Abstract: A variety of training boards and panel assemblies are releasably secured to the ground to provide targets with rebound capability for developing and improving ball handling skills. Pivotably mounted panel support arms, and stakes insertable through the arms and panel base region into the ground, are used to orient and secure training boards and panels relative to the ground. Complementary coupling elements can be used to join several panels together, and support brackets can be configured to mount panels at various vertical and near vertical orientations.
BALL CONTROL TRAINING DEVICE

BACKGROUND

The present invention relates to sports training boards and other equipment designed to improve ball handling skills, and more particularly to targets with rebound capability for use in improving a soccer player's reactions and ball handling skills.

Regardless of their levels of ability and experience, soccer players retain the need and desire to improve their kicking and other ball handling skills, and improve their reactions to approaching soccer balls, whether passed or deflected. While soccer matches and practice sessions certainly afford opportunities to further develop these reactions and skills, many players seek additional opportunities to work on their playing skills, at locations other than soccer fields where space may be limited, and at times when other soccer players may not be available.

A known product intended to address these needs includes a face panel or board designed to provide a rebound surface, two support boards hinged to the panel and positionable to extend rearwardly from the face panel to support it on the ground, and a center board also hinged to the face panel for keeping the support boards spaced apart and in position when the product is in use. While this product is useful for certain practice activities, it is unduly heavy and lacks the flexibility to accommodate a wide range of training activities.

Therefore, it is an object of the present invention to provide an athletic training device that is compact and lightweight, yet durable and able to withstand repeated contact with soccer balls and other projectiles.
Another object is to provide a ground supported target with rebounding capability and a means for securely and releasably fixing the target to the ground.

A further object is to provide a training device with rebound capability that is more flexible in terms of providing target areas of different sizes and different angles relative to the ground.

Yet another object is to provide a portable, ground supported athletic training device that is easier to use, transport, and store.

SUMMARY

To achieve these and other objects, there is provided an athletic training device. The device includes a panel structure having mutually perpendicular length, width and thickness directions, and a substantially smooth obverse surface extending generally in the length and width directions. A first panel support arm is mounted to the panel structure near a first end thereof for pivoting between a panel support position in which the first arm extends rearwardly away from the panel structure, and a storage position in which the first arm is disposed along and adjacent the panel structure. A second panel support arm is mounted to the panel structure near a second end thereof for pivoting between a panel support position in which the second arm extends rearwardly away from the panel structure, and a storage position in which the second arm is disposed along and adjacent the panel structure. The first arm and second arm when in their respective support positions are adapted to support the panel structure in an upright position on generally level ground with the width direction at a predetermined angle relative to the ground. A plurality of panel anchoring members are insertable into the ground to releasably secure the panel structure to the ground in
the upright position.

Each of the panel anchoring members can have an elongate shaft and an enlarged head at one end of the shaft. Preferably the panel structure and the support arms are provided with apertures running through these components, and the anchoring members extend through the apertures and into the ground. Thus, the anchoring members cooperate to securely fix the panel structure against sliding or skidding over the ground in response to horizontal forces, such as the impact from a kicked soccer ball. As compared to designs that rely on the weight of the board and support structure to resist sliding, the anchoring members provide a secure hold, yet allow a lightweight target construction.

Another aspect of the present invention is an athletic training apparatus. The apparatus includes a panel assembly having mutually perpendicular length, width and thickness directions, a substantially smooth obverse surface extending generally in the length and width directions, and a base region extending in the length direction along one edge of the panel assembly with a base region thickness greater than a general panel thickness over most of the panel assembly. A plurality of first apertures extend through the base region. A panel support structure is adapted to extend rearwardly from the panel assembly in a panel support position for maintaining the panel assembly in an upright position on generally level ground with the base region and a rearward support region of the support structure in contact with the ground. A plurality of second apertures extend through the support region. A plurality of elongate anchoring members are provided, each adapted to extend through one of the first and second apertures and into the ground. The anchoring members cooperate to
releasably secure the panel assembly to the ground in the upright position.

