

March 9, 1943.

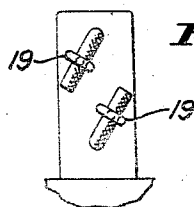
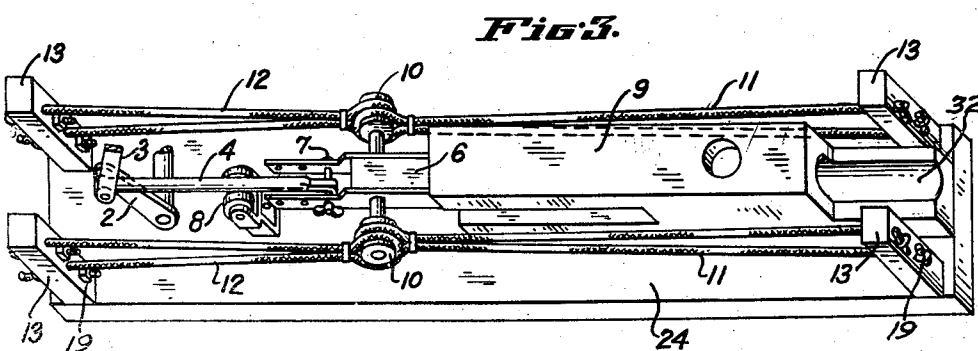
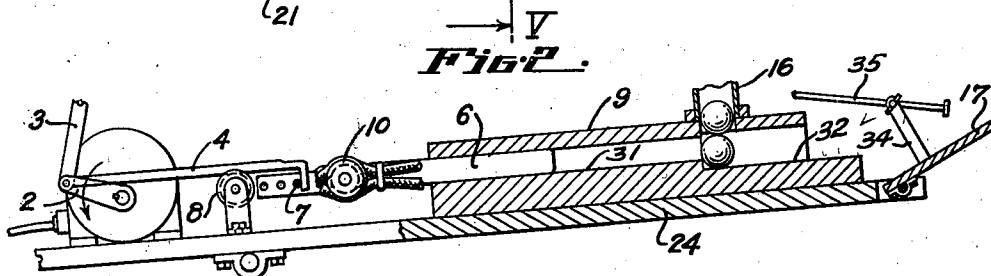
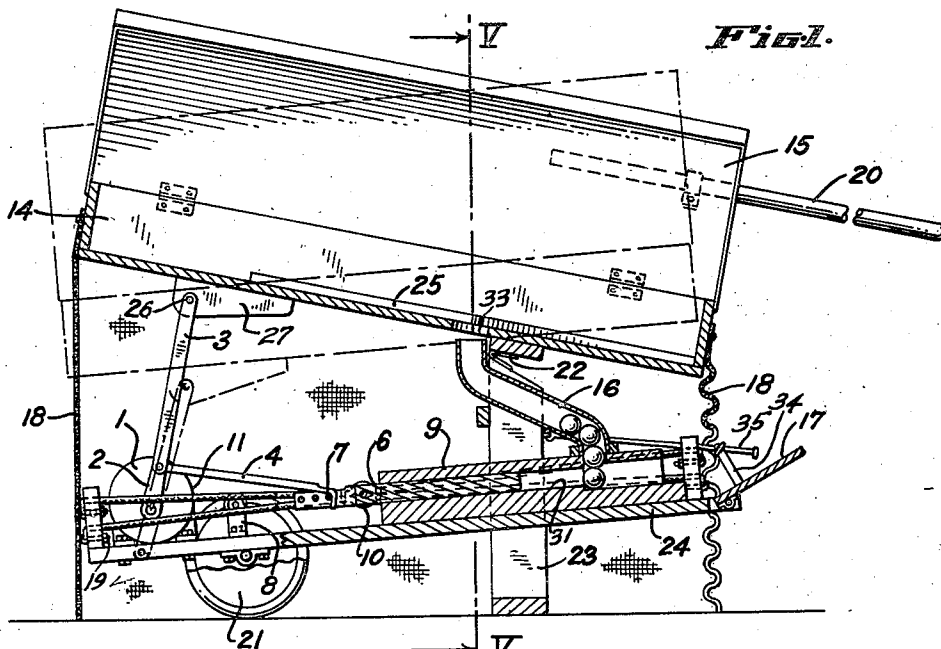
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2,313,409

