United States Patent

[11] 3,573,867

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[54] **MECHANICAL PASS RECEIVER**
15 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **273/55,**
46/119, 46/244, 46/245, 273/105.2
[51] **Int. Cl.** **A63h 11/00**
[50] **Field of Search** 273/105.2,
105, 102; 46/116, 119, 120

[56] **References Cited**
UNITED STATES PATENTS

2,691,845	10/1954	Jepson	46/119
3,303,821	2/1967	Harris	119/29
3,391,936	7/1968	Grimes	273/105

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ABSTRACT: A football forward pass practice device consisting of a radio-controlled motor-driven carriage on which is mounted a simulated football player with a pivoted torso and pivoted arms between which is attached a bag for catching a football. The movements of the simulated torso and arms are radio-controlled so that the device can simulate the action of a running football player catching a football.

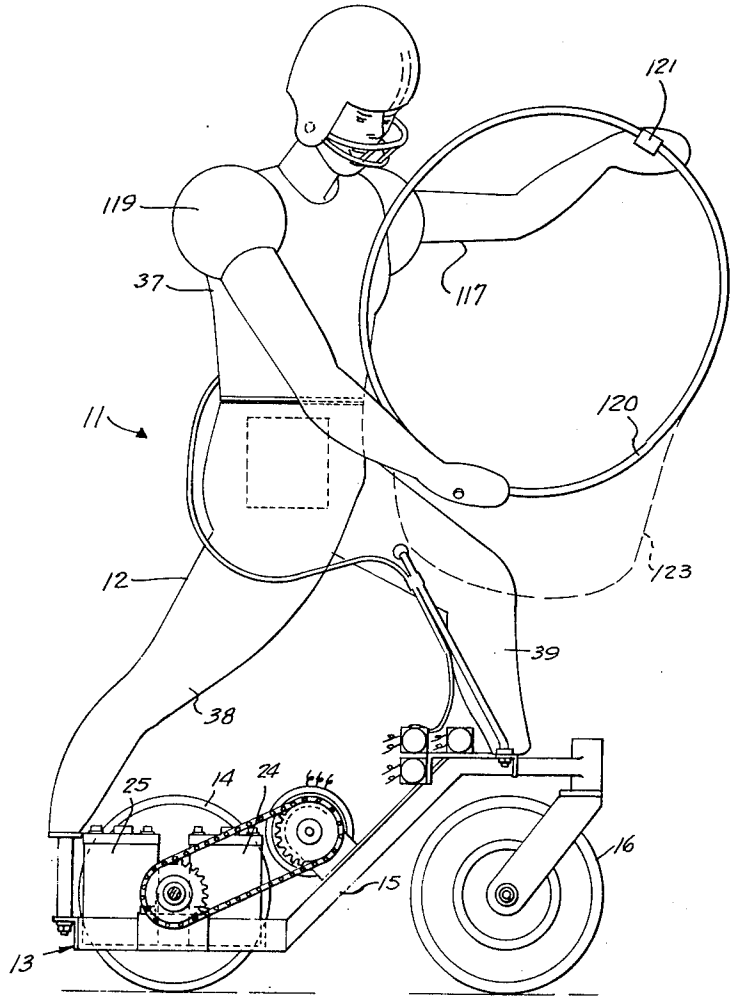
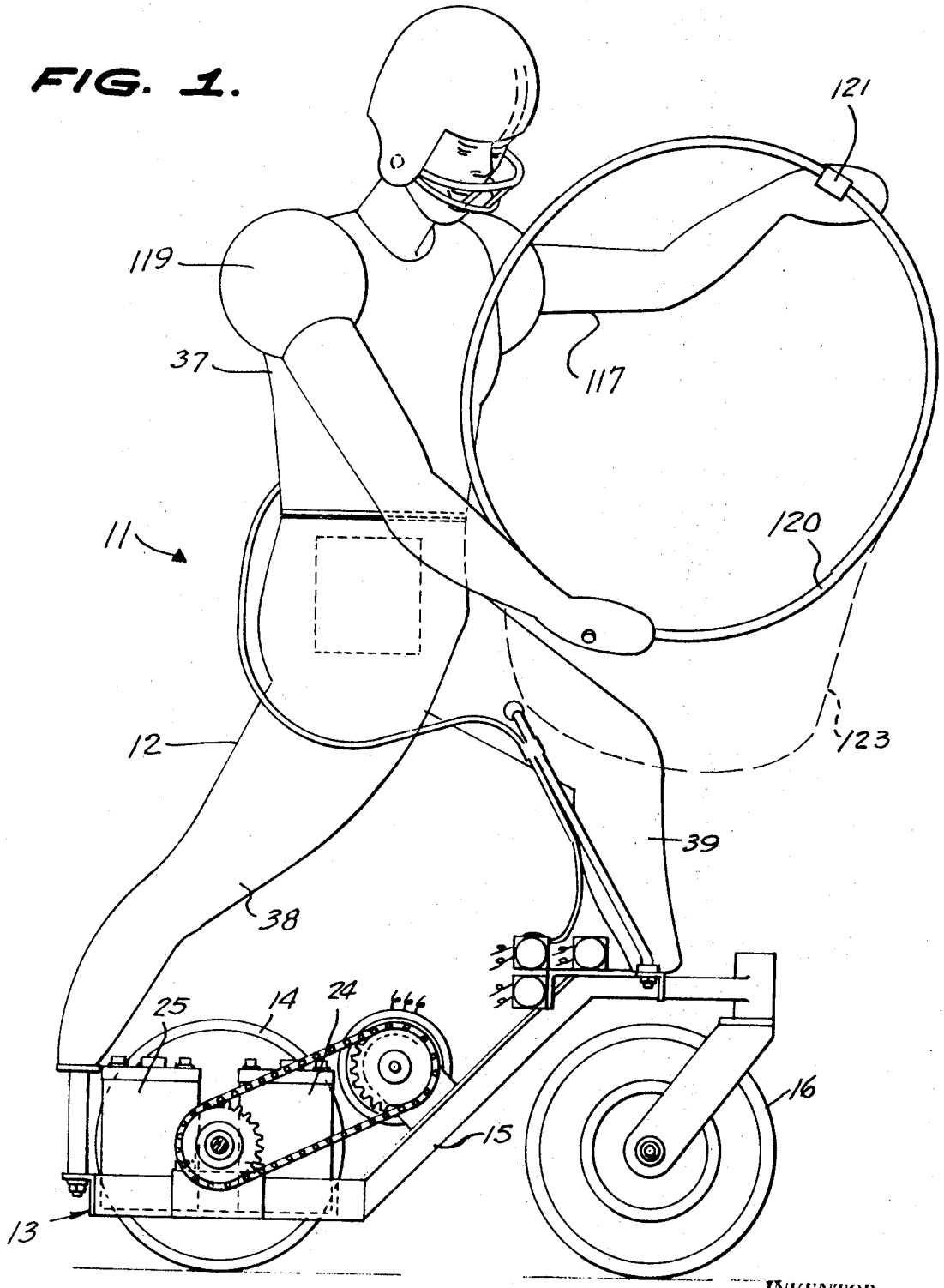