Along with the secure fixation provided by the anchoring members, the base region of the panel assembly provides a convenient location for forming relatively short apertures to accommodate the anchoring members. Further, the panel assembly can incorporate a panel reinforcing structure to support a relatively thin face panel against soccer ball impact and other forces. The reinforcing structure can have an open frame configuration, thus to provide the necessary impact resistance without unduly adding to the mass of the panel structure.

Further in accordance with the invention, there is provided a training board assembly. The assembly includes a first panel having first mutually perpendicular length, width and thickness directions, and a substantially smooth obverse surface extending generally in the first length and width directions. A set of first coupling elements are disposed along a first edge of the panel. A first panel support structure is adapted to extend rearwardly from the first panel in a panel support position for maintaining the first panel in an upright position on generally level ground with the first panel and a rearward support region of the support structure in contact with the ground. The assembly includes a second panel having second mutually perpendicular length, width and thickness directions, and a substantially smooth second obverse surface extending generally in the second length and width directions. A set of second coupling elements are disposed along a second edge of the second panel. The first and second coupling elements are adapted to form a plurality of interlocking engagements, each involving one of the first coupling elements and one of the second coupling elements, to releasably couple the first and second panels in a selected
alignment with the first and second edges adjacent one another and the first and second obverse surfaces providing a substantially continuous single surface.

The multiple panel approach can be used to selectively increase the size of the target area, by adding to the horizontal length, by adding to the vertical width, or both. Panels with universal coupling configurations can be used alone, or in any desired arrangement.

In accordance with yet another aspect of the present invention, the panel structure can incorporate components for generating sensible signals in response to a soccer ball or other object contacting the obverse surface. More particularly, pressure sensitive components, speakers and associated circuitry as taught in U.S. No. 6,808,462 (Snyder, et al.). Further, the panels can incorporate selection circuitry for generating different sounds or visible displays in response to different episodes of soccer ball contact.

**BRIEF DESCRIPTION OF THE DRAWINGS**

For a further understanding of the above and other features and advantages, reference is made to the following detailed description and to the drawings, in which:

Figure 1 is a frontal elevation of a training board for soccer, constructed in accordance with the present invention;

Figure 2 is a side elevation showing the training board mounted on level ground;

Figure 3 is a rear elevation of the training board;
Figure 4 is a forward perspective view of an alternative embodiment soccer training board;

Figure 5 is a rearward perspective view of the training board;

Figure 6 is an enlarged perspective view of part of the training board;

Figure 7 is a side elevation showing the training board mounted on level ground;

Figure 8 illustrates an alternative support arm design;

Figure 9 illustrates an alternative panel reinforcing structure;

Figure 10 is a forward elevation of a further alternative embodiment soccer training board;

Figure 11 is a side elevation of the training board shown in Figure 10;

Figure 12 is a top plan view of the training board;

Figure 13 is a rear elevation showing an assembly of two soccer training boards;

Figure 14 is a forward elevation showing two soccer training boards coupled side by side;

Figure 15 is a top plan view of a curved training board;

Figure 16 is a top plan view of a training board configuration incorporating pressure-responsive signaling components; and
Figure 17 is a block diagram of the signaling components.

DETAILED DESCRIPTION

Turning now to the drawings, there is shown in Figure 1 a training board 16 for soccer practice and training, for example to develop more accuracy in kicking and other ball handling techniques, and for improving the ability to react quickly to ball movement, specifically rebounds from board 16. The training board can be formed of suitable polymeric materials such as urethane and high density polyethylene, wood, or aluminum and other metals. The training board can have a length in the range of 3 feet to 6 feet, a width ranging from 12 inches to 18 inches, and a thickness on the order of one-half inch.

Training board 16 has a smooth, substantially planar obverse surface 18 which optionally can bear a visible target as indicated at 20. A pair of stakes 22 and 24, located near opposite ends 26 and 28 of the board, protrude downwardly from the training board.

