

June 30, 1953

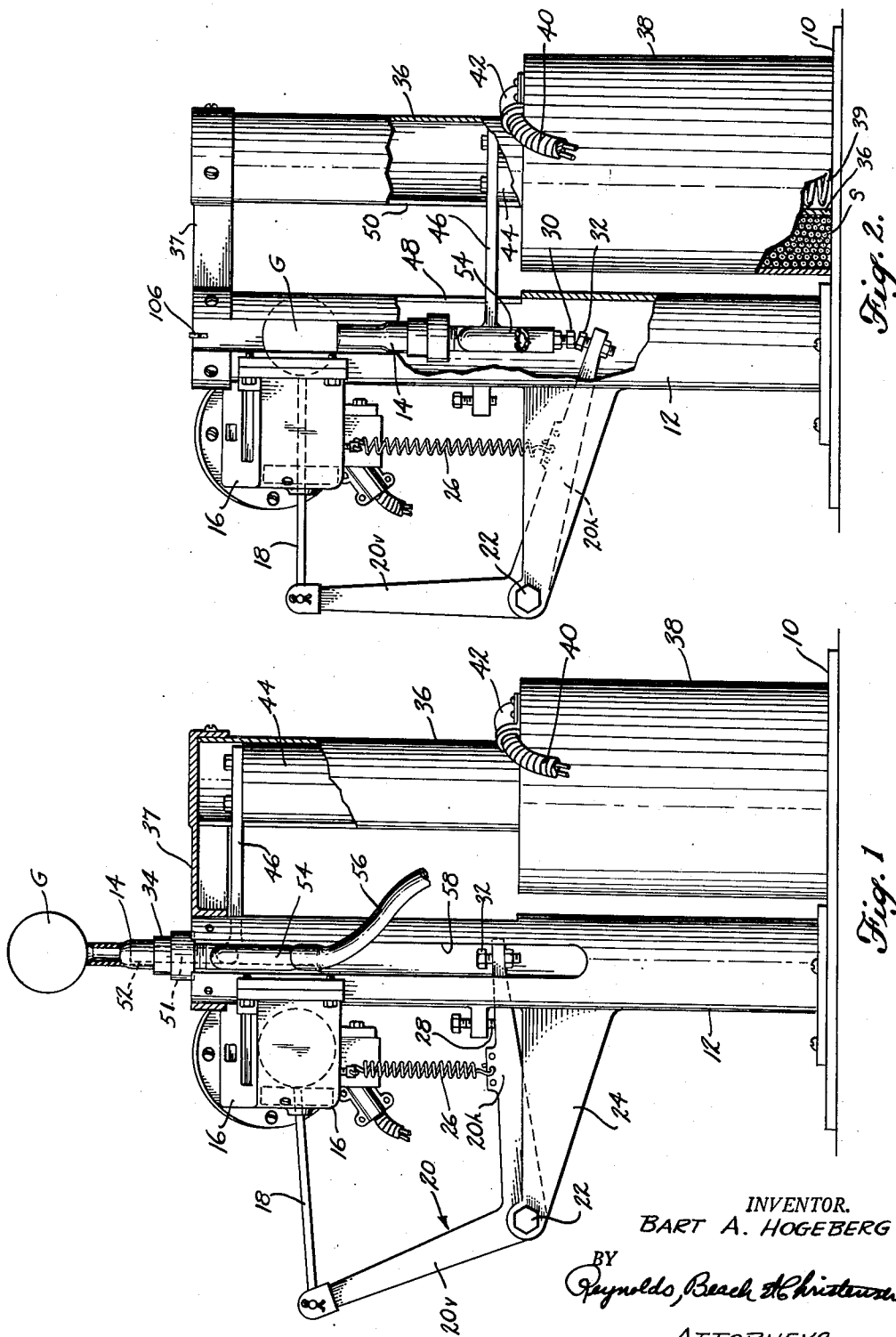
B. A. HOGEBERG

2,643,883

AIR-CONTROLLED SOLENOID GOLF TEE

Filed Oct. 16, 1950

2 Sheets-Sheet 1



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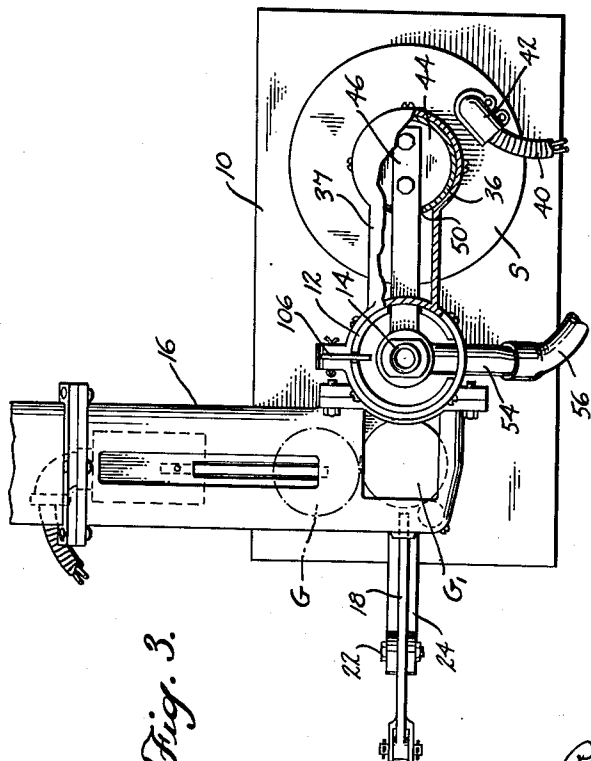
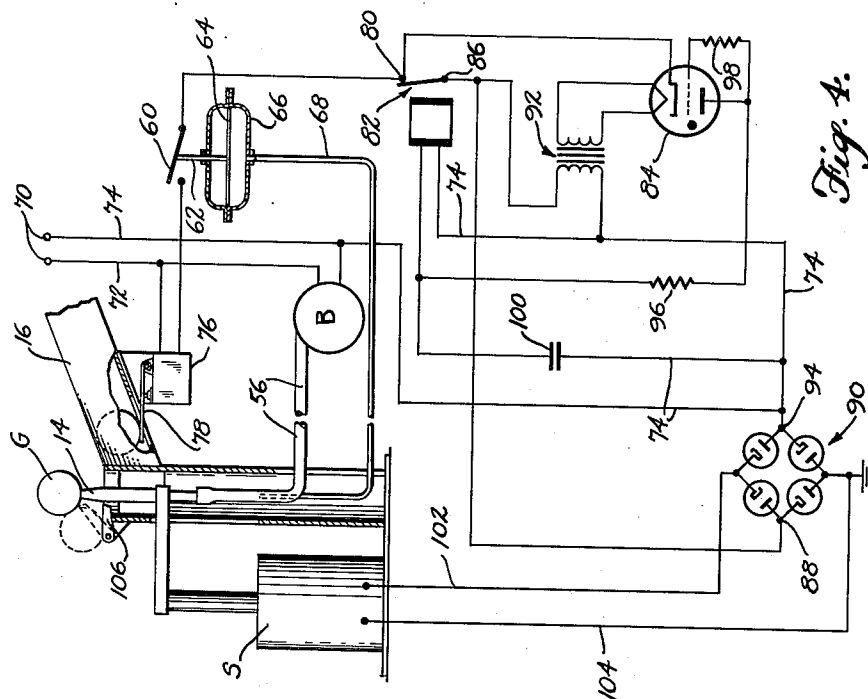
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AIR-CONTROLLED SOLENOID GOLF TEE

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7 Claims. (Cl. 273—33)

1

This invention relates to golf ball teeing machines for practice golf, and its general object is to provide an automatic teeing machine which is generally more reliable and trouble-free in its operation than those previously available.

In my copending application Serial No. 34,279, filed June 21, 1948, there is described an automatic golf ball teeing machine utilizing the force of a solenoid to effect descent of the reciprocable tee element for reloading each time a ball is driven therefrom. In that case the solenoid energizing circuit was controlled by photoelectric means utilizing an interrupted beam of light restored each time the beam-obstructing golf ball was removed from the tee. The improvements comprising my present invention pertain to a novel automatic control system and means which are herein illustratively described by reference to their application in an automatic teeing machine of an improved solenoid type, but it should be understood that the automatic controls contemplated are also applicable in golf ball teeing machines of other types or employing other motivating mechanisms for the movable tee element.

