Aug. 9, 1960 R. F. KOENER 2,948,536

GOLF TEE

Filed April 25, 1955 4 Sheets-Sheet 1

Fig. 1.

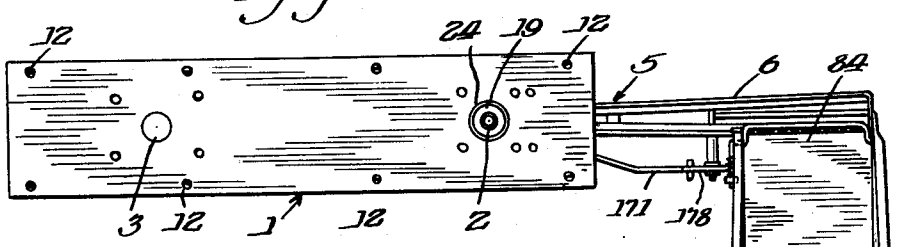


Fig. 7.

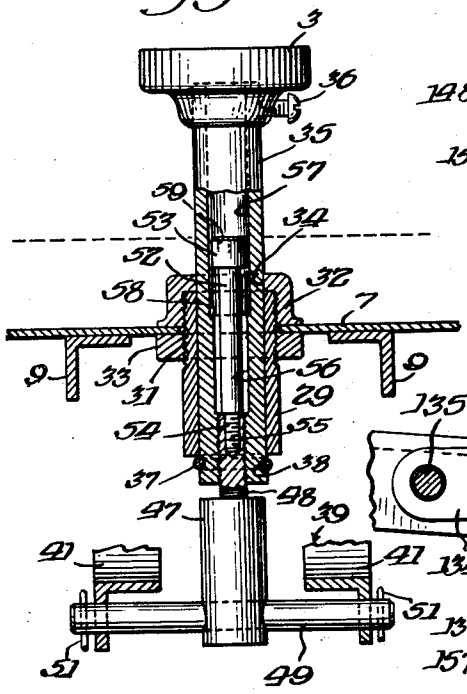
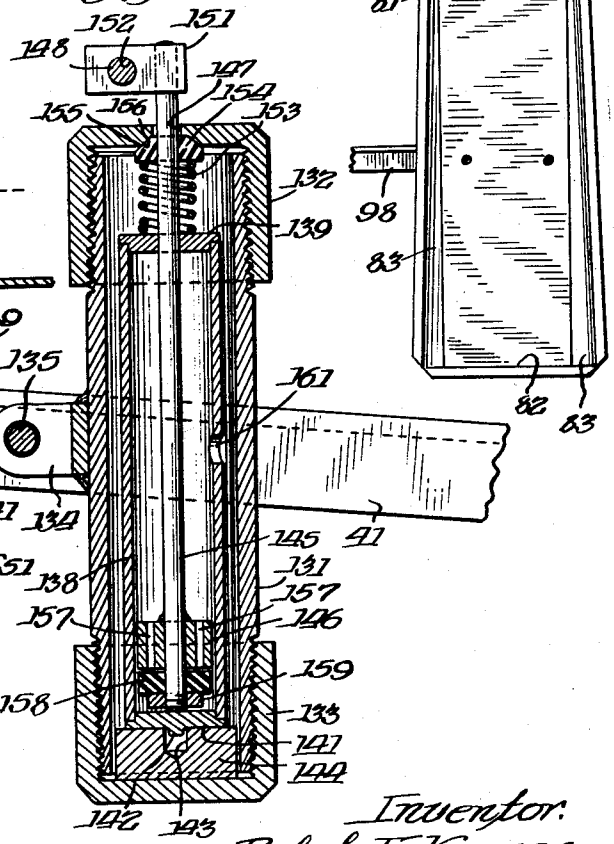


Fig. 6.



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GOLF TEE

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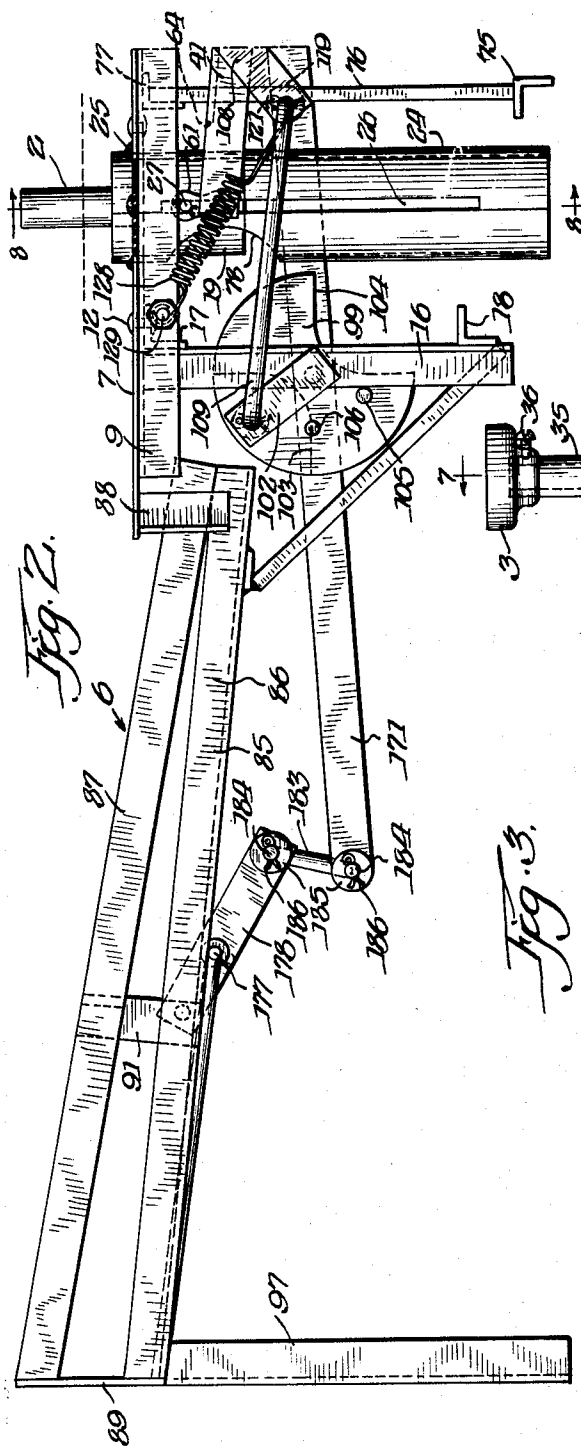


Fig. 2.

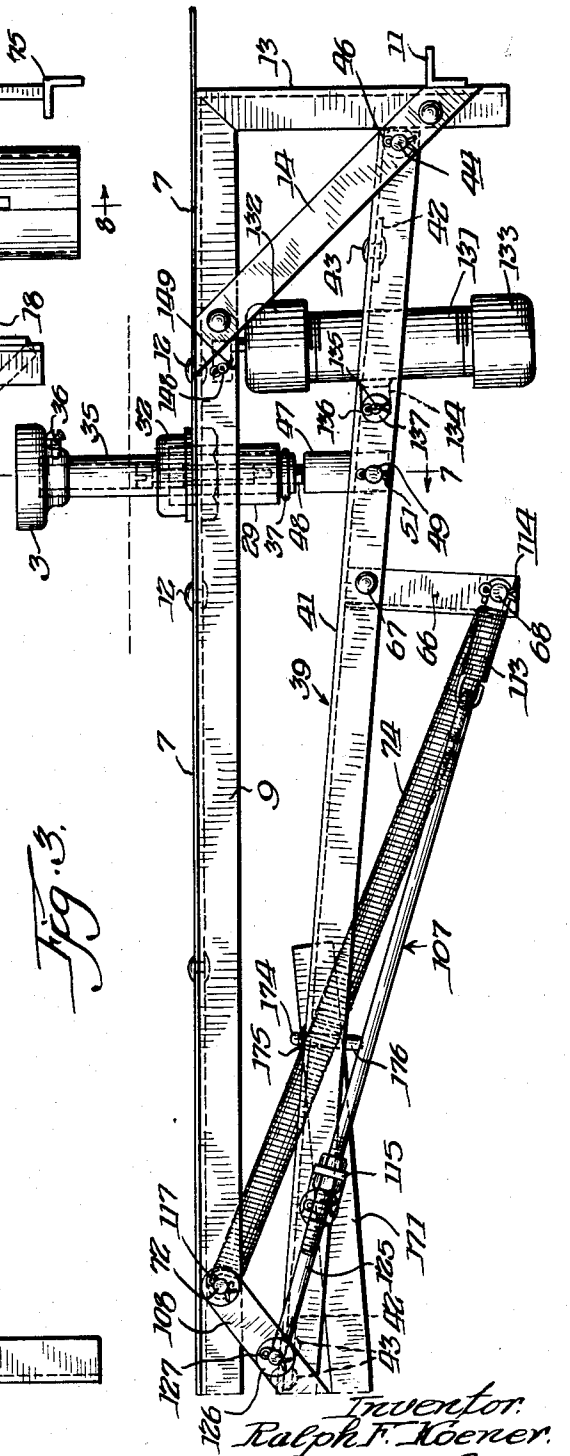


Fig. 3.

