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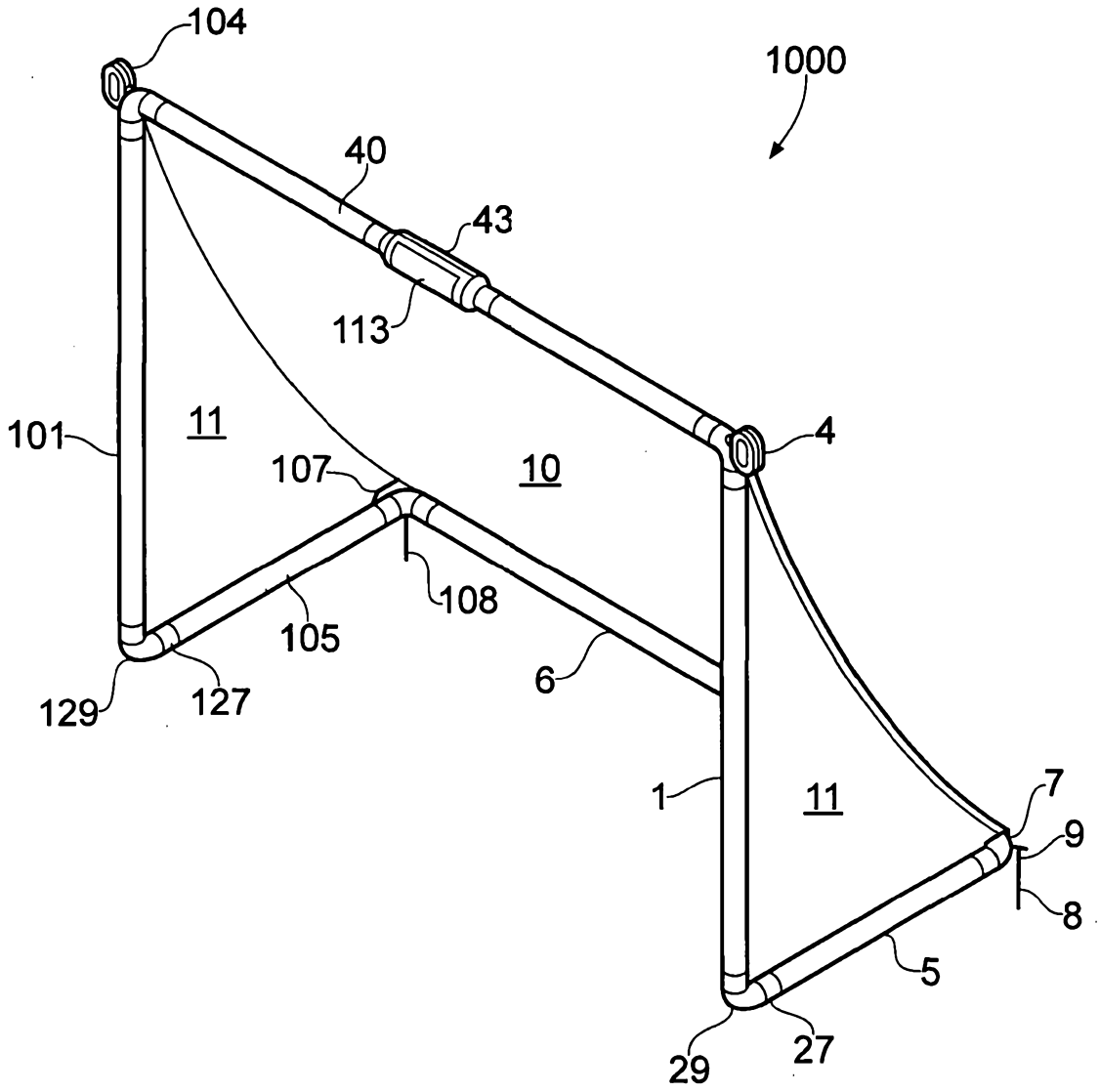
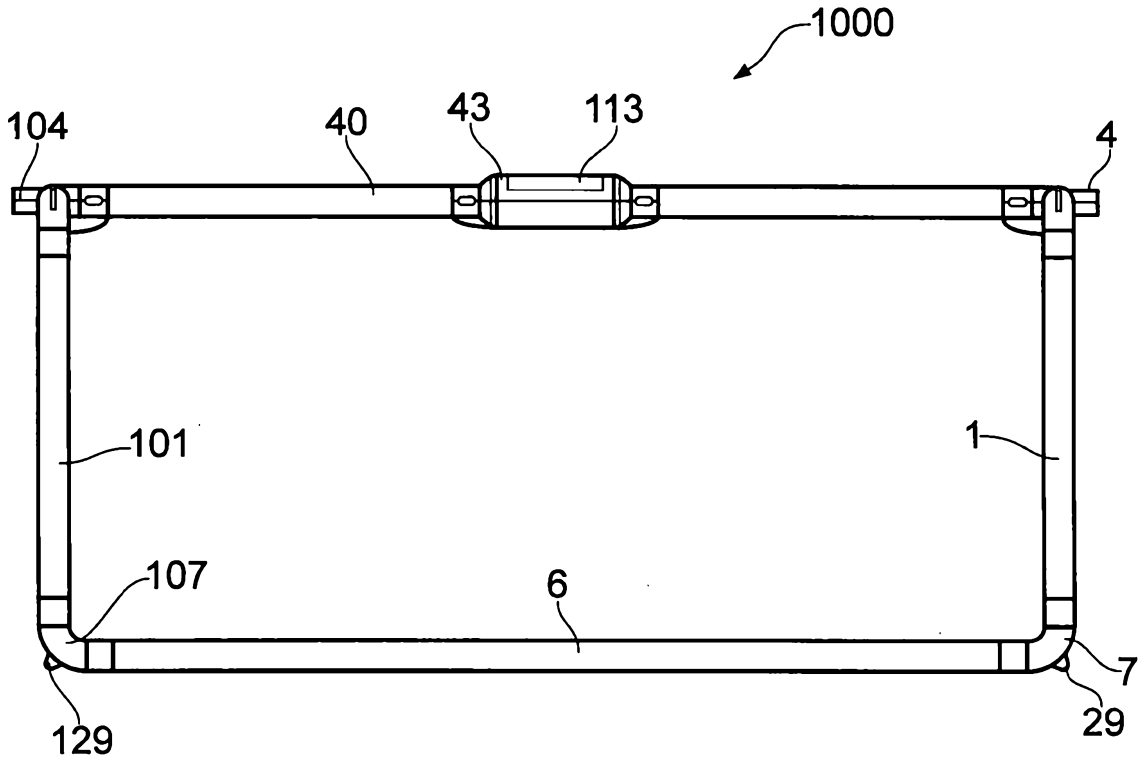


FIG. 1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43
113
4
101
1
107
6
7
129
29