Another object of this invention is an automatic ball-actuated control for a golf ball teeing machine which is unaffected by external conditions, such as the presence of ambient or accidental light conditions which might falsely trigger a photoelectric control as previously used, for example; by shock or vibration which might falsely trigger or damage a purely mechanical type of control; by badly marred golf balls which might prevent proper functioning of previous air-operated controls; dirt or moisture which might infiltrate and impair operation of various prior types of controls. More specifically, an object is to achieve a ball-actuated air-operated control for automatic golf ball teeing machines which is largely impervious to these and other normally adverse conditions, hence capable of more satisfactory and reliable operation than was previously obtainable.

My presently improved automatically controlled machine, employing a tee element constituting an air orifice, is capable of detecting badly marred golf balls if presented to the tee element in such a way that a large defect in the ball registers with the rim of such element, and thereupon of automatically rejecting such ball and reteeing another in its place. The operations of detecting and rejecting marred balls and reteeing the next succeeding ones, indefinitely if necessary, is continued until a ball is presented which has no serious defect thereon located to

2

alter appreciably the flow of air through the tee element. In that manner the badly cut golf balls eventually are detected, if not the first time through the machine, then at some future time, and, upon inspection by an operator, may be discarded if not playable for practice golf purposes. On the other hand minor surface defects which in no case are serious enough to justify discarding the golf ball for practice purposes ordinarily will not cause rejection of the ball by the machine. If a ball is rejected because of a fairly bad cut, for example, it may still be returned into the ball hopper and reused if desired with the probability that it will be so presented to the tee element, perhaps on several passages through the machine, that the defect will not cause the machine to reject it again, but ultimately a further rejection of such ball may be anticipated. The rejection of unplayable golf balls in one passage or another through the machine insures that each bad ball may at least be inspected for discard purposes if desired although the defect might not previously have been known to the operator.

The actual lapse of operating time between detection-rejection of a bad golf ball and automatically reteeing another ball in its place is not long enough to be objectionable to the practicing player, who in any event requires at least several seconds and usually much longer to reestablish himself at the proper stance for another practice stroke.

In its presently preferred and herein illustrated form the improved golf ball teeing machine comprises a vertically reciprocable tee element constituting an air orifice which is opened and closed by removal and deposit of a golf ball upon the tee. This tee element, guided for vertical movement in a housing or ball-guide tube to which a golf ball delivery chute is connected, is moved downward into ball reloading position by the force of a solenoid acting in opposition to a tee-elevating spring, generally as in my copending application cited above. However, in the present case the solenoid is completely enclosed in a separate tube located apart from the ball-guide tube and has a vertically reciprocable armature connected to the tee element by means of a transverse arm extending through registering slots in the tubes. As a result dirt, moisture or other foreign material which might accidentally drop into the open ball-guide tube will fall harmlessly at the bottom thereof and will not impair the mechanical or electrical operation of the solenoid operating device.

3

In accordance with this invention I have discovered that the use of positive air pressure, by which air is blown up and out through the tee element orifice, is markedly less critical and much more stable and reliable as a basis for a ball-actuated control than the former suggested practice of using a vacuum to suck air inward through such orifice. It will be appreciated that in either case the valving action of a golf ball placed upon and removed from such tee element orifice is utilized as the influence by which pressure is changed in the pneumatic system to effect actuation of a pressure sensitive switch or other control device which initiates operation of tee element motivating means. It is found that even small surface irregularities or defects on a golf ball may, if they prevent a tight seal of the ball upon the tee element orifice, usually prevent a sufficient pressure change in a vacuum type control system for reliable operation. However, with the type of system contemplated by my present invention, namely one using positive air pressure, such small surface irregularities or defects have no effect upon the stability of control. Moreover only relatively large cuts and mars in the surface of the golf ball prevent normal actuation of the control device by air pressure change, and in that case the failure of the machine to operate in the normal way is advantageously utilized as the basis for rejecting the bad ball and reteeing another as previously mentioned.

In the operation of the machine, air is blown upwardly and out through the tee element as an orifice, flowing freely through such orifice when open or uncovered by a ball but building up a back pressure when a ball effectively closes off such tee element orifice upon which it seats. Normally the initiation of back pressure in the pneumatic system, caused by the presence of a ball on the tee element, causes a diaphragm operated switch to effect opening of the solenoid energizing circuit and thereby permit the tee-reelevating spring to elevate the tee element into ball-teeed position. If a ball is badly marred, however, it may fail to cover this orifice sufficiently to produce ample back pressure to actuate the switch. Consequently time delay means is incorporated in the switch circuit to insure deenergization of the solenoid after a predetermined interval of time following descent of the tee element to reloading position even should a badly marred golf ball fail to cause a back pressure high enough to operate said diaphragm operated switch. Accordingly the tee element never remains permanently in the down position.