TENNIS BALL TRAP

Filed April 10, 1940

2 Sheets-Sheet 1



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TENNIS BALL TRAP

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2 Sheets-Sheet 2

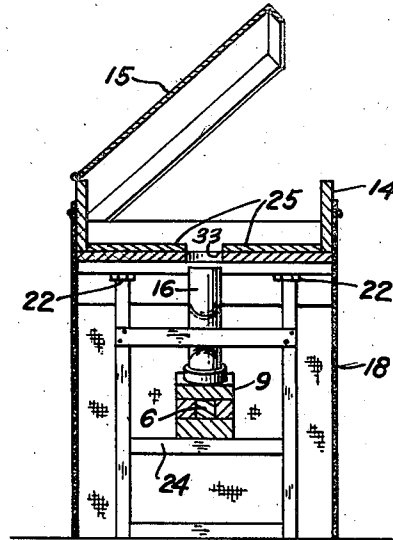


Fig. 5.

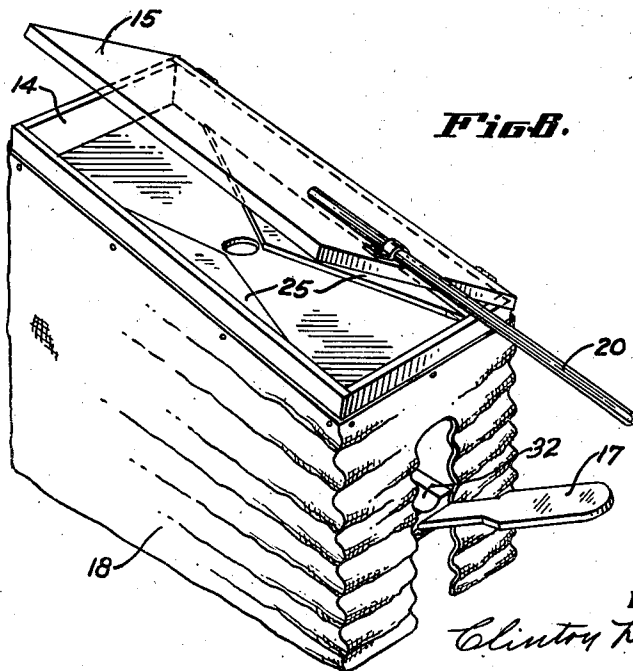


Fig. 6.

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UNITED STATES PATENT OFFICE

2,313,409

TENNIS BALL TRAP

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Application April 10, 1940, Serial No. 328,931

15 Claims. (Cl. 124—17)

My invention relates to ball projecting devices, and particularly to a tennis ball projecting device which is automatically operated to project a plurality of balls seriatum in a particular manner.

While ball projecting devices have been manufactured heretofore, such devices were usually complicated and expensive. The majority of the devices required an operator to place and release each of the balls independently and the ejecting tube required aiming to project a ball in a particular manner into a desired zone.

In practicing this present invention a mobile base is provided containing a ball ejecting trough and a striking plunger which is automatically operated. A hopper is mounted for tilting movement above the base and tube which delivers balls to the trough. A motor is employed for automatically engaging, loading and releasing the plunger which advances to strike the ball and force it from the trough. The motor also oscillates the hopper in which a guide is provided adjacent to the opening to the tube for directing the balls, moving from one or the other end of the hopper, through the opening.

The trough is attached to the base at a slightly rearward angle to prevent the balls from rolling forwardly therefrom. A deflector element is mounted at the mouth of the trough, being adjustable to vary the height at which the ball is delivered from the device. The tension on the plunger is adjustable so that the force applied to the plunger may be varied. The adjustment of the tension and the position of the deflector controls the speed and flight of the ball.

