March 16, 1971 A. L. SHOOK 3,570,171

AMUSEMENT DEVICE

Filed Jan. 24, 1969 3 Sheets-Sheet 1

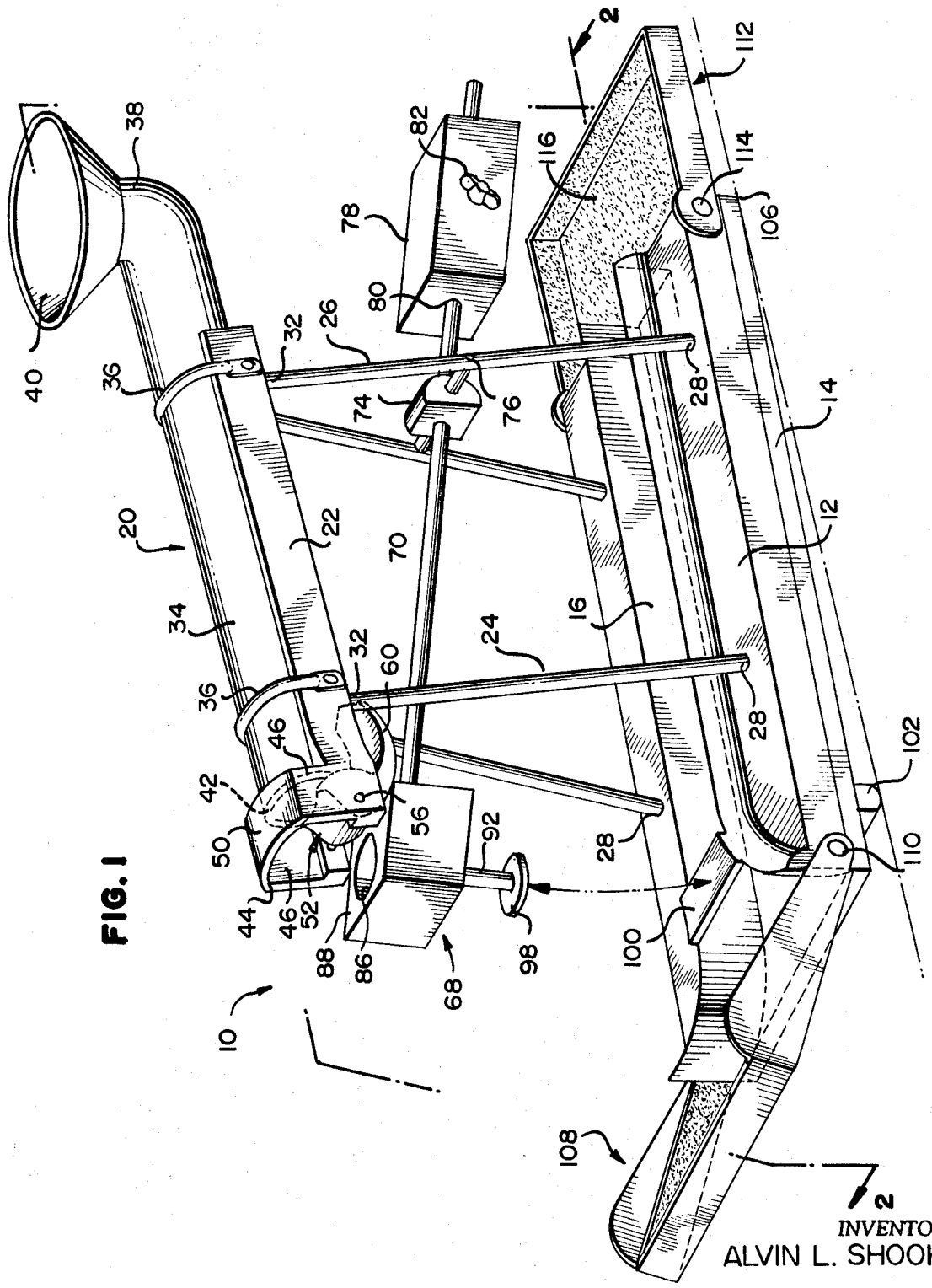


FIG. 1

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AMUSEMENT DEVICE

