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(54) **FOOTBALL PASSING GAME SYSTEM**

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(57) **ABSTRACT**

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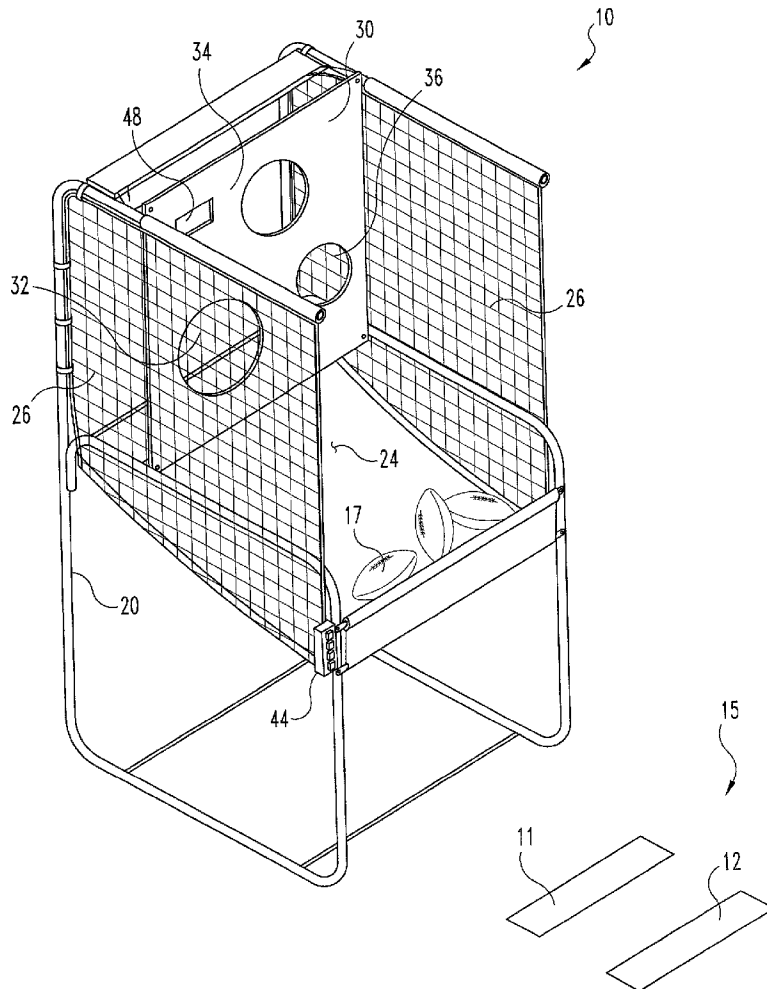
The present invention provides a football passing game system. A target with a number of target zone apertures of various sizes is mounted on a stand which holds the target a distance away from a player position. A game player attempts to pass a football through one of the defined target zone apertures. At least one light sensor is mounted adjacent each of the target zones to detect the passage of a football through an aperture. An impact sensor is mounted to the target and detects if the football impacts the target instead of passing through a target zone aperture. When a signal is generated by a light sensor or the impact sensor, a controller mounted to the target detects the signal and calculates the corresponding change in the game status. The game status is displayed on an electronic display adjacent the target.

