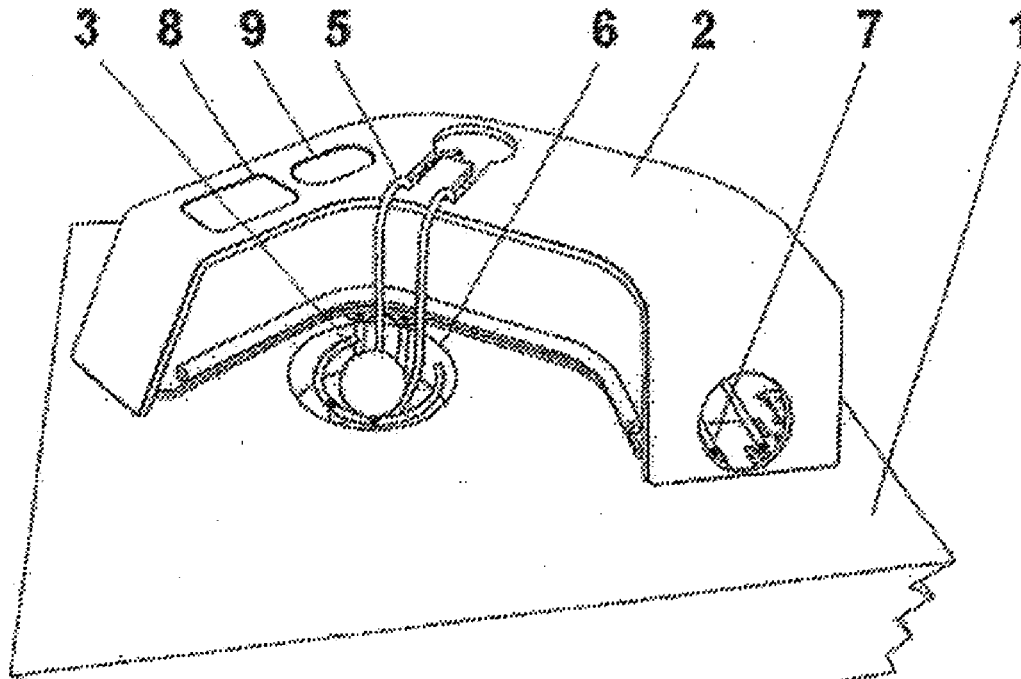




US 20180147462A1

(19) **United States**(12) **Patent Application Publication**
ARNOLD(10) **Pub. No.: US 2018/0147462 A1**(43) **Pub. Date: May 31, 2018**(54) **METHOD AND DEVICE FOR RETURNING
GOLF BALLS**(71) Applicant: **NORMAN ARNOLD, LEIPZIG (DE)**(72) Inventor: **NORMAN ARNOLD, LEIPZIG (DE)**(21) Appl. No.: **15/812,597**(22) Filed: **Nov. 14, 2017****Related U.S. Application Data**(63) Continuation of application No. PCT/DE2016/
000424, filed on Nov. 30, 2016.**Publication Classification**(51) **Int. Cl.**
A63B 57/40 (2006.01)
A63B 69/36 (2006.01)(52) **U.S. Cl.**CPC *A63B 57/405* (2015.10); *A63B 2220/801*
(2013.01); *A63B 2220/75* (2013.01); *A63B*
69/3676 (2013.01)(57) **ABSTRACT**

A method and a device for automatically returning golf balls towards a golfer over a predefined track, in particular for putting training on golfing greens, in which distances from a golf hole are different, includes a motorized lifting device having lowered and lifted positions of the golf ball and controllable assemblies generating a driving force causing the golf ball to roll down from its lifted position along a specific length and guiding the ball to the golfer by using a position guidance system. Preferably, a microcontroller is associated with the force-generating assemblies for controlling the required length of the rolling down motion. The microcontroller is at least connected to an air stream sensor and a humidity sensor by circuit technology, and optionally to mobile signal transmission computer equipment for transmitting the required length with a radio receiver assembly.



