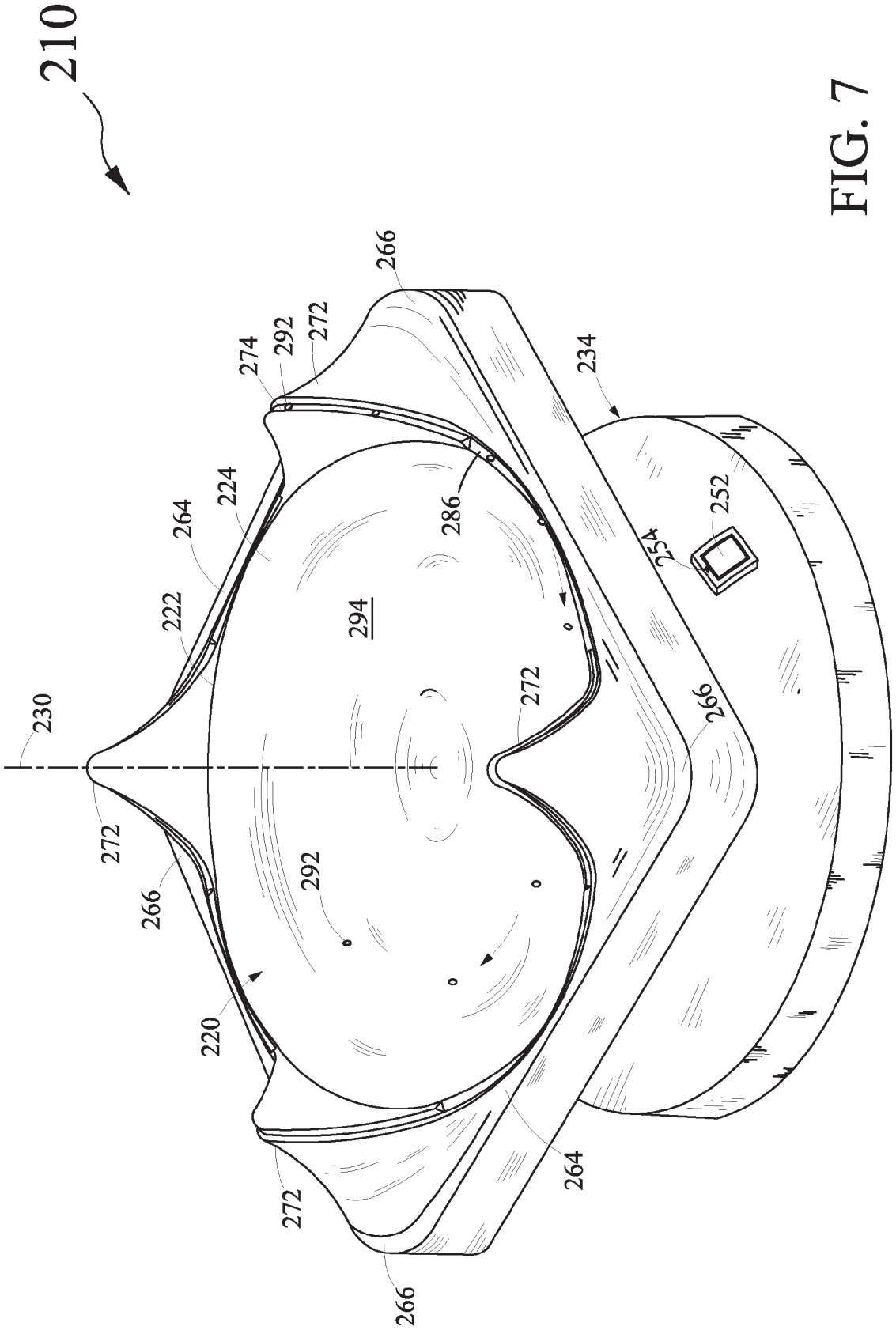
FIG. 6A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274
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286
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266
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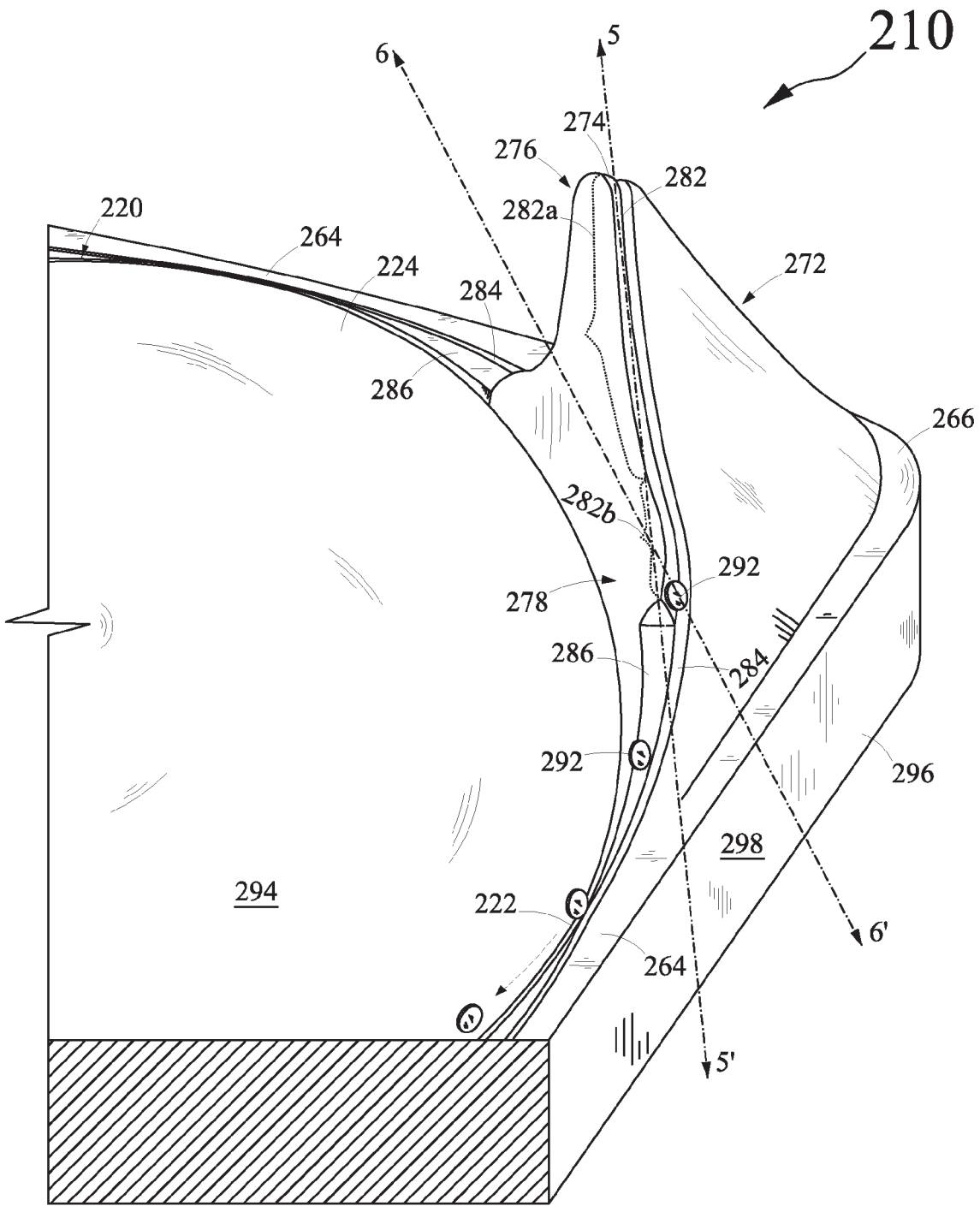
264
266

