Oct. 14, 1969 H. LOEWENSTERN, JR 3,472,333

REMOTE CONTROLLED WHEELED GOLF CLUB CARRIER

Filed April 25, 1967 4 Sheets-Sheet 1

FIG. 1

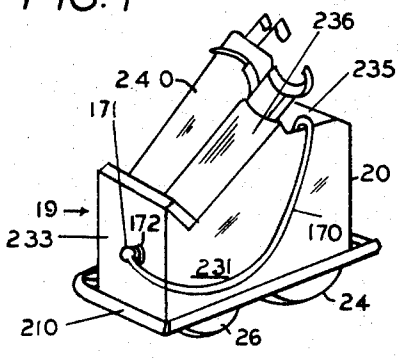


FIG. 2

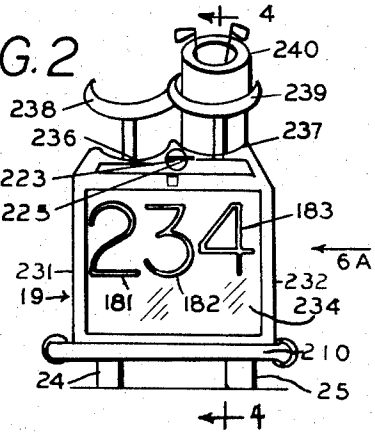


FIG. 3

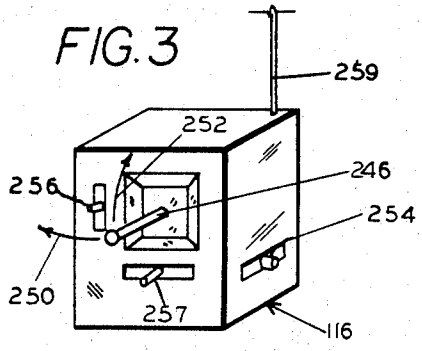


FIG. 4

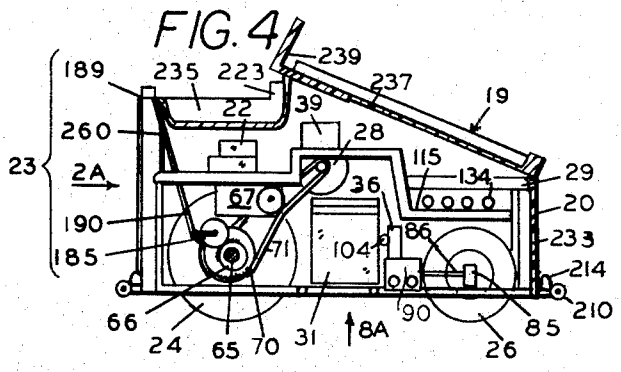


FIG. 5

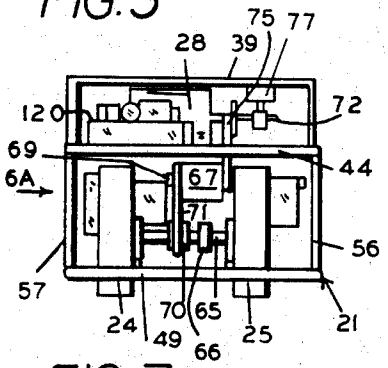


FIG. 6

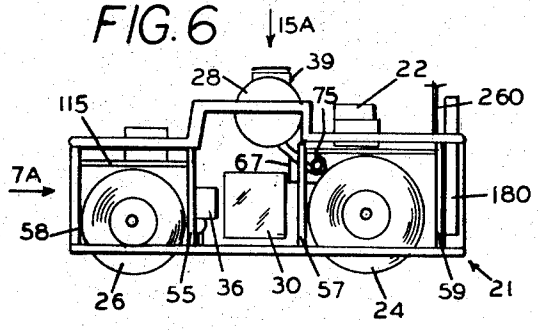
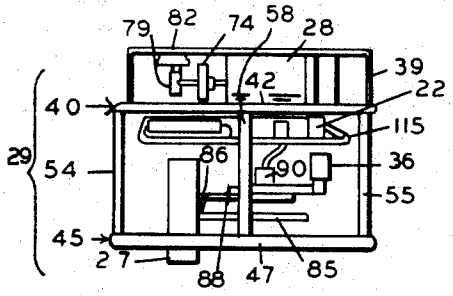


FIG. 7



HUGO LOEWENSTERN JR.
INVENTOR.

