March 9, 1965 M. I. GLASS ETAL 3,172,665

COMBINED TARGET AND BALL THROWING TOY

Filed Sept. 21, 1960

Fig 1

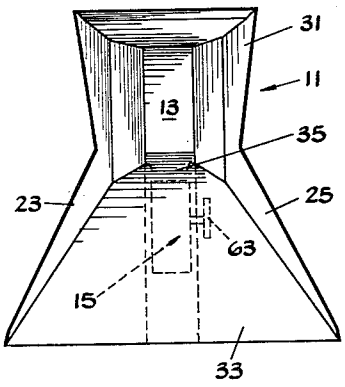


Fig 2

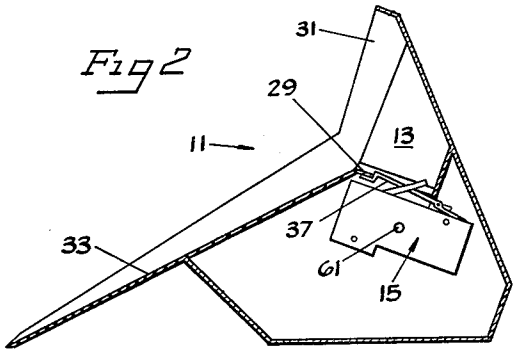
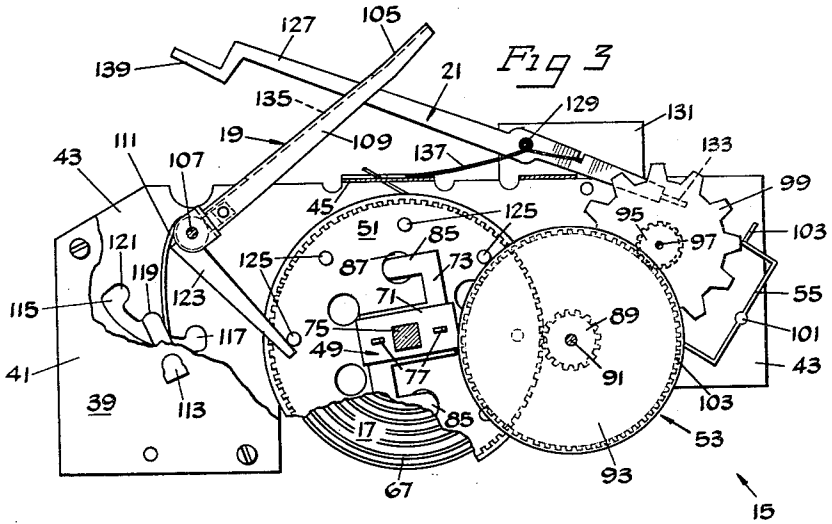


Fig 3



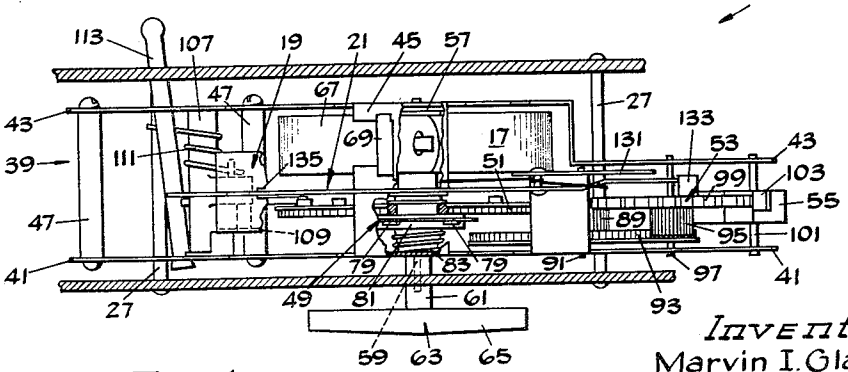


Fig 4

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COMBINED TARGET AND BALL THROWING TOY

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This invention relates generally to ball-throwing toys. More particularly, the invention relates to toys or devices adapted for receiving a ball in a receptacle and for automatically ejecting the ball from the receptacle. Toys of this type are very attractive to youngsters, as well as to grownups, as they make it possible for a single individual to engage in various challenging physical activities, such as playing "catch" and practicing "batting." In addition, the toy disclosed herein, as will be seen, is also adapted for play by preschool children.

