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(54) **GOLF TEE SHOT-GREEN PLACEMENT VIDEO/IMAGING CAMERA MONITORING AND MEASURING SYSTEM AND METHOD**

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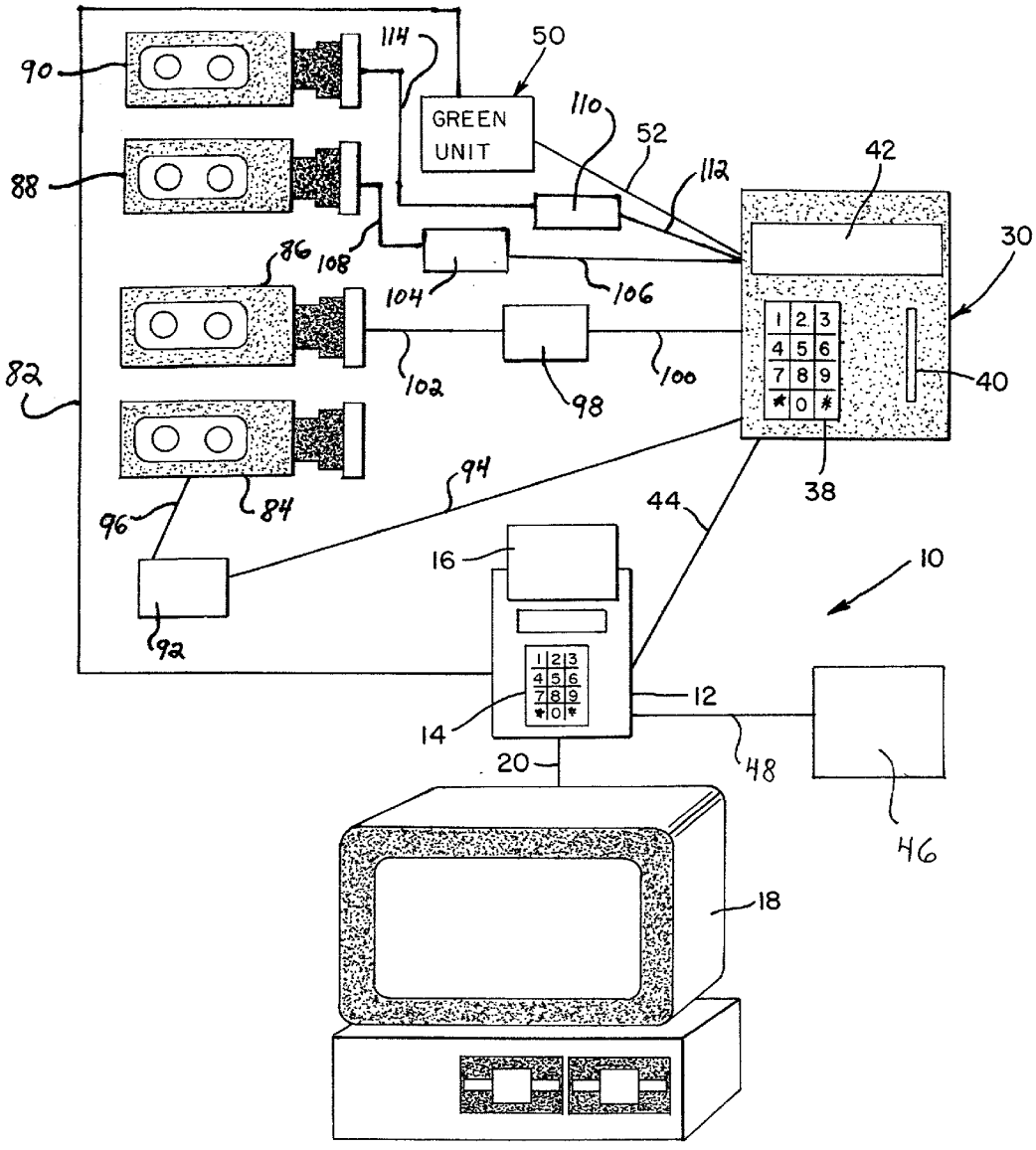
(57) **ABSTRACT**

A golf tee shot-green placement measuring system for measuring distances of tee shots upon a predetermined green from the cup or hole, and a method of performing such measurement, comprises the use of a video camera which once locked in position with respect to a predetermined region of the green, can measure the distances of golf balls from the green cup or hole through pixel grid measurements and the relationship of such pixels to inch dimensions.