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GOLF TEE

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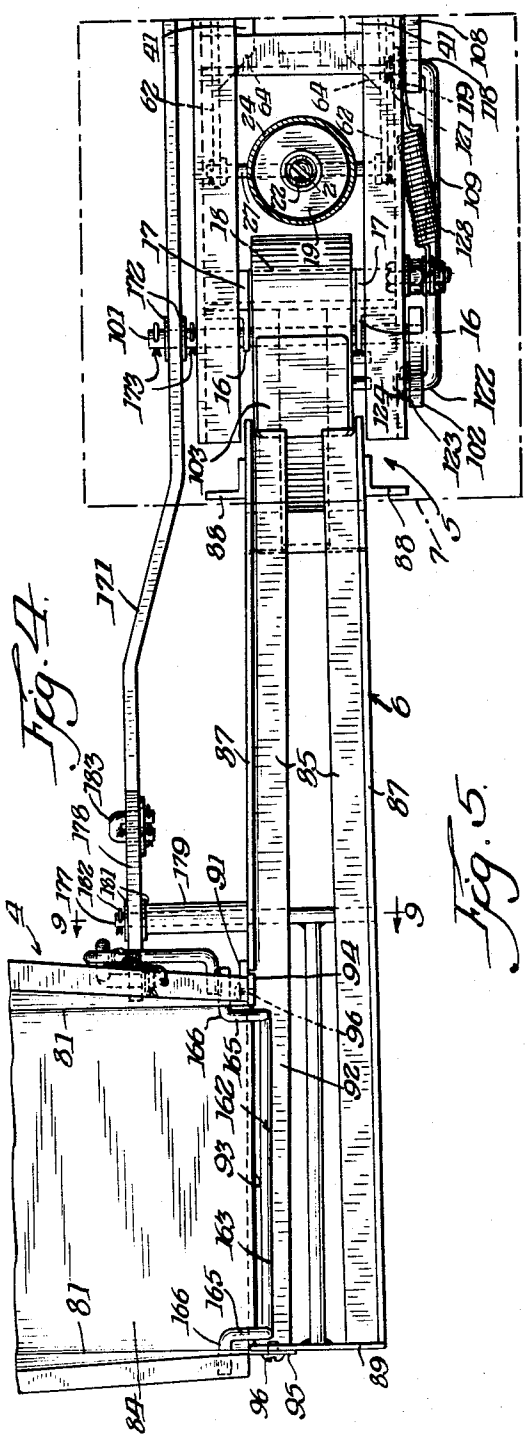


Fig. 4.

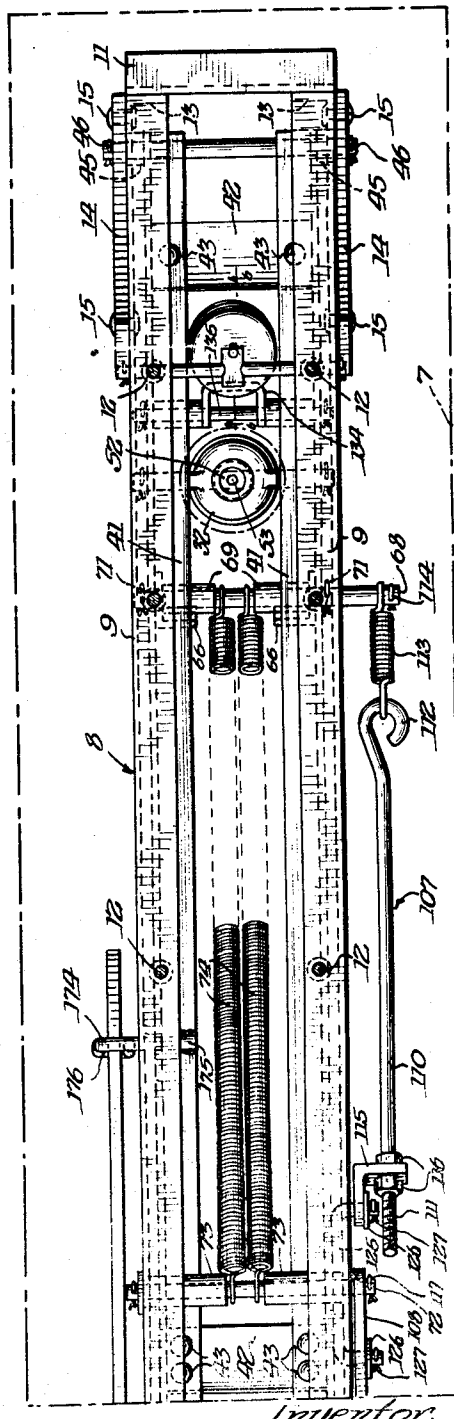


Fig. 5.

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Fig. 8.

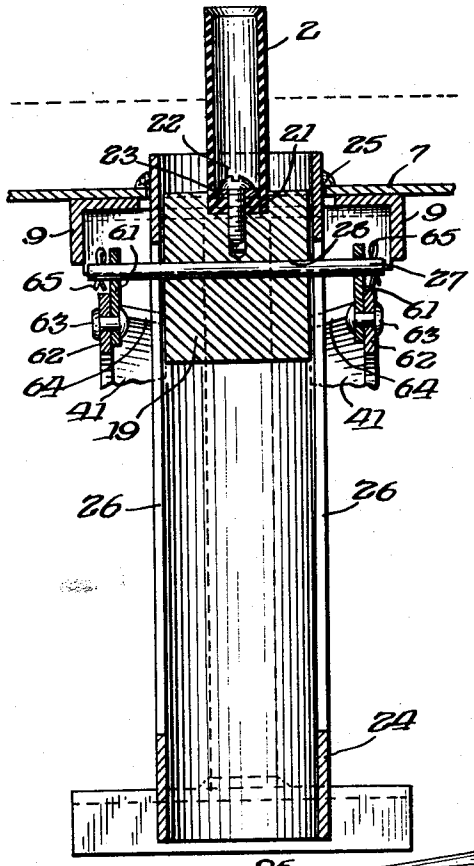


Fig. 10.