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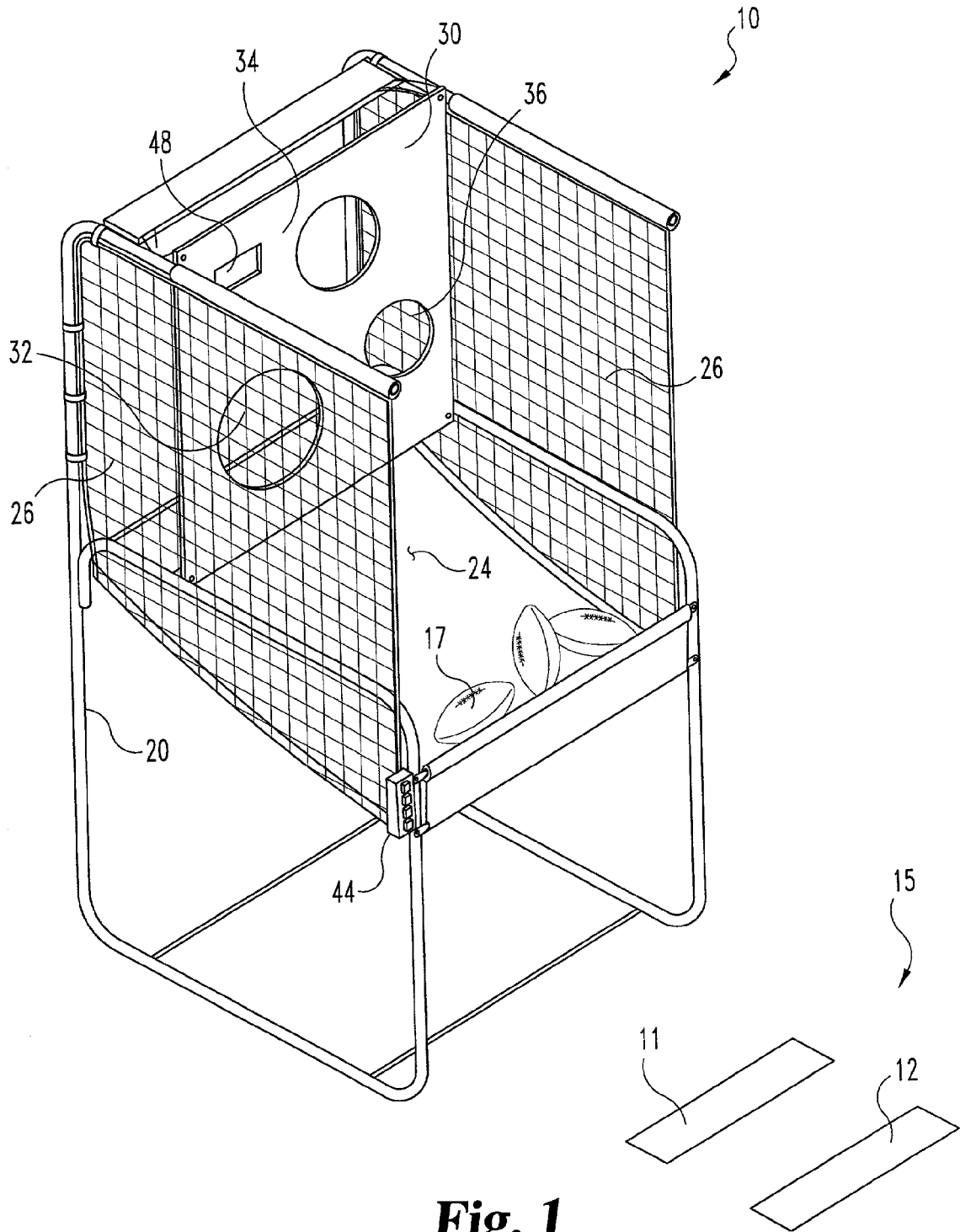


