March 29, 1938. H. I. SNIPPEN 2,112,611

BALL THROWING DEVICE

Filed May 27, 1936 2 Sheets-Sheet 1

Fig. 1

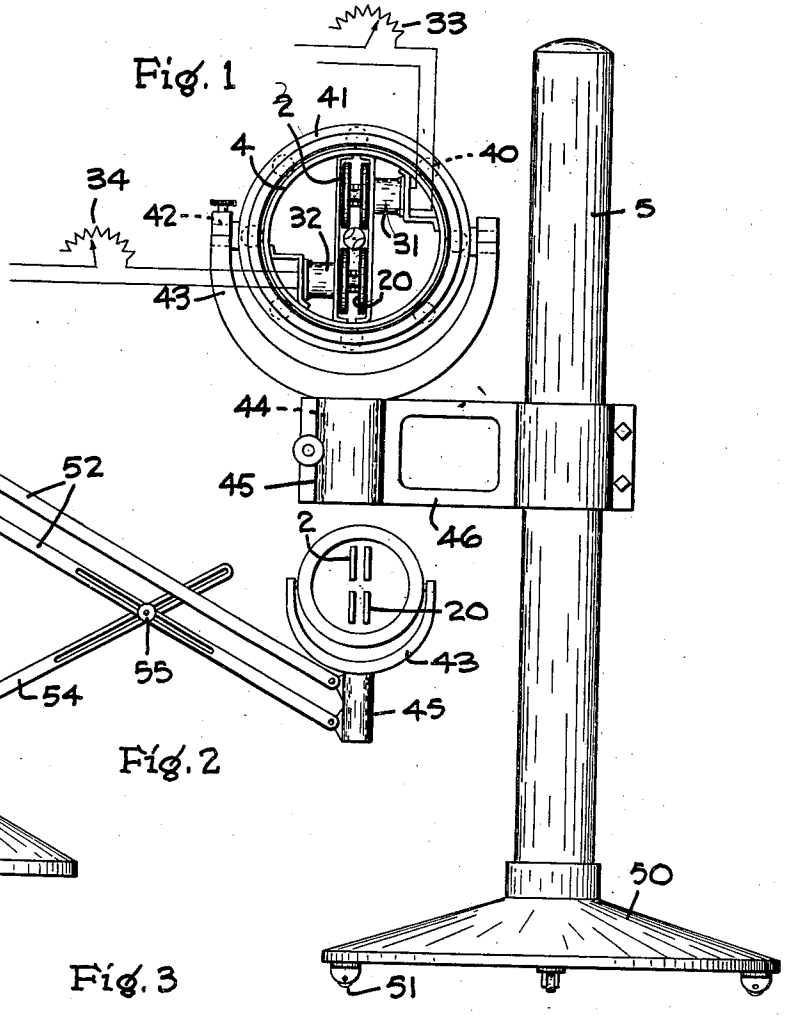
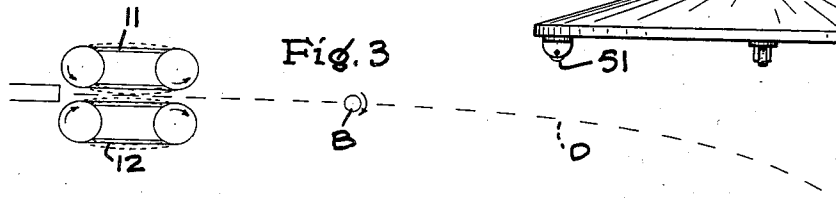


Fig. 2

Fig. 3



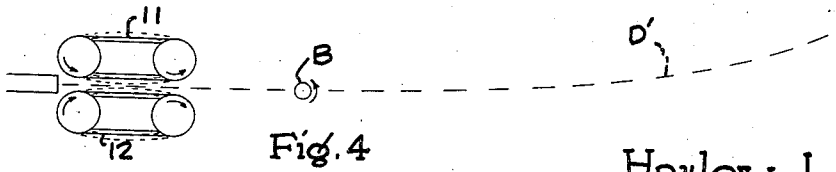


Fig. 4

Inventor

Harlow I. Snippen

By Charles L. Reynolds

Attorney

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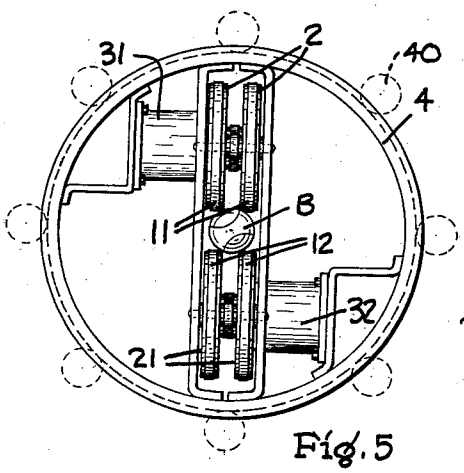