BY

Ely Silverman
ATTORNEY

Oct. 14, 1969 H. LOEWENSTERN, JR 3,472,333

REMOTE CONTROLLED WHEELED GOLF CLUB CARRIER

Filed April 25, 1967 4 Sheets-Sheet 2

FIG. 8

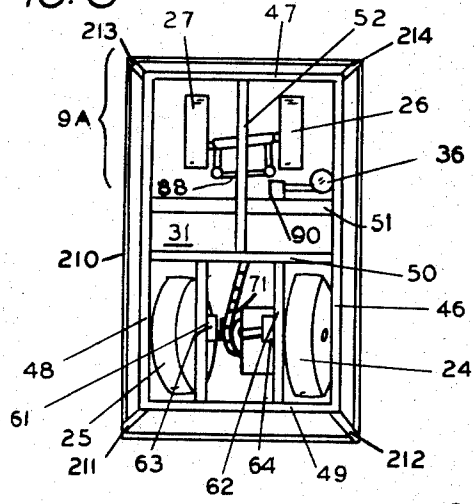


FIG. 11

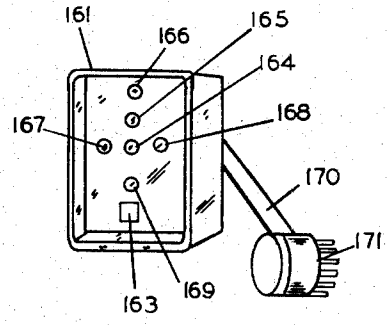


FIG. 9

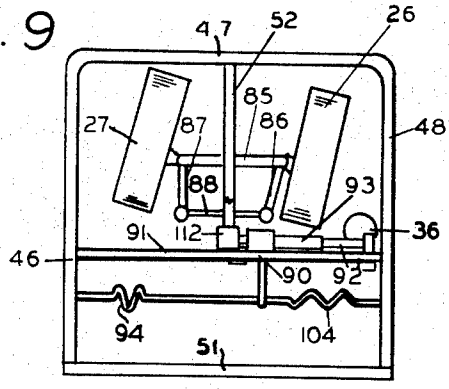


FIG. 12

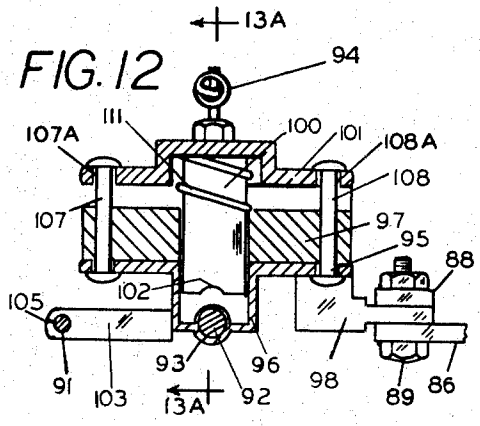


FIG. 10

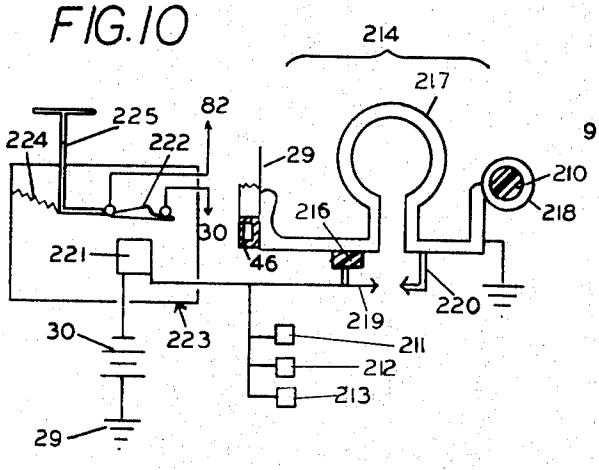
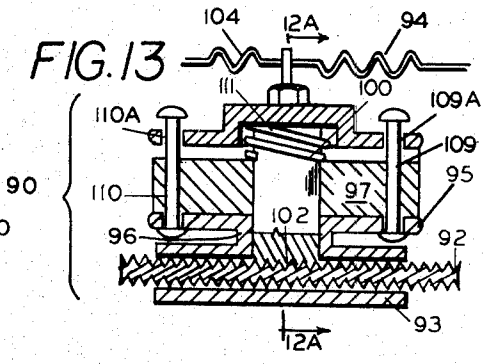


FIG. 13



HUGO LOEWENSTERN, JR.
INVENTOR.