Fig. 1

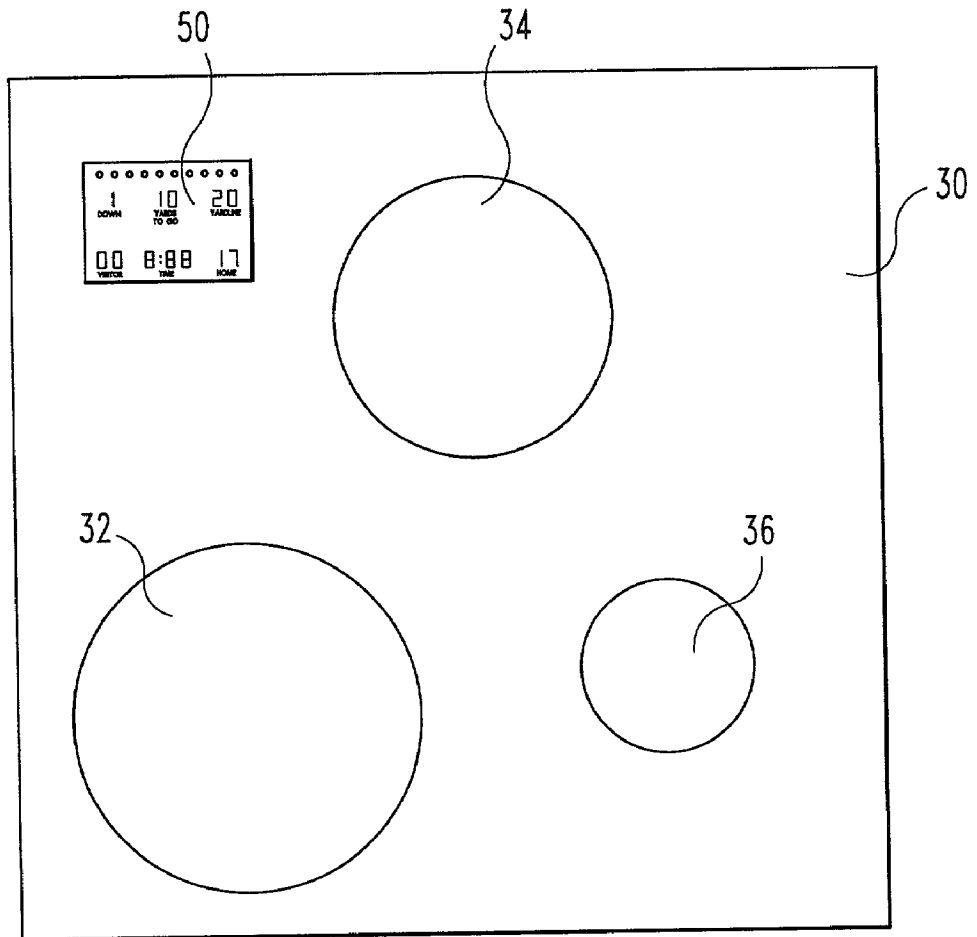


Fig. 2

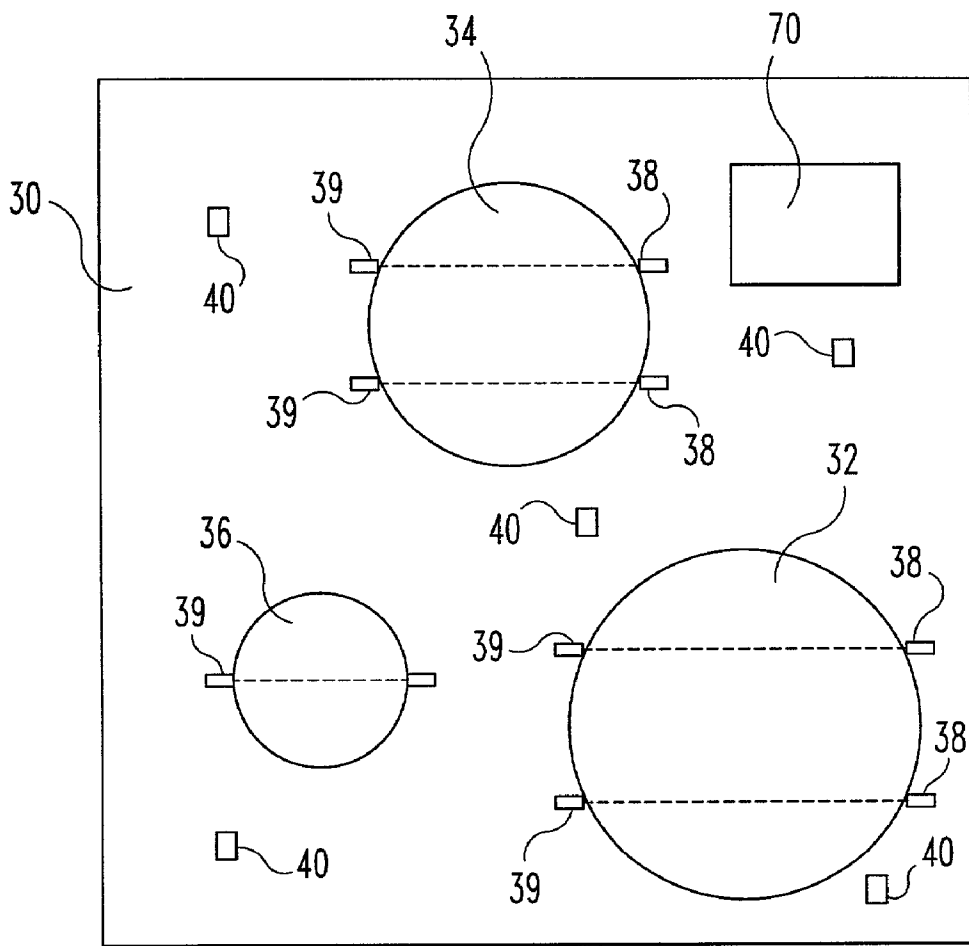


Fig. 3

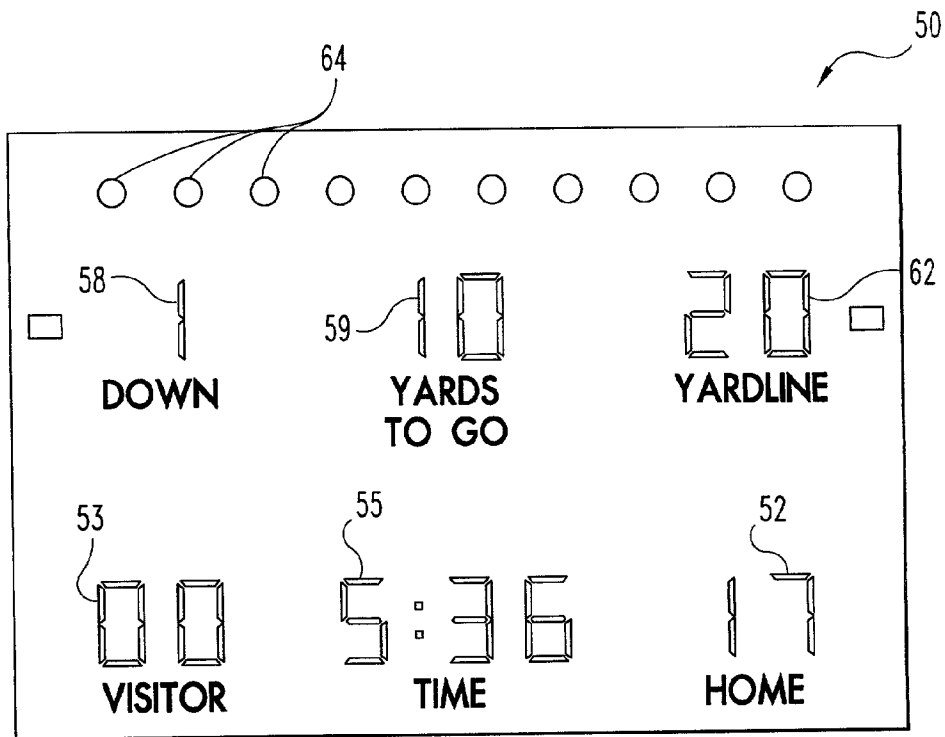


Fig. 4

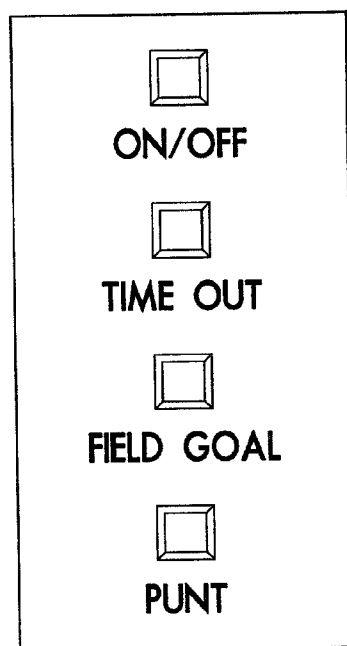
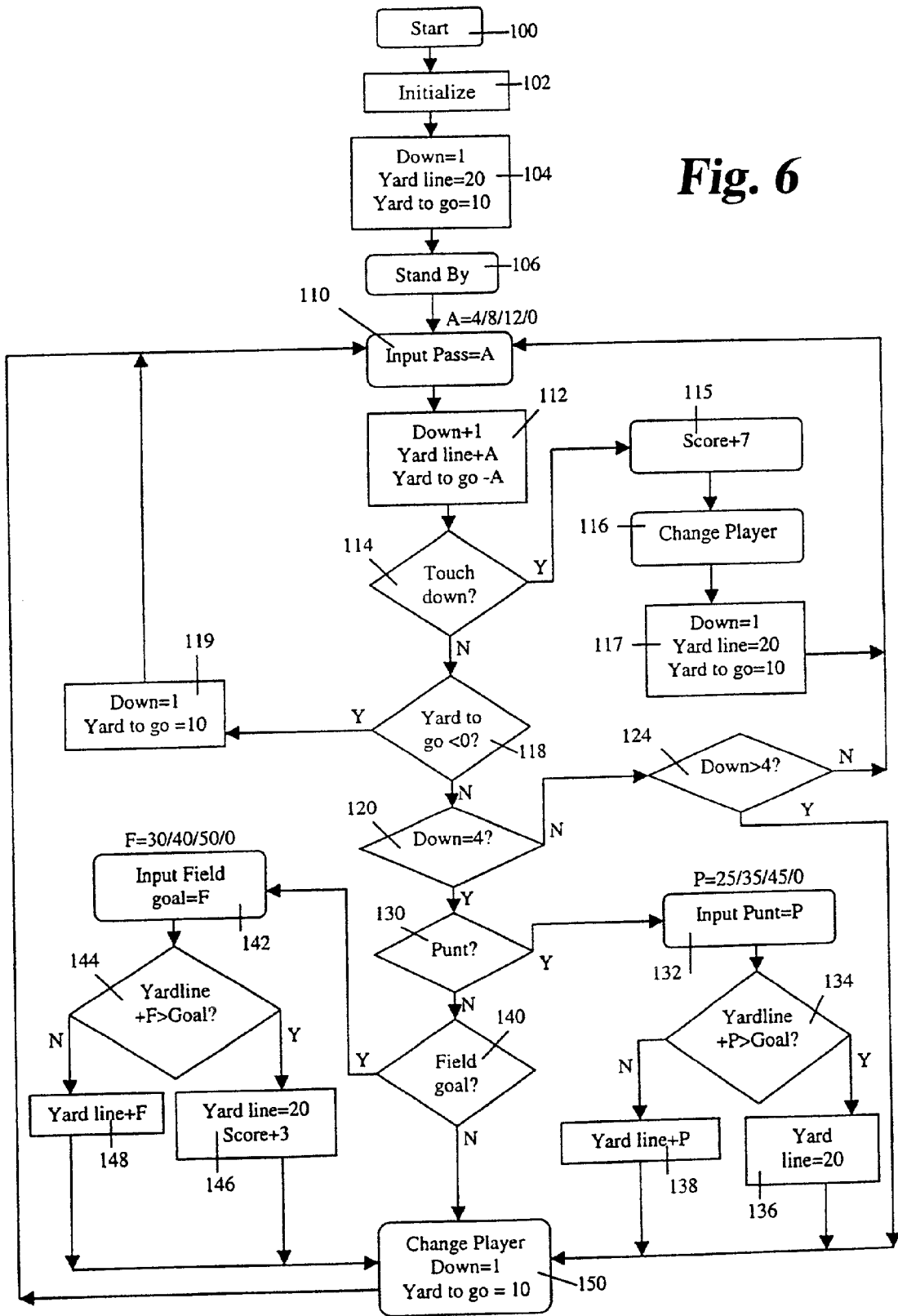


Fig. 5

Fig. 6



FOOTBALL PASSING GAME SYSTEM

FIELD OF THE INVENTION

[0001] The present invention relates generally to the field of recreational games, and more specifically provides a passing game for playing a game of football.

