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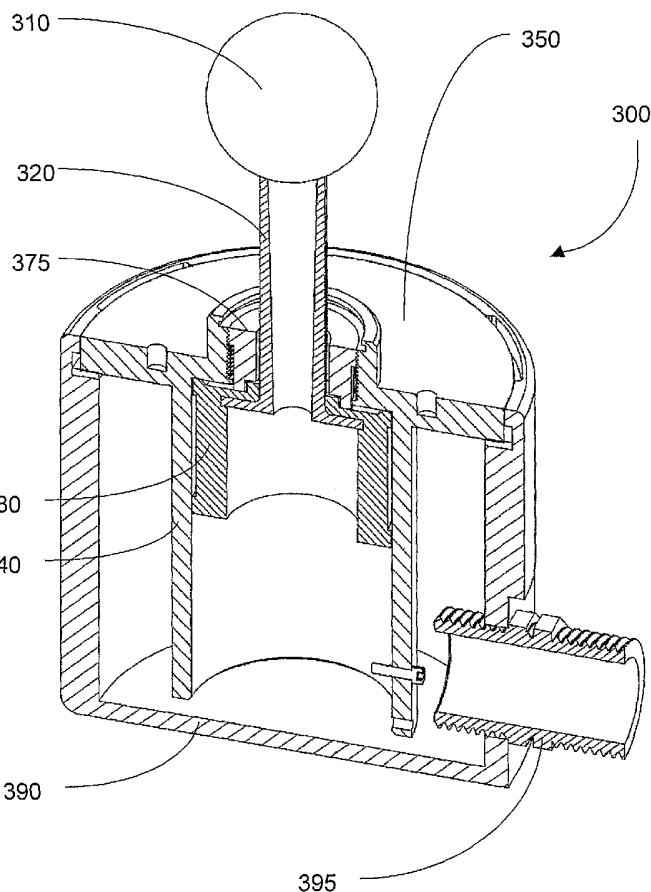
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(54) Title: SEMI AUTOMATIC AIR TEE



(57) Abstract: An automatic teeing device for positioning practice golf balls, for a driving range, including: a flexible, hollow tee, fabricated to sealingly engage a golf ball seated thereon; a cylindrical tee holder, configured to sealingly mount the tee therein; a cylinder sealingly surrounding the tee holder, allowing it and the tee to move vertically between raised and lowered positions therewithin; a cover and housing enclosing the cylinder having an air inlet introducing positive air pressure therein so the housing, cover, cylinder, tee holder, and tee together form an air-tight manifold when a golf ball is seated on the tee; and air pressure regulating apparatus ensuring that the air pressure introduced therein is within a desired range; wherein the tee, tee holder, cylinder, cover, housing, and air pressure regulating apparatus are adapted, in the presence of a source of positive air pressure within the desired range, to provide a force sufficient to raise the tee holder and tee with a golf ball seated thereon to their raised position without blowing the golf ball off of the tee and which, with no golf ball on the tee, is not sufficient to raise the tee holder and tee above the lowered position.



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Semi Automatic Air Tee

FIELD OF THE INVENTION

The present invention relates generally to aids in practicing the game of golf and, more specifically, to devices to place a golf ball on a tee.

BACKGROUND OF THE INVENTION

Golf has been a very popular game for many years now. In addition to playing on an actual golf course, golfers wishing to improve their skills often practice at a driving range, especially when practicing their tee shots. Normally, practicing golfers must repeatedly bend or stoop down to select a ball and to set it on a tee for each practice shot. This can be tiring, and interrupts the golfer's rhythm in repeating his practice shots. Further, it makes a practice session take longer, a disadvantage from the point of view of the proprietor of the golfing range. Automatic teeing would bring significant advantage to all parties.

Numerous systems and devices for automatic teeing have been patented. U.S. Patent number 5,145,176 to Lipson discloses a "Pneumatically operated golf ball tee" in which the golf ball is levitated by a continuous, upward, positive air flow from a hole or tube in the practice station. Since, however, it is not possible to pneumatically support a golf ball without some rotation or positional oscillation of the ball, it does not provide the desired stable target for proper golf practice. U.S. Patent number 6,120,383 to Brown discloses an "Apparatus for placing a golf ball on a tee" using negative air pressure or vacuum to pick up and hold a golf ball on a practice tee and stand the tee and ball up for a practice shot. While fully automated, this apparatus employs a four way valve and intricate pneumatics to control its operation. It is likely to be complicated and costly in practice. Both systems require an air pump, which is likely to be noisy and not conducive to the concentration golfers require for practice and play.