Upon elevation of the tee element, carrying a ball which effectively closes off the discharge orifice therein, such tee element will remain in its elevated position indefinitely until such ball is struck or otherwise removed therefrom. When the latter does occur the attendant reduction of back pressure in the pneumatic system causes the diaphragm operated solenoid control switch to effect energization of the solenoid for lowering the tee element to receive another ball from the delivery chute. On the other hand, if in the teeed position of the tee element the golf ball on the tee element fails to close the orifice therein sufficiently to build up the requisite back pressure in the system for maintaining the solenoid deenergized, then, after a predetermined time delay inherent in the control circuit, the tee element, carrying the defective ball, will

4

again automatically be lowered by reenergization of the solenoid. When this occurs the defective golf ball is automatically struck from the descending tee element by a deflecting arm which projects into the path of descent of the defective ball to unseat the same from the tee element, but which is freely pivoted to swing upward out of the path of an ascending ball carried by the tee element.

These and other features, objects and advantages of my present invention including certain details of the preferred and herein illustrated form thereof will become more fully evident from the following detailed description based upon the accompanying drawings.

Figure 1 is a side elevation view of the improved teeing machine with the tee element in ball-teeed position.

Figure 2 is a similar side elevation view with the tee element in ball-receiving or reloading position, parts being broken away to show interior details.

Figure 3 is a plan view of the same.

Figure 4 is a schematic diagram of the control system including the solenoid energizing and control circuit cooperating with the pneumatic ball actuated means.

Referring to Figures 1 to 3 inclusive, the machine comprises a base plate 10 upon which the ball guide tube 12 is mounted in upright position. The tee element 14 reciprocates vertically in this tube between elevated, ball-teeed position shown in Figure 1 and depressed, ball reloading position shown in Figure 2. An inclined ball-delivery chute 16 (Figure 3) delivers golf balls G to a loading position, represented by the ball outline G₁, beside a suitable entrance opening in the side of the ball guide tube 12 at or slightly above the level of the tee element 14 in its depressed position, similar to the arrangement disclosed in my copending application cited above.

A ball in loading position G₁, is pushed into the ball guide tube 12 by the loading plunger 18 automatically upon descent of the tee element 14 into ball reloading position as shown in Figure 2. For this purpose the plunger 18 is guided through an aperture in the delivery chute outer wall for reciprocation generally horizontally through the center of ball loading position G₁ in a direction transverse both to the ball delivery chute and ball guide tube 12, the plunger traveling between retracted position shown in Figure 1 and inwardly thrust position shown in Figure 2. Reciprocation of such loading plunger between these positions is effected by swinging of the bell crank 20 upon a horizontal pivot 22 carried by the fixed supporting arm 24 projecting laterally from the side of the ball guide tube 12. The generally horizontal arm 20h of the bell crank projects into the ball guide tube 12 through a suitable vertical slot in the side thereof adjacent the root of support arm 24, which slot accommodates swinging of arm 20h. A tension spring 26 connected at its upper end to the bottom of the guide chute 16 and at its lower end to the arm 20h normally urges such arm upwardly into contact with an adjustable stop 28, thereby maintaining the plunger 18 normally in its retracted position withdrawn from the delivery chute by the generally upright arm 20v of the bell crank pivotally interconnected with such plunger. Adjustable abutment elements 30 and 32 carried respectively by the vertically reciprocable tee element supporting-head 34 and the inwardly projecting end

of the arm 207 interengage upon descent movement of the tee element head 34, and thereby cause such arm to swing downwardly with the remaining downward travel of the head 34. Consequently as the tee element is arriving at ball reloading position, attendant rocking of the bell crank drives the loading plunger 18 inward to thrust a ball from loading position G₁ into the ball guide tube to seat upon the tee element.

