United States Patent

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[54] **APPARATUS FOR THROWING LIGHTWEIGHT BALLS AND THE LIKE**
16 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **124/26,** 124/36, 124/49
[51] **Int. Cl.** **F41b 7/00**
[50] **Field of Search** 124/16, 36, 10, 1, 7, 49, 26

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ABSTRACT: A machine for automatically feeding and continuously pitching lightweight balls at regular intervals in the same general direction. The machine utilizes the principle of a continuously revolving member that is temporarily restrained in its movement so that energy is built up and retained by said member, which energy is subsequently released to project the ball.

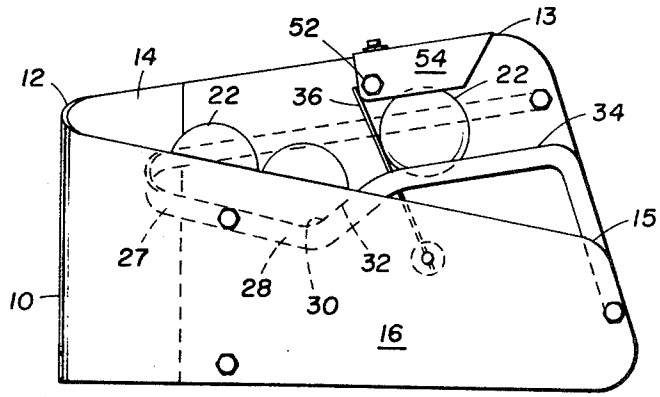


FIG 1

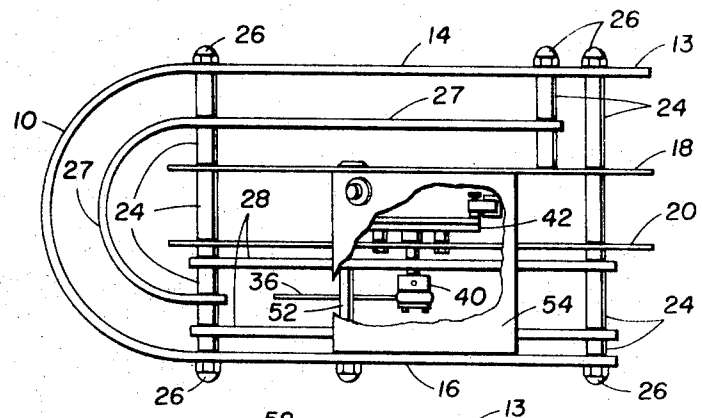
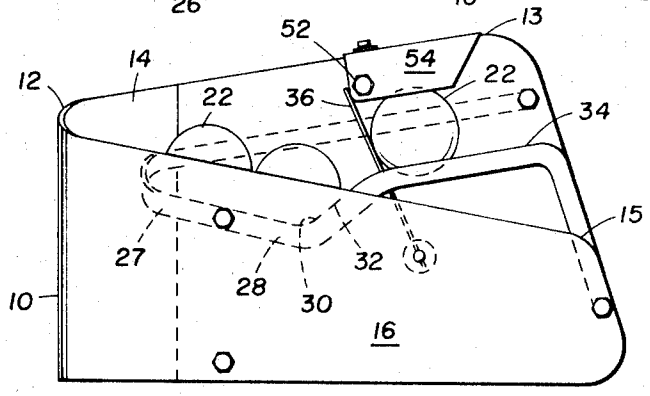