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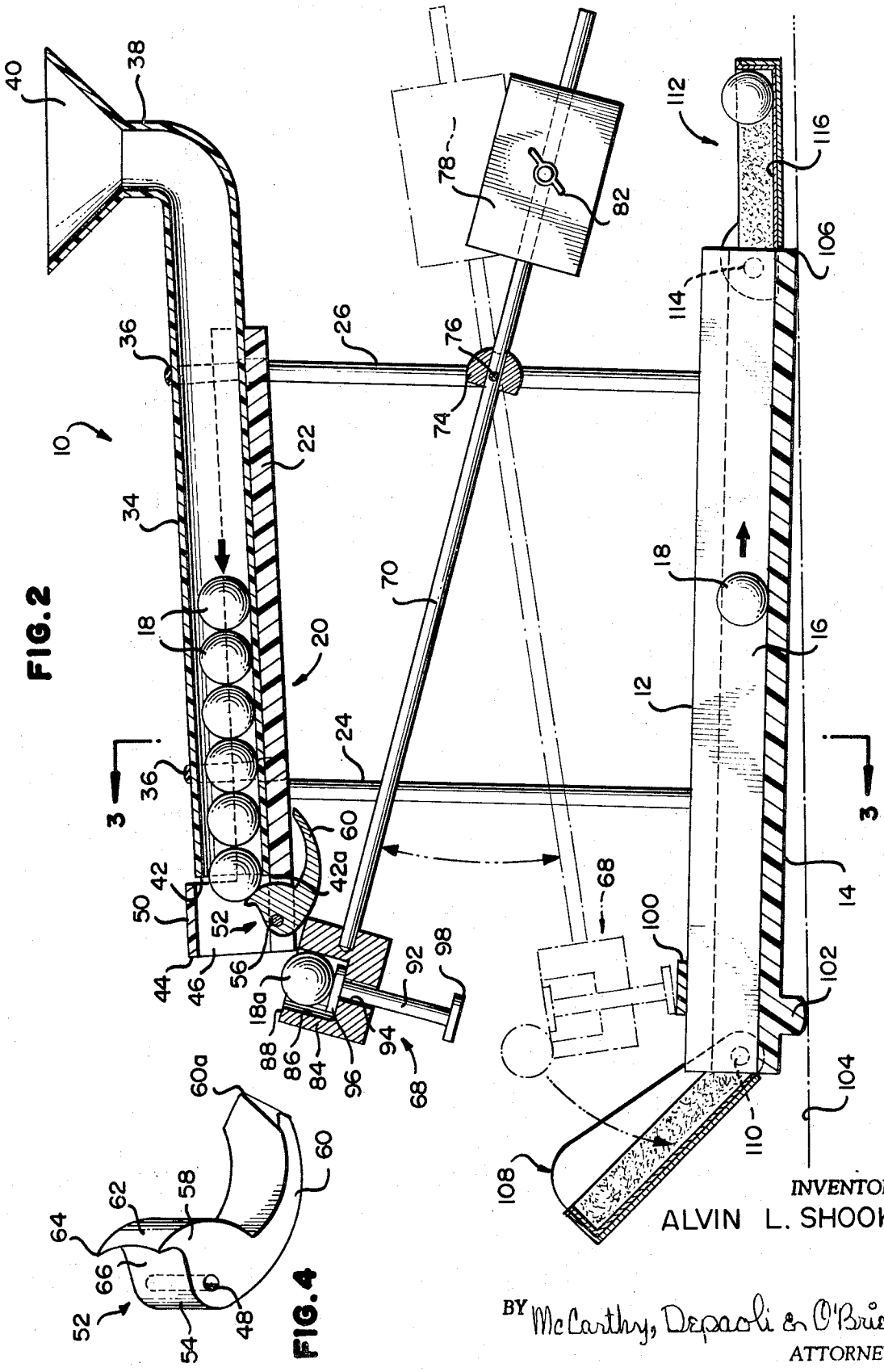


FIG. 2

FIG. 4

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March 16, 1971 A. L. SHOOK 3,570,171