BACKGROUND OF THE INVENTION

[0002] The sport of football is quite popular in the United States and many people enjoy watching or playing the game. To provide a standardized game, a complex set of rules have been developed for playing the game and specifically for dealing with passing situations. In order to play an actual game, it can sometimes be difficult to find the substantial amount of room needed as well as a sufficient number of players to form two full teams. Other factors, such as weather and the potential for injury, have also been known to make arranging a game difficult. Accordingly, there has developed a need and market for indoor or smaller scale games or practice facilities which can be played with less room and require fewer people. Such games can, for example, be set up in basements, garages, game rooms, gyms, fairs, party facilities or otherwise and preferably can be played in a relatively small area with one or two people.

[0003] Some games have been suggested which include various targets, physical arrangements and scoring apparatus. However, many of these games have not easily dealt with the complex rules involving passing and have been limited in structural complexity, size and shape.

[0004] One example of such a game is suggested by Marshall Cook et al. in U.S. Pat. No. 5,257,780. Cook suggests a game of relatively large size, over ten feet in length, intended for larger venues such as gyms or carnivals. The football game apparatus suggested by Cook includes a target with a short pass aperture and long pass aperture through which a player attempts to throw a football from approximately ten feet away. Motion sensors in front of and behind the target are positioned to detect the motion when a football is thrown, and then to detect whether it enters a target aperture within a specified time.

[0005] In order to accurately detect motion of the ball, Cook's system requires precise spatial distance and alignment of the sensors and a timing calculator in the controller as well as accurate adjustment of the threshold motion level to activate sensors. Cook's system is further complicated by the need to adjust the sensors to reduce and/or eliminate extraneous motion, such as movement of people or air flow, in order to avoid unintended activation of the motion sensors. Due to its size, Cook's game further includes a motorized conveyor for returning the football to the player's position.

[0006] The present invention improves on the above suggestions by providing a simpler and more accurate football passing game system which accurately accounts for the complex rules of the game.

SUMMARY OF THE INVENTION

[0007] According to a preferred embodiment, the present invention provides a passing game system. A target with a number of target zone apertures of various sizes is mounted on a stand which holds the target a predetermined distance

away from a player position. A game player stands at or behind the player position and attempts to pass or throw a football through one of the defined target zone apertures. At least one light sensor is mounted adjacent/behind each of the target zones and is configured to detect the passage of a football. At least one impact sensor is mounted to the target and detects if the football impacts the target instead of passing through a target zone aperture. When a signal is generated by a light sensor or an impact sensor, a controller mounted to the target detects the signal and calculates the corresponding change in the game status. The game status is displayed on an electronic display adjacent the target.

[0008] In a preferred embodiment, the electronic display includes visual indicia to indicate variables reflecting the game status including: each team's score, the time remaining, the down, the yards to go for a first down, the current yard line, and the team in possession along with the direction of play. A speaker or buzzer signals various changes in the game status. Preferably, the controller includes an internal processor governed in accordance with the rules of the game which defines and changes the variables to reflect the current game status.

[0009] It is a preferred object of the present invention to provide an improved apparatus for playing a passing game such as a game of football.

[0010] Further objects, features and advantages of the present invention shall become apparent from the detailed drawings and descriptions provided herein.

DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a perspective view of a preferred embodiment of the present invention.

[0012] FIG. 2 is a view of a target from the embodiment illustrated in FIG. 1 including defined target zones and an electronic display.

[0013] FIG. 3 is a rear view of the target illustrated in FIG. 2.

[0014] FIG. 4 is an enlarged view of the electronic display illustrated in FIG. 2.

[0015] FIG. 5 is an enlarged view of the control box illustrated in FIG. 1.

[0016] FIG. 6 is a flow diagram of the internal logic for a football game in a preferred embodiment of the present invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0017] For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations, modifications, and further applications of the principles of the invention being contemplated as would normally occur to one skilled in the art to which the invention relates.

[0018] According to a preferred embodiment, the present invention provides a passing game for projectiles, such as a football game, where a player stands in a designated position

and attempts to pass or throw projectiles through defined target areas. The game includes means for detecting when a projectile enters a target zone or misses and impacts the target. The rules governing the game are pre-programmed into a controller with an internal processor. Upon detection of appropriate signals, the controller and processor use the signals to determine the current status of the game and reflect that status on an electronic display and/or with audio signals.

[0019] Illustrated in FIG. 1 is a perspective view of a preferred embodiment of the present invention. Passing or projectile game 10 includes a stand 20 spaced in front of player position 15. Target 30 is mounted to stand 20. Player position 15 is defined by team mats 11 and 12 to define where a person stands during use. Target 30 includes pre-defined target apertures preferably of various sizes such as large, medium and small apertures 32, 34 and 36 respectively. Target 30 includes a display aperture 48 to which an electronic display may be mounted.

[0020] Apron 24 is mounted to the rear of stand 20 to catch projectiles thrown through the target apertures and extends underneath, forward and down from target 30 at an angle to return the projectile, such as a football 17, to a pickup position. Football 17 may be a regulation football or may be made of softer materials and/or reduced in size as appropriate for indoor, reduced scale game use.

