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McNabb

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[45] Dec. 4, 1973

[54] **BASKETBALL RETRIEVAL AND RETURN DEVICE**

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[52] **U.S. Cl.** ..... **273/1.5 A**, 124/7, 273/103

[51] **Int. Cl.** **A63b 69/00**

[58] **Field of Search** ..... 273/1.5 A, 103, 125; 124/6, 7

[56] **References Cited**

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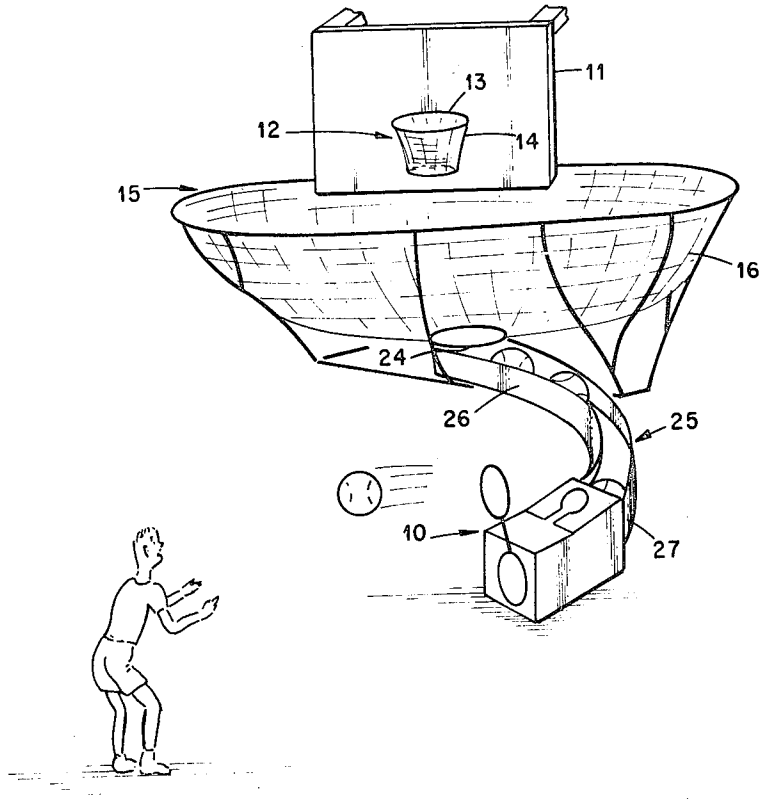
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Primary Examiner—Anton O. Oechsle
Assistant Examiner—Paul E. Shapiro
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[57] **ABSTRACT**

A large basket shaped framework enclosed by an outer covering is positioned beneath a basketball basket. A chute leads from the bottom of this framework to a basketball return mechanism. The return mechanism comprises a motor driven rotating projecting arm and a transfer arm for transferring a basketball from the end of the chute to the projecting arm. The projecting arm is connected to the motor by a drive shaft and a torsion spring mount. A tension spring controlled arm engages the end of the projecting arm to prevent it from rotating while the transfer arm operates. When the force in the torsion spring increases to a force greater than that of the tension spring, due to the continued operation of the motor, the projecting arm is released and throws the basketball resting thereon to a user.

