United States Patent

[11] **3,549,148**

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[54] **AUTOMATIC BALL RECEIVING AND TOSSING DEVICE**
1 Claim, 11 Drawing Figs.

[52] **U.S. Cl.** **273/103, 124/21**
[51] **Int. Cl.** **A63b 65/12**
[50] **Field of Search** ..... 273/103, 26(A), 26(D), 127(C), 129; 124/17, 35, 21, 30, 1

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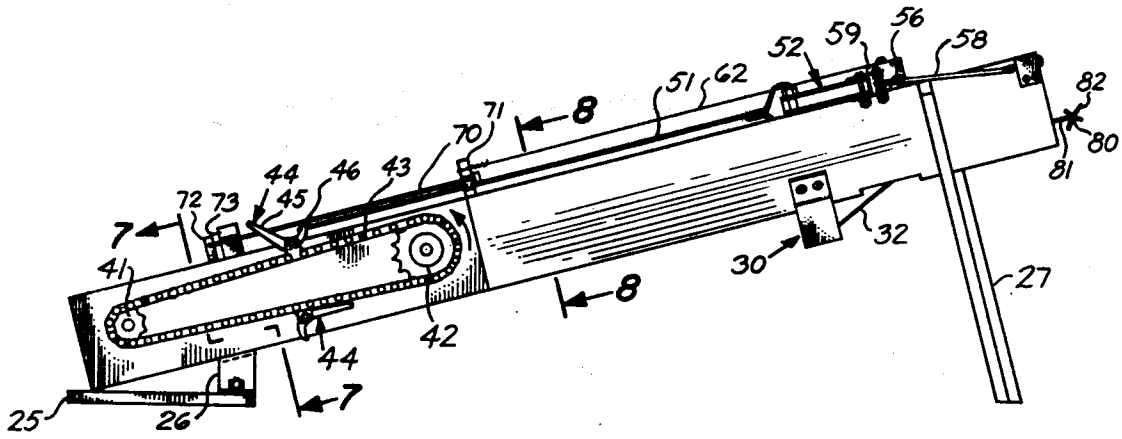
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ABSTRACT: An automatic ball-receiving and tossing device having a nonrigid ball receiver typically made of canvas, mechanism including stretchable elastic bands for tossing the ball from the machine, switch means operated by the ball to start a motor windup means for stretching the elastic bands to store energy therein, and trigger means for releasing the stretched bands to toss the ball from the device with sufficient force to travel a relatively long distance of 30 to 40 feet from the device.