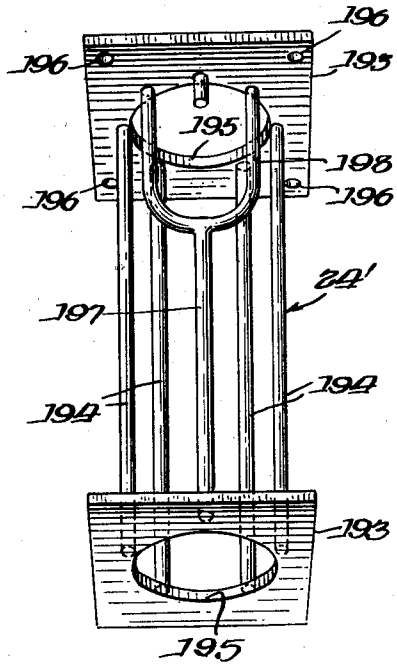
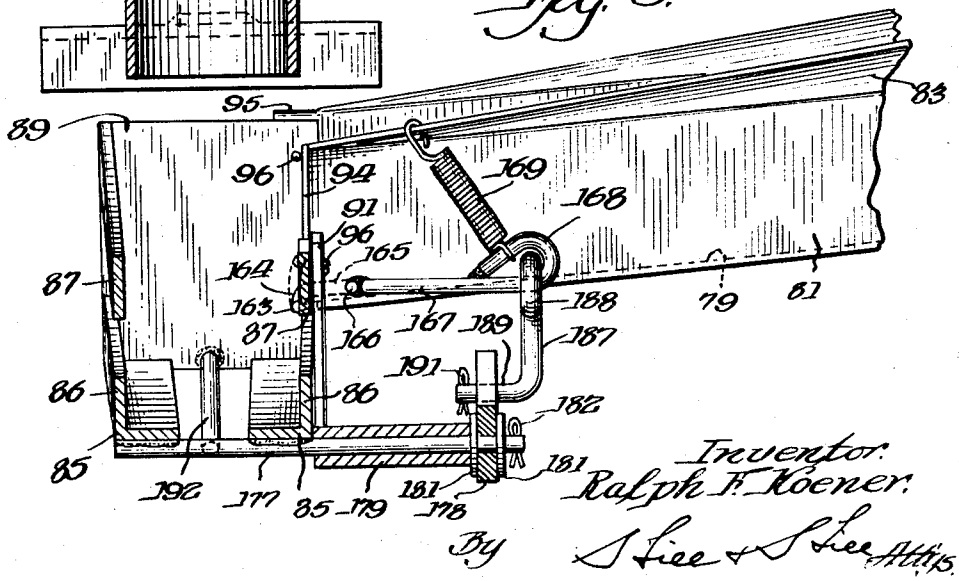


Fig. 9.



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GOLF TEE

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Filed Apr. 25, 1955, Ser. No. 503,431

8 Claims. (Cl. 273—201)

The invention relates generally to golf ball teeing mechanisms and particularly to a tee for successively teeing balls from a hopper or magazine under the control of the operator or user.

Many different types of golf teeing devices have been constructed, such devices being designed for use on golf practice ranges and similar golf practice or instruction establishments. However, while the problem of successively discharging golf balls from a hopper or the like and depositing the same on a suitable tee would appear to be a comparatively simple one, prior types of tees have not proved entirely satisfactory. In a large number of installations tees of this type are installed in outdoor driving ranges where they are exposed to the elements, and as the devices often are quite complicated, having a considerable number of moving parts many of which are small, rust and dirt often render the same inoperative. Obviously machines of this type are also subjected to severe usage and abuse during operation.

Another difficulty in the design of machines of this type has been the tendency of the balls to jam in the machine either in the hopper, resulting in failure to feed into the teeing mechanism, or in the teeing mechanism itself, particularly where the actuation of the machine is repeated when a ball fails to initially feed into the teeing mechanism.

The present invention has among its objects the production of a golf teeing mechanism which satisfactorily solves the problems referred to and which is very simple in construction, positive and dependable in operation and relatively foolproof, whereby the operation of the machine is predictable and efficient.

Another object of the invention is the production of a machine having such advantages which while comparatively small and compact, having a minimum of moving parts, eliminates all delicate mechanism and utilizes comparatively heavy and durable parts which will readily withstand the stresses to which they may be subjected, resulting in a machine that will efficiently perform over long periods with substantially no maintenance other than possibly an occasional oiling.

Another object of the invention is the production of a machine having the above advantages which also provides a simple adjustment for the height of the golf tee, which adjustment may be readily accomplished by the operator.

A further object of the invention is the production of such a golf tee having novel feed means for insuring feeding of the golf balls from the hopper or supply container and the discharge of only a single golf ball into the teeing mechanism, thereby eliminating any possibility of the discharge of more than one ball into the teeing mechanism and consequent jamming thereof.

A further object of the invention is the production of novel hydraulic check means for insuring the proper action of the tee following the depositing of a golf ball thereon, which check means is simple in construction and very durable and efficient in operation, whereby failures of the teeing mechanism as a result of faulty operation of the check means are substantially completely eliminated and maintenance accordingly reduced.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosures herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts:

Fig. 1 is a top plan of a teeing mechanism embodying the invention;

Fig. 2 is a side elevational view of the hopper end of the machine;

Fig. 3 is a side elevational view of the remainder of the machine and forms a continuation of Fig. 2;

Fig. 4 is an enlarged plan view of that portion of the machine illustrated in Fig. 2, with the top plate removed;

Fig. 5 is an enlarged top plan view of the remainder of the machine and forms a continuation of Fig. 4;

Fig. 6 is a sectional view through the hydraulic check means taken approximately on the line 6—6 of Fig. 5;

Fig. 7 is a sectional view through the manually engageable actuating structure taken approximately on the line 7—7 of Fig. 3;

Fig. 8 is a sectional view of the ball teeing mechanism taken approximately on the line 8—8 of Fig. 2;

Fig. 9 is a sectional view through the feed trough taken approximately on the line 9—9 of Fig. 4; and

Fig. 10 is a perspective view of a tee and ball guide member of slightly modified construction.

Referring to Figs. 1 to 5, the golf tee mechanism illustrated includes a generally horizontaly extending base or body structure, indicated generally by the numeral 1, forming supporting means for the mechanism and having a retractable tee member 2 adapted to receive and support a golf ball in proper position to be struck by a golf club, a manually actuatable pedal member 3 by means of which the tee mechanism may be actuated, a hopper indicated generally by the numeral 4 adapted to receive a supply of golf balls, and a ball delivery mechanism indicated generally by the numeral 5 and including a delivery chute 6. The body member 1 and mechanism carried thereby is adapted to be mounted below a tee surface indicated by dotted lines in Figs. 2 and 3, whereby only the pedal member 3 and tee member 2 extend thereabove. The physical details of the golf tee with which the present invention may be employed form no part of the invention and may be of any suitable construction such as those presently employed, some of which embody rubber mats and the like.

In the embodiment of the invention illustrated the body member 1 comprises a rectangular shaped plate 7 having a rectangular shaped frame structure 8 depending from the plate 7 and having longitudinally extending members 9 arranged in spaced parallel relation, connected at one end by an end member 11, the members 9 and 11 formed from angle iron stock, with the members 9 illustrated as being secured to the plate 7 by a plurality of rivets 12. As illustrated in Fig. 3, the end or cross member 11 is secured to downwardly depending portions 13 of the members 9, the structure being reinforced by diagonally extending brace members 14 having their ends connected to the respective elements of the frame structure, those illustrated being secured by rivets 15. The opposite end of the frame structure is provided with a pair of downwardly depending supporting members 16 each having their upper ends connected to one of the frame members 9 by suitable means, which in the present embodiment of the invention includes rein-

forcing angle members 17. The lower ends of the members 17 may be connected by a cross member 18.

As illustrated in Fig. 2, the tee 2 adapted to receive and support the golf balls comprises a flexible tubular member formed from rubber or similar material which is mounted on a cylindrical block or member 19, the member 2 being seated in a counter-bore 21 in the block 19 and secured by a screw 22 passing through a washer 23 and threaded into the block 19. The latter is supported for vertical travel in a vertically extending tubular guide member 24 extending through an opening in the plate 7 and secured thereto by any suitable means such as welding 25. As illustrated in Figs. 2 and 8, the member 24 is provided with a pair of longitudinally extending diametrically positioned slots 26 which are adapted to receive a rod 27 which extends through a bore 28 in the block 19, the slots 26 being so disposed that the rod 27 extends transversely with respect to the frame members 9. With this construction the block 19 and tee 2 may be moved along a vertical axis from an elevated position as illustrated in Fig. 8 to a fully retracted position within the member 24.

Retraction and extension of the tee member 2 and associated elements is accomplished by suitable mechanical connections between the pedal 3 and the block 19. The pedal structure, including the member 3, comprises a tubular body or housing member 29 which is threaded at its upper end as indicated at 31 and secured to the plate 7 by an internally threaded cap 32 positioned at the exterior face of the plate 7 and a lock nut 33 positioned below the plate. The cap 32 is provided with a bore 34 therein of approximately the same size as the internal diameter of the member 29, and extending through both of the members is a tubular member 35 carrying the pedal 3 at its upper end, the latter being locked in operative position by a set screw 36, the member 35 being vertically movable in the member 29. Withdrawal of the member 35 is prevented by suitable means such as a snap ring 37 seated in an annular groove 38 formed in the lower end of the member 35, and adapted to engage the lower end of the housing 29 upon full upward travel of the pedal member 3 and member 35.