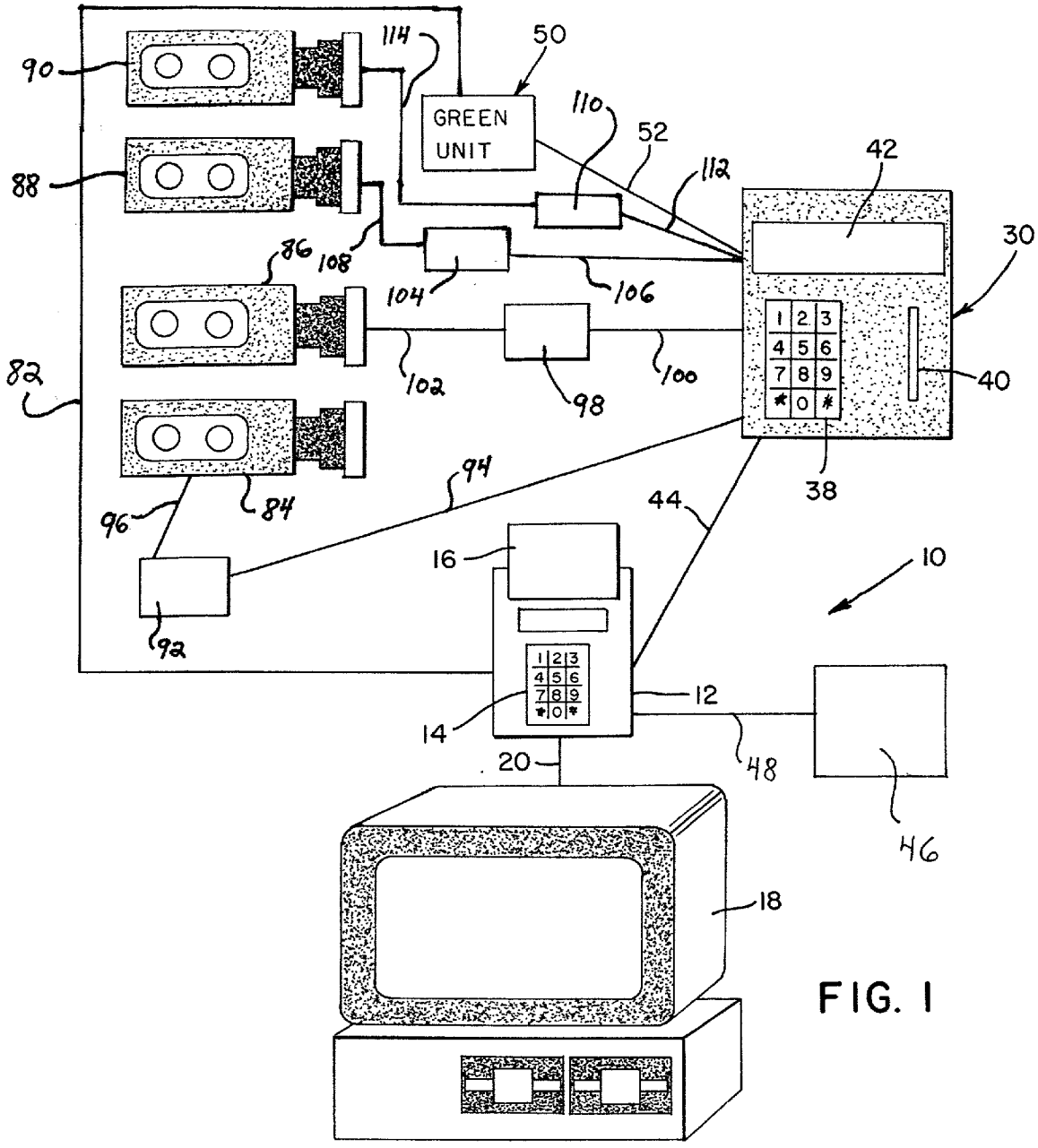

GREEN UNIT
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FIG. 1

FIG. 2

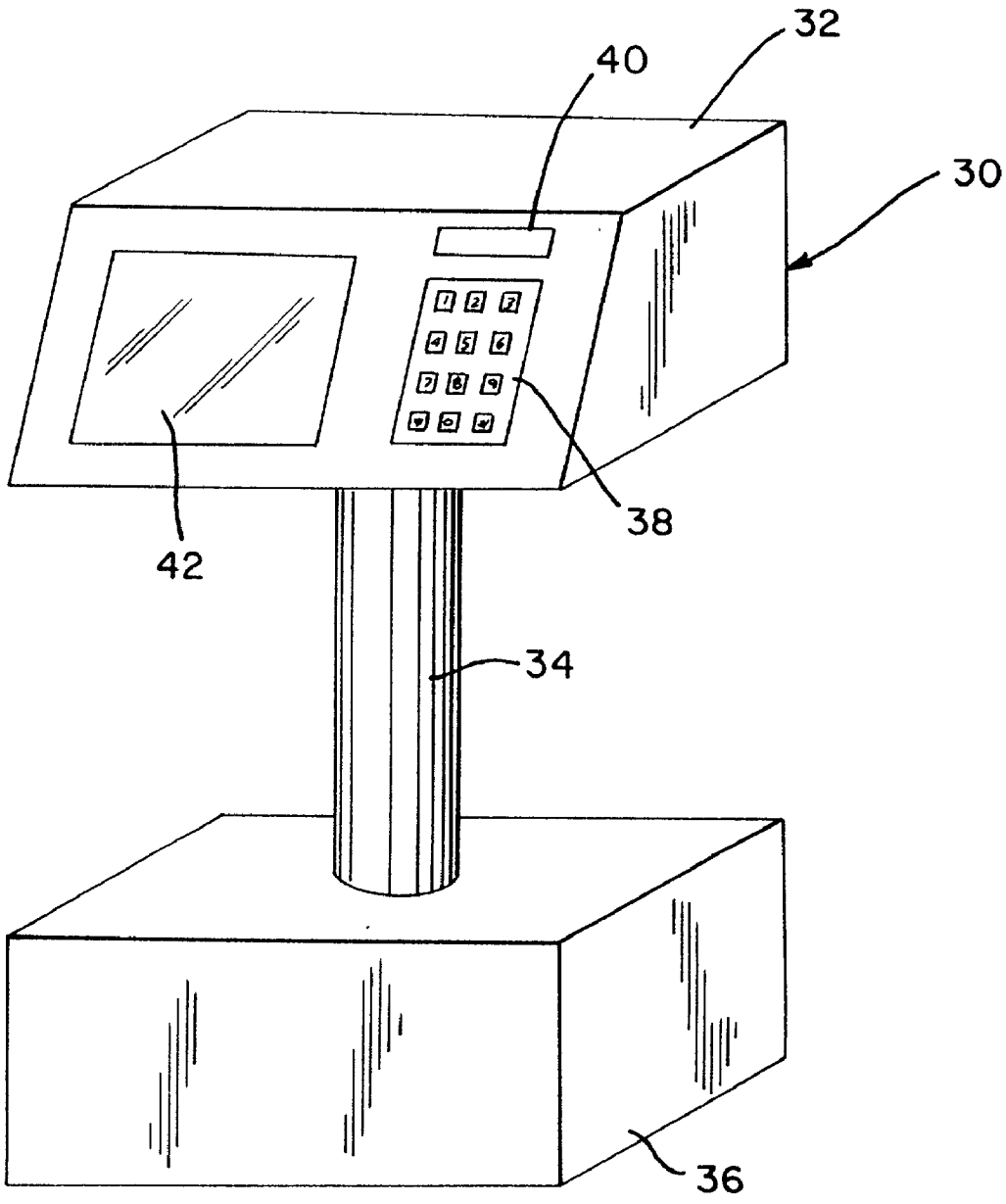
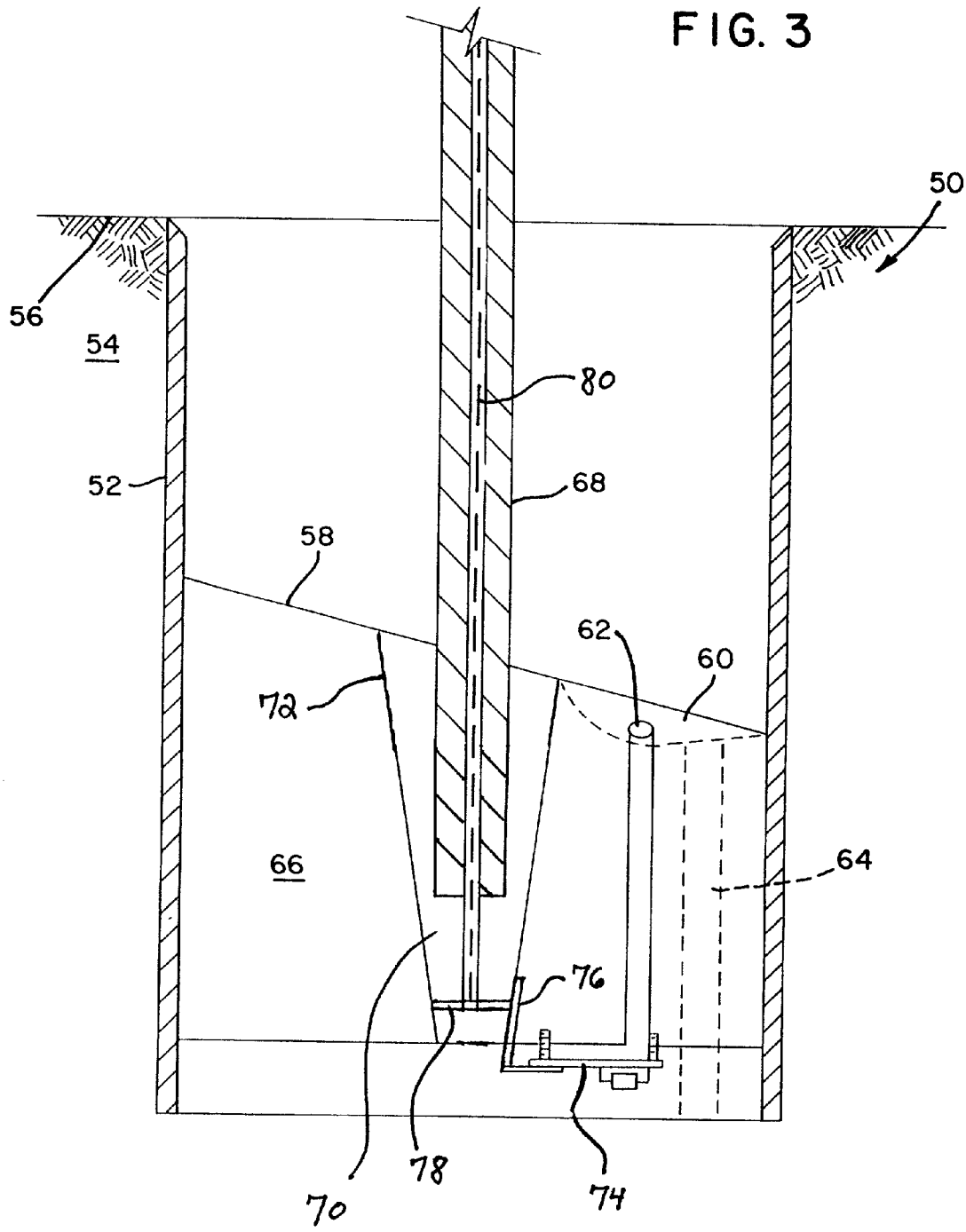


