

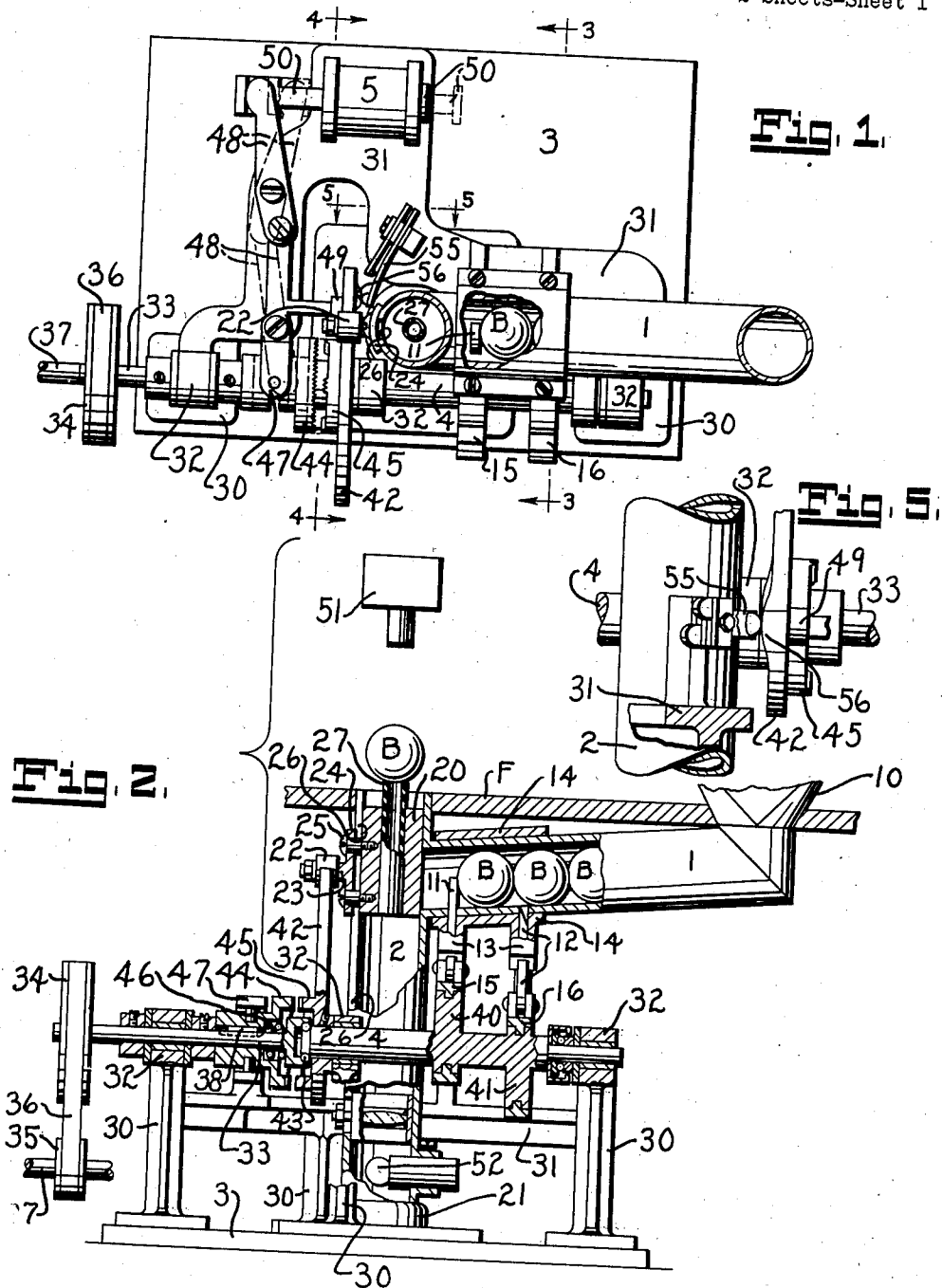
Nov. 30, 1943.

B. A. HOGEBERG
GOLF BALL TEEING MACHINE

2,335,280

Filed Aug. 26, 1941

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

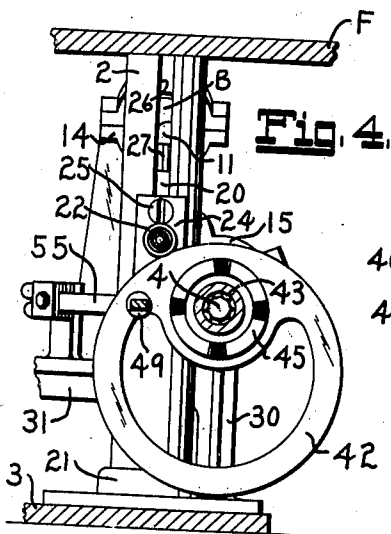


Fig. 4.

