US009631906B2

(12) **United States Patent**
English et al.

(10) **Patent No.: US 9,631,906 B2**
(45) **Date of Patent: Apr. 25, 2017**

(54) **ELECTRONICALLY SCORED TARGET ARRAY**

(71) Applicants: **Capel Calhoun English**, Alpharetta, LA (US); **Pierce Otis English**, Marietta, GA (US)

(72) Inventors: **Capel Calhoun English**, Alpharetta, LA (US); **Pierce Otis English**, Marietta, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/075,395**

(22) Filed: **Mar. 21, 2016**

(65) **Prior Publication Data**

US 2016/0273888 A1 Sep. 22, 2016

Related U.S. Application Data

(60) Provisional application No. 62/135,869, filed on Mar. 20, 2015.

(51) **Int. Cl.**
F41J 5/00 (2006.01)
F41J 5/052 (2006.01)
F41J 5/06 (2006.01)

(52) **U.S. Cl.**
CPC . ***F41J 5/052*** (2013.01); *F41J 5/06* (2013.01)

(58) **Field of Classification Search**
CPC . F41J 7/04; F41J 1/10; F41J 7/00; F41J 6/14; F41J 5/056; F41J 5/06
USPC 273/407, 406, 390–392, 371, 372, 374, 273/376
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,348,442 A * 8/1920 Prebble F41J 7/04 273/390
1,733,606 A * 10/1929 Junker A63F 9/02 273/371
2,691,526 A * 10/1954 Wesley A63F 9/0204 273/359
4,222,564 A 9/1980 Allen et al.
4,524,976 A * 6/1985 Seitz F41J 7/04 273/388
4,611,993 A * 9/1986 Brown F41J 9/14 273/371
5,342,062 A * 8/1994 Lance F41J 7/04 273/391

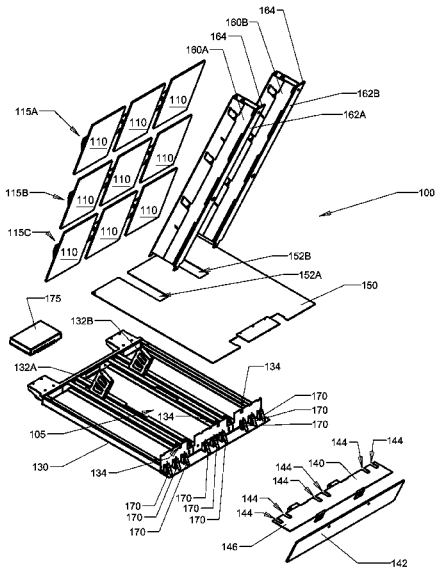
(Continued)

Primary Examiner — Mark Graham
(74) *Attorney, Agent, or Firm* — Asgaard Patent Services, LLC; F. Wayne Thompson, Jr.

(57) **ABSTRACT**

Implementations of an electronically scored target array are provided. In some implementations, the electronically scored target array may be used for training individuals in the use of rifles, hand guns, and similar weapons. In some implementations, the electronically scored target array may be used to facilitate competition between participating individuals. In some implementations, the electronically scored target array may be configured to record the performance (e.g., the number of target plates shot, number of target plates not shot (e.g., missed), overall time, etc.) of a shooter during a course of fire. In some implementations, the electronically scored target array comprises a base, a base guard, a cover plate, a first trunk tube, a second trunk tube, and nine target plates. In some implementations, the electronically scored target array may further comprise gaming software, a target controller, nine lasers mounted to the base, and an accelerometer secured to each target plate.

19 Claims, 10 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

6,322,365	B1	11/2001	Shechter et al.	
6,779,797	B1 *	8/2004	Chou	F41J 7/04 273/391
6,991,233	B2 *	1/2006	Goldsmith, Jr.	F41J 7/04 273/392
8,608,169	B2 *	12/2013	Saunders	F41J 7/04 273/392
2002/0158413	A1 *	10/2002	Dehart	F41J 7/00 273/390
2005/0098954	A1 *	5/2005	Stutz	F41J 7/04 273/390
2010/0032905	A1 *	2/2010	Morrow	F41J 1/10 273/366
2011/0175293	A1 *	7/2011	Brune	F41J 7/04 273/406
2013/0049299	A1 *	2/2013	Guthrie	A63B 24/0021 273/358
2014/0232067	A1 *	8/2014	Barry	F41J 1/10 273/392
2015/0069707	A1 *	3/2015	Dunlop	A63B 63/00 273/390
2015/0123346	A1 *	5/2015	Mason	F41J 1/10 273/371
2015/0268013	A1 *	9/2015	Heise	F41J 7/04 273/389
2015/0276356	A1 *	10/2015	Cesternino	F41J 9/02 273/370
2015/0369572	A1 *	12/2015	Smolka	F41J 5/14 273/371
2016/0091285	A1 *	3/2016	Mason	F41J 5/04 273/372