AMUSEMENT DEVICE

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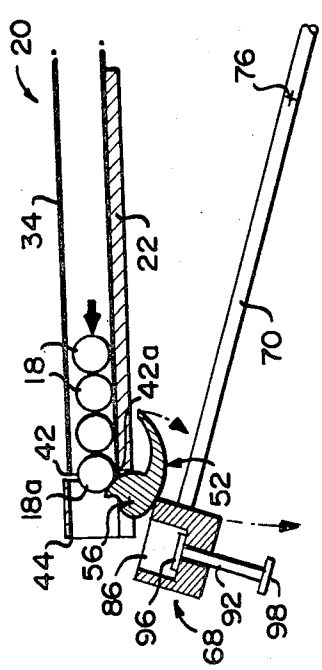


FIG. 5A

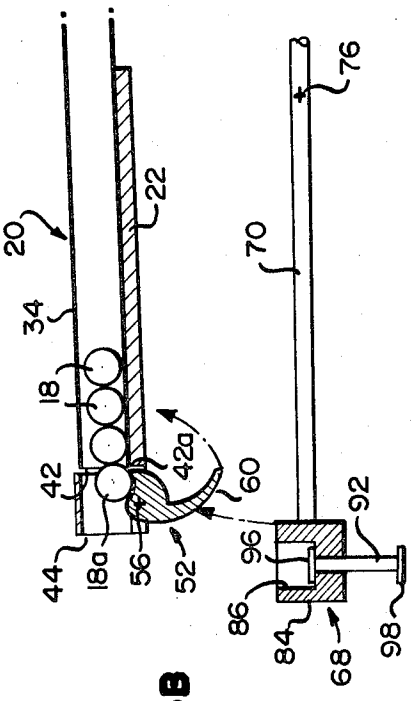


FIG. 5B

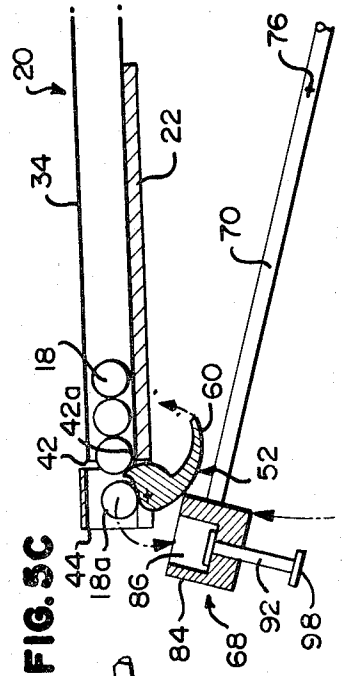


FIG. 5C

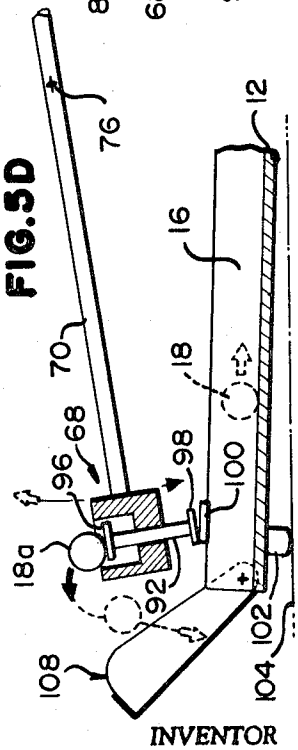


FIG. 5D

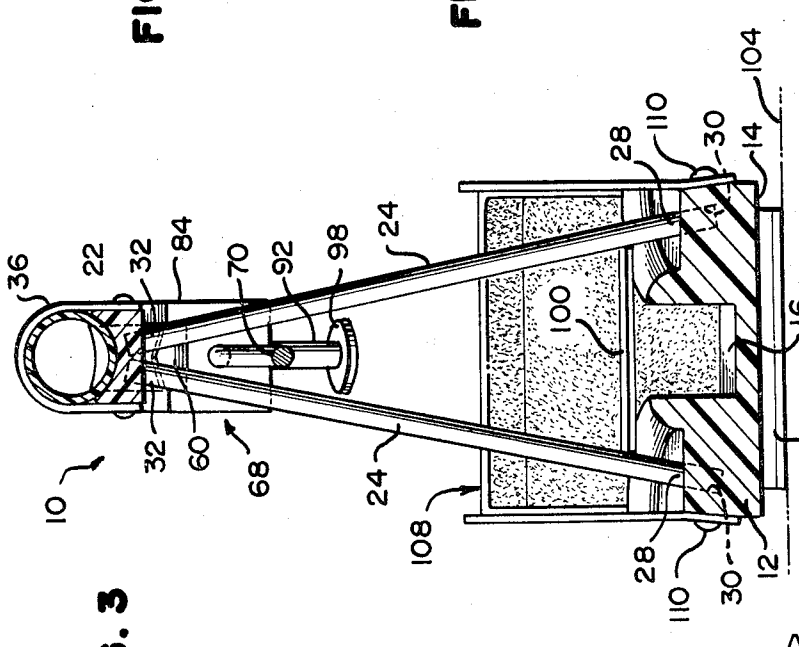


FIG. 3

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Patented Mar. 16, 1971

3,570,171

AMUSEMENT DEVICE

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Filed Jan. 24, 1969, Ser. No. 793,753
Int. Cl. A63h 29/08
U.S. Cl. 46—42 6 Claims

ABSTRACT OF THE DISCLOSURE

A ball amusement device including a declined chute overlying a base and having a discharge end guarded by a pivoted catch that permits only one by one gravitational discharging of balls loaded in the chute and a ball transfer lever pivotally mounted intermediate its ends for free vertical swinging movement between the base and the chute with the lever having a ball receiver on one end and a counter-weight on its other end and being moved by the counter-weight to a position wherein the receiver strikes the catch to effect release and transfer of one ball from the chute into the receiver with the thusly weighted receiver moving downwardly toward the base and having a slidable discharge plunger that, upon striking the base, ejects the ball therefrom, the lever operating in continuous seesaw movement to transfer the balls from the chute to the base with the balls collecting in a collection tray mounted on one end of the base under an input hopper end of the overhead chute.

BACKGROUND OF THE INVENTION

(1) Field of the invention

The present invention relates generally to new and novel improvements in amusement devices and, more specifically, is directed to new and novel improvements in amusement, educational and entertainment devices of the spherical ball type.

(2) Description of the prior art

The state of this art is well known and is exemplified by many patents and publications relating to ball type amusement and educational devices, wherein balls gravitate from an inclined chute onto an underlying base member of some sort by means of a connection arrangement of a gravational ramp-like nature between the lower discharge end of the chute and the base member.

The instant invention basically relates to novel improvements in such general type of amusement devices with such improvements primarily residing in the manner of effecting a orderly, entertaining and educationally worthwhile transfer in one by one continuous fashion of the ball elements from an overhead chute to an underlying base member. The transfer is effected in a way that is not only amusing to watch but in a way that is educational in that the mechanics of the transferring ball enable an amused watcher, regardless of age, to develop an arithmetic sense of counting and values. Further, more in-depth exploratative analysis and deliberative watching of the mechanics-in-action of the device will serve to develop in the onlooker a keener appreciation of the principles of physics which are involved in effecting the transfer of ball elements from the overhead chute onto the underlying base.

Consequently, the present invention improves upon the state of the art, with respect to ball amusement and educational devices of this general nature, in that it provides a very novel mechanical means for effecting the one by one orderly and continuous transfer of the ball or similar elements from the discharge lower end of an overhead chute onto an underlying base member.