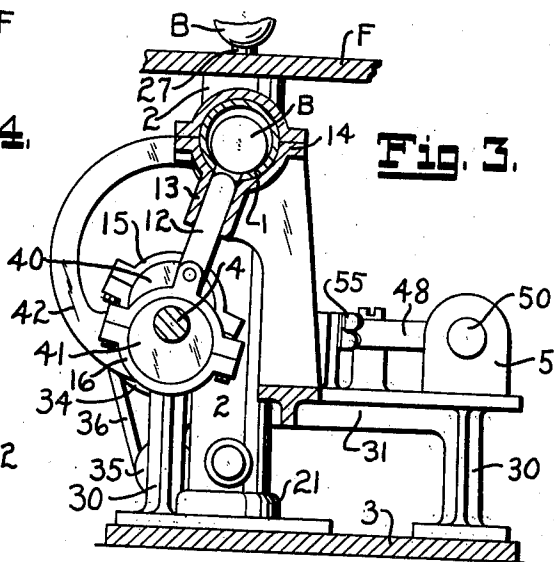


Fig. 3.

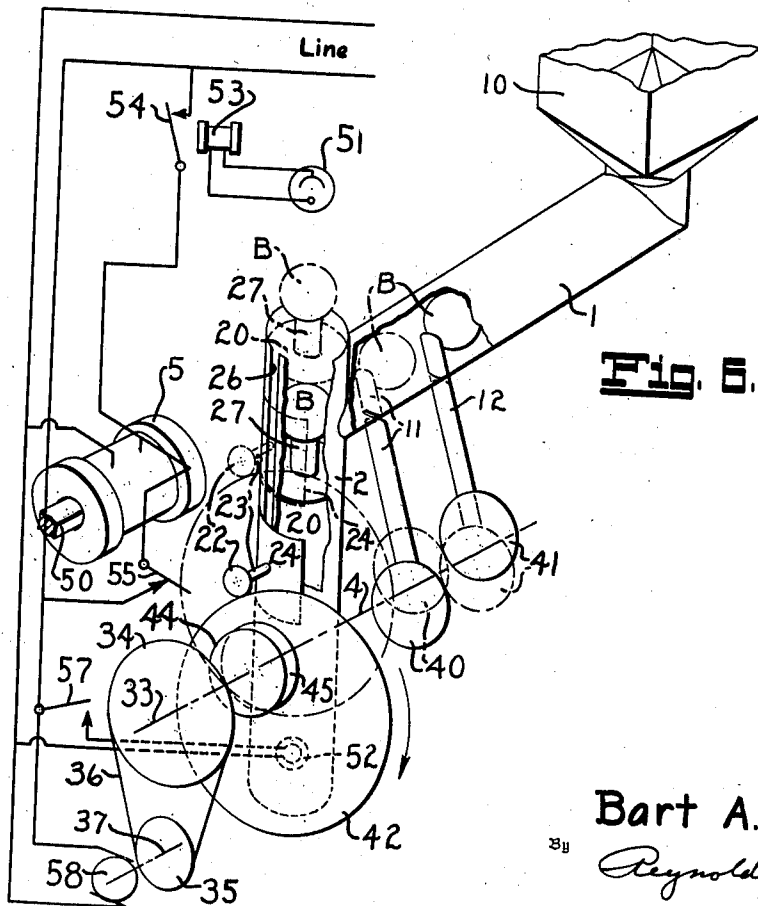


Fig. 6.

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UNITED STATES PATENT OFFICE

2,335,280

GOLF BALL TEEING MACHINE

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13 Claims. (Cl. 273—33)

My invention concerns a golf ball teeing machine, and in particular, one which will operate automatically to place a ball in teed position for driving each time a ball is struck from such position.

In order to improve the golfer's form, particularly in driving, establishments known as driving ranges have been set up where golfers may drive repeatedly from a single location without playing the driven balls farther or retrieving them. Successive balls to be driven may be teed manually in the usual way, but for such establishments machines have been proposed to tee the balls, so that it will not be necessary for the golfer to expend the time and effort necessary for this purpose.

Most of the machines developed heretofore have required manual operation by the golfer, such as by means of a foot lever, the operation of which, just as in manually placing the ball, has required the golfer to change his stance; so that he must reposition himself each time between successive strokes. Fully automatic machines have been proposed heretofore, but they have been unsatisfactory because their operation has been unreliable, and they have been of complicated construction and expensive to manufacture.

In general my mechanism includes a vertically reciprocable teeing member to which balls are fed successively, while in its lowered position, from a storage bin and gravity chute. Differentially reciprocable gates control movement of the balls through such chute for delivery one by one and in timed relationship with movement of the teeing member. Reciprocation of the tee and parallel gate members is effected by individual eccentric wheels disposed in vertical planes and all secured to and driven by the same shaft. This operating shaft is rotated slowly by any suitable drive arrangement, such as an electric motor provided with gear reduction mechanism.

A very important feature of my machine is the system for controlling operation of the drive shaft. Such control system is electrically operated by the use of a mechanically actuated circuit breaking switch and a photoelectric cell. This cell is disposed at one side of the position occupied by a ball to be driven, while a cell energizing light source, continuously illuminated, is placed at the other side of such teed ball position. The photoelectric cell may be located above the tee member, for example, while the light source may be below it. Such tee is longitudinally apertured for transmission of a light beam

through it to the photoelectric cell when a ball is not in teed position. As long as a ball occupies this driving position, the ball teeing control is quiescent, but when the ball is struck or otherwise removed from the tee, the photoelectric cell is energized by the light source to close an electric circuit, for initiating operation of the machine to place another ball in teed position. When the ball has been located thus, the photoelectric cell is no longer energized, but the machine continues to operate until a mechanical circuit breaking switch is opened by the ball delivering mechanism, again to deenergize the machine drive with a ball in teed, driving position.