SUMMARY OF THE INVENTION

The present invention seeks to provide a device for automatically positioning practice golf balls on a tee, with no need for the golfer to bend over to position the ball, which is both simple and inexpensive to implement and which can be made to work with relatively little noise. It is also a goal of the present application to provide an automatic teeing device that can be used in a driving range of multiple driving stations supported by a single source positive air pressure to actuate the teeing devices at all the stations.

There is thus provided, in accordance with a preferred embodiment of the invention, an automatic teeing device for positioning practice golf balls including:

a hollow tee for a golf ball, made of flexible material and fabricated to substantially sealingly engage a golf ball seated thereon;

a tee holder, substantially cylindrical and configured to allow the tee to be sealingly mounted therein;

a cylinder sealingly surrounding the tee holder, adapted to permit the tee holder with the tee mounted therein to move vertically between a raised position, defined by the point of abutting of the tee holder with the cover, and a lowered position, defined by a mechanical stop located in the wall of the cylinder, within the cylinder; and

a cover with a vertical opening for housing the cylinder, which further includes a substantially horizontal driving surface which has an indentation configured to gravitationally direct a golf ball to the opening of the cover to seat on the tee and which may have a top layer of artificial turf;

wherein, when the tee holder is in the lowered position in the cylinder, a golf ball entering the opening of the cover will seat on the top of the tee; and

wherein the tee, the tee holder, the cylinder, and the cover are adapted, in the presence of a source of positive air pressure within a desired predetermined range of magnitude, to provide a force which, when a golf ball is seated on the tee, is sufficient to raise the tee holder and the tee with the golf ball seated thereon to the raised position in the cylinder without blowing the golf ball off of the tee and which, when there is no golf ball seated on the tee, is not sufficient to raise the tee holder and the tee above the lowered position.

Additionally in accordance with a preferred embodiment of the invention, the teeing device further includes a housing having an air inlet port for introducing positive air pressure within the predetermined range of magnitude therein via at least one air conduit connected thereto, the housing adapted to engage the cover so that the housing, the cover, the cylinder, the tee holder, and the tee together form a substantially air-tight manifold when a golf ball is seated on the tee. The teeing device further includes air pressure regulating apparatus to ensure that the positive air pressure introduced therein is of a magnitude which falls within the desired predetermined range.

In accordance with a further preferred embodiment of the invention, the cover further includes a height adjustment mechanism adapted to adjust the height of the point of abutting of the tee holder and the cover.

There is further provided, in accordance with a further preferred embodiment of the invention, a golf practice driving range consisting of a multiplicity of practice driving stations, each station having an automatic teeing device as described hereinabove, and connected, via a multiplicity of air conduits, to a common source of positive air pressure, which may be a fan.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more fully understood and appreciated from the following detailed description, taken in conjunction with the drawings, in which:

Figure 1 is a schematic side view of a device for automatically positioning a practice golf ball on a tee, constructed and operative in accordance with an embodiment of the present invention, in its raised position.

Figure 2 is a schematic side view of the device of Figure 1, in its lowered position.

Figure 3 is a side view of a device for automatically positioning a practice golf ball on a tee, constructed and operative in accordance with an alternative embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to Figure 1, there is shown a schematic side view of a device for automatically positioning a practice golf ball on a tee, referred to generally as 100,

constructed and operative in accordance with a preferred embodiment of the present invention. Device 100 as shown has a golf ball 110, seated on flexible, hollow tee 120, which is set in tee holder 130, which is enclosed by cylinder 140. Cylinder 140 fits in cover 150, which includes driving surface 160 which may be covered by artificial turf 165 or, alternatively, by real grass. Cover 150 has an opening 170 through which tee 120 protrudes through an indented area of driving surface 160 to present golf ball 110 at the desired height for practicing tee shots.

