An automatic golf ball teeing device is disclosed. Each time a golf ball is hit off a tee a motor is energized to lower a platform to which the tee is attached and simultaneously release a golf ball down an inclined ramp to a position just above the lowered tee. The motor then raises the tee platform back toward its initial position teeing up the golf ball. The height to which the ball is teed may be automatically adjusted and the teeing device may be shut off automatically when the supply of balls is exhausted.

10 Claims, 12 Drawing Figures
AUTOMATIC GOLF TEE

BACKGROUND OF THE INVENTION

The present invention relates to devices employed for improving the skills of golfers. Specifically, the invention relates to devices designed to tee-up golf balls so that a golfer may perfect his stroke through repeated practice. Prior golf ball teeing devices include those which are manually operated requiring the golfer to pull a lever or depress a spring-loaded tee. Other golf ball teeing devices have been automatic in operation but employ an underground ball supply. This design has the disadvantage that should a jam in the ball feeding system occur, practice must be interrupted and the apparatus sufficiently disassembled to provide access to the jam. Examples of such prior devices include U.S. Pat. No. 2,295,599 to Mozell, U.S. Pat. No. 3,294,402 to Scott, U.S. Pat. No. 3,112,932 to Marsch, and U.S. Pat. No. 3,533,631 to Hlavdek. In these devices when a new ball is to be placed on the tee, the tee drops downwardly beneath the driving surface and receives a golf ball from an underground ball supply.

A prior teeing mechanism employing an elevated ball supply is U.S. Pat. No. 2,838,313 to Mozell. However, this device employs a fairly complicated teeing mechanism and depends upon a spring bias to complete the teeing cycle. Furthermore, the ball delivery system utilizes a pair of vertically disposed stops which have been found to be somewhat unreliable in operation.

OBJECTS OF THE INVENTION

It is accordingly an object of the present invention to provide an automatic golf ball teeing mechanism which utilizes an above-ground ball supply.

It is a further object of the present invention to provide a golf ball teeing mechanism which is simple in operation and avoids the use of spring biasing.

It is a further object of the present invention to provide a golf ball teeing mechanism which has a reliable golf ball delivery system.

Other objects and advantages will become apparent from the remaining portion of the specification.

SUMMARY OF THE INVENTION

The golf ball teeing mechanism of the present invention is automatic in operation. Each time a golfer hits a golf ball off the tee a cycle of operation of the mechanism is begun resulting in the placement of another golf ball on the tee. The present teeing mechanism is mounted to a base plate which is installed level with the platform on which the golfer stands. Rotatably attached to the underside of the base place is a swing arm which is raised by a motor cam and lowered by gravity. Mounted on the rear end of the swing arm is a tee platform having a tee mounted thereon which passes upwardly through an opening in the base plate.

The tee platform is tiltable on the swing arm between two positions. In a first position a golf ball is teed up and the tee platform is out of contact with a microswitch mounted on the swing arm. When the golf ball is hit off the tee, the tee platform is balanced such that it tilts to a second position contacting the microswitch. This energizes a motor permitting the swing arm to drop by gravity to a position such that the tee is slightly below the level of the base plate.

As the swing arm is lowered it activates a ball gate assembly along an inclined ramp to release one ball from a ball supply, permitting it to roll down the ramp to the tee. The motor then raises the swing arm and tee platform back toward their initial positions. Although the teed up ball again tilts the tee platform to its first position to reopen the microswitch, operation of the motor continues via a parallel circuit until another microswitch is opened by the swing arm striking a height adjustment assembly. The above described cycle repeats each time a ball is hit off the tee as long as there are balls on the inclined ramp to contact a third microswitch.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of the golf tee of the present invention;
FIG. 2 is a vertical sectional view of FIG. 1 taken along line 2—2 of FIG. 1;
FIG. 3 is a horizontal sectional view showing a bottom portion of the golf tee taken along line 3—3 of FIG. 2;
FIGS. 4 and 5 are fragmentary side views, partly in section, showing the ball hood and inclined ramp portions of the golf tee;
FIG. 6 is a vertical sectional view taken along the line 6—6 of FIG. 1;
FIG. 7 is a sectional view taken along the line 7—7 of FIG. 1 with the ball hood and ramp omitted;
FIG. 8 is a vertical section through the free end portion of the swing arm and its associated tee platform and tee assembly shown in FIG. 2 on an enlarged scale and as taken approximately along the line 8—8 of FIG. 1;
FIG. 9 is a schematic circuit diagram;
FIG. 10 is a sectional view of an alternate tee assembly;
FIG. 11 is a fragmentary view partly in section of an alternate gate assembly; and
FIG. 12 is a view taken along line 12—12 of FIG. 11.

