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BALL PROJECTOR HAVING CLUTCH AND SPRING MEANS CAUSING A STRIKER HEAD TO CONTACT A BALL IN ITS PATH OF TRAVEL

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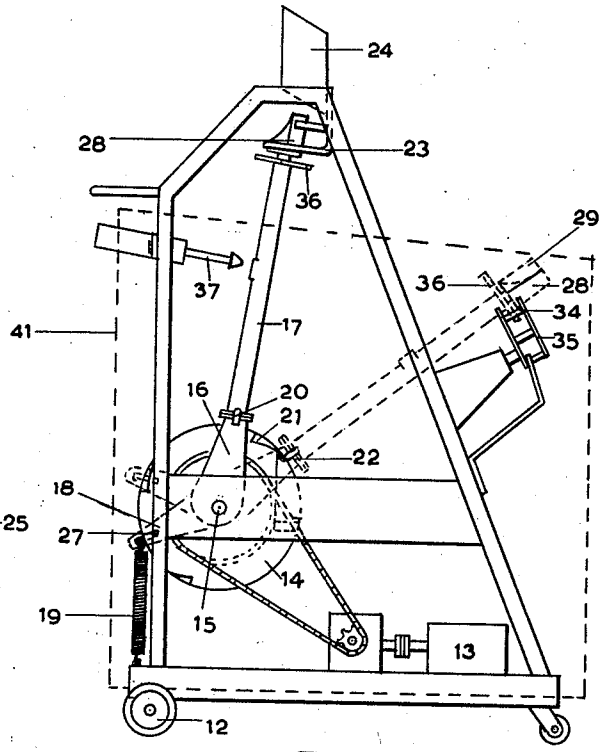


FIG. 1

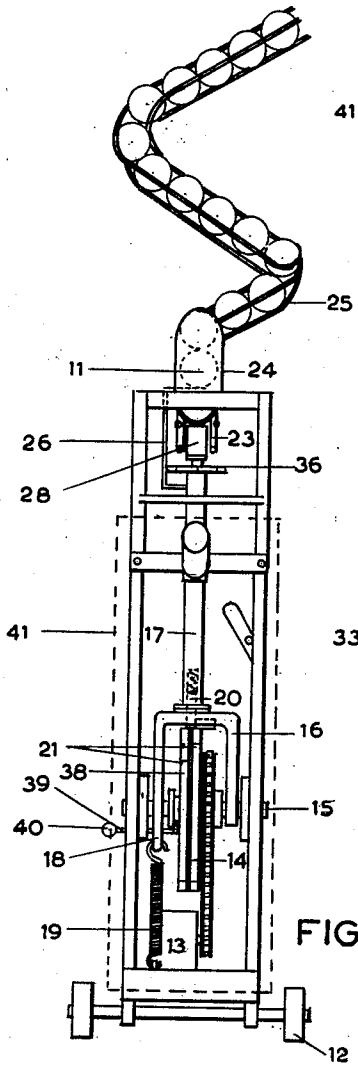


FIG. 2

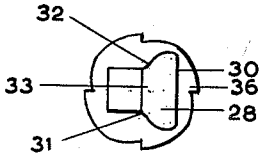


FIG. 4

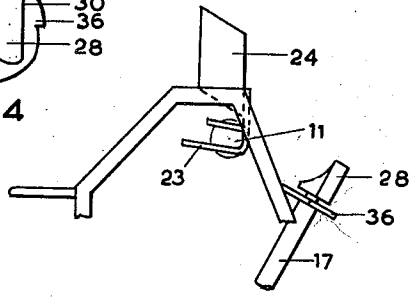


FIG. 3

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BALL PROJECTOR HAVING CLUTCH AND SPRING MEANS CAUSING A STRIKER HEAD TO CONTACT A BALL IN ITS PATH OF TRAVEL

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This invention relates to a machine for projecting balls which are to be returned in play, for example, a machine for providing a service of tennis balls.

Various machines for projecting balls to a player to be returned by him are known. For example, base balls are pitched to a batter, cricket balls are bowled to a batsman and tennis balls are served to a player.

The objection to such machines is that the service being mechanical, the delivery of the balls follows a certain directional regularity and therefore does not exercise the capacity of the player to meet variations in the service. With other power driven machines, unless the machine is securely anchored, the movement of the parts projecting the balls shake the whole machine to such an extent that its deliveries are liable to become so erratic as finally to be outside the arc of the field of play and the machine must be re-set.

It is the object of this invention to provide a power driven machine to project balls to be played, which machine will avoid the difficulties above mentioned, and as an example in a description of the invention, the service of tennis balls will be used.