FIG. 7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6
5
274
276
282
220
282a
264
224
272
284
286
266
282b
292
278
286
284
292
296
298
294
222
6'
264
5'

FIG. 8

DEVICE FOR COLLECTING AND PLAYING WITH CIRCULAR AND SPHERICAL OBJECTS WITH LAUNCHING RAMPS THEREON

FIELD OF THE INVENTION

The present invention relates to devices for collecting and/or playing with circular and spherical objects with launching ramps on the devices.

BACKGROUND OF THE INVENTION

Commonly, large funnel-shaped devices are used as apparatuses for demonstrating the principles of gravitational force and centrifugal force. When a circular or spherical object is launched tangentially from a guiding track on to an inner surface (i.e. a rolling surface) of the funnel-shaped device, the object gathers velocity during its descent along the guide path and the centrifugal force gathered thereby causes the object to roll along the inner surface of the device. At the same time, the gravitational force acts upon the rolling object, causing the object to roll downwards and inwards in a spiral path on the inner surface of the device, and ultimately, to drop out of the device. During the descent of the object along the inner surface of the funnel-shaped device, the object gathers velocity before exiting out of the narrow terminus of the funnel-shaped device. Such apparatuses are useful in teaching the basic principles of science to students and offer elements of entertainment and interactivity in the students' learning process.

Based on the same principles, "Wishing Wells" and "Coin Funnels" have also been devised and utilized for a plurality of reasons, such as fundraising purposes, amusement games, and the like. Such apparatuses may be installed in shopping malls, hospitals, museums, theaters, and retail stores, and other environments with pedestrian traffic to induce such pedestrians to deposit and deliver coinage into the apparatuses.

Such apparatuses generally have a guiding launch track for launching the circular or spherical objects onto a smooth trackless rolling surface. Various configurations of guiding launch tracks may be found in the prior art for launching the circular or spherical objects onto the rolling surface. U.S. Pat. No. 433,736 to Lockwood discloses a toy bank having a spiral ramp of several coils leading to a slot in the top of a drum-like base or container. U.S. Pat. No. 3,092,928 to Geiser discloses a toy for use with marbles, including an upper flat circular pan with a feed groove around its periphery leading to a tubular generally vertical track that discharges into a tangential extension of the top of an inverted conical base, so the marbles circle the base in decreasing circles an exit through a central bottom hole into a separate pan-like container.

When used for the purpose of amusement, the person playing the game may want the circular or spherical object dropped in the funnel-shaped device to remain rolling in the funnel as long as possible. This necessitates that the object utilize the maximum rolling surface available on the inner surface of the funnel-shaped device. U.S. Pat. No. Des 320,299 to Beiter discloses a "coin collector" with a guiding path disposed on the rolling surface for enabling a circular object to be launched onto the funnel-shaped device. Such a configuration decreases the rolling surface available for the objects to travel.

U.S. Pat. No. 5,911,299 to Aspnes discloses a "Vending Machine with Coin Entertainment" having a coin feed mechanism, in addition to other structural configurations, that drops the coin into a main chute and finally onto trackless and endless structure or vortex structure where the coin rolls in a spiral. This patent does not discuss the available rolling surface of the vortex structure for the coin to travel in a spiral path.

The available arts in the current domain have in common launch ramps that are mounted directly on the funnel surface, thereby limiting the available rolling surface to the area between the launch ramps. Therefore, the available arts are mostly silent in addressing the benefit of utilizing the maximum rolling surface for the swirling circular or spherical objects. Also, with the mounting of the launch ramps directly on the surface of the funnel, said ramps block the view of the coins rolling around the funnel surface. Moreover, the launch ramps in the prior art have uniformly sloped guiding track requiring longer launch ramps for exiting the coins at desired speed and angle. Such longer ramps require more material, resulting in higher manufacturing costs.

Accordingly, there remains a need for an amusement or collection device capable of providing a maximum rolling surface for such objects, and a more open view of such objects, while at the same time avoiding the complexities of configuration, manufacturing and assembly to provide an easy-to-use and inexpensive device.

SUMMARY OF THE INVENTION

In view of the foregoing disadvantages inherent in the prior art, the general purpose of the present invention is to provide a device for collecting and/or playing with circular and spherical objects configured to include all the advantages of the prior art, and to overcome the drawbacks of the prior art.

In one aspect, the present invention provides a device for collecting and/or playing with circular and spherical objects. The device comprises: a base comprising an open top portion and a closed bottom portion; an open top main body comprising a rim portion, and a circular portion extending downwardly and inwardly from the rim portion to an aperture concentric with the rim portion and coupling with the open top portion of the base; a flange extending horizontally and outwardly about the rim portion; and at least one launching ramp mounted on the flange. The open top main body is supported on the base along a common vertical central axis. The launching ramp extends upwardly and inwardly over the open top main body, the launching ramp comprising a curved guiding track extending downwardly towards the rim portion such that circular and spherical objects placed on the launching ramp roll down the curved guiding track and exit tangentially onto an inner surface of the circular portion along the rim portion and further through a downwardly and inwardly spiral path of decreasing radius on the inner surface of the circular portion into the aperture and down into the base.