[0021] Apron 24 preferably is mounted at an angle to allow a gravity feed to return football 17 to the pickup position 15. Netting 26 is mounted to the sides and/or top of stand 20 around target 30 to prevent the projectile from bouncing or escaping laterally or vertically. Preferably attached to stand 20 adjacent to apron 24 is a control box 44 (FIG. 5) for selecting various control functions. In one embodiment, control box 44 includes buttons for turning the power on/off, a pause (time-out) button and/or buttons to choose to punt or to attempt a field goal.

[0022] FIG. 2 illustrates a preferred embodiment of target 30. Target 30 preferably includes a number of various sized apertures such as large aperture 32, medium aperture 34 and small aperture 36. The various sized apertures are preferably rated in corresponding levels of difficulty and reward if the projectile successfully enters the target zone. Typically the largest aperture has the lowest difficulty and lowest reward. Electronic display 50 is preferably displayed on or adjacent target 30.

[0023] A rear view of target 30 is illustrated in FIG. 3. Adjacent each of the target zone apertures is preferably included light sensors each of which includes at least one aligned light beam emitter 38 and a light beam receiver 39. Preferably, light beam emitter 38 generates a light signal such as an infrared light beam modulated at a frequency that can be detected by detector 39 without interference from ambient light or accidentally activated by surrounding conditions.

[0024] In a preferred embodiment, each target zone aperture includes a sufficient number of light sensors spaced such that a projectile passing through the target zone will automatically intercept and break the beam of at least one light sensor emitter/receiver pair. When the projectile breaks a light beam, the sensor sends an appropriate signal to the controller that a projectile has been detected. Preferably, the

light sensors are aligned and rigidly attached to target 30 to prevent the need to move or adjust the light sensors when moving, assembling or disassembling game 10. Mounted on the rear of target 30 is at least one impact sensor 40. Impact sensor 40 is triggered when it detects an impact force against the target. In a preferred embodiment, five impact sensors are mounted spaced apart on target 30.

[0025] An electronic controller 70 with an internal processor is additionally mounted to target 30, preferably consolidated in a casing with electronic display 50. Electronic controller 70 is operably connected to each of the light sensors, impact sensor 40 and electronic display 50. The internal processor in electronic controller 70 is governed by specified rules for the game to define and change the status of the game in response to input from the sensors and to then reflect the game status on electronic display 50. Standard wiring and plugs are used to connect the light sensor and impact sensor components to receptacles in controller 70, and a power source is used. For clarity the wiring is not illustrated.

[0026] A preferred embodiment of electronic display 50 is illustrated in FIG. 4. Electronic display 50 preferably includes a plurality of indicia to indicate the current game status. Such indicia can include the home score 52, visitor score 53 and the time remaining 55 in the quarter and/or game. Additionally, in accordance with standard football rules, the team in possession, current down 58 and the yards to go for a first down 59 (starting at 10) may also be indicated. The current yard line 62 is indicated on the display using conventional football notation of a fifty-yard line in the middle descending to a zero-yard line for each team.

[0027] In a preferred embodiment, electronic display 50 includes a graph, such as a horizontal line of ten lights 64, which defines the team in possession of the ball and the team's position. The lights are lit beginning on the side corresponding to the team in current possession of the ball and sequentially lit as the team advances each ten yards down the field. A touchdown is scored when a team reaches the opposing team's zero yard or goal line. The unlit lights 64 and the side where they are located correspond to the remaining distance to go to score and the direction of travel. In preferred embodiments, electronic display includes light emitting diodes (LEDs), a liquid crystal display (LCD) or a small television screen or computer monitor. Preferably, the indicia are digital and illuminated, with sufficient size to allow for easy viewing from player position 15.

[0028] When playing the game, a player stands in front of the stand at player position 15. Team mats 11 and 12 correspond to the home team and visiting team respectively and can be used to handicap one player in comparison to the other. The player attempts to pass a projectile, such as football 17, through one of the target zone apertures 32, 34 or 36. When the football passes through a target aperture and breaks a light sensor light beam or impacts target 30, an appropriate signal is sent to controller 70 and the game status is updated on electronic display 50. The player position distance may be increased to raise the difficulty level.

[0029] The primary logic with which controller 70 determines the game status is illustrated with a flow diagram in FIG. 6. To the extent possible in a passing game, the logical rules governing the processor in controller 70 are intended to reflect the standard rules of a football game.

[0030] Upon turning the game on, with the power switch on controller **44**, the controller starts (block **100**) and self-initializes (block **102**). Controller **70** sets the internal variables of the Down equal to one, the Yard Line equal to twenty and the Yards To Go for a first down equal to ten as illustrated in step **104**. The controller then waits (block **106**) for an input signal (block **110**). Input signal A is determined by the sensors on target **30**, and corresponds to a pass made by the player. If the pass enters a target zone aperture, it is assigned a yardage level corresponding to the level of difficulty, such as 4, 8 or 12 yards for the large, medium and small apertures respectively. Yardage of zero is assigned if the football impacts target **30** and triggers impact sensor **40** without passing through a target zone aperture.