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SHEET 1 OF 2

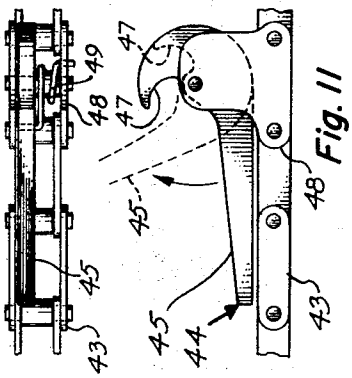


Fig. 10

Fig. 11

Fig. 2

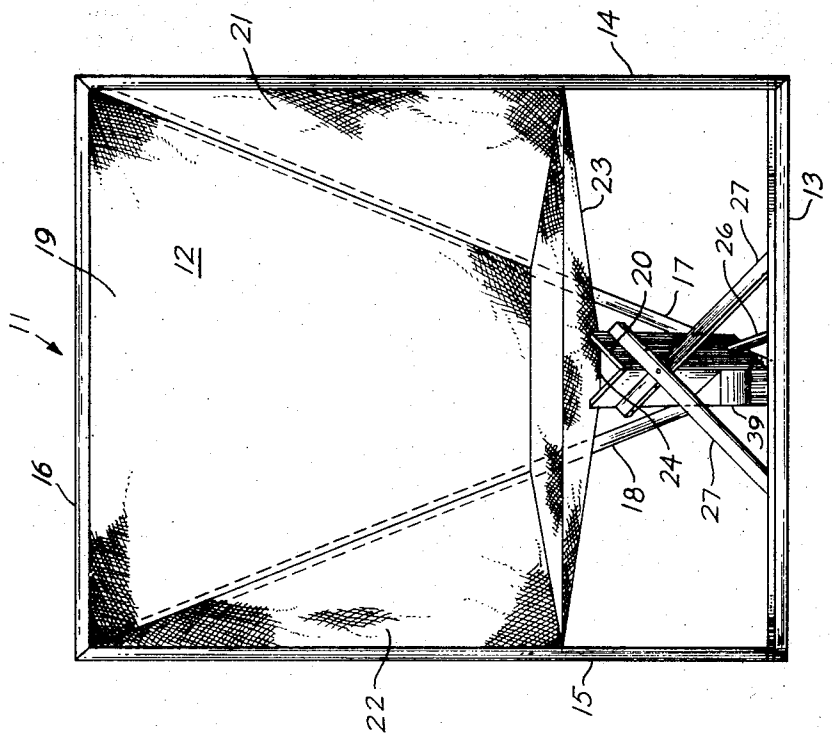


Fig. 1

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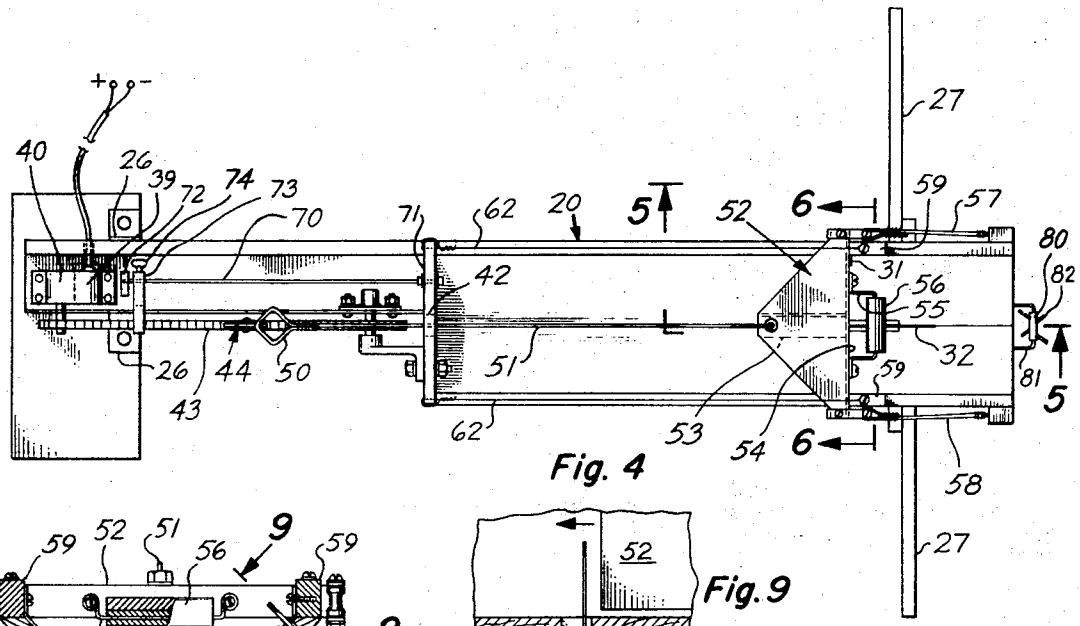