FIG. 1.



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FIG. 2.

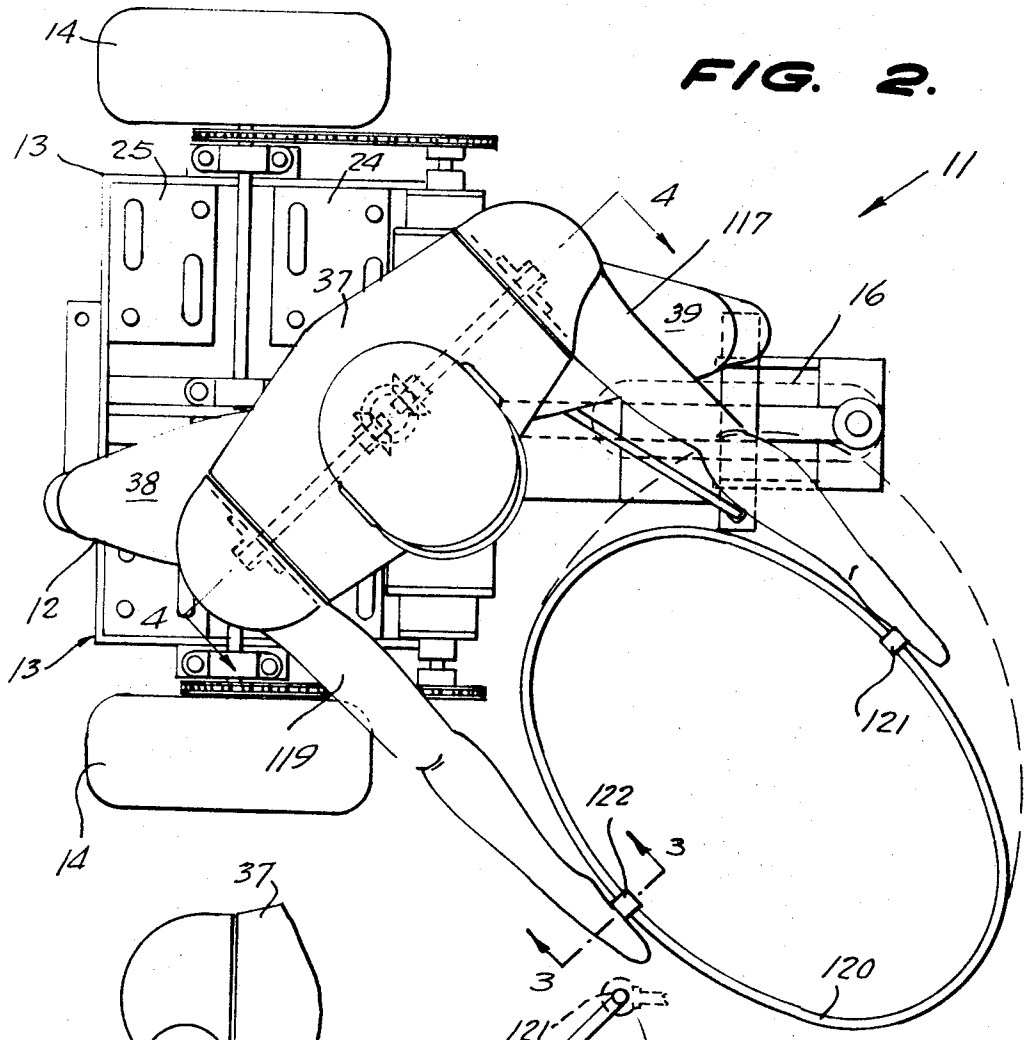
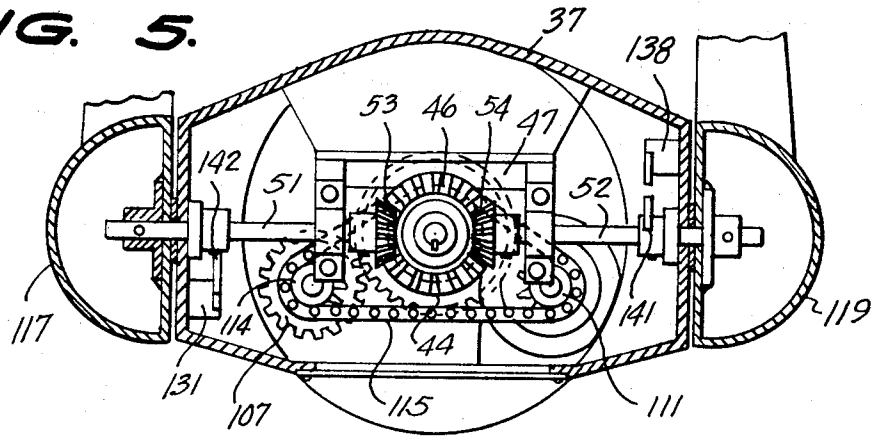