Due to the mounting of the launching ramps on the flange extending horizontally and outwardly about the upper end of the rim portion the device is capable of accommodating the launching ramps outside the rim portion, and, more specifically, outside an outer circumference of the circular portion. Such an accommodation of the launching ramps makes available the entire surface of the circular portion as a rolling surface for the circular and spherical objects, i.e., the entire surface of the circular portion is unobstructed for purposes of rolling objects thereon.

In another aspect, the present invention provides a device for collecting and/or playing with circular and spherical objects comprising: a base comprising an open top portion and a closed bottom portion; an open top main body comprising a rim portion, and a circular portion extending down-

wardly and inwardly from the rim portion to an aperture concentric with the rim portion and coupling with the open top portion of the base; a flange extending horizontally and outwardly about the rim portion; and at least one launching ramp mounted on the flange. The open top main body is supported on the base along a common vertical central axis. The launching ramp extends vertically on the flange.

The launching ramp comprises a first ramp having a grooved guiding track extending downwardly and outwardly from a top to a bottom of the launching ramp, and further extending to a curved stepped region defining a curved guiding track and a curved wall. The curved guiding track forms a lower portion of the curved stepped region. The curved stepped region tapers inwardly and finally matches with the rim portion of the open top main body such that circular and spherical objects placed on the top of the launching ramp roll down the grooved guiding track and further onto the curved guiding track. Such objects exit tangentially onto an inner surface of the circular portion along the rim portion and further travel on a downwardly and inwardly spiral path of decreasing radius on the inner surface of the circular portion into the aperture and down into the base.

In another aspect, the present invention provides a launching device, comprising: a ramp comprising a top portion having a downwardly-extending placement wall surrounded by a first side wall and a second side wall, configuring a three-walled mouth placement region, and a bottom portion comprising a curved guiding track and a curved wall configuring a stepped region, the curved guiding track forming a lower portion of the stepped region; and a fence comprising a plate portion, and a curved arm extending from a bottom of the plate portion.

The plate portion rests over the top portion of the ramp to configure a four-walled mouth drop region in combination with the three-walled mouth placement region, and the curved arm rests over the bottom portion of the ramp covering at least a portion of the curved guiding track along a complete length of the curved guiding track; and wherein the launching device is mounted outside an outer circumference of a circular body extending downwardly and inwardly from the outer circumference to an aperture such that circular and spherical objects dropped into the four-walled mouth drop region roll down the curved guiding track and exit tangentially onto an inner surface of the circular body at the outer circumference and further through a downwardly and inwardly spiral path of decreasing radius on the inner surface of the circular body into the aperture.

These together with other aspects of the present invention, along with the various features of novelty that characterize the invention, are pointed out with particularity in the claims annexed hereto and form a part of this disclosure. For a better understanding of the invention, its operating advantages, and the specific objects attained by its uses, reference should be made to the accompanying drawings and descriptive matter in which there are illustrated exemplary embodiments of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The advantages and features of the present invention will become better understood with reference to the following detailed description and claims taken in conjunction with the accompanying drawings, wherein like elements are identified with like symbols, and in which:

FIG. **1** is a perspective view of a device **10** for collecting and/or playing with circular and spherical objects, according to an embodiment of the present invention;

FIG. **2** is a cross-sectional view of the device **10** along line **2-2** of FIG. **1**, according to an embodiment of the present invention;

FIG. **3** is an exploded component perspective view of the device **10**, according to an embodiment of the present invention;

FIG. **4** is a front perspective view of a launching ramp **72**, according to an embodiment of the present invention;

FIG. **5** is a perspective view of the launching ramp **72** and a fence **104** positioned over the launching ramp **72**, according to an embodiment of the present invention;

FIG. **6**A is a top view of the launching ramp **72** and the fence **104** positioned over the launching ramp **72**, according to an embodiment of the present invention;

FIG. **6**B is a top view of the launching ramp **72** and the fence **104** positioned over the launching ramp **72** illustrating the descent of a coin **124** through the launching ramp **72** and the fence **104**, according to an embodiment of the present invention;

FIG. **7** is a perspective view of a device **210** for collecting and/or playing with circular and spherical objects, according to an embodiment of the invention;

FIG. **8** is a partial enlarged perspective view of the device **210**, according to an embodiment of the invention;

Like reference numerals refer to like parts throughout the description of several views of the drawings.

DETAILED DESCRIPTION OF THE INVENTION

The exemplary embodiments described herein detail for illustrative purposes are subject to many variations in structure and design. It should be emphasized, however, that the present invention is not limited to a particular device for collecting and/or playing with circular and spherical objects, as shown and described. It is understood that various omissions, substitutions, and equivalents are contemplated as circumstances may suggest or render expedient, but it is intended to cover the application or implementation without departing from the spirit or scope of the claims of the present invention. The terms "a" and "an" herein do not denote a limitation of quantity, but rather denote the presence of at least one of the referenced item.

The present invention provides a device for collecting and/or playing with circular and spherical objects. As used herein, "circular and spherical objects" refer to small circular objects, such as coins, marbles, ball bearings, and the like. The device is a combination of a funnel-shaped portion and at least one launching ramp for launching the circular objects onto an inner surface of the funnel-shaped portion. The launching ramp is configured such that an entire inner surface of the funnel-shaped portion may be used as a rolling surface for circular objects. The present invention provides an easy-to-use and highly entertaining collection and/or playing device that may be positioned outside shopping malls, hospitals, museums, theaters, retail stores, and the like places, wherein they may be approached by adults and children in large numbers for a variety of purposes.

Referring to FIGS. **1-3**, in one embodiment, a device **10** for collecting and/or playing with circular and spherical objects is shown. The device **10** comprises an open top main body **20** having rim portion **22** and a circular portion **28**. The rim portion **22** is a vertically extending circular rim defining an upper end **24** and a lower end **26**. The circular portion **28** extends downwardly and inwardly from the lower end **26** of the rim portion **22** to an aperture **32** concentric with the rim portion **22**. More specifically, the circular portion **28** is in the form of a "vortex-funnel-shaped portion" with convex side-

walls having a decreasing diameter from the lower end **26** of the rim portion **22** to the aperture **32**, around a vertical central axis **30**.