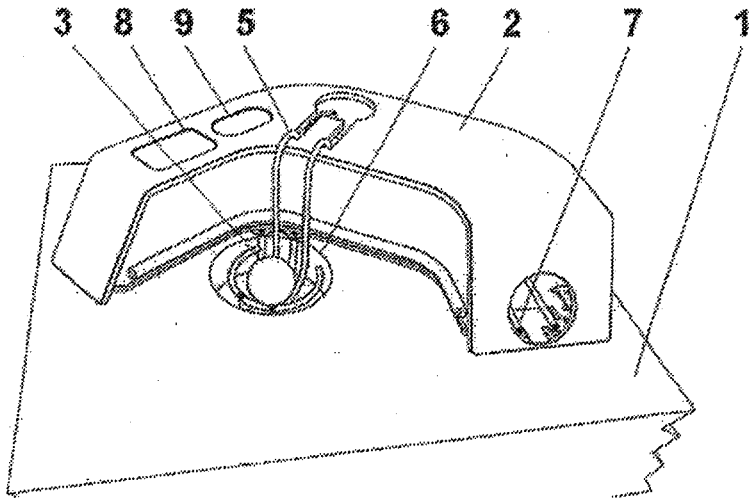


FIG. 1

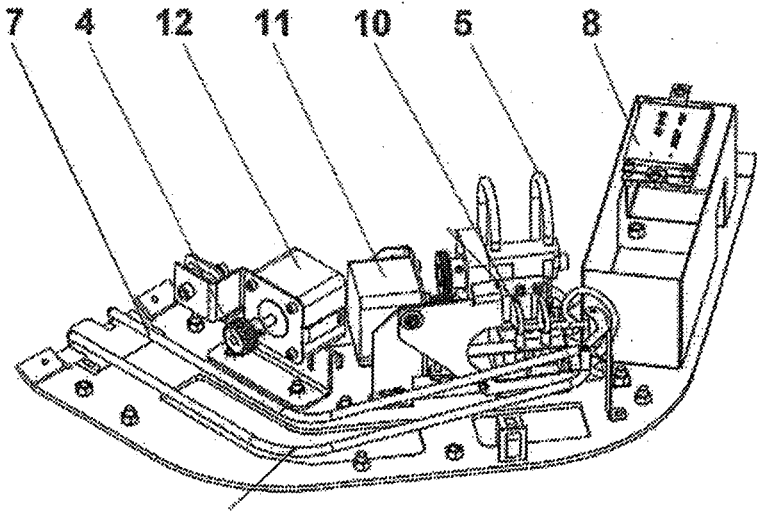


FIG. 2

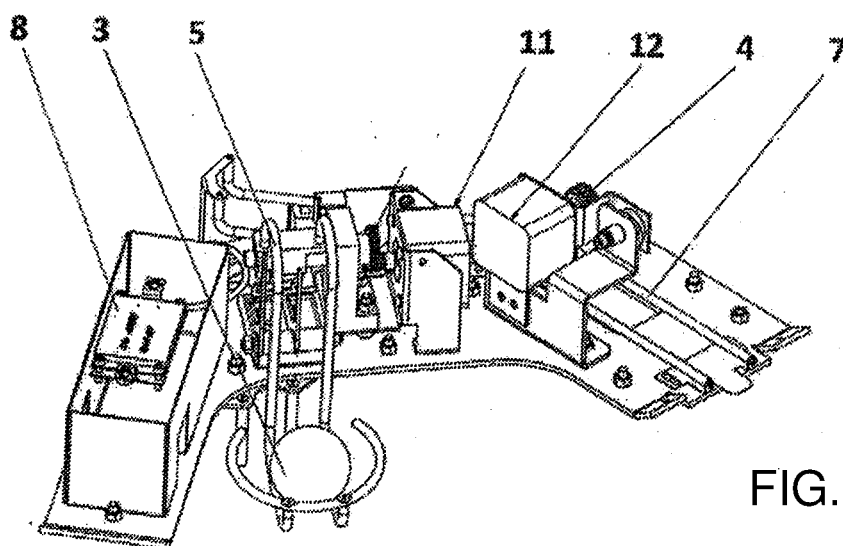


FIG. 3

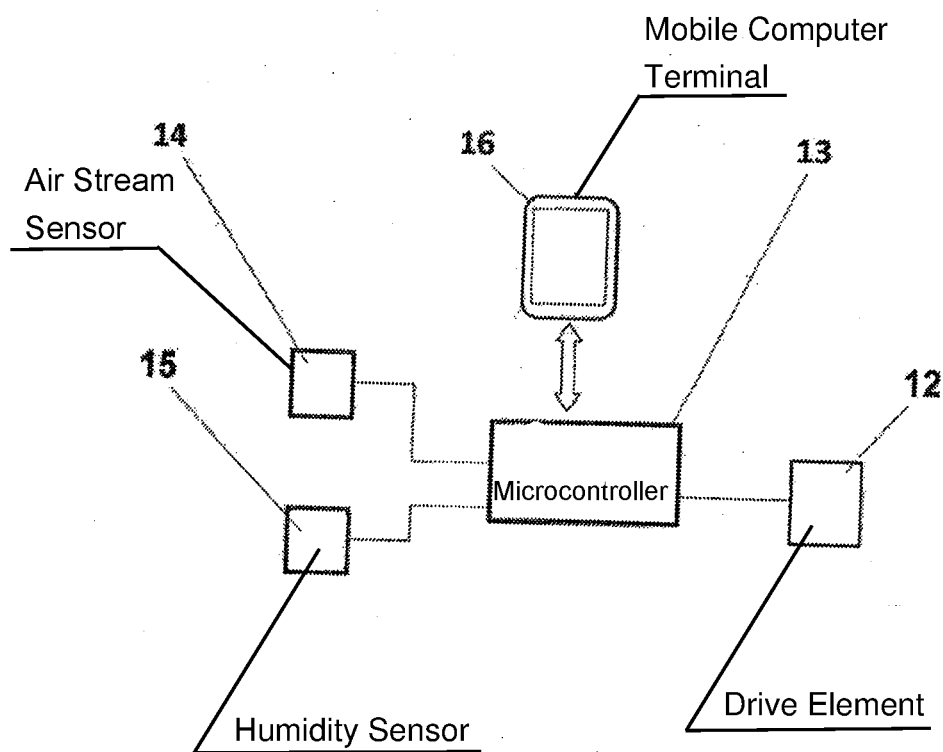


FIG. 4

METHOD AND DEVICE FOR RETURNING GOLF BALLS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation, under 35 U.S.C. § 120, of copending International Application PCT/DE2016/000424, filed Nov. 30, 2016, which designated the United States; the prior application is herewith incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a method and a device for returning golf balls to a location of a golfer, including putting training on golfing greens.

[0003] A device for ejecting a golf ball from a golf hole is known from U.S. Pat. No. 5,393,053. For that purpose, the device is provided with a putting green cup inserted into the golf hole, which is a receptacle for the golf ball during putting training. The movement from a lowered position to an elevated position is achieved by combining an ejecting device with a pin. The ejecting motion is triggered by pressing on the pin. After triggering the spring-actuated ejecting device, the golf ball is thrown out of the putting green cup. One disadvantage of that device is the random ejection of the golf ball in a number of different directions and restricting the distance of ejection to a distance determined by the existing spring force. Such a device is not suitable for performing training sessions where different distances from the training hole are involved.

[0004] U.S. Pat. No. 5,480,142 describes a lifting device lifting a golf ball, but only out of the golf container. When a golf ball is dropping on the golf container floor, an electric pressure switch is activated, triggering a control mechanism which in turn activates a telescopic lifting device, similar to a controllable telescopic antenna device. That leads to the golf ball inside the golf container being lifted to an upper position in which it stays until being removed by the player. The ball is not returned to the golfer's location in a targeted manner, however.

[0005] Furthermore, in U.S. Pat. No. 5,890,967A, a golf ball ejecting device is described in which a golf ball placed on a golf cup is abruptly pushed in an upward direction by using a piston. Such abrupt ejecting motion of the piston is triggered by a magnetic field generated by a magnetic coil. The piston motion is triggered after the magnetic field has been produced and is accelerated in the direction of the golf cup. When the piston meets the underside of the golf cup, a pulse of motion is transferred to the golf ball, thusly ejecting it out of the cylindrical interior of the device to the outside. When leaving the device, the golf ball has a trajectory which cannot be foreseen due to the different environmental conditions (wind, rain, etc.). That device is not suitable for returning the golf ball along a pre-determined path and a certain distance to a pre-defined target, namely the golfer's location.