Fig. 5

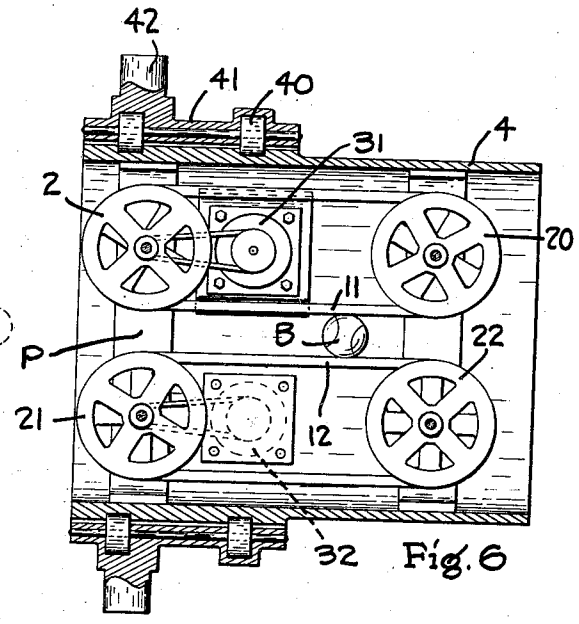


Fig. 6

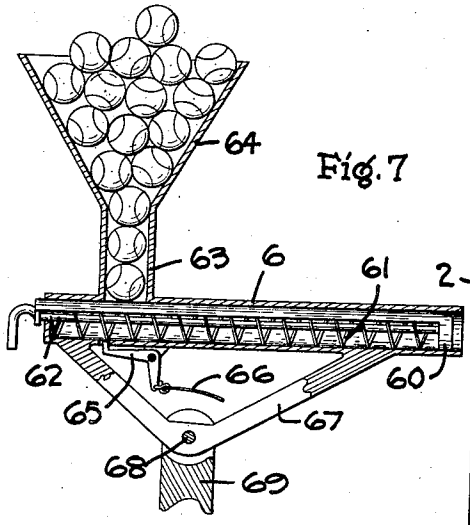
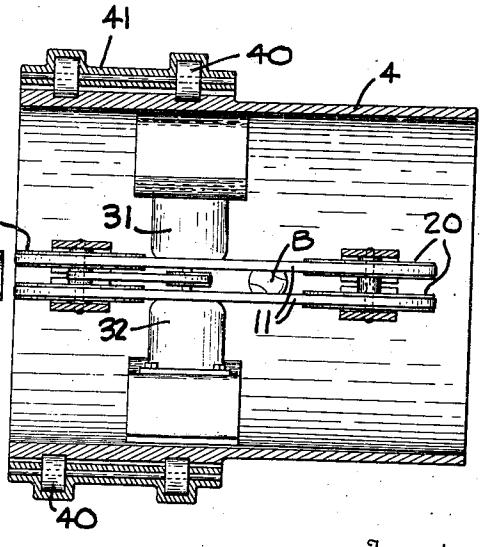


Fig. 7



Inventor

Harlow I. Snippen

By Charles L. Reynolds

Attorney

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UNITED STATES PATENT OFFICE

2,112,611

BALL THROWING DEVICE

Harlow I. Snippen, Seattle, Wash.

Application May 27, 1936, Serial No. 82,039

14 Claims. (Cl. 124—1)

My invention relates to a device for throwing balls, and has for its particular object the provision of means whereby a ball may be adequately controlled and given a high speed of delivery; the provision of means for rotating the ball about its center in flight, so as to curve the ball, and to alter the direction or plane of such curvature controllably, at will; to provide means whereby the ball may be aimed upwardly, downwardly or transversely; to provide means for projecting or feeding a ball to such a throwing device at a good speed so that it need not acquire all of its speed and momentum in the throwing device per se; to accomplish the adjustments referred to above in such a way as to avoid the necessity of change in the position of the ball projecting means; to provide a device by which all varieties of balls—high, low, fast, slow, and curved in all directions, and from all elevations or positions within the range of the device—may be delivered toward a player opposite the device.