The rim portion **22** in the form of a circular raised structure at an outer circumference of the circular portion **28** serves to guard against an errant circular or spherical object from spinning off the circular portion **28** and falling to the floor. Additionally, small objects such as marbles and ball bearings may be rolled along the rim portion **22** as a part of scientific experimentation (for example, in the illustration of orbit observations). Although, as envisioned herein that the open top main body **20** comprises the rim portion **22** as a vertically extending circular rim, the open top main body **20** may have the circular portion **28** with a rim portion of an insignificant height and merely forming the outer circumference of the circular portion **28**.

The open top main body **20** is supported on a base **34** along the common vertical central axis **30**. The base **34** has a container-like shape for storing circular and spherical objects that are dropped onto the device **10**. The base **34** has an open top portion **36** and a generally flat closed bottom portion **38**. A lower end portion **40** of the circular portion **28** near the aperture **32** couples with the open top portion **36** of the base **34** such that the open top main body **20** is held in an upward facing position with the rim portion **22** at the top in a level horizontal plane and the aperture **32** at the bottom. The device **10** may comprise an intermediate component coupling the lower end portion **40** to the open top portion **36** of the base **34**. For example, a ring **42** may be bonded (welded, cemented or adhesively bonded) to an outer surface **44** of the circular portion **28** at the lower end portion **40**. The ring **42** may be received on the open top portion **36** of the base **34** and fastened thereto. More specifically, the ring **42** may have a first pair of through holes **46** that align with a second pair of through holes **48** on the open top portion **36** of the base **34**, and be fastened thereto by passing fasteners (for example, bolts, screws, and the like) through the first pair of though holes **46** and the second pair of through holes **48**.

Alternatively, the lower end portion **40** and the open top portion **36** may have interfitting or telescoping coupling features for holding the open top main body in the upward-facing position. For example, an inner surface of the lower end portion **40** may include a set of internal threads that engage with a set of external threads on an external surface of the open top portion **36**. Alternatively, in cases where the open top main body **20** and the base **34** are made from a same material, the base **34** may be welded to the open top main body **20** or the base **34** and the open top main body **20** may be molded as a single-piece structure.

Additionally, the base **34** has an access feature for retrieving the contents, i.e., the circular and spherical objects collected inside the base **34**. The access feature may be in the form of a door **52** and a lock **54** that allows easy retrieval of the contents and enables secure storage before the contents are retrieved by authorized personnel.

Optionally, the closed bottom portion **38** has a centrally located raised ring structure (not shown) thereby providing a secure area for a circular and spherical object collection bucket (not shown) housed inside the base **34**. The secure area prevents the collection bucket from sliding out from under the lower end portion **40** of the circular portion **28**. The base **34** has features (for example, the raised ring structure) that aid in stackable shipping and storage of a plurality of the devices, thereby saving space. Alternatively, the device **10** further has a floor **56** that may be removably attached (bolted) with a bottom **39** of the base **34** to form the closed bottom portion **38**. The floor **56** may have a raised skirt **58** that may be received within the bottom **39** of the base **34**, and bolted thereto. The floor **58** further has a centrally located raised ring structure **62**, providing a secure area for a circular and spherical object collection bucket housed inside the base **34**.

The device **10** further comprises a flange **64** extending horizontally and outwardly about the upper end **24** of the rim portion **22**. The flange **64** may have a width sufficient to accommodate at least one launching ramp **72** (generally referred to as a "ramp") for launching circular and spherical objects onto the circular portion **28**. The launching ramp **72** extends upwardly. More specifically, the flange **64** may extend sufficiently to form mounting platforms **66** at corners for accommodating launching ramps **72**. The flange **64** extending to form mounting platforms **66** at corners is designed such that the overall width of the device **10** is not increased. Such a design involving extension of the generally circular shaped flange **64** of the device **10** to form corners does not require additional space for shipping in boxes or storage that is required by the manifestation of the device that lacks such mounting platforms. Also, such a design does not result in increasing the overall diameter of the device **10** and does not necessitate using any additional floor space with the presence of the mounting platforms **66**. Additionally, by mounting the launching ramps **72** in the corners, the launching ramps **72** do not block the view of the circular or spherical objects circling on the circular portion **28**.

Due to the mounting of the launching ramps on the flange **64** that extend horizontally and outwardly about the upper end **24** of the rim portion **22**, and, more specifically, on the mounting platforms **66**, the device **10** is capable of accommodating the launching ramps **72** outside the rim portion **22**, and, more specifically, outside the outer circumference of the circular portion **28**. Such an accommodation of the launching ramps **72** permits the entire surface of the circular portion **28** to be used as a rolling surface for the circular and spherical objects, i.e., the entire surface of the circular portion **28** is unobstructed for rolling objects thereon. The accommodation of the launching ramps **72** finds significance in maximizing the number of rotations of the objects as they descend on an inner surface **132** of the circular portion **28**.

Another use of the device **10** arising from the availability of the entire inner surface **132** of the circular portion **28** being unobstructed is for rolling small objects such as marbles and ball bearings as a part of scientific experimentation (for example, illustration of orbit observations). A ball bearing held in hand may be launched onto the circular portion **28**, similar to the launch of a ball onto a roulette wheel. The ball bearing will roll on the circular portion **28** for several revolutions, until the momentum has decreased to the point that gravitational force on the ball bearing exceeds centrifugal force, and then will follow a downward and inward spiral path of decreasing radius on the circular portion **28** into the aperture **32**. Such mounting generally results in the launching ramps being mounted on a back or a front side of the device **10**, so that the visibility of the travel of the circular and spherical objects on the circular portion **28** is not obstructed.

For example, as shown in FIGS. **1-3**, the device **10** has two launching ramps **72** removably mounted on two mounting platforms **66** on a back side of the device **10**. The launching ramps **72** extend upward and inward over the open top main body **20**, towards the vertical central axis **30**.

