ABSTRACT

The apparatus has a ball throwing arm that is moved to a cocked position by means of a line that is pulled by a user. When the ball throwing arm reaches the cocked position it engages a retaining member that is connected to a dampening device. After release of the pull on the ball throwing arm by the user a spring immediately acts on the ball throwing arm to project a ball. The retaining member holds the ball throwing member for a certain period of time before complete release, due to the action of the delaying device. Also, when the line is released by the user a retracting member acts on the line to force it inwardly toward the ball throwing apparatus. The ball throwing arm may be oriented in different positions so that the ball impacting member on the end thereof may cause the projected ball to have preselected degree of spin. The cocking of the ball throwing member causes a ball feeding device to position a ball to be projected to be positioned in the path of the ball throwing member. The ball throwing device is selectively and pivotally adjustable to a support base.

14 Claims, 7 Drawing Figures
This invention relates in general to ball throwing apparatus and in particular to ball throwing apparatus which can be operated by a person who is also the player of the balls and which affords economies in construction.

In sporting games such as baseball and tennis, to name only two, a substantial element of the game is based on the skill and ability of a person to hit a ball. While different players of such games actually possess ball-hitting capabilities which may vary considerably, these abilities of both the mediocre player and the excellent player are inevitably developed and refined by repetitive ball-hitting practice. Since this practice requires balls to be repetitively thrown or pitched to the hitter, it is apparent that the services of a person in addition to the practicing hitter are required for such practice.

The presence of another person to pitch or throw the ball for batting or hitting practice is frequently inconvenient or even unavailable. In the case of professional ball teams, for example, the practice pitcher is a paid individual whose time must be considered as an element of cost for the batting practice. Lower levels of sports, such as Little League baseball, may not have enough capable pitchers to satisfy the requirements of batting practice. Moreover, as nearly any parent can affirm, an enthusiastic ball-playing youngster frequently may wish to practice his hitting beyond the pitching endurance of his parents and in the absence of any playmate who will pitch.

Prior art attempts to overcome the foregoing problems have resulted in the development of various machines for pitching or throwing objects such as baseballs, tennis balls, and the like. Such machines frequently are used to provide pitching for such commercial endeavors as major-league baseball teams, batting ranges open to the public, tennis ball pitching machines installed in club environments, and the like. However, such machines of the prior art, however advantageous for such commercial and semi-commercial applications, have simply been far too expensive for purchase and use in non-commercial or casual situations such as Little League ball or simply as a pitching machine for a youngster.

Accordingly, it is an object of the present invention to provide improved apparatus for throwing balls.

It is another object of the present invention to provide ball-throwing apparatus of relatively simplified and economical construction.

It is still another object of the present invention to provide ball-throwing apparatus which can be operated by one person and which does not require an external power source.

It is still another object of the present invention to provide ball-throwing apparatus which can be actuated by the person to whom the ball is thrown and which allows a period of time for assuming a desired ball-throwing stance before throwing the ball to the person.

Other objects and many of the attendant advantages will become more apparent from the following description of an embodiment of the present invention, including the annexed drawing, in which:

FIG. 1 shows an isometric view of a ball throwing apparatus according to a disclosed embodiment of the present invention;
one of plural slots 44 provided in an adjustment member 45, as shown in detail in FIG. 3, so that the tension of the springs 40 and 41 can be adjusted to control the ball throwing force of the present apparatus. It will be understood, of course, that a single tension spring of appropriate characteristics can be provided in place of the two springs 41 and 42, although construction of apparatus according to the present invention may be more economically accomplished in certain applications through the use of two (or more) as needed readily available springs as an alternate to the procurement of a more-expensive special purpose spring. It will also be apparent to those skilled in the art that other sources of ball-throwing force could be provided as a substitution of the tension springs; for example, one or more spiral springs (not shown) may be fixedly or adjustably provided between the shaft 29 and the frame 11 at the mounting 30 to bias the ball throwing member 27. Whatever form of ball-throwing force is employed, the maximum forward motion of the ball throwing member 27 is limited by an abutment device 46 mounted to contact the arm 28 at a desired location of maximum forward movement. The abutment member 46 preferably is fabricated from sponge rubber or any other suitable resilient and shock-absorbing material.