FIG. 2a

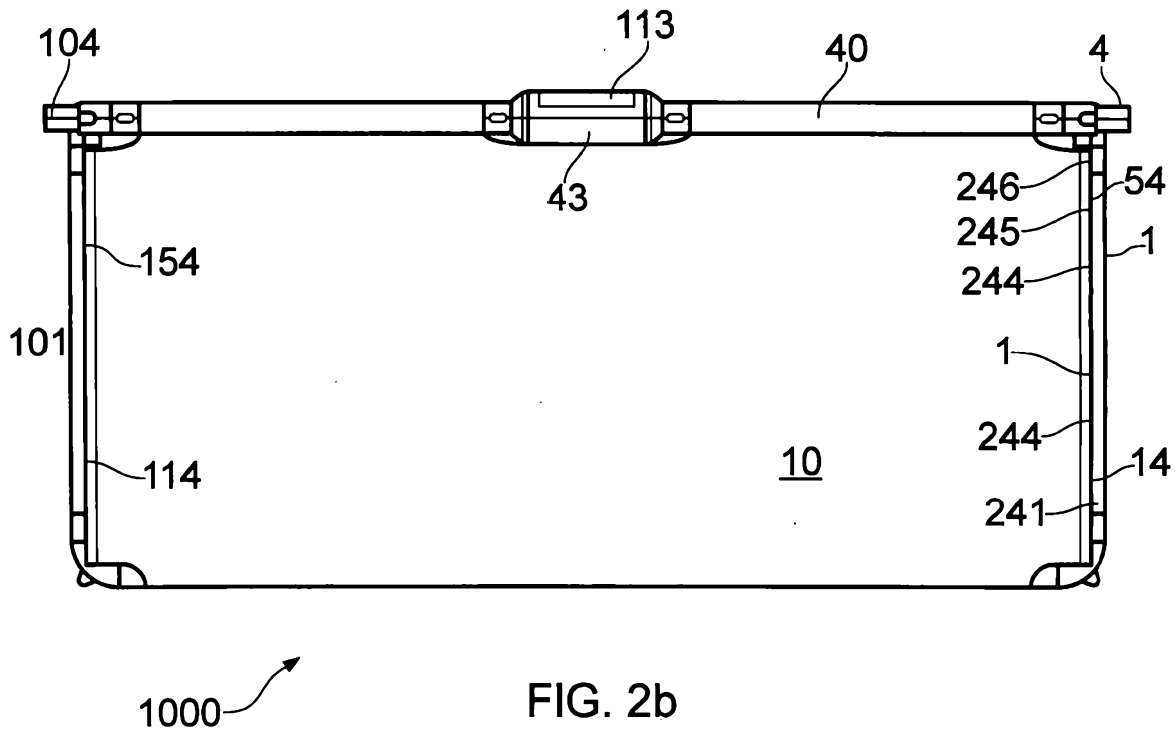

104
113
40
4
43
246
54
245
1
154
244
101
1
244
10
14
114
241
1000

FIG. 2b

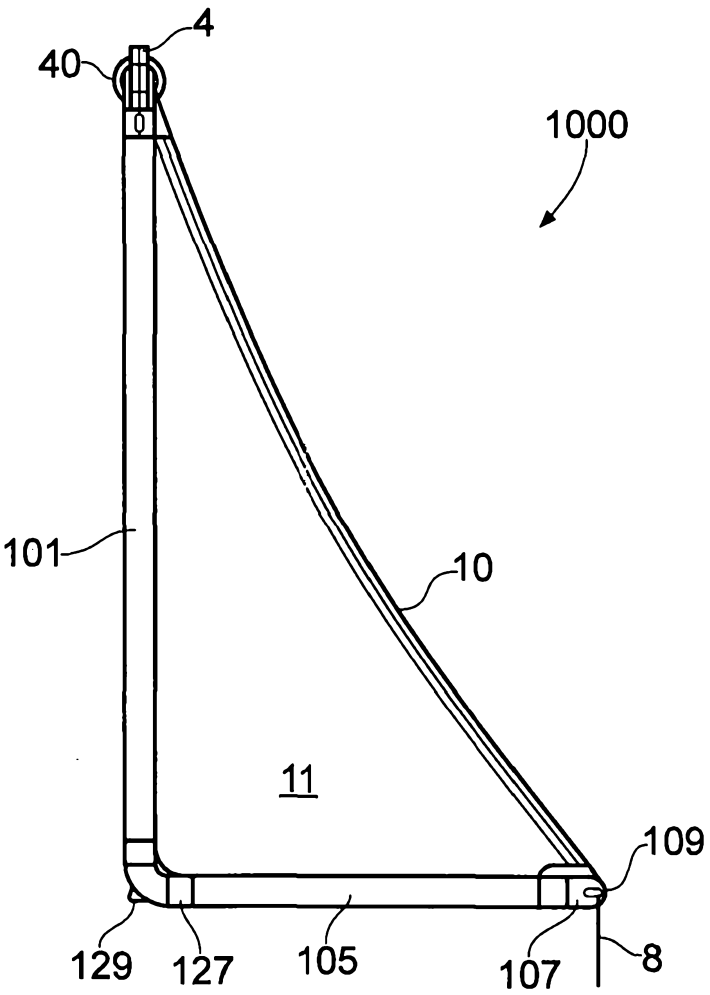


FIG. 3

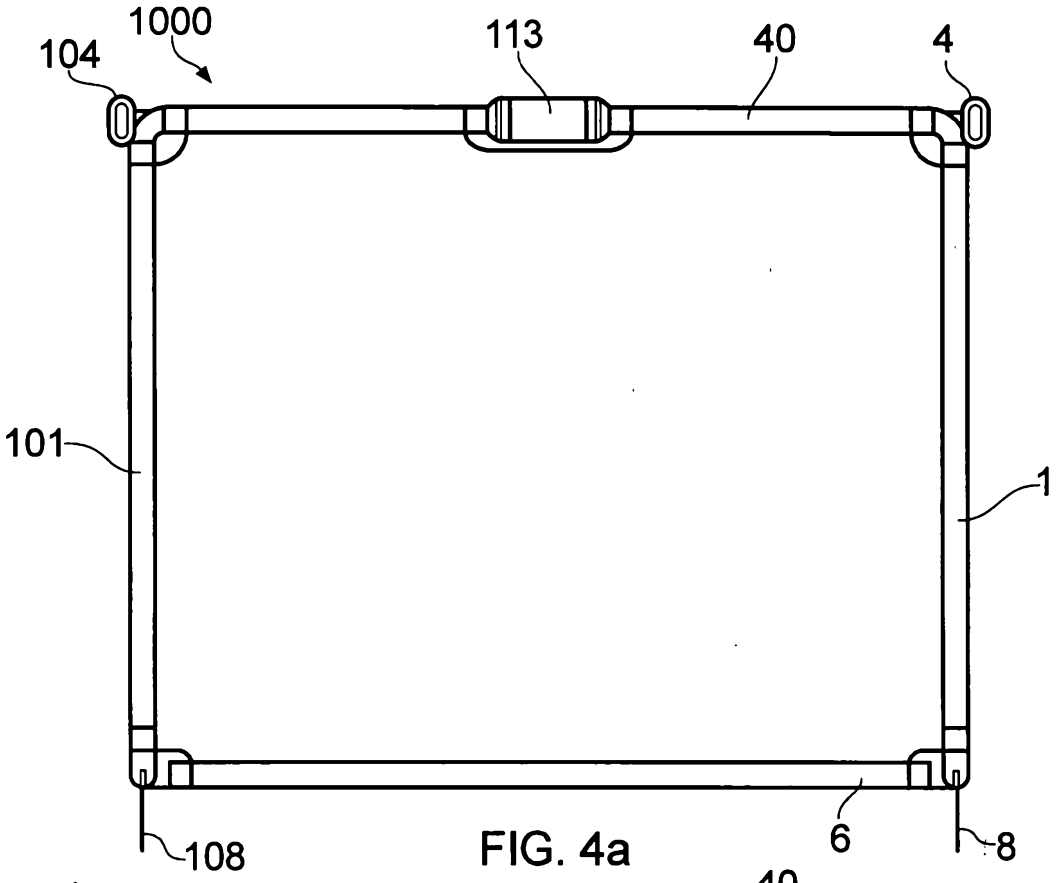
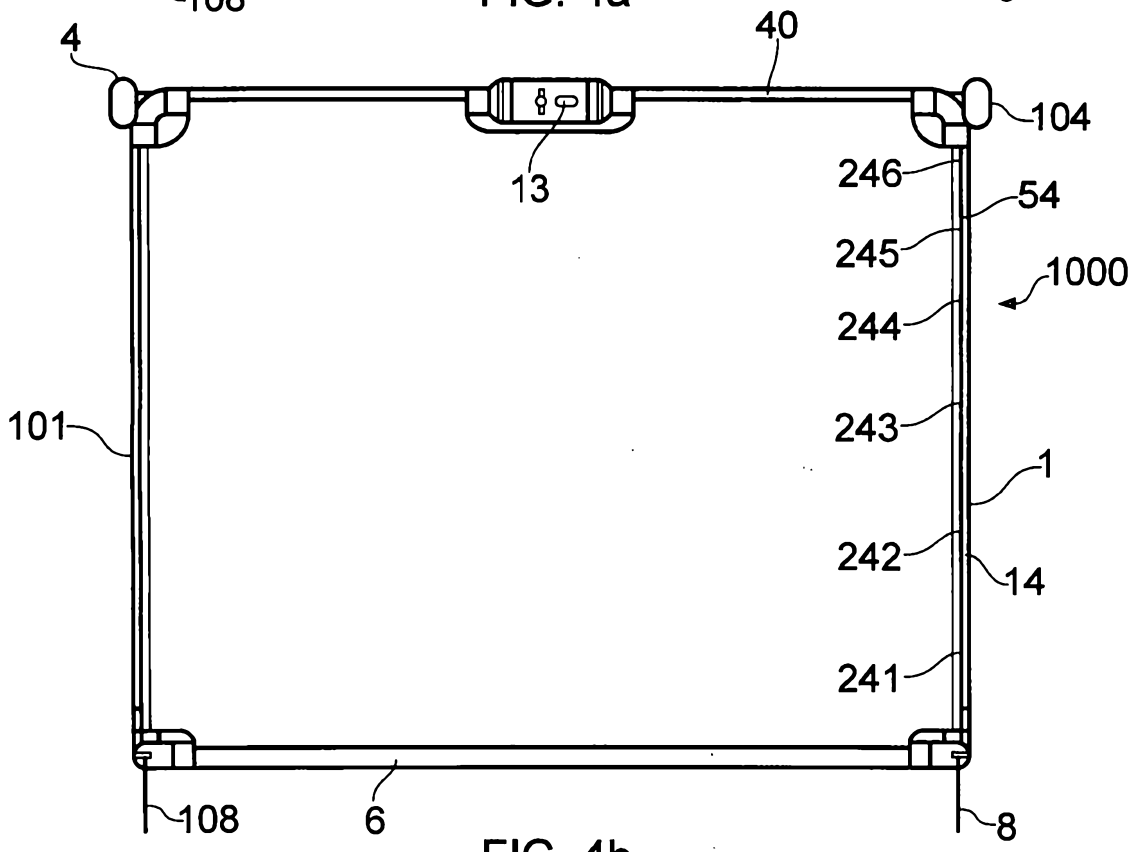

