

GOLF DRIVING MAT

The present invention relates to a golf driving mat and a golf driving mat system incorporating the same. The golf driving mat and golf driving mat system of the present invention are to be known as the TrueStrike™ golf driving mat and golf driving mat system.

Golf driving mats and golf driving mat systems are used at golf ranges and golf tees, in particular during the Winter. The construction of existing golf driving mats is, however, such that golfers can be given an unrealistic impression of shots struck therefrom. With existing golf driving mats, where a golfer hits a “clean” shot, that is, a correct shot, the resulting shot is substantially the same as would be achieved on a natural ground surface, but where a golfer hits a “fat” shot, that is, where the club head hits the ground behind the golf ball, typically about 20 mm behind the golf ball, the resulting shot is often an apparently good shot, instead of what should be a poor shot, as the club head rebounds from the surface of the mat and meets the golf ball at a reasonable angle and at only a slightly reduced speed. On the natural surface of a golf course, where a golfer hits a “fat” shot, the club head digs into the ground, to a lesser or greater extent depending upon the condition of the ground surface, causing the club head to be slowed considerably and thereby produce a poor shot. Thus, when a golfer hits a “fat” shot from existing golf driving mats, the resulting shot would often appear to be a good shot, leading the golfer to believe that the swing is good, when, in fact, the swing is poor, as the same “fat” shot on a natural ground surface would produce a poor shot, with the consequence that poor swing technique is developed.

Golf driving mats have been developed which provide a cushioning effect, for example, as disclosed in GB-A-2315024, US-A-4955611 and US-A-5273285, but these golf driving mats are still not considered adequately to provide a true impression of the strike of a golf ball from any given swing. It will also be noted that golf putting mats are known, one such mat being disclosed in DE-A-3926052.

It is an aim of the present invention to provide an improved golf driving mat and golf driving mat system incorporating the same, in particular utilizing a viscous material as an energy-absorbing medium, whereby a golfer is given a true impression of the strike of a golf ball from any given swing.

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In one aspect the present invention provides a golf driving mat, including: a flexible member over which a golf ball is in use located to be hit by a head of a golf club; and a viscous foam material disposed beneath the flexible member, wherein the viscous foam material is such as to slow the head of the golf club when the head of the golf club is hit
10 into the flexible member.

Preferably, the flexible member is formed of a ruckable material such that, when the head of the golf club is hit into the flexible member, the flexible member rucks up.

15 Preferably, the flexible member is formed of a resilient material.

Preferably, the flexible member is formed of a rubberised material.

Preferably, the viscous foam material is a visco-elastic foam material.

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More preferably, the visco-elastic foam material is a memory foam.

Preferably, the cavity has a depth of up to about 20 mm.

25 In one embodiment the cavity has a depth of about 20 mm.

Preferably, the mat includes: a ball-receiving member located over the flexible member on which the golf ball is in use located.

30 In one embodiment the ball-receiving member is removable.

Preferably, the ball-receiving member is formed of a resilient material.

Preferably, the ball-receiving member is formed of a fabric material.

In one embodiment the ball-receiving member has a smooth surface.

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In another embodiment the ball-receiving member has a non-smooth surface.

Preferably, the ball-receiving member has a ribbed surface.

- 10 In one embodiment the mat comprises: a receptacle including the flexible member at an upper surface thereof and containing the viscous foam material.

Preferably, the mat further comprises: a body unit comprising a main body in which the receptacle is disposed.

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The present invention also extends to a golf driving mat system, comprising: a base unit on which a golfer stands to hit a golf shot; and the above-described mat provided to the base unit.

- 20 In one embodiment the mat is removable.

Preferably, the base unit includes a recess in which the mat is in use located.

- 25 More preferably, the base unit comprises a base including first and second recesses in one of which the mat is in use located according to whether the golfer is a left-handed or right-handed golfer, and a sheet located on the base including an aperture through which the mat is presented.

In another embodiment the mat is integrally formed with the base unit.

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In another aspect the present invention provides a golf driving mat, including: a flexible member over which a golf ball is in use located to be hit by a head of a golf club; and a viscous material disposed beneath the flexible member, wherein the viscous material

comprises a resilient skeletal structure which is filled with a viscous medium and is such as to slow the head of the golf club when the head of the golf club is hit into the flexible member.

- 5 Preferably, the flexible member is formed of a ruckable material such that, when the head of the golf club is hit into the flexible member, the flexible member rucks up.

Preferably, the flexible member is formed of a resilient material.

- 10 Preferably, the flexible member is formed of a rubberised material.

Preferably, the resilient skeletal structure comprises a filamental structure.

More preferably, the filamental structure comprises an intertwined filamental structure.

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In one embodiment the viscous medium is a gel-like material.

Preferably, the gel-like material is a gel.

- 20 In another embodiment the viscous medium is a syrup.

In a further embodiment the viscous medium is an oil.

In a yet further embodiment the viscous medium is a paste.

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In a still further embodiment the viscous material is a particulate material.

In yet another embodiment the viscous material comprises a particulate material dispersed in a carrier medium.

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In one embodiment the carrier medium is a viscous liquid.

Preferably, the viscous liquid is an oil.

In another embodiment the carrier medium is a gel.

- 5 Preferably, the particulate material comprises particles selected from at least one of the group consisting of plastic particles, metal particles and plastic-coated metal particles.

Preferably, the cavity has a depth of up to about 20 mm.

- 10 In one embodiment the cavity has a depth of about 20 mm.

Preferably, the mat includes: a ball-receiving member located over the flexible member on which the golf ball is in use located.

- 15 In one embodiment the ball-receiving member is removable.

Preferably, the ball-receiving member is formed of a resilient material.

Preferably, the ball-receiving member is formed of a fabric material.

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In one embodiment the ball-receiving member has a smooth surface.

In another embodiment the ball-receiving member has a non-smooth surface.

- 25 Preferably, the ball-receiving member has a ribbed surface.

Preferably, the mat comprises: a receptacle including the flexible member at an upper surface thereof and containing the viscous material.

- 30 More preferably, the mat further comprises: a body unit comprising a main body in which the receptacle is disposed.

The present invention also extends to a golf driving mat system, comprising: a base unit on which a golfer stands to hit a golf shot; and the above-described mat provided to the base unit.

5 In one embodiment the mat is removable.

Preferably, the base unit includes a recess in which the mat is in use located.