FIG. 3.

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FIG. 5.



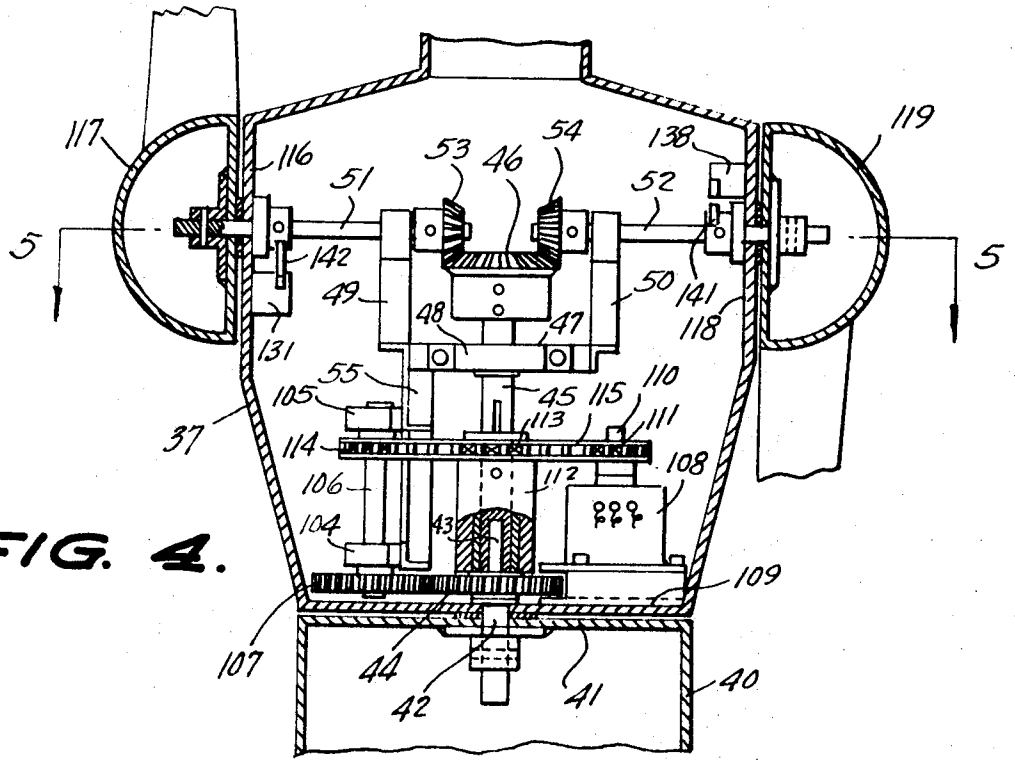
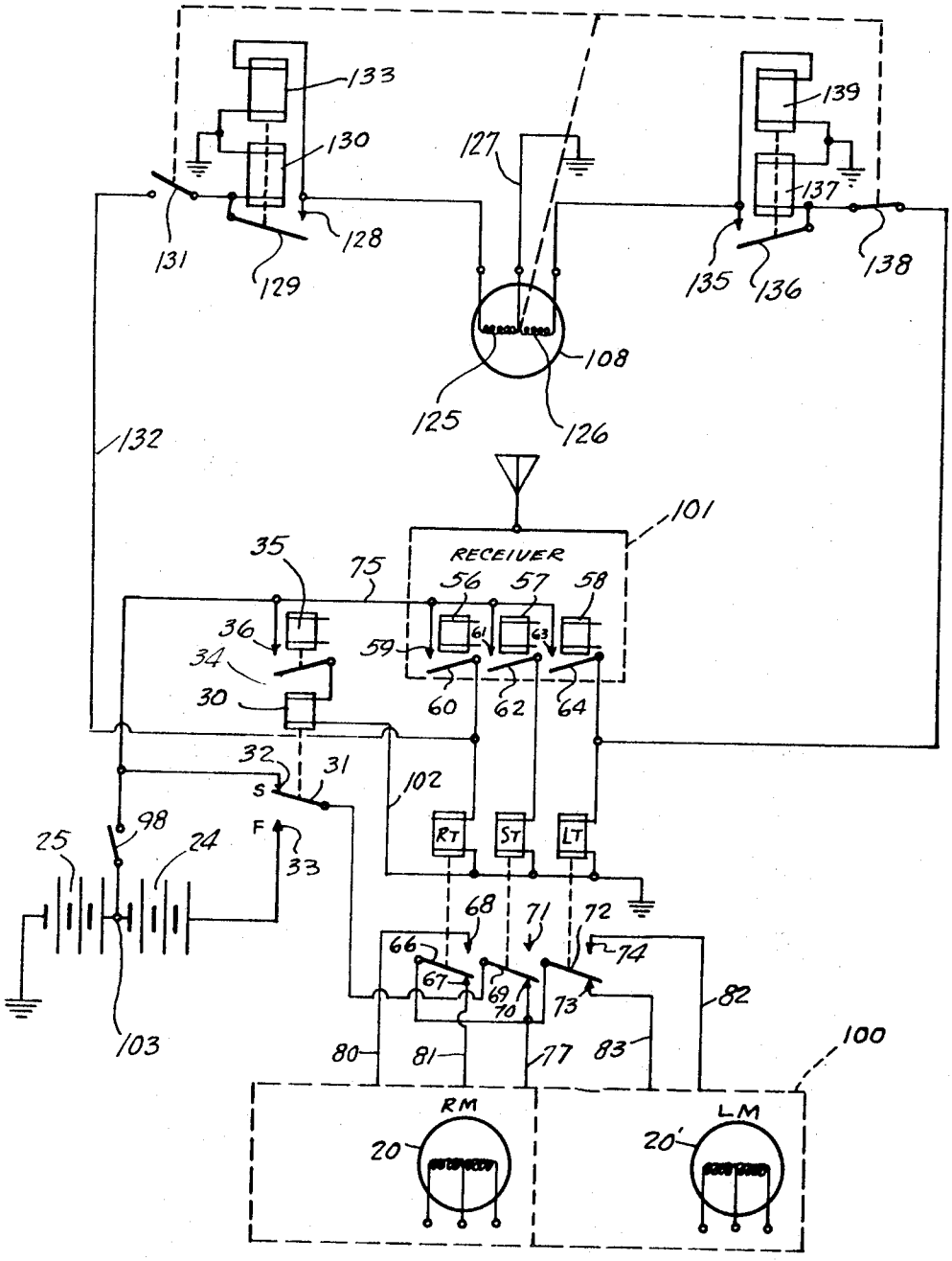


FIG. 4.

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FIG. 6.



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MECHANICAL PASS RECEIVER

This invention relates to athletic practice devices, and more particularly to a football practice device for improving the accuracy of a football thrower or passer.

The main object of the invention is to provide a novel and improved practice pass-receiving device which simulates the action of football player receiving a forward pass, the device being relatively simple in construction, being controllable accurately from a remote location, and closely simulating the body movements of an actual pass receiver.

A further object of the invention is to provide an improved football practice device intended to provide practice for persons desiring to improve their accuracy in throwing a football, for example, in throwing forward passes, the device being relatively inexpensive to fabricate, being durable in construction, and being completely self-contained so that it can be remotely controlled and move freely over a practice area.

A still further object of the invention is to provide an improved football practice pass device in the form of a simulated football player with simulated movable body parts arranged to closely simulate actual body movements of a football player receiving a forward pass or receiving a thrown football, the device being remotely controlled and being capable of maneuvering in a manner closely simulating the action of an actual football pass receiver, the device being adapted for remote control either by a football coach or by a person practicing throwing forward passes.

A still further object of the invention is to provide an improved practice pass-receiving apparatus in the form of a simulated football player mounted on a wheeled vehicle, the device being so arranged that the simulated football player can simulate actual body movements of a person receiving a forward pass and being so arranged that the device can operate with substantially the same speed and agility of an actual skillful forward pass receiver.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIG. 1 is a front elevational view of an improved football practice pass-receiving device constructed in accordance with the present invention.