1000
104
113
40
4
101
1
108
6
8

FIG. 4a


4
40
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13
246
54
245
1000
244
101
243
1
242
14
241
108
6
8

FIG. 4b

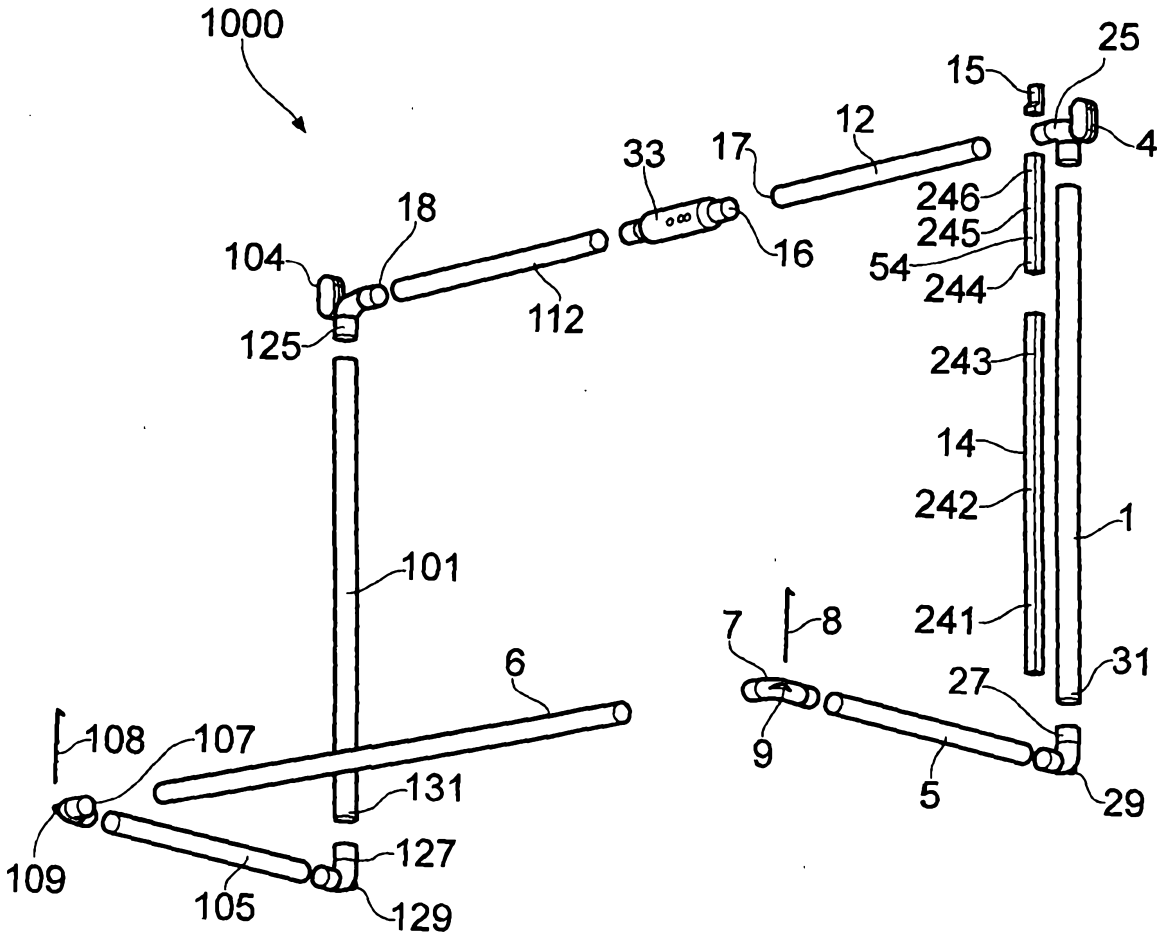
1000
25
15
12
4
33
17
246
18
245
104
16
54
244
112
125
243
14
242
1
101
241
7
8
31
6
27
108
107
9
131
5
29
109
127
105
129