10 More preferably, the base unit comprises a base including first and second recesses in one of which the mat is in use located according to whether the golfer is a left-handed or right-handed golfer, and a sheet located on the base including an aperture through which the mat is presented.

In another embodiment the mat is integrally formed with the base unit.

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In a further aspect the present invention provides a golf driving mat, comprising: an upper, flexible member over which a golf ball is in use located to be hit by a head of a golf club; a lower member; and a viscous material disposed between the upper and lower members, wherein the viscous material comprises a resilient skeletal structure filled with
20 a viscous medium and is such as to slow the head of the golf club when the head of the golf club is hit into the flexible member.

Preferably, the skeletal structure comprises a skeletal foam structure.

25 In one embodiment the skeletal foam structure comprises an open-cell foam structure.

Preferably, the skeletal foam structure includes a plurality of perforations in which viscous medium is contained.

30 In another embodiment the skeletal foam structure comprises an open-cell foam structure including a plurality of perforations in which viscous medium is contained.

In yet another embodiment the present invention provides a golf mat component which is removably fitted to a body unit, the golf mat component comprising: a frame; and a ball-receiving member which is attached to the frame, wherein the ball-receiving member is oversized such as to be loose when removed from body unit and tensioned when fitted to the body unit.

In a yet further aspect the present invention provides a golf mat component which is removably fitted to a body unit, the golf mat component comprising: a frame; and a ball-receiving member which is attached to the frame; wherein the frame includes at least one clip for fixing the golf mat component to the body unit, the at least one clip comprising a supporting member which is connected to a main body of the frame, and supports an outwardly-extending projection which is configured to engage at least one aperture in the body unit, and an outwardly-tapering release element which tapers outwardly in the direction from the connection, such that, when sliding a releasing tool thereover, the supporting member is deflected inwardly, releasing the projection from the at least one aperture in the body unit and enabling removal of the golf mat component.

Preferably, the frame includes a plurality of clips disposed in spaced relation along an edge thereof.

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More preferably, the frame includes a plurality of clips disposed in spaced relation along opposed edges thereof.

Preferably, the supporting member includes at least one recess for receiving a corresponding projection on a releasing tool.

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In a still yet further aspect the present invention provides a releasing tool for releasing a golf mat component from a body unit, the releasing tool comprising: a support member; and a plurality of blade members disposed in spaced relation along the length of the support member, each being commonly directed and being located at such positions as to fit into slots in releasing the golf mat component.

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Preferably, the blade members each include at least one projection thereon for engaging respective recesses on the golf mat component.

5 The golf driving mat of the present invention provides a true impression of the strike of a golf ball by utilizing a viscous material to effect the speed and position of the club head in the manner as would occur if the shot were made on the natural surface of a golf course. The golf driving mat is configured such as to slow the club head through the golf ball where the swing path of the club head is one which would produce a "fat" shot.

10 Preferred embodiments of the present invention will now be described hereinbelow by way of example only with reference to the accompanying drawings, in which:

Figure 1 illustrates a perspective view of a golf driving mat system including a golf driving mat in accordance with a first embodiment of the present invention;

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Figure 2 illustrates the base of the base unit of the golf driving mat of Figure 1;

Figure 3 illustrates the sheet of the base unit of the golf driving mat of Figure 1;

20 Figure 4 illustrates a first exploded perspective view of the golf driving mat of Figure 1;

Figure 5 illustrates a second exploded perspective view of the golf driving mat of Figure 1;

25 Figure 6 illustrates an enlarged fragmentary perspective view of the receptacle of one embodiment;

Figure 7 illustrates an enlarged fragmentary perspective view of the receptacle of another embodiment;

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Figure 8 illustrates an enlarged fragmentary perspective view of the receptacle of another embodiment;

Figure 9 illustrates a fragmentary vertical sectional view through the golf driving mat of Figure 1 where a golfer makes a “clean” strike of a golf ball resting thereon;

- 5 Figure 10 illustrates a fragmentary vertical sectional view through the golf driving mat of Figure 1 where a golfer makes a “fat” strike of a golf ball resting thereon;

Figure 11 illustrates a perspective view of a golf driving mat system including a golf driving mat in accordance with a second embodiment of the present invention;

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Figure 12 illustrates an exploded perspective view of the golf driving mat of Figure 11;

Figure 13 illustrates a side view of the golf driving mat of Figure 11;

- 15 Figure 14 illustrates a vertical sectional view (along section I-I) of the golf driving mat of Figure 11;

Figure 15 illustrates an enlarged fragmentary vertical sectional view (region A in Figure 14) of the golf driving mat of Figure 11;

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Figure 16 illustrates an enlarged fragmentary vertical sectional view (region B in Figure 14) of the golf driving mat of Figure 11;

- 25 Figure 17 illustrates an enlarged fragmentary perspective view of the receptacle of one embodiment;

Figure 18 illustrates an enlarged fragmentary perspective view of the receptacle of another embodiment;

- 30 Figure 19(a) illustrates a perspective view of a releasing tool in accordance with a preferred embodiment of the present invention of the golf driving mat of Figure 11;

Figure 19(b) illustrates a side view of the releasing tool of Figure 19(a);

Figure 19(c) illustrates an enlarged fragmentary side view of one blade member of the releasing tool of Figure 19(a);

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Figure 19(d) illustrates an enlarged fragmentary vertical sectional view (along section II-II) of one blade member of the releasing tool of Figure 19(a);

10 Figure 20 illustrates a fragmentary vertical sectional view through the golf driving mat of Figure 11 where a golfer makes a “clean” strike of a golf ball resting thereon;

Figure 21 illustrates a fragmentary vertical sectional view through the golf driving mat of Figure 11 where a golfer makes a “fat” strike of a golf ball resting thereon;

15 Figure 22 illustrates a perspective view of a golf driving mat system including a golf driving mat in accordance with a third embodiment of the present invention;

Figure 23 illustrates an exploded perspective view of the golf driving mat of Figure 22;

20 Figure 24 illustrates a side view of the golf driving mat of Figure 22;

Figure 25 illustrates a vertical sectional view (along section III-III) of the golf driving mat of Figure 22;

25 Figure 26 illustrates an end view of the golf driving mat of Figure 22;

Figure 27 illustrates a vertical sectional view (along section IV-IV) of the golf driving mat of Figure 22;