Prior ball-throwing or ball-returning devices can be generally grouped in two categories. In one category, the devices are generally large, complicated machines operable in response to actuation of a switch or lever by the player to individually throw one or more balls from a magazine of one sort or another. The other category of devices are generally dependent upon the energy of the arriving ball to cause returning of the ball to the player. In general, none of the previous devices provides a portable self-contained unit which is capable of repeatedly throwing or returning balls arriving in the device. Nor are the previous devices adapted to permit play by small children by rolling a ball into the device and then chasing the ball after it is thrown from the device.

Accordingly, the principal object of the invention is the provision of a ball-throwing toy. A further object of the invention is the provision of a self-contained portable unit which can be pre-powered and is operable to eject balls as they enter the unit. Another object of the invention is the provision of a ball-throwing device which can be adjusted to vary the distance over which a ball is thrown.

Further objects of the invention include the provision of a toy of the type preferred to above which can be safely played with by young children, and which is of economical, and yet sturdy, construction. Other objects and advantages of the invention will become apparent by reference to the following description and accompanying drawings of one embodiment of the invention in which:

FIGURE 1 is a front view of a toy incorporating the features of the invention;

FIGURE 2 is a side view of the device shown in FIGURE 1, with certain parts omitted and with certain parts in section;

FIGURE 3 is an enlarged side view, partially broken away and sectioned, of the interior operating mechanism contained within the toy shown in FIGURE 1; and

FIGURE 4 is a top view, partially in section and partially broken away, illustrating the interior mechanism shown in FIGURE 3.

As shown in FIGURES 1 and 2, a ball-throwing toy or device in accordance with the invention includes a free standing housing or casing 11 which can be placed on any flat supporting surface, such as a floor or the ground, and which incorporates a pocket or recess 13 adapted for receiving a ball which is automatically returned to the player. Supported by the housing 11 is a mechanism 15 for propelling an incoming ball toward a player located in front of the unit. Basically, the mechanism includes suitable power means, such as a spring wound motor 17, capable of releasably storing energy, means 19 actuated by the power means so as to cause throwing of a ball from the pocket, and means 21 responsive to the entrance

of a ball into the pocket 13 for actuating the power means so as to drive the ball throwing means 19.

The housing 11 can be readily fabricated in various ways from various materials, such as plastic, sheet metal, and wood. In the disclosed construction, the housing comprises two mating plastic sections which are secured together by suitable fastening means, indicated by the numeral 27 in FIGURE 4. The assembled housing 11 includes the beforementioned pocket 13 which incorporates an upwardly inclined floor or surface 29 for guiding a ball upwardly as it is propelled from the housing. Surrounding the entrance to the pocket 13 is an outwardly flaring structure 31 adapted for guiding an incoming a ball into the pocket, which structure includes a forwardly extending inclined ramp or scoop 33 by means of which a ball can be rolled upwardly into the pocket and into position for ejection from the housing by the mechanism 15. Thus, a ball can be located in the pocket for discharge by either rolling the ball up the ramp 33 or by throwing a ball at the housing so that it will be guided by the structure 31 into the pocket 13.

The upwardly inclined floor 29 of the pocket 13 includes a trough 35 which provides a pair of parallel shoulders adapted for supporting the ball as it travels within the pocket. In the bottom of the trough 35 there is an elongated slot 37 through which extend components of the ball-throwing means 19 and the spring motor release means 21.

