PROJECTILE-RETAINING WALL PANEL

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Appl. No.: 11/112,576
Filed: Apr. 22, 2005

Related U.S. Application Data
Provisional application No. 60/564,697, filed on Apr. 23, 2004.

Publication Classification

Int. Cl.  F41H 5/02
89/36.02

ABSTRACT

A ballistic panel to prevent firearm bullets from escaping a firearm training room. Elastomeric ballistic panels are butted against each other on a metal backing plate and along a seam. Each elastomeric panel butting edge has an overlap feature complementary to another elastomeric panel's butting edge along the seam to prevent bullets striking at the seam from traveling along the seam to the backing plate and then ricocheting therefrom into the training room.
PROJECTILE-RETAINING WALL PANEL
CROSS-REFERENCE TO RELATED APPLICATIONS

BACKGROUND OF THE INVENTION
[0002] Certain personnel such as police and members of the armed forces have jobs that require them to carry and use firearms. For their own and the public’s safety, armed personnel must be properly trained. Much of this training occurs at conventional firing ranges. However, for armed personnel to use their firearms safely and effectively in real life situations, at least a portion of the training must simulate reality.

[0003] To accomplish this realism, some training occurs in rooms that contain equipment that randomly present surprise target threats and other simulations. The trainee must perceive the threat or potential threat and make an instant decision whether to fire. A particular problem with these rooms is that bullets fired by the trainee do not endanger either the trainee or anyone else within or outside the training facility. That is, bullets fired within the training room must stay within the room, and must not ricochet within the room.

[0004] To accomplish these results, it is customary to provide steel panels or plates for containing bullets fired within a training room. Such steel panels or plates may completely cover the walls and ceiling to enclose the training room. A typical steel plate may be 4 ft. wide by either 4 ft. or 8 ft. tall.

[0005] To prevent ricochets within the training room the interior face of each steel plate may be covered with ballistic rubber or other ballistic panels perhaps 2" thick and 2 ft. wide by 2 ft. tall. Typically, several of these elastomeric panels are tightly butted to each other along seams. When a bullet strikes a ballistic panel, the pad slows the bullet, absorbs its kinetic energy, and prevents ricochet of the bullet and any bullet fragments. Ballistic panels are replaced after absorbing a certain number of bullets.

[0006] One concern with the described design is that the seams where the elastomeric ballistic panels abut other may not absorb and retain rounds as reliably as the other areas of the panels. In particular, rounds that strike a seam within the plane of the seams may contain enough kinetic energy to ricochet from the ballistic panel, since the seam has relatively less ability to absorb and retain bullets compared to the other areas of the ballistic panel. While few bullets strike the seams in this way, the potential for serious harm when a bullet does so may create an unacceptable risk for the trainee(s) within the space or room.

BRIEF DESCRIPTION OF THE INVENTION
[0007] The invention comprises a modification to a ballistic panel of the type previously described that employs a steel backing plate having an interior surface and a plurality of elastomeric ballistic panels covering the interior surface of the backing plate. Each elastomeric ballistic panel has at least one butting edge that abuts at least one other elastomeric ballistic panel’s butting edge along a seam. In accordance with the present invention, each butting edge has an overlap feature complementary to the butting edge of a different elastomeric ballistic panel’s butting edge.

[0008] The overlap feature can take any desired form to successfully reduce the incidence of ricochets from bullets striking seams between adjacent ballistic panels. One preferred embodiment comprises a lap joint formed by a lap projection extending along the length of each panel butting edge. Each lap projection complementarily overlaps the lap projection of an abutting ballistic panel.

[0009] A second preferred embodiment comprises a tongue projecting from and extending along the length of one elastomeric ballistic panel butting edge. A groove extends along the length of the another ballistic panel’s butting edge. The tongue and groove are designed so that the groove in one panel receives the tongue of the other panel’s butting edge.

[0010] Other embodiments such as a bevel along the edges of the adjacent ballistic panels may be employed in accordance with the present invention. The bevels overlap in a facing and parallel arrangement, each making approximately the same acute angle with the adjacent face of the panel.

BRIEF DESCRIPTION OF THE DRAWINGS
[0011] FIG. 1 shows a typical ballistic panel.

[0012] FIG. 2 is a detailed side view of a conventional form of a seam formed by two elastomeric panels’ butting edges.

[0013] FIG. 3 is a detailed side view of a seam formed by two elastomeric panels’ butting edges incorporating a first embodiment of the invention comprising a lap joint.

[0014] FIG. 4 is a detailed side view of a seam formed by two elastomeric panels’ butting edges incorporating a second embodiment of the invention comprising a tongue and groove joint.

[0015] FIG. 5 is a detailed side view of a seam formed by two elastomeric panels’ butting edges incorporating a third embodiment of the invention comprising a beveled edge on butting edges.

DESCRIPTION OF THE PREFERRED EMBODIMENTS
[0016] FIG. 1 shows a typical ballistic panel 10 structure with a hardened steel backing plate 12 and elastomeric ballistic panels 15, 18, and 21. Panels 15, et al. are attached to plate 12 by adhesive, clips, barbs, or any other convenient means.