7 Claims, 7 Drawing Figures



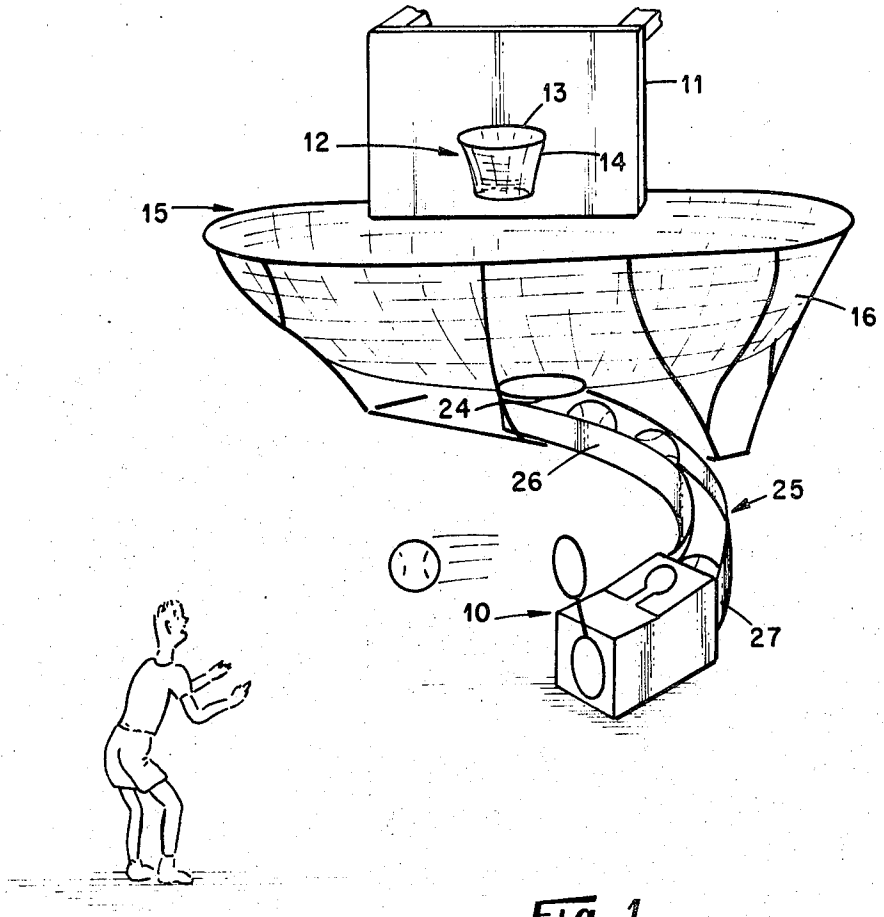


Fig. 1

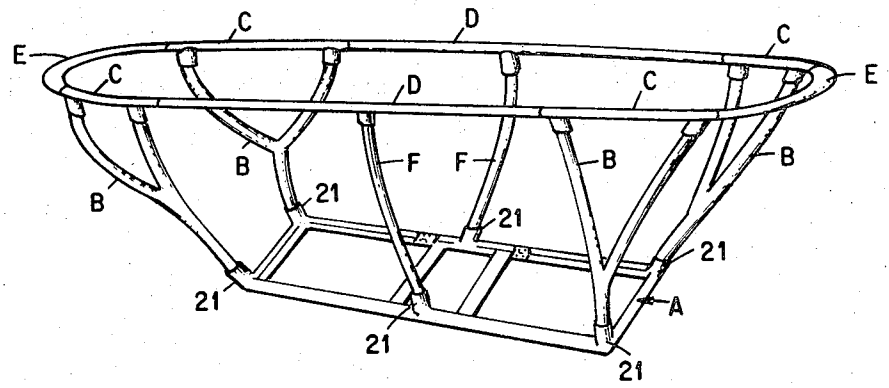

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Fig. 2

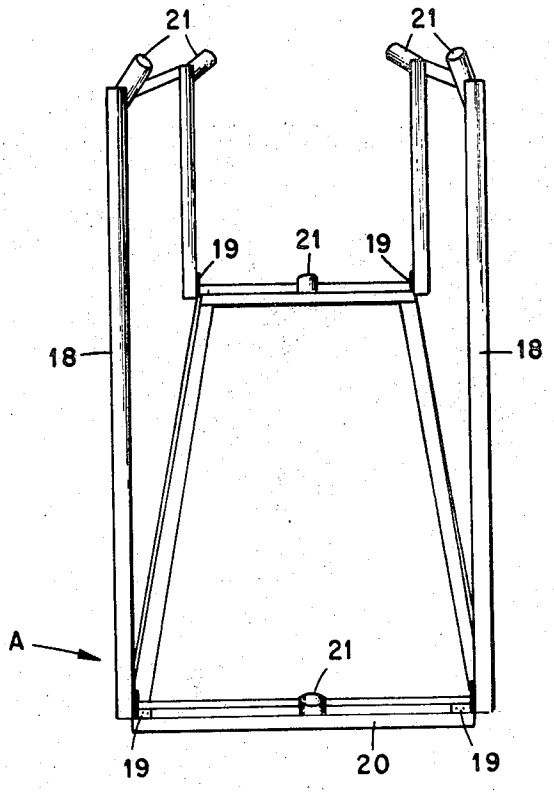

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Fig. 3

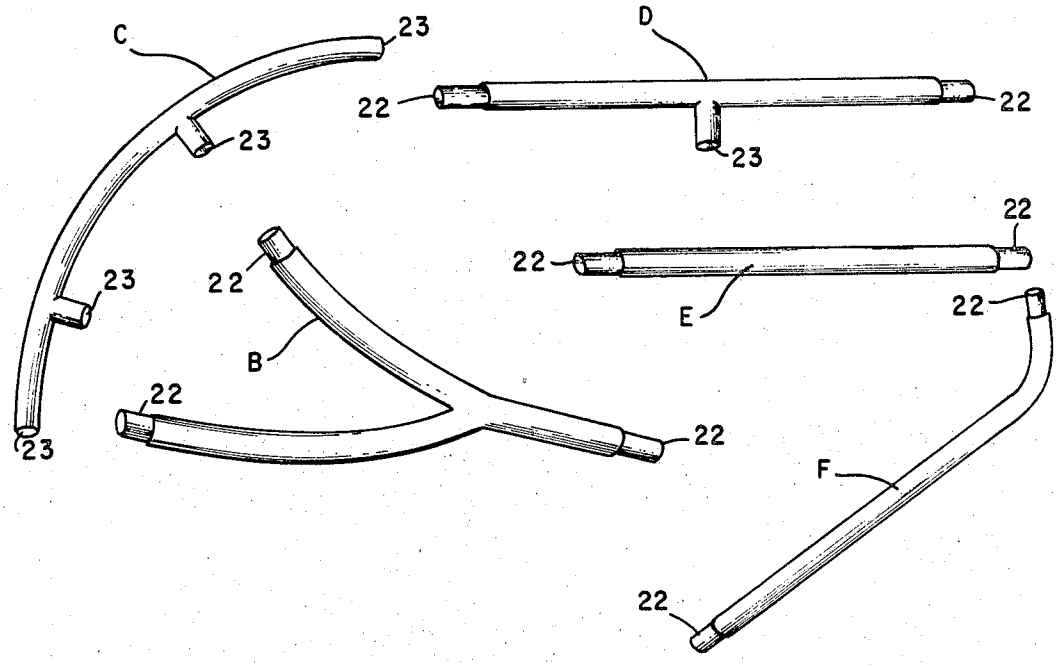


Fig. 4

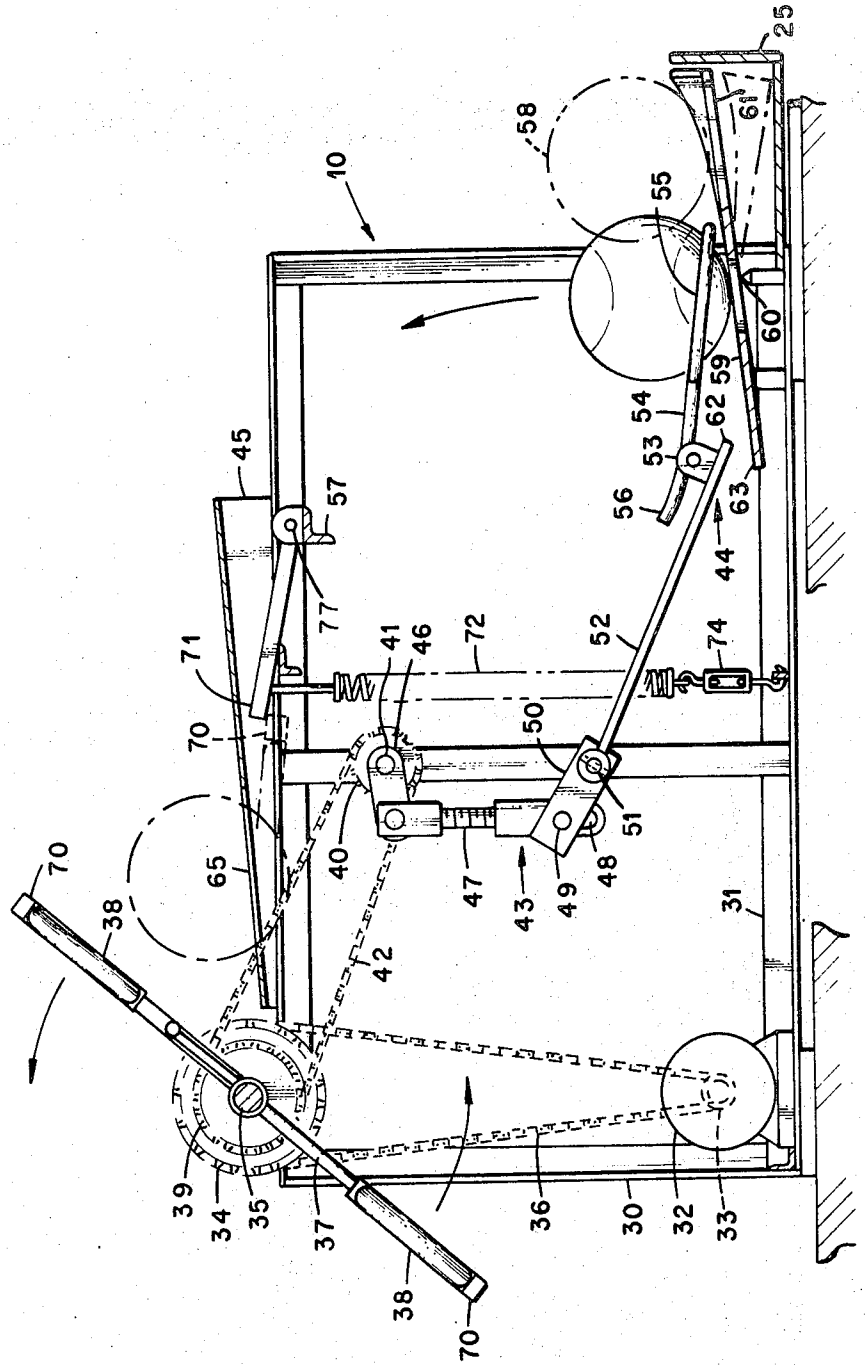

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Fig. 5

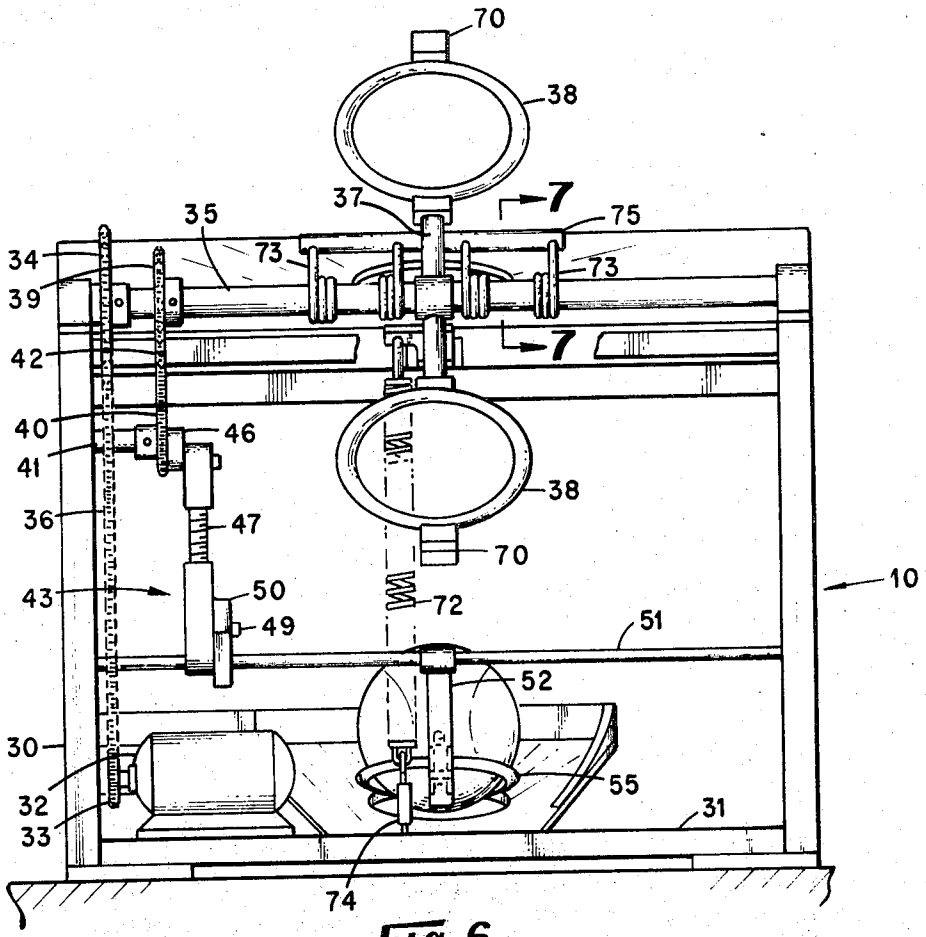

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Fig. 6

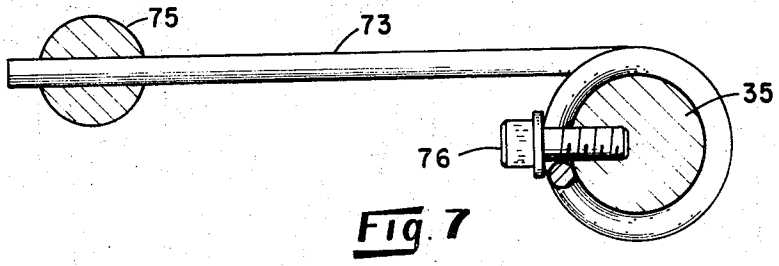

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Fig. 7

BASKETBALL RETRIEVAL AND RETURN DEVICE

BACKGROUND OF THE INVENTION

The invention described herein relates to an apparatus for practicing the sport of basketball. It is an improvement of known ball-return devices, such as that of J.L. King, U.S. Pat. No. 3,233,896, J.H. Scalf, U.S. Pat No. 2,808,264 and H.E. Kimbrell, U.S. Pat. No. 3,105,683.