FIG. 5

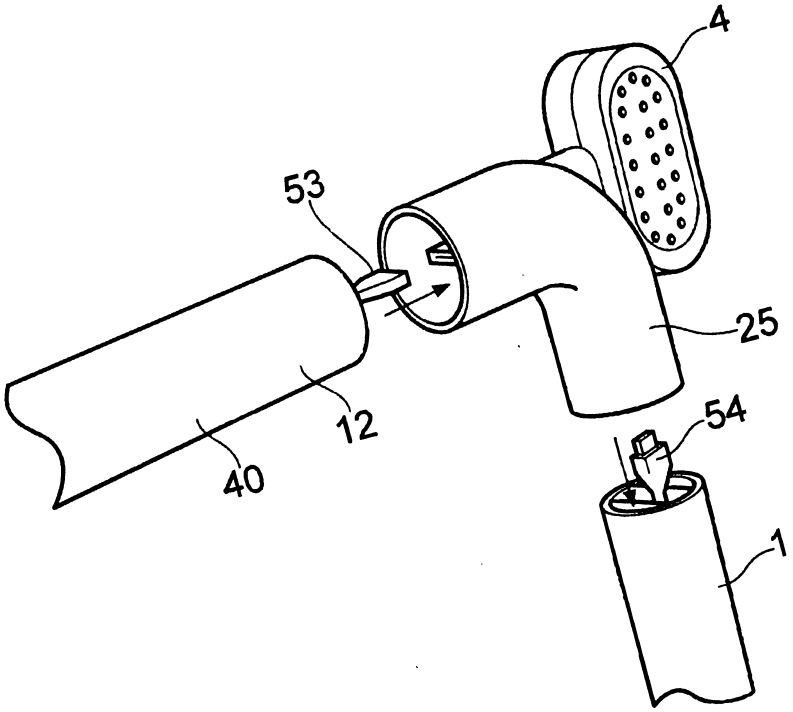

FIG. 6

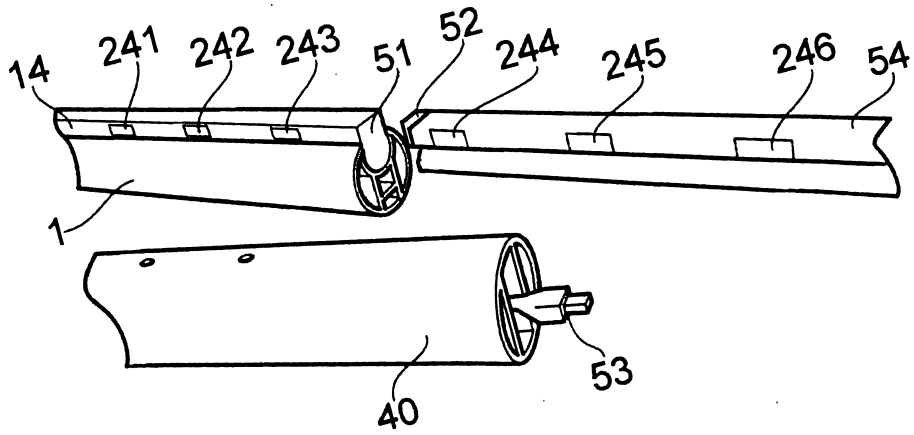

FIG. 7

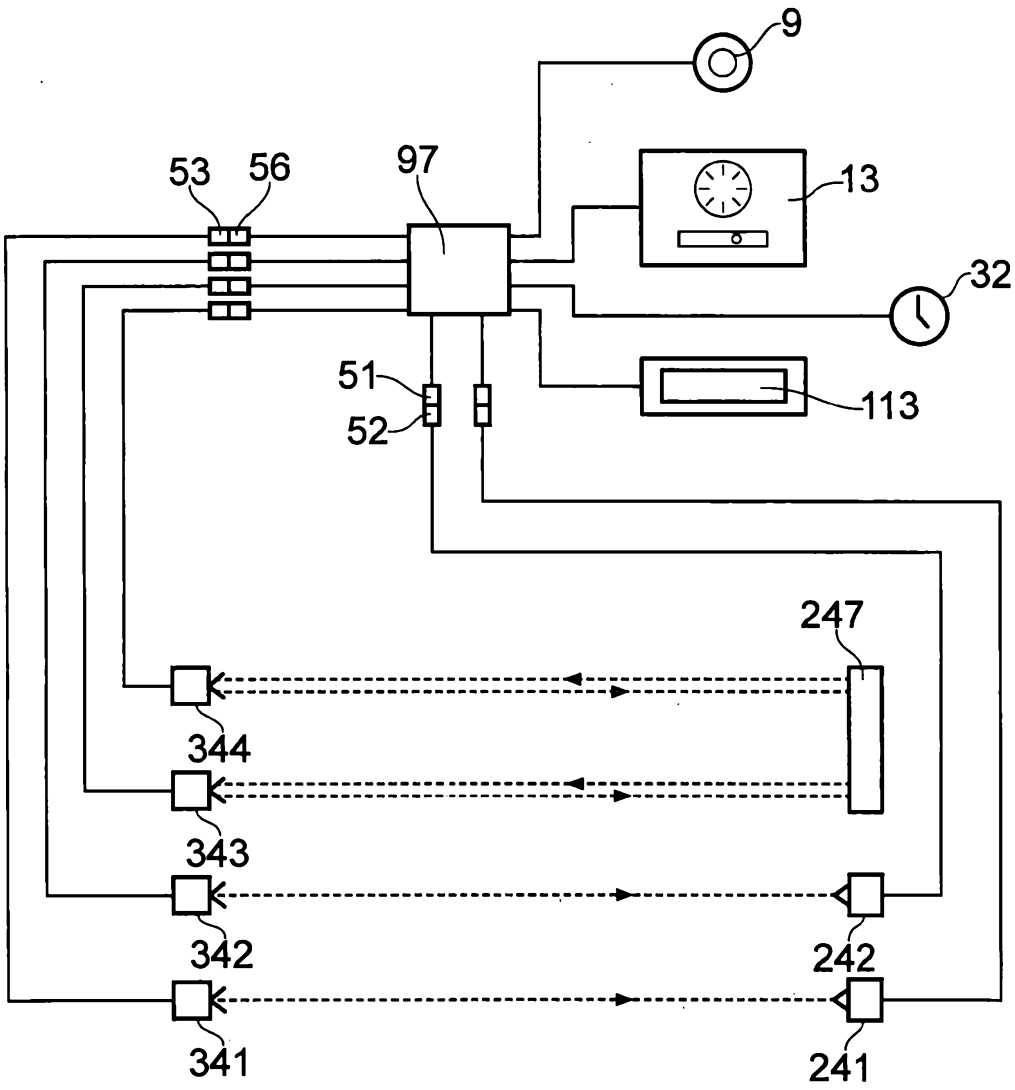

FIG. 8

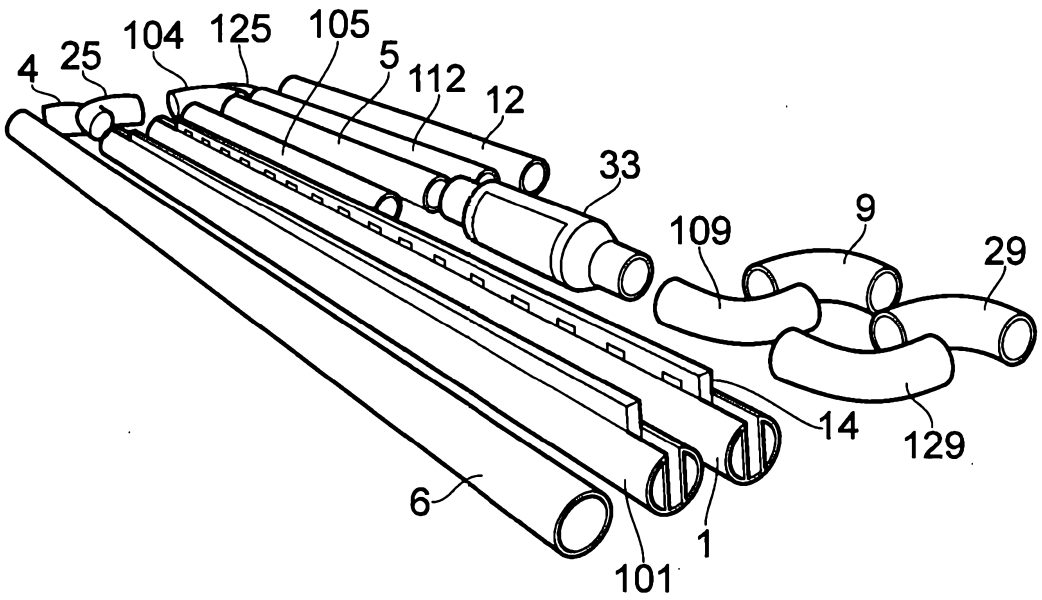

FIG. 9

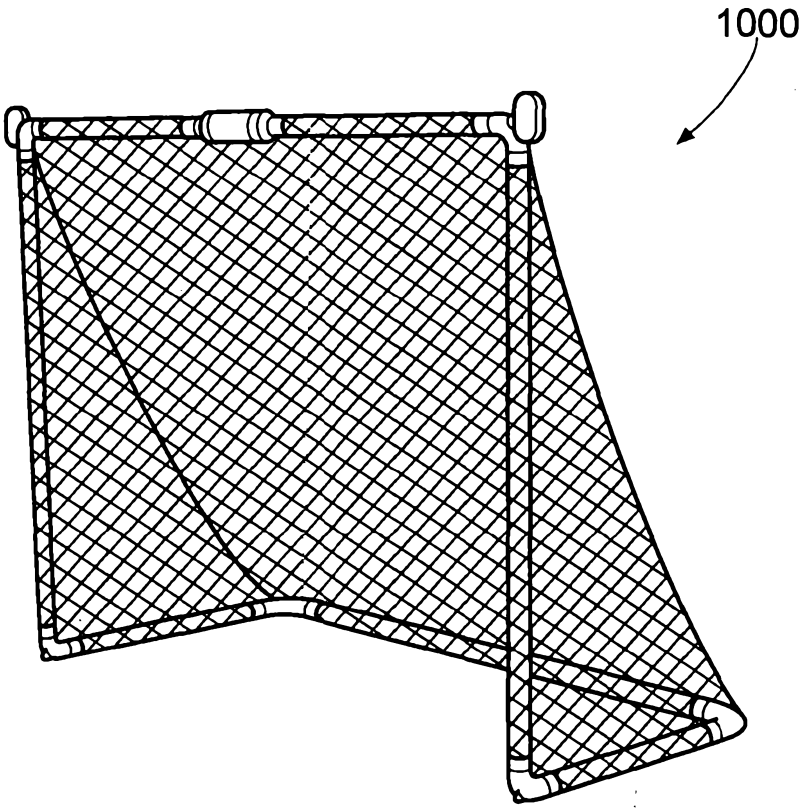

FIG. 10

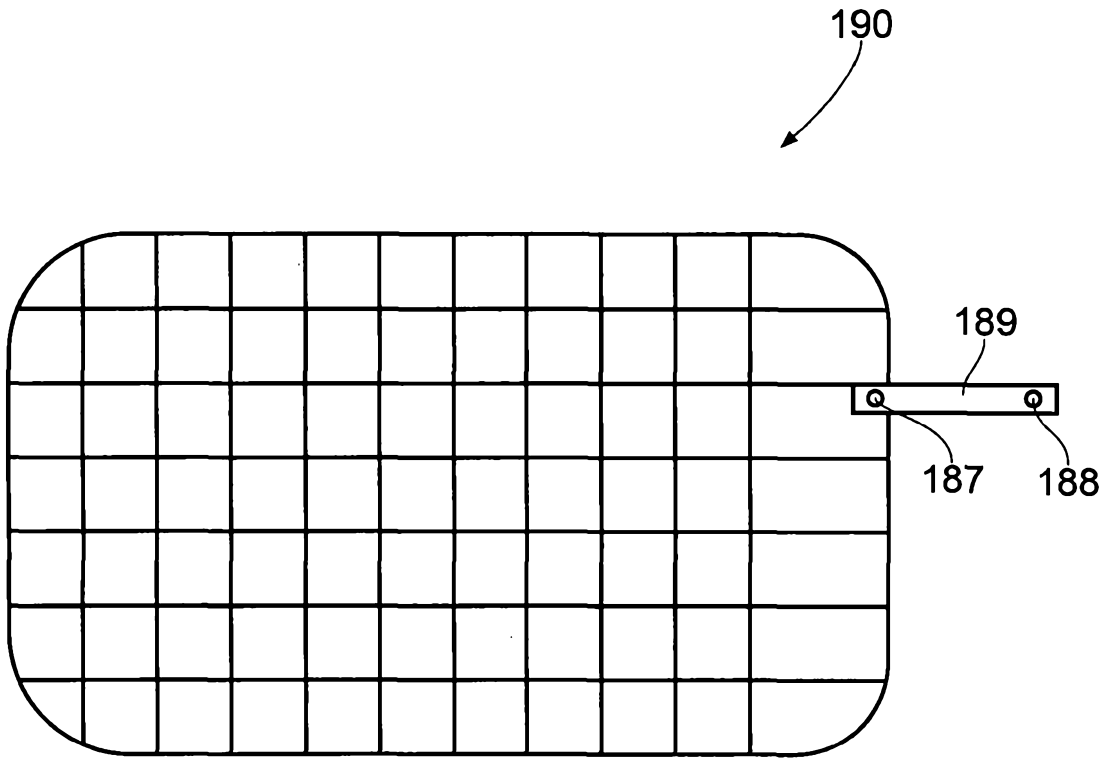

FIG. 11

A PORTABLE GOAL DEVICE

Field of the Invention

The present invention relates to a portable goal device for counting goals scored in a range of different sports. Specifically, the invention relates to a device configured to keep count of how many balls or pucks interrupt a plane defining an entrance to a goal.