As seen particularly in FIGURES 3 and 4, the mechanism 15 is carried in a frame 39 including two side members or plates 41 and 43 which are integrally interconnected by a transverse strip or plate 45 and are rigidified by several cross studs 47. The frame 39 is supported within the housing by the fastening means 27 which secures together the mating sections 23 and 25 of the housing 11. The frame 39 serves to support the various components of the mechanism 15 including the spring motor 17 which is connected through a one-way clutch 49 to a main gear 51. In turn, the main gear 51 is connected to a gear train 53 including a speed regulating bracket 55 of the escapement type.

More particularly, the spring motor 17 includes a cross shaft 57 which is journalled at one end in the side plate 43. At its other end, the cross shaft 57 includes a portion 59 of reduced diameter which is journalled in a bore within the stem 61 of a winding key 63. The stem of the winding key is journalled in the side plate 41 and is connected at its outer end to a cross bar 65 forming a handle by means of which energy can be stored in the spring motor.

The cross shaft 57 is connected to the inner end of a coiled main spring 67 which, as shown best in FIGURE 4, includes at its outer end an ear or tab 69 which is anchored in a slot in the transverse strip 45. Preferably, the main spring 67 is designed so that one winding will serve to store energy sufficient to throw a dozen or more balls from the housing.

The cross shaft 57 is connected for rotation with the winding key 63 through the one-way clutch 49 which also serves to drive the main gear 51. The clutch 49, as best shown in FIGURE 3, includes a plate or bar 71 having fixed thereto a ratchet 73 of thin resilient material. The bar 71 has a non-circular opening therein which is slidably engaged upon the mating configuration of an intermediate portion 75 of the cross shaft 57 so as to prevent rotation therebetween. Projecting from the bar 71 in the direction of the side plate 41 are a pair of lugs 77 which are adapted to be interfitted in a pair of mating recesses 79 in an enlarged hub or head 81 at the inner end of the stem 61 of the winding key 63. Interengagement of the lugs 77 in the recesses 79 is maintained by a helical spring 83 which surrounds the stem 61 and is interposed between the enlarged head 81 and the side plate 41. Thus, when

the winding key 63 is rotated in a clockwise direction, energy is stored in the main spring 67.

As previously noted, the energy in the main spring 67 is transmitted to the main gear 51 through the one-way clutch 49. In this regard, the main gear 51 is rotatably carried on the cross shaft 57 in facing relation to the ratchet 73 which includes two prongs or dogs 85. The end of each of the prongs 85 is rounded and bent toward the side plate 43 for interengagement with a series of circular holes 87 in the main gear 51. During unwinding of the main spring 67 when the cross shaft 57 is driven counterclockwise, the ends of the prongs 85 engage the holes 87 to drive the main gear 51 in the same direction. During winding of the main spring 67 by the key 63, the prongs 85 slip over the adjacent face of the main gear 51. Also to be noted is the further function of the spring 83 which additionally serves to retain the bar 71 and attached ratchet 73 in closely adjacent relation to the main gear 51.

When the main gear 51 rotates, it drives the gear train 53 which includes a pinion 89 mounted on a first transverse shaft 91 journalled in the side plates 41 and 43. Mounted on the first transverse shaft 91 is a gear 93 which, in turn, drives a pinion 95 mounted on a second transverse shaft 97 journalled in the side plates 41 and 43. The second transverse shaft supports a gear 99 which, as best seen in FIGURE 3, is engaged by the escapement bracket 55. As shown, the escapement bracket 55 is mounted on a pivot rod 101 carried by the side plates 41 and 43 and includes two spaced pallets 103 which interact with the teeth of the gear 99 to regulate or control the rate of unwinding of the spring motor 17.

Throwing of a ball from the pocket 13 is accomplished by movement of an elongated lever or member 105 which extends through the slot 37 in the bottom of the pocket 13 for engagement with a ball located in the pocket. The lever 105 is carried on a cross rod 107 journalled in the side plates 41 and 43 and includes along one side thereof a depending flange 109 which strengthens the lever against lengthwise flexure.