30 Figure 28 illustrates an enlarged fragmentary vertical sectional view (region C in Figure 25) of the golf driving mat of Figure 22;

Figure 29 illustrates an enlarged fragmentary vertical sectional view (region D in Figure 27) of the golf driving mat of Figure 22;

5 Figure 30 illustrates an enlarged fragmentary perspective view of the receptacle of one embodiment;

Figure 31 illustrates an enlarged fragmentary perspective view of the receptacle of another embodiment;

10 Figures 32(a) and (b) illustrate enlarged front and rear perspective views of one clip member of the ball-receiving unit of the golf driving mat of Figure 22;

Figure 33 illustrates an enlarged fragmentary perspective view of the ball-receiving member of the golf driving mat of Figure 22;

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Figure 34(a) illustrates a perspective view of a releasing tool in accordance with a preferred embodiment of the present invention for use with the golf driving mat of Figure 22;

20 Figure 34(b) illustrates a side view of the releasing tool of Figure 34(a);

Figure 34(c) illustrates an enlarged fragmentary side view of one blade member of the releasing tool of Figure 34(a);

25 Figure 34(d) illustrates an enlarged fragmentary vertical sectional view (along section V-V) of one blade member of the releasing tool of Figure 34(a);

Figure 35 illustrates a fragmentary vertical sectional view through the golf driving mat of Figure 22 where a golfer makes a "clean" strike of a golf ball resting thereon; and

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Figure 36 illustrates a fragmentary vertical sectional view through the golf driving mat of Figure 22 where a golfer makes a "fat" strike of a golf ball resting thereon.

Figures 1 to 8 illustrate a golf driving mat system including a golf driving mat in accordance with a first embodiment of the present invention.

- 5 The golf driving mat system comprises a base unit 1 on which a golfer stands to hit a golf shot, and a golf driving mat 3 which is mounted in the base unit 1 and from which golf balls are struck by a golfer.

The base unit 1 comprises a base 5 which is located on a ground surface, and a sheet 7
10 which is located on the base 5 and on which a golfer stands to hit golf shots. In this embodiment the base 5 includes first and second mat recesses 9a, 9b located at respective sides thereof in which the golf driving mat 3 is selectively disposed, and a sheet recess 11 in which the sheet 7 is located, and the sheet 7 includes a clearance aperture 15 through which the golf driving mat 3 is presented, with the sheet 7 being
15 locatable in the sheet recess 11 in one of two positions such that the clearance aperture 15 therein overlies one of the first and second mat recesses 9a, 9b. With this configuration, the golf driving mat system can be easily configured for both left-handed and right-handed golfers, with the golf driving mat 3 being located in the first mat recess 9a for use by a left-handed golfer and the second mat recess 9b for use by a right-handed
20 golfer, and the sheet 7 being disposed such that the clearance aperture 15 therein overlies the respective one of the first and second mat recesses 9a, 9b.

The golf driving mat 3 comprises a body unit 17, a receptacle 19 which is disposed within the body unit 17 and includes an upper, flexible member 21, a lower member 22
25 and a cavity 23, filled with a viscous material 25, therebetween, and an upper, ball-receiving unit 27 disposed over the flexible member 21 of the receptacle 19.

The body unit 17 includes a main body 29 within which the receptacle 19 is disposed.

- 30 The main body 29 includes first and second anchor pins 33a, 33b at one, the rear, end thereof in the direction of hitting to which the receptacle 19 is fixed such as to prevent

movement of the receptacle 19 forwardly on hitting golf balls from the golf driving mat 3.

5 The main body 29 further includes an impact element 35 which extends along the lower surface thereof in the direction of hitting, which impact element 35 acts to provide an impact surface such that, should a golfer hit down through the receptacle 19, the golf club re-bounds from the impact element 35 without any significant jarring. In this embodiment the impact element 35 is formed of a rubberised material, preferably a rubber.

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The receptacle 19, in this embodiment an enclosed, flexible bag, is a planar rectangular member having a predetermined depth, in this embodiment of about 20 mm, such that, where filled with a viscous material 25, in this embodiment a viscous foam material, the upper, flexible member 21 of the receptacle 19 simulates a ground surface, typically a
15 turfed ground surface. In this embodiment the receptacle 19 is fabricated from a ruckable material, such that, when a golfer hits a "fat" shot, the flexible member 21 is rucked up, which rucking up, together with the action of the underlying viscous material 25, causes the speed of the club head to be slowed in the same manner as when hitting a "fat" shot on a turfed ground surface.

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In one embodiment the receptacle 19 is formed of a synthetic material, preferably polyvinyl chloride (PVC). In another embodiment the receptacle 19 can be formed of a rubberised material, preferably a rubber, and more preferably a synthetic rubber. In a preferred embodiment the receptacle 19 is formed of a resilient material.

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The receptacle 19 includes first and second rear apertures 47a, 47b at the rear end thereof in which the anchor pins 33a, 33b on the main body 29 are located to fix the position of the receptacle 19 in the main body 29.

30 In this embodiment, as illustrated in Figure 6, the viscous material 25 is a viscous foam material, here a block of viscous foam material. In a preferred embodiment the viscous

foam material is a visco-elastic foam material, for example, a memory foam material, such as supplied by Tempurpedic.

5 In an alternative embodiment the viscous material 25 could comprise a resilient skeletal structure which is filled with a viscous medium.

In one embodiment, as illustrated in Figure 7, the resilient skeletal structure comprises an intertwined filamental structure, such as comprising irregular filaments, typically coiled filaments, for example, coiled plastic filaments.

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In another embodiment, as illustrated in Figure 8, the resilient skeletal structure comprises a regular filamental structure, typically formed of a plastics material.

In one embodiment the viscous medium comprises a gel, for example, an aqueous gel.
15 In a preferred embodiment the gel comprises a petroleum jelly. In an alternative embodiment the viscous medium could be a syrup, such as a corn syrup. In another alternative embodiment the viscous medium could be an oil, such as a silicone oil. In a further alternative embodiment the viscous medium could be a paste. In a yet further alternative embodiment the viscous medium could comprise a particulate material in a
20 carrier medium, for example, a gel or an oil, such as a silicone oil. In yet another alternative embodiment the viscous medium could be a particulate material. Examples of particulate materials include plastic particles, metal particles and plastic-coated metal particles.