It is well known that in the game of basketball the players endeavor to toss a ball through an annular member secured to a board at each end of a court and that the annular members generally have a net open at the bottom depending therefrom. The annular member, together with the net, is commonly called the basket. It is obvious that not all of the shots made toward the basket enter therein. Therefore, during practice sessions, it is generally necessary for a player to be stationed nearby to retrieve the thrown balls and then return them to the shooter or for the shooter to chase after the thrown ball and then return to the point at which he may be practicing a particular type of shot. This results in considerable wasted effort and shortens the effective practice time of each shooter.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a means for greatly increasing the number of practice shots which an individual may make at any point on the basketball court. It is an additional object of this invention to provide a basketball practice device which does not depend upon an individual having any particular degree of skill in shooting baskets. This invention will retrieve all balls thrown toward the basket whether or not they go through the annular member and will then impel the balls to the shooter at a predetermined rate, with a force which may be varied, and in an adjustable direction. The ability to control a number of variables which can influence the making of basketball goals will enable a basketball player or coach to concentrate on improving certain deficiencies which may thereby be discovered in the players shooting skills. Athletes can be easily, quickly and automatically graded as to proficiency with a particular shot by means of known devices such as an automatic counter attached to the ball return system of this invention and a photocell sensor installed within the rim of the basket to sense and record shots which enter therein. This invention will greatly increase the number of shots possible to the individual practicer in a given time and will be of particular value in the practice of baseline and outside shots.

This apparatus is easily installed, easily dismantled, can be stored compactly following practice sessions and can be economically manufactured. The invention is designed to be used in conjunction with a standard basketball backboard assembly with no damage to any part thereof.

Further features and objects of the invention will be apparent from an examination of the accompanying drawings which illustrate the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a general perspective view of the operation of the invention;

FIG. 2 is the preferred embodiment of the ball retriever portion of the invention;

FIG. 3 is the rectangular base portion of the preferred embodiment of the ball retriever portion of the invention in a partially folded position.

FIG. 4 shows the disassembled tubular members of the preferred embodiment of the ball retriever portion of the invention.

FIG. 5 is a partially sectioned side view of the ball return system of the invention.

FIG. 6 is an end view of the structure of FIG. 5.