The throw lever 105 is biased by suitable means, as seen in FIGURE 3, for counterclockwise rotation so as to throw a ball from the pocket 13. In the disclosed construction, this means for biasing movement of the throw lever 105 comprises a spring 111 having several convolutions disposed around the cross rod 107. At one end, the spring 111 engages the undersurface of the throw lever 105, while at the other end, the spring 111 is engaged by a shiftable cross bar 113.

The incorporation in the disclosed construction of the shiftable cross bar 113 makes possible, as will be seen, selective variation in the magnitude of the throwing force applied to a ball by the throw lever 105, whereby affording control of the distance over which the ball is thrown. One end of the shiftable bar is pivotally connected to the side plate 41, while the other end projects through an arcuate cut-out 115 in the side plate 43, and through a suitable opening in the adjacent wall of the housing to permit shifting of its position. The arcuate cut-out 115 is generally concentric with the axis of the cross rod 107 and includes, along its concave edge, several notches 117, 119, and 121 into which the other end of the shiftable cross bar can be located. As seen in FIGURE 3, the tensioned condition of the throw lever biasing spring 111 acts to retain the shiftable bar 113 in any selected notch. Positioning of the shiftable bar in the notch 117 will increase the tension in the spring 111 to provide for greater travel of a ball thrown from the housing, while positioning of the shiftable bar 113 in the notch 121 will result in a condition of less tension in the spring 111 and a resultant decrease in the distance travelled by a ball incident to ejection from the housing.

Fixedly extending from the throw lever 105 is an arm 123 which projects for releasable engagement by a series of studs or projections 125 spaced evenly around the main gear 51. Engagement of the arm 123 by one of the studs 125 incident to unwinding of the spring motor, i.e., counterclockwise rotation of the main gear, causes the throw lever 105 to be rotated clockwise against the action of the spring 111, thereby powering the spring 111 for effecting subsequent ball throwing movement of the throw lever 105. As the main gear rotates counterclockwise during continued unwinding of the spring motor, the arm 123 rides off the previously engaged stud 125, thereby permitting the throw lever biasing spring 111 to rapidly move the throw lever 105 in a counterclockwise direction so as to throw a ball from the pocket.

Release of the wound spring motor 17 for each ball throwing cycle is accomplished by an elongated release lever or member 127 which is pivotally carried intermediate its ends on a stud 129 projecting from a bent portion 131 of the side plate 41. In its normal position, the release lever 127 extends rearwardly from the stud 129 for engagement with an ear 133 on one face of the gear 99 so as to prevent unwinding of the spring motor. At its other end, the release lever 127 extends forwardly through the slot 37 in the bottom of the trough in the pocket 13 and through an elongated opening in the throw lever 105 so that a ball entering into the pocket will pivot the release lever 127 in the counterclockwise direction. This movement of the release lever 127 incident to the entrance of a ball, disengages its rearward end from the ear 133 on the gear 99 to permit unwinding of the spring motor, thereby causing throwing of an incoming ball from the device.

Biasing means in the form of a light spring 137 carried by the stud 129 is utilized to locate the release lever 127 in its normal position with its rearward end engaging the ear 133 on the gear 99 so as to prevent unwinding of the spring motor. The forward end of the release lever 127 includes a hooked portion 139 which engages the underside of the housing 11 adjacent the adjacent end of the slot 37 so as to prevent over-travel of the release lever beyond its normal position.