25 The ball-receiving unit 27 comprises a frame 51 which is removably attached, in this embodiment by screws 54, to the main body 29 of the body unit 17, and a ball-receiving member 53 which is attached to the frame 51 and on which golf balls to be hit are located. In being removable, the ball-receiving unit 27 allows for replacement when damaged, typically through wear.

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In this embodiment the upper surface of the ball-receiving member 53 is a smooth surface. In an alternative embodiment the upper surface of the ball-receiving member 53 can be a non-smooth surface, for example, a roughened or ribbed surface.

- 5 In this embodiment the ball-receiving member 53 comprises a resilient material, typically a fabric material containing Lycra[®], for example Cordura[®] as available from E.I. du Pont de Nemours and Company, Wilmington, US.

10 With this construction, when a golfer makes a good swing and hits a golf ball with a “clean” strike, the golf driving mat 3 reacts in the same manner as would a natural ground surface, as illustrated in Figure 9. However, when a golfer makes a poor swing which is such as to cause the club head to hit the ball-receiving member 53 of the ball-receiving unit 27 behind the golf ball, and hence the flexible member 21 of the receptacle 19, that is, hits the shot “fat”, the flexible member 21, under the reaction of
15 the viscous material 25, acts to cause the club head to dig into the golf driving mat 3, which causes the club head to be slowed down and make little or no contact with the golf ball, as illustrated in Figure 10.

By altering the thickness of the flexible member 21 of the receptacle 19 and the ball-receiving member 53 and the characteristics of the viscous material 25, the golf driving
20 mat 3 can be configured to simulate different ground conditions, from firm to heavy turfed ground, and even sand bunkers. In this embodiment, a golfer is able to select between a plurality of different golf driving mats 3 which are representative of different ground conditions.

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Figures 11 to 18 illustrate a golf driving mat system including a golf driving mat in accordance with a second embodiment of the present invention.

The golf driving mat system comprises a base unit 101 on which a golfer stands to hit a
30 golf shot, and a golf driving mat 103 which is provided to the base unit 101 and from which golf balls are struck by a golfer.

The base unit 101 comprises a base 105 which is located on a ground surface, and a sheet 107 which is located on the base 105 and on which a golfer stands to hit golf shots. In this embodiment the base 105 comprises first and second interlocking base parts 105a, 105b. In one embodiment a third interlocking base part can be disposed between the first and second base parts 105a, 105b to allow for the width of the mat system to be extended as required.

The base 105 includes a sheet recess 111 in which the sheet 107 is located, and the sheet 107 includes a clearance aperture 115, in this embodiment of rectangular shape, which is located to one side of the sheet 107 through which the golf driving mat 103 is presented.

The golf driving mat 103 comprises a body unit 117, in this embodiment integrally formed with the base 105, a receptacle 119 which is disposed within the body unit 117 and includes an upper, flexible member 121, a lower member 122 and a cavity 123, filled with a viscous material 125, therebetween, and an upper, ball-receiving unit 127 which is disposed within the body unit 117 and over the flexible member 121 of the receptacle 119.

The body unit 117 includes an outer frame 129, in this embodiment rectangular in shape, to which the ball-receiving unit 127 is fastened. In this embodiment opposed sides of the outer frame 129 in the direction of hitting each include a plurality of apertures 131, 133 spaced along the length thereof which receive counterpart projections 155, 161 on the ball-receiving unit 127, as will be described in more detail hereinbelow. In this embodiment the inner side of the outer frame 129 includes vertical slots 134 in registration with each of the apertures 133, which slots 134 are provided to accommodate a releasing tool, as will be described in more detail hereinbelow.

The body unit 117 further includes an inner frame 135, in this embodiment rectangular in shape, which is located inwardly of the outer frame 129 and defines an upstanding flange 136 which engages the ball-receiving member 153 of the ball-receiving unit 127 in tensioning the same, as will be described in more detail hereinbelow.

The body unit 117 further includes anchor members 137, 139 at the opposed ends thereof in the direction of hitting to which the receptacle 119 is fixed such as to extend the upper, flexible member 121 of the receptacle 119.

- 5 The body unit 117 further includes an impact element 141 which extends along the lower surface thereof in the direction of hitting, which impact element 141 acts to provide an impact surface such that, should a golfer hit down through the receptacle 119, the golf club re-bounds from the impact element 141 without any significant jarring. In this embodiment the impact element 141 is formed of a rubberised material, preferably a
10 rubber.

The body unit 117 further includes a support member 143 which is disposed within the inner frame 135 and includes a receptacle recess 145 in which the receptacle 119 is located.

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- The receptacle 119, in this embodiment an enclosed, flexible bag, is a planar rectangular member having a predetermined depth, in this embodiment of about 20 mm, such that, where filled with a viscous material 125, in this embodiment a resilient skeletal foam structure filled with a viscous medium, the upper, flexible member 121 of the receptacle
20 119 simulates a ground surface, typically a turfed ground surface. In this embodiment the receptacle 119 is fabricated from a ruckable material, such that, when a golfer hits a “fat” shot, the flexible member 121 is rucked up, which rucking up, together with the action of the underlying viscous material 125, causes the speed of the club head to be slowed in the same manner as when hitting a “fat” shot on a turfed ground surface.

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In one embodiment the receptacle 119 is formed of a synthetic material, preferably polyvinyl chloride (PVC). In another embodiment the receptacle 119 can be formed of a rubberised material, preferably a rubber, and more preferably a synthetic rubber. In a preferred embodiment the receptacle 119 is formed of a resilient material.

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The receptacle 119 includes apertures 147, 149 at the ends thereof in which the anchor members 135, 137 on the body unit 117 are located to anchor the upper, flexible member 121 of the receptacle 119.

- 5 In this embodiment, as illustrated in Figure 17, the skeletal foam structure comprises an open cell foam element in which the viscous medium is impregnated. In one embodiment the skeletal foam structure can include an array of apertures, in the manner of perforations, in which the viscous medium is present.
- 10 In another embodiment, as illustrated in Figure 18, the skeletal foam structure comprises a closed cell foam which includes an array of apertures, in the manner of perforations, in which the viscous medium is present.

- In one embodiment the viscous medium comprises a gel, for example, an aqueous gel.
- 15 In a preferred embodiment the gel comprises a petroleum jelly. In an alternative embodiment the viscous medium could be a syrup, such as a corn syrup. In another alternative embodiment the viscous medium could be an oil, such as a silicone oil.