FIG 2



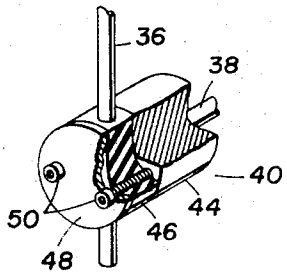


FIG 3

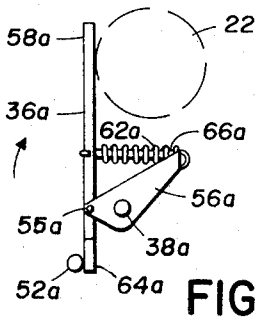


FIG 4

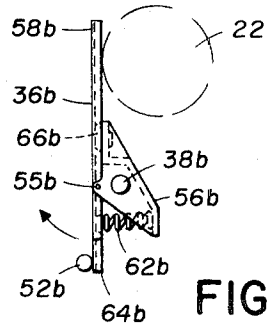


FIG 5

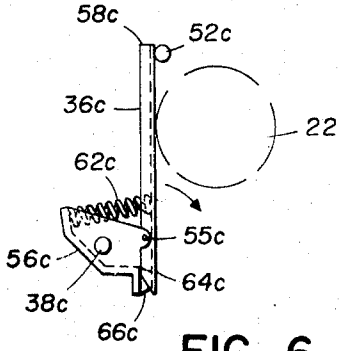


FIG 6

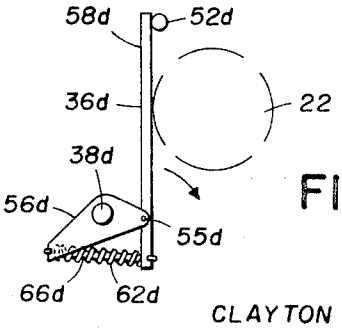


FIG 7

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APPARATUS FOR THROWING LIGHTWEIGHT BALLS AND THE LIKE

BACKGROUND OF THE INVENTION

The prior art discloses a number of machines which are capable of pitching heavy objects such as regulation baseballs, but because of the energy required to pitch such objects, any machine capable of repeatedly generating the force necessary to project them becomes quite complex and relatively expensive. The prior art also discloses machines for propelling lighter objects such as tennis balls, but these machine are relatively complex and a number of them must be manually operated. Moreover, prior art machines do not provide a simple way of absorbing the excess energy that is released to propel the object, nor does the prior art disclose any apparatus capable of continuously projecting or propelling a lightweight ball or other object which is simple in construction and inexpensive to manufacture and sell. If a ball-pitching apparatus could be inexpensively produced, there would be a considerable market for it, not only as an amusement device, but also as an aid in practicing tennis, baseball batting practice, etc. It is further obvious that the principles of projection employed in a simple apparatus could be used for many other applications in the toy and amusement field and other areas where a lightweight object is propelled.

SUMMARY OF THE INVENTION

Applicant's apparatus utilizes the principle of a rotating or revolving member which strikes an abutment in its path of rotation thereby temporarily restraining further movement of the member while the driving means to which it is operatively connected continues to rotate. When the propelling member thus is restrained, potential energy is stored which can be subsequently released and utilized to propel the object. In order to practically use this principle, however, it is necessary that the means connecting the propelling member to the driving means permit limited relative movement between them. If this relative movement is not provided for, excessive stress from reverse torque will be applied to the driving means upon release of the energy thereby causing undue wear and possible premature failure in the drive line or power source. Of course, if a power source and drive train strong enough to absorb such stress is utilized, provision for such relative movement may not be necessary, but greatly oversizing the power source and drive train increases the cost of the apparatus excessively and decreases the commercial potential of such apparatus. In applicant's invention, an adequately sized power source and power train are utilized at a cost which keeps the cost of the total apparatus within a reasonable range. Moreover, the relative movement between the propelling member and the driving means increases the propelling force. Relative movement between the propelling member and the driving means can be provided in several very simple ways when the teachings of applicant's invention are employed. Thus, an extremely simple and inexpensive apparatus can be produced which is capable of propelling lightweight objects continuously and automatically over a relatively long life span.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is top or plan view of an apparatus for propelling lightweight objects which embodies the principles of my invention, a part of the housing being broken away to show details of the propelling mechanism;

FIG. 2 is an elevational view of the discharge side of the apparatus of FIG. 1;

FIG. 3 is an enlarged view, partly in section, and showing details of the connection of the propelling member to the driving means;

FIG. 4 is an enlarged side view showing a second embodiment of a drive mechanism employing the principles of the invention;

FIG. 5 is a view similar to FIG. 4 but showing a further embodiment of a drive mechanism embodying the principles of my invention;

FIG. 6 is a view similar to FIG. 4 and 5 but showing a still further embodiment of a drive mechanism incorporating the principles of my invention; and

FIG. 7 is a view similar to FIGS. 4, 5, and 6 and showing yet another embodiment of a drive mechanism incorporating the principles of my invention.