* cited by examiner

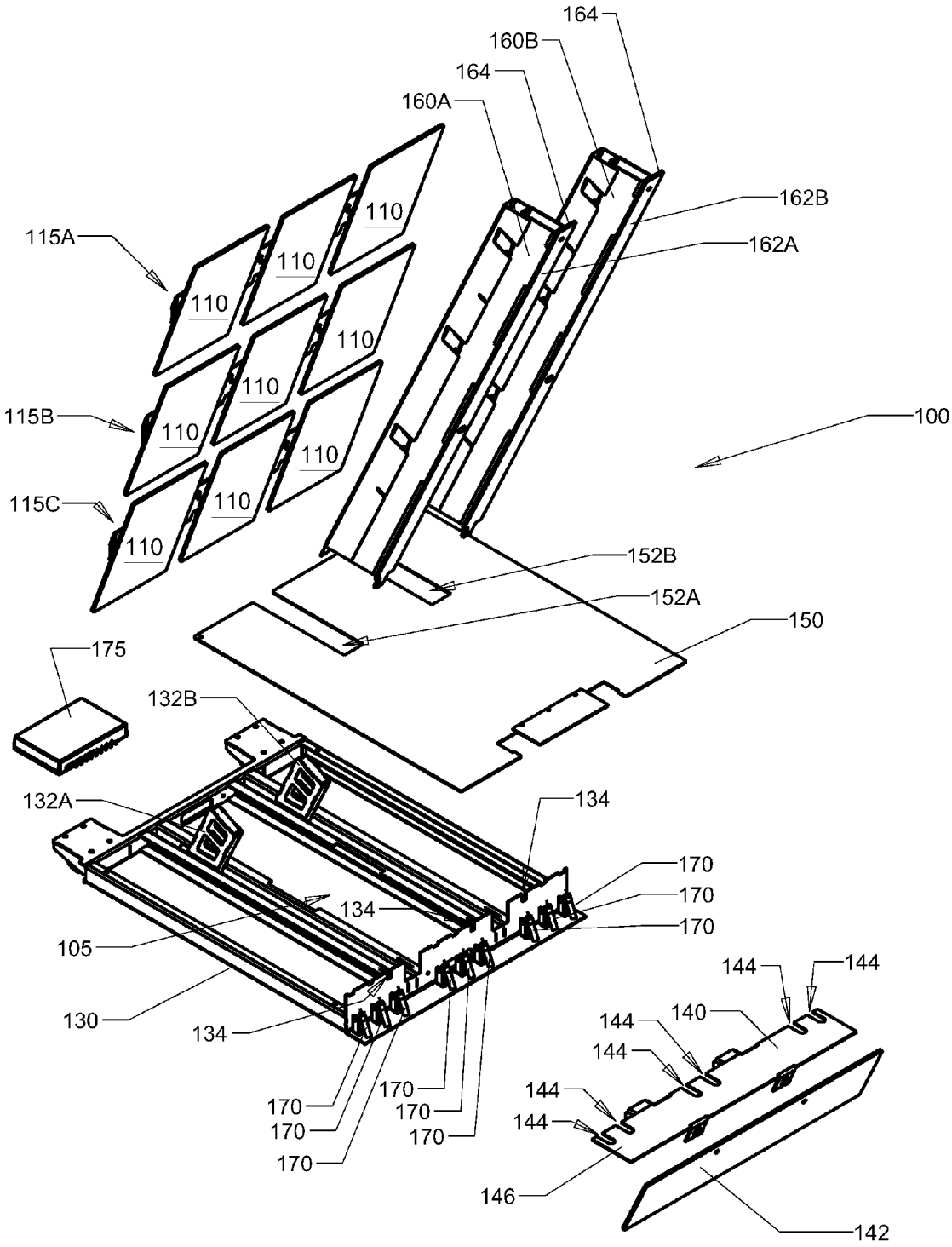

164
160B
164
160A
162B
162A
115A
110
110
110
110
110
110
110
110
110
115B
115C
100
152B
152A
150
175
132B
132A
134
170
170
170
134
105
130
134
144
144
140
144
144
144
144
170
170
170
170
170
170
146
142