Such a device will find many uses, for example, in batting practice for baseball teams. The batters may face automatic pitching which is controllable to deliver all sorts of balls and curves without the necessity of a pitcher facing the batter and weakening himself in throwing such curves. A particular batter may be weak against certain types of curves, or balls reaching him at a certain elevation or distance, and may practice against such pitching, automatically delivered, until he is able to hit the same. A tennis player may prove weak against certain types of serves or returns, and the machine may be set to deliver such types for practice until the player has mastered this weakness. The device may be used as an amusement device purely and simply.

In addition to the general objects stated above it is an object of my invention to provide such a device which shall be of sturdy construction, and yet simple and easy to operate, and capable of wide variation.

My invention comprises the novel ball throwing device and the novel supporting means therefor and ball projecting or feeding means in combination with the ball throwing device and its adjustments, all as shown in the accompanying drawings, and as will be hereinafter more particularly described and pointed out.

In the accompanying drawings I have shown my invention in illustrative forms.

Figure 1 is an elevation of the delivery end of such a device. Figure 2 is a similar view of the same with a modified form of support.

Figure 3 is a diagram, illustrating the principle of throwing one type of curve, and Figure 4 is a similar diagram, illustrating the principle of throwing a different type of curve.

Figure 5 is an elevation of the feed end of the ball throwing mechanism, and Figure 6 is an axial section through the same.

Figure 7 is an axial section through the ball throwing mechanism, taken on a plane at right angles to the sectional plane of Figure 6, and through the associated projecting or feed mechanism.

It has been proposed heretofore to throw balls by engaging them momentarily between a rapidly rotating wheel and a complemental device, as for example a fixed plate or another wheel, and in the latter case to vary the relative speeds of the wheels to develop different curves on the delivered ball. However, when it is remembered that a ball such as a baseball is frequently delivered by pitchers at speeds ranging upwards from 90 miles an hour, and exceptionally fast pitchers are claimed to have thrown baseballs at a speed of 150 miles an hour, it is evident that a ball cannot be made to attain such speeds by momentary contact with a wheel. Its speed must be increased to the maximum from zero or substantially zero in the very small fraction of time that it remains in contact with the rounded surface of the wheel. It is therefore one of my primary objects to provide means whereby the ball may be effectively engaged and its speed increased to that necessary to simulate the speeds attained in sports, and to this end I prefer to employ two belts 11 and 12, received on the respective sets of pulleys 2, 20, 21, 22, and so spaced that their adjacent parallel runs will receive between them and engage opposite sides of a ball B. These belts are driven with the adjacent runs moving in the same direction at high speeds by suitable drive means, as for example the variable speed motors 31 and 32.

Suitable means are provided, as will be evident to those acquainted with the electrical art, and typified by the rheostats 33 and 34 (Figure 1), for varying the absolute speed of each motor, and hence the relative speed of the two motors 31 and 32, so that the belt 11 may be driven the faster, or the belt 12, and so that the relative speeds of these two belts may be varied by any suitable amounts or increments, yet while both are advancing in the same direction toward the delivery point of the ball.

It is preferable that there be employed not one belt 11 or 12, but two such belts, as may best be seen in Figure 7, these being V-belts and cooper-

ating to drive the balls as though but one belt. Such V-belts have a considerable amount of stiffness, and especially when driven at the high speed necessary to project a ball their adjacent runs will bow towards each other, and this in itself serves as a powerful factor in gripping and controlling the ball during its advance between the belts, and in fact this centrifugal action is more depended upon than any other. In consequence the pulleys **2** and **21** may be spaced apart sufficiently that the ball will not come into contact with them, to be squeezed or retarded, thereby, but will be projected into the space between the belts and will be controlled wholly by these belts, and at the instant of delivery will not contact with the pulleys **20** and **22**. If vibration of the belts is found to affect the accuracy of the ball, such vibration may be limited or prevented by suitable backing plates engaging the belts between the pulleys, as is common in belt arrangements, or the belts or the ball may be otherwise controlled or directed.

If the belts **11** and **12** advance at the same speed, an uncurved ball is delivered, which may be fast or slow, according to the speed of the belts. As will be evident in Figure 3 (considering this to be a side elevation), if the upper belt **11** is advancing at a speed in excess of that of the lower belt **12**, the ball B will be given a top spin, and this will cause the ball in its flight to curve downwardly, as indicated by the dash line D. If, on the other hand, the lower belt **12** is advancing more rapidly than the upper belt **11**, the ball will be given an up spin, and will follow an upwardly directed path, indicated by the dash line D' in Figure 4.