Figure 2 shows training board 16 mounted to the ground 30, which preferably is substantially level. Stake 24 (and stake 22, not shown) protrude into the ground, and tend to maintain board 16 in an upright position as shown, in which the direction of the board width is substantially vertical, and a bottom edge 32 of the board is contiguous with the ground. A pair of support arms, one of which is shown at 34, extend rearwardly from the training board when in the support position shown in Figure 2, to support board 16 in the upright position. Support arm 34 is coupled to the training board through a hinge 36, to pivot relative to the board about a vertical (width direction) axis. Arm 34 has a rearward support region 38 that contacts the ground to
support the training board in the upright position. A stake 40, passing through an
aperture in support region 38 and into the ground, keeps the support arm in place and
cooperates with stakes 22 and 24 to prevent the training board and arms from skidding
or slipping horizontally over the ground in response to the impact of a soccer ball
striking obverse surface 18, or other horizontal forces. Stake 40 includes an elongate
shaft 42 that readily passes through the aperture in arm 34, and a head 44 larger in
diameter than the aperture.

As seen in Figure 3, a support arm 46 is mounted pivotally to the training
board through a hinge 48, and includes a rearward support region 50 positioned to
engage the ground and having an aperture therethrough adapted to receive a stake
similar to stake 40 for maintaining and securing training board 16 in the upright
position. Arms 34 and 46 are shown in a storage position, in which each arm is
disposed along and adjacent a reverse surface 52 of the board. Stakes 22 and 24, also
mounted pivotally relative to the training board, are shown in an upwardly pointing
storage position adjacent the training board.

Figure 4 shows an alternative training board or panel assembly 54 including a
face panel 56 with a substantially planar obverse surface 58, and a panel reinforcing
structure 60 behind the face panel. An enlarged base region 62 is formed along the
bottom of the panel assembly with a forward projection 64 that provides a wider
bottom edge 66. Apertures 68 and 70 extend through the forward projection in the
vertical (width) direction.

As seen in Figure 5, the reinforcing structure includes a plurality of spaced
apart vertical wall sections 72, a plurality of horizontal (lengthwise) wall sections 74,
and a plurality of inclined wall sections 76, all extending rearwardly from the face panel. The wall sections cooperate to impart strength to the panel assembly, in particular resistance to bending and breaking under stress due to impact of soccer balls or other objects striking obverse surface 58. As is readily apparent in Figure 5, wall sections 72-76 occupy only a fraction of the total volume occupied by the reinforcing structure. As compared to a solid panel assembly, panel assembly 54 requires much less material, and thus weighs considerably less.

Panel support arms 78 and 80 are mounted to the panel assembly near opposite side edges 82 and 84 through hinges 85 and 87, for rotation about respective vertical axes. Wall sections 72-76 are configured to provide pockets 86 and 88 to contain the support arms, so that the arms when in the storage position are recessed as indicated for arm 78. Support arm 80 is shown in the panel support position.

Figure 6 is an enlarged view of a portion of the panel near side edge 82, showing several wall sections and hinge 85 in more detail.

As seen in Figure 7, panel assembly 54 is secured to the ground in the upright position by pivoting support arms 78 and 80 to the panel support position. Then, with base region 62 and respective free end regions 90 and 92 in contact with the ground, stakes similar to stake 40 are inserted into the ground through apertures 68, 70 and apertures 94 and 96 of the support arms.

Figure 8 shows an alternative support arm 98 usable with panel assembly 54 and training board 16 in lieu of the support arms shown. Arm 98 has a closed loop structure with an aperture 100 formed through a horizontal arm segment 102 to receive a shaft 104 of a stake 106. A spherical head 108 of the stake abuts
segment 102 to secure the support arm in the manner previously indicated.

Figure 9 shows an alternative version training board panel assembly 110 including a planar face panel 112 and a reinforcing panel 114 contiguous with a reverse surface of the face panel. Although most of reinforcing panel 114 is planar, the planarity is interrupted by discontinuities or indentations 116 extending in the rearward (thickness) direction from the rest of the panel. Indentations 116 can be formed as nodules, or elongate channels or grooves, spaced apart by about four to six inches. The nodules or grooves impart structural rigidity, much in the same manner as wall sections 72-76 of panel assembly 54. If desired, the nodules or grooves can be arranged to provide pockets, so that the support arms (not shown) can be recessed when in the storage position.