Golf ball 110, tee 120, and tee holder 130 are raised to and supported at the raised position shown by a source of positive air pressure introduced into cylinder 140 by suitable means. Tee 120 is fabricated of known flexible and resilient material such as rubber that can endure repeated impacts from golf clubs as a golfer practices hitting golf balls 110 off the tee. Tee 120 must also be flexible enough and its top must be contoured so that when golf ball 110 is seated thereon it forms a substantially air-tight seal therewith, thereby allowing the pressurized air within cylinder 140, tee holder 130, and tee 120 to exert a force adequate to raise tee holder 130, tee 120, and golf ball 110 to the raised position shown in Figure 1 wherein tee holder 130 abuts cover 150; and tee 120 and golf ball 110 are positioned on driving surface 160 for a golfer to make a practice shot.

After the golfer hits the ball off tee 120, air will flow freely out of cylinder 140 via the bore of hollow tee 120. Air pressure within cylinder 140 will not be maintained and will not provide a force to support tee holder 130 and tee 120 in cylinder 140. Tee holder 130 and tee 120 will fall within cylinder 140, under their own weight, to their lowered position, as shown in Figure 2, which is determined by mechanical stop 180 in cylinder 140. The indented region 175 in driving surface 160 is large enough for the golfer to direct a new golf ball thereinto with a golf club, without having to bend over. In a further preferred embodiment of the present invention, the indented region may have a larger geometry sloping into the opening 170 of cover 150 to further facilitate directing golf balls thereinto. The present invention may further be integrated with automatic golf ball feeders such as are known in automatic teeing systems employed in the prior art. Once a new golf ball enters opening 170 in cover 150, as it seats on tee 120, the air flow through tee 120 will be blocked, and the pressure therein will increase. With the air flow stopped as tee 120 engages the golf ball, the increased air pressure will produce sufficient force to raise tee holder 130, tee 120, and the new golf ball to the raised position, as shown in Figure 1.

It will be appreciated by persons skilled in the art, that the positive air pressure supplied to teeing device 100 and specifically introduced into cylinder 140 must be regulated so that its magnitude will fall within a desired range for teeing device to perform as described hereinabove. Specifically, the pressure must be great enough to provide a force, when the bore of tee 120 is closed off by a golf ball 110, to lift tee holder 130, tee 120, and golf ball 110 without blowing golf ball 110 off tee 120 when tee holder 130 reaches its uppermost position in cylinder 140, as shown in Figure 1. Further, when there is no golf ball on tee 120, as shown in Figure 2, the residual air pressure in cylinder 140 when air flows unobstructed through the bore of tee 120, must never provide a force strong enough to raise tee holder 130 and tee 120 from their lowermost position in cylinder 140, as defined by mechanical stop 180.

In practice, the inventor has been able to meet these criteria using a fan as a source of positive pressure and a flow control valve to regulate the pressure in a teeing device constructed and operative in accordance with an embodiment of the present invention. It should, however, be noted that the use of fan and valve are presented by way of example, and other means of providing positive air pressure and regulating it so that its magnitude will be within the desired range should also be considered as being within the scope of the present invention. It should be noted that while thin-gauge conduits for gas flow limit gas flow in and of themselves, they do not limit transfer of pressure when there is no flow. In the present invention, this applies to the conduits connecting the pressure source via the regulating valve to the teeing device as well as to the hollow tee itself. This serves to facilitate provision of adequate pressure to provide the requisite lifting force when there is a golf ball on the tee, as well as limiting the lifting force as required in the case where there is no golf ball on the tee.

It should further be noted that use of a fan as a pressure source in the present invention, as opposed to use of an air compressor, which nonetheless should also be considered an embodiment of the present invention, has an added advantage of relatively quiet operation, thereby providing a relatively quiet environment for the golfer to practice therein.