FIG. 7 is a sectional view taken substantially along the line 7—7 of FIG. 6 as viewed in the direction indicated by the arrows showing the arrangement of the projectile spring of the device.

Similar reference characters refer to similar parts throughout the several views of the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Having reference to the drawings in detail, the ball retriever portion of the invention is generally indicated in FIG. 1 at 15 and is arranged so as to utilize a backstop or backboard 11 which may be supported in any suitable manner and has attached thereto a basket assembly 12. The basket assembly 12 is comprised of an annular member 13 and a net 14, all of which are conventional and well known. Ball retriever 15 is formed generally in the shape of a funnel and comprises a framework of tubular members with an outer covering 16 which can be constructed of netting or other flexible or foldable material. Ball retriever 15 is positioned in relation to basket assembly 12 so that the enlarged upward opening extends a substantial distance outward from a point beneath basket assembly 12 whereby a ball thrown or tossed in the direction of said basket assembly will encounter and be retrieved by the outer covering 16 even though the ball does not go through annular member 13.

Covering 16 is attached to ball retriever 15 by suitable attaching means which means are detachable and the entire ball retriever 15 is comprised of members having sleeve connectors which are telescopically attached one to another for ease and convenience in transporting the ball retriever and for compactability in storing when the subject invention is not in use. Covering 16 tapers downward to a circular opening 24 which is somewhat larger than a basketball in size so that a basketball retrieved by ball retriever 15 may pass, by force of gravity, therethrough.

A non-flexible chute 25 having an elevated portion 26 and a lower portion 27 is positioned with elevated portion 26 directly beneath the circular opening 24 of ball retriever 15 so as to transfer the basketball to ball return system 10. Chute 25 can be constructed of any durable material such as molded plastic, wood, wire or other metal but it is essential that chute 25 serve only to guide the ball downward and into position for subsequent pickup and projection.

A preferred embodiment of the framework of ball retriever 15 is shown in FIG. 2 wherein the netting is omitted to show details of construction. A partially folded view of the rectangular aluminum base A is shown in FIG. 3. The disassembled tubular members B, C, D, E, F of ball retriever 15 are further shown in FIG. 4.

Base A, FIG. 3, consists of two outer sections 18 attached by hinges 19 to a center section 20. Tubular support holders 21 are welded into base A at strategic

positions to support the tubular members B and F, FIG. 2. Tubular members B, C, D, E, and F interlock with each other, FIG. 2, to form the support required to maintain net 16 in position. The means for connecting members A, B, C, D, E, and F of the framework of ball retriever 15 consists of tapering male ends 22 of members B, D, E, and F, FIG. 4, to a size whereby the male ends 22 snuggly enter female ends 23 of members C, and D, FIG. 4, and tubular support holders 21 of base A, FIG. 3. The members are not required to be locked together by other than frictional forces in the described embodiment. However, the use of conventional pins or snaplocks will provide greater stability and permanence to ball retriever 15.

Referring to FIG. 5 and FIG. 6 the ball return system of the invention at 10 includes, in one embodiment, an iron framework welded together to form a housing 30 having a base 31 on which are supported the elements to be ennumerated. Base 31 supports a reduction gear motor 32 with sprocket 33 attached to the shaft 35 thereof. Sprocket 33 is connected to sprocket 34 on shaft 35 by means of standard chain drive 36. Projectile arm 37 is mounted to rotate around shaft 35. Appended to each end of projectile arm 37 is an annular ring 38 having a diameter smaller than a basketball so as to be able to pick up the basketball and project it to the shooter. Sprocket 39 is mounted on shaft 35 and is connected to sprocket 40 mounted on shaft 41 by means of standard chain drive 42.

Shaft 41 has pivotally attached thereto mechanical means 43 for raising and lowering loading arm assembly 44 which is disposed to pick up balls from chute 25 at a predetermined and adjustable rate and to thereafter deposit the balls one at a time onto loading platform 45. The means for activating loading arm assembly 44 is best illustrated in FIG. 5. Connecting arm 46 is pivotally attached at one end to shaft 41 and pivotally attached at the other end to a vertical member 47 which is suitably threaded as a means for adjusting the travel of said member. The lower end of vertical member 47 is provided with a slot 48 to engage pin 49 in one end of connecting arm 50. Connecting arm 50 is fixedly mounted to shaft 51.