Background

The use of goal posts is a feature of many sports such as football, lacrosse, polo, water polo, hockey goal, and basketball. Keeping track of how many goals are scored is essential.

In some cases, a person may be unsure if a goal has been scored or not. There can be differences of opinion between a person attacking and a person defending the goal.

In professional leagues an expert umpire and/or a complex goal monitoring machine may be used to determine if a goal should be counted.

A reliable, simple, and inexpensive device has hitherto not been available to keep track of goals scored during casual games and to encourage players to practise shooting at the goal.

Prior Art

Accordingly, a number of patent applications have been filed in an attempt to resolve the problem or similar, including the following:

Chinese publication CN-A-101 940 832 (Yuanbo) discloses a football goal capable of automatically judging a score. The football goal comprises a door frame, wherein the door frame is provided with a signal sensing system and a light-emitting device; and both the signal sensing system and the light-emitting device are connected with a central control computer. By applying the signal sensing system to a football match, the football goal can accurately judge whether a score is valid or not, and the light-emitting device is used for reminding a referee, thereby avoiding penalty mistakes of

the football match, and presenting a match more corresponding with football sporting spirits for football fans all over the world.

European publication EP-A-2 191 878 (Torres) discloses a device that has a sensor unit with a sensor for detecting a ball partially by an object, for example person, shielding a visible light. The sensor has a detection unit that determines a distance between the sensor and the ball. The sensor unit exhibits a transmitter for transmitting energy detected by the sensor. A computing unit interprets position of the ball according to rules of ball sports. The sensor unit has two sensor matrices that are aligned and/or positioned differently.

United Kingdom publication GB-A-2 471 636 (Heasly) discloses a goal assembly including: a frame defining the border or mouth of the goal; a controller; at least one scoring sensor for detecting passage of a ball past the frame and into the goal, said sensor then providing a signal to the controller; and a visual display system including one or more light sources. The visual display system is activated by the controller so as to provide a visual display, and the visual display incorporating a changing or non-static light pattern on part or all of the frame or a post or surface on which the frame is disposed.

US publication US-A-5748073 (Crawford) discloses an electronic goal detector having a sensor embedded within a hockey playing surface.

European publication EP-A-1457236 (Dingworth) discloses an electronic goal detector with a horizontal member on the ground at the front of detector. The horizontal member comprises a mirror strip which must be accurately assembled to operate properly.

Spanish publication ES-A-2363750 (Roca et al) discloses an electronic goal detector arranged detect a ball which passes through a zone in a grid dividing the goal entrance.

US publication US-A-2004/014538 (Bennett) discloses an electronic goal detector which indicates a ball passes across a plane.

Sport goal devices disclosed in the prior art are suitable for use in professional stadiums. In light of the foregoing prior art, there is a need for a sport goal device suitable casual games and to assist a player to practise.

Summary of the Invention

According to a first aspect of the invention there is provided a portable goal device for detecting a moving ball or puck as it breaks a plane of a goal, the device comprising a pair of uprights and a cross-bar connectable between the uprights, wherein at least one of the uprights comprises sensors comprising a video camera and a motion detector comprising an ultrasonic detector to detect the ball or puck by interruption of a wireless connection wherein the sensors are arranged in use to extend the connection within the plane to a perimeter defined by the uprights and the cross-bar and a playing field upon which the sport goal rests, and the cross-bar comprises a notification means for notifying a user of the interruption.

Advantageously the sensors are arranged in use to extend the wireless connection across the plane of the entrance of the goal such that the passage of an object from front to rear of the device breaks the wireless connection.

Preferably the notification unit is in communication with the sensors for notifying a user of breakage of said connection. Advantageously a notification of breakage indicates a ball or puck has passed into the entrance scoring a goal.

Preferably the sport goat device comprises a base connectable to the uprights, wherein the uprights are arranged to stand upright on the base.

Ideally the connection is arranged across the device wherein passage of an object from front to rear of the device breaks or attenuates the connection.

Preferably the sensors are contained or supported in strips that are adapted to be removable although fixed to the goal uprights so that they face into the entrance or mouth of the goal.

Preferably the motion detector also includes: photodetectors such as an electric eye and/or a passive infra-red (PIR) device and/or a microwave sensor and/or the video camera.

Preferably the video camera is arranged to provide an image of the goal entrance to the goal upon detection of a breakage in the wireless connection by way of at least one of the sensors.

Preferably the video camera may also be arranged to capture an image in front of the entrance upon detection of the breakage so that the image includes a person who caused the ball or puck to pass into the entrance of the goal.

Preferably the notification means is arranged to provide visual notification of the image. Preferably the notification means comprises a display screen.

Preferably the notification unit is arranged to send to a mobile phone an image or images of the ball or puck in the entrance of goal and or the person who caused the ball or puck to pass into the entrance upon detection of a breakage in the wireless connection by at least one of the sensors.

Preferably the sport goal device comprises a means to view an image of the object breaking the plane detected by the video camera.

Preferably the notification unit or portion comprises an audible notification means such as a loudspeaker. Preferably the notification unit is arranged to send an audio signal activating a sound of cheering from the loudspeaker upon detection of a breakage in the wireless connection by at least one of the sensors. Advantageously the sport goal device encourages a player to practise accurate shots which direct the ball or puck through the goal or to a specific portion or location of the plane of goal.

Preferably the loudspeaker is connected to the cross-bar, or one of the uprights, or the base.

Preferably the sensors are arranged in groups consisting of at least one transmitter and at least one receiver pair on opposing uprights. Preferably the sensors are arranged in opposing pairs, one sensor of a pair on one of the uprights and the other sensor of the pair on the other upright.

Typically, the device further includes a flexible net fixed between the uprights and cross-bar, and the device thereby is embodied as a goal for soccer or other goal sports such as hockey or lacrosse.

Ideally the connection is configured to be made by a plurality of sensors arranged along the uprights at a distance corresponding to an average width of a ball or puck for the appropriate sport. This spacing may assist in distinguishing between a false signal, for example caused by a goal-keepers foot or arm and a true signal caused by a ball or puck.

Preferably the connection is established at, and may be broken at, a plurality of heights and the broken or attenuated connection detected by the sensors. In this way the device provides a means for registering passage of balls or pucks into a goal at a variety of heights so that the entire goal mouth may be monitored, so that each goal is counted.

Ideally the sensors are arranged at user selected positions on the uprights so that a user may adjust the heights of the sensors from the cross-bar. In this way the sports goal device provides an automatic means of keeping score and relaying this score to the user.

In some embodiments the notification unit or portion comprises a means for registration and notification that a ball or puck has crossed a goal line at a particular height.

In preferred embodiments the device includes more than one means of notifying the user. For example, in some embodiments the notification portion or unit provides audible notification means. In addition, or the alternative in some embodiments the notification portion or unit provides visual notification means. Such means may comprise a plurality of light emitting diodes (LEDs).

The notification portion or unit may provide simple notification of breakage in the connection, for example wherein the user is notified of this breakage by flashing LEDs.

The notification may alternatively comprise wording or pictorial notification, for example wherein the LEDs are configured to be able to display more complex notifications.

Further embodiments provide further example of displays such as organic light emitting diodes (OLED) or liquid crystal displays (LCD).

For example, in some embodiments enablement of pictorial notifications may comprise a facility to notify in sports team colours and/or logos, or pictorial representations of players. This facility may be programmed at retail, or use.

In preferred embodiments the device or notification portion includes a printed circuit board (PCB), timer, data storage, data connectivity and/or memory to operate as a controller taking in data from the sensors and providing signals for the speakers, display screen and alerts.

Preferably the sport goal device comprises an electronic circuit as the controller. Preferably the controller is a printed circuit board (PCB).

Advantageously the PCB may comprise a timing facility wherein such facility may comprise an ability to override notification of breakage of the connection, for example after a prior breakage; so as to allow collection of the ball for a predetermined time period, which period may be stipulated by the user.