Now if the plane defined by the belts **11** and **12** be other than a vertical plane, for instance a horizontal plane, these curves will be the same, and will be controlled by the same factor, but if Figure 3 be considered a top plan view, the curve will be an in curve, and if Figure 4 be considered a top plan view the curve here will be an out curve. I provide means whereby such adjustments or any combination thereof may be made, to the end that all types of balls can be thrown, straight, fast, slow, or curved. With this idea in mind, then, it will be evident that the designation of the belt **11** as the upper one will not always be correct; the belt **11** may as well be the lower one; that is to say, the positions of the belts **11** and **12** may be reversed, for they are so supported that preferably they are bodily rotatable, with their driving means, about the path defined by the advance of the ball or its center while engaged by the belts.

Any suitable means of accomplishing this rotation may be employed. As herein shown, the belts, their supporting pulleys, and their drive means are all encased and mounted within a barrel **4**, preferably of cylindrical shape since in that shape it is not immediately apparent to a batter facing it what type of curved ball is to be thrown. This barrel is provided with guide means for rotating it about its axis, and for reasons which will appear hereafter these are preferably located adjacent the end where the ball is fed in or admitted. For instance, circular grooves are formed in the barrel for the reception of guide rollers **40** supported in a ring **41**, which is suitably supported, and the barrel may be rotated thus about its axis which coincides with the path of advance of the ball.

It is desirable that the barrel be movable for aiming, and to this end trunnions **42** may be formed on the ring **41**, to be supported within a yoke **43**, the yoke in turn having a post **44** receivable in a bearing **45** in a suitable stand, and preferably the barrel may also be elevated, as for example by moving the arm **46** vertically upon an upright post **5** supported in a base **50** carried upon casters **51**, or by the equivalent means shown in Figure 2, the parallel links **52**, supported from a collar **53** and supporting the bearing **45**. A slotted brace **54** and clamping screw **55** enables the angle of the parallel arms **52** to be adjusted.

The pivots at **42** and **44** permit the barrel to be elevated or depressed and to be swung transversely, that is, traversed. For convenience in feeding the balls to the throwing device, previously described, the axes of these two pivots should intersect at a point P which is also the point where the ball is delivered to the ball throwing device and first is engaged by the belts **11** and **12**. By so locating these pivot members a ball feeding arrangement, by which balls are projected one by one into the ball throwing device, may be located and need not be relocated for each small adjustment of the direction of the barrel.

Any suitable ball projecting mechanism may be provided, or they may be fed by hand. Preferably, however, the balls are projected one by one at a good speed, so that their initial inertia is overcome, and it is not necessary for the ball to acquire its entire momentum while in engagement with the belts. Such a projecting mechanism is shown in Figure 7, and comprises a sleeve **6** within which is reciprocable a plunger **60** under the influence of a spring **61**. A rod **62**, provided with a suitable handle, enables the plunger **60** to be retracted outwardly of the mouth of a chute **63**, to which the balls are delivered from the hopper **64**, the plunger being preferably held in retracted position by a catch **65** which, upon being released, as for example by pulling upon the cord **66**, permits the plunger to project the ball forwardly under the influence of the spring **61**, the sleeve **6** being aimed to deliver the ball at the point P where it is received between the belts and given a high speed and, if desired, a curve. To accomplish adjustments of the level and direction of the sleeve **6** it may be carried by a yoke **67** pivotally supported at **68** upon a suitable stand **69**. The ball feeding mechanism might, if desired, be mounted upon the support for the barrel **4**.

If a tennis ball is being delivered, for example, the ball throwing device may be controlled by one person while another opposite strokes the ball. The one manipulating the machine may quickly swing it or move it from one side to another, from a high position to a low position, and may vary the curvature and speed of the ball at will, so that in effect the player returning the balls has the variety of balls delivered to him that he might encounter in a game, or it may be preferred to deliver one type of ball repeatedly, so that the player may practice on some particular weakness.

I have described the belts **11** and **12** as bodily rotatable about the path of the ball, and this I believe to be the most convenient way of accomplishing variation of curvature. However, the principle to be kept in mind is that the ball is engaged at opposite sides and the point of engagement, that is, the plane defined by the two belts, is variable, that is, capable of being located in different positions angularly, about the path of the ball, and any arrangement which accom-

plishes such rotation of the two lines of engagement is deemed to be the equivalent of that described, whether there be actual rotation or mere change of the lines of engagement by belts.

What I claim as my invention is:

1. A ball throwing device comprising two members spaced apart to receive a ball between them, means to advance the ball-contacting faces of said members in the same direction but at different speeds, to curve the ball, and means to rotate the members about the path of the ball's center, at delivery, to vary the direction of curvature.