The arm 28 is retained in a reverse-movement or "cocked" position through interaction with a retaining member 50 which is mounted as at 51 for pivotal movement and which includes a slot 52 disposed in the free end of the retaining member. Controlled movement of the retaining member 50 is provided in the disclosed embodiment of FIG. 1 with a motion damping device 56 connected between an extension 65 of the retaining member and a support member 64 affixed to the frame structure 11. The motion damping device 56 can be any mechanism or apparatus which provides a controlled, limited rate of movement in response to a predetermined applied force. Damping devices of this type are well-known to those skilled in the art and typically employ hydraulic and/or pneumatic damping mechanisms utilizing piston-cylinder combinations, as exemplified by conventional door closing mechanisms. A spring 55 is connected between the extension 65 and the support member 64 to bias the retaining member 50 to the position shown in FIG. 1. Alternatively, a spring-driven or other type of mechanical timing device could be substituted for the cylinder-piston damper used herein.

Considering the operation of the disclosed apparatus as described thus far, it is assumed that a person desiring to receive a ball thrown from the present apparatus is standing at a location adjacent the pull handle 36. The person grasps and pulls the handle 36, applying force through the cord 34 to move the arm 28 downwardly against the force of the springs 40 and 41. Since the distance along the arm 28 between the shaft 29 and the point of attachment of the cord 34 is preferably chosen to be substantially greater than the effective length of the arm 42, the arm 28 can thus be lowered against the spring force by a youngster or another person not having exceptionally great muscular strength. As the arm 28 is lowered, the end portion 32 moves downwardly to engage the notch 52 defined in the free end of the retaining member 50. Further downward movement of the arm 28 causes the retaining member 50 to be rotated in a counterclockwise direction (as viewed in FIG. 4) around the pivot 51 until the abutment member 33 and the arm 50 contact a suitable motion stop 57. It will be seen that this counterclockwise movement of the retaining member 50 causes the piston to be withdrawn from the motion damping device 56, and it will be understood that the motion damping device is provided with valving or other suitable expedients which permit substantially unimpeded withdrawal of the piston.

When the handle 36 can be pulled no further, the person then releases this handle and grasps his bat, tennis racket, or the like to prepare for the imminent delivery of a ball from the present apparatus, this ball having been loaded into the ball receptacle 31 by mechanism to be described below. Release of the handle 36 removes tension from the cord 34, and so the arm 28 is urged at the force of the springs 40 and 41 to attempt to assume the broken-line position shown in FIG. 4. The end 32 of the arm 28 remains engaged in the notch 52 of the retaining member 50, however, and the retaining member is permitted to rotate in a clockwise direction (as viewed in FIG. 4) under the combined forces of the arm 28 and the spring 55 at a relatively slow rate, resulting from the resistance to inward movement of the piston by the motion damping device 56. After the passage of a predetermined time, the retaining member 50 will have rotated in a clockwise direction to the extent necessary to permit the arm end 32 to escape from the notch 52, at which time the arm 28 moves rapidly forward under the influence of the springs 40 and 41 until the abutment member 46 is contacted. It will be appreciated that this rapid forward movement of the arm 28 imparts corresponding movement to the ball 59, previously received in the ball throwing member 27, so that this ball is projected outwardly of the apparatus in a direction toward the person who had previously cocked the apparatus by pulling the handle 36.

The period of time provided between release of the handle 36 and the subsequent escape of the arm end 32 from the notch 52 is controlled by the motion damping characteristics of the device 56 and also the force applied by the spring 55 and the arm 28. Practically speaking, this period of time should be sufficient to enable the bat or other hitting implement to be grasped and the proper hitting stance assumed, and a time delay in the order of 5 to 10 seconds is appropriate although not limiting. To prevent the handle 36 from being suddenly jerked toward the apparatus 10 by the ball-throwing movement of the arm 28, a resilient member 62 such as an elastic cord or the like may advantageously be connected between the frame structure 11 and a suitable location 63 on the cord 34. The resilient member 62 gently functions to retract the handle 36 as soon as released and before the arm 28 is released by the retaining member 50.