Pivotally carried by the supporting frame structure is suitable linkage means illustrated as including a member indicated generally by the numeral 39 formed from suitable angle stock having spaced parallel members 41 connected by a pair of cross members 42 illustrated as being secured to the members 41 by rivets 43. As illustrated in Figs. 3 and 5, the member 39 is pivotally mounted on the supporting frame structure by a pin 44 extending through the members 14 and the adjacent ends of the members 41, washers 45 being interposed between each member 14 and the member 41, the pin 44 being rotatable in operative position by any suitable means, as for example, cotter keys 46.

The pivoted linkage means, including the member 39, is operatively connected to the tubular member 35 and pedal 3 by a connecting member 47 having a threaded shank 48 threaded into the adjacent end of the tubular member 35, the member 47 in turn being connected to the members 41 by a pin 49 extending through the adjacent members 41, as clearly illustrated in Fig. 7, and secured in operative position by suitable means such as cotter keys 51. As the member 35 is free to be rotated in the housing 29, the effective length of the structure comprising the members 35 and 47 may be varied, and as the outward movement of the member 35 is restricted by the stop ring 37 by rotation of the member 35 relative to the shank 48, the pin 49 and thus the upper limits of rotation of the linkage 39 may be adjusted. Such adjustment, as hereinafter discussed in detail, is operative to vary the height of the tee member 2 above the plane surface, and to achieve the desired adjustment of the tee member, a relatively small amount of travel between the members 35 and 47 will effect the desired tee adjustment.

Restriction of the relative movement of the members 35 and 47 to that necessary to give the desired tee travel may be accomplished by suitable means which comprises a stud screw 52 formed with a head 53 at its upper end and a threaded shank 54 at its lower end which is threaded into a bore 55 in the shank 48. Referring to Fig. 7, the member 35 is provided with a series of coaxial bores, the bore 56 being of a size to permit relatively free movement of the stem of the screw 52, while the bore 57 is of a size to receive the head 53 of the screw. As the bore 57 is of larger diameter than the bore 56, a shoulder 58 is formed at their juncture, the shoulder being adapted to engage the head 53, thereby restricting movement of the adjustment between the members 35 and 47. The head 53 of the screw may be provided with a suitable tool engaging opening 59 adapted to receive the end of a tool inserted in the upper end of the member 35.

Referring to Figs. 2 and 8, the ends of the members 41 adjacent the tee guide 24 are operatively connected with the pin 27 by respective links 61 which are pivotally connected to the vertically extending walls 62 of the members 41 by rivets 63, the horizontally extending walls of the members 41 terminating at a point spaced from the adjacent free ends of the members as indicated at 64. Cotter keys 65 or other suitable means on the pin 28 prevent disengagement of the links 61 therefrom. The rivet connections 63 between the members 41 and links 61 are such as to permit a pivotal movement of each link with respect to its associated member, so that the construction is free to adjust itself during actuation of the respective elements, eliminating any tendency of the parts to stick or bind and compensating for any variations resulting from manufacturing tolerances.

Extending downwardly from an intermediate portion of the members 41 is a pair of supporting members 66 rigidly secured by suitable means, as for example rivets 67 or welding to the frames 41, the member 66 being connected adjacent their lower ends by a pin 68 having a pair of spacer sleeves 69 thereon, the pin being retained in operative position by suitable means, which in the present instance includes a pair of cotter keys 71. Extending between the frame members 9 is a similar pin 72 having a pair of spacing washers 73 thereon, the pins 68 and 72 providing anchoring means for a pair of springs 74, the latter being operative to bias the linkage structure 39 in an upward or clockwise direction about the pin 44 as viewed in Fig. 3. It will be appreciated that with the structure thus far described the springs 74 bias the tee 2 and associated elements and the pedal 3 and associated elements in an elevated or raised position as shown in Figs. 2 and 3. Likewise as the pedal 3 and member 35 are rotated in a direction to extend the shank 48 therefrom, such movement of the latter will result in the downward movement of the member 47, pin 49 and members 41 about the pivot pin 44, thereby moving the pin 28, block 19 and tee 2 downwardly into the member 24. Similarly by depressing the pedal 3, as for example by stepping on the same, the members 41 may be moved downwardly to completely retract the block 19 and tee 2 within the tubular member 24. Such downward movement of the members 41 and related structure may be limited by any suitable means, as for example a transversely extending stop bar 75 which depends from a hanger strap 76 secured to an anchor shaped cross member 77 secured to the frame structure, the stop member 75 being positioned in the path of the members 41, thus preventing further downward movement of the latter.

As illustrated in Fig. 2, the guide member 24 is provided with an opening 78 in the side wall thereof of a size to permit the free passage of a golf ball into the member 24. It will be apparent from a reference to Fig. 2 that such passage of a golf ball can take place only when the block 19 and tee 2 are in a retracted position

below the opening 78, whereby the ball may be positioned upon the tee, and when the structure is in the position illustrated in Fig. 2, the block 19 is positioned in the opening 78. A supply of balls may be put into the hopper 4 and successively delivered to the tee 2 by suitable delivery mechanism indicated generally by the numeral 5 which is operatively connected to the pedal 3, whereby actuation of the latter retracts the tee member 2 and upon delivery of a ball to the tee member, the latter may be returned to its elevated position.

The details of the hopper and delivery mechanism are illustrated in Figs. 2, 4 and 9, and as shown the hopper 4 may be suitably formed from sheet metal or the like having a bottom 79, side walls 81 and end wall 82. If desired the walls 81 may be outwardly flared as indicated at 83. The hopper 4 is provided with an open end 84 and is operatively connected to the body structure 1 by the prismoidal shaped delivery shute 6 formed by a pair of longitudinally extending lower members 85 formed from angle stock, positioned with their outer walls 86 extending upwardly and cooperating with a second pair of members 87 formed from strap stock, each pair of members 86 and 87 forming one of the side walls of the trough being secured to respective downwardly depending angle members 88 rigidly connected to the body 1. The lower members 85 are coextensive in length and are connected at their free ends by an end plate 89. The wall member 87 adjacent the hopper 4 terminates at adjacent the hopper 4 and is connected to the cooperable member 85 by a strip 91, while the other member 87 extends to the end wall 89. The respective elements of the trough 6 may be secured together by any suitable means, as for example welding or the like. The side wall 86 of the member 85 adjacent the hopper 4 extends from the securing member 88 to approximately the member 91, with only the bottom wall 92 of such member 85 extending adjacent the hopper, this construction in effect forming a lateral opening in the side wall of the trough adapted to receive the front edge or lip 93 of the hopper.

As illustrated in Figs. 4 and 9 the side walls 81 of the hopper are provided at the open end of the latter with flanges 94 and 95, the flange 94 extending substantially at right angles to its associated side wall and adapted to be engaged with the member 91 of the trough, while the flange 95 extends in the same direction as its associated side wall and is adapted to be seated on the end wall 89 of the trough and may be connected thereto by any suitable means, as for example screws 96 or the like. As illustrated in Fig. 2, the trough 6 is inclined upwardly from its connection with the members 88 toward the end wall 89, the hopper being positioned transversely relative to the trough and also inclined upwardly from its connection therewith. The trough 6 may be additionally supported by a suitable downwardly depending leg member 97 and in like manner the hopper may be provided with a suitable supporting structure 98, the details of which will depend to a certain extent on the particular installation.