SUMMARY OF THE INVENTION

The present invention employs as a basic sttructural setting a base having a track-way on which ball elements can travel as they are discharged from the lower discharge end of a chute that overlies the base and is disposed in an inclined vertically spaced position relative to the base. The orderly transfer in one by one continuous fashion of the ball elements from the chute to the base track is effected by virtue of a catch member that is pivotally carried by the discharge end of the chute and restrains the ball elements so as to prevent the free gravitational discharge thereof and controls the discharge movement of the ball elements so as to discharge the ball elements in one by one consecutive and orderly fashion. The discharge is effected or carried out by virtue of a lever which is pivoted intermediate its ends to the vertical supporting structure, which fixedly supports the chute above the upper surface of the base, with the lever having a pocket provided ball receiver on one end and carrying an adjustable counter-weight on its other end. The adjustable counter-weight effects the initial impact of the catch by the receiver so as to cause the catch to pivot from a locking position in relation to the line of engaging ball elements in the chute into a position wherein a pocket in the catch receives and holds one of the ball elements with the catch restraining the other ball elements from further movement. The receiver is again brought into engagement with the catch so as to swing the catch about its pivot into a further position wherein the captured ball element is discharged by the catch into the pocket of the ball receiver on the end of the lever. The ball in the receiver offsets the counter-weight and causes the thusly weighted end of the lever to move downwardly toward the upper surface of the base. As the receiver approaches the upper surface of the base, a slidable ejector rod, which is carried by the receiver pocket and which terminates inwardly of the receiver pocket in a false bottom for the receiver pocket, is brought against a striker plate so that the rod with the supported false bottom is moved upwardly within the receiver pocket, thereby causing the ball element to be forcibly ejected from the receiver pocket before the receiver pocket reaches a position where it can come into contact with the upper surface of the base. The ejected ball elements is dislodged against an adjustably inclined end of the base that gives it an impetus to travel in a longitudinal trackway in the base and ultimately arrive in a collection tray that is adjustably carried by the opposite end of the base and which underlies an inlet hopper end of the overhead chute.

The release of the ball element from the receiver pocket lightens the receiver pocket and the counter-weight and is then effective to cause the receiver end to move upwardly back into an impacting position relative to the catch.

The lever will continue, in an automatic fashion, to move about its fulcrum in a seesaw manner and in so doing automatically empty the chute and transfer the ball elements from the chute to the base in one by one, consecutive and orderly fashion. Such movement of the lever is not only fascinating and entrancing to watch but also has enormous educational value in that it is conducive to teaching various simple principles of physics such as machine principles of moments and work, leverage principles, principles of motion and the like. Further, in a basic educational fashion, the lever, as it transfers the ball elements from the overhead chute to the base member, can be utilized as a counter so as to enable a small child to learn to count.

Accordingly, an important object of the present invention is to provide an entertaining and educationally worthwhile mechanical arrangement for effecting an

automatic, orderly and one by one consecutive transfer of ball elements from an overhead chute to an underlying base member.

A further important object of the present invention is to provide a very simple, sturdy and most efficient amusement device, which is built to withstand considerable wear and strain and which is built so as to effect without any outside power source an automatic machine transfer of ball elements from the overhead chute to the underlying base member in a very captivating and mind-training manner.

Ancillary to the foregoing objects and commensurate therewith, further objects of the present invention are to provide novel but simple mechanical arrangemnets for retaining the ball elements in the chute and for releasing them in one by one fashion into the receiver pocket of the lever and for pivotally arranging the lever and so constructing and mounting it that it automatically functions in a seesaw manner and to provide means for ejecting the ball elements from the receiver pocket of the lever as the receiver pocket approaches the base.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the ball amusement device of the present invention.

FIG. 2 is a longitudinal vertical sectional view, taken substantially on line 2—2 of FIG. 1 and with parts of the device being shown in side elevation and the receiver pocket being shown in striking engagement of the catch on the discharge end of the chute, such position being that which the lever would assume in initiating the operation of the amusement device.

FIG. 3 is a transverse, vertical cross-sectional view, taken substantially on line 3—3 of FIG. 2.

FIG. 4 is a perspective view of the catch element per se, which is pivotally disposed at the discharge end of the chute so as to guard the discharge end and restrain the ball elements from free gravitational movement from the chute and to transfer them in orderly one by one consecutive fashion from the chute into the pocket of the receiver on the end of the lever.

FIGS. 5A to 5D are diagrammatic illustrations of the operation of the transfer arrangement including the pivoted catch and the lever assembly and illustrate diagrammatically how the ball elements are transferred in one by one orderly and consecutive fashion from the overhead chute to the underlying base, with the lever operating in automatic and continuous seesaw fashion.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the accompanying drawings, the amusement device, generally desigated by the reference numeral **10**, includes a base **12** which can be formed in known ways from suitable materials, such as being molded in one piece from plastics. The base **12**, as shown particularly in FIG. 3, has a flat bottom **14** and is formed with a central, longitudinally extending trough **16** which defines a return runway for spherical ball elements **18**, which may be of any type or nature, such as conventional marbles.