A principal purpose of my invention, therefore, is to provide an automatic golf ball teeing machine which is of simple construction, yet which is positive and reliable in operation. More specifically, such object is accomplished by the use of a photoelectric cell and light source combination located on opposite sides of the teed position of a golf ball, so that when a ball is not in such position the photoelectric cell will be energized by a light beam from the light source passing through such position.

A further object is to make such an automatic unit of compact construction, and one which may be connected in multiple with like units all operated by a single drive. In such installations, of course, proper safety devices should be provided to guard against breaking the drive mechanism or the other units.

A unit embodying the principles of my invention is illustrated in the drawings. It will be evident that changes in details and construction may be made to adapt such unit to particular installations, or for structural or design reasons, without altering the general mode of operation of the machine.

Figure 1 is a plan view of my machine, and Figure 2 is a side elevation view thereof with parts broken away to show internal structure.

Figure 3 is a vertical section taken on line 3—3 of Figure 2, and Figure 4 is another vertical section taken on line 4—4 of Figure 1.

Figure 5 is a fragmentary section taken on line 5—5 of Figure 1, showing part of the control mechanism.

Figure 6 is a diagrammatic perspective view illustrating the mechanical operation of the machine, and showing the wiring diagram of the electrical control system.

Each teeing unit is complete in itself, except for its motive power which preferably is supplied by an external source. Golf balls are delivered to

the teeing member from an inclined gravity feed tube or chute 1, which in turn receives the balls from a storage container 10. These balls roll down the chute into an upright tube 2 within which the ball raising and teeing plunger 20 reciprocates. Preferably the tube or chute 1 is secured integrally to tube 2, from which it branches, to be supported by the latter. The upright tube in turn may be held in a flanged socket 21 mounted upon a base plate 3. The upper end of this tube projects through a hole in floor F, and the ball storage container 10 may also be supported from the floor and project above it.

Only one ball at a time may be fed from the gravity chute 1 to the upright tube 2, and the timing of such delivery is controlled by differentially reciprocable gate bars 11 and 12, which are guided for lengthwise movement in spaced guide slots 13 projecting downwardly from sleeve 14, which latter may encircle and reinforce tube 1 adjacent to its connection with tube 2. Reciprocation of the gate bars 11 and 12 is effected by eccentric collars 15 and 16, respectively, pivoted to such bars, and encircling eccentric wheels 40 and 41, respectively, carried by shaft 4. Differential movement of the bars is produced by setting the eccentric wheels 40 and 41 in opposite phase upon the shaft, that is, spaced apart 180 degrees, so that as bar 11 is moved upward, bar 12 will be moved downward, and vice versa.

It is only necessary that the gate bars 11 and 12 project upward into tube 1 a distance sufficient to prevent passage of the balls past these gates. The greater the diameter of eccentric wheels 40 and 41, of course, the more quickly will they move between ball holding and ball releasing positions. In Figure 2 gate 11 is shown in blocking position, while in Figure 6, in full lines, it is shown in retracted position, which latter position is reached in the middle of a cycle. Gate 12, on the other hand, is shown retracted in Figure 2, while in Figure 6, in solid lines, it has been raised to blocking position.

When a ball is released, in the manner shown in Figure 6, the lifting plunger 20 must be in its lowered position. It is raised to the broken line position, shown in solid lines in Figure 2, by rotation of eccentric wheel 42, which engages roller 22 fastened to the plunger. Preferably, this roller is journaled on a spindle 23 integral with, and disposed centrally of, a plate 24, curved laterally to conform to the exterior of tube 2. Screws 25 extend through holes at top and bottom of this plate for guiding engagement in a longitudinal slot 26 in the wall of tube 2, and are screwed into tapped holes in the body of plunger 20. Such interengagement of the slotted tube wall between plate 24 and block 20 prevents tilting of the plunger as it passes the junction of chute 2 with tube 1, and also restrains rotation of the plunger as eccentric wheel 42 exerts a side thrust on roller 22.

In order to coordinate the movements of gate bars 11 and 12 with plunger 20, eccentric wheel 42 is secured on shaft 4 in substantially the same angular relationship as eccentric wheel 40. This insures that the plunger will be in its lower position when gate bar 11 is retracted sufficiently to enable the next ball B to be delivered from gravity chute 1 into upright tube 2, as shown in Figure 6. Moreover, the plunger will have descended far enough at such time so that the ball will roll onto the tee tube 24, extending axially through and projecting well above it. Preferably this tube is made of flexible material, such as rubber, so that

when the ball is driven from it, or if the tube itself is struck by a golf club, it will bend, instead of it being broken, or the golf club being shattered, or some other part of the machine being damaged.