FIG. 3



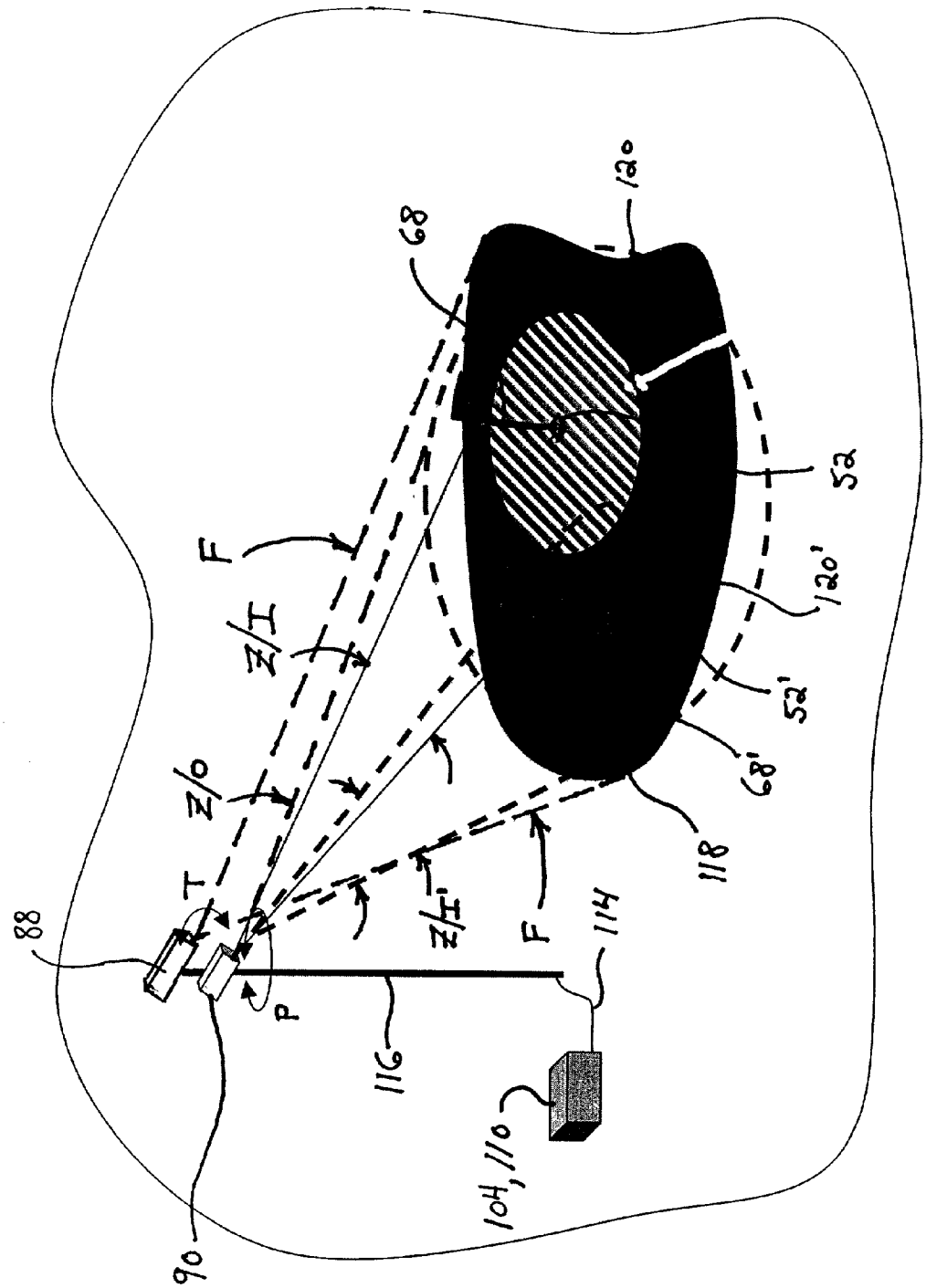



FIGURE 4

# GOLF TEE SHOT-GREEN PLACEMENT VIDEO/IMAGING CAMERA MONITORING AND MEASURING SYSTEM AND METHOD

## FIELD OF THE INVENTION

[0001] The present invention relates generally to amusement systems, and more particularly to a new and improved amusement system, and a method of operating the same, which is especially designed for use in connection with a golf course for monitoring the flight of individual golf tee shots from a predetermined or particular tee of the golf course, or from any one of a multitude of predetermined or particular tees of the golf course, onto a corresponding predetermined or particular one of the golf course greens so as to determine the presence of the tee shots upon the predetermined or particular green, so as to measure the distance of each tee shot golf ball from the cup of the predetermined or particular golf course green, and for determining the presence of golf ball tee shots which in fact have landed within the cup of the predetermined or particular golf course green as a hole-in-one tee shot, all as part of a contest of skill for which prize money and/or non-monetary prizes are awarded.

## BACKGROUND OF THE INVENTION

[0002] Over the years, particularly within recent times, and at least due in part to the emergence of a substantially large number of new, young, exciting, and competitive professional golfers upon the Professional Golfer Association (PGA) tour, golf has become one of the world's favorite and most widely played recreational activities. While most golfers will certainly agree that the sport is quite challenging, and in addition, at times quite frustrating, it is certainly, for the most part, very enjoyable and relaxing, which accounts for its extremely widespread popularity. As is often the case, however, even with the various challenges inherently integrated into the sport, it is almost natural for golfers, particularly for those golfers playing together as a group, such as, for example, within a foursome, to have a desire to pursue additional challenges or competition during their usual rounds of golf. This is particularly true if such an additional challenge or competition comprises a combination of skill, amusement, and the potential for remuneration, it having been additionally experienced that such an added challenge or competition further enhances or fosters friendship, camaraderie, and the like between the members of the group. It is necessary, however, that the aforenoted additional challenge or competition be capable of being integrally incorporated within the overall round of golf without upsetting the continuity of the round of golf for both participants and non-participants of the particular golf group, as well as with respect to other groups of golfers who may follow the particular group of golfers engaging in such additional challenge or competition.

[0003] What has been envisioned or contemplated by means of the present invention is the implementation and monitoring of a hole-in-one competition for a plurality of participating golfers playing within a defined or predetermined group of golfers, or even for a sole participating golfer, and concomitant therewith, the implementation and monitoring of a competition comprising golf tee shots, of one or more participating players, onto the green of a predetermined par-three hole of the golf course wherein the players will also be awarded a variety of prizes based upon both the presence of the tee shots upon the particular or predetermined green, as well as the distance of the tee shots from the hole or cup within a prescribed or predetermined region surrounding the hole or cup. A system similar to the aforenoted contemplated or envisioned system has been previously disclosed within U.S. Pat. No. 5,884,913 which is entitled GOLF TEE SHOT-GREEN PLACEMENT MONITORING SYSTEM and which issued on Mar. 23, 1999 to Daniel E. Cohen.

[0004] Briefly, as disclosed within the aforenoted patent, the system comprises three different units or sub-systems which are integrated together by means of suitable communication links. More particularly, the three different units or sub-systems comprise a first clubhouse base unit or sub-system which effectively manages or controls the operation of the overall system, a second tee unit or sub-system which is located at a predetermined or particular par-three hole of the golf course and which effectively initiates the operation of the system once a participating golfer has reached the predetermined or particular par-three hole of the golf course and has activated the tee unit or sub-system, and a third green unit or sub-system which is located upon the green of the predetermined or particular par-three hole of the golf course and which is activated by means of the second tee unit or sub-system so as to timely monitor the status of the incoming tee shots.

[0005] In connection with the green unit or sub-system, the cup of the predetermined or particular par-three hole of the golf course has been modified so as to integrally incorporate therein first detection means for detecting the presence of an incoming golf ball which would qualify as a hole-in-one. In addition, the flag pole operatively associated with the cup of the predetermined or particular parthree hole has also been modified so as to integrally incorporate therein second detection means for detecting the presence of incoming golf balls which effectively land upon the predetermined or particular green within predetermined distances from the cup. While the aforenoted patented system has been deemed quite satisfactory, it has been determined that the second detection means could desirably be improved so as to ensure enhanced accuracy in determining the disposition or location of the various golf balls upon the green and relative to the cup. For example, in view of the fact that the second detection means is integrally incorporated within the flag pole operatively associated with the cup of the predetermined or particular par-three hole, the effective field of view of such second detection means may sometimes be obscured or otherwise adversely affected by means of the particular terrain comprising the green of the predetermined or particular par-three hole. Consequently, a particular participant's golf ball may not in fact be detected by such detection means, or alternatively, the determination of the distance of such golf ball to the cup may be inaccurately skewed. In either case, the results of the contest may not be valid.