As an alternate to the location of the motion damping device 56 as depicted in FIG. 1, the motion damping device can be located as shown on FIG. 4 to be positioned on the side of the pivot 51 opposite from the notch 52. The motion damping device 56 is positioned to extend between the extension 53 of the retaining member 50 and the location 54 on the frame structure 11. The spring 55 (not shown in FIG. 4) can also be positioned adjacent and in parallel with the repositioned motion damping device 56, although it will be understood that the spring 55 may be contained internally as an integral part of the motion damping device 56, as is
typically provided with the conventional screen door closing mechanism. As an additional alternative, the motion damping device can be disposed below the retaining member 50 and to the left of the pivot 51, as viewed in FIG. 4, although it will be understood that the above-described unimpeded extension and impeded contraction of the piston arm 58 of a motion damping device thus located would have to be functionally reversed. In any event, placing the motion damping device to the left or ball-throwing side of the pivot 51 enables the overall length of the present apparatus to be shortened.

Turning next to the apparatus of the present invention which stores a quantity of balls and feeds these balls, one at a time, into the ball receptacle 31, the apparatus as shown in FIG. 5 is provided with a ball channel 68 which may be provided either by the discrete members 69, FIG. 4, or alternatively by a unitary trough or like member. The ball channel 68, of which only a portion is shown in the Figures, may advantageously extend in a generally spiral manner to have a ball-receiving opening adjacent the front 70 of the apparatus, it being primarily important that the ball channel have a downward slope which allows the balls 71 received therein to be gravity-fed to the lower end of the arm 81, against the stop member 72.

A rocking member 73 pivotally mounted as at 74 to the frame structure 11 includes a pair of upstanding fingers 75 disposed at a first end thereof, and the second end 76 of the rocking member is positioned to be in the downward path of travel traversed by the abutment member 33 on the arm 28. The rocking member 73 is appropriately biased to assume the position shown in FIG. 2, and it can be seen that the fingers 75 are thus positioned below and behind the stop member 72 a distance which is somewhat less than the diameter of one of the balls 71 contained in the ball channel 68.

When the arm 28 is lowered under the force applied through the cord 34 to be cocked, as described previously herein, the abutment member 33 is moved downwardly to contact the end 76 of the rocking member 73 and thus to rotate the rocking member around the pivot 74 in a direction to move the fingers 75 upwardly. The fingers 75 thus engage the initial ball in the ball channel 68 and displace this ball over the stop member 72 and into the now-positioned ball receptacle 31. At the same time, the fingers 75 remain positioned in the ball channel 68 to prevent any of the other balls 71 from entering the ball receptacle 31. As soon as the arm 28 is released by the retaining member 50 to move upwardly, the rocking member 73 again moves to place the fingers 75 in a lowered position to permit another one of the balls 71 to come to rest against the stop member 72, thus to await transfer to the ball receptacle 31 upon the next operative cycle of the apparatus.

Apparatus according to the present invention can be modified as particularly shown in FIGS. 6 and 7 to impart a desired characteristic of "spin" to the balls pitched or thrown by the apparatus, and which can thus be selectively adjusted to pitch curve balls to a batter. As seen in FIG. 6, for example, a modified shaft 79 provided with journaled ends 80 or other suitable rotation bearings has a ball propelling arm 81 rotatably extending through an opening 82 in the shaft 79 and terminating at an end 83 below the pivot 51. A resilient member such as the spring 84 surrounds the lower end of the arm 81 in compression between a retaining member 85 and the underside of the shaft 79. A stop member 86 extends outwardly from the arm 81 and extends along the upper side 87 of the shaft 79 to lie between two of the several lugs 88 projecting upwardly therefrom. It can be seen that the arm 81 can be lifted upwardly against the compression force of the spring 84 and then rotated to place the stop member 86 between any two of the lugs 88 for a purpose set forth below.

Disposed at the upper end 92 of the arm 81 is a ball hitting member 93 preferably having a substantially flat ball hitting surface 94. The arm 81 is shown in FIG. 6 in its fully-released position in contact with the resilient abutment member 46.