The structure for reciprocating plunger 20 and gates 11 and 12 may vary in construction and may be mounted in different ways. In order that each unit be compact, and as far as possible self-contained, however, I prefer that the driving mechanism be supported on standards 30 mounted on plate 3. Four of these standards may be provided, upon three of which a raised mounting plate 31 is supported. Two standards in alignment function as, or carry, end bearings 32 for a driven shaft 4 on which the eccentric wheels 40, 41 and 42 are secured. A driving shaft 33 is supported at one end by a third bearing 32 on a standard 30 aligned with the above-mentioned bearing standards. This latter shaft is continuously rotated at a slow speed by a pulley 34, driven by a belt 36 from a pulley 35, secured upon a line shaft 37. This line shaft will extend adjacent to all the several teeing units of a driving range installation, and will also be rotated continuously. The belt 36 interconnecting the driving and driven pulleys 35 and 34, respectively, will serve as a safety connection between each teeing unit and the master drive shaft, so that if, for any reason, the unit driven by it should jam, this belt would be thrown off the pulleys, enabling the other teeing units to be operated uninterruptedly without risk of injury.

It will be evident that driven shaft 4 must be mechanically separate from the continuously rotating drive shaft 33 in order to accomplish intermittent operation of the teeing mechanism. These shafts, however, may be in alignment, as shown, and in fact the end of shaft 33 adjacent to shaft 4 may be supported from it by a bearing 43, serving to restrict both radial and thrust movement of the shaft end, so that although shaft 33 may rotate continuously, it will not drive shaft 4 directly and synchronously, because of the interposition of this bearing.

In order to rotate shaft 4 intermittently by shaft 33, positive clutch mechanism, which may be of the claw clutch type, is provided. Such a clutch may incorporate a driving element 44 rotating continuously with shaft 33, adapted to mesh with a driven clutch element 45 secured to shaft 4. Normally these elements would be held out of engagement by a clutch releasing spring 46, interengaged between the clutch element 44 and a shoulder or an abutment on the end of shaft 33 engaged with bearing 43. To engage elements 44 and 45 for rotating shaft 4, a shifter 47 may be operated to slide element 44 along shaft 33 into contact with element 45. To enable element 44 to move thus it is slidably splined or keyed to shaft 33, such as by a feather or key 38, which constitutes the driving connection between the shaft and driving clutch element. By such movement between clutch element 44 and shaft 33 clutch spring 46 is compressed, so that immediately upon release of shifter 47 the clutch elements will be separated automatically by expansion of this spring. Disengagement of the clutch elements can also be effected, even if the clutch spring 46 is not provided, by opposite movement of shifter 47.

As shown best in Figures 1 and 4, the driving clutch element 44 may be a disk having radial serrations about the margin of one face, with which complementary serrations on driven clutch

element 45 may mesh. It is not necessary that both clutch elements have serrations about their entire circumferences, and, in fact, the clutch elements may be disengaged more readily if only a few circumferentially spaced groups of serrations are provided on one element, such as the driven member 44.

In order to afford automatic control of the teeing mechanism, I prefer that the clutch be electrically operated by a solenoid 5, which, when energized, will draw a plunger 50 inward. This movement actuates a lever system 48, preferably of the compound type, as shown in Figure 1, to move clutch shifter 47. It will be evident, therefore, that whenever the solenoid 5 is energized, plunger 50 will be moved to engage clutch elements 44 and 45 for driving shaft 4, which in turn rotates eccentric wheels 40, 41 and 42, and upon deenergization of solenoid 5 spring 46, expanding to disengage the clutch elements, will swing the levers 48 for again withdrawing plunger 50 from solenoid 5. In addition, in order to stop shaft 4 and the eccentric wheels carried by it at the instant that clutch elements 44 and 45 are disengaged, I provide a brake head 49, carried by one lever of the lever system 48, which will be forced into engagement with eccentric wheel 42 by the expansion of clutch release spring 46. Other suitable brake mechanism might be substituted for head 49, which might act to stop any member connected to move with shaft 4.

Each time a ball is driven from the tee tube 27, it is only necessary that the mechanism move through a complete cycle executed by a single revolution of shaft 4 to deliver another ball to tube 2 and to raise it into teed position. Especially since it is desirable to drive each unit from the same power source, such as an electric motor, however, movement of the mechanism of each individual unit should be controlled separately. In order to relieve the player from giving any attention to the machine, however, such control should be automatic and absolutely dependable. I therefore have devised a control system which is electrically operated, and depends upon mechanical action as little as possible.

The heart of my electrical control arrangement is a photoelectric cell 51, which is energized to initiate a ball teeing cycle by light, such as from a lamp 52 which is illuminated continuously during use of the unit. Such photoelectric cell and lamp are positioned so that the photoelectric cell energizing light beam will pass through the teed position of the ball. When a ball is not in such teed position to intercept the light beam, therefore, the photoelectric cell will be energized to tee another ball. To this end the photoelectric cell 51 and lamp 52 may be placed in any of various positions, on opposite sides of the upper end of tee tube 27, but I prefer that one element, such as the photoelectric cell, be placed above the teed position of the ball, and the other element, such as lamp 52, below the tee, as shown in Figure 2. Light from the lamp will shine upward through the hollow tube 27, extending completely through plunger 20 and serving as the ball tee.