2. A ball throwing device comprising two members spaced apart to engage opposite sides of a ball, means to advance one of said members at a speed greater than that of the other, to curve the ball upon delivery, and means to vary the plane of application of the curving force about the path of the ball at delivery, to vary the direction of its curvature.

3. A ball throwing device comprising two parallel belts spaced apart to engage opposite sides of a ball, means to advance the belts in the same direction and to vary their relative speed to curve the ball, and means to vary the plane of curvature.

4. A ball throwing device comprising two parallel belts spaced apart to receive a ball between them, means to advance the belts in the same direction and to vary their relative speed to curve the ball, and means to rotate the belts bodily about the path of the ball's center, while held by the belts, to vary the direction of such curvature.

5. A ball throwing device comprising two short belts spaced apart, a pair of pulleys whereon said belts run, spaced apart slightly more than the diameter of the ball to be thrown, plus the thickness of the two belts, to engage opposite sides of a ball, means to advance the belts at high speeds in the same direction, whereby the belts are bowed together by centrifugal forces, and means to project a ball rapidly between the belts at one end, in the direction in which the adjacent runs of the belt are traveling, whereby the ball can have impressed upon it by the belts the forward speed of the latter, notwithstanding their short engagement with the ball.

6. A ball throwing device comprising two belts spaced apart to engage opposite sides of a ball, means to advance the belts in the same direction, means to project a ball rapidly between the belts at one end, to be delivered at the opposite end, and means to adjust the angular direction of the belts, about the admission point of the ball, to aim the delivered ball.

7. A ball throwing device comprising two belts spaced apart to engage opposite sides of a ball, means to advance the belts in the same direction, means to project a ball rapidly between the belts at one end, to be delivered at the opposite end, and means to adjust the angular direction of the belts, horizontally and vertically, about the admission point of the ball, to aim the delivered ball.

8. A ball throwing device comprising a barrel, two sets of pulleys supported therein, an endless belt extending about the pulleys of each set, their adjacent runs being spaced apart to engage opposite sides of a ball, means to advance such adjacent runs at high speed, and to vary their relative speeds, and means supporting said barrel for rotation about its axis.

9. A ball throwing device comprising a barrel, two sets of pulleys supported therein, an endless belt extending about the pulleys of each set, their adjacent runs being spaced apart to engage opposite sides of a ball, means to advance such adjacent runs at high speed, and to vary their relative speeds, and means supporting said barrel for universal tilting movement and for rotation about its axis, to aim the delivered ball.

10. A ball throwing device comprising a barrel, two sets of pulleys supported therein, an endless belt extending about the pulleys of each set, their adjacent runs being spaced apart to engage opposite sides of a ball, means to advance such adjacent runs at high speed, and to vary their relative speeds, guide means encircling said barrel for rotation of the latter about its axis, a yoke supporting said guide means for tilting movement, and a stand supporting the yoke for swinging movement.

11. A ball throwing device comprising two parallel belts spaced apart to receive a ball between them, means to advance the belts in the same direction to discharge the ball, and means to revolve the bolts jointly about the path of the ball's center.

12. A ball throwing device comprising two belts spaced apart to engage opposite sides of a ball, means to advance the belts at different speeds in the same direction to discharge and curve the ball, means to project a ball rapidly between the belts at one end, means to revolve the belts bodily and jointly about the path of the ball's center, to vary the plane of its curvature, and means to tilt the discharge end of the belts jointly, about the center of the ball at the point of its first engagement by the belts, to aim the delivered ball.

13. A ball throwing device comprising a pair of parallel belts, pulleys whereon said belts run, spaced apart slightly more than the diameter of the ball to be thrown plus the thickness of the two belts, whereby the ball in its passage between the belts is not engaged by the belts at any point where the latter are in contact with the pulleys, and means to advance the belts in the same direction at high speeds, the pulleys being of such size, relative to the speed of advance of the belts, that the centrifugal force, acting on the belts, throws them between the pulleys, into engagement with the ball, to propel and direct it.

14. A ball throwing device comprising a pair of parallel belts, pulleys whereon said belts run, spaced apart slightly more than the diameter of the ball to be thrown plus the thickness of the two belts, whereby the ball in its passage between the belts is not engaged by the belts at any point where the latter are in contact with the pulleys, and means to advance the belts in the same direction at high speeds, the pulleys being of such size, relative to the speed of advance of the belts, that the centrifugal force, acting on the belts, throws them, between the pulleys, into engagement with the ball, to propel and direct it, and means to vary the relative speeds of the two belts.

HARLOW I. SNIPPEN.