Referring to Figs. 2 and 4, carried by the depending members 16 of the frame structure is a generally cylindrical ball delivery drum 99, the latter being carried on a transversely extending shaft 101 which extends through openings in the members 16, the drum being rotatable with the shaft. Rigidly mounted on one end of the shaft 101 is an arm 102 by means of which the drum 99 may be rotated through a desired arc. The drum 99 is provided with a more or less V-shaped notch or recess 103 of a size to receive a golf ball, and if desired the diametrically opposite portion of the drum 99 may be cut away as indicated at 104 to balance the drum structure with respect to its axis. The amount of rotation or oscillation of the drum may be determined by two stops 105 and 106 extending outwardly from a side face of the drum as illustrated in Figs. 2 and 4, the pins adapted

to engage the adjacent frame member 16 in the respective extreme positions of the drum. In the extreme position illustrated in Fig. 2, wherein the stop pin 105 of the drum is in engagement with the frame member 16, the recess 103 in the drum is in ball receiving position adjacent the end of the trough 6, and when the drum is rotated to the other extreme position with the pin 106 in engagement with the member 16, the recess 103 is positioned opposite the opening 78 in the guide member 24, in which position a ball carried by the drum in the notch 103 would tend to roll out of the drum into the guide member 24, such movement being prevented by the guide block 19 when the latter is in an elevated position as illustrated in Fig. 2.

The drum 99 is operatively connected to the actuating linkage associated with the pedal 3 by an adjustable spring biased link assembly indicated generally by the numeral 107, a pivotal arm 108 and a link 109 operatively connected to the arm 102. As illustrated in Figs. 3 and 5, the link assembly 107 comprises an elongated rod 110 which is threaded at one end as indicated at 111 and provided with an eye 112 at the opposite end, the link being operatively connected to the pin 68 by a spring 113, the latter having one end portion passing around the pin 68 and the other engaged with the eye 112. Disengagement of the spring 113 with the pin 68 is prevented by suitable means such as a cotter key 114. Adjustably mounted on the threaded end 111 of the rod 110 is an angle member 115 through which the link 110 passes, the member 115 being locked in any adjusted position along the link by suitable lock nuts 116. As illustrated in Fig. 3, the arm 108 is pivotally mounted on the pin 72, disengagement of the arm therewith being prevented by suitable means such as a cotter key 117. The opposite free end of the arm 108 is provided with a bore therein through which the adjacent transversely extending end 118 of the link 109 extends, the latter being retained in operative relation by a washer 119 and cotter key 121, the opposite transversely extending end 122 of the link 109 passing through an opening in the arm 102 and operatively secured thereto by suitable means such as a washer 123 and cotter key 124.

The member 115 carried by the rod 110 of the link assembly 107 is operatively connected to the arm 108 by a rod-like link 125, the ends of which are bent transversely to the axis of the link and extend through respective holes in the member 115 and the intermediate portion of the arm 108 as illustrated in Figs. 3 and 5, the link 125 being maintained in operative position with respect to its cooperable elements by suitable means such as washers 126 and cotter keys 127. The drum 99 and associated linkage is operatively biased in delivery position as illustrated in Fig. 2 by a spring 128, one end of which is operatively connected to the end 118 of the link 109 and the opposite end of which is connected to a suitable stud or pin 129 carried by the adjacent frame member 9. As hereinafter described in detail in connection with the operation of the machine, the linkage associated with the drum 99 is operable to rotate the drum from a ball receiving position to a ball delivery position when the pedal 3 is depressed, such action of the pedal also resulting in retraction of the tee 2 into the member 24 to a position for receipt of the ball from the drum.

As the return action of the tee 2 to the elevated position illustrated in Fig. 2 is accomplished by the action of the springs 74, returning the linkage 39 to its elevated position, which spring action would result in a rapid and sharp return action which would tend to project the ball up in the air and consequently off of the tee, means for damping the return action is provided, such damping means being illustrated in detail in Fig. 6, wherein the reference numeral 131 indicates an outer cylinder adapted to be closed by an upper cap 132 and a lower cap 133 illustrated as being threaded on the cylinder 131. As illustrated in Fig. 3, the outer cylinder 131 is provided

with a radially extending lug or bale 134 supported on a pin or rod 135 which is supported between the frame members 41, the rod being maintained in operative position by suitable means such as cotter keys 136 and washers 137, the cylinder 131 being free to pivot about the axis of the rod 135.

Positioned in the cylinder 131 is an inner spring biased cylinder 138 having upper and lower end members 139 and 141, respectively, the end member 141 having an axially extending downwardly depending boss 142 thereon positioned in a bore 143 of a cylinder stop member 144 seated on the lower cap 133. Carried by the rod 145 is a piston 146, the piston rod extending upwardly through an opening in the end member 139 and from the cylinder through an opening 147 in the upper cap member 132. The free end of the piston rod 145 is operatively secured to the frame structure by a pin 148 extending between the frame members 9 and maintained in operative position by cotter keys 149, the piston rod being operatively connected to the pin 148 by a generally cylindrical lug 151 rigidly secured to the rod 145 and having a bore 152 therein through which the pin 148 extends. The inner cylinder 138 is biased downwardly as viewed in Fig. 6 into engagement with the member 144 by a spring 153 which encircles the rod 145, bearing at its lower end on the end member 139 and at its upper end on an annular sealing member 154 of semi-resilient material, the member 154 and the inner face of the cap 132 having cooperable conical shaped seats 155 and 156, respectively. Thus the spring 153 performs the dual function of biasing the cylinder 138 and applying a sealing force to the seal 154 to effectively prevent the flow of hydraulic fluid through the opening 147 in the cap 132.

As illustrated in Fig. 6, the piston 146 is provided with a plurality of bores 157 which are radially disposed and extend parallel to the axis of the piston rod 145. Also carried by the rod 145 adjacent the lower face of the piston 146 is a valve member 158 of suitable material and retained on the rod 145 by suitable means such as a nut 159 threaded on the end of the rod. The entire structure is filled with a suitable hydraulic fluid, as for example, of the type used in the hydraulic brakes of vehicles, the inner cylinder 138 being provided with a hole 161 in the side wall thereof for the passage of fluid into the cylinder 138.

The valve member 158 is so related with respect to the adjacent face of the piston 146 that the valve member is free to move downwardly a slight distance to expose the adjacent ends of the bores 157 or may move up into sealing engagement with the face of the piston, operatively closing such bores. The degree of damping action of this structure is controlled by the difference in the internal diameter of the cylinder 138 and the external diameter of the piston 146, while the bores 157 and valve structure 158 provide a fast return action of the piston in one direction so that the damping action takes place only in a single direction of the piston. In operation, assuming the piston is at the lower end of its travel as illustrated in Fig. 6, as the piston rod 145 is withdrawn, thus raising the piston, fluid is free to flow between the piston and the side wall of the cylinder 138 and also through the bores 157 and between the piston and the valve member 158 into the lower part of the cylinder. As a result, the rod 145 and piston 146 may be readily moved upwardly with comparatively little resistance or damping action. However, upon initial return movement of the rod and piston fluid pressure at the bottom of the cylinder 138 will urge the valve 158 into sealing engagement with the adjacent face of the piston, closing the bores 157 so that all fluid must pass between the piston and the cylinder, the rate of flow being governed by the relative diameters defining the clearance therebetween. Such clearance may be readily proportioned to provide the proper damping action in the actuating linkage of the tee, whereby the pedal 3 and actuating structure may be readily depressed, but upon release of the pedal the tee 2 and associated mechanism will slowly return to the position illustrated in Fig. 2 under the action of the springs 74 and the damping mechanism. It will be noted that the floating construction of the cylinder 138 and the piston eliminates the necessity of extremely close tolerances in the fabrication of the device, the main dimension being the clearance between the piston 146 and the cylinder 138. Consequently irrespective of the usual manufacturing tolerances, the structure may be readily assembled and as the elements are in effect floating in the hydraulic fluid, all possibility of binding or sticking is eliminated.

To insure proper feeding of balls from the hopper 4 into the trough 6, mechanically actuated means is provided for releasing balls positioned in the trough 6 from engagement with the balls in the hopper 4, whereby the balls in the trough are free to roll down to the delivery drum 99. Such means, as illustrated in Figs. 4 and 9, comprises a generally U-shaped member indicated by the numeral 162 having a horizontally extending portion 163 adapted to be positioned adjacent the lip 93 of the hopper 4, the top surface of the portion 163 positioned approximately in or slightly below the plane of the bottom 79 of the hopper. As illustrated in Figs. 4 and 9, the member 162 extends upwardly at each end as indicated at 164 and laterally toward the hopper as indicated at 165, terminating in axially aligned portions 166 extending substantially parallel to the portion 163, the portions 166 extending through and pivotally supported by the side walls 81 of the hopper. Rigidly secured to the portion 166 of the member 162 at the side wall 81 adjacent the body structure 1 is an arm 167, the free end of which terminates in an eye 168 with a spring 169 connected to the eye 168 and the hopper, and operative to bias the arm 167 and member 162 in the position illustrated in Figs. 4 and 9. Pivotally mounted on the shaft 101, which carries the drum 99, is a lever member 171, the latter being secured against axial movement along the shaft 101 by suitable means such as a pair of washers 172 and cooperable cutter keys 173.