Descent movement of the tee-element supporting head 34 is effected by means of an intermittently energized solenoid device fixed upon the support 10 adjacent to the ball guide tube 12. The solenoid coil S appearing partly in Figure 2, comprises a large number of conductor turns surrounding the nonmagnetic vertical tube 36 received centrally within the solenoid housing 38 and projecting upwardly to a height materially above the solenoid. The two tubes, 12 and 36, are interconnected by a brace 37 as shown. The tube 36 slidably receives and guides the magnetic solenoid armature element 44 for vertical reciprocation therein. Energizing current is supplied to the solenoid winding at appropriate times through the two-wire conduit 40 which enters a terminal mounting 42 located at the top of the solenoid housing.

A compression spring 39 is received in the lower portion of the armature guide tube 36 and reacts upwardly on the solenoid armature element 44 to maintain such armature normally in an elevated position shown in Figure 1. A crossarm 46 extending through aligned vertical slots 48 and 50, respectively in the ball guide tube 12 and armature guide tube 36, as shown, rigidly interconnects the tee element supporting-head 34 and the solenoid armature element 44. This crossarm provides full support for the tee element head and thereby causes the tee element to reciprocate up and down between the extreme positions mentioned, effected by energization and deenergization of the solenoid which acts in opposition to the force of the armature spring. When the solenoid is energized the armature element 44, and with it the element 14 are drawn downward magnetically into ball reloading position of such tee element and the spring 39 is thereby compressed. When the solenoid is deenergized the spring relaxes and raises these elements into their upper position.

As will be evident the solenoid device, including coil and armature, is entirely separate from the ball guide tube and tee element and is laterally offset therefrom so that, in a ground installation, for example, dirt and water dropping through the ground or floor opening aligned with the reciprocating tee element 14 for teeing of golf balls through such opening will not come into contact with the solenoid device nor interfere with any parts which bear slidably upon each other or otherwise. In this latter connection it will be noted that the ball guide tube 12 serves no guiding function with respect to the tee element supporting-head except insofar as slot 48 assists in preventing horizontal swinging of the crossarm 46 about the vertical axis of armature guide tube 36. If desired the armature element and guide tube 36 may be adapted to function as a dashpot device, as disclosed in my copending application cited above, to prevent excessive acceleration and deceleration of the solenoid armature at the ends of travel thereof.

In order to render the improved solenoid golf ball teeing machine fully-automatic so that each time a golf ball G is driven from the tee element

14 the machine automatically lowers and reelevates the tee element with another ball teed thereon, such element herein is made in the form of a tubular orifice through which air is blown upwardly against the bottom of a golf ball seated thereon as shown in Figure 1. The tee element 14 is a rubber tube which is stretched elastically to fit around the tubular supporting stud 52 (Figure 1) carried by the reciprocative head 34. An air passageway 51 is formed through this head which communicates with the tubular tee element and an air supply tube 54 branching from the lower portion of the head. Air under pressure is delivered to the tube 54 by a flexible hose 56. The side of the ball guide tube 12 has a vertical slot 58 therein to accommodate such tube and hose for vertical reciprocation of the tee element.

As shown schematically in Figure 4, the flexible hose 56 extends to a suitable pressure source such as the blower B. If no ball is seated upon the upper end of the tee element to close off its orifice opening the air impelled by the blower will flow freely through the tube 56, passage 51 and out through the tee element orifice. Under this condition the force of the blower will be converted largely into velocity head, and the pressure head in the air passages named will be relatively low. However, when a golf ball G is seated upon the upper end of the tee element 14 and effectively closes the opening therein, a back pressure develops in these air passages which is relatively higher than the pressure under the previous condition.

This pressure variation accompanying opening and closing of the tee element orifice by the removal and replacement of a golf ball thereon is utilized to actuate a control switch 60 (Figure 4) in a manner effecting energization and deenergization, respectively, of the solenoid S. For this purpose, the arm of switch 60 is actuated by a control rod 62 connected to the central portion of a pressure-sensitive diaphragm 64, which constitutes the dividing partition in a housing 66, the lower portion of which is sealed except for an opening communicating with an air tube 68. The latter in turn extends into the hose 56 or other pressure point in the pneumatic system, for transmitting the air pressure of the latter continuously to the lower half of the diaphragm housing 66 as shown. The diaphragm causes switch 60 to be opened (Figure 4) when the tee element orifice is substantially closed by the presence of a golf ball on the tee element 14, and to be closed upon removal of such ball from the tee element.