[0006] The golf lifting technique described in German Patent Application DE 103 20 989 A1 only serves to lift a golf ball by a vertical movement from a hole of the surface for the ball until reaching a putting position above the surface for the ball. Due to the features of the ball lifting

device, the lifted golf ball cannot be returned to the golfer's location in a directed manner, and it is not even constructed for such purpose.

[0007] Devices are known for returning balls in bowling or ninepin alleys, such as the device for lifting balls into a ball returning system described in German Patent Application DE 196 49 863 A1. That device has a driving unit with a controllable drive motor driving a gripper arm moving on a predefined circular motion path. The gripper arm is rotating around a substantially horizontally disposed rotary axis to enable it to move along a circular track. The gripper arm, while moving in the circular path, will lift the ball located at a lower pickup position and release it at an upper release position. From there, it can roll back in the direction where it will be thrown again on a return roller track. With gravitational force, the ball rolls on such an inclined return rolling track back to the throwing area. The length and direction of the return path are determined by the fixed installation of the bowling or ninepin alley. The motion energy of the ball generated during rolling back is absorbed by the ascending roller track in the throwing area, thusly lifting the ball to the level of the throwing table. In order to place the ball in a pickup position within the throwing area, its motion is slowed down by the ascending roller track section. It is therefore a device for lifting balls of different diameters and weights in a reliable, low-noise manner. That device is, however, not suited to change the distance of the return path and/or ball direction of movement.

SUMMARY OF THE INVENTION

[0008] It is accordingly an object of the invention to provide a method and a device for returning golf balls, which overcome the hereinbefore-mentioned disadvantages of the heretofore-known methods and devices of this general type, with which training can be carried out while distances to a golf hole are different and which also perform an automatic return of the golf ball over a pre-defined track and direction to where a golfer is standing.

[0009] With the foregoing and other objects in view there is provided, in accordance with the invention, a method for returning golf balls, which comprises triggering a sensor detecting a golf ball and then lifting the golf ball out of a golf hole into an upper position, using controlled power-applying assemblies to generate a driving force rolling the golf ball in the upper position along a specified length of track, using a position guidance system to direct a movement of the golf ball towards a location of a player, and returning the golf ball to a playing area of a golfing green by applying movement energy.

[0010] With the objects of the invention in view, there is also provided a device for returning golf balls, comprising a lifting device configured to be inserted into a golf hole and being operated by an electric motor to move into an upper position, an overrun channel mounted downstream of the upper position of the lifting device, force-generating assemblies connected to the overrun channel and causing the golf ball to roll down in a controllable manner for a specified length, and a position guidance system disposed downstream of the overrun channel for determining a direction of a rolling down motion towards a golfer.

[0011] The method of the invention facilitates training for different distances to the golf hole and by maintaining the automatic return of the ball along a predefined track and direction to where the golfer is standing. Preferably, the

method is configured so that the force and direction of the forward motion of the golf ball and therefore the length of the achievable return track can be controlled. One embodiment of the method which requires low expenses makes use of gravity by using an inclined surface specifically created for this purpose. Another advantage of the method is an embodiment providing an as far as possible infinitely variable control of the power-generating assemblies for the forward motion of the golf ball to be returned, and thusly the infinitely variable control of the achievable return track connected thereto. For instance, controllable power-generating assemblies may preferably be used for the device which exercise a pneumatic pressure on the golf ball, or a mechanical pulse may be used. If tubular path control equipment is used for the directed return of the golf ball, a large prevention against the environment (wind) affecting its return track is achieved.

[0012] With the control system, and depending on the predefined length of the rolling motion of the golf ball, the power-generating assemblies are controlled so that the drive power needed in each case will be generated. Preferably, the track length and thusly the distance to be achieved in the direction of the player is predefined by using radio-technical signal transmission. It is best to perform the radio-technical signal transmission by way of mobile computer equipment, such as a smartphone. If precise control of the power-generating assemblies is desired, a microcontroller connected to at least a humidity sensor and at least one sensor to record air streams may be used.

[0013] Other features which are considered as characteristic for the invention are set forth in the appended claims.