Figure 10 illustrates a further alternative embodiment training board assembly 118 including an elongate panel 120 and panel support brackets 122 and 124 on opposite sides of the panel. Upper pins 126 and 128, and lower pins 130 and 132 project outwardly from the panel through openings in the brackets.

As seen in Figure 11, bracket 124 includes an upright section 134 disposed along a side edge of the panel, a horizontal forward extension 136 with several openings 138-142 formed therethrough, and an elongate rearward horizontal extension 144. Apertures 146 and 148 through extension 144 accommodate stakes insertable into the ground to releasably support and secure the bracket and panel 120 in the manner previously described. Optionally, bracket 124 can be hinged near the forward end of extension 144 as indicated at 150, to allow a user to fold the bracket into a storage position against panel 120. Panel support bracket 122 is substantially
the same as bracket 124.

Lower pin 132 is spring loaded, and accordingly can be pushed inward to free it from bracket 124, and lower pin 130 likewise can be freed from bracket 122. This facilitates a pivoting of panel 120 about a horizontal axis determined by upper pins 126 and 130. By selecting one of openings 138-142 to receive pin 132, panel 120 can be releasably locked into any one of several vertical or nearly vertical angles relative to the ground. The non-vertical angles are selected to provide elevated returns or "kick-backs" of soccer balls kicked against the panel.

Figure 12 is a top view showing a stabilizing arm 152 secured at its opposite ends to support brackets 122 and 124. As an option to further secure the assembly to the ground, stake-receiving apertures can be formed through the stabilizing arm as indicated at 154 and 156.

Figure 13 shows an alternative training board arrangement including an upper panel 158 and a lower panel 160. Opposite upper pins 162 and 164 protrude from panel 158 in the length direction, as do lower pins 166 and 168. Similarly, upper pins 170 and 172 and lower pins 174 and 176 protrude from lower panel 160.

A row of coupling elements in the form of tabs 178 are formed along a lower edge 180 of the upper panel. A row of complementary coupling elements in the form of recesses 182 are formed along an upper edge 184 of the lower panel. The maximum dimension (panel length direction) of tabs 178 is greater than the dimension (again, panel length direction) of the gap at the entrance of each recess. However, due to the flexibility of panels 158 and 160, tabs 178 and the regions of lower panel 160 near the gaps flex to allow insertion of each tab into the associated recess for a snap
fit that releasably holds panels 158 and 160 together, aligned so that the respective obverse surfaces of the panels (not shown) cooperate to provide a single, continuous ball contact surface.

Lower panel 160 is supported and secured to the ground by brackets (not shown) similar to brackets 122 and 124. To further stabilize upper panel 158 relative to the lower panel, a panel mounting structure is provided in the form of several rods 186, each rod secured to the panels by members 188 and 190 near its opposite ends.

Figure 14 shows an alternative panel arrangement including panels 192 and 194 adapted to be coupled side by side by tabs 196 arranged along a side edge 198 of panel 192, and an array of recesses 200 along a side edge 202 of panel 194. Along an opposite side edge 204 of panel 192 is a set of recesses 200. Likewise, a set of tabs 196 is formed along an opposite side edge 206 of panel 194. Thus, the panels can alternatively be coupled along opposite side edges 204 and 206. As a further alternative, the assembly can be enlarged to include further similarly configured panels. Each of panels 192 and 194 is oriented and secured relative to the ground by support arms and stakes (not shown) as previously described.

Figure 15 is a top view of an alternative training board 208 and a pair of supporting arms 210 and 212 pivotable to the support positions shown. Board 208 is curved about an axis that extends in the panel width direction, and is convex in the direction toward a player using the board. This arrangement tends to scatter rebounds of the soccer ball over a wider range, to provide practice in reacting to the deflected and passed balls. Alternatively, curved boards can be concave in the direction toward
the player.