Referring to FIGS. **4**, **5**, **6**A, and **6**B the launching ramp **72** has a top portion **74** for placement of circular objects and for guiding the circular objects to a bottom portion **76** having a curved guiding track **78**. The launching ramps **72** may be mounted using a first pair of through holes **82** on the bottom portion **76** of the launching ramp **72** that align with a second

pair of through holes **84** on the mounting platform **66**, and fastened thereto using fasteners (for example, blots, screws, and the like) passing through the first pair of though holes **82** and the second pair of through holes **84**. The device **10** may further comprise an intermediate bracket **86** (See FIGS. **1-3**) coupling the launching ramps **72**, thereby providing structural support to the launching ramps **72**. The intermediate bracket **86** may be welded, cemented or adhesively bonded to the back surface of the top portions **74** of the launching ramps **72**. Alternatively, the two launching ramps **72** and the intermediate bracket **86** may be molded as a single-piece structure.

The curved guiding track **78** extends downwardly along a curve of decreasing slope towards the rim portion **22**. More specifically, as shown in FIG. **2**, the curved guiding track **78** has an upper portion **78***a* steeper than a lower portion **78***b*, thereby providing a dual angle feature having a first angle of descent along line **3-3'** and a second angle of descent along line **4-4'**. The circular and spherical objects gain the required speed descending down the upper portion **78***a* (i.e., the steeper portion of the curved guiding track **78** providing the first angle of descent along line **3-3'**); and further descend down the lower portion **78***b* (i.e., the less steep portion of the curved guiding track **78** providing the second angle of descent along line **4-4'**).

The design of the curved guiding track **78** incorporating the dual angle feature improves the functionality of the launching ramps **72**, and of the overall device **10** as compared to launching ramps that feature a guiding track with almost a uniformly sloped surface and a single angle of descent. The improved functionality results from the fact that the dual angle feature allows for the incorporation of a shorter launching ramp **72** in the device **10**, thereby requiring less material (i.e., lower manufacturing costs) as compared to devices lacking the dual angle feature.

Furthermore, such shorter launching ramps **72** are not required to extend as high to impart the desired speed to the launched object as are launching rams that lack the dual angle feature. A shorter launching ramp improves the functionality for the end user, in that, for example, the shorter launching ramps **72** are naturally more accessible to children and other shorter individuals.

The top portion **74** has a downwardly extending placement wall **88** surrounded by a first side wall **92**, and a second side wall **94**, thereby forming a three-walled "mouth" placement region for receiving circular and spherical objects and for guiding the objects towards the curved guiding track **78**.

The launching ramp **72** has a first ledge **96** extending outwardly from a bottom of the first side wall **92** and a curved wall **98** extending downwardly from the first ledge **96** about a complete length of the curved guiding track **78**. The curved wall **98** along with the curved guiding track **78** configures a stepped region. The curved guiding track **78** forms a lower portion of the stepped region. Similarly, a second ledge **102** extends outwardly from a bottom of the second side wall **94**.

The device **10** may further comprise a fence **104** having a plate portion **106** and a curved arm **108** extending from a bottom of the plate portion **106**. The curved arm **108** has a cover region **114** and a wall region **112** configuring a stepped region. The cover region **114** forms a lower portion of the stepped region. The fence **104** may be positioned over the launching ramp **72** such that the bottom of the plate portion **106** sits over the first and second ledges **96**, **102**, while the wall region **112** rests upon the curved wall **98** and the cover region **114** covers at least a portion of the curved guiding track **78**.

When the fence **104** is in the above-mentioned position, the plate portion **106** of the fence **104** in combination with the three-walled mouth placement region configures a four-walled mouth drop region **116** (See FIG. **5**) for receiving the circular objects. The circular objects may be dropped in the four-walled mouth drop region **116** in addition to placing the circular object, thereby providing an easy-to-use circular and spherical object drop region. Such a four-walled mouth drop region **116** allows users to drop a plurality of such objects at once. Also, the stepped curved arm **108**, and, more specifically, the cover region **114** aids in keeping the circular and spherical objects on the curved guiding track **78**, as the objects descend down through the space between the curved guiding track **78** and the cover region **114**.

The fence **104** may be bonded to the launching ramp **72** in the above-mentioned position using suitable bonding techniques including, but not limited to, thermal bonding, ultrasonic bonding, adhesive bonding, cementing and welding. Alternatively, the fence **104** has engagement features for attachment with complementary engagement features on the launching ramp **72**.

The launching ramp **72** may further comprise at least one raised structural feature (lug(s), wedge(s), stud(s), protrusion (s), lip(s), and the like) disposed on the top portion **74** and/or the bottom portion **76** of the launching ramp **72** providing deflection surfaces for directing the circular and spherical objects towards the curved guiding track **78**, so that the circular and spherical objects may begin their descent at the same position every time so they achieve the required speed to perform on the inner surface **132** of the circular portion **28**. For example, the launching ramp **72** has a first lug **118** disposed on the top portion **74** of the launching ramp **72**. The first lug **118** extends from an intermediate portion of the first side wall **92** towards the three-walled mouth placement region. A second lug **122** may be disposed on the bottom portion **76** of the launching ramp **72**. The second lug **122** extends from the second ledge **102** towards the curved guiding track **78**.

Referring again to FIGS. **1** and **6**B, a circular object, herein a coin **124** is shown being dropped into the four-walled mouth drop region **116**. The placement wall **88** may have a label or sticker with the text, such as, "Drop Coins Here," instructing the users to drop or place the coins over the label or sticker. When the coin **124** hits the placement wall **88**, the sloping of the placement wall **88** may force the coin **124** against the inner surface **126** of the fence **104**. Optionally, the launching ramp **72** further comprises a deflecting surface **128** extending outwardly from bottom of the placement wall **88** for further forcing the coin **124** against the fence **104**. While traveling further down the top portion **74** of the launching ramp **72**, the first lug **118**, if required, deflects the coin **124** towards an intermediate portion of the three walled placement region. Next, while traveling further down the launching ramp **72**, the second lug **122**, if required, deflects the coin **124** towards the curved guiding track **78**. Alternatively, the coin **124** when dropped into the four-walled mouth drop region **116** may directly hit the second lug **122** and get deflected towards the curved guiding track **78**.