[0006] A need therefore exists in the art for a new and improved golf tee shot-green placement video camera monitoring and measuring system, and a method of operating the same, wherein in addition to the hole-in-one detection system, and in lieu of the monitoring and pin-closeness distance measurement system being located at a relatively low elevational position upon the green as a result of effectively being incorporated within the flag pole opera-

tively associated with the cup of the predeterminedly or particularly designated par-three hole, the monitoring and measuring system should be located at a relatively high elevational position, and at a location disposed adjacent to or off to one side of the green of the predeterminedly or particularly designated par-three hole, such that the monitoring and measuring equipment can firstly optically or visually view the entire green from a panoramic point of view so as to detect tee shots which have landed upon the green, such that the monitoring and measuring equipment can secondly be calibrated with respect to the pin and cup so as to be properly oriented with respect to the green regardless of the particular placement or location of the pin and cup upon the green, and such that the monitoring and measuring equipment can thirdly be operated with a limited field of view perspective so as to ensure the valid monitoring of the green area as well as the accurate measuring of the distances of the tee-shot golf balls from the cup of the predeterminedly or particularly designated par-three hole upon the particular golf course or playing surface.

## OBJECTS OF THE INVENTION

[0007] Accordingly, it is an object of the present invention to provide a new and improved golf tee-shot hole-in one detection, green presence, and pin-closeness distance measurement system, and a method of operating the same.

[0008] Another object of the present invention is to provide a new and improved golf tee-shot hole-in one detection, green presence, and pin-closeness distance measurement system, and a method of operating the same, wherein the golf tee-shot hole-in-one detecting, green presence, and pincloseness distance measurement system of the present invention can effectively overcome the various operational disadvantages characteristic of the PRIOR ART systems or apparatus.

[0009] An additional object of the present invention is to provide a new and improved golf tee-shot hole-in-one detection, green presence, and pin-closeness distance measurement system, and a method of operating the same, wherein the golf tee-shot hole-in one detection, green presence, and pin-closeness distance measurement system can be utilized to not only detect the presence of a hole-in-one golf tee shot, but in addition, can detect the presence of any tee shots upon the green as well as accurately determine the distances of golf balls, that have landed upon the green and within a predetermined distance, field, or range surrounding the hole or cup, from the cup.

[0010] A further object of the present invention is to provide a new and improved golf tee-shot hole-in-one detection, green presence, and pin-closeness distance measurement system, and a method of operating the same, wherein the golf tee-shot hole-in-one detection, green presence, and pincloseness distance measurement system can be utilized to initially optically or visually view the entire green from a panoramic point of view, and to secondly calibrate the system with respect to the pin and cup so as to properly orient the system with respect to the green regardless of the particular placement or location of the pin and cup upon the green.

[0011] A last object of the present invention is to provide a new and improved golf tee-shot hole-in-one detection, green presence, and pin-closeness distance measurement system, and a method of operating the same, wherein the golf tee-shot hole-in-one detection, green presence, and pincloseness distance measurement system can be utilized to initially optically or visually view the entire green from a panoramic point of view, to secondly calibrate the system with respect to the pin and cup so as to properly orient the system with respect to the green regardless of the particular placement or location of the pin and cup upon the green, and to thirdly operate with a limited field of view perspective so as to ensure the accurate measurement of the distances of the tee-shot golf balls from the cup of the predeterminedly or particularly designated par-three hole.

## SUMMARY OF THE INVENTION

[0012] The foregoing and other objectives are achieved in accordance with the teachings and principles of the present invention through the provision of a new and improved golf tee-shot hole-in-one detection, green presence, and pinclose-ness distance measurement system, and a method of operating the same, which basically comprises three different units or sub-systems interrelated or interconnected together by means of suitable communication lines. More particularly, the new and improved system of the present invention comprises a first base unit or sub-system which is located within the golf course club house, a second tee unit or sub-system which is located upon the tee of any predetermined or particularly designated three-par hole upon which the contest or tournament will be played, and a third green unit or sub-system which is located at any optically or visually advantageous position adjacent to the green of the predetermined or particularly designated three-par hole upon which the contest or tournament is being played. The base or club house unit or sub-system manages the operation of the entire system by initially issuing contest entry cards, transmitting data concerning a particular entry to the memory of a central computer as well as to the memory of the tee unit or sub-system located upon the tee of the predetermined or particularly designated three-par hole upon which the contest or tournament will be played, receiving data from the green unit or sub-system located upon the green of the predetermined or particularly designated three-par hole upon which the contest or tournament is being played, and ultimately processing all data so as to validate the results of a particular contest.

[0013] The tee unit or sub-system is activated by means of the contestant when the contestant arrives at the tee of the predetermined or particularly designated three-par hole upon which the contest or tournament is to be played, and in turn, activation of the tee unit or sub-system activates the green unit of the predetermined or particularly designated three-par hole upon which the contest or tournament will be played such that when the tee shot from the tee of the predetermined or particularly designated three-par hole upon which the contest or tournament is being played arrives at the green of the predetermined or particularly designated three-par hole upon which the contest or tournament is being played, the tee shot can be detected to either be physically within the cup either as a hole-in-one, or simply be at a location upon the green which is located in effect near the outer periphery of the green, or can be readily determined to be within a predetermined distance from the cup of the par-three hole. Data from the green unit or sub-system, concerning the particular tee shot and its result either as a hole-in-one, upon the outskirts of the green, or within a

predetermined distance from the cup, in addition to being transmitted to the memory of the central computer for ultimate validation and processing of the contest prize money, is also transmitted back to the tee unit so that the participant can readily appreciate or know the status of his or her tee shot. The computer located within the base or club house unit or sub-system is also utilized to control the cameras disposed at the green of the predetermined or particularly designated three-par hole upon which the contest or tournament will be played so as to properly calibrate the cameras with respect to, for example, the location of the pin or cup upon the green of the predetermined or particularly designated three-par hole upon which the contest or tournament is being played.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Various other objects, features, and attendant advantages of the present invention will be more fully appreciated from the following detailed description when considered in connection with the accompanying drawings in which like reference characters designate like or corresponding parts throughout the several views, and wherein:

[0015] **FIG. 1** is a schematic drawing illustrating the overall golf tee shot-green placement distance measurement system constructed in accordance with the principles and teachings of the present invention and showing the cooperative parts thereof;

[0016] **FIG. 2** is a front perspective view of a tee unit or sub-system component of the overall system of the present invention as illustrated within **FIG. 1** and as located at the tee of the predetermined or particularly designated three-par hole upon which the contest is being played;

[0017] **FIG. 3** is an elevational view, partly in cross-section, of the hole or cup component of the tee unit or sub-system as constructed in accordance with the principles and teachings of the present invention as illustrated within **FIG. 1** and as located upon the green of the predetermined or particularly designated three-par hole upon which the contest is being played; and

[0018] **FIG. 4** is a perspective view of the camera system located adjacent to the green of the predetermined or particularly designated three-par hole upon which the contest or tournament is being played.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0019] Referring now to the drawings, and more particularly to **FIG. 1** thereof, the new and improved golf tee shot-green placement measurement system constructed in accordance with the principles and teachings of the present invention is disclosed and is generally indicated by the reference character **10**. The system **10** has been constructed so as to, in effect, facilitate the operation and monitoring of a hole-in-one challenge or contest for participating golfers, wherein the hole-in-one challenge or contest is to be played upon one or more particularly or predeterminedly selected holes of a golf course upon which the system of the present invention has been installed. In conjunction with the hole-in-one challenge or contest, the system of the present invention also facilitates the operation and monitoring of auxiliary on-the-green and closest-to-the-pin challenges or contests for the participating golfers, wherein for those tee shots which do not comprise holes-in-one, such tee shots can nevertheless be considered to be winning tee shots, on a graduated scale, if the tee shots land either upon an outer peripheral or outskirt portion of the green of the particular or predeterminedly selected hole of the golf course or within predetermined distances from the hole or cup as may be pre-established in accordance with the rules of the challenge or contest.