[0014] Although the invention is illustrated and described herein as embodied in a method and a device for returning golf balls, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

[0015] The construction and method of operation of the invention, however, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0016] FIG. 1 is a fragmentary, diagrammatic, overall perspective view of the device;

[0017] FIG. 2 is a perspective rear view of the interior assembly of the device;

[0018] FIG. 3 is a perspective front view of the interior assembly; and

[0019] FIG. 4 is a block diagram of the control system including a microcontroller.

DETAILED DESCRIPTION OF THE INVENTION

[0020] Referring now to the figures of the drawings in detail and first, particularly, to FIG. 1 thereof, it is seen that during golf training, physical motions for final putting of a golf ball 3 into a hole 6 should be repeated under the same conditions as far as possible. It is necessary to do this unchanged from an unchanged location where the golfer is

standing. In order to prevent the many required changes of position because a player must manually go and get the golf balls 3 back, it is necessary to automatically return the golf ball 3 from out of the golf hole. The distances of the golf hole 6 to the golfer are chosen differently, therefore requiring the option of adjusting return tracks to be overcome by the device differently. A possible embodiment of the return method using the applied device is diagrammatically shown in FIG. 1, in an overall view. The device set up next to the golf hole 6 on a green 1 includes a mechanical lifting device 5 which will lift the golf ball 3 putted into the golf hole 6 upwards from its lower position. The upper section of the device is provided with a position guidance system 7, which is inclined at an angle. This position guidance system 7 is connected to the device, but can be folded out. The lifting motion for the golf ball 3 is performed by a "ladle" onto which the golf ball 3 drops. The upward motion performed by the lifting device 5 is triggered by a sensor 10 responding to weight changes, which is connected to the "ladle." An overrun channel into which the golf ball 3 will run when its upward motion is finished, is disposed in the upper position of the lifting device 5. This is done by the "ladle" being tilted down. This causes the golf ball 3 to run or roll inside the overrun channel to the inclined position guidance system 7. The existing gravity of the golf ball 3 has the effect of changing the velocity of the ball, depending on the height level of an inclination of a housing 2, and will thusly define the achievable return distance to the golfer. A short time later, the "ladle" will move down to the lower position in which it can receive the next golf ball 3. In order to make use of different return track lengths, it would be necessary in this simple embodiment to adjust the height level of the inclination to the desired return track. Therefore, the golf ball 3 is accelerated in accordance with the invention so that it can overcome the distance of the desired return track by using a power or force applying or transmission element or assembly 4 on the position guidance system 7 constructed as an inclination. A drive element 12 will control the operation.

[0021] The diagrammatic representation of FIG. 2 shows the back of the interior assembly of the device. FIG. 2 is a view looking into the interior of the device with the configuration of the assemblies without the housing 2. Once the device is commissioned, the golf ball 3 will be transported by the lifting device 5 out of the golf hole 6 into the upper section. The lifting device 5 is driven by a drive element 11. When the upper section of the device is reached and the lifting device 5 is triggered by mechanical contact with a limit stop, the assembly is tilted and the golf ball 3 is held in position. Then the golf ball 3 rolls inside an overrun channel to the position guidance system 7 with its inclined position. As it travels on its way along the position guidance system 7, the golf ball 3 makes contact with the rotating power transmission element 4, thus receiving a controlled motion impulse. The drive element 12 will determine the amount of power transmission which is then needed. The required power is transmitted to the golf ball 3 depending on the return track to be overcome. A display 8 connected to circuitry 9 will show the respective return track set by manual or radio technology and other operating data.

[0022] FIG. 3 diagrammatically shows a front view of the interior assembly of the device.