In accordance with this invention a machine for projecting balls comprises a rigid frame housing a rotatable shaft, a swinging spring loaded operating arm pivoted on said shaft, a detent on said arm, a notched disc secured to said shaft, the detent adapted to latch the arm in the notches, a fixed trigger in the path of the detent on said arm, motor means for driving said shaft, a striker head for the arm, a stand for a ball in the path of said head and a gate in a passage way for feeding individual balls to the stand following the backward swing of the arm.

Other features of the invention include two notched discs with the number of notches varied in each, a striker head with a number of striking faces varying in shape, a catch for turning the striker head, a gravity ball feeding passageway and a shock absorber to cushion the end of the forward swing of the striker arm.

A preferred form of the invention is illustrated in the accompanying drawing in which:

FIG. 1 shows the ball projecting machine in side elevation,

FIG. 2 is an end elevation of the machine, and

FIGS. 3 and 4 are details.

The machine illustrated is particularly suitable for serving tennis balls **11**, the base of the machine shown being conveniently mounted on wheels **12**.

On the base of the machine is fixed a suitable motor **13**. An electric motor is the more suitable but where an electric supply is not available an internal combustion engine may be used. The motor **13** is coupled to a disc **14** fastened to a rotatable horizontally mounted shaft **15**. Usually the speed of the drive between the motor **13** and the disc **14** is reduced by a suitable speed reduction gear.

On the shaft **15** carrying the disc **14** is rotatably mounted the bifurcated end **16** of the operating arm **17** straddling the disc.

The end **16** straddles the disc **14** so that the operating arm **17** is freely rotatable through the necessary angle about the shaft **15**.

In the drawing the end **16** on one side is provided

with a projection **18** to which is attached a tension spring **19** which is stretched on the backward rotation of the arm **17**. In the crotch of the bifurcated end **16** of the arm **17** is a spring controlled detent **20**.

The disc **14** has notches **21** in its periphery shaped to engage the detent **20** as the disc **14** rotates. When the detent **20** catches in a notch **21** the rotating disc **14** pushes the arm **17** backwardly until the detent **20** meets a trigger **22** fixed in its path and lifts it out of the notch **21** in the disc **14** and the arm **17** swings forwardly under the loading of the tension spring **19** and comes to rest in a substantially vertical position.

As the arm **17** reaches its top or near vertical position it encounters a ball **11** resting in a suitable stand **23** fixed below a gravity feeding spout **24** for the balls **11**. The spout **24** is fed by balls **11** from a rack **25** and a gate **26** in the passage way **24** is operated on each backward movement of the arm **17** to release a ball **11** from the spout **24** to rest on the stand **23** in the forward path of the arm **17**. After the arm **17** has struck the ball **11** it is no longer tensioned by the spring **19** and at this point the end of the spring **19** slips back into a slot **27** at the end of the projection **18**.

The arm **17** has a striker head **28**. Said head **28** may be rotatable about the axis of arm **17** on the end of said arm and be provided with a number of faces **29** for striking the ball **11**. The ball **11** may be struck squarely with a flat face **30** and fly from the machine giving a straight strong service. Another face **31** of the head **28** may project the ball at an angle to the left or another face **32** to the right, or again the angle of the face **33** of the club may project the ball **11** straight but upwardly. A pawl **34** fixed to a stand **35** on the backward position of the arm **17** may engage a suitable ratchet wheel **36** on the striker head **28** to rotate it, as and when desired, so that the service of the balls **11** is varied or not as required. When desired, the pawl **34** may be thrown out of the way so that the striker head **28** is not rotated and the balls **11** are repeatedly delivered in a similar manner and direction.

The forward swing of the arm **17** is brought to rest by contact with a suitable stop, conveniently in the form of a shock absorber **37**.

The speed of service of the balls **11** may be varied by altering the speed of the motor **13** or adjusting the gears in a gearbox attached to it. In the machine illustrated there is in addition to the disc **14**, a second disc **38** mounted concentrically with **14** and slidable on the shaft **15** by a lever **39** operated by a knob **40**. The disc **14** has four notches **21** equally spaced round its periphery. Slidable disc **38** has two notches **21**. When the discs **14** and **38** are together under the detent **20**, two of the notches in **14** are masked by the disc **38**, but when the disc **38** is moved axially away from under the detent **20** the four slots in disc **14** are operative.

The position of the trigger **22** above mentioned may be made adjustable to vary the backward swing of the arm **17** and therefore the subsequent speed of the projected ball **11**.

With the machine described it is only necessary to supply power to the motor **13** and tennis balls **11** to the rack **25** to start the machine serving balls and, if desired, the service of each ball may be varied automatically.