While the photoelectric cell has been shown above the ball, and the lamp 52, constituting the energizing light source, below the tee and within tube 2, the positions of these elements might be reversed. With the photoelectric cell thus disposed in the base of tube 2, daylight, or the general night illumination of the driving course, shining down through tube 27, could replace the

special lamp 52 as the light source to energize the photoelectric cell whenever such tube is not covered by a golf ball, provided that the photoelectric cell is sufficiently sensitive. In whatever position photoelectric cell 51 is located, its energization by a light beam from a light source on the opposite side of the teed position of the ball will operate a relay 53 to close a normally open control switch 54, which is in series circuit with clutch operating solenoid 5.

Assuming, therefore, that a golf ball B is in teed position on tube 27, photoelectric cell 51 will remain deenergized, and switch 54 will stay open, so that current cannot flow through solenoid 5 for effecting engagement of clutch members 44 and 45. When the ball is driven from the tee tube the photoelectric cell will be energized by the light beam passing through the teed position of the ball. Relay 53 will be actuated by the photoelectric cell to close switch 54, and current will flow through solenoid 5 to draw its plunger 50 to the right in Figure 1, thus moving levers 48 and shifter 47 to engage clutch elements 44 and 45. Because shaft 33 rotates continuously, shaft 4 will be rotated with it by such clutch engagement, in turn to revolve eccentric wheels 40, 41 and 42.

During the first portion of the rotation of eccentric wheel 40 a ball B will be released from chute 1 by retraction of gate bar 11, to roll by gravity into upright tube 2. Meanwhile, rotation of cam wheel 42 to the position shown in full lines in Figure 6, has allowed plunger 20 to descend so that the top of tee tube 27 is slightly below the junction of the bottom of tube 1 with tube 2. Thus the ball will fall onto the tee tube, immediately intercepting the beam of light, until that time energizing photoelectric cell 51, so that relay 53 will be deenergized and switch 54 will open. The electric circuit through clutch operating solenoid 5 will not thus be broken, however, because its circuit will still be completed through a normally closed switch 55, which is connected in parallel with switch 4.

The solenoid will thus remain energized to retain the clutch elements engaged until a single revolution of shaft 4 has been completed. At that time switch 55 will be broken mechanically by engagement with a cam hump 56 formed on eccentric wheel 42, as shown in Figures 1 and 5. Assuming that a ball has been delivered to the tee, so that switch 54 remains open, the circuit through solenoid 5 will thus be disrupted with plunger 20 in its raised position, as shown in Figures 2 and 3. Clutch spring 46 will immediately separate clutch members 44 and 45 and withdraw plunger 50 from solenoid 5, while brake 49 will engage eccentric wheel 42 to stop and hold the mechanism positively in this position. Shortly after the next cycle is initiated by closing of switch 54 upon energization of solenoid 5, cam hump 56 will pass beyond switch 55 so that it will again close before another ball enters tube 2 to intercept the photoelectric cell energizing beam.

While gate 11 is in its depressed position, as shown in solid lines in Figure 6, the balls in tube 1, with the exception of the one between gates 11 and 12, are held back by upward projection into it of gate bar 12. Upon continued rotation of shaft 4, however, gate 12 is withdrawn as gate 11 is again raised, and all the balls in the tube roll down until the now foremost one lodges against gate 11. Since only one ball can be

accommodated between gates 11 and 12, on initiation of the next operating cycle this ball alone will be delivered into tube 2 in the manner described.

If storage bin 10 and tube 1 should be empty, no ball would be delivered to tee tube 27 during the above operation. There would be nothing to interrupt the beam of light through the teed position of the ball, and it would therefore continue to energize photoelectric cell 51. Consequently relay 53 would remain energized to hold switch 54 closed, and despite the intermittent opening and closing of switch 55 by cam hump 56 as eccentric wheel 42 rotates, current would flow continuously to solenoid 5 through switch 54 to hold clutch elements 44 and 45 engaged and thus to rotate shaft 4 indefinitely. Plunger 20 and gates 11 and 12 will continue to reciprocate up and down in timed relationship, therefore, until an additional supply of balls has been fed into tube 1.

Even though no balls are available each individual unit can be rendered inoperative by mechanically preventing access of light to photoelectric cell 51, or by deenergizing the source of illumination, as by opening switch 57 which controls lamp 52. The photoelectric cell would not be energized to actuate relay 53, so that switch 54 would stay open and shaft 4 would remain stationary with plunger 20 in raised position, in which position switch 55 is held open by cam hump 56. Despite any single unit being thus rendered inoperative, the rest of the units can be operated continuously, if desired, by rotation of motor 58 driving line shaft 37.

It will be seen, therefore, that each unit will continue to operate as long as balls are supplied to it, irrespective of the other units, although all are driven by a single motor, unless voluntarily rendered inoperative. Only when a ball has been teed will each operating unit stop at the end of its operating cycle. As soon as the ball has been driven from teed position another cycle will commence without fail, and this no matter what defect of shape, size or weight the golf ball may possess.