Loading arm assembly 44 consists of lever arm 52 fixedly mounted to shaft 51. Lever arm 52 has a pivotal attachment 53 at the end opposite to the fixed position on shaft 51 wherein is pivotally mounted loading arm 54. Loading arm 54 has an annular portion 55 at one end for lifting the basketball and an upward curved portion 56 at the other end. When sprocket 40 turns connecting arm 46 toward a downward position, vertical member 47 translates the motion to connecting arm 50 whereupon shaft 51 turns in a counterclockwise direction causing loading arm assembly 44 to move upward carrying the ball toward loading platform 45. When the upward curved portion 56 of loading arm 54 meets trip point 57 loading arm 54 turns at pivotal attachment 53 thereby causing the ball to flip forward onto inclined loading platform 45. The ball rolls by force of gravity down the incline of loading platform 45 to an annular portion 65 wherein it rests until projectile arm 37 is activated.

When sprocket 40 turns connecting arm 46 toward an upright position, vertical member 47 translates the motion to connecting arm 50 whereby shaft 51 turns in a clockwise direction causing loading arm assembly 44 to move downward and into position to receive the ball from position 58 in chute 25. Loading ramp 59 adjacent to chute 25 is pivotally mounted at 60 whereby end 61 moves clockwise by force of gravity and is in position to receive a ball from chute 25 when loading arm assembly 44 is in an upward position. When loading arm assembly 44 moves into a downward position contact end 62 of lever arm 52 strikes pressure point 63 whereby loading ramp 59 moves counterclockwise at pivot mount 60, such movement causing the ball to roll forward and down loading ramp 59 by force of gravity into annular portion 55 of loading arm 54. It is an important function of slot 48 in vertical member 47 to provide a brief time delay to the upward motion of lever arm 52 to enable the ball to roll into said annular portion 55 of loading arm 54.

Activation of projectile arm 37 can best be shown by referring to the partially sectioned side view of FIG. 5 and the end view of the invention shown in FIG. 6. When contact bar 70 on projectile arm 37 strikes pressure stop 71 pivotally attached at 77 projectile arm 37 is retained momentarily by the tension exerted by helical holding spring 72 on pressure stop 71. The momentary suspension of the rotational motion of projectile arm 37 does not suspend the rotational motion as to torsional projectile spring 73 which is attached to and rotates with shaft 35. The resultant energy stored in projectile spring 73 is transferred to projectile arm 37 and is applied to pressure stop 71 by contact bar 70 until the downward force of holding spring 72 is overcome by the greater force built up in projectile spring 73. The sudden release of energy stored in projectile spring 73 causes projectile arm 37 to instantly and forcefully project the basketball to the shooter. The force by which the basketball is projected is controlled by the tension applied by holding spring 72 which tension is adjusted by means of turnbuckle 74 attached between base 31 and holding spring 72.

The arrangement of projectile spring 73 in the device is best shown in the end view of FIG. 6 and the sectional view of FIG. 7 taken substantially along the line 7—7 of FIG. 6. In the preferred embodiment one or more projectile springs 73 are fixedly mounted on one end to shaft 35 and to a connecting bar 75 which is attached to projectile arm 37 on their opposite ends. Pin 76 prevents dislodgement of projectile spring 73 from shaft 35 during rotation of said shaft 35.

In one embodiment of the subject invention whereby optimum operating conditions were achieved, an 18 revolutions per minute reduction gear motor 32 was coupled to an 11-toothed sprocket 33. Sprocket 33 was connected to a 44-toothed sprocket 34 on shaft 35 by means of a standard chain drive 36 which connection gave a 4:1 rotational reduction to produce 4.5 revolutions per minute from gear motor 32 to shaft 35. A sprocket 39 having 30 teeth was mounted on shaft 35 and was connected to a sprocket 40 having 15 teeth on shaft 41 by standard chain drive 42 whereby nine revolutions per minute were achieved on shaft 41.

Employment of the described specifications whereupon shaft 35 could turn at 4.5 revolutions per minute provides projectile arm 37 with the capability to project two balls per revolution or nine balls per minute. The consequent rotation of shaft 41 at nine revolutions per minute whereby nine balls are delivered to loading platform 45 per minute provides a highly efficient delivery system and is the preferred embodiment of this invention.