BY Ely Silverman

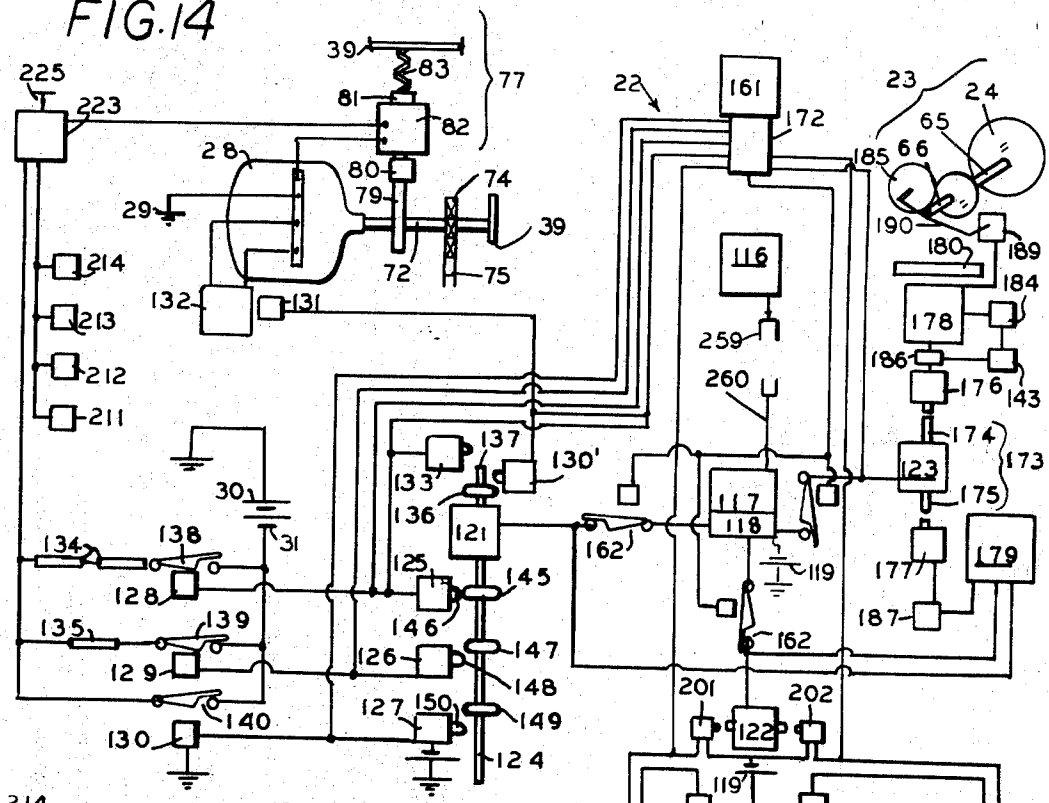
ATTORNEY

Oct. 14, 1969 H. LOEWENSTERN, JR 3,472,333

REMOTE CONTROLLED WHEELED GOLF CLUB CARRIER

Filed April 25, 1967 4 Sheets-Sheet 3

FIG. 14



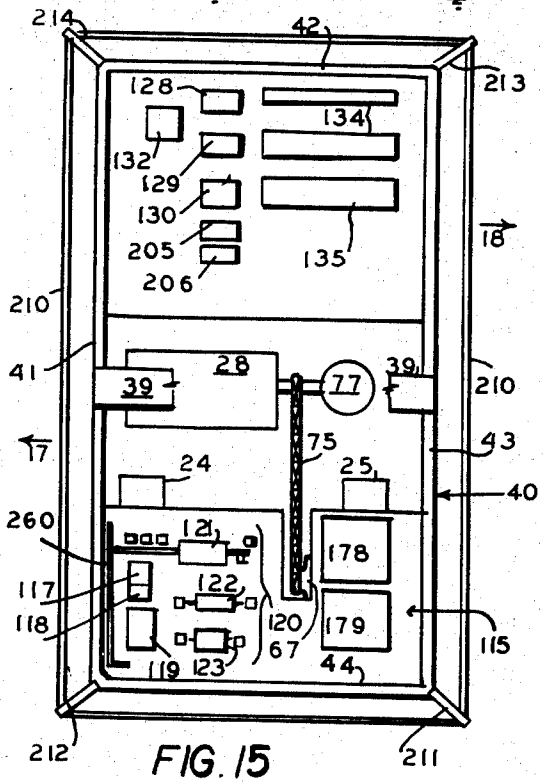


FIG. 15

HUGO LOEWENSTERN JR.
INVENTOR.

BY

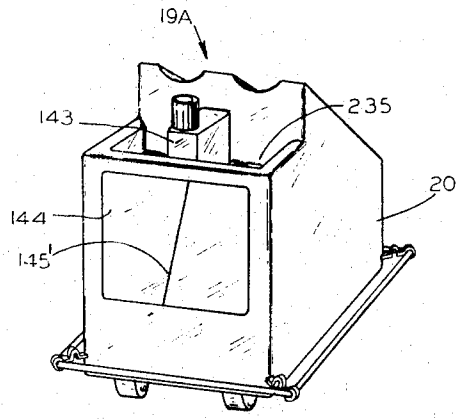
Ely Silverman
ATTORNEY

Oct. 14, 1969 H. LOEWENSTERN, JR 3,472,333

REMOTE CONTROLLED WHEELED GOLF CLUB CARRIER

Filed April 25, 1967 4 Sheets-Sheet 4

FIG. 16



HUGO LOEWENSTERN JR.
INVENTOR.

BY

Ely Silverman
ATTORNEY

United States Patent Office 3,472,333
Patented Oct. 14, 1969

3,472,333

REMOTE CONTROLLED WHEELED GOLF CLUB CARRIER

Hugo Loewenstern, Jr., 111 Parkview, P.O. Box 9009, Amarillo, Tex. 79106

Filed Apr. 25, 1967, Ser. No. 639,922
Int. Cl. B60k 27/00, 1/00; B62d 5/00
U.S. Cl. 180—98 5 Claims

ABSTRACT OF THE DISCLOSURE

A self propelled mobile carriage incorporating therein radio means for control of such carriage by its operator at a remote distance as well as at close distance without radio control and means for gathering intelligence and, on command by the operator, to provide that intelligence to the operator, said carriage also adapted to carry golf clubs.

One object of this invention is to provide an improved golf club carrier which is operable at a distance from the operator for motion to and from locations as directed by the operator.

Yet another object of this invention is to provide an apparatus which gathers intelligence relating to the situation of the golf ball and related terrain features for transmission to the operator.

Still another object of this invention is to provide such a vehicle which operates with a minimum of attention on the part of the operator.

Other objects of this invention will become apparent to those skilled in the art on the study of the below description and specification and drawings. In the drawings, which form a part of the description herein, like numbers refer to the same part throughout and, in said drawings;

FIGURE 1 is a perspective view of an apparatus according to the current preferred embodiment of this invention. The cart is shown carrying one set of golf clubs.

FIGURE 2 is a view of the apparatus shown in FIGURE 1 as seen in direction of arrow 2A of FIGURE 4.

FIGURE 3 is a perspective diagrammatic view of the radio control transmitter used with the apparatus of this invention;

FIGURE 4 is a sectional view of the apparatus of FIGURE 1 along the vertical longitudinal section 4—4 of FIGURE 2.

FIGURE 5 is a view as seen along the direction of the arrow 2A in FIGURE 4 of the apparatus of FIGURE 1 showing the driving wheel end of the frame, the shell being removed in this view.

FIGURE 6 is a side view of the left side of apparatus of FIGURE 1 as it is seen as viewed in the direction of arrow 6A of FIGURES 5 and 2, with shell removed.

FIGURE 7 is a view of the steering wheel end of the frame, generally as seen along the direction of arrow 7A of FIGURE 6, wheel 26 removed.

FIGURE 8 is a bottom view of the frame of the apparatus shown in FIGURES 1–7 generally as seen along the direction of the arrow 8A of FIGURE 4.

FIGURE 9 is an enlarged view of the zone 9A of FIGURE 8 with the steering wheels turned clockwise of the direction shown in FIGURE 8.

FIGURE 10 is a diagrammatic representation of one safety band support and the electrical connections thereof.

FIGURE 11 is a perspective diagrammatic view of the manual control system for the apparatus in FIGURES 1 through 8.

FIGURE 12 is a sectional view taken along the vertical section 12A—12A of FIGURE 13 showing the components of the steering clutch subassembly in the released position of that subassembly.

FIGURE 13 is a vertical cross-sectional view along the section 13A—13A of FIGURE 12 of the steering clutch subassembly in its engaged position with shaft 92.

FIGURE 14 is an overall wiring diagram of the motors and the steering and drive subassemblies as well as the radio control, manual control, autopilot and sign subassembly connection in respect to each other.

FIGURE 15 is a view along the direction of the arrow 15A of FIGURE 6, of the apparatus 19 of this invention with the shell thereof removed, and motor support bar 39 partly broken away FIGURE 16 shows another embodiment, 19A.