I claim:

1. A golf ball teeing machine, comprising a tee tube, means operable to deliver a golf ball to said tee tube, power means for effecting such operation of said delivery means, and automatic control means for said power means, including a photoelectric cell disposed in vertical alignment with the bore of said tee tube, and energizable by a beam of light passing therethrough and through the location occupied by a ball in teed position, after a ball has been driven therefrom, to effect energization of said power means to operate said delivery means for delivering another ball to said tee member.

2. A golf ball teeing machine, comprising a tee tube apertured throughout its length and guided for vertical reciprocation between a lower, ball receiving position and an upper, ball teed position, power means for moving said tee tube upward to ball teed position, and control means for said power means, including a photoelectric cell disposed in vertical alignment with the bore of said tee tube, and energizable by a beam of light passing therethrough, after a ball in teed position has been driven therefrom, to initiate downward movement of said tee tube to receive another ball for elevation into teed position.

3. A golf ball teeing machine, comprising a tee tube apertured throughout its length and guided

for vertical reciprocation between a lower, ball receiving position and an upper, ball teed position, power means for moving said tee tube upward to ball teed position, and control means for said power means, including a photoelectric cell disposed in vertical alignment with the bore of said tee tube, and energizable by a beam of light passing therethrough, after a ball in teed position has been driven therefrom, to initiate downward movement of said tee tube to receive another ball for elevation into teed position, and means operable to maintain said power means operative to raise the tee tube, with the ball thus received, into teed position after deenergization of said photoelectric cell by interception of its energizing beam of light through said tee tube by reception of a ball thereon in its lowered position.

4. A golf ball teeing machine, comprising a tee tube apertured throughout its length and guided for vertical reciprocation between a lower, ball receiving position and an upper, ball teed position, means operable to deliver a ball to said tee tube when in its lower position, power means for effecting such operation of said delivery means and for moving said tee tube upward to ball teed position, and control means for said power means, including a photoelectric cell disposed in vertical alignment with the bore of said tee tube, and energizable by a beam of light passing therethrough, after a ball in teed position has been driven therefrom, to initiate downward movement of said tee tube, and to operate said delivery means for delivering another ball to said tee tube for elevation into teed position.

5. A golf ball teeing machine, comprising a tee tube apertured throughout its length and guided for vertical reciprocation between a lower, ball receiving position and an upper, ball teed position, means operable to deliver a ball to said tee tube when in its lower position, power means for effecting such operation of said delivery means and for moving said tee tube upward to ball teed position, automatic control means for said power means, including a photoelectric cell disposed in vertical alignment with the bore of said tee tube, and energizable by a beam of light passing therethrough, after a ball in teed position has been driven therefrom, to initiate downward movement of said tee tube, and to operate said delivery means for delivering another ball to said tee tube for elevation into teed position, and means operable to maintain said power means operative to raise the tee tube, with the ball thus delivered, into teed position, and to complete an operating cycle of said delivery means, after deenergization of said photoelectric cell by interruption of its energizing beam of light through said tee tube by delivery of a ball thereon in its lower position.

6. A golf ball teeing machine, comprising an upright tube, a tee tube guided therein for reciprocation between a lower, ball receiving position and an upper, ball teed position projecting above the upper end of said upright tube, and apertured throughout its length, a ball delivery chute inclined downward to and communicating with said upright tube, gate bars projectible into said chute adjacent to said upright tube, and spaced apart a distance to receive only a single ball therebetween, a horizontal shaft, two eccentric wheels mounted on said shaft and disposed in parallel vertical planes adjacent to said upright tube, one for each gate bar, means connecting said eccentric wheels to their respective

gate bars, a finger projecting laterally from said tee tube through a vertical slot in said upright tube, a third eccentric wheel mounted on said shaft, parallel to said first two eccentric wheels, and engaged with said tee tube finger, the eccentric wheels for said tee tube and for the gate member nearer said upright tube being positioned on said shaft in substantially the same angular relationship, and the other eccentric wheel being disposed in substantially opposite phase, power means, clutch means interposed between said power means and said shaft and engageable to rotate said shaft and said eccentric wheels conjointly for effecting simultaneous movement of said tee tube and said gate bars, thus to deliver a ball from said chute onto said tee tube in its lower position, and to elevate it into teed position, and automatic control means for said clutch means, including a photoelectric cell disposed in vertical alignment with the bore of said tee tube and energizable by a beam of light passing there-through, after a ball in teed position has been driven therefrom, to initiate downward movement of said tee tube and operation of said gate bars to deliver another ball to said tee tube in its lower position, means operable to maintain said clutch means engaged to raise the tee tube, with the ball thus received into teed position, after deenergization of said photoelectric cell by interception of its energizing beam of light through said tee tube by delivery of a ball thereon in its lower position, and switch means positioned to be opened by one of said eccentric wheels, and connected in parallel with the circuit of said photoelectric cell, to effect disengagement of said clutch means when said tee tube has been raised to its upper position.