DETAILED DESCRIPTION

Referring to FIGS. 1 and 2, the general arrangement of the automatic golf tee is shown. Attached to a base plate 20 is an inclined ball ramp 22. The ball ramp 22 includes a pair of vertically disposed parallel side rails 22a which guide a golf ball downwardly onto a resilient driving surface 24. The driving surface 24 has a cut out portion 26 which guides the golf ball to a circular opening 28 in the base plate through which a rubber tee 30 extends and retracts. Positioned over a portion of the inclined ramp 22 is a ball hood 32. This hood is anchored to the sides of the ramp which in turn is bolted to the base plate 20. The ball hood 32 channels the golf balls as they roll down the inclined ramp from a ball supply 34 to prevent excessive bounce which would adversely affect the operation of the teeing mechanism.

Referring to FIGS. 2 and 3, a swing arm 36 is pivoted to the base plate 20 by a trunnion including a pivot pin 40 extending through a U-shaped bracket 38 depending from the base plate. The swing arm is therefore able to rotate about the trunnion pin 40 to permit its free end 42 to be raised to the position shown in solid lines (FIG. 2) or lowered, by force of gravity, to the position shown in phantom.

Secured by a bracket 44 attached to the base plate 20 is a DC electric motor 46 having a drive shaft 48 with a cam member 50 attached to its free end. The motor 46 is positioned such that the cam member 50 extends
under the swing arm as shown in FIGS. 2 and 3. When the motor operates the cam member initially permits the free end 42 of swing arm 36 to lower by force of gravity. As the cam member continues around it contacts the underside of the swing arm 36 pushing it upward into initial position until the motor circuit is deenergized as will be explained. Adhesively secured to the underside of the swing arm at the point of contact with cam member 50 is a low friction polymer wear strip 52. This strip reduces wear on the cam member and the force necessary to raise the swing arm.

A tee platform 54 is mounted to the free end 42 of swing arm 36. This platform is slightly larger than the swing arm and rests on it. The platform 54 is pinned to the swing arm in a slightly off-center position by a pin 56 which passes transversely through the swing arm and tee platform. The pin spaces the platform slightly above the swing arm near its midportion so that it cannot rest flush on the swing arm. Accordingly, the tee platform is tiltable about the pin through a few degrees of arc. The amount of tilt is adjustably limited by means of a small screw 55 (FIG. 8) threaded upwardly through the free end of the swing arm.

The tee 30 is secured to the tee platform by a nut and bolt 57. When a golf ball 58 is on the tee its weight causes the tee platform 54 to tilt such that the end 60 of platform is above the other end. A normally open microswitch 61 mounted on the swing arm 36 detects this condition as will be explained subsequently. When the tee platform is tilted to this first position the electric circuit to the motor 46 is not energized. As long as a ball remains on the tee the device remains inactive. In the absence of golf ball 58, the tee platform 54 tilts about the pin 56 to a second position such that the end 60 is lower than its other end. In this position the tee platform depresses a contact of switch 61 which extends up through a cut out portion 63 in the swing arm, shown in FIG. 8, closing such switch.

FIGS. 1, 3 and 7 show the mechanism for adjusting the height to which the ball is teed above driving surface 24 by the swing arm. The height adjusting mechanism includes a leaf spring 64 bolted at one end to the underside of the base plate 20. The leaf spring extends from its bolted end to a free end at one side of the swing arm as shown in FIG. 7. An adjustable screw 66 turned by a knob 70 above the base plate screws through a nut 68 in the base plate disposed near the middle of the leaf spring. Clockwise rotation of the screw forces the unsecured end of the leaf spring 64 downwardly from its horizontal position. A microswitch 72 is mounted on one side of swing arm 36 below the free end of the leaf spring. Thus when the swing arm is raised a selected distance determined by screw 66 the microswitch 72 will strike the spring member. This microswitch is normally closed but opens through spring contact to deenergize the motor, thereby stopping the swing arm at the selected height.

Referring to FIG. 1, a pair of terminals 74 and 76 are provided on the upper side of the base plate for connection to a DC power supply of 6 to 15 volts. A conventional battery pack can be used or a simple AC-DC converter can be attached to the terminals for 120 volt AC operation. Mounted on the underside of the base plate over a rectangular slot 78 cut therein is a cycle counter 80 (see FIGS. 2 and 3) for recording the number of cycles of operation of the mechanism. The provision of such a counter is optional. The counter has a visual display 82 which is positioned over the slot 78 so that the number of cycles may be read directly from the top side of the base plate. The counter is conventional in design and may, for example, be a Veedo Root No. 74795-006.