[0031] After receiving Pass Input information A, in step **112**, the controller raises the Down number by one, adds the pass value A to the Yard Line number and subtracts the pass value A from the Yards To Go for a first down. If the adjusted Yard Line is equal to or greater than the touchdown yardage (step **114**), the player's score is raised by seven (block **115**), a Change Player signal is sent (block **116**) and the team's variables are reset to the beginning of a player's turn (block **117**). The system then returns to step **110** to await Pass Input information A.

[0032] If a touchdown was not scored, step **118** questions whether the Yards To Go for a first down is equal to or less than zero. If a first down is indicated, the Down variable is reset to one and the Yards To Go variable is reset to ten (block **119**) and the system returns to step **110** to await new input pass information A.

[0033] If a first down was not achieved, step **120** decides whether it is the fourth down. If it is not the fourth down, the system checks whether the Down variable indicates that the prior down was a fourth down (step **124**). If the prior down was less than a fourth down, the system returns to step **110** and awaits a Pass Input signal A. If the prior down completed the fourth down, the controller sends a Change Player signal and resets the Down and Yards To Go variables (Step **150**).

[0034] If it is currently the fourth down, the player is given the option of using the controller to choose to punt (block **130**), to attempt a field goal (block **140**) or to pass. If the player chooses to pass or no button is pushed, the system returns to step **110** to await Pass Input A. If the player, using controller **44**, chooses to punt, the system waits for Input Punt information P (block **132**).

[0035] Punting is done by the player passing the football toward a target aperture in target **30** with the punt distance achieved corresponding to the level of difficulty of the target aperture. For example, punt values of 25, 35 or 45 yards may be assigned to the large, medium and small target apertures respectively. A punt value of zero is assigned to an impact outside a target aperture. If the punt value P plus the Yard Line is greater than the goal line (block **134**), the Yard Line is changed to twenty yards (block **136**). If the Yard Line does not exceed the goal threshold, the Yard Line is changed to where the punt was received (block **138**). After a punt, the Change Player signal is given, step **150**, and the Down and Yards To Go variables are reset.

[0036] If, using controller **44**, the player chooses to attempt a field goal during the fourth down (block **140**), the

system awaits field goal input F (block **142**). A successful pass of the football towards target **30** is assigned a field goal yardage corresponding to the level of difficulty of the target zone aperture. Examples of such yardage include 30, 40 and 50 yards respectively. Zero yardage is assigned if the football does not pass through a target zone aperture. After receiving the field goal input F (block **142**), the system compares the Yard Line plus the field goal input F to the goal line (the opposing team's zero yard line), (step **144**) to determine if a field goal is scored. If a field goal is scored, the Yard Line is reset to 20 and the team's score is raised by three, (step **146**). If a field goal is not scored, the Yard Line remains as the new Yard Line (step **148**). After completion of the field goal attempt, step **150** sends a Change Player signal and the Down and the Yards To Go for a first down variables are reset to their norms. The system then returns to step **110**, to await Pass Input A.

[0037] In a preferred embodiment, play of the game continues while the time for each quarter is indicated by a descending time counter **55** on electronic display **50**. At the end of the fourth quarter, the logic illustrated in FIG. 6 is suspended and the final score of the game is displayed. Controller **70** will then send an appropriate visual and audio end of game signal. Similarly, time counter **55** and an audio signal can be used to send a delay of game signal if excess time between pass attempts is about to elapse. Controller **70** increases the down number by one or sends the Change Player signal after a fourth down if the delay of game time elapses without a pass input. Various signals sent by controller **70** can be shown on electronic display **50** as well as with an audible signal such as a speaker for music, voice or a buzzer. Preferably, the audible signals generated differ to signify different events such as a first down, a score or a change of possession.

[0038] Game apparatus **10** can be manufactured and assembled from standard materials. For example, stand **20** may be metal such as aluminum or steel, with target **30** being made from wood, metal or plastic. Apron **24** may be made from a vinyl, canvas or plastic and it and/or target **30** may be decorated with various indicia to gain attention and/or reflect a preferred team colors. Projectile **17** may be a standard or reduced sized football. Preferably, the overall size of game **10** is sized to fit within a room with a standard eight foot ceiling. In a preferred embodiment, player position **15** may be located only a few feet away from target **30** as defined by team mats **11** and **12**. Also in preferred embodiments, controller **70** may be a microprocessor, a PLC or similar well known electronic logic components.

[0039] One advantage of a preferred embodiment of the present invention, in contrast to prior art games, is the relatively small size and portability of the present invention. For purposes of illustration, stand **20** can have a height of approximately seven feet, a width of approximately 39 inches and a depth of approximately 45 inches. In a preferred embodiment, player position **15** is, at a minimum, located **32** inches from target **30**. In this embodiment the apertures in target **30** are arranged in various sizes, such as 14", 11" and 8" in diameter from largest to smallest.

[0040] In a preferred embodiment, game **10** is manufactured in a modular, lightweight component form to enhance the ease of transport, assembly and disassembly. Preferably target **30** arrives assembled with the apertures and mounting

holes pre-cut and the modular light sensor emitters and receivers rigidly mounted around the apertures and connected to controller **70**. Stand **20** is made from modular, hollow metal tubing with nestable ends for connectivity. The tubing has pre-cut holes through the ends for placing connection bolts. Alternatively, the tubing connections are held in place with spring-loaded pins which can be manually depressed to unlock the tubing during assembly and disassembly. Controller **70** and display **50** can be mounted to target **30** with simple wood screws, nuts and bolts or similar fasteners, and have receptacles for plugs attached to wiring from the various components.