As illustrated in Figs. 3 and 5, the arm 171 extends toward the pedal 3 to the adjacent member 41 and is operatively connected thereto through a lost motion connection which comprises a laterally extending member 174 which is rigidly connected to the adjacent member 41 by welding or other suitable means as indicated at 175, the free end of the member being looped to form an eye indicated generally by the numeral 176. The arm 171 is thus free to slide axially in the eye 176, the latter being operative as the linkage 139 is pivoted about the pin 44 to rotate the arm 171 about its pivotal connection on the shaft 101. Thus as the linkage 39 is pivoted in a downward direction, the adjacent end of the arm 171 is likewise pivoted downwardly, while the opposite end of the arm is pivoted upwardly. Pivotally supported on a rod 177 carried by the members 85 of the trough 6 is an arm 178, the latter extending in opposite directions from its pivotal axis as illustrated in Fig. 2. The rod 177 is secured by welding or other suitable means to the members 85 and the arm 178 is maintained in the desired axial position on the rod by a spacer 179, the arm being retained on the rod by washers 181 and a cotter key 182. As illustrated in Fig. 2, the free end of the arm 171 is operatively connected to the arm 178 by a U-shaped link 183 formed from rod stock, having paralleling end portions 184 extending respectively through the free end of the arm 171 and the adjacent free end of the arm 178, the link being maintained in operative position by washers 185 and cotter keys 186. The opposite end of the arm 78, as illustrated in Fig. 9, is operatively connected to the arm 167 associated with the ball engageable member 162 by a link 187 having a cooperable eye 188 engageable with the eye 168

and provided at its opposite end with a transversely extending portion 189 extending through the arm 178 and retained in operative position by cotter key 191. The trough 6 is also provided with a longitudinally extending rod 192 secured at one end to the end wall 89 and at the opposite end to the rod 177 and, as illustrated in Fig. 2, the end of the rod 192 adjacent the end wall 89 is elevated above the plane of the trough bottom so that the rod tends to urge balls engaged therewith toward one side or the other of the trough.

The operation of the entire structure may be briefly described as follows: Assuming the hopper 4 is filled with balls and the mechanism is in the position illustrated in Figs. 2, 3, 4, 5, 8 and 9, the balls will readily roll over the agitator and releasing member 162 into the trough 6, down the latter to the delivery drum 99 which, being in the position illustrated in Fig. 2, is adapted to receive the foremost ball in the recess 103, such ball preventing a further flow of balls toward the drum. As the pedal 3 is depressed the linkage 39 begins to pivot downwardly about the pin 44, carrying with it the block 19 and tee 2, at the same time moving the cylinder 131 of the damping means and associated parts downwardly relative the piston rod 145 and piston 146, such damping means operating as previously described, whereby the latter exerts substantially no resistance to the described movements of the actuating linkage. As the linkage assembly 39 moves downwardly, which action is resisted by the springs 74, movement of the downwardly depending members 66 carried by the members 41 also results in the application of tension forces on the spring 113 and movement of the linkage 107 which in turn is operable to rotate the arm 108 downwardly about its pivotal connection with the pin 72. As will be apparent from a reference to Fig. 2, the rotation of the arm 108, which is resisted by the spring 128, will result in rotation of the arm 102 in a clockwise direction and with it the shaft 101 and drum 99. As the drum 99 begins to rotate the ball positioned in the recess 103 of the drum is transported to the member 24, the circumferential portion of the drum adjacent the stop pins 105 and 106 operatively engaging the next ball in the trough 6 and preventing any further feeding movement of the balls in the trough. As the block 19 and tee 2 are retracted to a position below the opening 78 the drum 99 completes its rotation into ball delivery position and the ball is thus free to roll from the recess 103 through the opening 78, into the member 24, resting upon the upper end of the tee 2. The relation of the parts is so determined that the top of the tee 2 is positioned below the edge of the opening 78 a distance merely sufficient to insure proper positioning of the ball on the tee, which under normal conditions is approximately not greater than a quarter of an inch. At the same time that these operations take place the downward rotation of the members 41, as a result of the connection thereof with the arm 171, results in rotation of the latter, moving the free end thereof to which the arm 178 is operatively connected upwardly as viewed in Fig. 2, which in turn is operative to move the opposite end of the arm 178 downwardly and with it through the link 187 the arm 167 connected to the ball releasing and agitating member 162. Such action is operative to rotate the portion 163 of the member 162 in a clockwise direction as viewed in Fig. 9 about the axis of the portions 166, so that the portion 163 of the member describes an arc approximating that indicated in dotted lines in Fig. 9, and it will be noted that the initial rotation of the portion 163 is outwardly into the trough as well as upwardly, continuous movement resulting in the rotation of such portion in the opposite direction. With this action the portion 163 in effect tends to reach out and up into engagement with the supply of balls, moving the balls upwardly and rearwardly into the hopper, such movement being relatively slight but sufficient to release the balls in the trough and insure that the latter will roll down into feeding position adjacent the delivery drum 99. Such outward action of the member 162 tends to move the balls in the trough outwardly or to the left as viewed in Fig. 9, the rod 192 cooperating therewith to insure freedom of the balls in the trough.

Upon release of the pedal 3 the return movement of the linkage assembly 39 and cooperable parts is controlled by the action of the damping means, the springs 74 supplying the motivating return force. The actuating elements slowly return to their original positions, the ball being elevated on the tee 2. As the block 19 and tee 2 move upwardly, the delivery drum 99 returns to its receiving position illustrated in Fig. 2, and the releasing and agitating means associated with the hopper return to their illustrated positions. If by any chance the pedal is again depressed prior to the removal of the first ball from the tee, depression of the pedal will result in the retraction of the tee structure as previously described, the tee carrying the first ball with it, at the same time the next ball which was delivered into the drum upon the return of the latter to receiving position, will be carried to a delivery position in the same manner as was the first ball. The latter will prevent the second ball from entering the member 24, and as the pedal is released the parts will return to their original positions, the drum 99 carrying the second ball with it and the tee again elevating the first ball. It will be noted that if the tee 2 with a ball thereon were to be depressed too far below the opening 78 during the sequence of operations described, the second ball upon arriving in delivery position would partially enter the opening 78, such second ball being positioned above the first ball, resulting in wedging of both balls in the guide member 24. However, by properly positioning the stop member 75 which determines the amount of travel of the members 41, the fully depressed position of the tee 2 may be properly determined.

After the ball has been properly teed on the member 2 the golfer may raise or lower the ball with respect to the playing surface by turning the pedal 3 in the proper direction. Referring to Fig. 3, it will be apparent that as the pedal 3 is turned in a direction to extend the member 47 with respect to the member 35, the entire operating linkage 39 and with it the block 19 and tee 2 will be moved downwardly, while the rotation of the pedal 3 in the opposite direction will result in the elevating of such structure and with it the tee and ball. Consequently such adjustment may be easily made by the operator at any time. This adjustment does not restrict the full downward travel of the actuating mechanism. Proper correlation of the ball delivery drum 99 with the tee 2 may be readily effected by the adjustment of the connecting member 115 on the link 110. As the length of travel of the ball releasing member 162 is not critical, no adjustment thereof is required.

In connection with the adjustment of the pedal 3 to raise or lower the tee 2, a compartively small amount of extension of the member 47 with respect to the member 35 is required and the amount of adjustment to be incorporated in the machine may be readily changed by varying the length of the screw 52.