Referring to FIGS. 4, 5 and 6, a ball gate assembly is shown. The ball gate assembly includes a pair of ball stops in the form of wire yokes 84 and 86. The yokes are generally rectangularly shaped with the shorter or lower yoke 84 disposed forwardly of the longer or upper yoke 86. Short yoke 84 is adapted to prevent a first-in-line golf ball from rolling down ramp 22 when the swing arm 36, to which it is attached, is in its raised position. Similarly, long yoke 86, also attached to arm 36, prevents succeeding balls from rolling down the ramp when the swing arm is lowered to release the first-in-line ball. The yokes pass downwardly through slots 88 cut in base plate 20 to enter holes cut on each side of the swing arm.

When the swing arm 36 is in its uppermost position the shorter or lower yoke 84 prevents the first ball on the inclined ramp from rolling toward the tee. Subsequently when the swing arm begins to lower the short yoke 84 drops downwardly through a slot in the ramp until the first ball is unrestrained, the yoke 84 being guided by such slot. The ball therefore rolls down the inclined ramp to the tee area. At the same time that the lower yoke 84 drops out of the way upper yoke 86 drops from a raised position near the top of the ball hood downwardly through a slot 94 in the hood 32 to a lowered position shown in FIG. 5 near the center of the hood passage where it prevents the second ball 92 from also rolling to the tee area. When the swing arm begins to move upwardly the yokes return to their starting positions shown in FIG. 4. This permits the second ball 92 to roll forward until it is restrained by the lower yoke 84.

Positioned between the two rails of inclined ramp 22 is a third microswitch 96, shown in FIGS. 4 and 5. Attached to this microswitch is a leaf contact member 98 which extends obliquely into the path of the ball supply. As long as there is at least one golf ball on the inclined ramp the leaf member will be depressed by the weight of the golf ball keeping it closed.

FIG. 9 discloses a schematic circuit diagram for the motor. A DC source 100 supplies current for operating the motor and the counter 80 when a circuit is completed by either the combination of switches 61 and 96 or switch 72. As mentioned, microswitches 96 and 61 are the ramp and tee microswitches, respectively, and are normally open. Microswitch 72 is the height adjust switch and is normally closed.

FIG. 10 illustrates an alternate tee assembly 110 which can be utilized in the present device. Tee 110 consists of a hollow rubber portion 112 which receives a metal pin portion 114 having a circumferential groove 115 near its lower end and on a flange 117 at its upper end. The pin 114 is received within a sleeve 116 having three openings 118 therein for receiving steel balls 120 having a diameter greater than the wall thickness of the sleeve 116 and adapted to engage in the groove 115 to retain the pin within the sleeve. The sleeve 116 is fixed as by a stud and nut 122 to the tee platform 54. Slidably received around the sleeve 116 is a collar 124 biased upwardly against the flange 117 by a spring 126. The collar 124 is provided with a circumferential groove 128 in its bore adapted to receive the
balls 120 when the collar is depressed to position the groove opposite the balls. In this position of the collar the pin 114 can be removed and a new pin inserted. In the normal position of the collar the balls 120 are forced into the groove 115 of the pin 114 to lock it in place. This arrangement permits quick and easy replacement of a worn out or damaged tee and permits rotation of the tee when a golf ball is hit which reduces wear and damage.

A modified form of the ball gate is illustrated in FIGS. 11 and 12. In the embodiment a pair of arms 140, 142 are pivotally connected by a pivot pin 144 to the swing arm 36 and extend upwardly through slots in the base 20 along the opposite sides of the hood 32' which in this embodiment is rectangular in outline. Extending between the upper ends of the arms 140, 142 is an upper stop rod 146 and extending between such arms at a lower point is a lower stop rod 148. The lower stop in the upper position of the swing arm 36 extends slightly above the ramp 22 so as to hold the lowermost ball 90 on the ramp. As the swing arm 36 is lowered, the lower stop rod 148 is retracted within a slot 150 in the ramp 22 releasing the ball 90. At the same time the upper stop rod 146 is pulled into the path of the next ball 92 so as to hold it in position, the rod 146 sliding through a slot 152 in the hood 32'. When swing arm 36 returns to its upper position, the lower stop rod 148 moves above the ramp and the upper stop releases the ball 92 which then rolls down against the stop 148.

OPERATION

Beginning from an initial condition wherein a supply of golf balls are present on the ramp 22 and a golf ball 58 is resting on tee 30, the operation is as follows. Initially the motor is off since the microswitch 61 from the tee platform and the microswitch 72 from the height adjustment are open. Cam 50 maintains swing arm 36 in its raised position. Immediately after a golfer hits a golf ball off the tee, the tee platform 54 lifts about the pin 56 closing microswitch 61. This completes a circuit via the microswitches 96 and 61 to energize the motor 46. The cam member 50 begins rotation from its initial position where it supports the swing arm in the raised position. As the cam member rotates the swing arm 36 is permitted to drop downwardly by the force of gravity carrying with it the tee platform and the tee.