Referring now to Figure 3, there is shown a side view of a device for automatically positioning a practice golf ball on a tee, referred to generally as 300, constructed and operative in accordance with a further preferred embodiment of the present invention. For the sake of simplicity, features common to the present embodiment and that discussed hereinabove with respect to Figures 1 and 2 are not referenced unless referred to in relation to

new features. Device 300 includes housing 390 with air inlet port 395 which may be attached, via one or more air conduits, to a suitable source of positive air pressure, as discussed hereinabove with respect to Figures 1 and 2. Housing 390 engages cover 350 to form, together with cylinder 340, tee holder 330, and hollow tee 320, a largely air-tight manifold, when a golf ball 310 is seated on tee 320. Device 300 further includes threaded bushing 375 which engages, via its threading, cover 350 and abuts tee holder 330. By turning threaded bushing 375 in cover 350, the height at which tee holder 330 abuts threaded bushing 375 can be adjusted, thereby adjusting the height of teed golf ball 310 as it sits on tee 320. Threaded bushing 375, tee holder 330, and tee 320 may advantageously be fabricated to interlock so that threaded bushing 375 may be turned simply by turning tee 320, thereby adjusting the height of tee 320 with no need to take apart the device or to use special tools. It should be noted that threaded bushing 375 is presented by way of example, and any other suitable height adjustment mechanism should also be considered as being within the scope of the present invention.

In a further preferred embodiment of the present invention, a number of automatic teeing devices such as that shown in Figure 3 and described hereinabove may be connected, via a suitable system of air conduits, to a common source of positive air pressure and arranged in an array of golf practice stations as is known in driving ranges. Each station has its own air pressure regulating device such as the valve discussed hereinabove. In practice, using known fans and flow control valves, up to twenty practice stations can be supported and serviced by a single source of positive air pressure.

It will further be appreciated by persons skilled in the art that the scope of the present invention is not limited by what has been specifically shown and described hereinabove, merely by way of example. Rather, the scope of the present invention is defined solely by the claims, which follow.

CLAIMS

1. An automatic teeing device for positioning practice golf balls which includes:
 - a hollow tee for a golf ball, made of flexible material and fabricated to substantially sealingly engage a golf ball seated thereon;
 - a tee holder, substantially cylindrical and configured to allow said tee to be sealingly mounted therein;
 - a cylinder sealingly surrounding said tee holder, adapted to permit said tee holder with said tee mounted therein to move vertically therewithin; and
 - a cover with a vertical opening for housing said cylinder;wherein said tee holder has a raised position and a lowered position in said cylinder;
wherein, when said tee holder is in said lowered position in said cylinder, a golf ball entering said opening of said cover will seat on said top of said tee; and
wherein said tee, said tee holder, said cylinder, and said cover are adapted, in the presence of a source of positive air pressure within a predetermined range of magnitude, to provide a force which, when a golf ball is seated on said tee, is sufficient to raise said tee holder and said tee with the golf ball seated thereon to said raised position in said cylinder without blowing the golf ball off of said tee.
2. A teeing device according to claim 1, wherein said raised position of said tee holder is defined by the point of abutting of said tee holder with said cover.
3. A teeing device according to claim 1, wherein said tee, said tee holder, said cylinder, and said cover are further adapted, in the presence of the source of positive air pressure within said predetermined range of magnitude, to provide a force which, when there is no golf ball seated on said tee, is not sufficient to raise said tee holder and said tee above said lowered position.

4. A teeing device according to claim 1, further including a mechanical stop located in the wall of said cylinder which defines said lowered position, in said cylinder, of said tee holder with said tee mounted therein.
5. A teeing device according to claim 1, wherein said cover includes a substantially horizontal driving surface which has an indentation configured to gravitationally direct a golf ball to said opening of said cover to seat on said tee.
6. A teeing device according to claim 5, wherein said horizontal driving surface of said cover includes a top layer of artificial turf.
7. A teeing device according to claim 1, further including a housing having an air inlet port for introducing positive air pressure within said predetermined range of magnitude therein via at least one air conduit connected thereto, said housing adapted to engage said cover so that said housing, said cover, said cylinder, said tee holder, and said tee together form a substantially air-tight manifold when a golf ball is seated on said tee.
8. A teeing device according to claim 7, further including air pressure regulating apparatus to ensure that the positive air pressure introduced therein is of a magnitude which falls within said predetermined range.
9. A teeing device according to claim 2, wherein said cover further includes a height adjustment mechanism adapted to adjust the height of said point of abutting of said tee holder and said cover.
10. An automatic teeing device for positioning practice golf balls which includes:

a hollow tee for a golf ball, made of flexible material and fabricated to substantially sealingly engage a golf ball seated thereon;

a tee holder, substantially cylindrical and configured to allow said tee to be sealingly mounted therein;

a cylinder sealingly surrounding said tee holder, adapted to permit said tee holder with said tee mounted therein to move vertically therewithin;

a cover with a vertical opening for housing said cylinder; and

a housing having an air inlet port for introducing positive air pressure within a desired predetermined range of magnitude therein via at least one air conduit connected thereto, said housing adapted to engage said cover so that said housing, said cover, said cylinder, said tee holder, and said tee together form a substantially air-tight manifold when a golf ball is seated on said tee;

wherein said tee holder has a raised position and a lowered position in said cylinder;

wherein, when said tee holder is in said lowered position in said cylinder, a golf ball entering said opening of said cover will seat on said top of said tee; and

wherein said tee, said tee holder, said cylinder, said cover, and said housing are adapted, in the presence of a source of positive air pressure within said predetermined range of magnitude, to provide a force which, when a golf ball is seated on said tee, is sufficient to raise said tee holder and said tee with the golf ball seated thereon to said raised position in said cylinder without blowing the golf ball off of said tee.

11. A teeing device according to claim 10, wherein said raised position of said tee holder is defined by the point of abutting of said tee holder with said cover.

12. A teeing device according to claim 10, wherein said tee, said tee holder, said cylinder, said cover, and said housing are further adapted, in the presence of the source of positive air pressure within said predetermined range of magnitude, to provide a force which, when there is no golf ball seated on said tee, is not sufficient to raise said tee holder and said tee above said lowered position.

13. A teeing device according to claim 10, further including a mechanical stop located in the wall of said cylinder which defines said lowered position, in said cylinder, of said tee holder with said tee mounted therein.
14. A teeing device according to claim 10, wherein said cover includes a substantially horizontal driving surface which has an indentation configured to gravitationally direct a golf ball to said opening of said cover to seat on said tee.
15. A teeing device according to claim 14, wherein said horizontal driving surface of said cover includes a top layer of artificial turf.
16. A teeing device according to claim 10, further including air pressure regulating apparatus to ensure that the positive air pressure introduced therein is of a magnitude which falls within said predetermined range.
17. A teeing device according to claim 11, wherein said cover further includes a height adjustment mechanism adapted to adjust the height of said point of abutting of said tee holder and said cover.
18. An automatic teeing device for positioning practice golf balls which includes:
 - a hollow tee for a golf ball, made of flexible material and fabricated to substantially sealingly engage a golf ball seated thereon;
 - a tee holder, substantially cylindrical and configured to allow said tee to be sealingly mounted therein;
 - a cylinder sealingly surrounding said tee holder, adapted to permit said tee holder with said tee mounted therein to move vertically therewithin;
 - a cover with a vertical opening for housing said cylinder;

a housing having an air inlet port for introducing positive air pressure therein via at least one air conduit connected thereto, said housing adapted to engage said cover so that said housing, said cover, said cylinder, said tee holder, and said tee together form a substantially air-tight manifold when a golf ball is seated on said tee; and

air pressure regulating apparatus to ensure that the positive air pressure introduced therein is of a magnitude which falls within a desired predetermined range;

wherein said tee holder has a raised position and a lowered position in said cylinder;

wherein, when said tee holder is in said lowered position in said cylinder, a golf ball entering said opening of said cover will seat on said top of said tee; and