[0020] The hole-in-one, on-the-green, and closest-to-the-pin challenges or contests are usually entered into by participating golfers prior to the commencement of their particular round of golf at a particular golf course upon which the system of the present invention has been installed, although this process may be altered as will be discussed hereinafter, and it is noted that for the purposes of the present invention, the golf course may comprise any type of golf course, or even a surface region upon which golf-type tee shots might be implemented, such as, for example, an eighteen-hole regulation golf course, a nine-hole golf course or round of golf, a driving range, a miniature golf course, a putting range, or the like. More particularly, in accordance with the operation of the both the hole-in-one, on-the-green, and closest-to-the-pin challenges or contests, if a particular golfer wants to participate in the challenges or contests, he or she would normally make such arrangements prior to the commencement of his or her round of golf. For example, at the time that the golfer is paying for his or her green fee within the club house, in preparation for starting his or her round of golf in accordance with his or her tee-off time, the golfer would pay, for example, an additional nominal charge or fee in return for which, if the golfer achieves a hole-in-one at the predetermined par-three hole of the golf course, or upon a designated hole of a putting green or a miniature golf course, he or she will receive predetermined prize money, or non-monetary prizes, commensurate with the amount of money he or she originally paid. For example, if the golfer originally pays a predetermined fee or charge and achieves a hole-in-one upon the predeterminedly selected par-three hole of the golf course, then the golfer will receive a predetermined monetary prize, or alternatively, a predetermined non-monetary prize, such as, for example, a new car, a vacation trip, and the like. Similar monetary or non-monetary prizes will be awarded, for example, upon a graduated scale, for on-the-green and closest-to-the-pin locations of the tee shots. It is of course to be further understood that the particularly established fees and prizes may be varied as determined by means of the management of the particular golf course upon which the system of the present invention has been installed. In addition, in accordance with management policies prevalent at a particular golf course or club, in lieu of the participating golfers paying an extra contest or challenge entry fee, such fees can in effect be included within the normal green fee that the club or golf course charges all golfers for playing upon its golf course.

[0021] Continuing still further, and as has been noted hereinbefore, for those tee shots that do not become holes-in-one, monetary and non-monetary prizes may also be awarded upon a graduated scale for those shots that land upon the outskirts or peripheral regions of the green or upon the green within specified distances from the hole or cup. For example, if the golfer initially paid a predetermined fee and if his tee shot simply lands upon, for example, an outskirt or peripheral region of the green, he would then be

paid a predetermined nominal amount of prize money or receive an appropriate non-monetary prize, however, if the golfer places his or her tee shot anywhere within ten feet from the cup or hole, the golfer would receive predetermined monetary or non-monetary prizes depending upon the distance of the shot from the hole or cup as measured in one-foot increments. Again, it is to be understood that the particularly established fees and prizes may be varied as determined by the management of the particular golf course upon which the system of the present invention has been installed.

[0022] It is to be further understood that other contests may be established or arranged by means of the golf course management. For example, in addition to daily hole-in-one, on-the-green, and closest-to-the-pin contests, an annual hole-in-one, on-the-green, and closest-to-the-pin contest may be held for all previous hole-in-one, on-the-green, and closest-to-the-pin winners who have won prizes within the past year. Alternatively, in connection with the closest-to-the-pin contests or challenges, it may be decided that a prize or payment may be awarded only to that golfer, within a participating group of golfers, for example, a foursome, whose tee shot was in fact closest to the pin. Still further, it may be decided that a prize or payment may be awarded only to that golfer who had the best or closest tee shot recorded upon the particular golf course within a particular day. Still yet further, contests may be held upon a local, regional, or national basis, between different golfers at different golf courses, as a result of the closest-to-the-pin data being entered into the particular golf course's computer memory, as will become more apparent hereinafter. In any case, it is to be understood that the present invention is not directed toward or meant to establish the particular rules, fees, or circumstances under which the particular prizes are to be awarded, but to the contrary, the present invention is directed toward a system for establishing, implementing, and monitoring the hole-in-one, on-the-green, and closest-to-the-pin contests or challenges.

[0023] Referring then again to **FIG. 1**, and in order to better understand and appreciate the structural arrangement of the various components comprising the present invention system **10**, it is to be initially noted that the system **10** of the present invention will be established or erected upon one or more predetermined par-three holes of the regulation golf course, or upon one or more particular holes of a putting green, miniature golf course, or the like. Accordingly, prior to the commencement of a round of golf, if a particular golfer, for example, chooses to participate in the hole-in-one, on-the-green, or closest-to-the-pin contest or challenge, then he or she will pay the aforenoted predetermined nominal fee in the golf course club house, if, in this instance, such entry fee is not already included within the normal green fee. In particular, the golf course club house may be provided with a computer terminal **12** which therefore issues the golfer a ticket, a card, or the like, with printed indicia or bar code information recorded thereon identifying the golf course, the golfer, the date and time, the golfer's tee-off time, the amount of money paid, and any other information which may be deemed pertinent or necessary in order to identify the particular golfer and to distinguish him or her from the other golfers. In particular, the club house computer terminal **12** may comprise a keypad **14** by means of which information may be inputted into the computer's memory, and a printer **16** by means of which a ticket or card, having the pertinent golf course and golfer information printed thereon either in alphanumeric form, a bar code, a magnetic strip, or the like, may be issued to the golfer. The information concerning the particular transaction with respect to the particular golfer is also transmitted by means of the club house computer **12** to a central computer **18** by means of any suitable conventionally available communication link or line **20**, such as, for example, a hardwire communication line, a wireless connection, a radio-frequency (RF) link, a fiber optic link, a satellite link, or the like, and it is noted that the central computer **18** may be located within the golf course club house, at another local location, or even at a remote national location by means of which different golf courses located within different regions of the country may be integrally connected.

[0024] With reference now being additionally made to **FIG. 2**, when the participating golfer arrives at any one of the particular predetermined or pre-selected par-three holes of the golf course upon which the challenge or contest, implemented by means of the system of the present invention, is to be played, he or she will approach a tee unit, generally indicated by the reference character **30**, which is located upon or immediately adjacent to the tee area of the afore-noted par-three hole. The tee unit **30** is seen to comprise a housing **32** within which a suitable computer data storage memory component, not shown, is disposed, and the housing **32** is fixedly mounted upon a standard **34** which, in turn, is fixedly mounted upon a base or foundation unit **36**. Housing **32** is provided with a keypad **38**, a reader **40**, which may be, for example, a bar code reader (BCR), an optical character recognition (OCR) reader, or the like, and a display window or screen **42**. A communication link or line **44**, similar to the communication link or line **20**, interconnects the club house computer terminal **12** to the tee unit computer terminal **32**, and in this manner, the information concerning the participating golfer and his golf contest or challenge participation, as originally appearing upon the ticket or card issued by means of the club house computer printer **16**, is transmitted to the computer terminal **32** of the tee unit **30**.