Referring to Figure 4, the preferred complete electric circuit for the teeing machine and automatic control device therein is energized by application of standard alternating voltage to the input terminals 70 across which the motor of blower B is directly connected as shown. One contact of diaphragm switch 60 is energized through the supply conductor 72 and through the switch 76 when the latter is closed by depression of its control arm 78 under the weight of a golf ball in the delivery chute 16. If there are no golf balls in the delivery chute the entire circuit, except blower B, is deenergized by switch 76 then being open.

The other contact of the switch 60 is connected to the contact 80 of the relay switch 82 and to the cathode of the thyatron tube 84. The relay switch 82 is of the normally closed type and its other terminal 86 is connected to the point 88

in the full-wave bridge rectifier circuit 90 and to one side of the primary winding of the filament transformer 92 for the thyatron tube 84. The other side of the filament transformer primary is connected to the supply conductor 74 which in turn is connected to the opposite point 94 in the bridge rectifier 90. One side of the winding of relay 82 is connected to conductor 74 and its opposite side, through the current-limiting resistor 96, to the anode of the thyatron 84. Anode and grid of the thyatron are interconnected, as through a resistor 98 of high resistance value, so that the thyatron functions as a diode rectifier. A filter condenser 100 is connected between the terminals of the relay winding as shown to convert the relay energizing current impulses of thyatron rectifier 84 into a steadier energizing current so that the relay will not chatter when energized. The output terminals of the full-wave bridge rectifier 90 are connected to the terminals of solenoid S through the supply conductors 102 and 104.

From an inspection of the circuit diagram, it will be evident that direct current energizing the solenoid S is supplied by the full-wave bridge rectifier 90 whenever all three of the switches 76, 60 and 82 are simultaneously closed, and that opening of any one of these switches disrupts energization of the solenoid and thereby causes the tee element 14 to return to elevated position.

Assuming that the on-off switch 76 is closed by the pressure of a supply of golf balls in the delivery chute 16, the normal operation of the control circuit is as follows. With the tee element in its elevated position carrying a golf ball which effectively closes the tee element orifice to create substantial back pressure in the pneumatic system, the diaphragm switch 60 is held open as shown in the figure. The relay switch 82 is then closed, being its normal position, as no energizing current then flows through the relay coil for the reason that the opening of switch 60 prevents flow of energizing current thereto through thyatron 84. Under these conditions no energizing current flows through the solenoid S either, and the tee element therefore remains indefinitely in its elevated position.

However, when the ball is struck from the tee element 14 and the tee element orifice is thereby opened, pressure in the pneumatic system immediately drops. This drop in pressure actuates the diaphragm 64 to close switch 60 and establishes flow of energizing current in the solenoid S. The tee element is immediately lowered thereby for automatic reloading by operation of the mechanism already described in connection with Figures 1 to 3. At the same time the thyatron filament commences heating by virtue of current flow through the primary of filament transformer 92; however, no plate current will flow in the thyatron until after the lapse of a thermal delay period represented by the several seconds required for the filament temperature to reach operating level.

This thermal delay period offered by the thyatron, and initiated at the time just indicated extends beyond the period of time required for the tee element to descend and another ball to be loaded upon the tee element by the teeing mechanism and reopen switch 60 to deenergize the solenoid. As soon as switch 60 reopens, flow of heating current in the thyatron filament, not yet at operating temperature, is automatically cut off, accompanied by deenergization of solenoid S. Therefore, the relay switch 82 never

opens, as thyatron 84 does not conduct plate current, at any point in the normal cycle of operation, that is, when switch 60 is opened by a ball on the tee element, even though heating of the thyatron filament is initiated every time the switch 60 is closed by removal of a golf ball from such tee element.

The machine and automatic control mechanism operates normally in the foregoing manner when the golf balls delivered to the tee element therein are not badly cut or marred, which includes all those golf balls which might reasonably be used for practice golf with such a machine and even those having fairly substantial surface irregularities. In other words, it is found that the pressure increase in the pneumatic system, influencing the diaphragm switch, whenever a golf ball is placed upon the tee element will be great enough to effect opening of such switch despite substantial surface irregularities on the ball registering with the rim of the tee element, and that a perfect seal between the ball and such rim is by no means necessary to effect that result. Only a very large cut or dent in the surface of a ball, registering with the tee element rim, will prevent a build-up in back pressure sufficient to open the switch 60 and cause deenergization of the solenoid S.