It is apparent that the sizes of the sprockets and gear motor are not limited to those enumerated herein and that shaft speeds can be increased or decreased at will by known and conventional means. It is an important advantage of the subject invention that the rate of delivery of balls to the shooter may be controlled by conventional means and that the invention can be interacted with existing electronic timing devices and operated in conjunction with known speed-control mechanisms so as to provide the optimum number of shots per given time span consistent with the shooters ability.

The aforedescribed means for retrieving any ball thrown toward the basket assembly is not limited to the style or scope of the apparatus described in the drawings. It is obvious that any base may be used to support a plurality of arms extendible radially therefrom and that a net or other covering can be suspended therefrom to retrieve a ball thrown generally in the direction of a basket assembly when said basket assembly is placed superior to a retrieval means. In the subject embodiment the framework of ball retriever **15** is composed of lightweight aluminum members to facilitate its portability with the base A mounted on rubber casters to prevent marring of hardwood gymnasium floors. The base can, however, be covered or mounted upon felt, carpeting, or any suitable resilient material. It is obvious that the materials for constructing the framework are not limited to any single material and that the main consideration is the durability and portability of the instant embodiment.

A preferred embodiment of this invention has been set forth in the description and drawings. These descriptions are used in a generic sense only and not for purposes of limitation. Various changes may therefore be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A portable and automatic basketball retrieval and return device for use in the practice of the sport of basketball with a conventional basketball goal and conventional basketballs which comprises, in combination:

a. a ball retrieval system comprising a base portion having a plurality of tubular members to form an upstanding frame attached to and extending therefrom, an outer covering attached to said frame whereby an enlarged upward opening is provided for the capture of a basketball and whereby said covering converges downwardly to guide the ball toward an opening in the lowest portion thereof;

b. a ball return system;

c. means for transferring a basketball from said ball retrieval system to said ball return system wherein said ball return system comprises:

d. a housing,

e. a reduction gear motor associated with said housing,

f. a drive shaft driven by said motor,

g. a basketball projectile arm,

h. means for imparting rotational movement from said drive shaft to said basketball projectile arm,

i. means for transferring a basketball to said projectile arm,

j. tension means for momentarily halting rotational movement of said projectile arm,

k. means for overcoming tension applied to said projectile arm wherein said means for overcoming tension comprises:

l. at least one projectile spring mounted in said projectile arm wherein said reduction gear motor continues to drive said drive shaft, wherein rotational movement is thereby imparted from said drive shaft to said basketball projectile arm after said projectile arm has been retained momentarily by said tension means whereby said tension means is overcome by force of said reduction gear motor thereby providing the force required to activate said projectile arm.

2. A basketball retrieval and return device as recited in claim **1** wherein the means for transferring a basketball from the ball retrieval system to the ball return system comprises a chute having an elevated portion mounted directly beneath said ball retrieval system whereby the basketball can roll by force of gravity to a lower portion of the chute whereupon entrance is made to the ball return system.

3. A basketball retrieval and return device as recited in claim **1** wherein said tension means for halting rotational movement of said projectile arm consists of a holding spring attached to a pivotally mounted pressure stop whereby tension is applied thereto whereby said projectile arm is momentarily halted from rotational movement.

4. A basketball retrieval and return attached as recited in claim **3** further comprising a turnbuckle attahced to said holding spring for adjusting the tension thereof.

5. A basketball retrieval and return device as recited in claim **1** wherein said means for transferring a basketball to said projectile arm comprises a pivotally mounted loading arm and means interconnecting said drive shaft to said loading arm thereby converting rotary motion of the former to pivotal movement of the latter.

6. A basketball retrieval and return device as recited in claim **5** wherein said interconnecting means comprises a vertical member provided with a slot therein to provide a time delay for movement of the ball to said loading arm during activation of said loading arm.

7. A basketball retrieval and return device as recited in claim **5** further comprising a pivotally mounted loading ramp interconnected to said loading arm whereby said loading ramp can sequentially and intermittantly retain a ball until said projectile arm is activated, thereby forcefully projecting the ball to the shooter.

* * * * *