Accordingly, the main objects of my invention are; to provide a ball projecting device having means for delivering balls to a trough from which they are propelled seriatum by a plunger; to provide a base having a trough therein which slopes toward a plunger which has a continuously operated engaging element for stressing and releasing the plunger to eject a ball from the trough; to provide a trough and operating plunger with a hopper containing a plurality of balls which are delivered to the trough through a tube as the balls roll across the mouth thereof; to provide a motor for engaging, tensioning and releasing the plunger and for oscillating a hopper containing the balls to deliver them to the ejecting device; to provide a ball ejecting device with an adjustable deflector at the mouth thereof for controlling the loft to the ejected ball; and in general, to provide a ball ejecting device which is

simple in construction, positive in operation and economical of manufacture.

Other objects and features of novelty of my invention will be either specifically pointed out or will become apparent when referring, for a better understanding of my invention, to the following description taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a sectional view of a ball delivering and projecting device, embodying features of my invention;

Fig. 2 is an enlarged sectional view of the projecting device illustrated in Fig. 1;

Fig. 3 is a top perspective view of the device illustrated in Fig. 2;

Fig. 4 is an enlarged view, in elevation, of an upright on the device illustrated in Fig. 3;

Fig. 5 is a sectional view of the structure shown in Fig. 1, taken on the line 5—5 thereof; and,

Fig. 6 is a reduced perspective view of the structure illustrated in Fig. 1, taken from the ball-ejecting end thereof with the cover of the hopper in open position.

Referring to the figures, I have illustrated a motor 1, which is connected by the usual flexible electric cable to a source of electric energy situated adjacent to a tennis court. A control switch is preferably provided in the cable or in a branch thereof so that the device is under complete control of a director. The motor is preferably of a type having a reduction gearing so as to have the shaft thereof operate at a slow speed for operating a crank arm 2. A connecting rod 4 is attached to the crank pin of the arm and is employed to engage a pin 7 in a ball projecting plunger 6 through its movement over a roller 8 which produces the engagement and release of the hook end of the rod from the pin.

A barrel 9 has an aperture 31 in which the plunger 6 operates, and has forwardly thereof a trough 32 from which the ball is ejected. It will be noted that the diameter of the plunger 6 is smaller than the diameter of the ball so that the ball is prevented from rolling into the plunger opening 31. The plunger is provided with a cross pin 10 having at each side pairs of rubber shock cords 11 and 12, the former of which propels the plunger 6 while the latter absorbs the shock after the ball is ejected. The ends of the shock cords are supported on uprights 13 and are anchored in place by screw hooks 19 by which the tension on the cords may be adjusted.

A ball storage hopper 14 is mounted on a hinge 22 for tilting movement. An aperture 33 is provided adjacent to a tube 16 which is employed to

deliver the balls to the trough 32. The hopper is provided with a cover 15 to which a handle 20 is attached for the purpose of moving the device about the court. Forwardly of the trough 32 I have provided a hinged deflecting element 17 which has a link 34 pivoted thereto and having an eye connection with a rod 35 by which the deflector may be angularly adjusted relative to the trough. The deflector controls the trajectory of the ball as it leaves the trough 32. It will be noted further that the rolling action of the ball on the trough and the deflector produces an over-roll of the ball which provides extra impetus thereto when striking and bounding from the court.

Suspended from the hopper 14 I have provided a curtain 18 which surrounds the operating mechanism of the device to cushion the sound produced thereby. The barrel 9 is mounted upon a base 24 which is supported on a pair of wheels 21 and also on legs 23. A link 3 is also connected to the pivot of the crank 2 and to a plate 27 on the hopper 14 by a pivot 26. A pair of guide elements 25 are mounted within the hopper 14 having projections extending adjacent to the opening 33 for the purpose of directing the balls over the opening as the hopper is oscillated by the arm 3 as the crank arm 2 is rotated.