[0025] Accordingly, when the golfer is present upon the designated par-three hole tee, if the card or ticket he or she received from the club house computer terminal **12** is of the type comprising alphanumeric information, he or she can insert such information into the tee computer terminal **32** by means of keypad **38**. On the other hand, if the card or ticket contains a magnetic strip, bar code, or the like, the golfer may simply insert the card or ticket within the tee unit card reader **40**. In either case, the computer memory of the tee unit computer **32** will receive such inputted data, compare such data with the information previously transmitted thereto by means of communication link or line **44**, and validate the data so as to thereby permit the golfer to participate in the challenge or contest. It is also noted that the card reader **40** can accept credit cards, for example, whereby if a particular golfer decides to enter the contest or challenge, but did not previously pay his entry fee, if required, while he or she was in the club house, the particular golfer can nevertheless enter or participate in the contest or challenge. In either case, the display window or screen **42** provides verification to the golfer that his or her information has been properly entered into and validated by the system and that he or she is therefore cleared to proceed with his or her tee shot in connection with the contest or challenge. In

addition, the information concerning the particular golfer and his associated validated information is transmitted back to the club house computer terminal **12** by means of the aforenoted communication link or line **44** whereby suitable information concerning the particular golfer can be displayed within the club house upon a suitable display or board **46** whereby, for example, people within the club house can be aware and keep track of the status of the particular con-tests or challenges, display or board **46** being in communication with the club house computer terminal **12** by means of a suitable communication link **48**. It is lastly noted that both the display window or screen **42** at the tee, as well as the display or board **46** within the club house, can also display advertising material when not being used in connection with the display of contest or challenge information.

[**0026**] Substantially simultaneously with, and a result of, the aforenoted verification and validation of the participating golfer's credentials at the tee unit or sub-system **30**, the tee unit or sub-system **30** will activate a green unit **50** through means of a communication link or line **52**, and it is seen that the green unit **50** comprises several different units or components which are located upon and adjacent to the green of the predetermined or preselected par-three hole of the golf course. The tee unit or sub-system **30** will maintain the green unit **50** active for a predetermined period of time sufficient enough for the golfer present at the tee area to hit his tee shot, for the tee shot to reach the green area, and for the various units or components of the green unit or sub-system **50** to detect the presence of the tee shot upon the green. The green unit or sub-system **50** is schematically illustrated within **FIG. 1**, while the details of the green unit or sub-system **50** are illustrated within **FIGS. 3 and 4**.

[**0027**] More particularly, the first component of the green unit or sub-system **50** comprises a cup member **52** which is similar to a conventional golf course green cup defining a golf course green hole, however, the cup member **52** of the present invention has been modified for the purposes of the present invention. The cup member **52** is fixedly mounted within the ground **54** so as to be disposed below ground level **56**, and inside the cup member **52**, there is disposed an inclined ramp or surface member **58**. At the lower end portion or side of the inclined ramp or surface member **58**, there is provided a substantially semi-circular recessed portion or pocket **60**. In this manner, when a golf ball enters the cup member **52**, regardless of the circumferential position at which the golf ball initially enters the cup member **52**, the ball will roll under the influence of gravity toward the recessed portion or pocket region **60** so as to be seated therein. The lowest point of the recessed portion or pocket region **60** has operatively associated therewith a photodetector aperture **62**, in connection with which there is provided a suitable photodetector, not shown, and accordingly, when a golf ball enters the cup member **52**, its presence can in fact be readily detected by means of the photodetector. Accordingly, when, for example, the tee shot of a participating golfer enters the cup member **52** and is detected by means of the photodetector, the photodetector can readily verify the status of the tee-shot as a hole-in-one. In order to maintain the cup member **52** free of any accumulated rain water, for example, the cup member **52** is further provided with a plurality of drain holes, only one of which is shown at **64**. It is also to be appreciated that in lieu of a photodetector, any other suitable means may be employed within the cup member **52** for detecting the presence of the golf ball there within, such as, for example, a suitable solenoid mechanism.

[**0028**] Still further, a flag pole holder assembly is provided for use in connection with the cup member **52**, and the flag pole holder assembly comprises a base member **66** fixedly mounted within the lower portion of the cup member **52**. The lower end portion of the flag pole is disclosed at **68** and extends vertically upwardly from the base member **66**, and the lower end portion **68** of the flag pole is fixedly mounted within a substantially frustoconically shaped support member **70** which is adapted to be removably mounted within a similarly shaped aperture portion **72** formed within the central portion of the base member **66**. The upper surface portion of the base member **66** is seen to comprise a major portion of the inclined ramp member or surface portion **58**, and in a similar manner, when the flag pole support member **70** is properly mounted within the base member aperture **72**, the upper surface portion of the flag pole support member **70** likewise forms a minor central portion of the inclined ramp member or surface portion **58**. A printed circuit board **74** is operatively associated with the aforenoted photodetector, not shown, and suitable electrical connectors **76,78** are operatively mounted upon the base member **66** and the flag pole support member **70**. Electrical connector **78** is in turn elecrically connected as at **80** to a suitable communication unit or transmitter, not shown, which is adapted to communicate with a computer unit integrally incorporated within the green unit or sub-system **50**. It is thus readily apparent that the entire cup **52** and flagpole assembly **68** comprises, in effect, an integral unit which may be moved from location to location upon the green of the particularly or predeterminedly designated par-three hole as is conventionally done by means of golf course greens-keeper personnel.

[**0029**] It is further noted that green unit or sub-system **50** is, in turn, adapted to be disposed in communication with the club house computer terminal **12** by means of a communication link or line **82**, and in this manner, for example, hole-in-one results occurring at the particular or predetermined par-three hole green may be transmitted to the club house computer terminal **12** such that the results may be recorded within the memory of the club house computer **12** as well as being displayed upon the aforenoted display or board **46** within the club house such that people in the club house can be aware of the contest or challenge results in a manner similar to people checking the leader board at nationally televised golf tournaments. In addition, such results are also transmitted back to the tee unit **30** by means of communication line or link **52** for display upon screen **42** so as to inform the golfer of the results of his or her tee shot, and such results are likewise transmitted from the club house computer **12** to the central computer **18** by means of the communication line or link **20**. It is also noted that in connection with all of the equipment or communication components comprising the present invention, electrical power may be provided by means of conventional power lines and facilities adjacent to or upon the particular golf course, or alternatively, the various components comprising the entire system **10** may be provided with electrical power by means of suitable rechargeable batteries, not shown, incorporated within the various units of the system. For example, batteries may be physically incorporated within the base unit **36** of the tee unit **30**, or within a particular one

of the components of the green unit **50**, the details of which will be more fully explained hereinafter.

[**0030**] With reference still being made to **FIG. 1**, it is further seen that in accordance with the teachings and principles of the present invention, a plurality of cameras **84**, **86**,**88**,**90** are disposed within the vicinity of both the tee and green regions of the particular predetermined par-three hole of the golf course upon which the contest or challenge is being conducted in order to not only monitor the contest or challenge, but in addition, to accurately measure the distance of the various tee shots which land upon the green area as effective entries within the contest or challenge. More particularly, the first one of the cameras **84** is adapted to be disposed within the vicinity of the tee area and has operatively associated therewith a camera controller **92** which is operatively connected to the tee unit **30** by means of a suitable communication line or link **94**. The camera controller **92** is, in turn, operatively connected to the camera **84** by means of a suitable communication line or link **96**, and in this manner, the camera **84** can be activated by means of the tee unit **30** when the participating golfer initiates the operation of the tee unit **30** by means of his credentials. In particular, camera **84** may be utilized to, for example, televise and videotape the outbound tee shot of the participating golfer with respect to the tee area. Obviously, the televised flight of the golf ball tee shot can be viewed back in the club house upon the display or board **46**, or suitable television monitors, not shown, such that, again, people within the club house can be aware of the status of the particular golfers participating within the various contests or challenges.

[**0031**] In a similar manner, the second one of the cameras **86** is adapted to be disposed within the vicinity, but just outside, of the green area so as not to interfere with the incoming tee shots, and has operatively associated therewith a camera controller **98** which is also operatively connected to the tee unit **30** by means of a suitable communication line or link **100** so as to be activated by means of the tee unit **30** in preparation for a tee shot to be shortly made by a participating golfer. The camera controller **98** is, in turn, operatively connected to the camera **86** by means of a suitable communication line or link **102**, and in this manner, the camera **86** can be activated by means of the tee unit **30** so as to be utilized to, for example, televise and videotape the inbound tee shot of the participating golfer with respect to the green area. Obviously, again, the televised flight of the golf ball tee shot can be viewed back in the club house upon the display or board **46** or upon suitable television monitors, not shown, such that people within the club house can be aware of the status of the particular golfers participating within the various contests or challenges.