Fig. 4

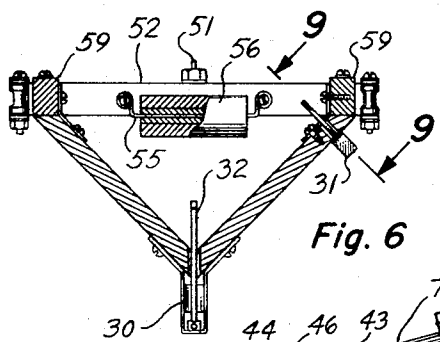


Fig. 6

Fig. 9

Fig. 3

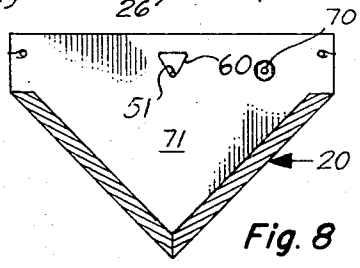


Fig. 8

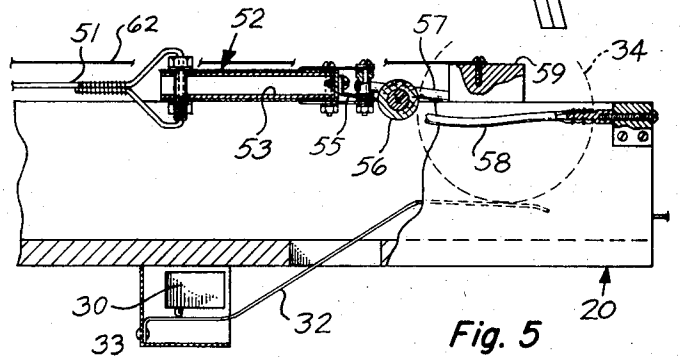


Fig. 5

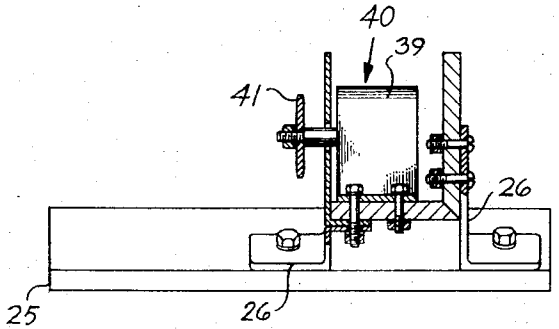


Fig. 7

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AUTOMATIC BALL RECEIVING AND TOSSING DEVICE

BACKGROUND OF THE INVENTION

This invention relates to a ball- catching and-throwing device, and more particularly to a device for catching and automatically throwing a ball a relatively long distance, 30 to 40 feet from the device.

Various prior art devices have attempted to solve the problems which exist. Most of these machines are not automatic since some piece of apparatus must be operated by the original thrower-catcher in order for the ball to be returned.

Some of the devices do attempt to return the ball automatically. One of the main difficulties of this type of machine has been the excessive mass required by the impeller. In order to efficiently propel a ball the impeller must have the least possible mass. However, simply reducing the mass is no solution to the problem since the impeller is subjected to high impact forces. Therefore, the design must be one which provides a high strength to weight ratio.

Such a device is desirable and useful. Normally two or more persons are required to play catch with a ball. A small child may not, for various reasons, have someone to play catch with at the time he wants to play. Using this invention, the child can play catch by himself with the device.

A "would be" ball player can practice catching, pitching, batting.

The device could even be used to keep a dog occupied and happy. A dog can easily be trained to drop a ball in the ball-catching device. The device will then automatically toss the ball for the dog to chase, recover and return to the machine for another throw.

One of the objects of this invention is to provide a device whereby one person may play catch without the aid of a second person.

Another object of this invention is to provide a device wherein the mass of the impeller is sufficiently low to efficiently throw the ball.

A further object of the invention is to provide a device which is efficient and yet relatively inexpensive.

A still further object of this invention is to provide a device which will throw a ball for a dog to chase.

The foregoing and other objects are realized in the present invention by a device having a ball-catching means. Switching means are provided to actuate motor means to drive a chain around sprockets. The chain is provided with a hook to engage a loop attached to an impeller. The linear movement of the hook stretches elastic bands storing energy to throw the ball ahead of the impeller when the hook is disengaged by the trigger means. A better understanding will be had from the following detailed description, and the accompanying drawings in which the preferred embodiment is disclosed.

FIG. 1 is a front view of the device.
FIG. 2 is a side view of the device.
FIG. 3 is a side view of the trough portion.
FIG. 4 is a top view of the trough portion.
FIG. 5 is a view taken at section 5–5 of FIG. 4.
FIG. 6 is a view taken at section 6–6 of FIG. 4.
FIG. 7 is a view taken at section 7–7 of FIG. 3.
FIG. 8 is a view taken at section 8–8 of FIG. 3.
FIG. 9 is a view taken at section 9–9 of FIG. 6.
FIG. 10 is a top view of the hook.
FIG. 11 is a side view of the hook.