[0023] FIG. 4 shows a block diagram of the control system using a microcontroller 13. This control system serves to define the return track and return direction by the golfer,

while the movement impulse required for the golf ball as well as the position which the position guidance system 7 has to take are determined by the microcontroller 13. This can be specified manually or by radio equipment. For example, it is possible to transmit the specifications by radio equipment by using a mobile computer terminal 16 (e.g. a smartphone). A special “App” can be created for this purpose. The microcontroller 13 will control the drive unit 12 in order to cause the transmission of the required movement impulse on the golf ball 3. In order to make the control highly precise, eliminating any influences such as rain and wind affecting the course of movement, the microcontroller 13 is connected with a sensor 14 for the recording of air streams and a humidity sensor 15. The controlled change of direction of the position guidance system 7 can be provided with some motion elements (such as wheel elements) below the housing 2 of the device, which are driven by an electric motor. The fact that the device is disposed around the golf hole 6 in a partially circular way, means that any controlled change of direction leads to the rotation of the device and the golf hole 6. The lifting device 5 inserted into the golf hole 6 will take the lead of the rotary motion during that operation.

[0024] Another embodiment can be provided with tubular position guidance systems. They facilitate the application of power-generating pneumatic assemblies which will exercise pneumatic pressure on the golf ball 3 in order to move it forward. Depending on the generated pressure, it is possible to control the achievable return track to the golfer in an infinitely adjustable manner. There is also the option of applying a controllable lifting magnet which will send a mechanical impulse to the golf ball 3 through a piston. In this embodiment, it is possible to control the return track in an infinitely adjustable manner depending on the power of the generated magnetic field. The usage of these embodiments makes it possible to provide embodiments of the device that do not depend on its height level. The devices may be kept very small and thusly may be transported more easily due to less material and weight.

[0025] In order to grip and return any poorly hit golf balls, a partially circular catching device is disposed in the area behind the golf hole 6, which will lead the poorly hit golf ball 3 into the golf hole 6, where it will be detected by the sensor and returned to the golfer's location by using the device.

1. A method for returning golf balls, the method comprising the following steps:

- triggering a sensor detecting a golf ball and then lifting the golf ball out of a golf hole into an upper position;
- using controlled power-applying assemblies to generate a driving force rolling the golf ball in the upper position along a specified length of track;
- using a position guidance system to direct a movement of the golf ball towards a location of a player; and
- returning the golf ball to a playing area of a golfing green by applying movement energy.

2. The method according to claim 1, which further comprises generating the driving force rolling the golf ball forward by a downward movement from the upper position initially due to gravity and along an inclined surface, and

using the position guidance system installed on an inclined surface to direct the rolling track towards the location of the player.

3. The method according to claim 1, which further comprises using a control system to generate the driving force rolling the golf ball forward along a specified length at an entrance of a tubular channel mounted at the upper position and an electrically operated pressure-generating assembly applying a controlled pressure force, and determining a direction of a rolling down motion by at least one of a shape or a length of the tubular channel.

4. The method according to claim 1, which further comprises using a control system to generate the driving force rolling the golf ball forward along a specified length by controlling a motion of a lifting magnet piston directed at the golf ball, and determining a direction of a rolling down motion by a location of the position guidance system.

5. The method according to claim 1, which further comprises using a microcontroller as a control system for the power-applying assemblies, and calculating a length of a required rolling down motion by using mobile computer equipment sending results to the microcontroller by radio technology.

6. The method according to claim 5, which further comprises using the microcontroller to control the power-applying assemblies depending on both a humidity and an air stream of an environment detected by sensors.

7. A device for returning golf balls, the device comprising: a lifting device configured to be inserted into a golf hole and being operated by an electric motor to move into an upper position;

an overrun channel mounted downstream of said upper position of said lifting device;

force-generating assemblies connected to said overrun channel and causing the golf ball to roll down in a controllable manner for a specified length; and

a position guidance system disposed downstream of said overrun channel for determining a direction of a rolling down motion towards a golfer.

8. The device according to claim 7, which further comprises a sensor detecting the golf ball, said lifting device having a ladle-shaped assembly connected to said sensor for picking up the golf ball.

9. The device according to claim 7, which further comprises a plurality of controllable motion elements disposed beneath the device for controlling a position of the device and moving the device around the golf hole to permit said position guidance system to be oriented into a number of different directions.

10. The device according to claim 7, which further comprises:

- a microcontroller associated with said force-generating assemblies for controlling a required length of the rolling down motion;
- at least one sensor for detecting an air stream;
- at least one sensor for detecting humidity;
- circuit technology connecting said sensors to said microcontroller; and
- mobile computer equipment configured to transmit a signal to said microcontroller for the required length as a radio receiver assembly.

* * * * *