FIG. 1A

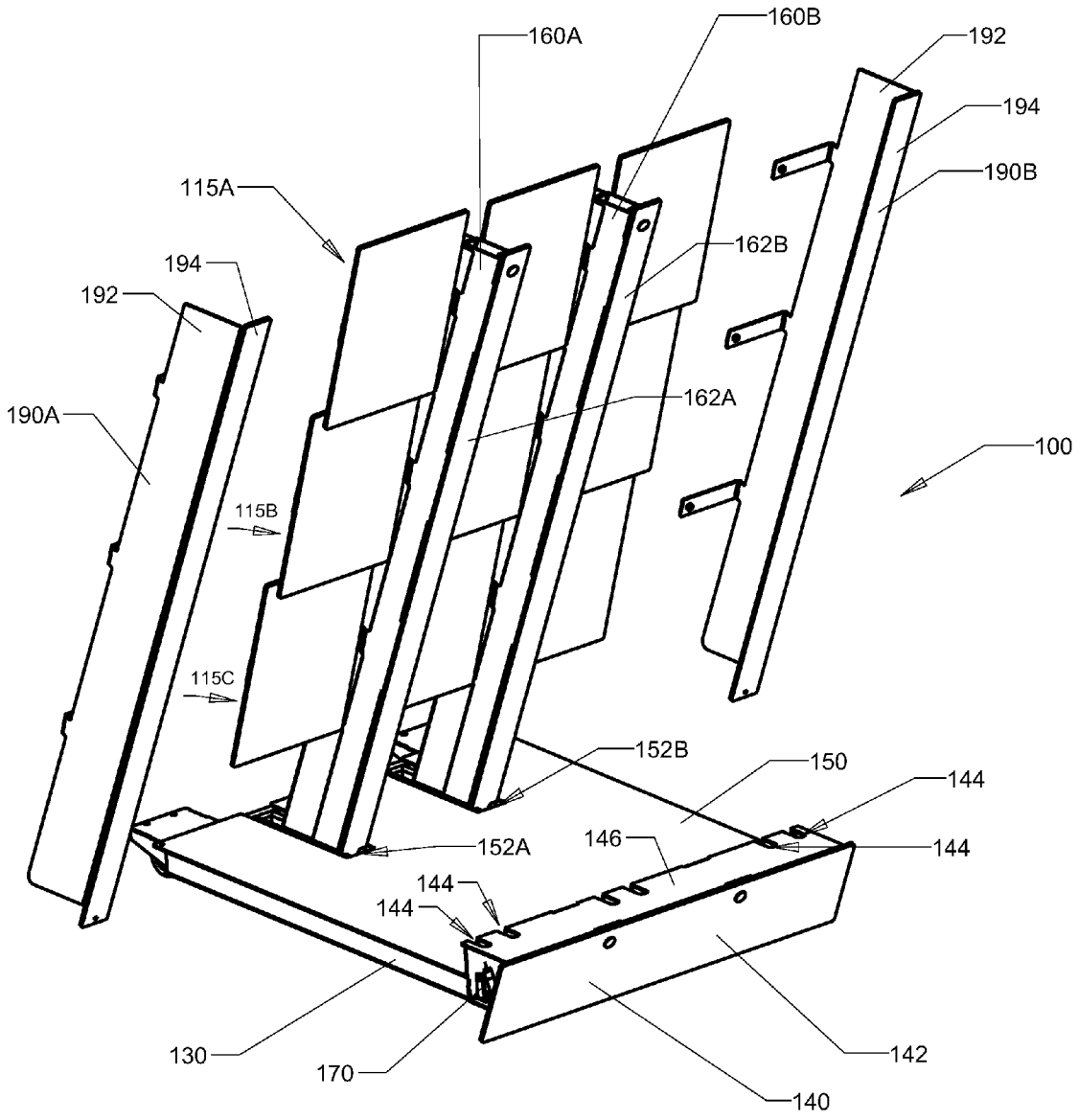

160A
160B
192
194
190B
115A
162B
194
192
190A
162A
100
115B
115C
152B
150
144
146
144
152A
144
144
130
170
142
140

FIG. 1B

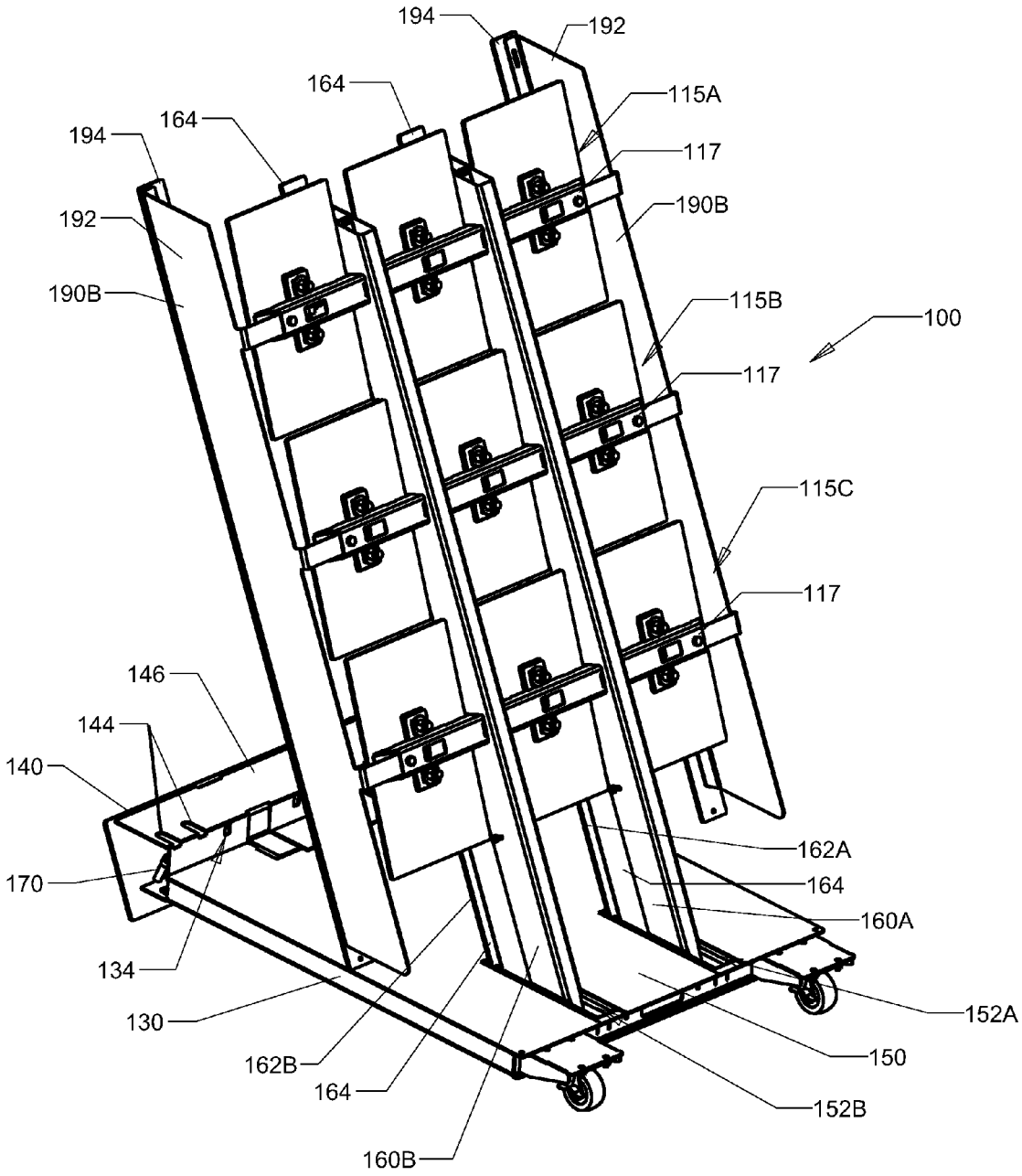

194
192
164
115A
164
194
117
192
190B
190B
115B
100
117
115C
117
146
144
140
162A
170
164
160A
134
152A
130
150
162B
164
152B
160B