The device consists of a ball-catching means, automatic means, energy-storing means, energy-releasing means, and ball-deflecting means.

BALL-CATCHING MEANS

The ball-catching means **10** is comprised of a rectangular main frame **11** to which a ball receiver or catcher **12** is secured. Catcher **12** is typically made of a flexible material such as canvas. Frame **11** consists of a base **13**, uprights **14** and **15**, traverse member **16** parallel to and spaced apart from the base **13**, two diagonal pieces **17** and **18** which extend from the rear of the base **13** upwardly to traverse member **16**.

The flexible material such as canvas is affixed to frame **11** in the following manner. The V-shaped back portion **19** which is disposed traverse the longitudinal axis of the trough **20** is attached to diagonal members **17** and **18** and to the transverse member **16**. Forwardly projecting wings **21** and **22** are affixed to diagonals **17** and **18** and to uprights **14** and **15**. Bottom **23** is loosely inclined toward the front and is provided with an opening **24** at the lowest point through which a ball may drop into trough **20**.

AUTOMATIC MEANS

The automatic means consists of a switch **30** and a second switch **31**. Switch **30** is operated by a bellcrank lever **32**. Bellcrank lever is preloaded so as to press on switch button **33** keeping it depressed when the bellcrank lever is at rest. The bellcrank lever is positioned so that one end inclines into trough **20** and is adapted to be depressed by the weight of a ball **34**. When the bellcrank lever **32** is depressed by the weight of ball **34**, switch button **33** is allowed to resume its extended position. Switch **30** is normally closed. When switch button **33** is depressed the switch is open, when extended the switch is closed.

As ball **34** rolls down the trough and off bellcrank lever **32** the preload on lever **32** returns bellcrank to depress switch button **33** and open switch **30**.

Second switch **31** is also normally closed. Arm **35** projects upwardly across switch button **36** and extends beyond the body of the switch. The upper portion of the arm is positioned so that impeller **52** may contact the arm and bend it back when the impeller is at rest against stops **59**. The bending action depresses switch button **36** and opens switch **31**. As impeller **52** is pulled away from stops **59** the arm resumes its normal position and closes switch **31**.

Switch **30** and second switch **31** are connected in parallel to motor **39**. When either switch is closed motor **39** will run.

As ball **34** drops on trough **20** switch **30** is closed by bellcrank lever **32**. Bellcrank lever **32** is depressed by the weight of ball **34**. Motor **39** starts to run. Impeller **52** is pulled away from stops **59** and switch **31** is closed. Ball **34** follows impeller **52** and rolls off bellcrank lever **32** allowing switch **30** to open. Since switch **31** remains closed, motor **39** continues to operate.

ENERGY-STORING MEANS

The energy-storing means includes a motor **39** which is affixed to the trough **20** and operatively connected to a gearbox **40**. Gearbox **40** drives a sprocket **41**. A second sprocket **42** is mounted on trough **20** in a spaced relationship with sprocket **41**. A chain **43** is positioned about the sprockets **41** and **42** so as to form an endless belt.

Hook **44** is carried by the chain **43**. Hook **44** is shaped like the letter J having a relatively long leg **45** and a relatively short leg **46** joined by a constant radius curve **47**. Hook **44** is attached to chain **43** by a bracket **48**. Hook **44** is rotatably mounted in bracket **48** and is normally positioned so that the long leg **45** lays along the chain by spring **49**. One or more hooks like hook **44** may be carried by chain **43** to decrease the time the operator must wait for the ball to be thrown. In its normal position, hook **44** is adapted to engage loop **50**. Loop **50** is affixed to one end of rod **51**. The other end of rod **51** is attached to impeller **52**.

Impeller **52** is triangular in shape with rod **51** attached at the apex of the triangle. Impeller **52** is constructed of a structural member **53**, such as a channel or I-beam, of a lightweight material such as aluminum. A flat sheet of aluminum is wrapped around the structural member to form the triangle. The base of the triangle **54** has a bracket **55** upon which is rotatably mounted a roller **56**. The roller is positioned so that the axis of the roller **56** is approximately on the centerline of a ball resting in the trough **20**. One end of elastic bands **57** and **58** are fastened at either end of base. The other end of the elastic bands **57** and **58** are affixed to trough **20**.