For this purpose, preferably the timer is configured with a preselected time delay, or it is configured with a user selectable time delay. Preferably the time delay is selectable by use of a control input. Preferably the sensors and notification means operate in combination with the controller, so as to pause notifications for a period after a breakage in connection.

Preferably the sport goal device comprises a touch screen with a display by which a user may set a delay time, activate recording of images by a camera, and connect to the internet or a communications network. Preferably the controller is configured with a communicator to connect to the internet.

Preferably a memory is provided for the controller to store commands from the user, time, images from cameras, and / or goal count due to interruptions, speed of a ball which interrupts the goal plane, and /or location of a ball which interrupts the goal plane.

Preferably the touch screen is in communication with a controller which is communication with the memory. Advantageously the goal count and images of a goal scored taken by sensor cameras, and images of a goal scored taken by the another camera mounted on the camera are transferable to the display or via the internet to a remote user or user device.

Preferably the touch screen is arranged to enable a user to select an image to watch as a reply. Preferably images are stored in memory with tag to goal count at the instant the image was recorded so that an image is selectable for replay according to the goal count at the time the image was recorded. Preferably images are stored in memory with a tag to speed and location in the plane of the goal speed and location so that an image is selectable for replay according to speed and location. Preferably the touch screen is arranged on the notification unit on the sport goal device so that a user can view a reply on the sport goal device. Preferably the touch screen is arranged to enable a user to send a selected image via the internet a mobile communication network to a remote device.

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Preferably the sport goal device comprises a means for image recognition by which an image taken by a sensor camera of object which interrupts the plane of the goal is automatically recognizable. Advantageously the controller is thereby enabled automatically determine whether an interruption is caused by a ball by recognizing a ball in an image and to count accordingly.

Preferably upon breakage or interruption of the connection, the controller counts one goal scored, and then stops counting for the time delay. A player has time during that time delay to retrieve a ball or puck from inside the sport goal device. During this time the sport goal device is prevented from counting. After the time delay, controller resumes counting so a new interruption of the connection after the time delay will be counted as an additional goal.

Preferably the controller is programmable. Preferably the controller receives a signal from at least one of the sensors indicating an interruption. Using the timer, the controller detects the time of the interruption and estimates the speed of the ball or puck as it passes through the entrance to the goal.

In some embodiments the notification portion includes a manual data input or local control means for example to provide a timed and/or manual override for the sensors. Such control means may be wireless and/or arranged in a convenient location such as on an upright in use.

Advantageously data storage may allow a tally to be kept of connection breakages, or goals.

Advantageously data connectivity may allow for updates to the notifications and style thereof. Advantageously data connectivity may further allow data to be taken elsewhere, for example to a personal computer or for upload to the World Wide Web. Such data connection may be provided by a universal serial bus (USB).

Preferably the sport goal device comprises a power supply device. Preferably the power supply device comprises a battery housed within or a tubular component the base so that battery provides ballast to keep the sport goal device upright.

In some embodiments the device may include solar harvesting or photovoltaic capability, so that a solar cell or solar panel is arranged to charge a battery and supply current for the power supply for the device. Ideally the solar panel is flexible to wrap up or roll up. Preferably the cross-bar is a hollow tube and configured to house the solar panel when rolled up so to protect the solar panel from rain. Ideally the solar panel is configured to wrap up around the cross-bar. Preferably the cross-bar is connected to the uprights so that it is free to rotate whereby the solar panel may be unwrapped as the cross-bar turns. Preferably when unwrapped the solar panel covers an area from the cross-bar to the base.

Preferably the controller is configured to save power. Ideally after a preselected amount of time after the sport goal device is turned on, the controller reduces power usage. Preferably the controller reduces power up detecting the battery charge is below a preselected level.

Preferably the controller reduces power usage by dimming a light provided as an alert when a goal is detected. Preferably the controller reduces power usage by lowering the volume of an alert or cheer sounded by speakers when a goal is detected.

Preferably the timer operates in combination with the controller, so as to pause operations of electrical devices after a pre-selected delay or upon the detection of a battery reaching a pre-selected charge. Electrical devices paused save power. Electrical devices paused to save power include the sensors, cameras, speakers, and / or display unit.

Preferably the notification unit and sensors are embedded in the cross-bar and uprights respectively.

Preferably the notification unit is comprised in the cross-bar. Preferably the cross-bar comprises two side-bars and the notification unit, wherein the notification means is arranged to be joined between the two side-bars to form the cross-bar.

The notification unit is ideally situated on the centre of the cross-bar, facing outwards from entrance of the sport goal device, so as to provide an easily legible display.

In some embodiments the notification unit may be further comprised by, or supplemented by, a plurality of lights; which lights are arranged on the cross-bar, and/or uprights of the device in use so as to provide more effective and expansive recognition of breakage of the connection and consequently goals. Such lights may be regularly spaced along the elongate lengths comprised by the cross-bar and uprights so as to provide clearer notification of a goal.

In preferred embodiments the device comprises a kit of components that are adapted to be assembled at a playing field or pitch. The sport goal device is constructed from the components. Preferably the components are just easily taken part and adapted to be stowed away. The sport goal device thereby capable of being dismantled into plural parts for transport or storage.

In still further embodiments the device comprises a number of separate parts, as an aftermarket device, for adaptation of existing goals.

For example, some embodiments may be provided as a strip of sensors for attachment to goal uprights, and a unit configured for attachment to the cross-bar. The unit may be envisaged to be placed elsewhere in use.

Preferably the notification unit is provided with an attachment mechanism, typically configured for attachment to a tubular member. Preferably the notification unit comprises a tubular end, a clip, or a sleeve by which the notification unit is attachable to the cross-bar or the side-bar.

In wired embodiments the various component parts may interconnect advantageously through use of a common hardwire connection system, whereby the notification portion could be displaced and connected to another apparatus for downloads and/or uploading of data.

In some embodiments the notification portion or unit may comprise wireless connectivity, for example being enabled to communicate locally or remotely with independent electronic devices, such as smartphones via GPS or WAP.

Preferably the sport goal device is assembled from pipes are arranged to be joined by insertion together.

Preferably the pipes are arranged to form a watertight seal upon insertion together.

Preferably internal to the pipes are conductors for electrically connecting the controller, sensors, transmitters, cameras, and other electrical components. Preferably the conductors are arranged to be connected by insertion of the pipes together.

Preferably the controller is arranged to pause operations of electrical devices after a pre-selected delay or upon the detection of a battery reaching a pre-selected charge.

Preferably the notification means is activated by simultaneous interruption of a preselected group of connections.

Preferably the sport goal device comprises a reflector arranged along one of the uprights to form a connection reflection of a transmitted signal from a transmitter and sensor on the opposite upright.

Preferably the sensors arranged along one of the uprights are in register with sensors arranged along the opposite upright so and so as to form a connection between each of the sensors in register.

Preferably the controller is configured with the location of the sensors to determine where in the plane of the goal the ball or hockey passes by detecting which of the connections is interrupted.

Preferably the controller activates the notification means to make a particular noise which is dependent on the location where the ball passes through the entrance plane of the goal.

Preferably the sport goal device comprises an internet communication mean to transfer images or goal count information.

Alternatively, the wireless connectivity may comprise inter-machine operability, such as Bluetooth (TM), wherein the portion may correspond without wiring, enabling easier installation, but requiring independent power sources.

The invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Brief Description of Figures

Figure 1 shows an isometric view of a preferred embodiment of the sport goad device in use;

Figures 2a shows a plan view looking up from below the base of the embodiment of the sport goal device as shown in Figure 1;

Figures 2b shows a plan view looking down from above the cross-bar of the embodiment of the sport goal device as shown in Figure 1;

Figures 3 shows a side view of the embodiment of the sport goal device as shown in Figure 1;

Figures 4a shows a front view of the embodiment of the sport goal device as shown in Figure 1;

Figures 4b shows a front view of the embodiment of the sport goal device as shown in Figure 1;

Figure 5 shows an exploded isometric view of an alternative embodiment of the sport goal device;

Figure 6 shows in detail an exploded view of a cross-bar, upright, and cross-bar corner connector as components of the sport goal device;

Figure 7 shows in detail an upright, sensor-bar, and sensors as components of the sport goal device;

Figure 8 shows a functional block diagram of one embodiment of a system;

Figure 9 shows a kit of parts from which the sport goal device is constructed;

Figure 10 shows the sport goal device in assembled form comprising net; and

Figure 11 shows a net comprising a connector strip.

Detailed Description of Figures

With reference to the figures there is shown in Figures 1, 2, 3, and 4 an embodiment of a sport goal device 1000 assembled for use as goal in soccer, polo, water polo, or hockey. The sports goal device 1000 is arranged to detect a flying sports object such as a puck or ball breaking a plane at the entrance of the goal.