FIG. 1C

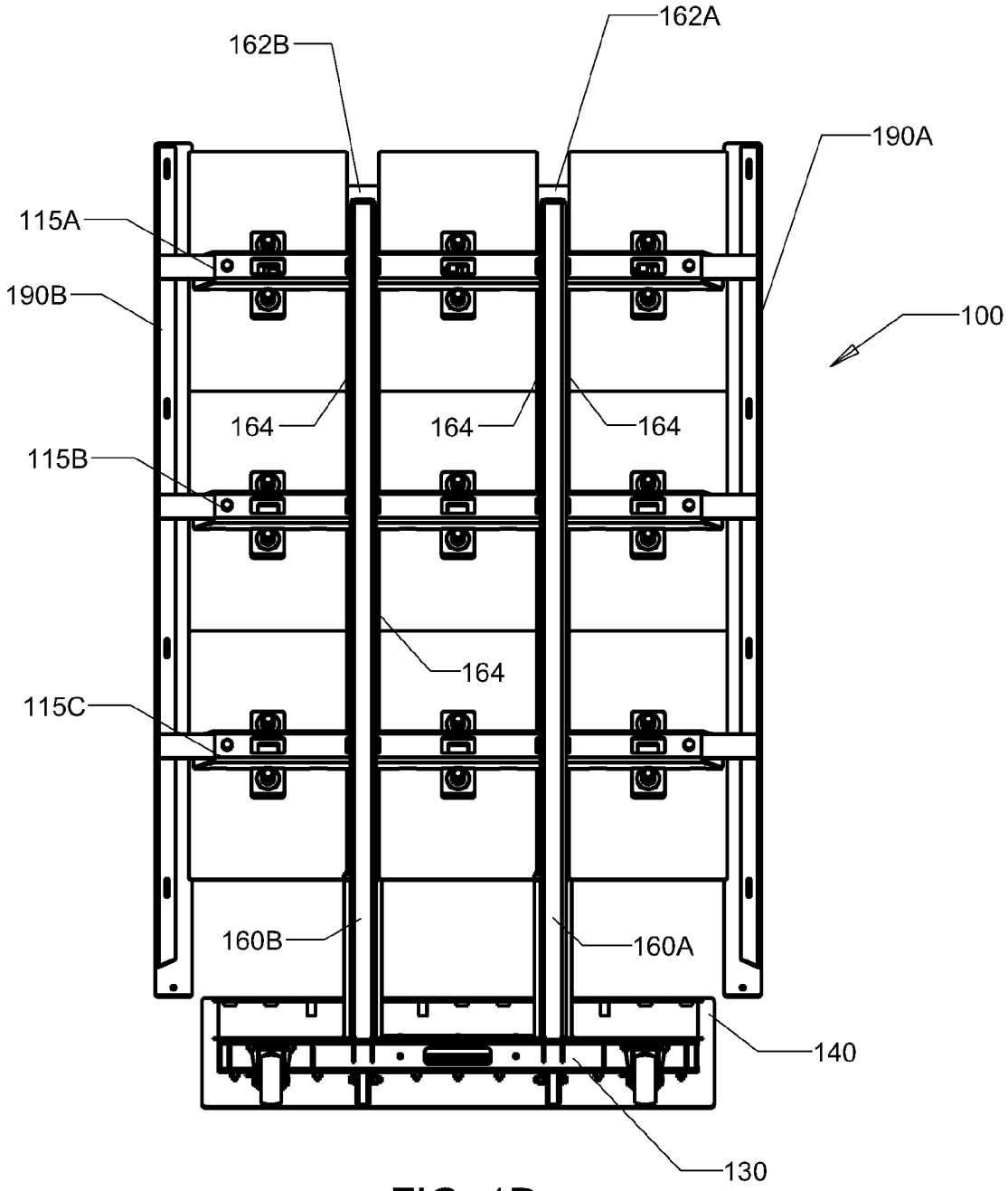

162B
162A
190A
115A
190B
100
164
164
164
115B
164
115C
160B
160A
140
130

FIG. 1D

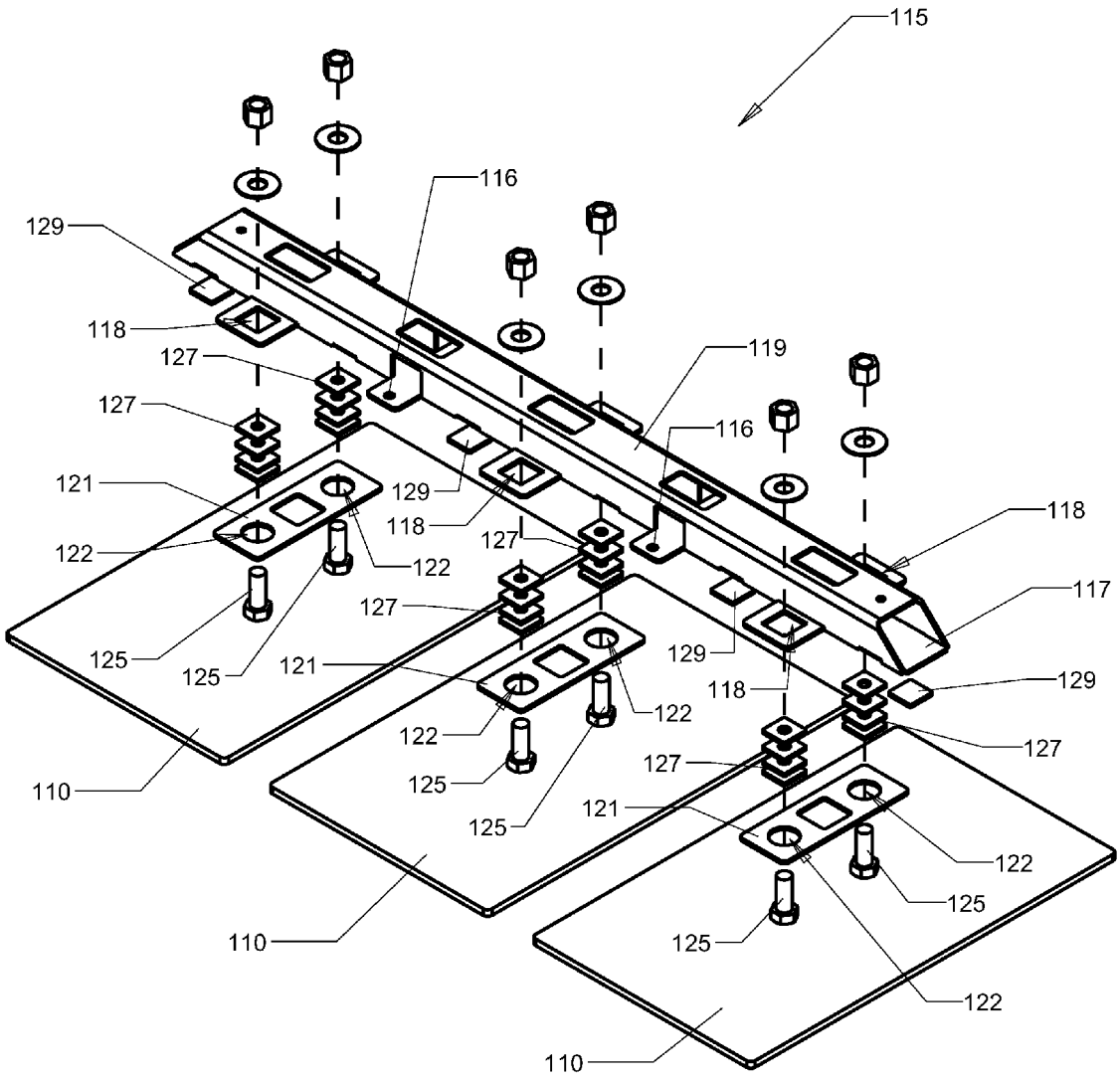

115
116
129
118
127
119
116
127
121
129
118
122
127
122
118
127
117
125
125
121
129
129
118
122
122
127
125
127
121
125
122
125
110
110
122
110