FIG. 2 is a top plan view of the device shown in FIG. 1.

FIG. 3 is a fragmentary vertical cross-sectional view taken substantially on the line 3–3 of FIG. 2.

FIG. 4 is a fragmentary enlarged vertical cross-sectional view taken substantially on the line 4–4 of FIG. 2.

FIG. 5 is a horizontal cross-sectional view taken substantially on the line 5–5 of FIG. 4.

FIG. 6 is an electrical wiring diagram showing the connections of the various electrical components employed for executing simulated body movements of the simulated football player in the apparatus illustrated in FIGS. 1 to 5.

Referring to the drawings, 11 generally designates a football practice pass-receiving unit constructed in accordance with the present invention. The unit 11 consists in general of a simulated football player 12 mounted on a motor-driven wheeled base, designated generally at 13, and being generally similar in construction to the corresponding wheeled base shown in the L. R. Harris, U.S. Pat. No. 3,303,821, issued on Feb. 14, 1967. The wheeled base 13 comprises a frame 15 to which is journaled a pair of rear wheels 14, 14 and provided with a swiveled front wheel 16. As described in U.S. Pat. No. 3,303,821, the rear wheels 14 are reversibly and selectively driven by a pair of reversible electric motors 20 and 20' which are controlled by respective single-pole, double-throw relays RT, ST, and LT, the relay RT having the pole 66 and the lower and upper contacts 67 and 68, the relay ST having the pole 69 and the lower and upper contacts 70 and 71, and the relay LT having the pole 72 and the lower and upper contacts 73 and 74.

The control wires 80, 81, 77, 83 and 82 from the poles and contacts of the relays RT, ST and LT lead to the relay system, designated generally at 100, associated with the right motor 20 and the left motor 20' and fully described in the above-mentioned U.S. Pat. No. 3,303,821. The relays RT, ST, and LT are respectively controlled by relays 56, 57 and 58 mounted in a radio receiver of conventional construction, shown at 101, the relays 56, 57 and 58 being arranged to respond to different modulation frequencies applied to a carrier from a suitable remote transmitter received by the receiver 101. As described in U.S. Pat. No. 3,303,821, the relays 56, 57 and 58 are provided with the respective normally open sets of contacts 60–59, 62–61 and 64–63. The respective sets of contacts 59–60, 61–62 and 63–64 are connected in series with the windings of the respective relays RT, ST and LT, between a grounded wire 102 and a wire 75 which is connected through a control switch 98 to a junction terminal 103 between series-connected batteries 25 and 24, the negative terminal of battery 25 being grounded and its positive terminal being connected to the negative terminal of the battery 24 at the junction 103.

As described in U.S. Pat. No. 3,303,821, when the associated remote transmitter emits a carrier modulated by a tone suitable to energize the relay 56, the relay RT becomes energized by the engagement of the contact 59, whereby the armature 66 is elevated to engage its associated contact 68, causing the motor 20 to reverse its direction and causing the wheel frame to execute a right turn. Similarly, when the transmitter emits the carrier whose modulation contains the tone required to energize the relay 58, the relay LT becomes energized, causing its armature 72 to engage its upper contact 74, and causing the reversal of motor 20', whereby the wheeled vehicle executes a left turn. To stop movement of the wheeled frame, it is merely necessary to transmit a carrier modulated by the tone required to energize the relay 57, which causes energization of relay ST, elevating pole 69 from contact 70, which results in deenergization of both motors 20 and 20', in the manner described in the above-mentioned U.S. Pat. No. 3,303,821.

In accordance with the present invention, provision is made for providing a selection of two different speeds of operation of the wheeled frame, namely, fast and slow speed operation. Slow speed operation is provided by the closure of the switch 98 and the above-described mode of operation, whereby only the battery 25 is utilized to energize the motors 20 and 20'. A speed-control relay 30 is employed to energize the motors either from the single battery 25 or from the series-connected batteries 25 and 24. Thus, the relay 30 has a pole 31 which normally engages an upper contact 32 but which can be moved into engagement with a lower contact 33 responsive to the energization of the relay 30. Pole 31 is connected to the pole 69 of relay ST which normally engages its lower contact 70 and forms part of the normal energizing circuit for the driving motors 20 and 20'. When relay 30 is energized, its pole 31 engages its lower contact 33 and substitutes the series-connected batteries for the single battery 25, thereby providing corresponding increase in speed of operation of the motors 20 and 20'. The winding of relay 30 is connected between the grounded wire 102 and the pole 34 of a radio-controlled relay 35 which is energized from the receiver 101 in response to the reception of an appropriate signal from the command transmitter, for example, by a specific modulation tone impressed on the carrier and received by the receiver 101. The upper contact 36 of relay 35 is connected to the wire 75, so that with switch 98 closed, the relay 30 becomes energized responsive to the energization of the relay 35, causing its pole 31 to move from its slow-speed position wherein it engages contact 32 to its high-speed position, wherein it engages contact 33.