Unlike the previous described embodiments of the present invention, in which a ball was supplied to the receptacle 31 when the ball throwing arm 28 was substantially completely retracted to a cocked position, a ball 95 to be thrown according to the present embodiment is positioned in the spring-powered release path of the arm 81 to be struck by the surface 94 of the ball hitting member 93 immediately before the forward movement of the arm 81 is terminated by the abutment member 46. It will be apparent to those skilled in the art that the ball 95 will be propelled forwardly of the apparatus along a certain trajectory, and that the angular relation of the surface 94 relative to such trajectory controls the direction and amount of spin, if any, imparted to the thrown ball. If the surface 94 is substantially perpendicular to the ball trajectory, the ball will be propelled with substantially no imparted spin. However, if the surface 94 is adjusted by the aforementioned rotation of the arm 81 in the opening 82, the surface 94 assumes a non-perpendicular relationship relative to the trajectory of the ball, and the ball as struck by the surface 94 is propelled with a spin component the direction and magnitude of which is determined by the direction and extent of the nonperpendicularity relative to the ball trajectory.

The ball 95 is supported on a pair of guide members 96 and 97 which are preferably inclined with a slight rearward pitch to roll the ball backwardly to contact the stop member 99.

A plurality of balls may be disposed in a ball channel 102 inclined to cause the lead ball in the channel to abut against the guide member 96 and the stop 98. The lead ball 95 in the ball channel 102 is moved into position on the guide members 96 and 97, thus occupying the position shown by the phantom ball in FIG. 6, by a pair of fingers 103 disposed on an end of a rocking member 104 pivotally attached as at 105 to the support member 64. The other end of the rocking member 104 is connected by a link 106 to the extension member 65, which is attached to the retaining member 50. It will be understood that lowering of the retaining member 50 and the extension member 65, caused by engagement of the upper end 92 of the arm 81 in the notch 52 of the retaining member 50, also lowers the link 106 and produces a corresponding upward movement of the fingers 103 disposed on the rocking member 104. The fingers 103 thus lift the lead ball over the motion stop provided by the guide member 96 to place this ball between the guide members 96 and 97, in a position for impact and propulsion when the ball propelling arm 81 is subsequently released.

The adjustable connection between the frame structure 11 and the base structure 12 can be adjusted to provide the desired trajectory of the balls 59 which are
pitched or thrown by the present apparatus, although it will be understood that trajectory control can be accomplished by other expedients such as, for example, adjusting the position of the abutment member 46. A receptacle closed by the door 23 can be provided at the end 15 of the base structure for storage of balls and for placement of weights as needed to stabilize the present apparatus on uneven terrain. As another alternative to the embodiment disclosed herein, the frame structure 11 and the components associated therewith can be provided without the base structure 12 and the feet 13 mounted on the upstanding members 16. In this manner, the ball throwing apparatus could be provided for mounting at a suitable elevated location such as the top of a table or another support. The function of the pulley 35 would, of course, be provided by a suitable apparatus disposed within the frame structure 11.

Furthermore, it will be understood that the foregoing relates only to preferred embodiments of the present invention, and that numerous modifications and alterations may be made therein without departing from the spirit and the scope of the present invention as defined in the following claims.

1 claim:

1. Apparatus for propelling an article, comprising:
   a. Article propelling member operative to move along a path;
   b. first means operatively connected to urge said article propelling member in a first direction along said path to propel an article;
   c. second means selectively operative to urge said article propelling member in a second direction along said path in opposition to said first means;
   d. means operative in response to movement of said article propelling member to a certain location in said second direction to retain said member at said certain location in opposition to said first means; and
   e. release means for releasing the article propelling member, said release means being operative in response to the force applied to the release means by the article propelling member when the article propelling member is urged in a first direction by said first means to release said retaining means a certain period of time after termination of a user's force on the second means.

2. Apparatus as in claim 1, wherein:
   a. said second means is positionable at a remote location adjacent a trajectory of an article propelled by said article propelling member.
   b. Apparatus as in claim 1, wherein:
     a. said second means includes control means selectively operable to urge said article propelling means in said second direction, said control means extending from said apparatus to be positionable at a location remote thereof and adjacent an expected path of an article to be propelled by.
   c. Apparatus as in claim 3, wherein:
     a. said control means includes a pull member extending to said remote location and operative upon being pulled to a predetermined distance beyond said remote location to urge said article propelling member into said retaining means at said certain location; and
     b. retraction means operatively associated with said pull member to return said pull member said predetermined distance to said remote location when said pull member is released after being pulled, so that such return of said pull member occurs independently of the subsequent release of said article propelling member.