While I have illustrated the guide member 24 for the tee 2 and block 19 as being tubular in construction, the guide member 24 may be constructed as an open member, as for example the structure illustrated in Fig. 10, wherein the guide member 24' is formed from the pair of spaced parallel plate-like members 193 connected by a plurality of parallel rods 194 arranged around the circumference of a circle, the radial distance from the axis of such circle to the circumference of the rods being approximately equal to the interior radius of the member 24. The plates 193 are provided with openings 195 therein and the upper plate may be secured to the frame structure by suitable means, as for example bolts passing

through holes 196 formed in the upper plate. The guide member 24' is provided with a ball receiving opening formed by a rod 197 terminating at its upper end in a U-shaped portion 198 which provides an opening corresponding to the opening 78 in the member 24. With either of the constructions illustrated in Figs. 8 or 10 the guide member is open at the lower end whereby accumulation of foreign matter which might enter the guide member is free to pass through the same and cannot accumulate therein, so that the possibility of blocking of the guide member is eliminated.

It will be noted from the above disclosure that I have provided a comparatively simple, foolproof tee structure which may be readily adjusted by the operator to provide any desired tee height, which tee structure is very durable in construction to reduce maintenance problems to a minimum. It will also be noted that I have provided novel means for insuring delivery of balls to the tee as well as the proper feeding of the balls to the delivery means. I have provided a simple yet very efficient hydraulic damping or check structure for achieving uniformly efficient operation of the machine.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

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

1. A golf ball teeing apparatus comprising horizontal supporting means for mounting the apparatus substantially in the plane of the tee, said horizontal supporting means comprising a rectangular plate-like member, depending supporting means operatively supported below the plate-like member, teeing means operatively mounted at the forward end of the depending supporting means for vertical movement, operator-operated means operatively mounted on the depending supporting means in axial alignment with the teeing means and at the rear of the depending supporting means, said teeing means and said operator-operated means extending through the plate-like member, linkage means operatively connecting said operator-operated means and said teeing means and said linkage means being operatively mounted on said depending supporting means with the operator-operated means pivotally connected to the linkage means intermediate the pivotal connection of the linkage means and the pivotal connection of the teeing means to the linkage means, guide means for said operator-operated means depending from said depending supporting means, guide means for said teeing means operatively mounted on said depending supporting means, a support member depending from and affixed to said linkage means and positioned forward of the connection of the operator-operated means to the linkage means, spring means operatively connected at its lower end to the supporting member and at its upper end to the rear of the teeing means and operatively connected to the depending supporting means, whereby upon downward movement of the operator-operated means the teeing means is lowered and upon release of the operator-operated means the teeing means is biased upwardly, dampening means operatively mounted between the depending supporting means and the linkage means to the rear of the operator-operated means for dampening the return movement of the teeing means under the spring-biased action of the spring means, golf ball delivering means operatively mounted from the depending supporting means being movable into a position contiguous to the teeing means, said golf ball delivering means being movable into one position operative to receive a golf ball and into another position operative to deliver a golf ball to the teeing means, and linkage means operatively connected to the golf ball delivering means and to the depending supporting means and to the supporting member dependent from the linkage means whereby with the operator-operated means in its raised position permits delivery of a golf ball to the golf ball delivering means delivers a golf ball to the teeing means, and upon release of the operator-operated means the golf ball is delivered above the horizontal supporting means in its teed position, said operator-operated means comprising a vertically extending adjusting screw including a transverse member for pivotally mounting the operator-operated means on the linkage means, a tubular member in operative threaded engagement with the vertically extending adjusting screw, a pedal member operatively mounted on the upper end of said tubular member, said guide means for said operator-operated means comprising downwardly extending tubular support means detachably affixed to the rectangular plate-like member and operatively mounting the tubular member, an annular groove formed on the lower end of said tubular member, annular stop means mounted in the annular groove for limiting the upward movement of said operator-operated means, said tubular member formed with concentric openings, a stud means operatively mounted in said concentric openings and operatively affixed to said vertically extending adjusting screw, a head formed on said stud means complementally formed to the largest opening whereby said head forms a stop for limiting the outward movement of said tubular member with respect to the vertically extending adjusting screw, operation of the tubular member by rotation in one direction lowering the teeing means into any one of its positions from its highest setting to its lowest setting and upon operation of the operator-operated means in the lowest setting of the teeing means a golf ball within the golf ball delivering means is delivered to the teeing means, and upon operation of the tubular member by rotation in an opposite direction the teeing means is adjusted within the range from its lowest to its highest adjusted position, whereby upon operation of the operator-operated means a golf ball in the golf ball delivering means is delivered to the teeing means.

2. A golf ball teeing apparatus comprising horizontal supporting means for mounting the apparatus substantially in the plane of the tee, said horizontal supporting means comprising a rectangular plate-like member, depending supporting means operatively supported below the plate-like member, teeing means operatively mounted at the forward end of the depending supporting means for vertical movement, operator-operated means operatively mounted on the depending supporting means in axial alignment with the teeing means and at the rear of the depending supporting means, said teeing means and said operator-operated means extending through the plate-like member, linkage means operatively connecting said operator-operated means and said teeing means and said linkage means being operatively mounted on said depending supporting means with the operator-operated means pivotally connected to the linkage means intermediate the pivotal connection of the linkage means and the pivotal connection of the teeing means to the linkage means, guide means for said operator-operated means depending from said depending supporting means, guide means for said teeing means operatively mounted on said depending supporting means, a support member depending from and affixed to said linkage means and positioned forward of the connection of the operator-operated means to the linkage means, spring means operatively connected at its lower end to the supporting member and at its upper end to the rear of the teeing means and operatively connected to the depending supporting means, whereby upon downward movement of the operator-operated means and the teeing means is lowered and upon release of the operator-operated means the teeing means is biased upwardly, dampening means operatively mounted between the depending supporting means and the linkage means to the rear of the operator-oper-

ated means for dampening the return movement of the teeing means under the spring-biased action of the spring means, golf ball delivering means operatively mounted from the depending supporting means being movable into a position contiguous to the teeing means, said golf ball delivering means being movable into one position operative to receive a golf ball and into another position operative to deliver a golf ball to the teeing means, and linkage means operatively connected to the golf ball deliverying means and to the depending supporting means and to the supporting member depending from the linkage means whereby with the operator-operated means in its raised position permits delivery of a golf ball to the golf ball delivering means delivers a golf ball to the teeing means, and upon release of the operator-operated means the golf ball is delivered above the horizontal supporting means in its teed position, said golf ball delivering means comprises a cylindrical member, supporting means for the cylindrical member extending downwardly from the aforesaid depending supporting means, a transverse shaft for operatively mounting the cylindrical member with the axis of the transverse shaft and cylindrical member in alignment and in a plane parallel to the plate-like member, the cylindrical surface of the cylindrical member provided with an inwardly extending V-shaped notch to receive a golf ball, stop means operatively mounted on the cylindrical member for locating the aforesaid V-shaped notch in a golf ball receiving position, another stop means operatively mounted on the cylindrical member for positioning the V-shaped notch in its delivery position for delivering a golf ball to the teeing means, and said supporting means for the cylindrical member operatively positioned with respect to the aforesaid stop means for positioning the V-shaped notch as the operator-operated means is operated to lower the teeing means to deliver a golf ball thereto and to return the V-shaped notch to its golf ball receiving position to receive a golf ball upon successive operation of the operator-operated means, and the aforesaid linkage means operatively connecting the golf ball delivery means and the linkage means operatively connected to the operator-operated means rotating the cylindrical member to its golf ball delivering position as the operator-operated means is actuated and upon release of the operator-operated means the cylindrical member is rotated in operative direction to a golf ball receiving position.