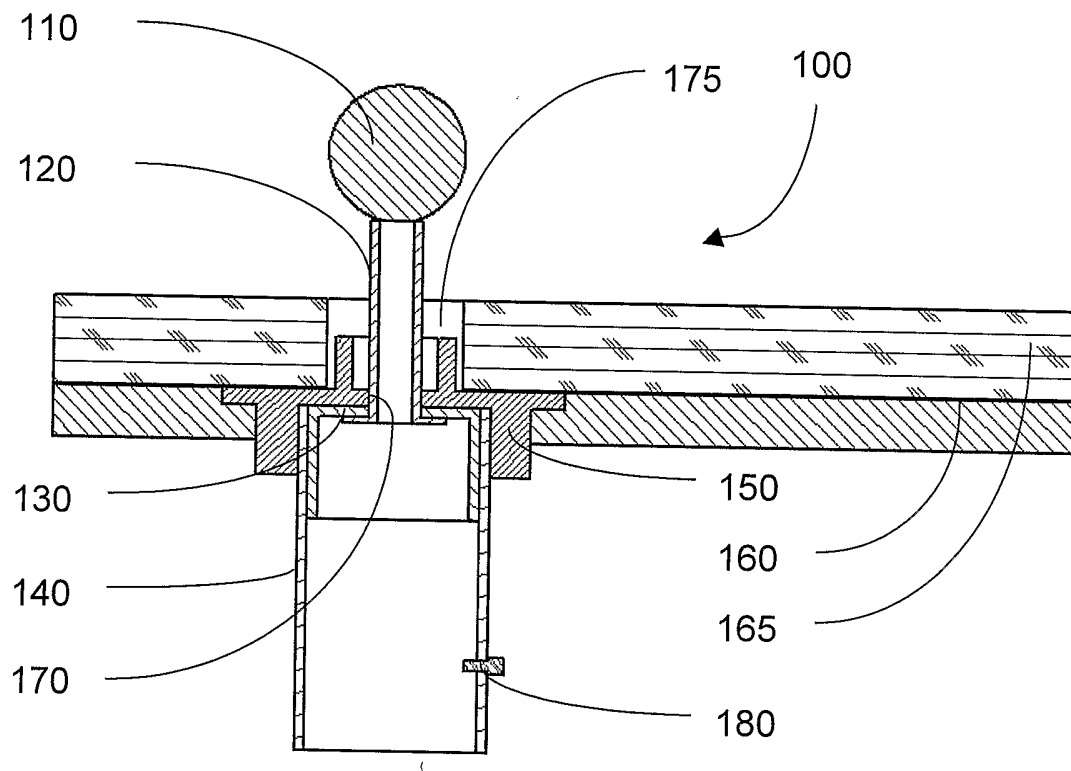
wherein said tee, said tee holder, said cylinder, said cover, said housing, and said air pressure regulating apparatus are adapted, in the presence of a source of positive air pressure within said predetermined range of magnitude, to provide a force which, when a golf ball is seated on said tee, is sufficient to raise said tee holder and said tee with the golf ball seated thereon to said raised position in said cylinder without blowing the golf ball off of said tee and which, when there is no golf ball seated on said tee, is not sufficient to raise said tee holder and said tee above said lowered position.

19. A teeing device according to claim 18, wherein said raised position of said tee holder is defined by the point of abutting of said tee holder with said cover.
20. A teeing device according to claim 18, further including a mechanical stop located in the wall of said cylinder which defines said lowered position, in said cylinder, of said tee holder with said tee mounted therein.
21. A teeing device according to claim 18, wherein said cover includes a substantially horizontal driving surface which has an indentation configured to gravitationally direct a golf ball to said opening of said cover to seat on said tee.