However, even when there is deposited on the tee element in its lowered position a ball which is so badly defective and is so positioned on the tee element rim that it fails to sufficiently block the orifice to effect opening of the switch 60, this circumstance nevertheless does not render the machine inoperative, but instead results immediately in the automatic removal of the badly defective ball from the tee element and the automatic reteeing of the next ball in the delivery chute. The detection and rejection of badly defective balls in this manner is accomplished as follows. The cycle involved begins with the removal of a satisfactorily teed golf ball, that is, one effectively blocking the tee element orifice, from the tee element in elevated position, attended by closing of diaphragm switch 60 initiating descent of the element 14, and initiation of the thermal delay period represented by the time required for heating of the thyatron filament to a temperature conducive to flow of thyatron plate current. Then because the badly defective ball delivered upon the tee element arrived in ball reloading position fails to reopen the switch 60, the condition specified above, such tee element would tend to remain in the down position indefinitely except for the fact that after the elapse of a few seconds, the filament of thyatron 84 arrives at operating temperature and the tube becomes conductive. When the latter occurs, the thyatron functions as a rectifier supplying energizing current to the coil of relay 82 which opens the contacts of such relay.

The effect of opening the relay 82 is twofold. First, it effects deenergization of the solenoid S so that the tee element 14 is permitted to return to elevated position carrying the defective ball. Secondly, opening of the relay 82 breaks the energizing circuit for the primary of thyatron filament transformer 92, and the thyatron filament immediately commences to cool off. However, because of thermal lag of its filament a definite although short period of time elapses before the tube becomes non-conductive even after removal of filament current. During this lapse of time the thyatron continues to conduct, therefore,

which it does long enough for the tee element to reach elevated position.

When flow of plate current in the thyatron ceases and permits the relay 82 again to return to closed position, the diaphragm switch 60 still being closed, solenoid S is again energized and the tee element again lowered carrying the badly defective ball. The pivoted ball-deflecting arm 106 projecting into the path of the descending golf ball then unseats the ball from the tee element and causes it to roll out of the way, as suggested by the dotted line position of the ball in Figure 4. The empty tee element is then free to receive another ball from the delivery chute. While the ball-deflecting arm is unyielding to a defective ball descending on the tee element, it is free to swing upwardly out of the path of the next ball being raised by the tee element, as indicated by the dotted line position of such arm.

It will be evident that the machine will indefinitely repeat its automatic reteeing cycle of operation employing the thermal delay of the thyatron until the tee element receives a golf ball having a sufficiently good surface engaging the tee element rim to reopen the diaphragm switch 60. It is important to note, however, that the design or adjustment of the pneumatic system and diaphragm switch is not at all critical with relation to the degree of smoothness of the golf ball surface seated upon the tee element, because the back pressure in the system builds up to a relatively large extent even when the tee element is covered by a fairly rough ball, which includes all of the golf balls which normally might be used for practice golf. However, the control adjustment or design of the diaphragm switch may easily be made such that a very badly marred ball will fail to reopen the switch 60. As previously mentioned, a vacuum type system is extremely critical of adjustment and, except with very expensive and elaborate vacuum equipment will fail to operate at all unless a very close seal between the tee element and the golf ball surface is obtained. Moreover, a vacuum system is also subject to the possibility of dirt and moisture being drawn by the vacuum into the system, to the damage of the equipment. In a positive pressure type system such as that disclosed herein, the amount of force directed upwardly against the golf ball and tending to unseat it from the tee element is negligible as the diaphragm actuated switch may easily be constructed to respond sensitively to varying pressures at low level.

I claim as my invention:

1. Automatic golf ball teeing apparatus comprising a tee element reciprocable between ball-teed and ball loading positions and having therein a normally open air orifice adapted to be closed by seating of a golf ball on such tee element, ball loading means cooperating with such tee element to deliver a golf ball to such element automatically in loading position thereof, pneumatic means connected to said tee element to effect passage of air through said orifice when open, pressure-sensitive control means connected with said pneumatic means for actuation of such control means oppositely by corresponding reverse changes of pressure in said pneumatic means effected by seating and removal of a golf ball upon and from said tee element, respectively, tee element motivating means controlled by said control means to move said tee element from ball-teed position to ball loading position in response to pressure change accompanying removal of a golf ball from said tee element, and

reversely in response to the reverse pressure change accompanying loading of a golf ball on said tee element, delay means connected to said motivating means to effect such reverse operation thereof automatically upon expiration of a predetermined delay period following activation of said delay means should said control means fail to effect such reverse operation, and means operable to activate said delay means upon removal of a golf ball from such tee element.