3. A golf ball teeing apparatus comprising horizontal supporting means for mounting the apparatus substantially in the plane of the tee, said horizontal supporting means comprising a rectangular plate-like member, depending supporting means operatively supported below the plate-like member, teeing means operatively mounted at the forward end of the depending supporting means for vertical movement, operator-operated means operatively mounted on the depending supporting means in axial alignment with the teeing means and at the rear of the depending supporting means, said teeing means and said operator-operated means extending through the plate-like member, linkage means operatively connecting said operator-operated means and said teeing means and said linkage means being operatively mounted on said depending supporting means with the operator-operated means pivotally connected to the linkage means intermediate the pivotal connection of the linkage means and the pivotal connection of the teeing means to the linkage means, guide means for said operator-operated means depending from said depending supporting means, guide means for said teeing means operatively mounted on said depending supporting means, a support member depending from and affixed to said linkage means and positioned forward of the connection of the operator-operated means to the linkage means, spring means operatively connected at its lower end to the supporting member and at its upper end to the rear of the teeing means and operatively connected to the depending supporting means, whereby upon downward movement of the operator-operated means the teeing means is lowered and upon release of the operator-operated means the teeing means is biased upwardly, dampening means operatively mounted between the depending supporting means and the linkage means to the rear of the operator-operated means for dampening the return movement of the teeing means under the spring-biased action of the spring means, golf ball delivering means operatively mounted from the depending supporting means contiguous to the teeing means, said golf ball delivering means in one position operative to receive a golf ball and in another position operative to deliver a golf ball to the teeing means, linkage means operatively connected to the golf ball delivering means and to the depending supporting means and to the supporting member dependent from the linkage means whereby with the operator-operated means in its raised position permits delivery of a golf ball to the golf ball delivering means and upon the operator-operated means being lowered the golf ball delivering means delivers a golf ball to the teeing means, and upon release of the operator-operated means the golf ball is delivered above the horizontal supporting means in its teed position, an inclined golf ball delivery chute in axial alignment with the aforesaid operator-operated means and teeing means and golf ball delivering means, said golf ball delivery chute extending forwardly and inclined upwardly with respect to the golf ball delivering means, the lower end of said golf ball delivery chute extending beneath the forward end of the plate-like member and contiguous to the golf ball delivering means, said golf ball delivering means operatively mounted for rotation about a horizontal axis, said golf ball delivering means provided with a golf ball receiving notch, said notch adapted to receive a golf ball from the golf ball delivery chute, and upon operation of the operator-operated means the golf ball delivering means is rotated from its golf ball receiving means for delivering a golf ball to the teeing means and preventing delivery of a golf ball from the golf ball delivery chute until the golf ball delivering means is returned to its golf ball receiving position, said golf ball delivery chute being substantially prismoidal in shape forming a U-shaped trough with the lower end of the U-shaped trough permitting a golf ball to pass therethrough to the golf ball delivering means, said U-shaped trough diverging outwardly toward its upper end and a lateral opening formed contiguous to the upper end of the U-shaped trough, and a transversely positioned hopper inclined upwardly for receiving a plurality of golf balls and the lower end of the hopper operatively connected to the lateral opening in the U-shaped trough whereby golf balls positioned in the hopper are discharged under the action of gravity to be delivered to the U-shaped trough with the delivered golf balls in alignment for successive delivery to the golf ball delivering means, whereby upon actuation of the golf ball delivering means and upon successive operation of the operator-operated means golf balls are delivered from the golf ball delivery chute to the teeing means by the golf ball delivering means and tee and after a golf ball is driven from the teeing means and the operator-operated means successively operated golf balls are successively delivered to the teeing means and delivery of another ball is prevented until the delivered golf ball has been driven from the tee whereupon successive operation of the operator-operated means the next ball is delivered from the golf ball delivering means to the teeing means and the golf ball delivering means is returned to its golf ball receiving position to receive another golf ball.

4. A golf ball teeing apparatus as set forth in claim 3 wherein agitator means for the hopper is operatively mounted on the hopper transverse to the discharge opening thereof, said agitator means comprising a substantially U-shaped agitator member, the base thereof extending downwardly within the U-shaped trough contiguous to the lateral opening thereof whereby golf balls are free to discharge from the hopper into the U-shaped trough

of the golf ball delivery chute, an arm operatively connected to the agitator means for actuating the agitator means, spring means for biasing the U-shaped member permitting the U-shaped member to be operatively positioned within the golf ball delivery chute, link means operatively connecting the aforesaid linkage means and the agitator means, a lost-motion connection operatively connecting the aforesaid linkage means to the link means, whereby upon operation of the operator-operated means the base of the U-shaped member of the agitator means is biased upwardly out of the U-shaped trough across the discharge opening of the hopper restraining the golf balls within the hopper from discharging into the golf ball delivery chute, and upon release of the operator-operated means the agitator means is biased downwardly within the U-shaped trough permitting golf balls to discharge from the hopper into the golf ball delivery chute.

5. A golf ball teeing apparatus as set forth in claim 4 wherein said link means comprises a lever member pivotally mounted on the axis of the golf ball delivering means, and operatively connected at one end to the lost-motion connection, another lever pivotally supported on the golf ball delivery chute intermediate the first-mentioned lever member and the arm of the agitator means, a link member connecting the contiguous ends of the first and second lever members, and another link formed with a lost-motion connection operatively connecting a lost-motion connection at the end of the arm operatively connected to the agitator means, and the aforesaid spring means operatively biasing the aforesaid linkage means biasing the link means.

6. A golf ball teeing apparatus comprising supporting means for mounting the apparatus substantially in the plane of the tee, spaced teeing means and operator-operated means therefor operatively mounted on said supporting means, pivoted linkage means operatively connecting the teeing means at one end and the operator-operated means contiguous to the pivot connection for the linkage means, spring means for biasing the teeing means in its uppermost position, said spring means operatively connected to the horizontal supporting means at the upper end and to the linkage means, means for delivering under the action of gravity golf balls arranged for successive delivery, golf ball delivering means operatively mounted for to and fro movement between the means for delivering golf balls under the action of gravity and the teeing means, said golf ball delivering means operative from a golf ball receiving position to a golf ball delivering position, agitator means operatively mounted with respect to the means for delivering golf balls under the action of gravity, said agitator means operative to restrain a portion of the golf balls during the period in which a golf ball is delivered to the teeing means and upon return of the golf ball delivering means to its golf ball receiving position the agitator means permits golf balls to move under the action of gravity, and linkage means interconnected with the aforesaid linkage means and the golf ball delivering means and agitator means for successively actuating the golf ball delivering means and agitator means to permit transfer successively upon the operation of the operator-operated means a golf ball from the means for delivering golf balls under the action of gravity by the golf ball delivering means to the teeing means within the cycle of the teeing means from its golf ball receiving position to its teeing position.

7. A golf ball teeing apparatus comprising supporting means for mounting the apparatus substantially in the plane of the tee, spaced teeing means and operator-operated means therefor operatively mounted on said supporting means, pivoted linkage means operatively connecting the teeing means at one end and the operator-operated means, spring means for biasing the teeing means in its uppermost position, said spring means operatively connected to the supporting means at the upper end and to the linkage means, means for delivering under the action of gravity golf balls arranged for successive delivery, golf ball delivering means operatively mounted for to and fro movement between the means for delivering golf balls under the action of gravity and the teeing means, said golf ball delivering means operative from a golf ball receiving position to a golf ball delivering position, agitator means operatively mounted with respect to the means for delivering golf balls under the action of gravity, said agitator means operative to restrain a portion of the golf balls during the period in which a golf ball is delivered to the teeing means and upon return of the golf ball delivering means to its golf ball receiving position the agitator means permits golf balls to move under the action of gravity, linkage means interconnected with the aforesaid linkage means and the golf ball delivering means and agitator means for successively actuating the golf ball delivering means and agitator means to permit transfer successively upon the operation of the operator-operated means a golf ball from the means for delivering golf balls under the action of gravity by the golf ball delivering means to the teeing means within the cycle of the teeing means from its golf ball receiving position to its teeing position, and dampening means operatively connected to the supporting means and to the aforesaid linkage means restraining the return movement of the teeing means to its teeing position upon release of the operator-operated means.

8. A golf ball teeing apparatus as set forth in claim 7, said operator-operated means comprising a vertically extending adjusting screw including a transverse member for pivotally mounting the operator-operated means on the linkage means, a tubular member in operative threaded engagement with the vertically extending adjusting screw, a pedal member operatively mounted on the upper end of said tubular member, guide means for the operator-operated means including stop means, said tubular member being formed with an annular groove at its lower end, a snap ring positioned in said groove, rotation of the tubular member in one direction being operative to lower the teeing means in any one of its positions from its highest setting to its lowest setting and upon operation of the operator-operated means in the lowest setting of the teeing means a golf ball within the golf ball delivering means is delivered to the teeing means, and upon operation of the tubular member by rotation in an opposite direction the teeing means is adjusted within the range from its lowest to its highest adjusted position, whereby upon operation of the operator-operated means a golf ball in the golf ball delivering means is delivered to the teeing means.

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