The apparatus of this invention, generally shown as 19, comprises a shell assembly 20, a self-propelled wheeled vehicle assembly 21, a control assembly 22 for the vehicle assembly and an intelligence gathering and transmitting assembly 23.

The self-propelled wheeled vehicle assembly 21 comprises a frame 29, a motor 28 thereon, a drive wheel assembly, and a steering wheel assembly; the drive wheel assembly comprises a pair of drive wheels (comprising a left drive wheel, 24, and a right drive wheel 25); the steering assembly includes a left steering wheel 26 and a right steering wheel 27. The elements are operatively interconnected; the drive wheels and the motor 28 are supported on the frame 29 and the steering wheels 26 and 27 are also located on the frame 29. The energy source 30 is operatively connected to the motor 28 and is supported on the frame 29. The operation of the assembly 21 actuates as well as supports the assembly 23.

The frame 29 comprises an upper or top rigid frame 40 and a lower or bottom rigid frame 45. The top rigid frame comprises a rigid top left side horizontal member 41, a rigid top steering end horizontal member 42, a top rigid right side member 43 and a top rigid driving end member 44 and, additionally, a transverse U-shaped motor and brake support member 39, all firmly attached to each other. The rigid motor and brake support member 39 is a bar that extends transversely to the length of the vehicle and extends from and is firmly attached to the members 41 and 43 and serves to support the motor 28 and related braking assembly parts.

In view of the fact that this vehicle moves in a direction of a line passing from driving wheels to the steering wheels and also in the direction from the steering wheels to the driving wheels the ends of the apparatus are referred to as the steering wheel end and the drive wheel end, inasmuch as at one time or another either may be to the forward or the rear apparatus end in view of the motion of the apparatus. However, to standardize the reference words used herein, the steering wheel end will be referred to as the front end and the drive wheel end will be referred to as the rear end in regard to the motion of the apparatus. However, the term "front" and "rear" means only direction insofar as control of motion is concerned, rather than which is momentarily the front or the rear. Hence, the referents steering wheel end drive wheel are used herein. Left and right are as shown in FIGURE 15, respectively; left (as when the vehicle is moving in the direction from the driving wheel end toward the steering wheel as is usual in conventional vehicles today) is shown by arrow 17, right is shown by arrow 18.

The rigid bottom frame 45 of the vehicle comprises a rigid bottom left side member 46, a bottom rigid steerwheel end member 47, a bottom rigid right side member 48 and bottom rigid drive wheel end member 49. A rigid bottom transverse member 50 extends from about the middle of element 46 to the middle of element 48. Members 46–50 are firmly joined to each other.

A first or rear rigid bottom transverse member 50 close

to but spaced from the drive wheels extends from members **46** to **48** and is firmly joined to both and a second or front rigid transverse bottom member **51** close to but spaced from the steering wheels extends from element **46** to **48** and is firmly attached to both. A rigid center longitudinal bar **52** extends horizontally from the center of the second transverse bar **51** to the center of member **47** and is firmly joined thereto. Right and left front vertical bars, such as **54** and **55**, at the steering or front end of frame **29** and corresponding right and left vertical bars **56** and **57** at the rear or drive wheel at the right and left side of frame **29** respectively and vertical bar **59** at the driving wheel end center and vertical bar **58** at the steering wheel end center to serve to attach the corresponding portions of the top and bottom frames **40** and **45**.

Drive wheel axle support bar **61** extends from bar **50** to bar **49** on the right side and drive wheel axle support bar **62** extends from frame piece **50** to frame piece **49** on the left side.

Journals **63** and **64** on rods **61** and **62**, respectively, support an axle of **65** of the rear drive wheels. The drive wheels **24** and **25** are mounted on the axle **65**.

The motor **28** is a DC series wound electric motor which is supported on support **39** and is operatively connected with the batteries **30** and **31**. The batteries **30** and **31** are firmly mounted on and secured to the lower frame **45** and are attached to the frame members **50** and **51**. The motor **28** is provided with an output shaft **72** to which is attached a chain sprocket **74** for driving a motor output drive chain **75**.

A speed reduction gear train box **67** is mounted below and firmly attached to and supported on the top frame **40**. Drive chain **75** is operatively connected to a transmission drive sprocket on box **67**. The transmission **67** provides a gear reduction and an output sprocket **69** which drives a chain **71** which connects to and drives a sprocket wheel **70** on the drive wheel axle **65**. Thereby, shaft **72** connects to and drives the drive wheels **24** and **25**.

The brake assembly **77** comprises a drum **79** which is located on the shaft **72**, a brake shoe **80** which is located on the bottom of a piston **81** which piston is vertically movable within an armature coil **82**. The armature coil **82** is firmly supported on the transverse motor support bar **39**. The armature coil is electrically connected in series with the series wound motor generally as shown in FIGURE 14.

The steering wheels **26** and **27** are each rotatably and pivotally supported on conventional yokes and steering knuckles **86** and **87**, respectively. The front end of each knuckle is pivotally supported on a spindle and the spindle is supported on a rigid frame member **85**; member **85** is firmly attached to member **52**. The front end of each knuckle rotatably supports a steering wheel on an axle. The spindles in this case are set so that there is no camber, i.e., the tops of the wheels are vertically directly above the bottom of the wheel. However, there is a caster to the wheels whereby as is conventional, release of the steering motor may automatically neutralize the apparatus so that it will steer straight ahead. The rear end of each of yokes **86** and **87** is pivotally attached to a rigid tie rod **88**. A steering control pin **89** which pivotally joins the knuckle **86** and the tie rod **88** is joined to a lug **98** of a steering clamp subassembly **90**. A rigid straight transverse solid cylindrical steering clamp guide rod **91** extends from the frame element **48** to **46** and a helically threaded rigid steering control shaft **92** extends from motor **36** to a journal **112** firmly located on member **52**. Rotation of the shaft **92** is determined by rotation in one direction or the other of the motor **36** which is a D.C. motor arranged for rotation in one direction or the other. The axis of cylindrical shaft **91** and threaded shaft **92** are both straight and parallel to each other.