A view of the sport goal device 1000 including a net is shown in Figure 10.

The sports goal device comprises two parallel uprights 1, 101. The uprights 1, 101 are connected by a cross-bar 40. The two parallel uprights and the cross-bar define the side and top of the perimeter of the entrance of the goal when the sport bar device is resting on a playing field for use. The perimeter is in the plane of the goal which is set across the of entrance the sport goal device.

In an embodiment which is shown in Figures 1, 2a, 2b, 3, 4a, 4b and 6, the cross-bar 40 includes a notification portion 43. The notification portion comprises a notification display 113 centrally situated on the cross-bar. The display provides visual notification of the number of goals scored by a ball or puck breaking the plane. The display also provides an image as visual confirmation. In some embodiments the notification portion is arranged to send number of goals scored and visual confirmation to a remote medium.

The notification portion comprises two corner loudspeakers 4, 104 for audio notification. The loudspeakers are encompassed in corner connectors which are connected to corners form where the uprights 1, 101 join the cross-bar 40. The audio notification loudspeakers 4 are arranged to direct sound in front of the goal in use.

In another embodiment which is shown in Figure 5, the cross-bar 40 comprises two side-bars 12, 112 joined by a notification unit 33. The two side-bars 1, 101 and notification unit 33 have tubular endings 16, 17, 18 to facilitate connecting the side-bars to the notification unit. The notification unit 33 and side-bars 12, 112 are arranged to be joined by insertion.

The uprights 1, 101 and cross-bar 40 are portable pipes arranged to be assembled together for use. The cross-bar can be assembled by inserting the tubular ends into each other. So joined the two side-bars and notification unit form an elongate pipe with the notification unit substantially in the middle.

The notification unit 33 connects into the side-bars 12, 112 so that the assembled cross-bar has the form of an elongate tube or pipe.

The pipes comprise internal wiring and electrical connectors to electrically connect the sensors to the notification means. The connectors 16 are USB connectors. The pipes are arranged to be joined by insertion together. Figures 6 and 7 show the wiring and electrical connectors 53, 54 in the ends of a side-bar 12 and upright 1.

In some embodiments the interior wiring is replaced by conductors attached to the inner surface of the tubes and tubular connectors. The electrical connectors are thereby obviated as simply inserting the tubes together simultaneously mechanically connects the components and electrically connects the notification unit and sensors.

The tubes are connected by a watertight fit. The conductors and sensors which are housed in the tubes and sensor strips are thereby waterproofed so that the sport goal device is operable in wet weather.

The notification unit 33 and notification portion 43 are cylindrical. The unit and portion can be rotated in the cross-bar 40. The display screen 113 is thereby directed or inclined at a preferred angle for notification of players.

The notification unit 33 and notification portion 43 include controls 13. The controls are on the reverse side to a display screen 133 which is on the fore-side, wherein the unit can be rotated to easier access the controls and position the display.

As shown in Figure 5, at least one of the uprights 1, 101 comprise sensors 141, 142 to detect the puck or ball. The sensors form a wireless connection in the plane of the entrance to the sports goal device.

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Figures 2b, 4b, and 5 show that a plurality of sensors 241, 242, 243, 244, 245, 246 as a first set are carried on one or more sensor-bars 14, 54 fixed along one of the uprights 1.

Figure 2b shows an embodiment comprising a second set of sensors 341, 342, 343, 344, 345, 346 arrayed along the upright 101 which is opposed to the upright 1 whereon the first set of sensors is fixed.

A controller, which in some embodiments is located in the notification unit 33, is in communication with the sensors. The controller is configured with the distance separating the sensors in the first set. The controller is also configured with the location of the sensors along each of the uprights 1, 101. The controller determines where in the entrance plane of the goal a ball or hockey passes by detecting which of the connections is interrupted as in interruption is detectable by controller as a change in a signal from a particular sensor.

The controller also detects the times at with timer 32 which each of the sensors on the first set sends a signal that there is an interruption and the time that each of the sensors in the second set sends a signal that there is an interruption. The controller uses the

time differential to calculate the location between the uprights where the interruption occurred.

The sensors in the first set are separated by a preselected distance to capture a ball or puck entering the goal entrance when at least a preselected number of sensors are interrupted. In some embodiments the distance is adjustable because the sensors are arranged so slide on the sensor strip 14. In some embodiments the sensors in the first set and the second set are separated by a preselected distance. In some embodiments the controller is configured to activate the speakers or lights of the notification unit only when the at least a preselected group of sensors detect an interruption simultaneously. In some embodiments the preselected group is a preselected number of adjacent sensors. This prevents the alert being activated by a player's hand in the goal entrance since the hand will not be large enough interrupt three sensors. Preferably the sensors comprise video cameras by which the controller connected the sensors can distinguish a part of a person from a ball in the goal entrance.

Connected to the frame which houses the loudspeakers is another video camera arranged to view out in front of the plane of the goal to record a player shooting a ball or puck at the goal entrance.

The controller operates the loudspeakers 4, 104. The controller makes the loudspeakers to make a particular noise which is dependent on the speed and location where the ball passes through the entrance plane of the goal. The controller makes the speakers make a loud cheering noise when the entrance plane in interrupted in a high corner by a ball moving above a pre-selected speed. The controller makes the speakers make a less jubilant cheering noise when the ball passed through the middle of the goal entrance below a pre-selected speed. The controller is configurable by an input device on the notification unit. A user can choose pre-selected speeds and locations where the goal entrance is interrupted. So sounds chosen by user are provided through the speakers. The notification unit 33 is also arranged to light up or show a video image which is dependent on the location and speed of the ball or puck through the entrance.

In another embodiment, not shown, there are sensor-bars on both uprights. One of the sensor-bars is fixed along one of the uprights 1 and the other sensor-bar is fixed

along the other upright 101. The sensors on each upright correspond with the opposing sensors in use, so as provide a sequence of parallel sensing connections vertically; wherein breakage of the connection at any height is registered and a notification activated at the notification portion.

A detailed view is shown in Figure 6 of an un-joined cross-bar and upright. Universal serial bus (USB) connectors 53, 54 in the ends of the notification unit 33 and side-bars 12, 112 electrically connect the controls 13 and display screen 113 to the sensors 241, 242, 243, 244, 245, 246 in the sensor-bars 14, 54.

When a goal is scored, the flying sport object enters an area of the plane across the entrance of sports goal device. The sensors detect breakage of the wireless connection in the area where the object enters.

The notification unit 33 in the middle of the cross-bar 40 cross-bar comprises a notification means for notifying a user of the breakage.

The uprights include internal sensor apparatus providing four sections each having a plurality of sensors, which apparatus is inserted into collars having apertures for sensor passage. The apparatus comprises the sensors and at least one sensor-bar 14, 54.

The sensor-bars 14, 54 fix the sensors 241, 242, 243, 244, 245, 246 in position with respect to the uprights 1, 101. The sensor-bars are connected to upright in a slot in the upright. The sensor-bar is normally held in position in the slot by friction and a person can move the sensor-bar by sliding it along the upright in the slot.

A set of sensors 241, 242, 243 can be moved together by moving the sensor-bar 14. The sensor-bar enables the person to move the set of sensors together. The person can adjust the position of the sensors along the upright while maintaining their position relative to each other. The sensors create a sensed field across the plane parallel to and below the cross-bar 40 which in use is an area of the plane of the entrance to the goal. An area of the plane at the entrance to the goal may be thereby selected by the person for detection of the ball or puck.

To stabilize the uprights 1, 101 in the upright position, the uprights are connected by upright connectors 29, 129 to a base which in use rests on a playing surface.

The base comprises two returns 5, 105. The returns are connected at a right angle to the uprights 1, 101 so that the returns are substantially parallel to each other. The base also comprises a back 6. The back 6 is connected to returns 5, 105 and extends between them. The back 6 is parallel to the cross-bar 40.

There are base corner connectors 7, 107 located proximate the distal end from where the returns 5, 105 are connected to the uprights 1, 101. The base corner connections 7, 107 join the returns 5, 105 to the back 6.

The returns 5, 105 and back 6 are in some embodiments curved in part to allow for unevenness in the playing surface. The base corner connections 7, 107 are provided with displaceable pins 8, 108 and through-eyes 9, 109 to affix the base to the ground of the playing surface. The sports goal device is thereby fixable to the playing surface to prevent movement of the goal in use.

15 09 17

Figures 1 and 3 show the sports goal device includes a net reaching between and fastened to the base, cross-bar 40 and uprights 1, 101. The net comprises a back 10 and side panels 11.

An end of a flexible net connector strip 189 is attached to the net. A magnet or ferrous part 187 is attached to the end of the strip which is attached to the net. The strip has a distal end from the end of the strip attached to the net. A second magnet or a ferrous part 186 is attached to the distal end of the strip. The strip is wrapped around the cross-bar, one on the uprights, or a component of the skeletal base, and the net is thereby attached to the to the sport goal device. Figure 11 shows the net 190 with the strip 189.