The ball elements **18** are housed in a single self-engaging line fashion within a chute assembly **20** that is positioned above the upper surface of the base **12**. The chute assembly **20** includes a U-shaped supporting trough **22** which is supported in a declined plane relative to the horizontally positioned base **12** by forward and rearward pairs of bipod arranged legs **24** and **26**. The spaced divergently related lower ends **28** of the legs are socketed in suitable socket openings **30** provided in the upper surface of the base and the convergent upper ends **32** of the legs are socketed in suitable sockets provided in the lower portion of the trough **22**. The rearward pair **26** of legs is higher than the forward pair **24** so that the trough is supported in a declined plane.

A cylindrical tube **34**, in which the spherical ball elements **18** are directly housed, is cradled in the trough and held therein by virtue of U-shaped clamping straps or brackets **36**. The tube **34** has a rearward upper end portion **38** which terminates in a vertically disposed frusto-conical inlet hopper **40** into which the ball elements **18** are manually deposited either in one by one fashion or collectively and from which the ball elements roll into the chute tube **34** where they are oriented in engaging alignment, as shown particularly in FIG. 5A.

The lower discharge end **42** of the tube **34** terminates inwardly of the extending end portion **44** of the trough, such end portion being defined by projecting axial extensions or ear-like projections **46** of the side walls of the trough which ear-like projections **46** are provided with transversely aligned apertures **48**. A reenforcing web **50** upstands from the projections **46** and has its bight portion disposed above the outlet or discharge opening **42** of the tube, so that the projections **46**, which are bent slightly outwardly from the planes of the side walls, and the web portion **50** do not interfer with or impede the gravitational movement of the ball elements from the discharge end **42** of the chute tube **34**.

A catch member **52** is provided for the purpose of restraining the ball elements and then discharging the ball elements in one by one, consecutive, orderly and automatic fashion as illustrated in FIGS. 5A to 5C. The catch member **52** is of tongue-like configuration and includes a body portion **54** which is disposed between the ear-like projections **46** and pivoted therebetween for free rotational movement on a pivot pin **56** fitted in the apertures **48**. The body portion **54** has a head portion **58** on one side of the pivot **56** and a long arcuate tail portion **60** on the other side of the pivot. The head portion is formed with a slightly curved outer surface **62** that meets at a sharp edge **64** with an inner arcuate surface **66**, the latter defining a pocket for reception of the ball elements, as shown in FIGS. 5B and 5C. The tail portion **60** projects from the body portion and is struck on a wide arc and terminates in a free pointed extremity **60***a*.

The catch member is controlled by a lever transfer mechanism **68**, which is pivotally carried by the rearward pair of uprights or support legs **26**, and which adapted to swing vertically between the chute assembly and the underlying base in effecting a transfer of the ball elements in one by one and orderly fashion from the upper level in which the chute arrangement is disposed to the lower surface level of the base.

The lever mechanism **68** includes a long lever **70** which is provided with opposing end portions **72** and **74** and which is provided adjacent the end portion **72** and intermediate the same and the center of mass of the lever with a mounting block **74** that is journalled on a pivot pin **76** which is transversely fixed between the opposing rearward legs **26**. The end portion **72** of the lever which is the end portion to the rear of the fulcrum **76** carries an apertured lead counter-weight **78** which is slidably adjustable on the lever, the weight having a central, longitudinally extending bore **80**, slidably receiving the lever and being provided with a hand set screw **82** extending through one side of the weight to lockingly engage the lever so as to lock the weight in selected positions along the longitudinal extent of the lever end portion **72**, depending upon the size and weight of the ball elements **18**.

The opposite end of the lever **70** carries a fixed ball receiver **84** which is in the form of a square block arranged perpendicular to the lever and attached at one side wall to the end thereof. The receiver **84** is formed vertically with a ball receiving and containing pocket **86** which opens through the top wall **88** of the block.