The clamp **90** comprises a horizontal armature frame plate **95**, a vertical piston guide sleeve **96** and a horizontal control shaft sleeve **93**, an annular armature **97**, and a steering lug **98**, and a guide lug **103** operatively and firmly interconnected and a movable piston **100** and the movable guide frame **101** fixed to the piston **100**. Clamp **90** is the steering clutch (sub)assembly.

The subassembly of sleeve armature, lug, and frame provides a firmly yet adjustably located support for the piston shaft **100**. Shaft **100** slidably fits in sleeve **96** and armature **97**. Shaft **100** is firmly attached at its upper end to a flat rigid guide frame **101**. Shaft **100** has a lower threaded end, the threads of which match the threads on the shaft **92**. The shaft **92** is threaded and the major diameter thereof is slidably located within cylinder **93** which has a smooth internal cylindrical surface. The cylinder **93** is firmly attached to the vertical sleeve **96** which in turn is firmly attached to the frame **95**. A plurality of cylindrical rigid vertical columns as **107**, **108**, **109**, and **110** are firmly fixed at their bottom to the frame plate **95** and are located in holes as **107A**, **108A**, **109A**, and **110A** respectively, in the movable guide frame **101**. Columns **110**, **108**, **109**, and **107**, and holes in frame **101** respectively provide that the frame **101** may move vertically up and down on the columns **107**, **108**, **109**, and **110** with respect to the base **95** against the force of a spring **111** on actuation of the armature coil **97**. Nuts at the top of the columns limit the upward motion of the piston relative to the armature. The piston **100** travels upwardly from the shaft **92** about ¼ inch and is slidably located in sleeve **96**.

Movement downward of the piston **100** provides for the operative contact of the threaded bottom face **102** of the piston **100** with the threads on the shaft **92** and, on rotation of the shaft **92**, the subassembly **90** is moved left or right along the length of the shaft **92**. The frame element **95** is firmly attached by a guide lug element **103** which has a cylindrical hole **105** therein parallel to the axis of hollow cylindrical sleeve **93** so that it freely slides along the rod **91**. This provides for a vertical orientation of the shaft **100**. A steering lug **98** is firmly attached to a portion of the assembly **90** near to the steering wheels and it is through the forward portion of this lug **98** that the pin **89** is located, which pin serves to locate the yoke **86**, (as shown in FIGURE 12) and the tie rod **88**. A D.C. steering motor **36** which has an output shaft which has two alternate winding connections whereby it may selectively be rotated in one direction or the reverse thereof, is firmly mounted on frame **45**. Its output shaft is connected to a gear which operatively engages a gear at the end of the threaded control shaft **92**. Actuation of the steering motor rotates the shaft **92** in one direction; when clamp **90** engages shaft **92**, then clamp **90** and pin **89** are moved in one direction along the length of shaft **92**; on reversal of direction of motor **36** and engagement of piston **100** with shaft **92**, clamp **90** (and pin **89**) move in the other direction. Thereby movement of the clamp **90** is accomplished in one direction or the other along the length of the threaded shaft **92** on rotation of shaft **92** and orientation of the wheels **25** and **26** is accomplished by actuation and movement of motor **36** and clamp **90** in one, leftward, direction as shown in FIGURE 9; steering movement in the other direction is accomplished by reversal of rotation of shaft **92**.

A pair of balanced return tension springs **94** and **104** are attached, respectively, to the members **46** and **48** at their lateral ends and at their center portion to the subassembly **90**. Spring **111** sits on the top of armature **97** and, when no current passes through armature **97**, pushes upward on plate **101** (to which piston **100** is attached) and rapidly raises face **102** from contact as well as engagement with the threaded shaft **92**.

On release of the shaft **100** from engagement thereof with the saft **92**, the springs **94** and **104** serve to urge the clamp subassembly **90** to the position such as shown in FIGURE 8 whereat the force of the springs **94** and **104** balance each other. In this position of equilibrium the wheels **26** and **27** are in the position as shown in FIGURE 8 for movement of apparatus **19** in a straight line.

Spring 111 by raising piston face 102 from the shaft 92 permits free motion of the steering clamp subassembly 90 along the length of the shaft 92. The radio control system, of apparatus 19, comprises a hand carried transmitter 116, a receiver, 117, and a servo subassembly, 120. Receiver 117 is located in the vehicle 19 on a breadboard 115 which is firmly attached to and carried on the frame 40. An amplifier 118 is operatively connected to the receiver and a standard battery 119 is provided for powering the receiver and the servos. The battery, a receiver, decoder, and amplifier may be regarded as forming a radio receiver subassembly. This transmitter and receiver subassembly are standard items such as used in radio controls for model airplanes. It is within the scope of this invention that the main batteries 30 and 31 may be connected to a potentiometer with appropriate voltage take-off leads therefrom to provide electrical power for the receiver and associated servos as herebelow described.

The servo assembly comprises three servos, 121, 122, and 123 which are each separately mounted on the board 115. All these servos are electrically operatively connected to the receiver and amplifier 118, although not simultaneously operative; the first servo, 121, is operatively connected to and operated by receiver 117 and amplifier 118. The output of servo 121 operates the speed control assembly; a second servo 122 provides for control of the steering assembly and a third servo 123 provides for connecting either an automatic pilot assembly 179, or a signaling sign apparatus 17. Each servo is selectively and controllably operated by a pulse duration modulation circuit (as is in the commonly referred to as PDM) in the transmitter and in the receiver when radio control transmitter 116 is used to control the apparatus 19.