2. The automatic golf ball teeing apparatus defined in claim 1, wherein the pneumatic means comprises a blower connected to the tee element and operable to force air under positive pressure out through the tee element orifice when open and to build-up back pressure when a golf ball is seated on such tee element effectively to close such orifice.

3. The automatic golf ball teeing apparatus defined in claim 1, and further delay means operatively connected to the motivating means and controlling such motivating means to effect movement of the tee element into ball loading position thereof automatically upon expiration of the delay period of such further delay means, and means interconnecting the first-mentioned delay means and said further delay means to actuate said further delay means by operation of said first-mentioned delay means in the event a defective golf ball fails to close the tee element orifice.

4. The automatic golf ball teeing apparatus defined in claim 1, and further delay means operatively connected to the control means and to the motivating means and operable to prevent actuation of the motivating means by the control means during a predetermined period following initiation of movement of the tee element toward ball-teed position.

5. Automatic golf ball teeing apparatus comprising a tee element reciprocable between ball-teed and ball loading positions and having therein a normally open air orifice adapted to be closed by seating of a golf ball on such tee element, ball loading means cooperating with such tee element to deliver a golf ball to such element automatically in loading position thereof, pneumatic means connected to said tee element to blow air under positive pressure outward through such tee element orifice when open and to build up back pressure therein when closed, pressure-sensitive control means connected with said pneumatic means for actuation of such control means oppositely by corresponding reverse changes in pressure in said pneumatic means effected by seating and removal of golf balls upon and from said tee element, respectively, and tee element motivating means controlled by said control means to move said tee element from ball-teed position to ball loading position in response to pressure decrease accompanying removal of a golf ball from said tee element, and reversely in response to pressure increase accompanying loading of a golf ball on said tee element by said loading means.

6. Automatic golf ball teeing apparatus comprising a tee element reciprocable between ball-teed and ball loading positions and having therein a normally open air orifice adapted to be closed by seating of a golf ball on such tee element, ball loading means cooperative with such tee element to deliver a golf ball to such element automatically in loading position thereof, pneumatic means connected to said tee ele-

11

ment to effect passage of air through said orifice when open, pressure-sensitive control means connected with said pneumatic means for actuation of such control means oppositely by corresponding reverse changes of pressure in said pneumatic means effected by seating and removal of a golf ball upon and from said tee element, respectively, tee element motivating means controlled by said control means to move said tee element from ball-teed position to ball loading position in response to pressure change accompanying removal of a golf ball from said tee element, and reversely in response to the reverse pressure change accompanying loading of a golf ball on said tee element, automatic means connected to said motivating means to effect movement of the tee element into ball-teed position and immediately thereafter back into ball loading position failing actuation of the control means to cause movement of the tee element from ball loading position to ball-teed position, and means cooperating with said tee element and automatically operable to unseat a golf ball carried by said tee element during movement thereof from ball-teed to ball loading position.

7. Automatic golf ball teeing apparatus comprising a tee element reciprocable between ball-teed and ball loading positions and having therein a normally open air orifice adapted to be closed by seating of a golf ball on such tee element, ball loading means cooperating with such tee element to deliver a golf ball to such ele-

12

ment automatically in loading position thereof, pneumatic means connected to said tee element to effect passage of air through said orifice when open, pressure-sensitive control means connected with said pneumatic means for actuation of such control means oppositely by corresponding reverse changes of pressure in said pneumatic means effected by seating and removal of a golf ball upon and from said tee element, respectively, tee element motivating means controlled by said control means to move said tee element from ball-teed position to ball loading position in response to pressure change accompanying removal of a golf ball from said tee element, and reversely in response to the reverse pressure change accompanying loading of a golf ball on said tee element, and delay means connected for actuation by operation of said control means and connected to said motivating means operatively to effect such reverse operation thereof automatically upon expiration of the delay period of said delay means should said control means fail to effect such reverse operation.

BART A. HOGEBERG.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,051,253	Goehler et al. -----	Aug. 18, 1936
2,335,280	Hogeborg -----	Nov. 30, 1943
2,520,952	Mozel -----	Sept. 5, 1950