Means is provided and is carried by the ball receiver **84** for dislodging and ejecting contained balls from the pocket **86** when the ball laden receiver approaches the base. Such means includes an ejector rod **92** which is

slidably positioned in a bore **94** formed in the bottom wall of the receiver. The ejector rod is freely slidable in the bore **94** and has an inner end provided with a transverse head **96** that constitutes a false bottom for the pocket **86**. The outer end of the rod terminates in a transverse foot **98** which is adapted to strikingly engage a striker plate **100** fixed transversely on the base across the runway **16** adjacent the front end of the base, as shown in FIGS. 1 and 2.

The bottom surface **14** of the base is provided adjacent the front end of the base with depending legs **102** which are adapted to seat on a horizontal supporting surface **104** along with the rear end portion **106** of the under surface of the base, as shown in FIG. 2. Thus, the base is securely mounted on a horizontal supporting surface **104** in a slightly inclined position extending slightly downwardly from the front to the rear end thereof.

A rebound channel or trough plate **108** is pivotally fixed by pivot pins **110** to the sides of the base adjacent the front end and is adapted to be positioned at various angles relative to the base. A collection tray **112** is pivoted by pivot pins **114** to the sides of the base at the rear end thereof and has its interior covered with a felt cloth **116** or similar cushioning liner. The collection tray **110** is normally disposed horizontally in its working relationship with the base as shown in FIG. 2, while the rebound tray **108** is disposed in an angular position relative to the base such as that shown in FIG. 2. During transportation or storage of the device **10**, both the rebound trough **108** and the collection tray **112** can be swung into angularly inturned or perpendicular positions with respect to the base so as to reduce the overall length of the device.

Before actual operation, which can best be appreciated from a consideration of FIGS. 5A to 5D, the ball elements **18** are loaded in the tube **34** and the forwardmost ball element **18***a* is directly captured or restrained by the arcuate under surface **62** of the head portion **58** of the catch member **52**. The catch member is held in the position shown in FIG. 5A by virtue of the engagement thereof by the receiver **68** which is held up by the counterweight **78**. In such held position, the catch member serves as a guard to block and restrainingly hold the line of ball elements against movement.

The device **10** is then placed in operation by applying a slight upward manual pressure on the weighted end portion **72** of the lever **70** which causes the receiver to move away from the catch member. With the holding pressure removed from the catch member, as the receiver end of the lever moves slightly away from the catch member, it swings about the pivot **56**, since the mass of the body portion and tail portion are disposed on the same side of the pivot **56**, and swings downwardly in a clockwise direction, moving the tail portion into a substantially perpendicular position, as shown in FIG. 5B. In such position of the catch member **52**, the interior arcuate pocket portion **66** is in receptive registery with the line of ball elements and gravitationally receives and contains the initial ball element **18***a*. It is to be noted that the distance from the pivot **56** for the catch member **52** to the edge **42***a* of the discharge opening is smaller than the ball element and in no event can the ball element drop therethrough. Upon the return movement of the receiver, under the weight action acting on the short end portion **72** of the long lever, the upper wall of the receiver will strike the free extremity of the tail portion **60**, as shown in FIG. 5B, and will move the catch member in a counterclockwise direction, thereby moving the body and head portions upwardly and causing the head portion to dump the ball element **18***a* into the pocket **86** of the receiver, as illustrated diagrammatically in FIG. 5C. The catch member will swing back into the position of FIG. 5B to receive and retain the next succeeding ball element in its pocket **64** while preventing the line of ball elements from leaving the chute until the receiver returns to strike the tail portion.

The receiver **86**, which is overweighted by the contained ball element **18***a*, overcomes the weight of the counterweight **78** and the receiver end of the lever starts to descend towards the upper surface of the base. As the receiver approaches the base, the foot portion **98** of the ejector rod **94** strikes the striker plate **100** and moves the rod **94** upwardly in the pocket with the false bottom **96** being moved upwardly in the pocket to eject the contained ball element **18***a*, as shown in FIG. 5D. The ball element, as it is ejected or expelled from the receiver pocket, impinges on the upwardly inclined rebound tray **108** and is given a rolling impetus so as to travel down the return runway **16** into the interior of the collection tray **110**.