5. Ball throwing apparatus comprising:
   a. a frame structure;
   b. a ball throwing member disposed on said frame structure for movement along a path relative thereto; resilient means connected to apply force urging said ball throwing member in a first direction along said path to throw a ball;
   c. means operatively connected to said ball throwing member to move said ball throwing member in a second direction along said path in opposition to the force applied by said resilient means;
   d. retaining member disposed to selectively engage said ball throwing member and operative in response to movement of the ball throwing member in said second direction until a certain location is reached where the ball throwing member is retained in a cocked position and delay means for causing the retaining member to delay complete release of said ball throwing member for a certain period of time after the application of a cocking force has been applied and the ball throwing force is free to act on said ball throwing member, said delay means being operative in opposition to the movement of the ball throwing member in the first direction by the force applied by said resilient means during the time the ball throwing member is actuated by the resilient means until the ball throwing member is completely released by said retaining member.

6. Apparatus as in claim 5, wherein:
   a. said retaining member is disposed in said path at said certain location thereon to engage and retain said ball throwing member thereat.
   b. Apparatus as in claim 6, wherein:
     a. said retaining member is disposed to be movable to a first position for retaining engagement of said ball throwing member in a cocked position and to a second position for complete disengagement of said ball throwing member; and
     b. said delay means is operatively connected with said retaining member to enable said retaining member to move from said first position to said second position only upon passage of said certain period of time.

8. Apparatus as in claim 5, wherein:
   a. said resilient means is operatively connected between said frame structure and said ball throwing member means; and selectively adjustable means interposed at the connection of said resilient means and said frame structure to vary the amount of energy stored in the resilient means, said stored energy being applied to urge said ball throwing means in the first direction.

9. Apparatus as in claim 5, further comprising:
   a. means operative to adjust the final position said ball throwing member can assume in said first direction relative to a reference surface on which said apparatus is disposed.

10. Apparatus as in claim 9, wherein:
    a. said last-mentioned means includes a base structure disposed to rest on the reference surface and operative to receive said frame structure; and
9 adjustable means connected between said base structure and said frame structure to selectively adjust the position of said frame structure relative to said base structure.

11. Apparatus as in claim 5 wherein:

said means to move said ball throwing member in a second direction includes a pull member extending to a location remotely positioned from said frame structure, said pull member being operatively connected to said ball throwing member to move said ball throwing member in said second direction to said certain location after being pulled a predeter-
mined distance; and

retracting means operatively associated with said pull member to return said pull member said predeter-
mined distance when said pull member is released after being pulled, so that such return of said pull member occurs before the movement of said ball throwing member in said first direction and before complete release of said retaining member after said certain period of time.

12. Apparatus as in claim 5, further comprising:

ball receiving means for receiving a ball for projection, said ball receiving means being disposed on said ball throwing member;

ball storing means disposed on said frame structure for receiving a plurality of balls; and

ball feeding means operative in response to said ball throwing member being moved to said second location to transfer one of said plurality of balls from said ball storing means to said ball receiving means.

13. Apparatus as in claim 5, further comprising:

ball striking member disposed on said ball propelling member to move along a predetermined path and to project a ball;

means disposed on said frame structure for positioning a ball in said predetermined path in position propelling impact by said ball striking member; and

means adjustably mounting said ball striking member to selectively vary the orientation of said ball striking member, so that a predetermined angular motion is imparted to said ball after the ball has been struck by said ball striking member.

14. Apparatus as in claim 13, further comprising:

means disposed on said frame structure for receiving a number of balls and for supplying said balls sequentially to a location adjacent said ball positioning means; and

ball feeding means operative in response to said ball striking member being moved to said certain location to transfer one of said balls from an adjacent location into position on said ball positioning means so as to be impacted by said ball striking member.

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