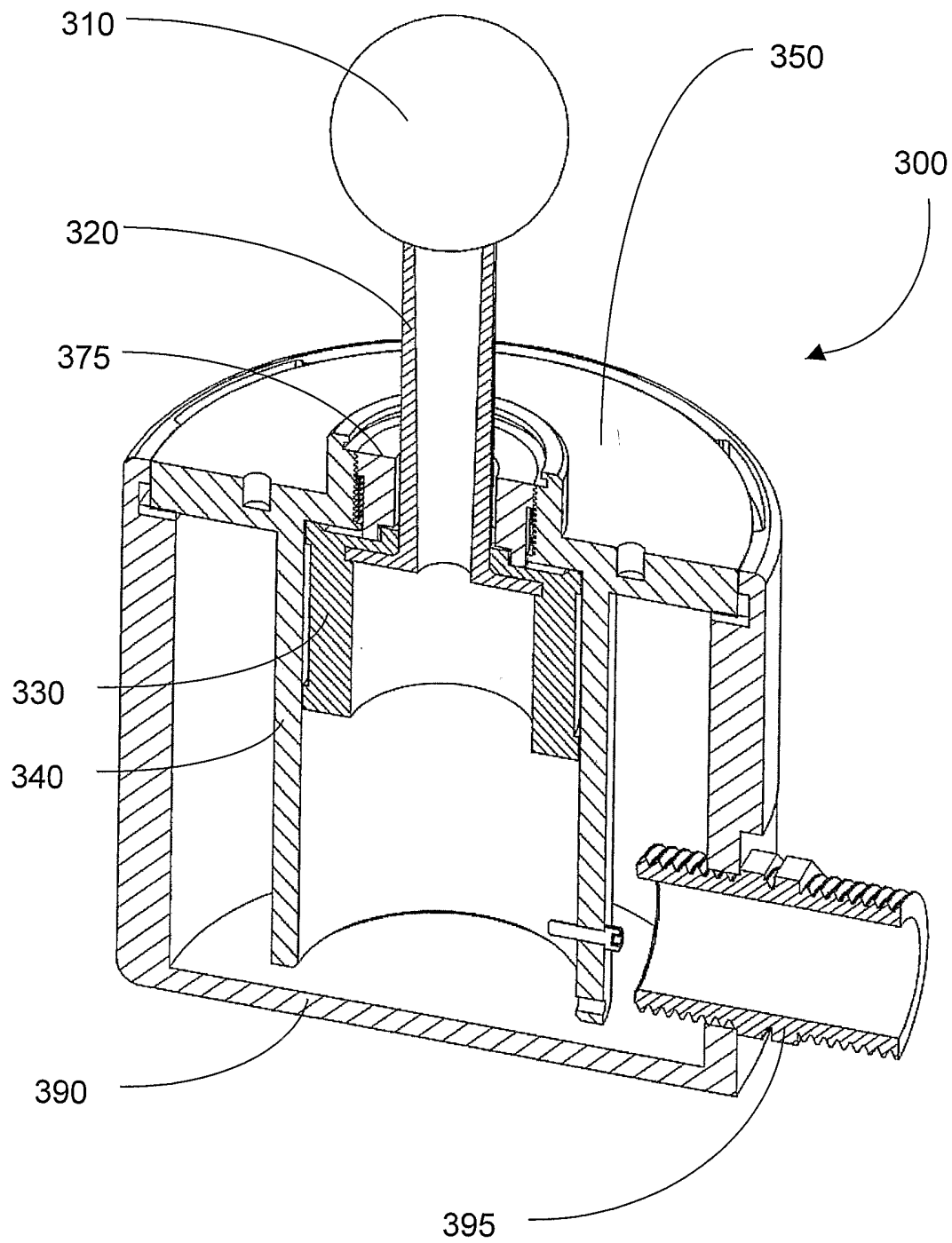
22. A teeing device according to claim 21, wherein said horizontal driving surface of said cover includes a top layer of artificial turf.
23. A teeing device according to claim 19, wherein said cover further includes a height adjustment mechanism adapted to adjust the height of said point of abutting of said tee holder and said cover.
24. A teeing device according to claim 18, wherein said source of positive air pressure is a fan.
25. A golf practice driving range consisting of a multiplicity of practice driving stations, each station including an automatic teeing device according to claim 18 and connected, via a multiplicity of air conduits, to a common source of positive air pressure.
26. A driving range according to claim 25, wherein, in each of said stations, said raised position of said tee holder of said teeing device is defined by the point of abutting of said tee holder with said cover.
27. A driving range according to claim 25, wherein, in each of said stations, said cover of said teeing device includes a substantially horizontal driving surface which has an indentation configured to gravitationally direct a golf ball to said opening of said cover to seat on said tee.
28. A driving range according to claim 27, wherein said horizontal driving surface of said cover includes a top layer of artificial turf.

29. A driving range according to claim 28, wherein, in each of said stations, said cover of said teeing device further includes a height adjustment mechanism adapted to adjust the height of said point of abutting of said tee holder and said cover.
30. A driving range according to claim 25, wherein said common source of positive air pressure is a fan.

1/3

**Fig. 1**

3/3

**Fig. 3**