The principles of my invention, as well as further objects, advantages and features thereof, will be readily apparent from a consideration of the following description taken in connection with said drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

Referring first to FIGS. 1 and 2, the particular embodiment shown is an apparatus for mechanically pitching lightweight objects such as hollow plastic baseballs. The illustrated embodiment is thus one application for utilizing the principles of my invention. In the illustrated embodiment of FIGS. 1 and 2, the ball-pitching apparatus includes an outer housing **10** which is shown as a single piece of material formed somewhat in the shape of a "U" with the top edge **12** inclined from the uppermost point **13** along the input side **14** of the apparatus to the lower most point **15** along the discharge side **16**. Positioned between the input side **14** and discharge side **16** of the apparatus are two partitions or divider plates **18** and **20**. The front, top and bottom edges of partitions **18** and **20** coincide with the respective edges of side **14** and partitions **18** and **20** are preferably positioned parallel to each other and parallel to the sides **14** and **16** of the housing **10**. The partition **18** is spaced from the input side **14** a sufficient distance to permit the free linear movement within said space of a ball **22** or other object to be propelled. Similarly, the partition **20** is spaced from the discharge side of **16** of the housing **10** a distance to also permit the free linear movement of ball **22** therebetween. As will be evident from the description hereinafter, the partitions **18** and **20** in cooperation with the sides **14** and **16** of the housing **10** assist in guiding and confining the balls **22** along a defined path from the input to the discharge end of the apparatus.

The housing **10** and the partitions **18** and **20** are rigidly held together in the desired spaced relationship by he use of spacers **24** through which extend bolts **26** or other suitable fastening means which draw the partitions and housing **10** together against the spacers **24**.

Supported by bolts **26** within the space formed between the input side **14** of housing **10** and the partition **18** and continuing around the "U" is a ball feed rail **27**. From the point of termination of feed rail **27** and continuing through the space between the discharge side **16** and partition **20** are a pair of parallel feed rails **28**. Rails **27** and **28** are inclined downwardly from a point near the uppermost point **13** on the input side **14** to the lowest point **30** on the discharge side **16**. Balls **22** will therefore roll freely by gravity from the input side around the "U" and into the discharge side. The rails **27** and **28** can be positioned by utilization of the same bolts **26** and spacers **24** which retain the housing **10** and partitions **18** and **20** in assembled relationship.

If desired in a particular design, the input path could be located above, rather than alongside of, the discharge side, the balls dropping by gravity from the input to the discharge side at the rear of the apparatus.

In the embodiment shown, the rails **27** and **28** are inclined to a low point **30** along the discharge side **16** of the apparatus. At this point **30** the rails **28** curve upwardly to form an abutment **32** which serves as a stop to prevent the balls **22** from further gravity movement. The rails **28** continue beyond the stop **32** into a relatively flat portion which is preferably slightly inclined upwardly to provide a projecting or propelling station **34**.

From the description thus far, it will be evident that a plurality of balls **22** can be placed in the apparatus along the feed rails **27** and **28** between the stop **32** and the extreme end on the input side **14**. It will be further evident that if a ball is moved beyond the stop **32** into the propelling station **34** that the following balls will move up until the ball next in line strikes the stop **32**. Thus, as long as one or more balls **22** are placed in the apparatus, a ball will roll to stop **32** and be in position to be fed into the propelling station **34**, as described more fully hereinafter.

The mechanism for propelling the balls **22** is an extremely simple one and is partly shown in detail in FIG. **3**. A propelling member **36**, which in the first embodiment is a flexible rod, is operatively connected to a drive shaft **38** through a hub **40**. When the apparatus is in use, the drive shaft **38** is continuously rotated by connection to a power source such as electric motor **42** (see FIG. **1**) which is mounted between partitions **18** and **20**. Since electric motors generally operate at speeds in excess of what is desirable for rotation of the rod **36**, a suitable gear train (not shown) can be provided to reduce the speed of the rod **36** to a desired level. As best seen in FIG. **3**, the hub **40** consists of three parts, a main portion **44** which is affixed to the drive shaft **38** in any suitable manner, a resilient portion **46** and an end portion **48**. The resilient portion **46** is made of a suitable material, such as rubber, so that the rod **36** capable of movement with respect to the drive shaft **38**. The rod **36** is inserted into an opening extending transversely through the resilient member **46**, and a pair of fasteners **50** extend axially through the end portion **48** and the resilient portion **46** and into the main portion **44** of the hub **40**. When the fastening members **50** are tightened, the resilient portion **46** will be squeezed between the end portion **48** and main portion **44** thus holding the rod **36** in place so that it will rotate as the drive shaft **38** is driven while still permitting the rod **36** to have a limited amount of movement relative to the drive shaft **38** due to the resiliency of the portion **46**.

