Oct. 13, 1970 J. J. HLADEK 3,533,631

APPARATUS FOR AUTOMATICALLY TEEING GOLF BALLS

Filed Sept. 3, 1968 2 Sheets-Sheet 1

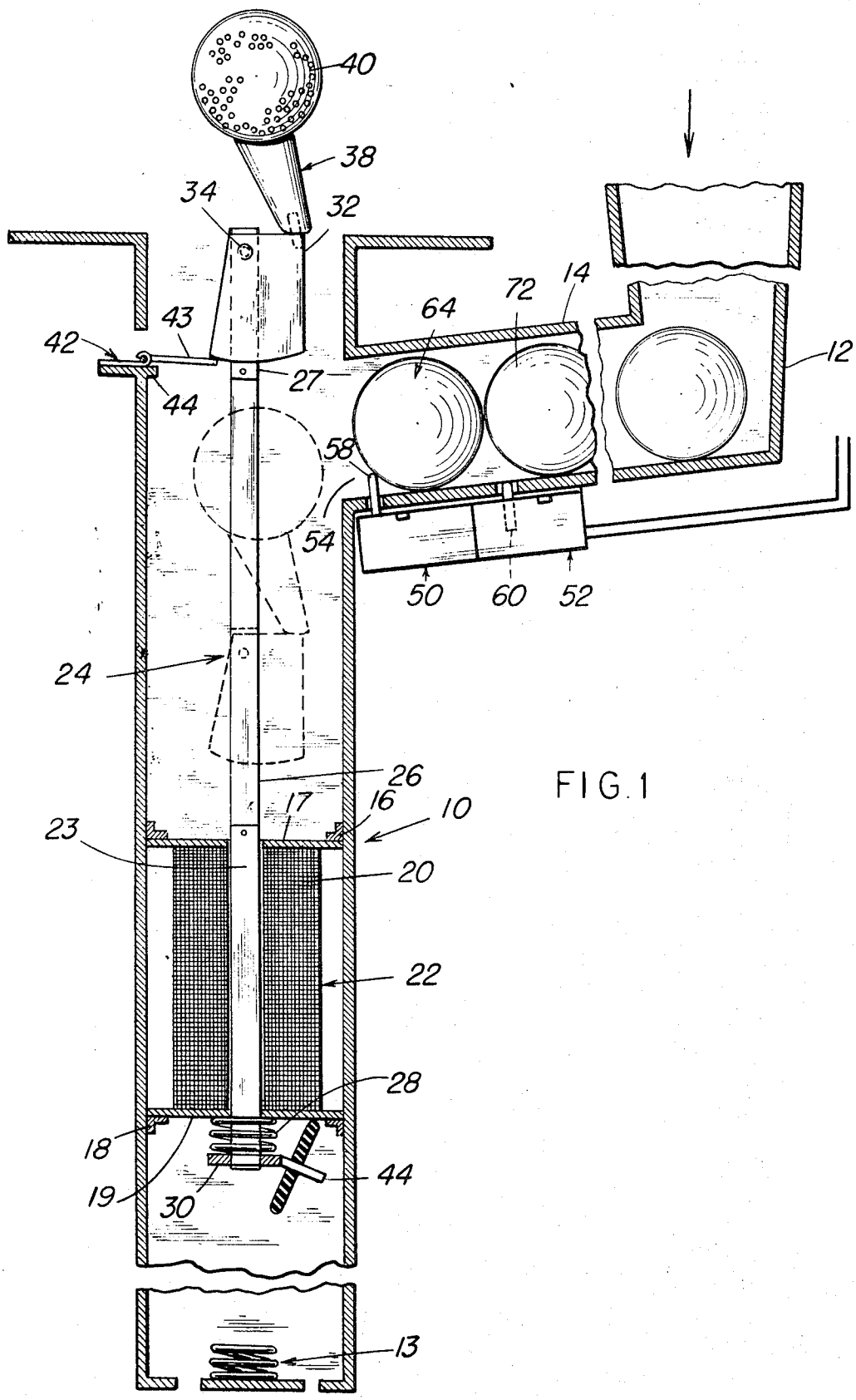


FIG. 1

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APPARATUS FOR AUTOMATICALLY TEEING GOLF BALLS

Filed Sept. 3, 1968 2 Sheets-Sheet 2

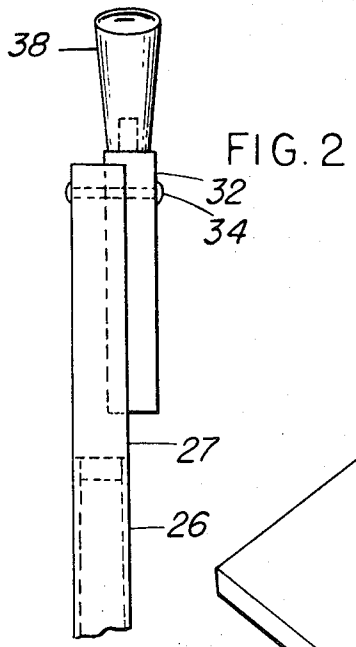


FIG. 2

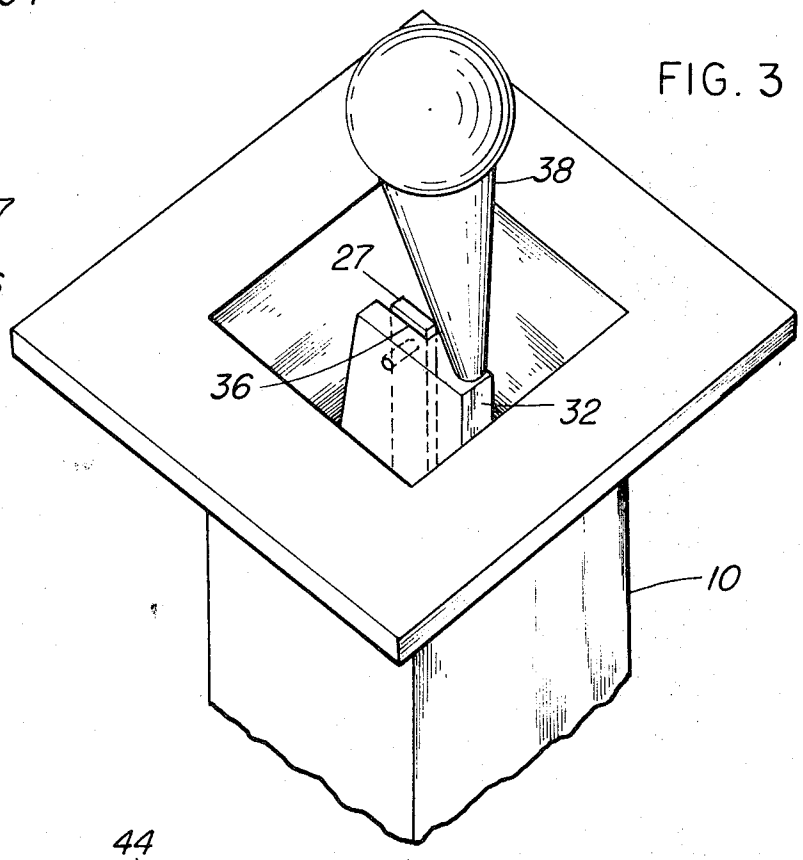


FIG. 3

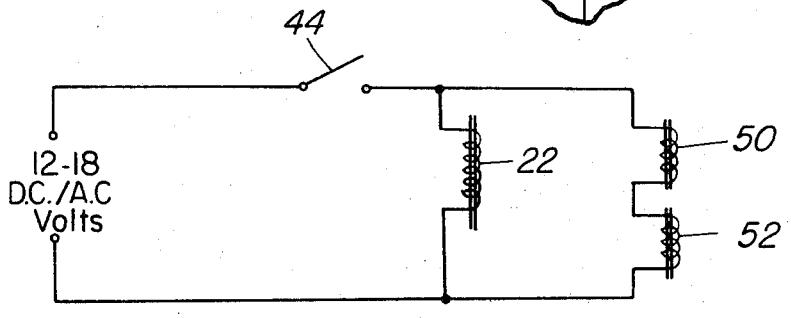


FIG. 4

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3,533,631

APPARATUS FOR AUTOMATICALLY TEEING GOLF BALLS

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ABSTRACT OF THE DISCLOSURE

Apparatus for automatically teeing golf balls in which a rod assembly including a golf ball receiving tee element is held in an elevated ball-presenting position by a mechanical detent engaging a pivotable counterbalance on which the tee element is carried. When the golf ball is stroked by the golfer the tee element is caused to pivot, the detent is released and the rod assembly retracts to a ball-loading position. When the rod assembly moves into the retracted position, electrical solenoid operated devices function to release a new golf ball from a suitable supply and the ball feeds onto the tee element. Simultaneously with the release of the new golf ball, another electrical solenoid operated device strokes the rod assembly to return it to its elevated ball-presenting position. The counterbalance in the course of the latter travel pivots as it passes the mechanical detent so as to ride clear of the detent and permit the detent to re-engage the counterbalance anew to hold the rod assembly in its ball-presenting position.