Accordingly, the coin **124** placed on the three-walled mouth placement region or dropped onto the four-walled mouth drop region **116** rolls down the curved guiding track **78** and exits onto the inner surface **132** of the circular portion **28** along the rim portion **22** (as illustrated in FIG. **1**). Due to gravitational force, the coin **124** follows a downward and inward spiral path of decreasing radius on the inner surface **132** of the circular portion **28** into the aperture **32** and down into the base **34**. Due to the presence of the walls (i.e., the placement wall **88**, and the first and second side walls **92**, **94**), the raised structural features (i.e., the first lug **118** and the second lug **122**), the optional deflection surfaces (i.e., the

deflecting surface **128**), and the curved guiding track **78**, the circular and spherical objects exit the launching ramp **72** at a required and uniform speed, rotation, and launch angle.

The open top main body **20** may be made of a material providing structural integrity to the device **10**, while also providing an aesthetic appearance to the device **10**. Suitable materials include, but are not limited to, resins, plastics, fibers, metal, and the like, as well as combinations comprising at least one of the foregoing. For example, the open top main body **20** can be made of automotive strength fiberglass. The launching ramps **72** may be made of a material providing a consistent rolling surface for the circular objects, while also providing an aesthetic appearance to the device **10**. Suitable thermoplastic materials include, but are not limited to, polyolefins, polyesters, polyamides, polyvinyl chloride, polybutylene terephthalate, and acrylonitrile butadiene styrene (ABS).

Additionally, aesthetic decorations and/or designs, product or manufacturer information, source identifiers, messages, logos, and the like may be disposed on one or more surfaces of the device **10** for advertising, sponsorship messaging purposes and to otherwise provide additional revenue-generating information. For example, as shown in FIGS. **1-3**, a placard or a sign frame **134** may be supported on lip(s), ledge(s), and similar structural features on a back side of the launching ramps **72**. The device **10** may further comprise a skirt **136** extending downwardly preferably from an outer periphery of the flange **64**. The skirt **136** provides an outer surface **138** for disposing messages and logos.

Referring to FIGS. **7** and **8**, in another embodiment, a device **210** for collecting and/or playing with circular and spherical objects is shown. The device **210** comprises an open top main body **220** comprising a rim portion **222** and a circular portion **224**. The circular portion **224** extends downwardly and inwardly from the rim portion **222** to an aperture (not shown) concentric with the rim portion **222**. More specifically, the circular portion **224** is in the form of a vortex-funnel-shaped portion having a decreasing diameter from the rim portion **222** to the aperture, around a vertical central axis **230**. The rim portion **222** may have an insignificant height and as shown in FIGS. **7** and **8** is an outer circumference of the circular portion **224**.

The open top main body **220** is supported on a base **234** along the common vertical central axis **230**. The base **234** has a container-like shape for storing circular and spherical objects that are dropped into and onto the device **210**. The base **234** has an open top portion (not shown) and a generally flat closed bottom portion (not shown). A lower end portion of the open top main body **220** near the aperture couples with the open top portion of the base **234** such that the open top main body **220** is held in an upward facing position with the rim portion **222** at the top in a level horizontal plane and the aperture at the bottom. Preferably, the base **234** may be welded to the open top main body **220** or the base **234** and the open top main body **220** may be molded as a single-piece structure. Alternatively, the device **210** may comprise intermediate components or telescoping coupling features for coupling the lower end portion of the open top main body **220** with the open top portion of the base **234**.

Additionally, the base **234** has an access feature for retrieving contents, i.e., the circular and spherical objects collected inside the base **234**. For example, the access feature is in form of a door **252** and a lock **254** that allow easy retrieval of the contents and enables secure storage before the contents are retrieved by authorized personnel.

The device **210** further comprises a flange **264** extending horizontally and outwardly about the rim portion **222**. The flange **264** may have a width sufficient to accommodate at least one launching ramp **272** for launching circular and spherical objects onto the open top main body **220**. More specifically, the flange **264** may extend sufficiently to form mounting platforms **266** at corners for accommodating the launching ramps **272**. The flange **264** extending into the mounting platforms **266** at corners is designed such that the overall width of the device **210** is not increased. Such a design involving extension of the flange **264** at the corners does not require additional space, for shipping in boxes or storage that is required by the manifestation of the device that lacks such mounting platforms **266**. Moreover, such a design does not result in increasing the overall diameter of the device **210**; and does not necessitate using any additional floor space with the presence of the mounting platforms **266**.

Due to the mounting of the launching ramps on the flange **264** extending horizontally and outwardly about the upper end of the rim portion **222**, and, more specifically, on the mounting platforms **266**, the device **210** is capable of accommodating the launching ramps **272** outside the rim portion **222** of the open top main body **220**. Such an accommodation of the launching ramps **272** permits the entire surface of the circular portion **224** to serve as a rolling surface for the circular and spherical objects, i.e., the entire surface of the circular portion **224** is unobstructed for rolling objects thereon. The accommodation of the launching ramps **272** finds significance in maximizing the number of rotations of the circular and spherical objects while they descend on an inner surface **294** of the circular portion **224**.

Another use of the device **210** due to the availability of the entire inner surface **294** of the circular portion **224** being unobstructed is for rolling small spherical objects such as marbles and ball bearings as a part of scientific experimentation and orbit observations. A ball bearing held in hand may be launched on the open top main body **220**, similar to the launch of a ball onto a roulette wheel. The ball bearing will roll on the circular portion **224** for several revolutions, until the momentum has decreased to the point that gravitational force on the ball bearing exceeds centrifugal force, and then will follow a downward and inward spiral path of decreasing radius on the circular portion **224** into the aperture.

For example, as shown in FIG. **7**, the device **210** has four launching ramps **272** disposed on four mounting platforms **266** on four corners of the device **210**. The launching ramps **272** extend vertically on the mounting platforms **266**.

The launching ramps **272** have a placement region **274** at a top **276** for placement of circular and spherical objects; and a first ramp in the form of a grooved guiding track **282** extending downwardly and outwardly along a curve of decreasing slope from the top **276** to a bottom **278** of the launching ramps **272**. The grooved guiding track **282** has an upper portion **282***a* steeper than a lower portion **282***b*. The angle of descent along the upper portion **282***a* is represented by line **5-5'**. The lower portion **282***b* has a wall along which the circular and spherical objects rest while exiting from the grooved guiding track **282**. More specifically, the angle of a circular object is along the wall of the lower portion **282***b*, as represented by line **6-6'**. The first ramp further extends as a curved stepped region from the lower portion **282***b* of the grooved guiding track **282**, the curved stepped region extending substantially along a plane of the flange **264**. The curved stepped region defines a curved wall **284** and a curved guiding track **286**. The curved guiding track **286** forms a lower portion of the curved stepped region. The curved stepped region tapers inwardly and finally matches with the rim portion **222** of the device **210**, i.e., the first ramp finally matches with the open top main body **220** substantially along a tangent thereto.