As previously indicated, the rod **36** is flexible but it also must have a considerable amount of rigidly. The rod **36** extends radially outwardly from the hub **40** a distance sufficient to engage a ball **22** resting on the feed rails **28** against the stop **32**. The motor **42** and drive shaft **38** are mounted on the partition plates **18** and **20** at a position so that the drive shaft **38** is beneath the propelling station **34**, slightly ahead of the stop position **32**, and generally transverse to the feed rails **28**. Thus, as the rod **36** rotates with drive shaft **38**, it will move up between the feed rails **28** and engage a ball **22** resting on the rails at the stop **32**. Since the ball **22** is restrained from lateral movement by the parallel rails **28** assisted by the partition **20** and the housing discharge side **16**, the rod **36** will move the ball **22** upwardly as it continued to rotate. The ball **22** will thus be moved up into the propelling station **34**. It is obvious that if the rod **36** were allowed to freely continue its rotative movement, the ball **22** might be moved out of the propelling station but little velocity would be imparted to the ball. Therefore, there is provided in the path of rotation of the flexible rod **36** at a point above the propelling station **34** an abutment or deflector pin **52**. The position of the rod **36** in hub **40** is adjusted so that the outer end of rod **36** just engages the deflector pin **52** and temporarily restrains further movement of the rod **36** while the drive shaft **38** continues to rotate. The rod **36** will thus flex and the resilient portion **46** of the hub **40** will "give" storing potential energy in the drive mechanism until such time as the rod has flexed a sufficient amount to slip beneath the deflector pin **52**. When the rod **36** bypasses pin **52**, the potential energy will be released, and the ball **22** which has previously been lifted from the stop **32** into the propelling station **34** will be propelled at a relatively high velocity out of the apparatus along a path determined primarily by the incline of the feed rails **28** within the propelling station **34**.

Obviously, when this energy is released, much of it is utilized to propel the ball from the apparatus. However, some of this energy must be absorbed by the propelling mechanism. If the rod **36** is connected rigidly to the drive shaft **38**, considerable reverse torque will be exerted upon the drive mechanism which can cause it to fail, particularly after repeated operation. However, the resilient portion **46** of hub **40** permits relative movement between the rod **36** and the drive shaft **38** and the excess energy will be absorbed so that little or no stress is placed upon the driving mechanism itself. This feature is extremely important since it avoids oversizing the drive mechanism in order to resist the stresses, which would add considerably to the cost of the apparatus and thereby decrease the marketability of the apparatus.

With the motor operating continuously, the flexible rod **36** will be rotated continuously at the selected speed. As long as balls are in the apparatus, a ball will always move into position against the stop **32** as the ball ahead is lifted into the propelling station **34**. Each ball will in turn be automatically fed into the propelling station **34** by the rod **36** as it rotates through each revolution. If a compact design is not necessary, the balls could be fed from directly above the propelling station **34**, and lifting of the ball by rod **36** would, thus, not be necessary. Either design eliminates the necessity of an elaborate feed mechanism, which might be required if the rod had to be retracted and released during each cycle. However, since rod **36** continuously revolves, this eliminates the problem of avoiding interference with the next ball as the rod is retracted.

If desired, a protective shield **54** can be affixed to the partition **20** to assist in supporting the deflector pin **52** and also to minimize possible injury by the user particularly by getting his face in a position where it might be struck by the rod **36**.

In the embodiment of the propelling mechanism described above, it is obvious that the rod **36** must possess certain qualities. The rod, of course, must be resilient with a considerable amount of rigidity, and it must also have good "memory" or ability to return to its initial condition. In addition, the rod **36** should have high fatigue strength so that it will have a relatively long life. The design of the hub **40** is also important. The position of the rod **36** can be very simply adjusted and replaced if necessary by merely loosening the fastening means **50** to free the rod. The resilient portion **46** should be of a high-friction material to resist excessive twisting, but the material should also be sufficiently resilient to absorb the shock when the potential energy is released and thereby minimize the reverse torque on the motor and drive train. The resiliency of the portion of **46** of the hub **40** also will store a certain amount of the potential energy and thereby assist in propelling the ball when the energy is released.