- The ball-receiving unit 127 comprises a frame 151, in this embodiment rectangular in shape, which is removably attached to the outer frame 129 of the body unit 117, and a ball-receiving member 153 which is attached to the frame 151 and on which golf balls to be hit are located. In being removable, the ball-receiving unit 127 allows for replacement when damaged, typically through wear.
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- 25 In this embodiment the frame 151 comprises first and second frame parts 151a, 151b between which the ball-receiving member 153 is clamped in a loose state.

- In this embodiment the frame 151 includes a plurality of fixed outwardly-extending projections 155 on an outer side thereof in the direction of hitting which are configured to engage in corresponding ones of the apertures 131 in the outer side of the outer frame 129 of the body unit 117, and a plurality of clips 157 on an inner side thereof in the
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direction of hitting which are configured to engage with respective ones of the apertures 133 in the inner side of the outer frame 129.

In this embodiment each clip 157 comprises a supporting member 159 which is
5 connected, here resiliently hinged, at one end to the upper, first frame part 151a of the frame 151, and supports an outwardly-extending projection 161 at the other, free end which engages a respective one of the apertures 133 in the inner side of the outer frame 129, and a release element 163 on an outer surface thereof intermediate the hinged connection and the projection 161 which provides for release of the ball-receiving unit
10 127, as will be described in more detail hereinbelow.

In this embodiment the release elements 163 each comprise an outwardly-tapering element which tapers outwardly in the direction from the hinged connection, such that, when sliding a releasing tool thereover, the supporting member 159 is deflected
15 inwardly, releasing the respective projection 161 from the aperture 133 in the inner side of the outer frame 129 and enabling the removal of the ball-receiving unit 127.

In this embodiment the supporting member 159 includes a pair of recesses (not illustrated) therein for receiving respective projections on a releasing tool when the
20 releasing tool is fully inserted in the respective slot 134 in the outer frame 129, as required to release the projections 161 from the respective apertures 133 in the inner side of the outer frame 129. Through the provision of the recesses, the releasing tool engages the frame 151 of the ball-receiving unit 127 to allow the frame 151 to be hinged out of the body unit 117, as will be described in more detail hereinbelow.

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In this embodiment the ball-receiving member 153 is oversized such as to be loose in the frame 151 when not fitted, and, when the frame 151 is fitted to the body unit 117, be tensioned by engagement with the peripheral flange 136 of the inner frame 135. With this configuration, the ball-receiving member 153 is not required to be tensioned prior to
30 fitting of the frame 151.

In one embodiment the upper surface of the ball-receiving member 153 can be a smooth surface. In an alternative embodiment the upper surface of the ball-receiving member 153 can be a non-smooth surface, for example, a roughened or ribbed surface, such as grid-shaped ribs.

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In this embodiment the ball-receiving unit 127 is fitted to the body unit 117 by locating the fixed projections 155 on the outer side of the frame 151 in the apertures 131 in the outer side of the outer frame 129 of the body unit 117, and hinging the ball-receiving unit 127 downwards to the body unit 117 such as to engage the clips 157 on the inner
10 side of the frame 151 in the apertures 133 in the inner side of the outer frame 129 of the body unit 117.

As discussed hereinabove, in this embodiment the ball-receiving unit 127 is released from the body unit 117 by using a releasing tool.

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Figures 19(a) to (d) illustrate a releasing tool 181 for use in releasing the ball-receiving unit 127 from the body unit 117, such as required for replacement.

The releasing tool 181 comprises a handling member 182, in this embodiment in the
20 form of a bar, and a plurality of blade members 183 which are disposed in spaced relation along the length of the handling member 182 at such positions to fit into the slots 134 along the inner edge of the outer frame 129 of the body unit 117.

The blade members 183 are configured to engage the release elements 163 of the
25 respective clips 157 and have a thickness which is such that, on insertion fully into the slots 134 along the inner edge of the outer frame 129 of the body unit 117, the supporting members 159 of the clips 157 are deflected such that the projections 161 are released from the apertures 133 in the inner side of the outer frame 129 of the body unit 117, allowing for the removal of the ball-receiving unit 127.

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The blade members 183 include first and second pairs of projections 185, 187 on each of the opposite sides thereof. Depending on the orient, ones of the pairs of projections 185,

187 engage in the pairs of recesses in the respective supporting members 159 of the clips 157. With this configuration, the releasing tool 181 engages the frame 151 of the ball-receiving unit 127 to allow the ball-receiving unit 127 to be hinged out of the body unit 117.

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In this embodiment the ball-receiving unit 127 is removed from the body unit 117 by inserting the blade members 183 of the releasing tool 181 fully into respective ones of the slots 134 in the inner side of the outer frame 129 of the body unit 117, subsequently raising the releasing tool 181 to hinge the inner side of the ball-receiving unit 127 upwards, and then releasing the fixed projections 155 on the outer side of the frame 151 from the apertures 131 in the outer side of the outer frame 129 of the body unit 117.

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With this construction, when a golfer makes a good swing and hits a golf ball with a “clean” strike, the golf driving mat 103 reacts in the same manner as would a natural ground surface, as illustrated in Figure 20. However, when a golfer makes a poor swing which is such as to cause the club head to hit the ball-receiving member 153 of the ball-receiving unit 127 behind the golf ball, and hence the flexible member 121 of the receptacle 119, that is, hits the shot “fat”, the flexible member 121, under the reaction of the viscous material 125, acts to cause the club head to dig into the golf driving mat 103, which causes the club head to be slowed down and make little or no contact with the golf ball, as illustrated in Figure 21.

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By altering the thickness of the flexible member 121 of the receptacle 119 and the ball-receiving member 153 and the characteristics of the viscous material 125, the golf driving mat 103 can be configured to simulate different ground conditions, from firm to heavy turfed ground, and even sand bunkers. In this embodiment, a golfer is able to select between a plurality of different golf driving mats 103 which are representative of different ground conditions.

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Figures 22 to 33 illustrate a golf driving mat system including a golf driving mat in accordance with a third embodiment of the present invention.

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The golf driving mat system comprises a base unit 201 on which a golfer stands to hit a golf shot, and a golf driving mat 203 which is provided to the base unit 201 and from which golf balls are struck by a golfer.