BACKGROUND OF THE INVENTION

The present invention relates to apparatus for automatically teeing golf balls. The apparatus is suited for installation at a golf course, golf driving range or other area where a golfer might find it convenient to practice golf stroking. As is well known, many golf driving ranges and golf courses do not have apparatus for mechanically presenting and replenishing a supply of golf balls on a golfing practice tee to a golfer, and he must therefore resort to manual replenishment. This is a laborious procedure at times and often is disconcerting to the golfer to have to interrupt his practice to set up new balls. If the golfer himself does not attend to replenishment, attendants are required with commensurate added costs to maintaining the practice range. Certain efforts have been made in the past to provide automatic or semi-automatic golf teeing devices. However, such devices as are known are generally of complicated construction, are expensive to install, have low reliability in operation and require frequent maintenance. These shortcomings of prior art golf ball teeing devices are undesirable, particularly from the standpoint of inconvenience to the golfer. For example, U.S. Pat. 2,643,883 describes an air-controlled golf teeing device in which the presence of a golf ball on a tee element fitted with an air port builds up a back pressure in the air-control system which occurrence actuates devices in the system to raise up the teeing apparatus to a ball-presenting position. On the other hand, the absence of a ball on the tee element creates a certain pressure differential in the air system to the extent that it is utilized for triggering devices for retracting the apparatus to a ball-loading position. This apparatus thus functions on the condition that replenishment will occur automatically whenever the golf ball is removed from

the tee by a golfer stroking the ball. However, if the ball is accidentally knocked from the tee by a golfer in the course of his address, is blown from the tee by wind or deliberately removed by the golfer for visual inspection of same, the apparatus will automatically function to replenish the ball supply without the golfer having driven the first ball in the intended manner since no overriding control is provided to take into account removal of the ball from the tee by other than stroking. Other known types of teeing devices require some act on the part of the golfer other than stroking to replenish a ball. Generally they require the golfer to step on a pedal adjacent the tee to trigger operation of the teeing device.

SUMMARY OF THE INVENTION

The present invention is concerned with an automatic golf teeing apparatus in which the replenishment operation is triggered or initiated by the act of the golfer in stroking the ball from the tee. It is easily and economically manufactured, is fully automatic and reliable and positive in its mode of operation.

In general, the apparatus is intended and suited for installation at a golf course or driving range and includes a below ground level enclosure or housing in which is supported a rod assembly which can be moved between a retracted ball-loading position within the housing to an elevated or ball-presenting position in which a tee element at the top of the rod assembly extends slightly above ground level through an opening at the top of the housing to present the ball to the golfer for stroking. The tee element is mounted on a counterbalance plate pivoted at the top of a support rod forming part of the rod assembly, the counterbalance having an at-rest position in which it is engaged by a detent means normally to hold the rod assembly in ball-presenting position. The arrangement is such that the counterbalance can be pivoted from its at-rest position in one direction only, namely, a direction opposite to that in which the ball is stroked so that the act of the golfer stroking the ball pivots the counterbalance freeing it from the holding action of the detent thereby allowing the rod assembly to retract downwardly to a ball-loading position. Movement of the rod assembly from ball-presenting to ball-loading position is utilized to close switch means controlling a number of electrical solenoids, certain of which control release of a fresh ball from a ball supply chute for deposit on the tee element. The armature of another solenoid unit forms part of the support rod structure and also becomes energized when the rod assembly is moved to a retracted ball-loading position, the armature of this solenoid being pulled up to stroke the rod assembly upwardly to the elevated or ball-presenting position. The counterbalance during elevation of the rod assembly, pivotally deflects against the detent means until it rides past the detent allowing the latter to re-engage or reseat below the counterbalance and restraining the rod assembly in the ball-presenting position until the occurrence of the next act of stroking by the golfer.