The speed servo 121 comprises a movable output shaft 124 with knubs or enlargements 145, 147, 149 thereon to controllably and selectively operate any one of three microswitches 125, 126, or 127 for, respectively connecting a low, medium or high speed circuit of the motor 28. Each microswitch as 125 has a microswitch relay body and a projecting shaft 146; when shaft 124 moves downward shown in FIGURE 14, the knub or projection 145 engages the end of shaft 146 and causes it to move into its microswitch body and closes the electric circuit therein. Projection 147 is located to engage shaft 148 of microswitch 126 on further downward (as shown in FIGURE 14), movement of shaft 124. The knub 149 is on shaft 124 to contact shaft 150 of microswitch 127 to actuate that switch on further downward movement of shaft 124. The distance of spacing between the projections 145, 147, 149 along shafts 124 is slightly less than the distance of spacing of shafts 146, 148 and 150. Hence one microswitch at a time is engaged when the shaft 124 moves downward as shown in FIGURE 14. Each microswitch as 125, 126 and 127 is separately connected to a power supply and is electrically in series with a relay armature; microswitch 125 is operatively connected in series with and actuates a relay armature 128; microswitch 126 is operatively connected in series with relay armature 129 and microswitch 127 is operatively connected in series with relay armature 130.

The ground connection (frame 29) and the power connection of relay 130 are shown but their connections are not shown for the other switches, for clarity of representation and as such conventional connections are clearly within the skill of those of average skill in the radio control art. Each relay coil 128, 129 and 130, serves to actuate a switch 138, 149 and 140, respectively. The switch 138 is connected in series to a resistance 134 and to armature 82 of the safety brake assembly 77 and thence to the motor 28, which is a series wound motor. The upper end of shaft 124 has a projection 136, which engages a projecting shaft of a microswitch 130'. This microswitch is connected in series with a reversing relay 131. The reversing relay 131 operates a double throw double pole switch 132 which is operatively connected to the armature and coils of the D.C. motor 28 to provide for reversing the direction of rotation thereof (as it provides for actuation of the motor drive shaft 72 in one direction in one position of the movable components of that switch 132 and in the reverse direction in the other position of the movable components of the switch 132). A microswitch 133 is located to the right (as shown in FIGURE 15) end of the shaft 124. That microswitch (133) is engaged by shaft end 137 and it thereby closes the circuit therein after the circuit in microswitch 130' has been closed, and the reversing relay 131 has been actuated thereby. The microswitch 133 actuates relay 128 and passes current to the components of the D.C. motor 28 to provide for the reverse direction of rotation of shaft 72. When the shaft 124 is moved slightly upward from the position shown in FIGURE 14, it does not close switches 126, 127, 128 or 130 and accordingly the spring 83 of the brake subassembly 77 urges the shoe 80 into contact with the drum 79 and holds the shaft 72 and wheels 24 and 25 in fixed or stopped position. The transmitter 116 and receiver subassembly and servo 121 provide for controllably bringing the shaft 124 to such position to bring the brake assembly 77 into operation and stop the apparatus 19 or hold it in fixed position when the apparatus is not driven to its rear or front.

The sign assembly 178 comprises a series of three aligned symbol arrays or symbol formers as 181, 182 and 183 which are supported in frame 29 for formation and display of numerical characters to be displayed. Each symbol former is composed of a plurality of illuminable tube sections; the sections are formed so that when selected portions thereof are illuminated, the illuminated sections combine to form a desired numerical symbol. Such signs are conventional, as taught in U.S. Patent 2,481,269. The A.C. power for the sign is provided by alternator 184 driven by battery 30 and 31. The symbol arrays 181, 182 and 183 are supported on the frame 29 and are protected from mechanical damage by a transparent plastic window 180, which is located in and supported on the shell 20.

The drive sprocket 66 on shaft axle 65 is operatively connected to a driven odometer sprocket 185 which is rotatably mounted on an axle held in a bracket; therefor the odometer sprocket is held in contact with the sprocket 66. The odometer sprocket is provided with an arm which actuates a cable 190 which is operatively connected to an odometer 189; the odometer also serves to actuate the sign assembly 178. The odometer is visible and mounted on the top of shell 20. The cable 190 is attached to a odometer actuator arm, the arm is attached to the wheels of the odometer whereby each oscillation of the odometer arm corresponds to a one-yard motion of the drive wheel, and each actuation of the odometer arm causes a one-unit change in the reading of the odometer and in the numerical value of the symbol able to be displayed by the sign assembly 178 on command thereto by transmitter 116. The odometer provides for checking out the sign operation; while the odometer may be directly read, number of teeth in wheels 66 and 185, and the perimeter of the drive wheels 24 and 25 are so related that the odometer gives a reading in yards during the travel of the apparatus 19; and, further, the sign assembly 178 is connected to the odometer to provide, on command, a symbol that also is a measure of the distance the apparatus has traveled. The odometer is operatively connected to the sign apparatus so that each number wheel on the odometer acts as a symbol selector, as in U.S. Patent 2,481,269 (issued Aug. 22, 1950 to Moses Allen, assignor to T. R. Welch).

The steering system for apparatus 19 comprises the wheels 26 and 27 and their supporting axles and tie rod 88. Rod 88 is operatively connected to bolt 89 of the assembly 90 via lug 98 as shown in FIGURE 12. The steering servo 122 operates either the steer right microswitch 201 or the steer left microswitch 202; switch 201

is connected via a limit control microswitch 203 to a relay steer right 205; relay 205 operates steer right power relay 207. Relay 207 takes the full power of the battery sources 30 and applies it to the motor 36 and clamp assembly 90. The motor 36 is driven by the steer right circuit (of battery 30 relay 207) to drive shaft 92 in one, clockwise, direction (as seen in direction in which FIGURE 4 is viewed). A corresponding steer left circuit is provided by servo 122 actuation of the steer left microswitch 202, which is in series with left turn control switch 204 and steer left relay 206; relay 206 actuates relay 208 to supply power from battery 30 to motor 36 to drive steer control screw 92 in the counter clockwise direction. A manual control switch box 161 is provided; it is connected by a cable 170 and male plug 171 to female plug 172 on the cart 19. Box 161 supports button switches 163–169 and one button thereof, 163, provides, with the plug 172 and cable 170 connected (an alternative connection shown in the wiring diagram of FIGURE 14), for actuation of lockout relay 162. Relay 162 disconnects the radio control 117 from the drive servo 121 and from the steering servo 122. The manual control box 161 is then operatively connected to the output leads from the microswitches controlled by these servos (121 and 122).