- 5 The base unit 201 comprises a base 205 which is located on a ground surface, and a sheet 207 which is located on the base 205 and on which a golfer stands to hit golf shots. In this embodiment the base 205 comprises first and second interlocking base parts 205a, 205b. In one embodiment a third interlocking base part can be disposed between the first and second base parts 205a, 205b to allow for the width of the mat system to be
10 extended as required.

The base 205 includes a sheet recess 211 in which the sheet 207 is located, and the sheet 207 includes a clearance aperture 215, in this embodiment of rectangular shape, which is located to one side of the sheet 207 through which the golf driving mat 203 is presented.

15

- The golf driving mat 203 comprises a body unit 217, in this embodiment integrally formed with the base 205, a receptacle 219 which is disposed within the body unit 217 and includes an upper, flexible member 221, a lower member 222 and a cavity 223, filled with a viscous material 225, therebetween, and an upper, ball-receiving unit 227
20 which is disposed within the body unit 217 and over the flexible member 221 of the receptacle 219.

- The body unit 217 includes an outer frame 229, in this embodiment rectangular in shape, to which the ball-receiving unit 227 is fastened. In this embodiment the opposed sides
25 of the outer frame 229 in the direction of hitting each include a plurality of apertures 231 spaced along the length thereof which receive counterpart clips 257 on the ball-receiving unit 227, as will be described in more detail hereinbelow. In this embodiment the opposed sides of the outer frame 229 include vertical slots 234 in registration with each of the apertures 231, which slots 234 are provided to accommodate a releasing tool, as
30 will be described in more detail hereinbelow.

The body unit 217 further includes an inner frame 235, in this embodiment rectangular in shape and formed of a resilient material, which is located inwardly of the outer frame 229 and defines an upstanding flange 236 which engages the ball-receiving member 254 of the ball-receiving unit 227 in tensioning the same, as will be described in more detail
5 hereinbelow.

The body unit 217 further includes anchor members 237, 239 at the opposed ends thereof in the direction of hitting to which the receptacle 219 is fixed such as to extend the upper, flexible member 221 of the receptacle 219.

10

The body unit 217 further includes an impact element 241 which extends along the lower surface thereof in the direction of hitting, which impact element 241 acts to provide an impact surface such that, should a golfer hit down through the receptacle 219, the golf club re-bounds from the impact element 241 without any significant jarring. In
15 this embodiment the impact element 241 is formed of a rubberised material, preferably a rubber.

The body unit 217 further includes a support member 243 which is disposed within the inner frame 235 and includes a receptacle recess 245 in which the receptacle 219 is
20 located.

The receptacle 219, in this embodiment an enclosed, flexible bag, is a planar rectangular member having a predetermined depth, in this embodiment of about 20 mm, such that, where filled with a viscous material 225, in this embodiment a resilient skeletal foam
25 structure filled with a viscous medium, the upper, flexible member 221 of the receptacle 219 simulates a ground surface, typically a turfed ground surface. In this embodiment the receptacle 219 is fabricated from a ruckable material, such that, when a golfer hits a "fat" shot, the flexible member 221 is rucked up, which rucking up, together with the action of the underlying viscous material 225, causes the speed of the club head to be
30 slowed in the same manner as when hitting a "fat" shot on a turfed ground surface.

In one embodiment the receptacle 219 is formed of a synthetic material, preferably polyvinyl chloride (PVC). In another embodiment the receptacle 219 can be formed of a rubberised material, preferably a rubber, and more preferably a synthetic rubber. In a preferred embodiment the receptacle 219 is formed of a resilient material.

5

The receptacle 219 includes apertures 247, 249 at the ends thereof in which the anchor members 237, 239 on the body unit 217 are located to anchor the upper, flexible member 221 of the receptacle 219.

10 In this embodiment, as illustrated in Figure 30, the skeletal foam structure comprises an open cell foam element in which the viscous medium is impregnated. In one embodiment the skeletal foam structure can include an array of apertures, in the manner of perforations, in which the viscous medium is present.

15 In another embodiment, as illustrated in Figure 31, the skeletal foam structure comprises a closed cell foam which includes an array of apertures, in the manner of perforations, in which the viscous medium is present.

In one embodiment the viscous medium comprises a gel, for example, an aqueous gel.

20 In a preferred embodiment the gel comprises a petroleum jelly. In an alternative embodiment the viscous medium could be a syrup, such as a corn syrup. In another alternative embodiment the viscous medium could be an oil, such as a silicone oil.

The ball-receiving unit 227 comprises a frame 251, in this embodiment rectangular in shape, which is removably attached to the outer frame 229 of the body unit 217, and a ball-receiving member 254 which is attached to the frame 251 and on which golf balls to be hit are located. In being removable, the ball-receiving unit 227 allows for replacement when damaged, typically through wear.

30 In this embodiment the frame 251 comprises a first, inner frame member 252 and a plurality of second, outer frame members 253a, 253b between which the ball-receiving member 254 is clamped in a loose state.

In this embodiment the ones of the outer frame members 253a disposed to the respective sides of the frame 251 in the direction of hitting each include a clip 257, which clips 257 are configured to engage in corresponding ones of the apertures 231 in the outer sides of the outer frame 229 of the body unit 217.

In this embodiment, as illustrated in Figures 32(a) and (b), the clip members 253a each include a clip 257 which comprises a supporting member 259 which is connected, here resiliently hinged, at one upper end, and supports an outwardly-extending projection 261 at the other, free end which engages a respective one of the apertures 231 in the opposed sides of the outer frame 229 of the body unit 217, and a release element 263 on an outer surface thereof intermediate the hinged connection and the projection 261 which provides for release of the ball-receiving unit 227, as will be described in more detail hereinbelow.

In this embodiment the release elements 263 each comprise an outwardly-tapering element which tapers outwardly in the direction from the hinged connection, such that, when sliding a releasing tool thereover, the supporting member 259 is deflected inwardly, releasing the respective projection 261 from the aperture 231 in the respective side of the outer frame 229 of the body unit 217 and enabling the removal of the ball-receiving unit 227.

In this embodiment, as illustrated in Figures 32(a) and (b), the supporting member 259 includes a pair of recesses 264 therein for receiving respective projections on a releasing tool when the releasing tool is fully inserted in the respective slot 234 in the outer frame 229, as required to release the projections 261 from the apertures 231 in the respective side of the outer frame 229. Through the provision of the recesses 264, the releasing tool engages the frame 251 of the ball-receiving unit 227 to allow the frame 251 to be hinged out of the body unit 217, as will be described in more detail hereinbelow.