The operation of the device is as follows: As the motor is operated the crank arm 2 running at reduced speed will advance the hook on the rod 4 toward the pin 7, with which it engages as the rod is raised from the roller 8. Upon the continued movement of the arm 2 the rod 4, in engagement with the pin 7, will draw the plunger 6 rearwardly against the tension of the rubber shock cords 11. Further movement of the arm 2 causes the rod 4 to engage the roller 8 and moves the hook end out of contact with the pin 7, thereby releasing the plunger which is drawn forwardly by the shock cords 11. The forward movement of the plunger ejects a ball from the trough 32 and the movement of the plunger is snubbed by the shock cords 12 which are also attached to the pin 10.

During the operation of the rod 4 the link 3 produces the oscillation of the hopper 14 and the delivery of another ball to the tube 16. The deflector 17 is adjusted to produce the proper loft to the ball, as the tilt of the barrel is such as to direct the balls at or below the height of the net. The shock cords may be adjusted in tension to control the speed of the ball in addition to the adjustment of the pin 7 on the plunger. Through the various adjustments the speed, loft and point of delivery of a ball may be regulated and continuously repeated.

While I have described and illustrated several embodiments of my invention, it will be apparent to those skilled in the art that various changes, omissions, additions and substitutions may be made therein without departing from the spirit and scope of my invention, as set forth in the accompanying claims.

What is claimed is:

1. In a ball projecting machine, a base, a barrel, a plunger in said barrel, biasing means for said plunger, an element having a releasable hook for moving the plunger to provide a bias thereto, means for releasing the hook from said plunger, means for delivering balls adjacent to the mouth of the barrel ahead of said plunger, a deflector in the path of the ball which is adjustable to control the trajectory thereof, a ball storage hopper pivoted above said base and ball deliver-

ing means, a crank arm for oscillating said hopper and a motor for continuously driving the hooked element and said crank arm.

2. In a ball projecting machine, a base, a barrel, a plunger reciprocally mounted in said barrel, a shaft projecting on either side of the plunger, shock cords projecting forwardly and rearwardly of the shaft on each side thereof, an adjustable detent on said plunger, an operating element engageable by said detent for stressing one set of the shock cords when the plunger is moved in one direction, which plunger is advanced in the opposite direction by the shock cords upon the release of the element by the detent, the movement of the plunger in said last direction being absorbed by the other set of shock cords.

3. In a ball projecting device, a ball projecting trough, a barrel communicating with said trough, a plunger in said barrel, biasing means for said plunger and means releasably engaging the plunger at variable points for applying a variable stress to said biasing means when moving the plunger away from the trough which, when released, moves forward and ejects the ball from the ball projecting trough under the stress selected.

4. In a ball projecting device, a ball projecting element, a barrel communicating with said element, a plunger in said barrel, biasing means for said plunger, means releasably engaging the plunger at variable points for applying a stress to said biasing means when moving the plunger away from the projecting element, which, when released, moves forward at selected speeds for ejecting the ball from the ball projecting element, and a deflector adjacent to the ball delivery end which is adjustable to vary the loft to the ball so delivered.

5. In a ball delivering device, a base, a ball delivering element, a ball striking element, resilient means engaging said ball striking element, an adjustable member on said striking element, a crankarm, a member engageable with said adjustable member, engaging and operated by said crank arm, and motor means for driving said crank arm continuously to produce the engagement of the members and for moving the ball striking element to stress the biasing means, and means for thereafter separating the members for releasing the striking element which ejects the ball.

6. In a ball delivering device, a base, a ball delivering element, a ball striking element, resilient means engaging said ball striking element, an adjustable member on said striking element, a crankarm, a member engageable with said adjustable member, and operated by said crank arm, motor means for driving said crank arm continuously to produce the engagement of the members and for moving the ball striking element against the biasing means, means for thereafter separating said members for releasing the striking element which ejects the ball and means for delivering balls to said ball ejecting end to permit the continued operation of the device.

7. In a ball delivering device, a base, a ball delivering element, a ball striking element, resilient means engaging said ball striking element, an adjustable member on said striking element, a crank arm, an element releasably engageable with said adjustable member which is operated by said crank arm, motor means for driving said crank arm continuously to produce the engagement of the releasable element and member moving the ball striking element against the biasing means, means for thereafter separating

the releasing element from said member for ejecting the ball, means for delivering balls to said ball ejecting end to produce the continued operation of the device, said ball delivering means including a storage hopper which is pivoted for tilting movement, and a link interconnecting said crank arm and hopper for delivering balls therefrom as the arm is continuously operated.