FIG. 2A

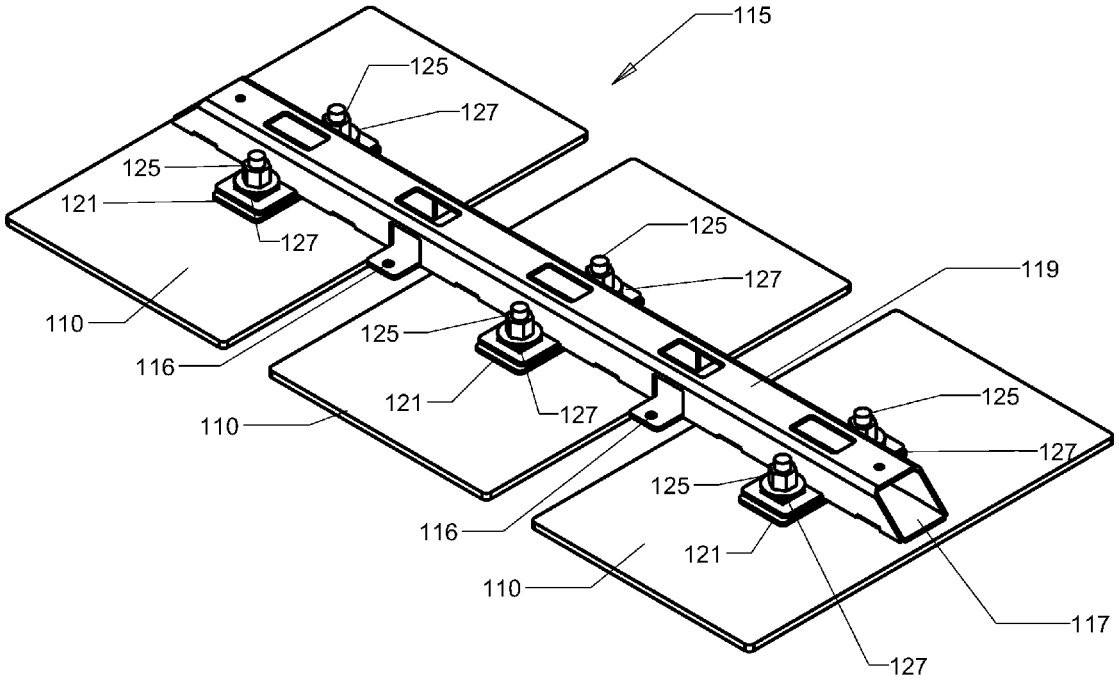

115
125
127
125
121
127
125
127
119
110
125
116
121
127
110
125
127
125
116
121
110
117
127