In this embodiment the ball-receiving member 254 is oversized such as to be loose in the frame 251 when not fitted, and, when the frame 251 is fitted to the body unit 217, be

tensioned by engagement with the peripheral flange 236 of the inner frame 235. With this configuration, the ball-receiving member 254 is not required to be tensioned prior to fitting of the frame 251.

- 5 In this embodiment, as illustrated in Figure 33, the ball-receiving member 254 is a spacer fabric as supplied by Scott & Fyfe, Tayport, Scotland, which comprises a first, lower fabric element 265, a second, upper fabric element 266 spaced from the lower fabric element 265 and a plurality of fibre elements 267, here monofilaments, which interconnect the first and second fabric elements 265, 266. In this embodiment the upper
10 fabric element 266 is patterned, here as defined by a hexagonal weave. With this configuration, the fibre filaments 267 act to support a golf ball when the upper fabric element 266 is worn through.

In this embodiment the ball-receiving unit 227 is fitted to the body unit 217 by locating
15 the clips 257 on the respective outer sides of the frame 251 in the apertures 231 in the respective outer sides of the outer frame 229 of the body unit 217.

As discussed hereinabove, in this embodiment the ball-receiving unit 227 is released from the body unit 217 by using a releasing tool.

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Figures 34(a) to (d) illustrate a releasing tool 281 for use in releasing the ball-receiving unit 227 from the body unit 217, such as required for replacement.

The releasing tool 281 comprises a handling member 282, in this embodiment in the
25 form of a bar, and a plurality of blade members 283 which are disposed in spaced relation along the length of the handling member 282 at such positions to fit into the slots 234 along the respective sides of the outer frame 229 of the body unit 217.

The blade members 283 are configured to engage the release elements 263 of the
30 respective clips 257 of the ball-receiving unit 227 and have a thickness which is such that, on insertion fully into the slots 234 along the respective sides of the outer frame 229 of the body unit 217, the supporting members 259 of the clips 257 are deflected

such that the projections 261 are released from the apertures 231 in the respective sides of the outer frame 229 of the body unit 217, allowing for the removal of the ball-receiving unit 227.

- 5 The blade members 283 include first and second pairs of projections 285, 287 on each of the opposite sides thereof. Depending on the orient, ones of the pairs of projections 285, 287 engage in the pairs of recesses 264 in the respective supporting members 259 of the clips 257. With this configuration, the releasing tool 281 engages the frame 251 of the ball-receiving unit 227 to allow the ball-receiving unit 227 to be removed from the body
10 unit 217.

In this embodiment the ball-receiving unit 227 is removed from the body unit 217 by first inserting the blade members 283 of the releasing tool 281 fully into respective ones of the slots 234 in one side of the outer frame 229 of the body unit 217, and
15 subsequently inserting the blade members 283 of the releasing tool 281 fully into respective ones of the slots 234 in the other side of the outer frame 229 of the body unit 217.

With this construction, when a golfer makes a good swing and hits a golf ball with a
20 “clean” strike, the golf driving mat 203 reacts in the same manner as would a natural ground surface, as illustrated in Figure 35. However, when a golfer makes a poor swing which is such as to cause the club head to hit the ball-receiving member 254 of the ball-receiving unit 227 behind the golf ball, and hence the flexible member 221 of the receptacle 219, that is, hits the shot “fat”, the flexible member 221, under the reaction of
25 the viscous material 225, acts to cause the club head to dig into the golf driving mat 203, which causes the club head to be slowed down and make little or no contact with the golf ball, as illustrated in Figure 36.

By altering the thickness of the flexible member 221 of the receptacle 219 and the ball-receiving member 254 and the characteristics of the viscous material 225, the golf driving
30 mat 203 can be configured to simulate different ground conditions, from firm to heavy turfed ground, and even sand bunkers. In this embodiment, a golfer is able to select

between a plurality of different golf driving mats 203 which are representative of different ground conditions.

Finally, it will be understood that the present invention has been described in its
5 preferred embodiments and can be modified in many different ways without departing from the scope of the invention as defined by the appended claims.

CLAIMS

1. A golf driving mat, including:
a flexible member over which a golf ball is in use located to be hit by a head of a
5 golf club; and
a viscous foam material disposed beneath the flexible member, wherein the
viscous foam material is such as to slow the head of the golf club when the head
of the golf club is hit into the flexible member.
- 10 2. The mat of claim 1, wherein the flexible member is formed of a ruckable
material such that, when the head of the golf club is hit into the flexible member,
the flexible member rucks up.
- 15 3. The mat of claim 1 or 2, wherein the flexible member is formed of a resilient
material.
4. The mat of any of claims 1 to 3, wherein the flexible member is formed of a
rubberised material.
- 20 5. The mat of any of claims 1 to 4, wherein the viscous foam material is a visco-
elastic foam material.
6. The mat of claim 5, wherein the visco-elastic foam material is a memory foam.
- 25 7. The mat of any of claims 1 to 6, wherein the cavity has a depth of up to about 20
mm.
8. The mat of any of claims 1 to 6, wherein the cavity has a depth of about 20 mm.
- 30 9. The mat of any of claims 1 to 8, including:
a ball-receiving member located over the flexible member on which the golf ball
is in use located.

10. The mat of claim 9, wherein the ball-receiving member is removable.
11. The mat of claim 9 or 10, wherein the ball-receiving member is formed of a resilient material.
12. The mat of any of claims 9 to 11, wherein the ball-receiving member is formed of a fabric material.
13. The mat of any of claims 9 to 12, wherein the ball-receiving member has a smooth surface.
14. The mat of any of claims 9 to 12, wherein the ball-receiving member has a non-smooth surface.
15. The mat of claim 14, wherein the ball-receiving member has a ribbed surface.
16. The mat of any of claims 1 to 15, comprising:
a receptacle including the flexible member at an upper surface thereof and containing the viscous foam material.
17. The mat of claim 16, further comprising:
a body unit comprising a main body in which the receptacle is disposed.
18. A golf driving mat system, comprising:
a base unit on which a golfer stands to hit a golf shot; and
the mat of any of claims 1 to 17 provided to the base unit.
19. The mat system of claim 18, wherein the mat is removable.
20. The mat system of claim 19, wherein the base unit includes a recess in which the mat is in use located.