7. A golf ball teeing machine, comprising a tee tube apertured throughout its length and guided for vertical reciprocation between a lower, ball receiving position and an upper, ball teed position, drive means operable to reciprocate said tee tube, continuously operable power means, a clutch operatively interconnecting said power means and said tee tube drive means, a clutch operating solenoid energizable to engage said clutch, and automatic control means, including a photoelectric cell disposed in vertical alignment with the bore of said tee tube, and energizable by a beam of light passing therethrough, after a ball in teed position has been driven therefrom, a switch closed by energization of said photoelectric cell, and opened by deenergization thereof, a second, normally closed, switch connected in parallel with said first switch, positioned to be opened by movement of said tee tube drive means in raising said tee tube into its upper position, said switches both being connected in circuit with said clutch operating solenoid, and said clutch being engaged by energization of said solenoid to initiate operation of said drive means upon energization of said photoelectric cell when a ball in teed position is driven from the tee tube, said clutch being disengaged to terminate operation of said drive means upon deenergization of said solenoid when said second switch is opened by movement of said drive means into a position corresponding to the upper position of said tee tube, said photoelectric cell switch having previously opened upon deenergization of said photoelectric cell by interception of its energizing beam of light by reception of another ball upon the tee tube in its lower position.

8. A golf ball teeing machine, comprising a tee tube member guided for vertical reciprocation

between a lower, ball receiving position and an upper, ball teed position, a horizontal shaft, an eccentric wheel mounted on said shaft adjacent to the path of reciprocation of said tee tube member, and having its peripheral portion engaged directly with said tee tube member, power means operable to rotate said shaft and eccentric wheel for raising said tee tube member from its lower position to its upper position by such engagement, automatic control means for said power means, including a photoelectric cell disposed in vertical alignment with the bore of said tee tube member, and energizable by a beam of light passing through the ball teed position, after a ball in teed position has been driven therefrom, to initiate downward movement of said tee tube member for reception of another ball thereon, means operable to maintain said power means operative to raise the tee tube, with the ball thus received, into teed position, after deenergization of said photoelectric cell by interception of its energizing beam of light through said tee tube by delivery of a ball thereon in its lower position, and means operated by said eccentric wheel to terminate operation of said power means when said tee tube member has been raised substantially to its upper position.

9. A golf ball teeing machine, comprising a tee member guided for reciprocation between a lower, ball receiving position and an upper, ball teed position, a ball delivery chute inclined downward to the upper end of said tee member in ball receiving position, gate members projectible into said chute adjacent to said tee member and spaced apart a distance to receive only a single ball therebetween, a substantially horizontal shaft, three eccentric wheels mounted on said shaft, one having its peripheral portion engaged directly with said tee member and each of the other two being operatively engaged with a gate member for effecting conjoint reciprocation of said three member by rotation of said eccentric wheels, the eccentric wheels for said tee member and for the gate member nearer said tee member being positioned on said shaft in substantially the same angular relationship, thus to move said tee member and such gate member simultaneously in the same direction, and the other eccentric wheel being disposed in substantially opposite phase to move the other gate member oppositely, and power means operable to rotate said shaft and eccentric wheels conjointly for effecting such simultaneous movement of said tee and gate members, thus to deliver a ball from said chute onto said tee member in its lower position and to elevate it into teed position.

10. A golf ball teeing machine, comprising a tee member movable between a lower, ball receiving position and an upper, ball teed position, a ball delivery chute inclined downward to the upper end of said tee member in ball receiving position, gate bars projectible into said chute adjacent to said tee member and spaced apart a distance to receive only a single ball therebetween, a substantially horizontal shaft, two eccentric wheels mounted on said shaft, one operatively engaged with each gate bar, a third eccentric wheel mounted on said shaft and engaged with said tee member, the eccentric wheels for said tee member and for the gate member nearer said tee member being positioned on said shaft in substantially the same angular relationship, and the other eccentric wheel being disposed in substantially opposite phase, power means, clutch means interposed between said

power means and said shaft interengageable to rotate said shaft and said eccentric wheels conjointly for effecting simultaneous movement of said tee member and said gate bars, thus to deliver a ball from said chute onto said tee member in its lower position and to elevate it into teed position, and electric control means for said clutch means including switch means operable, after a ball in teed position has been driven from said tee member, to initiate downward movement of said tee member and operation of said gate bars to deliver another ball to said tee member in its lower position, means operable to maintain said clutch means engaged to raise the tee member with the ball thus received into teed position, and switch means positioned to be opened by one of said eccentric wheels and connected in circuit with said first switch means to effect disengagement of said clutch means when said tee member has been raised to its upper position.

11. A golf ball teeing machine, comprising a tee member movable between a lower, ball receiving position and an upper, ball teed position, drive means for thus moving said tee member, including an electric control circuit energizable to effect operation of said drive means and deenergizable to terminate operation thereof, a normally closed switch in said control circuit, normally opened to deenergize said circuit automatically in response to the raising of said tee member substantially to its upper position, and a second switch in parallel with said normally closed switch in said control circuit, closable under abnormal conditions to maintain said control circuit energized despite opening of said normally closed switch when said tee member is raised substantially to its upper position, and further closable when said tee member is in its upper position to energize said control circuit after deenergization thereof under normal conditions by opening of said normally closed switch, thereby to initiate a further cycle of movement of said tee member.