The simulated player FIG. 12 comprises the lower body portion fixed relative to frame 15 and the vertically swiveled simulated torso 37. Thus, the lower portion of the simulated player includes the legs 38 and 39 fixedly secured respectively to the rear and forward portions of frame 15, said legs 38 and 39 merging in the hollow top portion 40 representing the player's hips. Said top portion 40 is provided with a horizontal top wall 41, as shown in FIG. 4. The hollow simulated torso 37

is vertically swiveled to the lower body portion by being rotatably engaged with an upstanding vertical shaft 42 fixedly secured centrally in the top wall 41 and projecting upwardly into the hollow torso portion 37, the vertical shaft 42 being provided with a reduced top portion 43. Shaft 42 is rigidly secured to the top wall 41 of the lower body portion and has rigidly secured thereon a sun gear 44. Rotatably journaled on the upstanding reduced shaft element 43 coaxially therewith is a vertical shaft 45 to the top end of which is secured a beveled gear 46. A cross bracket 47 is rigidly connected to the front wall of torso 37 and has a supporting collar 48 rotatably receiving shaft 45 and serving as a bearing for said shaft. Rigidly secured to the opposite ends of the cross bracket 47 are upstanding post members 49 and 50 in which are journaled respective horizontal pinion shafts 51 and 52, respective pinion gears 53 and 54 being secured to the inner ends of said pinion shafts and meshingly engaging the beveled gear 46.

Cross bracket 47 is provided at its left end, as viewed in FIG. 4, with a depending vertical arm 55. Respective vertical bearing brackets 104 and 105 are provided on the arm 55, and journaled in said bearing brackets is a vertical shaft 106, to the lower end of which is secured a planet gear 107 which meshes with the sun gear 44. Designated at 108 is a reversible electric motor vertically mounted on the horizontal bottom wall 109 of the hollow torso portion 37, the motor being provided with the vertical shaft 110 which has mounted thereon a driving sprocket wheel 111. Secured on the shaft 45 is a vertical sleeve member 112 formed at its top end with an integral sprocket wheel 113 which is substantially horizontally aligned with the sprocket wheel 111. An additional sprocket wheel 114 is secured on the upper portion of shaft 106, likewise substantially in horizontal alignment with the sprocket wheel 111. A sprocket chain 115 drivingly couples the motor sprocket wheel 111 to the sprocket wheels 113 and 114. Thus, motor 108 simultaneously drives the planetary gear 107 and the shaft 45, causing the crossbar 47 and parts attached thereto to rotate around the vertical axis defined by the shaft 42, and causing the shaft 45 to rotate, thereby rotating the pinion shafts 51 and 52 in opposite directions.

Shaft 51 is journaled in a vertical transverse upper sidewall portion 116 of the hollow torso member 37, and the outer end portion of shaft 51 is rigidly secured to a simulated arm 117. In a similar manner, the other pinion shaft 52 is journaled in the opposite upper vertical transverse wall portion 118 of the torso member 37 and is rigidly secured at its outer end to an opposite simulated arm 119.

As will be readily understood, when the shaft 45 is rotated by the action of the sprocket chain 115, this causes the shafts 51 and 52 to rotate in opposite directions, elevating one simulated arm and lowering the other simulated arm. Reversal of the motor 108 produces a correspondingly reverse result. Thus, the arm motions occur simultaneously with the pivoting action of the hollow torso member 37 around the vertical axis defined by shafts 42.

Designated at 120 is a rigid ring which is pivotally connected to the free ends of the simulated arms 117 and 119 at the respective hand portions thereof, as shown at 121 and 122. Attached to the rigid ring member 102 is a suitable flexible bag, such as a bag formed of flexible netting, designated at 123. The simulated arms 119 and 117 are made of suitable durable somewhat flexible material, such as flexible plastic material, for example, polyethylene, or the like. The arms 117 and 119 are sufficiently flexible to allow the ring 120 to be rotated from one extreme position thereof to the other, for example, from the position of FIG. 1 wherein the left arm 117 of the simulated FIG. is elevated and the right arm 119 is depressed, to the opposite position wherein the simulated left arm 117 is elevated and the simulated right arm 119 is depressed. As will be presently described, when the apparatus turns to the right, as viewed in FIG. 1, the left arm 117 is elevated and the right arm 119 is lowered, and conversely, when the machine is steered to the left, as viewed in FIG. 1, the reverse actions occur, namely, the right arm 119 is elevated and the left arm 117 is lowered, with the simulated torso face having rotated correspondingly, namely, to a position opposite that shown in FIG. 1.

As shown in FIG. 6, the motor 108 is of a conventional reversible type and comprises the respective motor windings 125 and 126, driving the motor in opposite directions respectively when energized. As is further evidenced in FIG. 6, the windings 125 and 126 have a common grounded junction 127. The ungrounded terminal of winding 125 is connected through the contacts 128 and 129 of a relay 130 and through a limit switch 131 and a wire 132 to the pole 60 of the "right turn" relay 56. Thus, assuming the limit switch 131 to be closed, the winding 125 of motor 108 becomes energized simultaneously with the energization of the "right turn" power relay RT. This is evidenced from FIG. 6, where in it is seen that the winding of the relay 130 has one grounded terminal and has its other terminal connected to wire 132 through the limit switch 131. Pole 129 is further provided with a holding winding 133 having one grounded terminal and having its other terminal connected to the contact 128.