The machine may also be used for pitching baseballs.

For bowling cricket balls a cup may be substituted for the more or less flat striker head on the arm and the balls fed from a position to supply the cup when the arm is in its backward position. With this arrangement the ball will be carried during the swing of the arm and only projected from the machine when the arm makes contact with the shock absorber or other stop.

The ball projecting machine as described may be mounted on at least one pair of wheels to facilitate transport and it should be suitably shrouded as indicated by the dotted line **41** to avoid accidental contact with the swinging arm.

What I claim as new and desire to secure by Letters Patent is:

1. A machine for projecting balls comprising a substantially rigid frame, a shaft rotatably mounted on said frame, a swinging operating arm pivoted to said frame coaxially with said shaft, a detent on said arm, a disc having at least one notch secured to said shaft, the detent adapted to extend into said notch and latch the arm to the disc, a fixed trigger on the frame and in the path of movement of the detent on said arm, motor means drivingly connected to said shaft so as to drive it in one direction, a striker head mounted on the arm, a support for supporting a freely resting ball in the path of movement of said head, resilient means secured between said arm and frame urging said arm to rotate in second direction opposite to said one direction, said motor means adapted to rotate said arm and detent in said one direction toward said trigger when said detent is in said notch whereby said trigger engages and releases said detent from said notch and said resilient means snaps said arm in said second direction so said head may strike a ball on said support, stop means on said frame in the path of movement of said arm, said stop means contacting said arm after said arm has struck said ball and thereby preventing said arm from rotating completely around its pivot axis.

2. A machine as claimed in claim 1 in which the striker head is rotatable about the longitudinal axis of said arm and has a number of striking faces extending at different angles to said arm axis.

3. A machine as claimed in claim 1 including a rack by which balls are fed by gravity to said support in the path of the operating arm and a gate associated with said support to automatically release a ball on each backward swing of the operating arm.

4. A machine as claimed in claim 1 wherein said stop means comprises a shock absorber connected to said frame to check the forward movement of the operating arm after said head has struck the ball.

5. A machine as defined in claim 1 including a second disc drivingly connected to but axially slidable on said shaft and having a smaller number of notches therein than said first mentioned disc, operating means connected to said second disc for axially moving it into and out of alignment with said detent.

6. A machine as defined in claim 5, wherein a portion of said arm includes a yoke pivotally mounted on said shaft, both said discs extending into said yoke.

7. A machine as defined in claim 1 including means rotatably mounting said striker head on the longitudinal axis of said arm, a ratchet wheel secured to said head, means mounted on said frame in the path of movement of the ratchet wheel so as to rotate said wheel and head less than a full turn each time said arm is moved in one of said directions, said head being provided with a plurality of ball striking faces on its periphery, each of said faces being inclined at a different angle to the longitudinal axis of said arm.

8. A machine for striking and projecting balls through the atmosphere comprising an upright frame having a front and a rear, a generally horizontally extending shaft rotatably mounted in said frame, motor means on said frame drivingly connected to said shaft so as to rotate it continuously in one direction, an arm pivotally mounted on said frame so as to oscillate on an axis coaxial with the axis of said shaft, clutch means drivingly connecting said arm to said shaft, a striker head mounted on said arm in spaced relation to said shaft, a ball support on said frame for supporting a ball in the path of movement of said head, resilient means secured between said arm and frame urging said arm to rotate in another direction opposite to said one direction, a clutch release device mounted on said frame at a fixed location adjacent the path of movement of said clutch means, said clutch release means adapted to contact and operate said clutch means to disconnect said arm from said shaft when said striker head is rearwardly of said ball support whereby said resilient means may move said arm and striker head in said other direction so that said striker head may strike and project a ball forwardly from said ball support, and stop means connected to said frame in the path of movement of said arm, said stop means adapted to contact said arm and prevent it from moving completely around said shaft and beyond said frame.

9. A machine as defined in claim 8, wherein said clutch means includes a wheel fixed coaxially to said shaft, a plurality of notches in the periphery of said wheel, a detent movably mounted on said arm, spring means urging said detent into one of said notches; and said clutch release means including a cam means fixed to said frame in the path of movement of said detent, said cam means adapted to contact said detent and cam it out of said notch.

10. A machine as defined in claim 1, wherein said resilient means comprises an elongated coil spring, an anchor member extending radially from said shaft and fixed to said arm, said radially extending member having a radially extending slot therein, one end of said coil spring slidably mounted in said slot and the other end of said coil spring secured to said frame, said one end of said coil spring being slidable to the radially outer end of said slot to release the tension therein after said ball has been struck.

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