In operation, the spring motor 17 is first wound up by rotating the winding key 63 in the clockwise direction. During this operation, the prongs 85 of the ratchet 73 slip along the adjacent face of the main gear 51 while, at the same time, the release lever 127 is in engagement with the gear 99 to prevent unwinding of the coiled main spring 67. After setting the housing 11 on a supporting surface, the player then locates a ball in the pocket 13 either by throwing the ball into the pocket or by rolling it up the inclined ramp 33. Upon entry of a ball into the pocket 13, the ball rides onto the release lever 127 extending in the trough, thereby causing the release lever to pivot counterclockwise so as to disengage its rearward end from the gear 99. When thus released, the spring motor 17 is free to unwind and drives the main gear 51 through the one-way clutch 49 in the counterclockwise direction. This causes the throw lever 103 to pivot clockwise against the action of its biasing spring 111. When the spring 111 is fully cocked, the arm 123 of the throw lever 105 rides off the engaged one of the studs 125, thereby permitting the throw lever 105 to rotate rapidly in the counterclockwise direction under the influence of its biasing spring 111. This movement causes the ball located in the pocket 13 to be thrown from the housing. As the ball leaves the pocket, the spring 137 returns the release lever 127 to its normal position for engagement with the gear 99 to prevent further unwinding of the spring motor.

The disclosed ball returning device operates to automatically eject an entering ball after a short time interval, while using only a small amount of the energy which can be stored in the spring motor. Moreover, the device incorporates suitable means for pre-tensioning the throw lever biasing spring so that the throw of the ball ejected from the housing can be selectively varied to suit the individual playing with the device. There is thus provided a simple device for receiving and returning balls, which

device is highly attractive in appearance and reliable in its operation. Moreover, the disclosed device can be safely played with by young children, as well as by the young in heart.

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

What is claimed is:

1. A toy comprising a housing adapted to be placed on a supporting surface, said housing including a pocket adapted for receiving a ball, said pocket having a rearwardly and downwardly inclined surface for supporting a ball received in said pocket, and a structure flaring outwardly from the entrance to said pocket so as to guide a ball into said pocket. Said structure including an upwardly inclined ramp leading to said pocket from the supporting surface in front thereof so as to provide a path along which a ball can be rolled into said pocket, means supported by said housing for releasably storing energy, a throw lever pivotally carried by said housing and extending into said pocket for throwing engagement with a ball located therein incident to pivotal movement of said lever in one direction, means on said housing biasing said throw lever for pivotal movement in said one direction, means on said housing for selectively controlling the magnitude of the action of said biasing means, an arm extending fixedly from said throw lever, said arm being releasably engageable by said energy storing means incident to release thereof so as to pivot said lever in the direction opposite to said one direction, thereby transferring energy to said biasing means, which energy is released to cause ball throwing movement of said lever incident to disengagement of said arm from said energy storing means occurring incident to continued release of said energy storing means, and means for incrementally releasing the energy stored in said energy storing means, said energy releasing means including a release lever pivotally supported by said housing for movement relative to a position engaging said energy storing means so as to prevent release thereof, said release lever extending into said pocket in position to be pivoted from said position preventing release of said energy storing means in response to the arrival of a ball into said pocket, whereby said energy storing means is released and said throw lever is caused to throw the ball from said housing through an upwardly extending trajectory, and means on said housing biasing said release lever toward said position preventing release of said energy storing means so as to return said release lever to said position upon the throwing of a ball from said pocket.

2. A ball throwing toy which comprises a ball, a housing adapted to be placed on a supporting surface, said housing including means defining a pocket adapted for receiving said ball and retaining it always in view of a player, said pocket means including a rearwardly and downwardly inclined floor portion having an elongated slot formed therein, means supported by said housing for releasably storing energy, means supported by said housing for releasing energy from said energy-storing means, a release lever extending upwardly through the slot in said pocket and being connected to said energy-releasing means, said release lever being supported on said housing for movement relative to the slot in said pocket and operable to actuate said energy-releasing means upon engagement of said lever by said ball entering said pocket, a ball-throwing member carried by said housing and extending through the slot in said pocket for movement fore and aft of the pocket to provide for throwing engagement with said ball, means biasing said ball throwing member for movement forwardly in said pocket, and means releasably connecting said energy-storing means to said ball-throwing member so that upon release of energy from said energy-storing means said ball-throwing member is first moved rearwardly in said pocket and then instantaneously released, whereby said biasing means causes said ball-throwing member to throw said ball from said pocket in an upward trajectory.

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