The opposite drive winding 126 of motor 108 is similarly connected to the contacts 135 and 136 of a relay 137 and a limit switch 138 to the pole 64 of the signal-controlling "left turn" relay 58. Pole 136 is further provided with a holding winding 139, connected between ground and contact 135. With limit switch 138 closed, winding 126 is thus energized simultaneously with the energization of the "left turn" power relay LT.

As shown in FIGS. 4 and 5, the limit switches 138 and 131 may be operated by respective projections 141 and 142 carried by the respective arm-operating shafts 52 and 51. The limit switches 131 and 138 are of the normally closed type. In the position illustrated in FIG. 1, with the simulated left arm 117 at its top limit position, the projection 142 engages the operating elements of the limit switch 131 and opens said limit switch. The opposite limit switch 138 is closed. Thus, the winding 125 becomes deenergized when arm 117 reaches the top limit of its movement. Correspondingly, the opposite winding 126 of motor 108 will become deenergized when limit switch 138 is opened responsive to the movement of the simulated left arm 119 to the top limit of its swing.

The position of the device illustrated in FIG. 1 corresponds to movement of the vehicle 13 toward the right, as viewed in FIG. 1, namely, immediately following a "right turn" command. If a "left turn" command should then be received by the receiver 101, the relay 58 will lift its pole 64 into engagement with its contact 63 and thereby energized the "left turn" power relay LT. This causes pole 72 to be elevated into engagement with contact 74 and to operate the "left turn" motor winding 20' to swing the vehicle toward the left, as viewed in FIG. 1. Simultaneously, the winding 126 of motor 108 becomes energized since relay 137 is energized simultaneously with the relay LT, causing contacts 135 and 136 to close. The motor 108 then operates to rotate the torso 37 in a counterclockwise direction, as viewed in FIG. 2, by the action of sprocket chain 115, shaft 106, gear 107 and sun gear 44, as above described. As the simulated torso 37 rotates counterclockwise from the position of FIG. 2, bevel gear 46 acts on the pinion gears 54 and 53 to rotate shaft 52 in a direction to elevate simulated arm 119 and rotate shaft 51 in a direction to lower simulated arm 117. As arm 119 reaches its top limiting position, the arm 141 engages the operating element of the limit switch 138 and opens said limit switch. This deenergizes the holding winding 139 and allows contacts 135 and 136 to open, whereby the winding 126 of motor 108 becomes deenergized, with the parts in a position reversed from that shown in FIG. 1, namely, with the simulated torso 37 rotated to its limiting counterclockwise position, as viewed in FIG. 2, with arm 119 elevated and arm 117 lowered, which turns the ring 120 to a position appropriate for receiving a thrown football under these conditions.

Thus, when the appropriate command signals are transmitted to the device to cause the simulated football player to

travel and toe execute a left turn, as viewed by the thrower, the torso **37** rotates to a position opposite from that shown in FIG. **1** and the positions of the simulated arms are reversed, namely, the arm **119** is elevated and the arm **117** is lowered, whereby to swing the ring **120** and net **123** to the opposite side of the player's body, as viewed in FIG. **1**, and to present a target to the thrower corresponding to that of an actual pass receiver running toward the left. When this occurs, the limit switch **131** closes, preparing the device for the reception of a command signal appropriate for changing the direction of movement of the simulated football player, namely, for causing the simulated football player to execute a right turn. Thus, when the appropriate signal for a right turn is received, the relay RT becomes energized responsive to the energization of the receiver relay **56**, causing the vehicle to swing to the right and simultaneously causing the winding **125** of motor **108** to become energized because of the closure of the contacts **128–129**. The simulated torso **37** is then rotated clockwise back to the position shown in FIG. **2**, and concurrently, the simulated arm **119** is lowered and the simulated arm **117** is elevated, to restore the positions of the parts shown in FIGS. **1** and **2**. As arm **117** reaches the upper limit of its elevated position, limit switch **131** is opened, causing winding **125** to become deenergized so that the circuit is restored to the configuration shown in FIG. **6**.

The pivotal connections between the ring **120** and the ends of the simulated arms **119** and **117** may be of any suitable construction. For example, as shown in FIG. **3**, inwardly directed eye bolts **150** may be fastened to the simulated hand portions of the arms and the rigid ring **120** may pass through the eye portions of said eye bolts to thereby define the pivotal connections **121** and **122**. As previously mentioned, the arms **117** and **119** are preferably made of a material which is sufficiently flexible to allow the ring **120** to be rotated from one inclined position thereof, such as that shown in FIG. **3**, to the opposite inclined position thereof, involving a rotation of approximately 90° in a clockwise direction of the ring from the position shown in FIG. **3**.