The manual control box 161 is provided with switch button 163 for radio control lockout, button 164 for low speed forward, 165 for medium speed forward, 166 for high speed forward, 167 for left turn, 168 for right turn, 169 for reverse; each of these buttons must be held to continue in operative connection with apparatus 19.

The third servo 123 has a control shaft 173 therein one end of which, 174, serves to actuate a microswitch 176 which actuates a relay 186 which actuates a sign assembly 178; the other end 175 of shaft 173 actuates via microswitch 177 a relay 187 which actuates auto pilot 179. The auto pilot is connected to servos 121 and 122, and its microswitches as 133 and 130 to proceed on command from transmitter 116, or stop.

A flexible safety band 210 is supported on a series of like resilient band support subassemblies 211, 212, 213, and 214. Each of the support subassemblies is supported at one corner of the frame 29 and each projects horizontally outward therefrom at an angle of 45 degrees to side members as 46 and 48.

Each support as 214 comprises a rigid base member as 216 which is attached to the frame 29, a resilient intermediate member 217, and a band support element 218. Members 216, 217, and 218 are continuous and integral. A grounded contact point 220 is supported on element 218. A contact point 219 which forms a contact with 220 when the band 210 is forced toward the frame 29 as when the apparatus 19 bumps into a tree or a player, is supported on but insulated from element 216. Contact 219 is connected in series with the armature 221 of a normally closed relay switch arm 222 and battery 30. Similar contact points of assembly 211, 212 and 213 are also connected to the armature 221. A snap-over compression spring 224 holds the switch 223 open until its switch arm 222 is manually returned to its colsed position by the operator pressing the release arm 225 to overcome spring 224 and return arm 222 to the closed switch position of arm 222. Accordingly, in operation when the apparatus 19 contacts the tree or a person, the contact points 219 and 220 close and break the connection of a battery 30 and the motor 28. At this point the spring 83 urges the shoe 30 into contact with the drum 79 and stops the apparatus 19 and holds it in its position.

The shell 20 is formed of a rigid strong plastic, ⅛ inch thick, a polystyrene. It comprises side walls 231 and 232, steering wheel face wall 233 and drive wheel face 234. The top portion has an upwardly open carrier cavity 235 and two semicylindrical sloped bag carrier compartments 236 and 237. T-shaped bag holder supports 238 and 239 are firmly supported in the shell wall for each compartment and a set of golf clubs, as 240 is firmly held by straps in each compartment; one end of each of the straps is attached to the shell permanently. The other end of each strap is provided with a latch on shell 20 for firmly fixing that end of the strap to the shell 20. Switch 223 is located between compartments 236 and 237 near the top of center wall of cavity 235 and is firmly attached thereto. Arm 225 projects upward of the body of switch 223. Pulling upward on T-shaped arm 225 locks elements 80 and 79 of brake assembly 77. Pushing down on arm 225 connects the switch arm 222 in series with battery 30 and armature coil 82 of brake assembly 77. The aerial or antennae for receiver 117 is located near wall 234 above frame 40. Plug 172 and odometer 189 are located in face 233 and on top of face 233, respectively and there firmly attached to the shell 20.

Control of system 120 is by arm 246 of assembly 116; left turning of wheel 26 and 27 is effected by moving arm 246 in direction 250 (right is opposite); forward speed is by moving arm 246 in direction 252, (rearward is reverse). The appearance and structure and circuitry of such pulser control is conventional (as shown on pages 186 and 191 of Radio Control handbook by H. G. McEntee, Gernsback Library, Inc. 1961, Library of Congress Catalog Card 61–15636). The autopilot assembly 179 is actuated via servo 123 by full rightward motion of switch 254. Sign assembly 178 is actuated by reverse motion of that switch 254. Zero settings of arm 246 movement in directions 250 and 252 are provided at adjustments 256 and 257, respectively. Antenna 259 of remote control transmitter 116 provides for operative radio connection with antenna 260 of receiver 117.

In the operation of this apparatus the operator may control the vehicle 19 to travel to such points as he desired to evaluate the best manner in which to hit the golf gall and, when the vehicle has, under his control, reached that position then, by the remote control 116, the operator actuates the servo switch 123 to actuate the sign control to then give to the operator an indication of the distance from the operator at which the vehicle 19 is located. The symbols 181, 182, 183 of the sign 179 are sufficiently large size (about 15 inches high) to be clearly visible at a distance of 150 yards to a person with normal eyesight.

After the player hits the ball and while the golf ball is still clearly in sight, the player may send the vehicle 19 by box 116 to the point at which the ball is located and there let the vehicle stand. To facilitate this movement and control the apparatus 19 the auto pilot assembly is called into play once the operator has the vehicle aimed substantially in the direction to which he wishes to go; the auto pilot is called into play by switch 254 and servo 123. The auto pilot then holds the apparatus 19 in the desired orientation with no further concern by the operator until the operator desired to again change the course or speed of the apparatus.

The apparatus according to this invention is also provided with a manual control system. The manual control system is used when the radio control system would be inconvenient to use, such as when there are other carts in the area provided with transmitters and receivers which operate on the same radio wave length as apparatus 19, and, accordingly there might be interference therebetween. Accordingly in such situations the manual control is used. The manual control 161 is connected to the driving assembly control circuit as is shown in FIGURE 14 and to the steering circuit assembly control circuit as shown in FIGURE 14 to provide for control of the operation of the cart through a solid energy transmission means which is not affected by radio waves; more particularly it is a multichannel electric cable. The operation of the manual control provides that the operator may with a six-foot long cable 170 control the vehicle 19 within a six-foot range of the operator and the operator may thereby operate the apparatus 19 notwithstanding the radio interference that otherwise would interfere with communication between the transmitter 116 and the receiver 117.

The intelligence gathering means which is supported on the vehicle as hereinabove disclosed is an odometer and

sign assembly operatively connected to the drive wheel assembly. This particular intelligence gathering means **23** necessarily requires the operation of the apparatus **19** in order to gather the intelligence provided.