Stops 59 are positioned so as to limit the travel of the impeller. When hook 44 engages the loop and through rod 51 starts to pull the impeller against the resistance of elastic bands 57 and 58, hook 44 is pulled into a vertical position. The long leg 45 sticks up vertically. Rod 51 passes through a triangular-shaped opening 60 in block 71 which serves as a guide and locates loop 50 so that it is in the exact position to engage hook 44. Guide wires 62 serve to hold impeller in position on trough 20.

As hook 44 moves with chain 43, energy is stored in elastic bands 57 and 58.

ENERGY-RELEASING MEANS

The energy-releasing means consists of a rod 70 supported by blocks 71 and 72 in a spaced relationship from trough 20. A slideable member 73 is mounted on rod 70. The slideable member 73 is rectangular in cross section and positioned along rod 70 by setscrew 74.

As hook 44 moves the long leg 43 contacts member 73 forcing the leg 43 of the hook to a horizontal position releasing loop 50 from the hook and allowing the energy to be released.

DEFLECTING MEANS

The ball-deflecting means is comprised of a roller 80 affixed to the trough 20 by a bracket 81 which allows the roller to rotate. A plurality of projections 82 extend from the periphery of the roller at varying angles from vertical and at varying lengths.

As the ball is projected from the device the roller is positioned so that the ball will contact one of the projections and be deflected. The force of the ball striking the projection 82 causes the roller to rotate, thus presenting a different projection. The deflection of the ball is thus a random deflection.

OPERATION

In operation, a ball 34 thrown toward the device will be caught by catcher 12 and will fall towards bottom 23 of the catcher 12 and then through hole 24 to trough 20. The ball rolls toward the impeller and comes to rest against roller 56 and actuating arm 32. The weight of the ball depresses actuating arm 32 closing the circuit to the motor. Motor 39 will rotate sprocket 41 and chain 43 will start to travel toward the rear of the machine and leg 46 of hook 44 will engage loop 50. As the hook continues to travel this engagement will draw the impeller 52 away from stops 59, stretching the elastic bands 57 and 58, thus storing energy. As impeller 52 moves away from stops 59 the actuator of the second switch 31 contacts will cause motor 39 to continue to operate even after ball 34 rolls down the incline following impeller 52 and off actuator arm 32. The hook continues to travel until it strikes trigger 73 which disengages loop 50 from leg 46 of the hook 44. The energy stored in the stretched bands will then draw the impeller 52 at great velocity. Since ball 34 is in front of impeller 52, ball 34 is driven at great velocity off the device and thrown a substantial distance away. The impeller 52 comes to rest against stop 59 opening second switch 31, which stops the operation of the motor.

During ejection of the ball it passes over actuator arm 32 so quickly that the contacts of switch 30 are not closed long enough to operate the motor 39.

As the ball leaves the trough 20 it strikes one of the projections 82 on roller 80 deflecting the ball 34. Roller 80 is caused to rotate, thus presenting a different projection 82 for the next ball. A random deflection is thus achieved so that the game is more interesting to the player.

I claim:

1. A device for automatically throwing a ball comprising in combination:

a ball trough inclined with respect to a horizontal ground support;

a ball-catching device mounted over said trough and adapted to direct a ball into said inclined trough; and

means for automatically sensing a ball in said trough and automatically throwing said sensed ball comprising an energy-storing means and an energy-releasing means; said sensing means comprising a ball-actuated switch in said trough; said energy-storing means being affixed to said through and having a ball impeller, a resilient energy-storing member attached to said impeller, and a motor-driven sprocket chain with a hook member that engages said resilient member whereby a ball received in said trough will actuate said switch to start the running of said motor-driven sprocket with its hook and thereby stretch said engaged resilient member to store energy to throw a ball; and said energy-releasing means comprising an elongated rod mounted rearward of said ball impeller with a hook-engaging block adjustably mounted on said rod whereby said hook of said energy-storing means is triggered to release energy when it engages said adjustable block and thereby throw said ball.