21. The mat system of claim 20, wherein the base unit comprises a base including first and second recesses in one of which the mat is in use located according to whether the golfer is a left-handed or right-handed golfer, and a sheet located on the base including an aperture through which the mat is presented.
22. The mat system of claim 18, wherein the mat is integrally formed with the base unit.
23. A golf driving mat, including:
a flexible member over which a golf ball is in use located to be hit by a head of a golf club; and
a viscous material disposed beneath the flexible member, wherein the viscous material comprises a resilient skeletal structure filled with a viscous medium and is such as to slow the head of the golf club when the head of the golf club is hit into the flexible member.
24. The mat of claim 23, wherein the flexible member is formed of a ruckable material such that, when the head of the golf club is hit into the flexible member, the flexible member rucks up.
25. The mat of claim 23 or 24, wherein the flexible member is formed of a resilient material.
26. The mat of any of claims 23 to 25, wherein the flexible member is formed of a rubberised material.
27. The mat of any of claims 23 to 26, wherein the resilient skeletal structure comprises a filamental structure.
28. The mat of claim 27, wherein the filamental structure comprises an intertwined filamental structure.

29. The mat of any of claims 23 to 28, wherein the viscous medium is a gel-like material.
- 5 30. The mat of claim 29, wherein the gel-like material is a gel.
31. The mat of any of claims 23 to 28, wherein the viscous medium is a syrup.
32. The mat of any of claims 23 to 28, wherein the viscous medium is an oil.
- 10 33. The mat of any of claims 23 to 28, wherein the viscous medium is a paste.
34. The mat of any of claims 23 to 28, wherein the viscous material is a particulate material.
- 15 35. The mat of any of claims 23 to 28, wherein the viscous material comprises a particulate material dispersed in a carrier medium.
36. The mat of claim 35, wherein the carrier medium is a viscous liquid.
- 20 37. The mat of claim 36, wherein the viscous liquid is an oil.
38. The mat of claim 35, wherein the carrier medium is a gel.
- 25 39. The mat of any of claims 34 to 38, wherein the particulate material comprises particles selected from at least one of the group consisting of plastic particles, metal particles and plastic-coated metal particles.
40. The mat of any of claims 23 to 39, wherein the cavity has a depth of up to about 20 mm.
- 30

41. The mat of any of claims 23 to 39, wherein the cavity has a depth of about 20 mm.
42. The mat of any of claims 23 to 41, including:
5 a ball-receiving member located over the flexible member on which the golf ball is in use located.
43. The mat of claim 42, wherein the ball-receiving member is removable.
- 10 44. The mat of claim 42 or 43, wherein the ball-receiving member is formed of a resilient material.
45. The mat of any of claims 42 to 44, wherein the ball-receiving member is formed of a fabric material.
- 15 46. The mat of any of claims 42 to 45, wherein the ball-receiving member has a smooth surface.
47. The mat of any of claims 42 to 45, wherein the ball-receiving member has a non-
20 smooth surface.
48. The mat of claim 47, wherein the ball-receiving member has a ribbed surface.
49. The mat of any of claims 23 to 48, comprising:
25 a receptacle including the flexible member at an upper surface thereof and containing the viscous material.
50. The mat of claim 49, further comprising:
a body unit comprising a main body in which the receptacle is disposed.
- 30 51. A golf driving mat system, comprising:
a base unit on which a golfer stands to hit a golf shot; and

the mat of any of claims 23 to 50 provided to the base unit.

52. The mat system of claim 51, wherein the mat is removable.

5 53. The mat system of claim 52, wherein the base unit includes a recess in which the mat is in use located.

10 54. The mat system of claim 53, wherein the base unit comprises a base including first and second recesses in one of which the mat is in use located according to whether the golfer is a left-handed or right-handed golfer, and a sheet located on the base including an aperture through which the mat is presented.

15 55. The mat system of claim 51, wherein the mat is integrally formed with the base unit.

20 56. A golf driving mat, comprising:
an upper, flexible member over which a golf ball is in use located to be hit by a head of a golf club;
a lower member; and
a viscous material disposed between the upper and lower members, wherein the viscous material comprises a resilient skeletal structure filled with a viscous medium and is such as to slow the head of the golf club when the head of the golf club is hit into the flexible member.

25 57. The mat of claim 56, wherein the skeletal structure comprises a skeletal foam structure.

30 58. The mat of claim 57, wherein the skeletal foam structure comprises an open-cell foam structure.

59. The mat of claim 58, wherein the skeletal foam structure includes a plurality of perforations in which viscous medium is contained.

60. The mat of claim 57, wherein the skeletal foam structure comprises an open-cell foam structure including a plurality of perforations in which viscous medium is contained.
- 5
61. A golf mat component which is removably fitted to a body unit, the golf mat component comprising: a frame; and a ball-receiving member which is attached to the frame, wherein the ball-receiving member is oversized such as to be loose when removed from body unit and tensioned when fitted to the body unit.
- 10
62. A golf mat component which is removably fitted to a body unit, the golf mat component comprising: a frame; and a ball-receiving member which is attached to the frame; wherein the frame includes at least one clip for fixing the golf mat component to the body unit, the at least one clip comprising a supporting member which is connected to a main body of the frame, and supports an
- 15
- outwardly-extending projection which is configured to engage at least one aperture in the body unit, and an outwardly-tapering release element which tapers outwardly in the direction from the connection, such that, when sliding a releasing tool thereover, the supporting member is deflected inwardly, releasing
- 20
- the projection from the at least one aperture in the body unit and enabling removal of the golf mat component.
63. The golf mat component of claim 62, wherein the frame includes a plurality of clips disposed in spaced relation along at least one edge thereof.
- 25
64. The golf mat component of claim 63, wherein the frame includes a plurality of clips disposed in spaced relation along opposed edges thereof.
65. The golf mat component of any of claims 62 to 64, wherein the supporting member includes at least one recess for receiving a corresponding projection on a
- 30
- releasing tool.

66. A releasing tool for releasing a golf mat component from a body unit, the releasing tool comprising: a support member; and a plurality of blade members disposed in spaced relation along the length of the support member, each being commonly directed and being located at such positions as to fit into slots in releasing the golf mat component.

5

67. The releasing tool of claim 66, wherein the blade members each include at least one projection thereon for engaging respective recesses on the golf mat component.

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