[**0032**] Continuing still further, the third one of the cameras **88** is also adapted to be disposed within the vicinity, but just outside, of the green area so as not to interfere with the incoming tee shots, and has operatively associated therewith a camera controller **104** which is also operatively connected to the tee unit **30** by means of a suitable communication line or link **106** so as to be activated by means of the tee unit **30** when the participating golfer has activated the tee unit **30**. The camera controller **104** is, in turn, operatively connected to the camera **88** by means of a suitable communication line or link **108**, and in this manner, the camera **86** can be activated by means of the tee unit **30** so as to be utilized to, for example, continuously televise and videotape the green area from a panoramic perspective or point of view. More particularly, the third camera **88** serves two functions. Firstly, camera **88** provides visual security with respect to the entire green area, particularly in combination with the first and second video cameras **84**,**86**, so as to effectively prevent any fraudulent disposition or appearance of any golf balls upon the green area other than those legitimately shot from the tee area by means of the participating golfers. Secondly, third camera **88** can detect the presence of tee shots which have landed, for example, upon the outskirts or peripheral regions of the green whereby such tee shots can in fact qualify for prizes which have not landed upon the green within predeterminedly specified distances from the cup, or which have not been holes-in-one, and data concerning such on-the-outskirt green tee shots can be transmitted to the computer integrally incorporated within the green unit **50**. Again, the images of third camera **88** can also be transmitted back to the club house for viewing by the public upon display or board **46**, or television monitors, not shown.

[**0033**] Lastly, the fourth camera **90** is also adapted to be disposed within the vicinity, but just outside, of the green area so as not to interfere with the incoming tee shots, and has operatively associated therewith a camera controller **110** which is also operatively connected to the tee unit **30** by means of a suitable communication line or link **112** so as to be activated by means of the tee unit **30** when a tee shot is about to be driven by means of a participating golfer. The camera controller **110** is, in turn, operatively connected to the camera **90** by means of a suitable communication line or link **114**, and in this manner, the camera **90** can be activated by means of the tee unit **30** so as to be utilized to, for example, televise and videotape the disposition of the tee shots of the participating golfers upon the green area and with respect to the hole or cup **52**. Most importantly, the camera **90** comprises suitable computer programming which enables the camera **90** to accurately measure the respective distances of the various golf ball tee shots from the hole or cup **52**. Again, the video images of fourth camera **90** can also be transmitted back to the club house for viewing by the public upon the display or board **46**, or upon auxiliary television monitors, not shown.

[**0034**] As can be better appreciated from **FIG. 4**, both of the cameras **88**,**90** are mounted upon a vertical standard **116** located off to one side of the green **118** and can be respectively controlled by means of their camera controllers **104**, **110** so as to achieve tilt adjustments as schematically indicated by means of the double-headed arrow T as well as panning adjustments as schematically indicated by means of the double-headed arrow P. Camera **88** can therefore be suitably adjusted so as to in fact properly encompass the entire field of view, as schematically noted by the arrows F, of the green whereby detection of tee shots upon the outskirts or peripheral regions of the green can be achieved. Camera **90** is further able to achieve zoom-in/zoom-out movements whereby, for example, when the camera **90** is disposed in its zoom-out mode, the camera **90** is capable of encompassing or viewing a relatively wide field of view as denoted by means of the arrows Z/O, whereas when the camera **90** is disposed in its zoom-in mode, the camera **90** is capable of encompassing or viewing a relatively narrow field of view as denoted by means of the arrows Z/I. Accordingly, when the camera **90** is disposed in its zoom-out

mode, and is also moved in its tilting and panning modes T,P, it is capable of in effect viewing the entire green area **118** so as to be able to detect the particular location or placement of the cup or hole **52** and the associated flag pole **68**. As is well-known in golf, the cup or hole **52**, and the associated flag pole **68**, are moved, upon a predetermined cyclical basis as conventionally determined by means of golf course management personnel, between different green positions or locations **52,52',68,68'**. Accordingly, in properly positioning or orienting the camera **90** in connection with a current round of golf and the particular contest or challenge, the zoom-out, panning, and tilting modes permit the camera **90** to in fact be initially calibrated by detecting the current position or location of the cup or hole **52,52'** and the flag pole **68,68'**. Once the cup or hole **52,52'** and the flag pole **68,68'** have in fact been detected, the camera **90** is locked in such position with respect to its tilting and panning movements T,P, with the cup and pin location effectively centered within the camera's field of view, and subsequently, the camera **90** is shifted to its zoom-in mode whereby the camera **90** will then view that area of the green **120,120'** which surrounds the cup or hole **52,52'** and the flag pole **68,68'** and within which the tee shots must land to be considered valid entries in the closest-to-the-pin contest. It is to be noted that while the camera **90**, for example, has been noted or described as being a video camera, any other similarly operative visual or optical implement can of course be employed as long as such is capable of, for example, visually measuring or determining the distances of the golf ball tee shots from the cup or hole **52,52'**.

[**0035**] One mode of operation that is contemplated in accordance with the use of such distance-measuring video cameras **90** is to incorporate appropriate or suitable software therewithin which effectively superimposes, for example, a geometrical grid over the viewed green area **120,120'** wherein, as is known, the grid comprises rows and columns of pixels. As is further well known, since there is a finite number of pixels per inch, when the software of the camera determines the number of pixels that exist, for example, between the particular golf ball detected upon the defined green area **120,120'** and the cup or hole **52,52'**, such information can be readily converted into distance measurements. The camera **90** and its software can of course differentiate or distinguish between the different golf balls upon the green area **120,120'**, and their relative positions with respect to each other, whereby the particular location or distance of each golf ball from the cup or hole **52,52'** can be readily determined, put into the memory of the computer of the green unit **50** for transmission, in turn, back to the tee unit **30** for display upon the screen **42**, as well as into the club house computer **12**, the club house display monitor or board **46**, and the like. Such information can of course be transmitted from the camera **90** to the club house computer **12**, as well as to the central computer **18**, by any wired or wireless links or lines similar to those previously discussed in connection with the various connections defined, for example between the club house computer **12**, central computer **18**, the tee unit **30**, the green unit **50**, and the like. Still further, it is to be understood that in lieu of the aforenoted pixel-grid distance measuring format, suitable ultrasonic, triangulation, or similar techniques may likewise be employed. Sensors may even be employed to detect predetermined frequency signals transmitted from the golf balls.

[**0036**] Thus, it may be seen that in accordance with the principles and teachings of the present invention, there has been disclosed a new and improved golf tee shot-green placement monitoring and measuring system wherein, in addition to the provision of a plurality of cameras for monitoring the outbound tee shot from the tee, the inbound tee shot to the green, and a panoramic view of the green to ensure the valid placement of tee shots upon the green, including contest-winning tee shots that have landed upon an outskirt or peripheral region of the green, a fourth camera is provided for actually facilitating or accomplishing the measurement of the distances of tee shots, which have landed upon the green, from the cup or hole in conjunction with a closest-to-the-pin contest or challenge among participating golfers. The camera is initially calibrated in a zoom-out mode so as to detect the presence and location of the cup or hole, and its associated pin, the camera is then positionally locked upon such location with the cup or hole, and the associated pin, at the center of the camera's field of view, and the camera is then operated in a zoom-in mode such that the camera's field of view is now narrowed to a region of the green within which the tee shots must be placed in order to be valid entries into the closest-to-the-pin contest or challenge. In addition to the aforenoted on-the-green and closest-to-the-pin contests or challenges, the apparatus or system of the present invention also comprises hole-in-one detection components.

[**0037**] Obviously, many variations and modifications of the present invention are possible in light of the foregoing teachings. It is therefore to be understood that within the scope of the appended claims, the present invention may be practiced otherwise than as specifically described herein.

What is claimed as new and desired to be protected by Letters Patent of the United States of America, is:

**1**. A golf tee shot-green placement measurement system, for use in connection with golf challenge contests, comprising:

a golf ball cup member disposed upon a predetermined green area of a predetermined hole of a golf region upon which golf balls can be shot; and

means disposed adjacent to, but outside of, said predetermined green area of said predetermined hole of said golf region for measuring the distance of a golf ball, hit from the tee of said predetermined hole of said golf region and disposed upon said predetermined green area of said predetermined hole of said golf region, from said golf ball cup member so as to determine closest-to-the-pin golf challenge contest results.