The invention accordingly comprises the features of construction, combination of elements, and arrangements of part, which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

A fuller understanding of the nature and objects of the

present invention will be had from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a front elevational view of an automatic golf teeing apparatus constructed in accordance with the principles of the present invention, the rod assembly being shown in full lines in its elevated or ball-presenting position, the tee element and counterbalance plate being shown in dashed lines in the position they occupy when the rod assembly is in a retracted or ball-loading position.

FIG. 2 is a fragmentary side elevational view of the upper end of the rod assembly when viewed in the direction of the line II—II in FIG. 1.

FIG. 3 is a fragmentary perspective view of the upper end of the rod assembly showing the manner in which it extends above ground level in its elevated or ball-presenting position.

FIG. 4 is a diagram of the circuitry used with the apparatus shown in FIGS. 1–4.

Throughout the description like reference numerals are used to denote like parts in the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The automatic golf teeing apparatus of the present invention is a compact, relatively small structure which is quickly and easily installed at golf courses, practice driving ranges, parks, home backyard or other such location as the golfer may choose. As seen in FIG. 1, and as is customary in structure of this type, the automatic golf teeing apparatus is designed so that its major components are housed below ground level in a suitable housing **10**. The specific form of the enclosure or housing in general can be varied but in a preferred form is of generally cylindrical or rectangular shape. A hopper **12** for holding a supply of replacement golf balls is provided at a location adjacent the housing **10** and communicates with the latter by means of ball supply chute **14**. Supported within the housing **10** on suitable interconnected retainer brackets **16–19** is the coil or winding **20** of a solenoid unit **22** which functions in the manner to be more fully described later to elevate the rod assembly **24** to a ball-presenting position. The armature **23** of the solenoid unit **22** forms the lower end section of the rod member of rod assembly **24**, the latter further including an intermediate rod section **26** and an upper end rod section **27** and being shown in its elevated or ball-presenting position in full lines in FIG. 1. A short length of the armature **23** extends below the coil **20**, such short length being enclosed by a compression spring **28** the function of which will be described later. A retainer disc **30** is connected to the lower tip end of armature **23** as shown and maintains the enclosing mounting of spring **28** thereon. Spring **28** serves to assist in stroking the entire rod assembly downwardly to a ball-loading position from the ball-presenting position following the stroking of a ball. Mounted at the top end of the rod assembly **24** is a counter-balance **32** which is a plate-like member pivoted as at **34** to the tip end of the upper rod section **27** and designed to have an at-rest position as shown in FIG. 1. The pivot point **34** at which the counterbalance is secured to the rod assembly is located to one side of its center of weight so that by force of its own weight the counterbalance tends to move or pivot clockwise past the at-rest position. However, the counterbalance **32** is maintained in a condition of static equilibrium in its at-rest position by a suitable stop means. Such stop means for maintaining the counterbalance normally in its at-rest position can be provided in various ways, a preferred form of stop being provided by forming a slotted section **36** at one face of the counterbalance in the manner shown in FIG. 3 whereby the upper rod section **27** nests in or is received in the slotted section and forms an abutment or stop structure to prevent clockwise pivoting of the counterbalance beyond the normal at-rest position. Thus it will be seen that the counterbalance can pivot from its at-rest position only in a counterclockwise direction which feature is utilized to provide that stroking of a ball from the after-described tee element triggers replenishment of a golf ball to the tee element.

Fixed to the top of the counterbalance **32** and movable as a unit therewith is a golf tee element **38** which can be made of a suitable flexible material such as rubber, the upper part of the tee being of generally rounded surface in conformance to the rounded surface of the golf ball **40** which is received thereon.

The rod assembly **24** is supported within the housing **10** in such manner that it is capable of vertical reciprocating movement therein in the course of being stroked or slid axially between an elevated ball-presenting position (the position shown in full lines in FIG. 1) and a retracted or ball-loading position. The positions of the tee element **38** and counterbalance **32** when the rod assembly is in retracted position are shown in FIG. 1 in dashed lines. Normally the rod assembly **24** is maintained in the ball-presenting position in opposition to the force of gravity and a certain biasing effect of spring **28** by means of a detent **42**. The detent **42** conveniently is provided in the form of a hinged lever or latch element **43** which engages beneath the lower edge of the counterbalance **32** in the manner shown in FIG. 1 to provide a holding action preventing downward movement or retraction of the rod assembly. The latch element **43** shoulders against a suitable stop **44** on the housing which prevents movement of the element downwardly beyond the horizontal position shown. As will appear, the latch element is free to pivot upwardly.