It is within the scope of the invention that other intelligence gathering means can be supported on the vehicle **19**. In another embodiment **19A** of this invention servo **123** is used to bring into play a closed circuit television camera **143** in lieu of sign **178**, it provides on the screen **144** thereof a trace **145'** indicating the direction of the path of a golf ball in the field of view thereof relative to the vehicle **19A**. By this particular apparatus, after the ball has gone over the cart the operator may direct the auto pilot of the apparatus **19** to follow the path of the ball.

In a particular embodiment of the invention motor **28** is a 1.25 horsepower 24 v. 55 amp. 2500 r.p.m. DC series wound motor. The drive wheel tires are 5.3 x 4.50 size and the steering wheel tires are 4.10 x 3.50 size. The power source is two 12 volt batteries (Sears #82, 78 plates, heavy duty), **30** and **31**.

The transmitter **116** is a DIGITAL 3 by F and M Electronics of Albuquerque, N. Mex. operating at 27.045 m.c. The overall circuit of such a transmitter is shown at Figure 314, page 42 of Advanced Radio Control by Edward L. Safford (Gernsback Library, 1965, Library of Congress Catalog Card 65022390 and herebelow referred to as "ARC"). The receiver **117** is a proportional control RC single channel unit (and has a circuit as shown at Figure 325 (page 53 and 54 of ARC). The pulse decoder may be a pulse sorter as is shown at Figure 414, page 79, ARC. The proportional control servo circuits are shown at pages 112 and 113 Figure 518 and 519 ARC. The motor control circuit of the servo is shown at page 105, Figure 511 ARC.

The face **233** of shell **30** is 20 inches high (over the bottom of shell **30**) and 24 inches wide; face **234** is 24 inches high. The top of compartment **236** is 26 inches high; compartment **235** is 17 inches deep. Face **231** is 41 inches long. Frame **45** is four inches above the bottom of wheels **24**, **25**, **26**, and **27**. Frame **29** is made of 1 inch square tubing.

The apparatus **19** travels at 3 to 4 miles per hour and weighs about 300 lbs. when empty. The apparatus is not a full substitute for a caddy but is useful in practice rounds rather than in tournament play, where caddies are usually available.

Another circuit usuable for this system is a telephone dial control system as described in Radio Control Models and Electronics. (Model Aeronautical Press, Ltd. 13–35 Bridge St., Hemel Hempstead Herts, Great Britain.), article entitled "Flip-Flop" by C. Jarvis, pages 482–485 and 510. However the invention herein is not in the details of radio control and servo circuitry which are known to those skilled in the art but rather in the combination of subassemblies to provide a new and useful apparatus for use on the golf course.

I claim:

1. A remotely controlled and intelligence gathering wheeled vehicle, said vehicle comprising a ground contacting drive wheel assembly, a ground contacting steering wheel assembly, and a frame, said drive wheel assembly mounted on and supporting said frame, and said steering wheel assembly mounted on said frame, and a remote control therefor:

(a) said drive wheel assembly comprising an energy source, a motor operatively attached to said source and a ground engaging wheel operatively attached to said motor, and a first control means for said drive wheel assembly operatively attached thereto,

(b) said steering wheel assembly comprising a ground engaging steering wheel, a movable steering wheel positioning means attached to said frame and to said steering wheel and a second control means operatively connected to said wheel positioning means, said first and second control means mounted on said vehicle,

(c) a third control means operatively connected with said first and second control means and spaced away therefrom, and including a radio wave generating unit,

(d) intelligence gathering means supported on said vehicle and operatively connected to said vehicle, and

(e) a receptacle for golf clubs carried by said frame,

(f) signaling means on said vehicle for signaling from said vehicle intelligence gathered by said intelligence gathering means and said signaling means being operatively connected to said intelligence gathering means,

(g) a fourth control means on said vehicle for actuating said signaling means and,

(h) control means on said third control means operatively connected to said fourth control means by radio waves for actuating said fourth control means and whereby said third control means is operatively connected to said first and second control means by radio waves.

2. Apparatus as in claim **1** including a fifth control means and wherein said fifth control means is connected to said drive wheel assembly and steering control assembly by an electric cable, and said fifth control means comprises a plurality of switch means, one selectively operatively connected with said steering wheel assembly, one with said drive wheel assembly.

3. Apparatus as in claim **2** wherein said intelligence gathering means is an odometer, said odometer is operatively connected to a drive wheel and said odometer is operatively connected to a signalling means comprising sign symbols of about 15 inches height, said sign symbols mounted on said wheeled vehicle.

4. Apparatus as in claim **2** wherein an automatic pilot means is operatively connected to said steering means and to said drive wheel assembly, said automatic pilot means comprising means sensitive to the orientation of said vehicle and a sixth control means operatively connected to said means sensitive to the orientation of said vehicle, said sixth control means being, also, operatively connected to said first and second control means for said wheeled vehicle; and

a seventh control means on said vehicle operatively connected to an eighth control means remotely located from said vehicle, said seventh control means connected to and operative to start and stop said automatic pilot means, and said eighth control means operatively connected to said seventh control means by radio waves, both said eighth control means and said third control means being located together and both spaced away from said vehicle.

5. Apparatus as in claim **4** wherein the intelligence gathering means is supported on the vehicle and comprises a camera means for detecting and indicating the direction of the path of travel of a golf ball in the field of view thereof and relative to said vehicle.

References Cited

UNITED STATES PATENTS

1,587,083	6/1926	Neuzerling.	
2,551,742	5/1951	Huebner et al.	180—79.1
2,711,027	6/1955	Williamson.	
2,723,492	11/1955	Muller.	
2,832,426	4/1958	Seargeant	180—2
2,836,253	5/1958	Lovell.	
3,095,937	7/1963	Vulliet-Durand	180—2

A. HARRY LEVY, Primary Examiner

U.S. Cl. X.R.

46—244; 73—490; 180—2, 65, 77, 79.1, 92; 188—163