[0017] In one preferred embodiment, panels 15, et al. are cast from automobile tire scraps by vulcanization process, in known manner. The panels 15, et al. must be dense and thick enough to retain rounds striking at near perpendicular angles and soft enough to allow rounds striking at shallow incident angles to penetrate rather than glance or ricochet, in known manner.

[0018] The panels 15, et al. are tightly butted against each other along seams 16. Tight butting along seams 16 reduces the possibility that a bullet striking directly on a seam 16 can
penetrate the panels 15, et al. at seam 16 and then ricochet back toward the trainee directly along the entry path. The description to this point describes the present invention as well as the prior art, the prior art being illustrated in FIG. 2.

[0019] FIG. 2 shows the conventional manner of forming the butting surfaces 18' and 21' of two adjacent panels 18 and 21. In this design, surfaces 18' and 21' are approximately perpendicular to face surfaces 20 and 22 of panels 18 and 21, shown in FIG. 2 in edge view. The problem with this design is that even with tightly butting surfaces 18' and 21', ricochets by bullets fired parallel to surfaces 20 and 22 and that hit at seam 16 may ricochet back through seam 16 and escape from panels 18 and 21. While few of these bullets may strike in precisely this way, the consequences of such ricochets are undesirable.

[0020] FIGS. 3-5 show modified seam 16 constructions that avoid (at least to some extent) the problem of bullets hitting the conventional seam 16 of FIG. 2. FIG. 3 shows a lap joint type of seam 16 between panels 18 and 21. A lap projection 24 forms a part of a butting surface 18b and extends along the width of panel 18 (horizontal dimension in FIG. 1). A lap projection 26 forms a part of a butting surface 21b and extends along the width of panel 21.

[0021] When panels 18 and 21 are mounted on plate 12, projection 24 overlaps projection 26 in a complementary fashion to form an essentially void-free seam 16. (FIGS. 2-5 show small voids to aid understanding of the structure.) Each of the projections 24 and 26 form an overlap feature.

[0022] Bullets striking surfaces 20 and 22 at seam 16 must pass through solid material for at least half the thickness of panels 18 and 21. This path through solid rubber is usually sufficient to prevent escape of so-directed bullets and bullet fragments. At the very least, this overlap feature greatly attenuates the velocity of any ricocheting bullets or fragments that might escape ballistic panel 10.

[0023] FIG. 4 shows a tongue and groove structure for seam 16. Panel 18 has a tongue 18c centrally located along the butting edge thereof. Tongue 18c extends generally the entire width of panel 18. A complementary groove 21c is centrally located along the butting edge of panel 21. Groove 21 is dimensioned and located to receive tongue 18c. Rounds directed to surfaces 20 and 22 at seam 16 must pass through solid material for at least one-third of the thickness of panels 18 and 21 adjacent to the main body of panel 18, and at least two-thirds of the thickness of panels 18 and 21 elsewhere. In many cases this path through solid rubber is sufficient to prevent escape of rounds directed normal to surfaces 20 and 22. This overlap feature will usually prevent any ricochets and greatly attenuate the velocity of any ricochets that might occur.

[0024] As described, the present invention provides an improved elastomeric ballistic panel whereby an adjacent ballistic panels do not provide a direct path into and out of the panel along the seam. Modifications and variations of the present invention are possible in light of the above teachings. For example, FIG. 5 shows a further seam embodiment. Butting surfaces 18a and 21a comprise bevels each forming an acute included angle a with facing surfaces 20 and 22. Preferably the angle a is no greater than approximately 45°. Each bevel comprises an overlap feature for the respective panel, and each bevel 18a and 21a should have the same angle a so that their respective surfaces face and mate with each other in a complementary manner. Of course the bevels should tightly mate with each other when the blocks 18 and 21 are installed on panel 12. Therefore, in accordance with the teachings herein, the invention may be practiced other than as specifically described.

1. In a ballistic panel of the type having a bullet-resisting backing plate defining an interior surface and a plurality of elastomeric panels covering the interior surface of the backing plate, each elastomeric panel adjacent to at least one other elastomeric panel along a seam with each elastomeric panel having a butting edge butted to a butting edge of at least one other adjacent elastomeric panel to form the seam, the improvement wherein each elastomeric panel butting edge has an overlap feature, said overlap feature being complementary to an overlap feature of an adjacent elastomeric panel.

2. The ballistic panel of claim 1, wherein the overlap feature comprises a lap projection extending along the length of each elastomeric panel butting edge.

3. The ballistic panel of claim 2, wherein each lap projection tightly fits against another lap projection.

4. The ballistic panel of claim 1, wherein the overlap feature comprises a tongue projecting from and extending along the length of one elastomeric panel butting edge and a groove extending along the length of another elastomeric panel butting edge, said groove receiving said tongue.

5. The ballistic panel of claim 4, wherein the tongue of the one elastomeric block tightly fits into the groove of the other elastomeric block.

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