Figure 16 shows a further alternative panel assembly 214 including a face panel 216, a panel reinforcing structure 218, and a sensing and signaling layer 220 between the panel and reinforcing structure. A speaker 222 and a light source 224 are mounted to opposite sides of the panel assembly.

As indicated schematically in Figure 17, sensing and signaling layer 220 includes a pressure-responsive sensor 226, a signaling component 228, and optionally further includes a selection component 230 coupled between the sensor and signaling component. As described in U.S. Patent No. 6,808,462, which patent is incorporated by reference herein, sensor 226 generates an electrical signal responsive to pressure from the impact of a soccer ball against the face panel. Upon receiving the electrical signal, component 230 selects one of several outputs and provides the selected output to signaling component 228, which may be either speaker 222 or light source 224. The speaker (or light source) emits one of several sounds (or one of several light displays), depending on the output selected. Of course, if only a single audio or visible response is desired, the selection component is eliminated and the sensor is coupled directly to the light source or speaker.
CLAIMS

1. An athletic training device, including:
   
a panel structure having mutually perpendicular length, width and thickness directions, and a substantially smooth obverse surface extending generally in the length and width directions;
   
a first panel support arm mounted to the panel structure near a first end thereof for pivoting between a panel support position in which the first arm extends rearwardly away from the panel structure and a storage position in which the first arm is disposed along and adjacent the panel structure;
   
a second panel support arm mounted to the panel structure near a second end thereof pivoting between a panel support position in which the second arm extends rearwardly away from the panel structure and a storage position in which the second arm is disposed long and adjacent the panel structure;
   
wherein the first arm and second arm when in their respective support positions are adapted to support the panel structure in an upright position on generally level ground with the width direction at a predetermined angle relative to the ground; and
   
a plurality of panel anchoring members insertable into the ground to releasably secure the panel structure to the ground in the upright position.

2. The device of claim 1 wherein:
   
the panel structure is at least generally rectangular, and has a length dimension at least 1.5 times its width.

3. The device of claim 1 wherein:
4. The device of claim 1 wherein:
the obverse surface is curved about an axis extended in the width direction.

5. The device of claim 1 wherein:
the anchoring members are secured to the panel structure.

6. The device of claim 1 wherein:
the panel structure includes a base region disposed along the ground when the panel structure is in the upright position, and a plurality of apertures through the base region, and wherein the anchoring members extend through the apertures and into the ground when so supporting the panel structure.

7. The device of claim 1 wherein:
each of the support arms has an opening extending therethrough substantially parallel to the width direction when the associated arm is in the panel support position, and the anchoring members extend through the openings and into the ground when so securing the panel structure.

8. The device of claim 1 further including:
a visible target area on the obverse surface.

9. The device of claim 8 wherein:
the panel structure incorporates components for generating a sensible signal
responsive to pressure from an object contacting the target region.

10. The device of claim 9 wherein:

the components include a pressure-responsive sensor for generating an electrical signal, and a signaling component for generating the sensible signal in response to receiving an electrical signal.

11. The device of claim 10 wherein:

the signaling component is selected from the group of signaling components consisting of: speakers for generating the audible signals, and light sources for generating visible signals.

12. The device of claim 11 further including:

a selecting component operably coupled between the sensor and the signaling component and adapted, in response to receiving the electrical signal, to select one of several control outputs individually associated with several different sensible signals, and to provide the selected control output to the signaling component thereby causing the signaling component to generate the sensible signal associated with the selected control output.

13. An athletic training apparatus including:

a panel assembly having mutually perpendicular length, width and thickness dimensions, having a substantially smooth obverse surface extending generally in the length and width directions, and having a base region extending in the length direction along one edge of the panel assembly with a base region thickness greater than a general panel thickness over most of the panel assembly, and a plurality of first apertures extending through
tie base region;

a panel support structure adapted to extend rearwardly from the panel assembly in a
panel support position for maintaining the panel assembly in an upright position on generally
3vel ground with the base region and a rearward support region of the support structure in
ontact with the ground, and a plurality of second apertures extending through the support
sgion; and

a plurality of elongate anchoring members, each adapted to extend through one of the
irst and second apertures and into the ground, whereby the anchoring members cooperate to
leasably secure the panel assembly to the ground in the upright position.