8. In a ball delivering device, a base, wheels on said base rendering said device mobile, a ball delivering element, a plunger projectable into said element, a shaft extending through said plunger, forwardly and rearwardly disposed shock cords connected to said shaft at each side of the plunger, a pin on said plunger adjustable longitudinally thereof, a crank arm, a rod on said crank arm having a hook projectable over said pin, a roller in the path of movement of said rod to control the engagement and disengagement of the hook with said pin, whereby the continued operation of the arm causes engagement of the hook with the pin, the movement of the plunger to tension one set of shock cords and to cause the release of the hook from the pin to permit the plunger to move toward the ball under the stress of said shock cords, the movement of which is absorbed by the other set of shock cords.

9. In a ball delivering device, a base, wheels on said base rendering said device mobile, a ball projecting element, a plunger projectable into said element, a shaft extending through said plunger, forwardly and rearwardly disposed shock cords connected to said shaft at each side of the plunger, a pin on said plunger adjustable longitudinally thereof, a crank arm, a rod on said crank arm having a hook projectable over said pin, a roller in the path of movement of said rod to control the engagement and disengagement of the hook with said pin, a tube mounted on said ball projecting element for delivering balls thereto, and a storage hopper mounted above the base for tilting movement having an opening aligned with said tube.

10. In a ball delivering device, a base, wheels on said base rendering said device mobile, a ball projecting element, a plunger projectable into said element, a shaft extending through said plunger, forwardly and rearwardly disposed shock cords connected to said shaft at each side of the plunger, a pin on said plunger adjustable longitudinally thereof, a crank arm, a rod on said crank arm having a hook projectable over said pin, a roller in the path of movement of said rod to control the engagement and disengagement of the hook with said pin, a tube mounted on said ball projecting element for delivering balls thereto, a storage hopper mounted above

the base for tilting movement having an opening aligned with said tube, and a link interconnecting the hopper with the crank arm for tilting said hopper as the plunger is continuously operated to deliver balls to the ball projecting element seriatim.

11. In a ball delivering device, a base, wheels on said base rendering said device mobile, a ball projecting element, a plunger projectable into said element, a shaft extending through said plunger, forwardly and rearwardly disposed shock cords connected to said shaft at each side of the plunger, a pin on said plunger adjustable longitudinally thereof, a crank arm, a rod on said crank arm having a hook projectable over said pin, a roller in the path of movement of said rod to control the engagement and disengagement of the hook with said pin, a tube mounted on said ball projecting element for delivering balls thereto, a storage hopper mounted above the base for tilting movement having an opening aligned with said tube, a link interconnecting the hopper with the crank arm for tilting said hopper as the plunger is continuously operated to deliver balls to the ball projecting element, and an adjustable deflector adjacent to the front end of the ball projecting element for controlling the loft of the ball relative to the speeds of delivery thereof.

12. In a ball projecting device, a barrel, a floating projecting element in said barrel, and stressed resilient members connected forwardly and rearwardly to said element for positioning said element at rest within said barrel.

13. In a ball projecting device, a barrel, a floating projecting element in said barrel, stressed resilient members connected forwardly and rearwardly to said element for positioning said element at rest within said barrel, means for moving said element to stress one of said members while relieving the stress on the other member, and means for releasing said moving means to permit the element to be moved by the stressed member, arrested by said other member, and thereafter positioned at rest within said barrel by both of said members.

14. In a ball projecting device, a ball receiving element, a plunger projectable into said element, and forwardly and rearwardly disposed shock cords secured to said plunger for positioning said plunger at rest in said element.

15. In a ball projecting device, a ball receiving element, a ball striking member associated with said element, and forwardly and rearwardly disposed shock cords secured to said member for positioning said member relative to said element.

CLINTON L. WALKER.