Although the embodiment which has been described performs quite satisfactorily, there are other ways of achieving the same results while utilizing the principles of the invention. In FIG. **4** there is shown another mechanism which will serve the purpose of storing potential energy and releasing the energy in order to propel a ball while still minimizing the reverse torque applied to the drive mechanism upon release of the energy. In the embodiment of FIG. **4**, parts corresponding to the first embodiment will be referred to by use of the same reference numeral followed by the letter "*a*." All that is shown in this embodiment is the propelling member and its operative connection to the drive shaft, the remaining portion of the apparatus being similar to that described with reference to the first embodiment. In this second embodiment, the propelling member is a rigid rod **36***a*. The rod **36***a* is pivotally connected at **55***a* to a mounting member or bracket **56***a* which is in turn affixed to and rotatable with the drive shaft **38***a*. The rod **36***a* is pivotally connected to the bracket **56***a* at a point **55***a* radially outwardly from the axis of rotation of the drive shaft **38***a*. Affixed to the rod **36***a* between its ball-engaging end **58***a* and its pivot point **55***a* is a spring **62***a* or other resilient means. The other end of the spring **62***a* is suitably affixed to the bracket **56***a* as shown. There may also be provided within the spring **62***a* a rubber stop member **62***a*, and the spring will bias the rod **36***a* is in its normal relaxed condition. The rod **36***a* extends slightly beyond the pivot point **55***a* in the direction opposite to the ball-engaging end **58***a* and terminates in a stop end **64***a*

which is axially offset so that the ball-engaging end **58***a* will bypass the deflector pin **52***a* during rotation of rod **36***a*. Note that in this embodiment deflector pin **52***a* is located beneath the drive shaft **38***a*. This permits the rod **36***a* to be shorter and thus a smaller radius of rotation than in the first embodiment since it does not need to extend beyond the ball to engage the deflector pin. Thus, the apparatus will be more compact.

As the drive shaft **38***a* rotates in the direction of the arrow of FIG. **4** and the rod **36***a* revolves with it, the rod will lift a ball **22** into the propelling station **34** as in the first embodiment. Then, as the drive shaft **38***a* continues to rotate, the stop end **64***a* of the rod **36***a* will strike the deflector pin **22***a* and restrain further movement of the rod **36***a*. However, the drive shaft **38***a* will continue to rotate carrying with it the bracket **56***a* thereby tensioning the spring **62***a*. When restrained, the rod **36***a* will, of course, pivot relative to the bracket **56** *a*, and the pivot point **55***a* will move away from the deflector pin **52***a* as rotation continues, carrying with it the rod **36***a*. As rotation continues, the stop end **64***a* of rod **36***a* will slip by the deflector pin **52***a* at about the time the spring **62***a* has been stretched to its maximum. When this occurs, the potential energy stored in spring **62***a* will be released to propel the ball **22** outwardly from the apparatus. The spring **62***a* and stop **66***a* (if used) will absorb the shock and minimize the reverse torque on the drive mechanism.

In FIG. **5** I have shown a variation of the embodiment of FIG. **4**. In describing this embodiment, reference numerals for components corresponding to those of the first two embodiments will referred to by the use of the same reference numeral followed by the letter "*b*." In the embodiment of FIG. **5**, the deflector pin **52** *b* is located beneath the axis of rotation of the drive shaft **38***b* as in the embodiment of FIG. **4**. Thus, the rod **36***b* will short with the ball-engaging end **58***b* closer to the pivot point **55***b* while the axially offset stop end **64***b* extends a distance beyond the pivot **55***b*. In this embodiment, the spring **62***b* is affixed to the rod **36***b* at a point between the pivot **55***b* and the stop end **64***b* and will thus be compressed to store the potential energy for propelling the ball. The bracket **56***b* is provided with a stop **66***b* on the portion opposite to the connection with spring **62***b*. In its normal condition, the spring **62***b* biases the rod **36***b* against the stop **66***b*. As the drive shaft **38***b* rotates in the direction of the arrow of FIG. **5**, the rod **36***b* will revolve with it. The rod **36***b* will lift a ball into the propelling station, and about the same time the stop end **64***b* of the rod will engage the deflector pin **52***b*. Further movement of the rod **36***b* will thus be restrained while the drive shaft **38***b* carrying with it bracket **56***b* continues to rotate compressing the spring **62***b*. As the bracket **56***b* continues to rotate, the pivot point **55***b* will move away from the deflector pin **52***b* until the rod **36***b* almost bypasses the deflector pin **52***b*. At his time, the spring **62***b* will be compressed to a maximum degree. When the rod **36***b* bypasses pin **52***b*, the energy thus stored will be released to propel the ball outwardly from the apparatus, and the stop member **66***b* and spring **62***b* will absorb the shock and minimize the reverse torque exerted on the drive mechanism upon release of the potential energy.