The apparatus also includes a mercury switch unit **44** located at the underside of the frame members **19** and secured to retainer disc **30**, which switch means is normally open with the rod assembly in a ball-presenting position. The switch unit **44** is designed to be closed by movement of the rod assembly when the latter is retracted and more specifically the action of the switch body coming into striking abutment with the floor of housing **10**. The switch body can be supported within a resilient, preferably rubber, body **44***a* to protect same from damage. The switch **44** is connected in circuit with the coil **20** of the rod assembly operating solenoid unit **22** and the coils of the solenoid units **50** and **52** controlling ball release from chute **14** as shown in FIG. 4.

Replenishment of balls to the golf tee element **38** is made by delivering balls from hopper **12** under force of gravity to the tee element when the rod assembly **24** is in a ball-loading position by feed of the balls through downwardly sloping ball supply chute **14** which is so sized that the balls may move therethrough only singly in succession, the chute **14** having an outlet opening into the side of the housing as at **54**. Release of a ball from the supply chute **14** is controlled by solenoid units **50** and **52**, these units having armatures **58** and **60** respectively which are of oppositely acting character and the operation of which will be shortly described.

Further understanding of the apparatus will be had from the following description of the manner in which it operates to replenish a golf ball to the tee element **38** immediately upon and as incident to the practice stroking of a ball by the golfer.

Normally the rod assembly **24** is maintained, as shown in FIG. 1, in an elevated or ball-presenting position in which condition golf ball **40** is mounted on the top of the tee element **38**. Moreover in this condition, solenoid unit **50** is in de-energized condition and the first armature **58** thereof extends through ball supply chute **14** and locates in front of or down chute of the first replacement or spare golf ball **64** in the ball supply chute in the manner shown and thereby prevents release of ball **64** from the chute until replenishment is required. Solenoid unit **52** also is deenergized and its armature **60** which is oppositely acting with respect to armature **58** is retracted as shown. When the golfer strokes the golf ball **40** from the tee element

38, the tee element and the counterbalance 32 to which it is fixed pivot under the force of the golf club in a counterclockwise direction, releasing the counterbalance from the holding action of the detent 42. The force of gravity acting on the rod assembly 24 along with a certain biasing effect of spring 38 will immediately stroke the rod assembly downwardly from the ball-presenting position moving it to its retracted or ball-loading position. Near the end of the movement of the rod assembly 24 to the ball-loading position, the retainer disc 30 strikes damping spring 13 fixed at the bottom of the housing and the latter absorbs the kinetic energy of the rod assembly to minimize shock damage to the same and bring it to a smooth stop. As the rod assembly reaches the ball-loading position, the mercury switch unit 44 closes completing the electrical circuit (FIG. 4) from power source 70 to the solenoid unit 22 and the solenoid units 50 and 52 energizing same. With the rod assembly 24 in its retracted or ball-loading position, the now empty tee element 38 locates adjacent the opening 54 in the ball supply chute 14 so that the energization of the solenoid unit 50 allows the armature 58 thereof to retract from the ball supply chute in front of the first replacement ball 64 and this ball rolls through the opening and onto the tee element. Concurrently the armature 60 of solenoid unit 52 is pulled up and extends into the ball supply chute behind or up chute of the first ball 64 and engages the second ball 72 to prevent its exit from the ball supply chute. With the closing of switch unit 44 solenoid unit 22 also is energized and its armature 23 is pulled upwardly so as to thereby stroke the rod assembly upwardly returning it to its elevated or ball-presenting position, the repose of the rod assembly in the ball-loading position being but for an instant. As the rod assembly 24 strokes upwardly and reaches its ball-presenting position, mercury switch 44 strikes the lower retainer bracket supporting winding 20 and it opens and all solenoid units are de-energized resulting in retracting the armature 60 of solenoid unit 52 from the ball supply chute and extension of the armature 58 of solenoid unit 50 into the ball supply chute so that the second ball 72 of the replenishment stock is allowed to roll into engagement with armature 58 in a position adjacent the chute opening thus to locate it for delivery to the tee element 38 during the next cycle of operation of the teeing apparatus. As the rod assembly strokes upwardly from its ball-loading to ball-presenting position, the arm or latch 43 of the detent pivots upwardly allowing the counterbalance 38 to pass clear of the detent. When the counterbalance has been raised sufficiently above the detent arm 43 the latter pivots back to its horizontal holding position and re-engages the counterbalance below the lower edge thereof to hold the rod assembly in the ball-presenting position in opposition to the force of gravity. Spring 38 also functions as a damping means during elevation of the rod assembly in a manner similar to that in which spring 13 functions during the retraction of the rod assembly.