As the swing arm drops it pulls wire yokes 84 and 86 downwardly. When the forward yoke 84 drops sufficiently a ball is released from the ball hood and rolls down the inclined ramp. The ramp provides sufficient momentum for the ball to continue rolling across the driving surface 24 in cut out 26 to a position just above the lowered tee. At the same time the remaining balls on the inclined ramp are prevented from rolling down the ramp by the rear yoke 86 which has dropped downwardly to a position near the center of the ball hood.

The cam member 50 continues to rotate and once again makes contact with the underside of the swing arm causing it to begin rising toward its initial position. As the swing arm rises, lifting the tee with it, the just-released ball seats on the tee and the golf ball directly over the tee seats thereon and is lifted by it. The forward yoke 84 comes back upward into the path of the golf balls again preventing any balls from rolling down the ramp. The rearward yoke 86 also returns to its original position permitting the golf ball second in line to move forward in preparation for the next cycle of operation.

The motor cam continues to lift the swing arm even after the ball becomes seated on the tee to reopen microswitch 61. This is due to the parallel circuit via microswitch 72, which closed during the initial portion of the cam cycle when the swing arm was descending and the microswitch first cleared the leaf spring 64. Thus, in the mid and latter portions of the cycle the motor is energized regardless of the state of switches 96 and 61 because of the alternate current path available via switch 72. Finally, when the swing arm rises to the point where its microswitch 72 again contacts the adjustable leaf spring both circuit paths are open and the motor shuts off.

Each time a golfer hits a ball off the tee, the above described cycle will occur until the last ball on the ramp has been teed-up. At this point the microswitch 96 on the ramp is opened. When the golfer hits the last ball off the tee the motor remains off due to the switch 96 being open. Thus the machine automatically shuts itself off when the supply of golf balls is exhausted.

Having described the invention in what is considered to be the preferred embodiment thereof, it is desired that it be understood that the invention is not to be limited other than by the provisions of the following claims.

I claim:

1. An automatic golf ball teeing device comprising: a base including a base surface; a generally horizontally extending swing arm pivotally mounted at one end thereof beneath said base surface for pivotal movement about a horizontal axis; motor means on said base and means driven by said motor means for controlling the movement of said swing arm about said axis between a lower position and a raised position; a tee platform means pivoted to said swing arm adjacent the free end thereof, said tee platform means being tiltable on said swing arm about a horizontal tilt axis between a first and a second position; a tee attached to said tee platform means and extending above said base surface when said swing arm is in said raised position and being retracted vertically to a position for receiving a ball when said swing arm moves to said lowered position; said tilt axis being positioned such that said tee platform means is tilted to said first position by the weight of a golf ball on said tee and tilts to said second position in the absence of a golf ball on said tee; switch means operatively engaged with said tee platform means for connecting said motor means to a source of power to effect operation of said motor means to move said arm from said raised to said lower position when said platform means moves from said first to said second position thereof; a switch actuator means mounted on said base; a normally closed switch for connecting said motor means to said source of power mounted on said swing arm, said switch adapted to be engaged and opened by said switch actuator means when said swing arm is above selected positions; and means for adjusting the elevation of said switch actuator means thereby to control the height of said swing arm at which said switch contacts said
actuator means, regulating the height of said tee above said base.

2. The teeing device of claim 1 including:
an inclined ball ramp means on said base surface for retaining a supply of golf balls in tandem and guiding a ball to said tee;
and a ball gate assembly means positioned along said ramp means connected to said swing arm and operable upon lowering movement of said swing arm to release a single ball down said ramp means toward said tee.

3. The device of claim 2 further including a ball hood located along said ramp means for channeling said balls and preventing excessive bounce on said ramp means.

4. The device of claim 2 wherein said tee is removably mounted upon said platform means.

5. The device of claim 2 further including a cycle counter means connected to said tee platform means for determining the number of balls which have been teed up.

6. The device of claim 1 including a tee switch and said tee platform means in said second position closes said tee switch to initiate operation of said motor means.

7. The device of claim 6 including a normally open ramp switch mounted on said ramp above said ball gate assembly and adapted to be closed by a ball positioned on said ramp immediately above said gate, said ramp switch being connected in series with said tee switch whereby said motor operation is initiated only when there is at least one ball on said ramp means to close said ramp switch and there is no ball on said tee to close said tee switch.

8. The device of claim 7 wherein a tee height switch is connected in parallel with said tee and ramp switches and closes upon downward movement of said swing arm from said raised position to continue operation of said motor through a complete operating cycle.

9. The device of claim 2 wherein said ball gate assembly comprises a pair of ball stops connected to said swing arm for vertically reciprocating movement therewith.

10. The device of claim 9 wherein a first lower stop moves below said ramp means when said swing arm is lowered to release a first ball down said ramp means and a second upper stop moves simultaneously therewith into the path of said balls above first said ball to prevent additional balls from being released down said ramp means to said tee.

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