The sports goal device comprises tubular components which are easily assembled. The sport goal device is easy to construct and take apart at the playing field. Figure 1 shows the sport goal device constructed and Figure 5 shows the components. Dis-assembly is just as simple. In some embodiments the tubular components comprise magnets to magnetically connect them for easy assembly or disassembly.

The uprights, base, cross-bar, and side-bars are all formed in hollow tubular plastics and so are tubes or pipes. Thus the entire sports goal device is easily assembled by

hand by joining the ends of the pipes together. The joined tubular plastics form a skeleton over which the net is draped.

To assemble the sport goal device, the notification unit 33 is inserted between two side-bars 12, 112 to construct the cross-bar 40. The side-bars are inserted into cross-bar corner connectors 25, 125. The uprights 1, 101 are inserted into the cross-bar corner connectors 25, 125. This completes assembly of the perimeter portion of the sports goal device which forms the perimeter of the entrance to the goal in use.

To join the perimeter portion to the base, perimeter corner connectors 29, 129 are provided The perimeter corner connectors are shown in Figure 5. The uprights 1, 101 have ends 31, 131 which are distal from the cross-bar 40. The ends 31, 131 are connected to ends of the returns 5, 105 using the perimeter corner connectors 29, 129 provided. The base is assembled by joining the returns 5, 105 to the back 6 using the base corner connectors 7, 107.

The electrical connectors are arranged to be in matching positions on the components which connect together so that as the hollow tubular components are connected together, the electrically connectors connecting components are placed in matching positions. Figure 6 illustrates that electrical connectors 53 in cross-bar 40 is set in a matching position to connect to connector 56 in the cross-bar corner connector. Figure 7 illustrates that electrical connector 51 at end of sensor-bar 14 is in placed in register with electrical connector 52 at the end of sensor-bar 54. The other electrical connectors are also placed in register with each other as the two side-bars 12, 112 are joined to make the cross-bar 40, and the uprights 1, 101 are inserted into the cross-bar corner connectors 25, 125. Assembly and dis-assembly by a child or other non-professional person is done in minutes by joining the hollow tubular components.

The connectors have hollow tubular openings for easily connecting the tubular ends of the side-bars, cross-bar, uprights, returns, and back.

To provide further stability the hollow pipes 5, 106, 6 of the base may be filled with a loose filler such as sand, gravel, or earth which is likely to be found near the playing field. The returns 5, 105, and the back 6 are easily filled with the weighted filler just before they are joined together to form the base. With the base on the ground, the uprights 1, 101 are easily connected to the in the upright position to the base. The

filler in the base weights base to prevent the sport goal device from being knocked over by wind or an errant ball or puck which hits the perimeter portion. Batteries may also be use used to provide stability as ballast and to provide a source of energy for the sensors, display, and controls.

Figure 8 shows a functional block diagram of one embodiment of a system and shows a central processor 2000 which manages signals received from sensors 2002 which received pulsed infra-red signal from photodiodes 2004.

Sensors 241 and 242 in the first set of sensors are in register a sensor and/or transmitter 341 and 342 in the second set of sensors. An interruption of a transmission or beam with the plane of the goal entrance connecting the sensors which is detected by a controller 97.

The sensors/transmitters 343, 344 on an upright 101 send a transmission or within the plane of the goal entrance which is reflected by reflector 247 on the opposite upright 1. An interruption of the reflected transmission or beam with the plane of the goal entrance connecting the sensors which is detected by a controller 97.

The controller 97 which is a PCB in some embodiments is connected to the display 113 of the notification unit, a speaker 4, and an input device 13 for configuring the controller 97.

Figure 9 shows a kit of parts from which the sport goal device which is constructed. A kit of part in some embodiments also includes a net. Figure 10 shows the kit of parts assembled and a net draped over the assembled parts to make sport goal device which includes the net.

The invention has been described by way of examples only. Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the claims.

Claims

1. A sport goal device for detecting a moving ball or puck as it breaks a plane of a goal, the device comprising a pair of uprights and a cross-bar connectable between the uprights, wherein at least one of the uprights comprise sensors comprising a video camera and a motion detector comprising an ultrasonic detector to detect the ball or puck by interruption of a wireless connection wherein the sensors are arranged in use to extend the connection within the plane to a perimeter defined by the uprights and the cross-bar and a playing field upon which the sport goal device rests, and the cross-bar comprises a notification means for notifying a user of the breakage.

2. A sport goal device according to claim 1 wherein the sensors detect the ball or puck speed and location in the plane of the goal.

3. A sport goal device to claim 1 or 2, comprising a base connectable to the uprights, wherein the uprights are arranged to stand upright on the base.

4. A sport goal device according to any preceding claim wherein the motion detector also comprises a photodetector.

5. A sport goal device according to any preceding claim wherein the motion detector also comprises a passive infrared (PIR) sensor.

6. A sport goal device according to any preceding claim wherein the video camera is a motion detector.

7. A sport goal device according to any preceding claim comprises a means to view an image of the object breaking the plane detected by the video camera.

8. A sport goal device according to claim 7 wherein the notification means is arranged to provide visual notification of the image.

9. A sport goal device according to claim 8 wherein the notification means comprises a display screen.

10. A sport goal device according to any preceding claim wherein the sensors are arranged in pairs.

11. A sport goal device according to any preceding claim wherein the sensors are arrange-able at selectable positions on the uprights to adjust the heights of the sensors from the cross-bar.

12. A sport goal device according to any preceding claim wherein the sensors are contained in strips or bars arranged along the uprights.

13. A sport goal device according to claim 12 wherein the bars are arranged to slide along the uprights to adjust the position of the sensors relative to the cross-bar while maintaining their position relative to each other.

14. A sport goal device according to any preceding claim comprising a controller with a timer facility wherein the sensors and notification means operate in combination with the circuit with timer facility, so as to pause notifications for a period after a breakage in connection.

15. A sport goal device according to any preceding claim wherein the notification means comprises an audible notification means.

16. A sport goal device according to claim 15 wherein the audible notification means comprises at least one loudspeaker.

17. A sport goal device according to claim 16 wherein the loudspeaker is fixed to a corner where the cross-bar is connectable to an upright.

18. A sport goal device according to claim 16 or 17 comprising two loudspeakers.

19. A sport goal device according to any preceding claim comprising a notification unit comprising the notification means.

20. A sport goal device according to claim 19 wherein the notification unit forms the cross-bar.

21. A sport goal device according to claim 20 wherein the cross-bar comprises two side-bars and the notification unit, wherein the notification means is arranged to be joined between the two side-bars to form the cross-bar.

22. A sport device according to claim 21 wherein the notification unit and side-bars are arranged to be joined by insertion.

23. A sport goal according to any preceding claim wherein the uprights and cross-bar are portable pipes arranged to be assembled together for use.

24. A sport goal device according to claim 23 wherein the pipes comprise internal conductors and electrical connectors to electrically connect the sensors to the notification means.

25. A sport goal device according to claim 23 or 24 wherein the pipes are arranged to be joined by insertion together.

26. A sport goal device according to claim 25 wherein the pipes are arranged to form a watertight seal upon insertion together.

27. A sport goal device according to claim 26 as dependent upon claim 23 wherein the conductors are arranged to be connected by insertion of the pipes together.

28. A sport goal device according to any preceding claim comprising a controller arranged to pause operations of electrical devices after a pre-selected delay or upon the detection of a battery reaching a pre-selected charge.

29. A sport goal device according to any preceding claim wherein the notification means is activated by simultaneous interruption of a preselected group of connections.

30. A sport goal device according to any preceding claim comprising a reflector arranged along one of the uprights for reflection of a transmitted signal from a transmitter and sensor on the opposite upright.

31. A sport goal device according to any preceding claim wherein sensors arranged along one of the uprights are in register with sensors arranged along the opposite upright so and so as to form a connection between each of the sensors in register.

32. A sport goal device according to any preceding claim comprising a controller configured with the location of the sensors to determine where in the plane of

the goal the ball or hockey passes by detecting which of the connections is interrupted.

33. A sport goal device according to claim 32 wherein controller activates the notification means to make a particular noise which is dependent on the location where the ball passes through the entrance plane of the goal.

34. A sport goal device according to any preceding claim comprising an internet communications means to transfer images or goal count information.

35. A sport goal device according to any preceding claim wherein the notification means comprises a USB connector or a wireless communicator.

36. A sport goal device according to claim 35 comprising a touch screen with a display by which a user may set a delay time, activate recording of images by a camera, and connect to the internet or a communications network.

37. A sport goal device according to claim 36 wherein the touch screen is arranged to enable a user to send a selected image via the internet or a mobile communication network to a remote device.