12. A golf ball teeing machine, comprising a tee member movable between a lower, ball receiving position and an upper, ball teed position, drive means for thus moving said tee member, including an electric control circuit energizable to effect operation of said drive means and deenergizable to terminate operation thereof, a normally closed switch in said control circuit, normally opened to deenergize said circuit automatically in response to the raising of said tee member substantially to its upper position, a photoelectric cell disposed at one side of the teed position of the ball defined by said tee member in its upper position, and a second switch in parallel with said normally closed switch in said control circuit, closable by energization of said photoelectric cell effected by a beam of light passing through the location occupied by a ball teed by said tee member in its upper position, thereby to energize said control circuit after deenergization thereof by opening of said normally closed switch, when a ball in teed position has been driven from said tee member.

13. A golf ball teeing machine, comprising a tee member movable between a lower, ball receiving position and an upper, ball teed position, drive means for thus moving said tee member, including a substantially horizontal shaft, an eccentric wheel mounted on said shaft and having its peripheral portion engaged directly with said tee member, an electric control circuit energizable to effect operation of said drive means and

deenergizable to terminate operation thereof, a normally closed switch in said control circuit, normally opened to deenergize said circuit automatically by engagement with said eccentric wheel in raising said tee member substantially to its upper position, and a second switch in parallel with said normally closed switch in said control circuit, closable under abnormal conditions to maintain said control circuit energized despite opening of said normally closed switch by said eccentric wheel in raising said tee member substantially to its upper position, and further closable when said tee member is in its upper position to energize said control circuit after deenergization thereof under normal conditions by opening of said normally closed switch, thereby to initiate a further cycle of movement of said tee member.

14. A golf ball teeing machine, comprising a tee member movable between a lower, ball receiving position and an upper, ball teed position, drive means for thus moving said tee member, continuously operable power means, positive clutch means operable to effect a driving connection between said power means and said drive means, clutch operating means operable to effect engagement and disengagement of said clutch means, clutch disengaging control means normally operated to effect clutch disengaging operation of said clutch operating means automatically in response to raising of said tee member substantially to its upper position, and clutch engaging control means operable to override said clutch disengaging control means, either to interdict under abnormal conditions such operation of said clutch disengaging control means to effect clutch disengaging operation of said clutch operating means, or to effect clutch engaging operation of said clutch operating means after clutch disengaging operation thereof effected by normal operation of said clutch disengaging control means.

15. A golf ball teeing machine, comprising a tee member movable between a lower, ball receiving position and an upper, ball teed position, drive means for thus moving said tee member, continuously operable power means, positive clutch means operable to effect a driving connection between said power means and said drive means, a clutch operating coil energizable to effect engagement and deenergizable for disengagement of said clutch means, a normally closed switch in circuit with said clutch operating coil, normally opened to deenergize said coil automatically in response to the raising of said tee member substantially to its upper position, and a second switch in parallel with said normally closed switch in circuit with said clutch operating coil, closable under abnormal conditions to maintain said clutch operating coil energized despite opening of said normally closed switch when said tee member is raised substantially to its upper position, and further closable when said tee member is in its upper position to energize said clutch operating coil to effect engagement of said clutch means after deenergization of said coil under normal conditions by opening of said normally closed switch, thereby to initiate a further cycle of movement of said tee member.

16. A golf ball teeing machine, comprising a tee member guided for vertical reciprocation between a lower, ball receiving position and an upper, ball teed position, drive mechanism operable to effect reciprocation of said tee member, power means operable to actuate said drive mechanism for raising said tee member from its lower posi-

tion into its upper position, deenergizing means operable to terminate actuation of said drive mechanism by said power means, means operable automatically by said drive mechanism when said tee member has been raised substantially to its upper position to actuate said deenergizing means, and energizing means operable to override said deenergizing means, while said tee member is stationary in such upper position, and to initiate actuation of said drive mechanism by said power means for lowering said tee member from its upper position.

17. A golf ball teeing machine, comprising a tee member guided for vertical reciprocation between a lower, ball receiving position and an upper, ball teed position, drive mechanism operable to effect reciprocation of said tee member, power means operable to actuate said drive mechanism for raising said tee member from its lower position to its upper position, automatic control means for said power means, including a photoelectric cell disposed at one side of such ball teed position, and energizable by a beam of light passing through the ball teed position, after a ball has been driven therefrom, to initiate actuation of said drive mechanism by said power means to move said tee member downward for reception of another ball

thereon, means independent of said photoelectric cell operable thereafter to continue actuation of said drive mechanism by said power means, and means operated automatically by said drive mechanism when said tee member has been raised substantially to its upper position to control said independent means for terminating actuation of said drive mechanism by said power means.

18. A golf ball teeing machine, comprising a tee member guided for vertical reciprocation between a lower, ball receiving position and an upper, ball teed position, drive means, including a drive wheel rotatable to effect reciprocation of said tee member, friction brake means adapted for sliding frictional contact with a face of said drive wheel, clutch means to rotate said wheel for raising said tee member when said brake means are released, and differentially movable means operable, when said tee member approaches its upper position, simultaneously to disengage completely said clutch means and to move said friction brake means into sliding contact with such drive wheel face to stop said eccentric wheel gradually, thus to leave said tee member in its upper position.

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