The circular and spherical objects gain the required speed descending down the upper portion **282***a*; and further descend down the lower portion **282***b*, and further along the curved guiding track **286** to exit the launching ramps **272** at a uniform angle. Accordingly, the grooved guiding track **282** provides an initial steeper portion for circular and spherical objects to gain the required speed, and a final less steep portion extending to the curved stepped region and finally matching with the open top main body **220** for exiting the circular and spherical objects at uniform angles onto the inner surface **294** of the circular portion **224**.

The design of the first ramp improves the functionality of the launching ramps **272**, and of the overall device **210** as compared to launching ramps having a ramp design with almost a uniformly sloped surface and a single angle of descent. The improved functionality results from the fact that the present ramp design allows for the incorporation of a shorter launching ramp **272** in the device **210** thereby requiring less material (i.e., lower manufacturing costs) as compared to devices without the present ramp design.

Furthermore, such shorter launching ramps **272** are not required to extend as high to impart the desired speed to the launched object as are launching ramps that lack the present design of the launching ramps **272**. A shorter launching ramp improves the functionality for the end user, in that, for example, the shorter launching ramps **272** are naturally more accessible to children and other shorter individuals.

Due to the launching ramps **272** extending vertically on the mounting platforms **266** and the ramp design, the open top main body **220**, the flange **264** and the launching ramps **272** may be molded as a single piece structure in an efficient and cost-effective manner. Such a manufacturing approach of molding the entire device **210** as a single piece structure results in a considerable reduction in manufacturing costs, while simultaneously providing a more durable and professional product.

Referring again to FIGS. **7** and **8**, a circular object, herein a coin **292**, is shown placed on the placement region **274** and further rolling in direction of the arrow. The placement region **274** may have a label or sticker with the text, such as "Place Coins Here," instructing the users to place the coins over the label or sticker. The coin **292** placed on the placement region **274** rolls down the grooved guiding track **282** and further on the curved guiding track **286**, and finally exits onto the inner surface **294** of the circular portion **224** along the rim portion **222**. Due to gravitational force, the coin **292** follows a downwardly and inwardly spiral path of decreasing radius on the open top main body **220** into the aperture and down into the base **234**. To provide further assistance to the user in launching coins, an open mouth coin-drop area can be created by adding to the ramp a fence similar to the fence **104** depicted in FIG. **5**. The addition of such a fence can make the object launch process easier for children users.

In addition to the first ramp, the launching ramps **272** have a second ramp structurally similar to the first ramp on an opposite side of the first ramp. Accordingly, each of the launching ramps **272** may launch circular objects in two directions, i.e., clockwise and counter-clockwise directions. For example, a total of eight circular objects may be launched at a time using the device **210** having four launching ramps **272** with each launching ramp **272** having two oppositely directed ramps. Accordingly, eight users may play a racing game by launching circular objects (coins) at the same time. Such a launching of multiple circular objects at the same time may provide a lot of fun, excitement, and educational experimental value to the users.

Additionally, aesthetic decorations and/or designs, product and manufacturer information, source identifiers, messages and logos, and the like may be disposed on one or more surfaces of the device **210** for advertising, sponsorship and messaging purposes and to otherwise provide additional revenue generation information. For example, a placard or a sign frame may extend across a diameter of the open top main body **220** and be supported on two diagonally opposite launching ramps **272**. The device **210** may further comprise a skirt **296** extending downwardly preferably from an outer periphery of the flange **264**. The skirt **296** provides an outer surface **298** for disposing messages and logos.

The foregoing descriptions of specific embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed, and obviously many modifications and variations are possible in light of the above teaching. The embodiments were chosen and described in order to best explain the principles of the invention and its practical application, and to thereby enable others skilled in the art to best utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated. It is understood that various omissions, substitutions, and equivalents are contemplated as circumstances may suggest or render expedient, but it is intended to cover the application or implementation without departing from the spirit or scope of the claims of the present invention.

Call Out List: Device for Collecting and Playing with Circular and Spherical Objects with Launching Ramps Thereon

10	device
20	open top main body
22	rim portion
24	upper end of rim portion 22
26	lower end of rim 22
28	circular portion
30	vertical central axis
32	aperture
34	base
36	open top portion of the base 34
38	closed bottom portion of the base 34
39	bottom of the base 34
40	lower portion of the circular portion 28
42	ring
44	outer surface of the circular portion 28
46	first pair of through holes on ring 42
48	second pair of through holes on open top portion 36
52	door
54	lock
56	floor
58	skirt
62	raised ring structure
64	flange
66	mounting platform(s)
72	launching ramp(s)
74	top portion of the launching ramp 72
76	bottom portion of the launching ramp 72
78	curved guiding track
78a	upper portion
78b	lower portion
82	first pair of through holes on the bottom portion 76
84	second pair of through holes on mounting platform 66
86	intermediate bracket
88	placement wall
92	first side wall
94	second side wall
96	first ledge
98	curved wall
102	second ledge
104	fence

-continued

106	plate portion of the fence 98
108	curved arm of the fence 98
112	wall region of the curved arm 106
114	cover region of the stepped curved arm 106
116	four-walled drop region
118	first lug
122	second lug
124	coin
126	inner surface of fence 104
128	deflecting surface
132	inner surface of the circular portion 28
134	sign frame
136	skirt
138	outer surface of skirt 136
210	device
220	open top main body
222	rim portion
224	circular portion
230	vertical central axis
234	base
252	door
254	lock
264	flange
266	mounting platform(s)
272	launching ramp
274	placement region
276	top
278	bottom
282	grooved guiding track
282a	upper portion
282b	lower portion
284	curved wall
286	curved guiding track
292	coin
294	inner surface of the circular portion 224
296	skirt
298	outer surface

What is claimed is:

1. A device for collecting and/or playing with circular and spherical objects,

comprising:

a base comprising an open top portion and a closed bottom portion;

an open top main body comprising

a rim portion, and

a circular portion extending downwardly and inwardly from the rim portion to an aperture concentric with the rim portion and coupling with the open top portion of the base, wherein the open top main body is supported on the base along a common vertical central axis;

a flange extending horizontally and outwardly about the rim portion; and

at least one launching ramp mounted on the flange, the launching ramp extending upwardly, such that the at least one ramp is configured outside the outer circumference of the circular portion, the launching ramp comprising a curved guiding track extending downwardly along a curve of decreasing slope towards the rim portion, such that circular and spherical objects placed on the launching ramp roll down the curved guiding track and exit tangentially onto an inner surface of the circular portion along the rim portion and further through a downwardly and inwardly spiral path of decreasing radius on the inner surface of the circular portion into the aperture and down into the base.