**2**. The system as set forth in claim 1, wherein:

said distance measuring means comprises a device selected from the group comprising a video camera, visual equipment, and optical implement.

**3**. The system as set forth in claim 2, wherein:

said video camera has software incorporated therein which effectively superimposes a grid, comprising rows and columns of pixels, over said predetermined green area of said predetermined hole of said golf region so as to measure the distance of the golf ball from said golf ball cup member in accordance with a predetermined number of pixels per inch of distance.

4. The system as set forth in claim 2, wherein:

said video camera is mounted upon a vertically oriented standard; and

a camera controller is operatively connected to said video camera for moving said video camera within vertically oriented tilting modes, horizontally oriented panning modes, and zoom-in/zoom-out field-of-view modes for adjusting the fields of view of said video camera with respect to said green area of said predetermined hole of said golf region.

5. The system as set forth in claim 1, further comprising:

means operatively associated with said green area of said predetermined hole of said golf region for detecting the presence of a golf ball as being upon an outskirt portion of said green area of said predetermined hole of said golf region.

6. The system as set forth in claim 1, further comprising:

means disposed upon said tee of said predetermined hole of said golf region for activating said measuring means disposed adjacent to, but outside of, said predetermined green area of said predetermined hole of said golf region for a predetermined time period which extends for a sufficient time for said golfer to drive his tee shot from said tee area of said predetermined hole of said golf region, for said tee shot to land upon said predetermined green area of said predetermined hole of said golf region, and for said measuring means to measure the distance of the golf ball, hit from said tee of said predetermined hole of said golf region and disposed upon said predetermined green area of said predetermined hole of said golf region, to said golf ball cup member.

7. The system as set forth in claim 6, wherein:

said activating means is operatively connected to said measuring means by means of a communication link.

8. The system as set forth in claim 7, wherein:

said communication link is se elected from the group comprising a hardwire, a wireless, a radio frequency, a satellite link, and a fiber optic communication link.

9. The system as set forth in claim 1, further comprising:

means disposed upon said predetermined green area of said predetermined hole of said golf region for determining the condition placement of said tee shot as being within said golf ball cup member as a hole-in-one.

10. The system as set forth in claim 9, wherein:

said means for determining said tee shot as a hole-in-one comprises is disposed within said golf ball cup member and is selected from the group comprising a photodetector and a solenoid mechanism.

11. The system as set forth in claim 6, further comprising:

first computer means disposed within a club house of said golf region for issuing a ticket card, having encoded data thereon with respect to the golfer, to the golfer for enabling the golfer to participate in a hole-in-one contest comprising placing said tee shot directly within said golf ball cup member, for enabling the golfer to participate in an on-the-green contest comprising placing said tee shot upon an outskirt portion of said green area, and for enabling the golfer to participate in a closest-to-the-pin contest comprising placing said tee shot within a specified distance from said golf ball cup member;

second computer means disposed upon said tee area for accepting said encoded data from said ticket card, for comparing said accepted encoded data with said encoded data disposed within said first computer means, and for validating said ticket card whereby said second computer means can activate said measuring means disposed upon said green area; and

third computer means disposed upon said green area for recording data concerning tee shots as holes-in-one, upon outskirt portions of said green area, and within predetermined distances from said golf ball cup member.

12. The system as set forth in claim 11, wherein:

said first, second, and third computer means are operatively connected to each other by communication links selected from the group comprising a hardwire, a wireless, a radio frequency, a satellite, and a fiber optic communication link.

13. The system as set forth in claim 3, further comprising:

a second video camera disposed adjacent to said tee area for visually tracking said tee shot outbound from said tee area;

a third video camera disposed adjacent to said green area for visually tracking said tee shot inbound to said green area; and

a fourth video camera disposed adjacent to said green area for monitoring said green area in a panoramic mode so as to ensure that any golf balls disposed upon said green area comprise only legitimate tee shots from said tee area to said green area so as to qualify as on-the-green tee shots.

14. The system as set forth in claim 11, further comprising:

display means disposed within said club house and upon said tee area for displaying contest data when golfers are participating in a contest upon said predetermined hole of said golf region, and for displaying advertising material when golfers are not participating in a contest upon said predetermined hole of said golf region.

15. A method for measuring the distance of a golf tee shot when said golf tee shot lands upon a green area of a hole of a golf region for use in connection with closest-to-the-pin golf challenge contests, comprising the steps of:

providing a golf ball cup member disposed upon a predetermined green area of a predetermined hole of a golf region; and

using means, disposed adjacent to, but outside of, said predetermined green area of said predetermined hole of said golf region, to measure the distance of a golf ball, hit from the tee of said predetermined hole of said golf region and disposed upon said predetermined green area of said predetermined hole of said golf region, from said golf ball cup member so as to determine closest-to-the-pin golf challenge contest results.

**16**. The method as set forth in claim 15, further comprising the steps of:

using, as said distance measuring means, a device selected from the group comprising a video camera, visual equipment, and optical implement.

**17**. The method as set forth in claim 16, further comprising the step of:

using a video camera as said means for measuring said distance of said golf ball tee shot, disposed upon said green area of said predetermined hole of said golf region, from said golf ball cup holder.

**18**. The method as set forth in claim 17, further comprising the steps of:

disposing said video camera in a zoom-out mode;

tilting and panning said video camera while in said zoom-out mode so as to detect the location of said golf ball cup holder and an associated flag pole;

locking said video camera in position so as to center said golf ball cup member and said flag pole within the field of view of said video camera; and

disposing said video camera in a zoom-in mode so as to narrow said field of view of said video camera to a predetermined field of view within which golf balls must be located so as to qualify as entries in said closest-to-thepin golf challenge contest.

**19**. The method as set forth in claim 17, further comprising the step of:

incorporating software within said video camera for effectively superimposing a grid, comprising rows and columns of pixels, over said predetermined green area of said predetermined hole of said golf region so as to measure the distance of the golf ball from said golf ball cup member in accordance with a predetermined number of pixels per inch of distance.

**20**. The method as set forth in claim 15, further comprising the steps of:

using first computer means disposed within a club house of said golf region for issuing a ticket card, having encoded data thereon with respect to the golfer, to the golfer for enabling the golfer to participate in a hole-in-one contest comprising placing said tee shot directly within said golf ball cup member, for enabling the golfer to participate in an on-the-green contest comprising placing said tee shot upon an outskirt portion of said green area, and for enabling a golfer to participate in a closest-to-the-pin contest comprising placing said tee shot within a specified distance from said golf ball cup member;

using second computer means disposed upon said tee area for accepting said encoded data from said ticket card, for comparing said accepted encoded data with said encoded data disposed within said first computer means, and for validating said ticket card whereby said second computer means can activate said measuring means disposed upon said green area; and

using third computer means disposed upon said green area for recording data concerning tee shots as holes-in-one, upon outskirt portions of said green area, and within predetermined distances from said golf ball cup member.

**21**. The method as set forth in claim 20, further comprising the step of:

operatively interconnecting said first, second, and third computer means to each other by communication links selected from the group comprising a hardwire, a wireless, a radio frequency, a satellite, and a fiber optic communication link.

**22**. The method as set forth in claim 17, further comprising the step of:

using a second video camera disposed adjacent to said tee area for visually tracking said tee shot outbound from said tee area;

using a third video camera disposed adjacent to said green area for visually tracking said tee shot inbound to said green area; and

using a fourth video camera disposed adjacent to said green area for monitoring said green area in a panoramic mode so as to ensure that any golf balls disposed upon said green area comprise only legitimate tee shots from said tee area to said green area so as to qualify as on-the-green tee shots.

**23**. The method as set forth in claim 19, further comprising the step of:

displaying contest data upon display means disposed within said club house and upon said tee area when golfers are participating in a contest upon said predetermined hole of said golf region, and displaying advertising material upon said display means when golfers are not participating in a contest upon said predetermined hole of said golf region.

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