14. The apparatus of claim 13 wherein:

the panel assembly includes a face panel including the obverse surface, and a panel
inforcing structure for supporting the face panel against forces due to impact from moving
bjects contacting the obverse surface.

15. The apparatus of claim 14 wherein:

the reinforcing structure includes a generally planar reinforcing panel including a
urality of indentations extending in the thickness direction.

16. The apparatus of claim 14 wherein:

the reinforcing structure includes a plurality of wall segments extending rearwardly
ay from the face panel and forming a grid.

17. The device of claim 13 further including:
a visible target area on the obverse surface.

18. The device of claim 17 further including:

components disposed between the face panel and reinforcing structure for generating sensible signal responsive to pressure from an object contacting the target region.

19. The device of claim 18 wherein:

the components include a pressure-responsive sensor for generating an electrical signal, and a signaling component for generating the sensible signal in response to receiving the electrical signal.

20. The device of claim 19 wherein:

the signaling component is selected from the group of signaling components consisting of: speakers for generating the audible signals, and light sources for generating sensible signals.

21. The device of claim 19 further including:

a selecting component operably coupled between the sensor and the signaling component and adapted, in response to receiving the electrical signal, to select one of several control outputs individually associated with several different sensible signals, and to provide the selected control output to the signaling component thereby causing the signaling component to generate the sensible signal associated with the selected control output.

22. The apparatus of claim 13 wherein:

the base region includes a portion extending forwardly from a major plane of the
>bverse surface, and the first apertures extend through said portion.

23. The apparatus of claim 13 wherein:
   each of the anchoring members includes an elongate shaft, a converging tip at one end
   of the shaft, and an enlarged head at an opposite end of the shaft.

24. The apparatus of claim 13 wherein:
   the support structure includes a first support arm mounted to a first end region of the panel assembly, and a second support arm mounted to a second, opposite end region of the panel assembly.

25. The apparatus of claim 24 wherein:
   the support arms are mounted to the panel assembly to pivot between the support position and a storage position in which the support arms are disposed along and adjacent the panel assembly.

26. The apparatus of claim 25 wherein:
   the support arms when in the storage position are recessed into the panel assembly.

27. A training board assembly including:
   a first panel having first mutually perpendicular length, width and thickness rections, a substantially smooth first obverse surface extending generally in the first length and width directions, and a set of first coupling elements disposed along a first edge of the first panel;
   a first panel support structure extending rearwardly from the first panel in a panel
support position for maintaining the first panel in an upright position on generally level round with the first panel and a rearward support region of the first panel support structure in contact with the ground; and

a second panel having second mutually perpendicular length, width and thickness directions, a substantially smooth second obverse surface extending generally in the second strength and width directions, and a set of second coupling elements disposed along a second edge of the second panel;

wherein the first and second coupling elements are adapted to form a plurality of interlocking engagements, each involving one of the first coupling elements and one of the second coupling elements, to releasably couple the first and second panels in a selected alignment with the first and second edges adjacent one another and the first and second obverse surfaces providing a substantially continuous single surface.

28. The assembly of claim 27 further including:

a support structure releasably coupled to the first and second panels on opposite sides hereof from the first and second obverse surfaces, wherein the first and second edges extend in the first and second length directions.

29. The assembly of claim 27 further including:

a second panel support structure extending rearwardly from the second panel in a panel support position for maintaining the second panel in an upright position on the ground with the second panel and a rearward support region of the second panel support structure in contact with the ground, wherein the first and second edges extend respectively in the first and second width directions.
30. The assembly of claim 29 wherein:

the first panel further includes a set of the second coupling elements along a third edge thereof opposite and parallel to the first edge, and the second panel further includes a set of the first coupling elements along a fourth edge thereof opposite and parallel to the second edge.