FIG. 2B

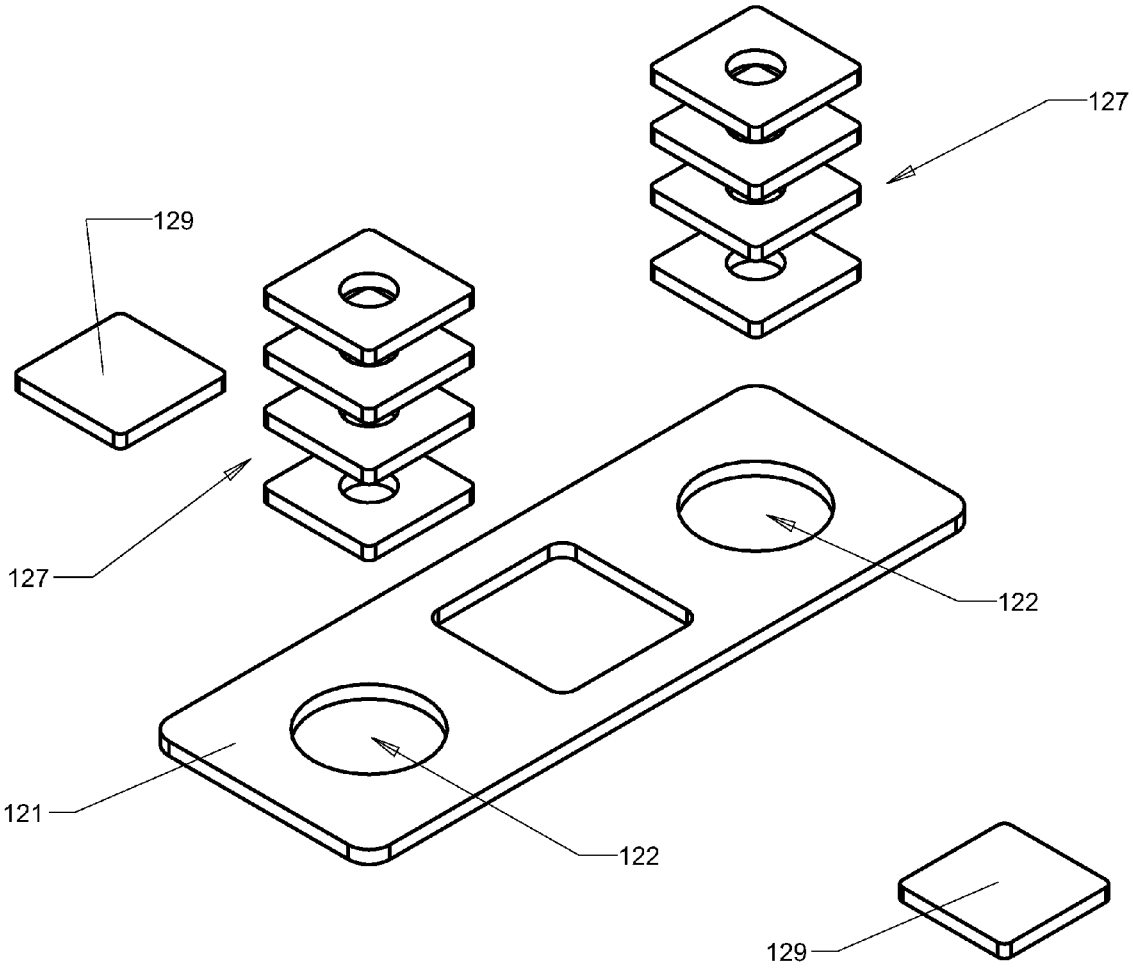


FIG. 2C

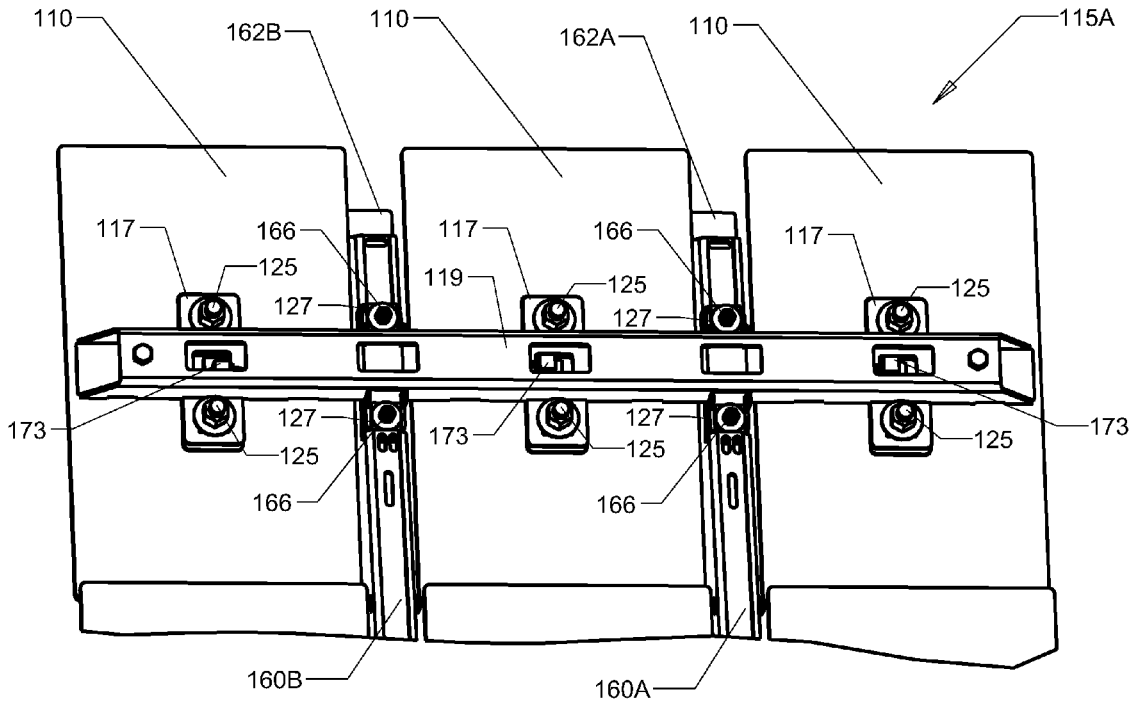

110
162B
110
162A
110
115A
117
166
125
127
119
117
166
125
127
117
125
173
127
125
166
173
127
125
166
125
173
160B
160A

FIG. 3A

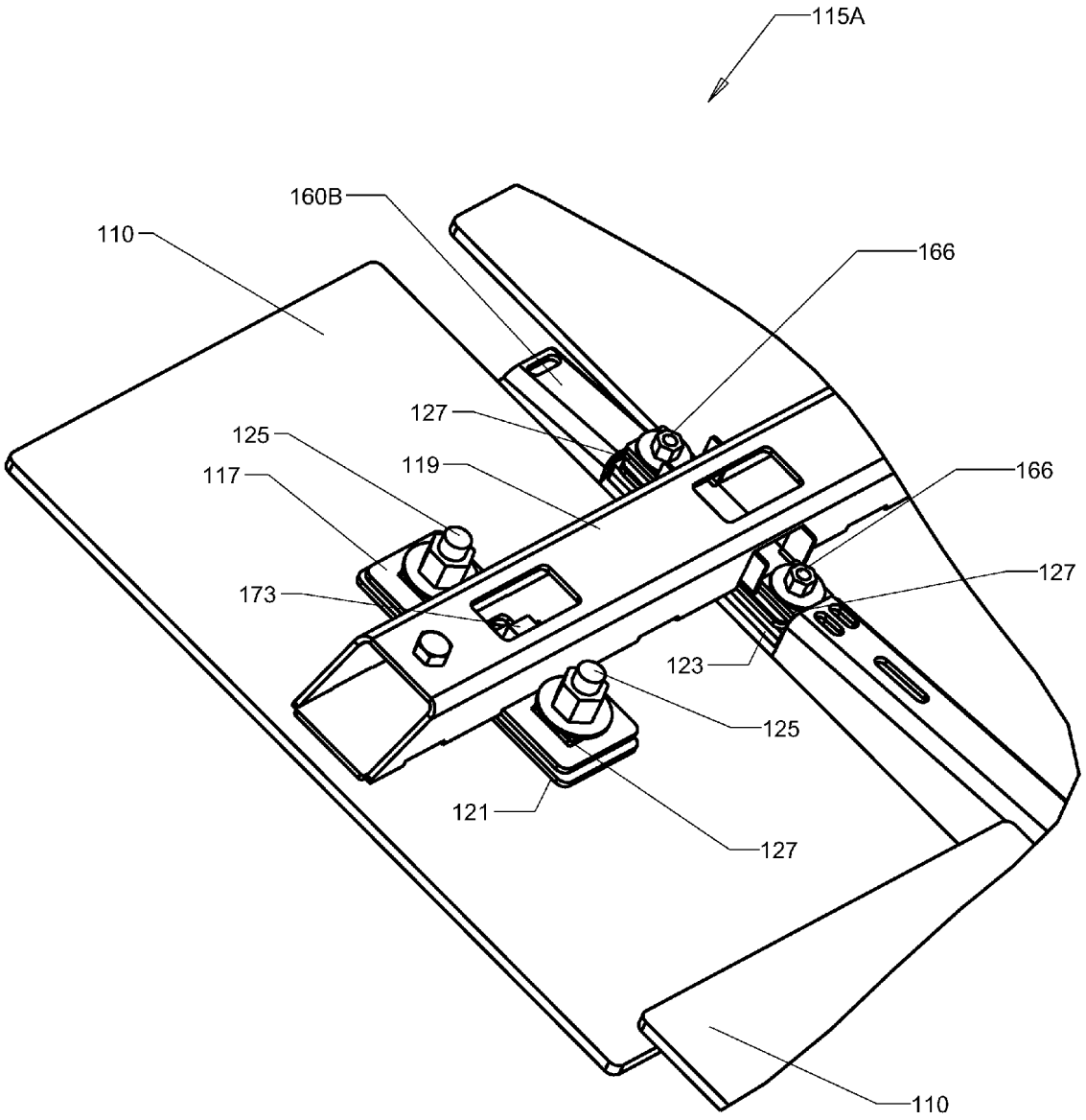

115A
160B
110
166
127
125
119
117
166
127
173
123
125
121
127
110

FIG. 3B

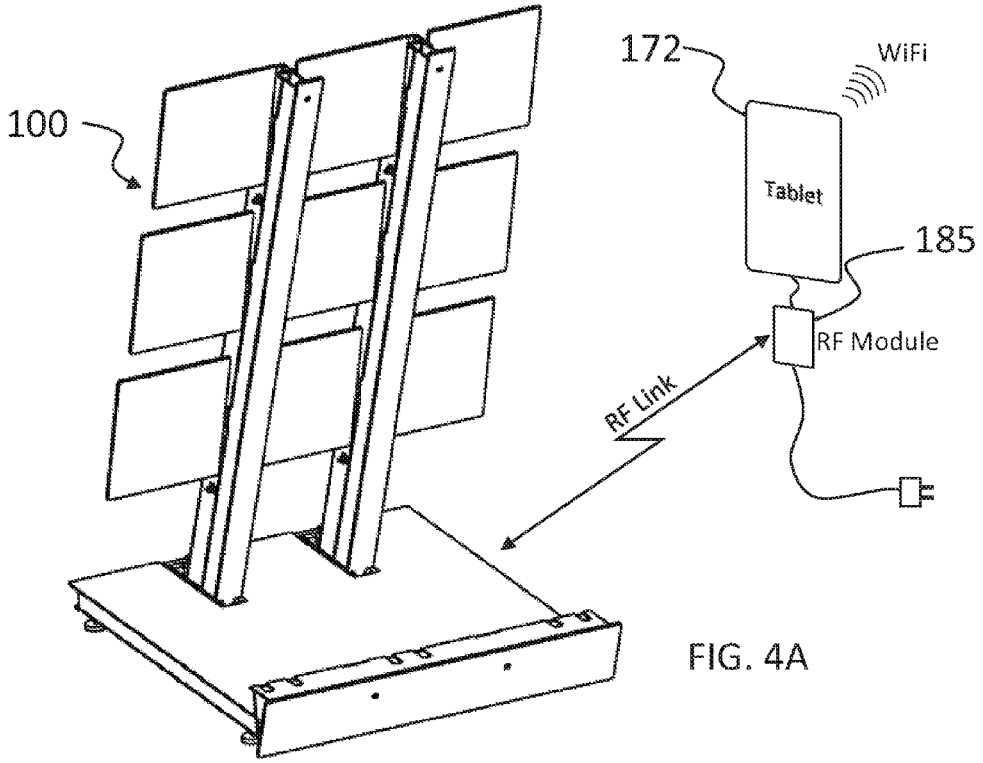

100
172
WiFi
Tablet
185
RF Module
RF Link

FIG. 4A

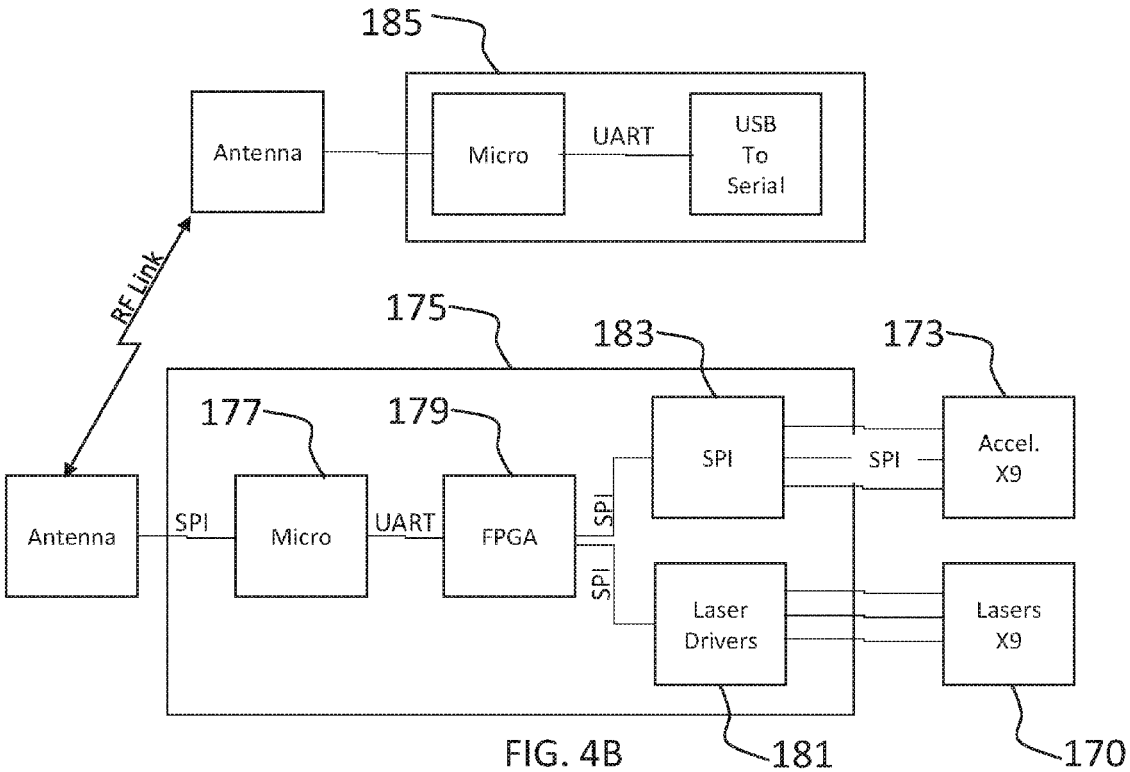

185
Antenna
Micro
UART
USB
To
Serial
RF Link
175
183
173
177
179
SPI
Accel.
X9
Antenna
SPI
Micro
UART
FPGA
SPI
SPI
Laser
Drivers
Lasers
X9
181
170

FIG. 4B

ELECTRONICALLY SCORED TARGET ARRAY

CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Patent Application Ser. No. 62/135,869, which was filed on Mar. 20, 2015, and is incorporated herein by reference in its entirety.

TECHNICAL FIELD

This disclosure relates to implementations of an electronically scored target array.

BACKGROUND

Competitive shooting sports today include firing handguns, rifles, and other firearms at various types of targets (e.g., steel, paper, etc.). Performance is a measure of accuracy, speed, time, shot placement, shot grouping, and a host of combinations of these and other criteria. To successfully compete, a shooter must possess a combination of skills, competitive talents, and equipment (e.g., firearm and ammunition). The required skills involve marksmanship fundamentals, such as stance, grip, sight picture, sight alignment, breathing control, trigger manipulation, and follow through. Competitive talents necessary to compete vary by discipline, but may include shooting while moving, drawing from the holster, transitioning efficiently between targets, etc.

A variety of target systems are available for shooters to develop their marksmanship skills and facilitate competition between participants. User preference, competitive considerations, and the size of a firing range often direct the target or target system selected for use.

SUMMARY OF THE INVENTION

Implementations of an electronically scored target array are provided. In some implementations, the electronically scored target array comprises a base, a base guard, a cover plate, a first trunk tube, a second trunk tube, and nine target plates. In some implementations, the electronically scored target array may further comprise a target controller, nine lasers, and nine accelerometers.

In some implementations, the base of the electronically scored target array may be configured to support the trunk tubes. In some implementations, the trunk tubes may be at a 65 degree angle relative to the base.

In some implementations, a first strike plate and a second strike plate may be secured to the front side of the first trunk tube and the second trunk tube, respectively. In some implementations, the strike plates may be configured to protect the trunk tubes and/or other portions of the electronically scored target array located behind the target plates from damage.