As previously mentioned, the device may be operated either at a fast speed, responsive to the corresponding command signal transmitted to the receiver and delivered to the relay **35**, or at a relatively moderate speed wherein the device is energized from the single battery **25**. Thus, the apparatus may be controlled so as to simulate the movements either of a relatively fast runner intended as the target for the thrower or of the movements of a relatively slow runner simulating the pass receiver. By combining fast and slow runner characteristics in a practice session, the thrower becomes accustomed to adjusting quickly to different conditions such as those which may develop in an actual contest and is thereby enabled to greatly improve his throwing accuracy.

It will be noted that when the "fast" relay **35** is energized, with the main control switch **98** closed, the batteries **25** and **24** are connected in series through the pole **69**, providing fast operation of the device. The batteries **24** and **25** may comprise conventional 12-volt batteries, and therefore the arrangement provides 12-volt operation for slow speeds and 24-volt operation for fast speeds.

From the above discussion, it will be understood that the switch **98** may be employed for presetting the device for operation. Thus, with the switch **98** closed, the device is set for multiple-speed operation, the choice of speeds being provided by the action of the relay **35** controlled by an appropriate radio signal. When the high-speed command signal is received, as above explained, the relay **35** causes the subsidiary relay **30** to become energized and to connect pole **31** to contact **33**, thereby causing high-speed operation. Normally, operation is at a relatively slow speed, as above explained. With the switch **98** left open, the various power relays RT, ST, LT and **30** cannot become energized and therefore the device is rendered inoperative.

While a specific embodiment of an improved practice football pass receiver device has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

I claim:

1. A motor-driven football pass receiver comprising: a motor-driven steerable vehicle, means to drive the vehicle and control its steering direction, a simulated football player mounted on said vehicle having a simulated torso rotatable about a substantially vertical axis, said simulated torso being provided with simulated arms pivotable on opposite sides of said torso, a target means attached to said arms, and means rotating said torso and pivoting said arms on the simulated player in accordance with the steering direction of the vehicle.

2. The practice football pass receiver of claim **1**, and wherein said target means is attached between the simulated arms.

3. The practice football pass receiver of claim **2**, and wherein said target means includes a rigid ring member pivotally connected at diametrically opposite portions thereof to the free end portions of the simulated arms.

4. The practice football pass receiver of claim **3**, and a flexible receptacle attached to said rigid ring member.

5. The practice football pass receiver of claim **4**, and wherein the simulated player is provided with a sun gear mounted on a vertical axis and the simulated torso is pivoted to rotate around said vertical axis, said rotating means comprising a planetary gear journaled to the simulated torso and meshing with said sun gear, and means to rotate said planetary gear.

6. The practice football pass receiver of claim **5**, and wherein the means to rotate said planetary gear comprises a motor mounted on the simulated torso and means drivingly coupling said motor to said planetary gear.

7. The practice football pass receiver of claim **6**, and means to rotate said simulated arms in opposite directions simultaneously with the rotation of the simulated torso around said vertical axis.

8. The practice football pass receiver of claim **7**, and wherein one simulated arm rises while the other simulated arm descends, responsive to the rotation of the simulated torso around said vertical axis.

9. The practice football pass receiver of claim **8**, and wherein said simulated arms are pivotally mounted on substantially aligned horizontal axes.

10. The practice football pass receiver of claim **9**, and **1**, the means to rotate the steering arms cor prises a beveled gear journaled on said simulated torso to rotate on said vertical axis, means drivingly coupling said motor to said beveled gear, and respective pinion gears connected with the simulated arms on said substantially aligned horizontal axes and meshing with said beveled gear.

11. The practice football pass receiver of claim **1**, and means to control the steering direction of the vehicle and concurrent rotation of said pivoted body portion, in accordance with respective radio control signals.

12. The practice football pass receiver of claim **11**, and means to control the speed of movement and concurrent rotation of said pivoted body portion in accordance with a further radio signal.

13. The practice football pass receiver of claim **12**, and wherein the vehicle is provided with electric driving motor means, and at least two driving batteries, and wherein the speed-controlling means comprises circuit means selectively connecting either a single driving battery or a series connection of the driving batteries to said driving motor means in accordance with the reception of said further radio signals.

14. The practice football pass receiver of claim **11**, and wherein said pivoted body portion comprises a simulated torso provided with simulated arms pivoted to opposite sides of said simulated torso, said target means comprising a receptacle attached between said arms, motor means drivingly connected

between the torso and the simulated player, means drivingly connecting said simulated arms to said motor means, circuit means to energize said motor means simultaneously with steering movements of the vehicle, and means to open said circuit means at a predetermined limiting position of at least one of said simulated arms, whereby to deenergize said motor means.

15. The practice football pass receiver of claim 14, and wherein said means to open said circuit means comprises a normally closed limit switch on the simulated torso included in said circuit means, and means connected to and moving with at least one of the simulated arms located so as to engage and open said limit switch when said one of the simulated arms reaches said predetermined limiting position.