The lever **70** will continue in its seesaw action to effect release of one ball after another from the chute tube **34** and to transfer the released balls to the base with the ball retained by the receiver in its lowering of the balls being automatically ejected therefrom. Such operation of the device **12** will be a continuous one that will delight onlookers as they watch a ball element being repeatedly brought down from the chute assembly and automatically finding its way to the collection tray. During the return of the ball elements to the collection tray or after all of the ball elements arrive thereat, the ball elements can be singly or collectively dropped back into the loading hopper **40** for the chute assembly.

What is claimed is:

1. An amusement device comprising a base member adapted to be supported on a substantially horizontal supporting surface, a chute assembly for spherical ball elements mounted above the base member and fixedly disposed in an inclined position vertically spaced above the base member and adapted to contain a plurality of ball elements, said chute assembly having a bottom trough on which the ball elements roll and having an open lower discharge end through which the ball elements are adapted to gravitate, means operatively disposed at said discharge end for restraining the ball elements from free falling movement from the chute assembly and for discharging the ball elements in one by one fashion through the discharge end, a ball element transfer lever mounted intermediate its ends on a fixed horizontal axis located between the chute assembly and the base member with the lever being mounted for free vertical swinging movement in a vertical plane between the chute assembly and the base member, a ball element receiver carried by one end of the lever, a counter-weight adjustably carried by the other end thereof, said counter-weight being operative to cause the receiver to engage and actuate the ball element restraining means whereby a ball element is discharged from the chute assembly and deposited into the receiver which then is overweighed to overcome the counter-weight and moves toward the base member, said base member having a runway lengthwise underlying the ball transfer lever and said runway having a pivoted impact portion at one end in advance of the base engaging position of the receiver and against which a ball element ejected from the receiver is adapted to impinge and said runway having a ball element collection means at the other end thereof, and means carried by the receiver and operative in response to the movement of the receiver itself into a base engaging position for automatically ejecting a ball element from the receiver and depositing it on the impact portion of the runway for travel on the runway to the collection means thereby unburdening the receiver which is moved back into engagement of the ball restraining means by the counter-weight.

2. The device of claim **1** wherein said ball restraining means includes a catch member swingably mounted and bodily positioned in advance of the discharge opening and having a head portion and a tail portion, a pivot transverse to the trough and lying therebelow on which the catch member is swingably mounted at its head portion with the tail and mass of the catch member on the

upstream side of the pivot, said head portion having an inner ball receiving pocket within which a ball is adapted to set with the tail portion depending below the pivot and being adapted to be struck and engaged by the receiver so as to move the ball containing catch member about its pivot.

3. The device of claim 1 wherein said receiver includes a body portion carried by the end of the lever and having an upper end wall, said body portion having a cup-like bore formed vertically therein and passing through the upper end wall for receiving and seating a ball released by the ball restraining means, and said last means includes an apertured bottom wall on the body portion, a rod freely slidable in the aperture and having a headed inner end disposed within the bore and defining a false bottom therefor and having an outer end having a transverse foot portion, said foot portion being adapted to strike a part of the base member to cause the rod to slide in the bore and eject a contained ball element therefrom.

4. The device of claim 3 wherein said collection means is a pivoted tray and said impact portion is a pivoted plate and a striker plate overlying the runway adjacent the impact plate and upon which the foot portion of the

rod seats to eject the ball from the receiver onto the impact plate.

5. The device of claim 1 wherein said last means includes said receiver being formed as a ball receiving cup and having an open top wall into and from which a ball element passes, said ball receiving cup having an apertured bottom wall and an ejector rod freely slidable in said aperture and adapted to strikingly engage the base member as the ball containing receiver approaches the base member and be moved up in the cup to eject the contained ball element therefrom.

6. The device of claim 5 wherein said ejector rod has a head portion defining a false bottom for the cup and a foot portion adapted to impact the base member.

References Cited

UNITED STATES PATENTS

1,244,457	10/1917	Bain	46—42
1,392,727	10/1921	Welsh	46—42
1,478,350	12/1923	Okel	46—42
1,534,097	4/1925	Wilhelm et al.	46—42

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