2. The device of claim **1**, wherein the circular and spherical objects comprise at least one of coins, marbles, and ball bearings.

3. The device of claim **1**, wherein the launching ramp comprises a

a top portion having a downwardly extending placement wall surrounded by a first

side wall and a second side wall to configure a three-walled mouth placement region, and

a bottom portion comprising the curved guiding track and a curved wall configuring a stepped region, the curved guiding track forming a lower portion of the stepped region.

4. The device of claim **3**, wherein at least one of the top portion and the bottom portion comprise at least one raised structural feature providing a deflecting surface for directing the circular and spherical objects towards the curved guiding track.

5. The device of claim **4**, wherein the top portion of the launching ramp comprises a first lug extending from an intermediate portion of the first side wall towards three-walled mouth placement region.

6. The device of claim **4**, wherein the bottom portion comprises a second lug extending from a bottom portion of the second side wall towards the curved guiding track.

7. The device of claim **3**, further comprising a fence having a

a plate portion, and a curved arm extending from a bottom of the plate portion, wherein the fence is positioned over the launching ramp, such that,

the plate portion rests over the top portion of the launching ramp to configure a four-walled mouth drop region in combination with the three-walled mouth placement region, and

the curved arm rests over the bottom portion of the launching ramp covering at least a portion of the curved guiding track along a complete length of the guiding track.

8. The device of claim **7**, wherein the curved arm comprises a cover region and a wall region configuring a stepped region, the cover region forming a lower portion of the stepped region, and

wherein when the fence is positioned on the launching ramp the wall region rests upon the curved wall of the bottom portion of the launching ramp, and the cover region covers at least a portion of the curved guiding track of the bottom portion of the launching ramp.

9. The device of claim **1**, further comprising at least one of advertising messages, logos, source identifiers, and manufacturer information on an outer surface of at least one of the base, the open top main body, the flange, and the launching ramp.

10. The device of claim **1**, further comprising at least one of advertising messages, logos, source identifiers, and manufacturer information on an outer surface of a skirt extending from an outer periphery of the flange.

11. A launching device, comprising:

a ramp comprising

a top portion having a downwardly extending placement wall surrounded by a first side wall and a second side wall, configuring a three-walled mouth placement region, and

a bottom portion comprising a curved guiding track and a curved wall configuring a stepped region, the curved guiding track forming a lower portion of the stepped region; and

a fence comprising

a plate portion, and

a curved arm extending from a bottom of the plate portion;

wherein the plate portion rests over the top portion of the ramp to configure a four-walled mouth drop region in combination with the three-walled mouth placement

region, and the curved arm rests over the bottom portion of the ramp covering at least a portion of the curved guiding track along a complete length of the curved guiding track; and

wherein the launching device is mounted outside an outer circumference of a circular body extending downwardly and inwardly from the outer circumference to an aperture, such that circular and spherical objects dropped into the four-walled mouth drop region roll down the curved guiding track and exit tangentially onto an inner surface of the circular body at the outer circumference and further through a downwardly and inwardly spiral path of decreasing radius on the inner surface of the circular body into the aperture.

12. The launching device of claim **11**, wherein at least one of the top portion and the bottom portion comprise at least one raised structural feature providing a deflecting surface for directing the circular and spherical objects towards the curved guiding track.

13. The launching device of claim **12**, wherein the top portion of the launching ramp comprises a first lug extending from an intermediate portion of the first side wall towards the three-walled mouth placement region.

14. The launching device of claim **12**, wherein the bottom portion comprises a second lug extending from a bottom potion of the second side wall towards the curved guiding track.

15. A device for collecting and/or playing with circular and spherical objects, comprising:

a base comprising an open top portion and a closed bottom portion;

an open top main body comprising

a rim portion, and

a circular portion extending downwardly and inwardly from the rim portion to an aperture concentric with the rim portion and coupling with the open top portion of the base, wherein the open top main body is supported on the base along a common vertical central axis;

a flange extending horizontally and outwardly about the rim portion; and

at least one launching ramp mounted on the flange, the launching ramp extending vertically on the flange, the launching ramp comprising a first ramp having a grooved guiding track extending downwardly and outwardly along a curve of decreasing slope from a top to a bottom of the launching ramp, and further extending to a curved stepped region defining a curved guiding track and a curved wall, wherein the curved guiding track forms a lower portion of the curved stepped region, and the curved stepped region tapering inwardly and finally matching with the rim portion of the open top main body,

such that, circular and spherical objects placed on the top of the launching ramp roll down the grooved guiding track and further on the curved guiding track and exit tangentially onto an inner surface of the circular portion along the rim portion and further through a downwardly and inwardly spiral path of decreasing radius on the inner surface of the circular portion into the aperture and down into the base.

16. The device of claim **15**, wherein the circular and spherical objects comprise at least one of coins, marbles, and ball bearings.

17. The device of claim **15**, wherein the launching ramp further comprises a second ramp on an opposite side of the first ramp, the second ramp having a grooved guiding track extending downwardly and outwardly from a top to a bottom of the launching ramp, and further extending to a curved stepped region defining a curved guiding track and a curved wall, wherein the curved guiding track forms a lower portion of the curved stepped region, and the curved stepped region tapering inwardly and finally matching with the rim portion.

18. The device of claim **17**, wherein circular and spherical objects placed on top of the launching ramp roll down at least one of the first ramp and the second ramp.

19. The device of claim **17**, wherein the device has four launching ramps mounted on the flange, each launching ramp comprising at least one of the first ramp and the second ramp.

20. The device of claim **15**, further comprising at least one of advertising messages, logos, source identifiers, and manufacturer information on an outer surface of a skirt extending from an outer periphery of the flange.

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