[0041] Game **10** can be stored and shipped in a relatively flat, palette sized box with the tubular members nested in a row and controller **70** arranged in a relatively flat first layer, and with target **30** and apron **24** forming a second layer. In one preferred embodiment, the box is less than approximately four inches in height with a length and width each less than approximately three and half feet.

[0042] In alternate embodiments, logical rules for other projectile games, such as baseball or basketball may be incorporated into processor or controller **70** with corresponding changes in electronic display **50**.

[0043] While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the spirit of the invention are desired to be protected.

What is claimed is:

1. A football game system, comprising:
 - a) a target defining a plurality of target zone apertures;
 - b) a football;
 - c) a player position spaced apart from said target from where a player passes said football towards said target;
 - d) at least one light sensor mounted adjacent to each of said target zones, wherein each of said light sensors is configured to detect if said football enters one of said target zones and send a signal;
 - e) at least one impact sensor mounted to said target, wherein said impact sensor is configured to detect if said football impacts said target outside of one of said target zones and send a signal;
 - f) an electronic display;
 - g) an electronic controller configured to receive signals from each of said light sensors and said impact sensor and coupled to said electronic display to reflect the game status.
2. The football game system of claim 1 wherein said target is mounted adjacent a first end of said stand and said player position is located adjacent a second opposing end of said stand.
3. The football game system of claim 2 further comprising an apron mounted to said stand behind and extending forward underneath said target at a downward angle to receive said football after a pass and to return said football to said player position.
4. The football game system of claim 3 wherein said controller defines and controls the values for a plurality of variables according to the rules for defining the status of a football game, wherein said variables are defined from a selection of: each team's score, the team in possession, the quarter, the time remaining in the quarter, the current yard line, the current down, and the yards to go for a first down.
5. The football game system of claim 4 wherein the controller displays the current status of the game on said electronic display by displaying said plurality of variables.
6. The football game system of claim 5 wherein said controller detects input from said sensors to update said variables and said electronic display in response to a player passing said football.
7. The football game system of claim 5 further comprising a control mechanism operably connected to said controller, wherein said control mechanism allows a player to select the option of punting or attempting a field goal, and wherein a sensor detects the player's pass of said football to determine the distance of said punt or said field goal attempt.
8. The football game system of claim 7 further comprising an audible signal generator connected to said controller.
9. The football game system of claim 3 wherein each of said light sensors is comprised of an aligned light emitter and a light detector.
10. The football game system of claim 9 wherein said light emitter emits infrared light.
11. The football game system of claim 9 wherein said electronic display is comprised of a plurality of LEDs.
12. The football game system of claim 11 wherein said electronic display includes a line of LED's which are illuminated to correspond to the current team in possession and the current yard line.
13. A projectile game system, comprising:
 - a) a target defining a plurality of target zone apertures;
 - b) a projectile;
 - c) a player position spaced apart from said target from where a player throws said projectile towards said target zone apertures;
 - d) at least one light sensor mounted adjacent to each of said target zones, wherein each of said light sensors is configured to detect if said projectile enters one of said target zones;
 - e) at least one impact sensor mounted to said target, wherein said impact sensor is configured to detect if said projectile impacts said target outside of one of said target zones;
 - f) an electronic display mounted adjacent said target.
14. The projectile game system of claim 13 further comprising an electronic controller configured to receive input from each of said light sensors and said impact sensor, and wherein said controller displays the game status on said electronic display.
15. The projectile game system of claim 14 wherein said electronic controller is controlled by logical rules corresponding to a game, and wherein said controller defines a plurality of variables corresponding to the game status.
16. The projectile game system of claim 15 wherein the game is football.

17. The football game system of claim 14 wherein each of said light sensors is comprised of an aligned light emitter and a light detector.

18. The football game system of claim 17 wherein said light emitter emits infrared light.

19. The football game system of claim 17 wherein said electronic display is comprised of a plurality of LEDs.

20. A compact, modular football game system, comprising:

- a) a plurality of tubular metal components connectable to form a stand;
- b) a substantially flat target mountable to said stand and defining a plurality of target zone apertures;
- c) at least one light sensor rigidly affixed to said target adjacent to each of said target zones;
- d) at least one impact sensor affixed to said target;

e) an electronic display mountable to said target;

f) an electronic controller mountable to said target and operably connectable to each of said light sensors, said impact sensor and said electronic display.

21. The compact, modular football game system of claim 20 wherein said stand has a height of less than about seven feet.

22. The compact, modular football game system of claim 21 wherein said stand has a depth of less than about forty-five inches.

23. The compact, modular football game system of claim 22 wherein said target is mounted on said stand at a mounting position, wherein said stand has a front defining the minimum proximity of a player position, and wherein the distance from the mounting position to the front of said stand is about thirty-two inches.

* * * * *