In FIG. **6** there is illustrated still another embodiment of the invention, this embodiment being similar to the embodiment of FIG. **5** except that the deflector pin is located above the drive shaft similar to the first embodiment. Parts of the mechanism of the embodiment of FIG. **6** which correspond to those of the other embodiments are referred to in the following description with the same reference numeral followed by the letter "c. " In the embodiment of FIG. **6**, the rod **36***c* is pivotally mounted at **55***c* to bracket **56***c* which is rotatable with the drive shaft **38***c*. The ball-engaging end **58***c* of the rod **36***c* extends a considerable distance beyond the pivot **55***c* so as to be engageable with the deflector pin **52***c*. The stop end **64***c* of rod **36***c* is biased into engagement with stop **66***c* on bracket **56***c* by spring **62***c* which is connected to rod **36***c* between pivot **55***c* and the ball engaging end **58***c*. Thus, with the shaft **38***c* turning in the direction of the arrow of FIG. **6** and rod **36***c* revolving therewith, the rod will, as in the other embodiments, lift a ball into the propelling station. When the end **58***c* of the rod **36** *c* engages the deflector pin **52** *c*, further movement of the rod **36***c* will be temporarily restrained. However, as the bracket **56***c* continues to rotate with the drive shaft **38***c*, the spring **62***c* will be compressed and the pivot point **55***c* will move away from the deflector pin **52***c*. When the bracket **56***c* has rotated a sufficient amount so that rod **36***c* bypasses deflector pin **52***c*, the potential energy stored in spring **62***c* will be released causing the rod **36***c* to pivot rapidly under action of the spring **62***c* and thereby propel the ball outwardly from the apparatus. As in the other embodiments, the spring **62***c* and stop **66***c* will serve to absorb the shock and minimize reverse torque on the motor and drive train.

In FIG. **7** there is shown yet another embodiment of the propelling mechanism, which embodiment is similar co the embodiment of FIG. **4** in that tension of a spring is used to store the potential energy for propelling the ball. However, in this embodiment, as in the embodiment of FIG. **6**, the deflector pin is located above the axis of rotation of drive shaft. In describing the embodiment of FIG. **7**, reference numerals for parts corresponding to parts of the other embodiments will be the same but followed by the letter "d. " In the embodiment of FIG **7**, the rod **36***d* is pivotally mounted at **55***d* on the bracket **56***d*. The ball-engaging end **58***d* is a sufficient distance from the pivot **55***d* so as to engage deflector pin **52***d*, and a spring **62***d* is connected to the rod **36***d* between the pivot **55***d* and the end **64***d* opposite to the end **58***d* which engages the deflector pin **52***d*. As in the embodiment of FIG. **4**, a rubber stop **66***d* may be provided between the bracket **56***d* and end **64***d* of rod **36***d*, stop **66***d* being preferably located within spring **62***d*. In operation, as the drive shaft **38***d* rotates in the direction of the arrow of FIG. **7**, a ball will be lifted by rod **36***d* into the propelling station. As rod **36***d* engages the deflector pin **52***d*, thereby temporarily restraining its further movement, the bracket **56***d* will continue to rotate with the drive shaft **38***d* placing spring **52***d* in tension and thus storing potential energy. As the bracket **56***d* continues to rotate, the end **58***d* of the rod **36***d* will bypass the deflector pin **52***d* and the potential energy stored in spring **62***d* will be released causing rod **36***d* to propel the ball outwardly from the apparatus. Again, the spring **62***d* and stop **66***d* will serve to absorb the shock of the instantaneous release of the energy and will minimize reverse torque on the motor.