It should be apparent to those skilled in the art that the apparatus of the present invention can be modified within the scope of the invention. For example, instead of utilizing a single mercury switch unit 44, for energizing all solenoid units, separate switch units could be used for controlling operation of the rod assembly stroking solenoid and for controlling the solenoid units 50 and 52 which control release of replacement balls from the ball supply chute 14.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. Apparatus for teeing golf balls which comprises:

a rod assembly including a support rod, a tee element for holding a golf ball and a counterbalance means pivoted to one end of said support rod, said tee element being fixed to said counterbalance means said counterbalance means being pivoted to said rod in such a manner as to be weight-biased to a normal at rest position,

means for supporting said rod assembly in an upright condition and for travel between an elevated ball-presenting position and a retracted ball-loading position,

detent means engageable with said counterbalance means when it is in said at-rest position for holding said rod assembly in said ball-presenting position, said counterbalance means pivoting in response to striking of a ball on said tee to move in a direction against said weight bias to disengage said detent means, means for automatically retracting said rod assembly to a ball-loading position upon disengagement of said detent means and said counterbalance means

means operable in response to movement of said rod assembly to said ball-loading position for elevating said rod assembly to said ball-presenting position, and

ball-loading means operable when said rod assembly is in said ball-loading position for delivering a golf ball to said tee.

2. The apparatus of claim 1 further comprising a hopper for holding a supply of golf balls, and a chute extending downwardly inclined from said hopper, said chute receiving a series of golf balls from said hopper and providing a passage through which said golf balls can move singly, said chute having an outlet, said tee element locating adjacent said outlet when said rod assembly is in a ball-loading position.

3. The apparatus of claim 2 wherein the means operable for delivering a golf ball to said tee element comprises a pair of solenoid units having corresponding but oppositely acting armatures, the armature of one of said solenoid units when the latter is de-energized extending into said ball supply chute at said outlet and in front of the first golf ball in said series to prevent release of a said first ball from said chute, the armature of the other of said solenoid units when said other solenoid unit is energized extending into said ball supply chute behind said firstball to prevent release of balls other than said first ball from said chute, the armature of said one solenoid unit retracting from said chute when said one unit is energized to release said first ball through said outlet, the armature of said other solenoid unit retracting when said other unit is de-energized.

4. The apparatus of claim 3 wherein the means operable for elevating said rod assembly includes an electrical solenoid having an armature, said armature forming part of said support rod, said armature stroking upwardly when said electrical solenoid is energized.

5. The apparatus of claim 4 further comprising normally open switch means in circuit with each of said solenoid units, and a source of electrical power, said switch means connecting said solenoid units with said source when said rod assembly moves from its ball-presenting to ball-loading positions, the movement of said rod assembly from a ball-presenting to a ball-loading position opening said switch means.

6. The apparatus of claim 1 wherein said counterbalance means is pivoted to said support rod at a location to one side of its center of weight, said counterbalance means having a slotted portion receiving said support rod, the weight of said counterbalance means urging said counterbalance means into abutment with said rod to thereby hold itself in an at-rest position.

7. The apparatus of claim 1 further comprising bias-

ing means engaging said rod assembly and operable to apply a certain downwardly stroking force to said rod assembly when said counterbalance means is released from said detent means.

8. The apparatus of claim **1** further comprising damping means engageable when said rod assembly for damping the movement of said rod assembly from said ball-presenting to said ball-loading position.

9. The apparatus of claim **1** wherein said detent means comprises a pivoting latch having a stopped horizontal position wherein it engages said counterbalance means at the underside thereof when said rod assembly is in a ball-presenting position, said latch being adapted to pivot upwardly away from said counterbalance means when

struck by said counterbalance means during the course of movement of said rod assembly from its ball-loading to ball-presenting position until said counterbalance means has passed above said latch.

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