It will be apparent from the description of the above embodiment that I have provided an extremely simple apparatus for automatically propelling lightweight objects such as hollow plastic baseballs. Simplicity is achieved by the gravity feed system combined with a continuously revolving propelling member that propels the ball upon release of the stored potential energy. In some designs, the propelling member also serves to feed the ball into a propelling position. The problems of prior art apparatus of minimizing reverse torque upon release of the energy to propel the object is very simply accomplished by operatively connecting the propelling member to the continuously rotating drive shaft in a manner which permits relative movement between them and permits an operative connection containing resilient means that also serves to absorb the shock. Using the principles of the invention, an apparatus can be made and sold at a cost considerably below that of prior art apparatus. Although the cost is greatly reduced, the simplicity and few moving parts of the apparatus contribute to a long useful life. It will be obvious to those skilled in the art that there are many revisions, modifications and changes to the specific embodiments shown which can be made without departing from the spirit and scope the principles of the invention as set forth herein. It is my intention, however, that all such revisions and modifications as are obvious to those skilled in the art will be included within the scope of the following claims.

I claim:

1. An apparatus for throwing lightweight balls through the air, said apparatus comprising a housing, balls, a drive shaft rotatably mounted in said housing, means for continuously

rotating said shaft, propelling means revolvably driven through a substantially regular path by said drive shaft as said shaft rotates, means operatively connecting said propelling means and said drive shaft in such a way to provide for limited relative movement for storing of energy therebetween, means for feeding said balls into ball-propelling position in said path, and abutment means extending into the portion of said path near which an outer portion of said propelling means passes, said abutment means being positioned so as to be engageable by said outer portion of said propelling means as it revolves to temporarily restrain movement of said propelling means while said shaft continues to rotate, said propelling means comprising a rod in engagement with a ball in said ball-propelling position at the same time that another portion of said rod engages said abutment means, thereby causing energy to be built up in the rod that engages a ball and subsequently released to propel a ball when said another portion of said rod moves past said abutment means.

2. The apparatus of claim 1 in which said means for feeding said balls includes storage means for a plurality of said balls, and said balls are fed into said path by force of gravity.

3. The apparatus of claim 2 in which said means for feeding said balls includes a stop adjacent to said ball-propelling position for preventing movement of said balls into the propelling position solely by force of gravity.

4. The apparatus of claim 3 in which said stop holds a ball in a waiting position that is in the path of said propelling means, and said propelling means revolves about a substantially horizontal axis and engages a ball abutting said stop in said waiting position and moves said ball into said ball-propelling position as said propelling means revolves.

5. The apparatus of claim 1 in which said rod includes a somewhat flexible propelling member operatively connected to said drive shaft, the outer end of said member being engageable with said abutment means.

6. The apparatus of claim 5 in which said means operatively connecting said rod and said drive shaft includes a hub affixed to said drive shaft, said hub having a portion that is deformable to a significant degree with respect to the remaining portion of said hub, and said rod is mounted in said portion so that said rod can move relative to said shaft.

7. The apparatus of claim 1 in which said means operatively connecting said rod and said drive shaft includes a hub affixed to said drive shaft, said hub having a portion that is deformable to a significant degree with respect to the remaining portion of said hub, and said rod is mounted in said deformable portion so that said propelling means can move relative to said drive shaft.

8. The apparatus of claim 6 in which said hub includes a main portion affixed to said drive shaft, and an end portion axially spaced from said main portion and affixed thereto, said deformable portion being positioned and held between said main portion and said end portion and having a radial opening therein, said rod being positioned in the said opening in said deformable portion.

9. The apparatus of claim 1 in which said rod includes a rigid member operatively connected to said drive shaft and engageable with one of said balls when in ball-propelling position.

10. The apparatus of claim 1 in which said means operatively connecting said propelling means and said drive shaft include a mounting member affixed to and rotatable with said drive shaft, said rod being pivotally affixed to said mounting member at a point radially outwardly from the axis of said drive shaft, and resilient means interconnecting said mounting member and said rod.

11. The apparatus of claim 10 in which said rod includes a rigid The member engageable with one of said balls when in said ball-propelling position.

12. The apparatus of claim 11 in which there is included a resilient stop member with which said rod is engageable after said ball has been propelled thereby to assist in absorbing the reverse torque upon release of said stored energy.

13. The apparatus of claim 10 in which said resilient means is placed in tension when said rod engages said abutment means and said drive shaft continues to rotate.

14. The apparatus of claim 10 in which said resilient means is placed in compression when said propelling means engages said abutment means and said drive shaft continues to rotate.

15. The apparatus of claim 10 in which said abutment means is located on the side of the axis of said drive shaft opposite to the propelling position of said ball.

16. The apparatus of claim 10 in which said abutment means is located on the same side of the axis of said drive shaft as the propelling position of said ball.