In some implementations, a first spall plate and a second spall plate may be secured on opposite sides of the electronically scored target array. In some implementations, each spall plate may be secured to one or more of the plate cross bars used to secure target plates to the trunk tubes of the electronically scored target array. In some implementations, the spall plates may be configured to prevent ricocheting projectiles and/or spall from striking objects or structures located on either side of the electronically scored target array. In this way, for example, the electronically scored target array may be used at an indoor firing range without damaging the interior walls.

In some implementations, the cover plate may be configured to fit onto the top of the base. In some implementations, the cover plate may be configured to cover one or more interior compartments of the base. In this way, any electronics (e.g., the target controller), wiring, and/or other equipment stored within the interior compartment(s) may be protected from spall resulting from projectiles impacting on and/or around the target plates and/or strike plates.

In some implementations, the electronically scored target array may include a first target plate assembly, a second target plate assembly, and a third target plate assembly. In some implementations, the electronically scored target array may include more than three or less than three target plate assemblies.

In some implementations, each target plate assembly may comprise three target plates secured to a plate cross bar, three isolation blocks, two isolation bars, and six dampener blocks. The target plates of each target plate assembly are spaced to not come into contact with each other. In some implementations, the target plates when secured to a target plate assembly may be at a 70 degree angle relative to the base.

In some implementations, the angle (e.g., 70 degrees) of the target plates relative to the base may be different than the angle (e.g., 65 degrees) of the trunk tubes relative to the base. In this way, spall resulting from a projectile impacting on one target plate will not be deflected downwardly along a path that would cause it to strike a target plate positioned below it.

In some implementations, the isolation blocks, isolation bars, and dampener blocks of each target plate assembly may be made of an isolation material. In some implementations, the isolation blocks, isolation bars, and dampener blocks may be positioned and used to shock isolate each target plate from the plate cross bar and/or to shock isolate the plate cross bar from each trunk tube. In this way, when a projectile strikes any portion of the electronically scored target array the resulting forces (i.e., vibrations) are not transferred to a target plate that was not directly struck by the projectile. This prevents the accelerometer on the back side of each target plate from registering a hit when there was none.

In some implementations, the nine lasers may be secured to the base of the electronically scored target array. In some implementations, there may be one laser for each target plate on the electronically scored target array. In some implementations, each laser is positioned so that a laser beam generated thereby illuminates a single target plate.

In some implementations, a target controller in conjunction with a computer (e.g., a laptop, desktop, tablet, and/or other portable electronic device) may be used to control the operation of the lasers and/or the accelerometers of the electronically scored target array.

In some implementations, when an accelerometer on a target plate registers the impact of a projectile on that target plate, a signal is passed to the target controller. In some implementations, the target controller may be configured to control when, for how long, and/or which accelerometer(s) are activated. In this way, only hits on a target plate with an activated accelerometer are recorded.

In some implementations, a laser(s) may be used to designate the target plate(s) having an active accelerometer. A signal may be passed from the target controller to the laser(s) and thereby control when, for how long, and/or which laser(s) are activated. In this way, a user may know which target plates to engage (i.e., to shoot) for score.

In some implementations, gaming software may be used in conjunction with a computer and one or more target controllers. In some implementations, the gaming software may be used to control the activation of the lasers and/or accelerometers of an electronically scored target array. In some implementations, the gaming software may be used to create a preset course of fire that will control the activation of the lasers and/or accelerometers. In some implementations, a course of fire may be randomly generated by the gaming software.

In some implementations, the gaming software may be used to associate recorded times, the number of target plates shot, the number of target plates not shot (i.e., missed or not engaged), and/or any other recorded information with a particular shooter. In some implementations, the recorded times, successful hits on the target plates, the number of target plates not hit, and/or any other recorded information (e.g., personal information about the shooter) may be stored by the gaming software and associated with an account of the shooter's.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A-**1**D illustrate an example implementation of the electronically scored target array according to the principles of the present disclosure.

FIG. **2**A illustrates an exploded view of a target plate assembly according to the principles of the present disclosure.

FIG. **2**B illustrates a rear view of an assembled target plate assembly according to the principles of the present disclosure.

FIG. **2**C illustrates an isolation block and two dampener blocks according to the principles of the present disclosure.

FIGS. **3**A and **3**B illustrate a close up view of a target plate assembly of the electronically scored target array shown in FIGS. **1**C and **1**D.

FIGS. **4**A and **4**B illustrate a target controller and a computer that may be used to operate the electronically scored target array.

DETAILED DESCRIPTION

FIGS. **1**A-**1**D illustrate an example electronically scored target array **100** according to the principles of the present disclosure. In some implementations, the electronically scored target array **100** may be used for training individuals in the use of rifles, hand guns, and similar weapons. In some implementations, the electronically scored target array **100** may be configured to record the performance (e.g., the number of target plates hit, number of target plates not hit (e.g., missed or not engaged), overall time, etc.) of a shooter during a course of fire. In some implementations, the electronically scored target array **100** may be used to facilitate competition between participating individuals.

As shown in FIGS. **1**A-**1**D, in some implementations, the electronically scored target array **100** may comprise a base **130**, a base guard **140**, a cover plate **150**, a first trunk tube **160**A, a second trunk tube **160**B (collectively trunk tubes **160**), and nine target plates **110**. In some implementations, the electronically scored target array **100** may further comprise a target controller **175**, nine lasers **170**, and nine accelerometers **173** (see, e.g., FIGS. **1**A and **4**B). In some implementations, the electronically scored target array **100** further comprises a first spall plate **190**A and a second spall plate **190**B.

As shown in FIGS. **1**A and **1**B, in some implementations, the base **130** of the electronically scored target array **100** may be configured to support the trunk tubes **160**. In some implementations, the base **130** may include a first protrusion **132**A and a second protrusion **132**B (collectively protrusions **132**) configured to receive thereon and/or support the first trunk tube **160**A and the second trunk tube **160**B, respectively (see, e.g., FIG. **1**C). In some implementations, the protrusions **132** are configured to be received within an opening located on at least one end of each trunk tube **160**. In some implementations, the protrusions **132** may be at a 65 degree angle relative to the base **130** (see, e.g., FIG. **1**A). In this way, the trunk tubes **160**, when secured to the protrusions **132**, are at a 65 degree angle relative to the base **100** (see, e.g., FIG. **1**B). In some implementations, the angle of the protrusions **132** relative to the base may be greater than, or less than, 65 degrees.

As shown in FIG. **1**C, in some implementations, the trunk tubes **160** may have the profile of a rectangle. In some implementations, the trunk tubes **160** may be hollow. In some implementations, the trunk tubes **160** may be a solid piece of material except for an interior opening on at least one end configured to receive a protrusion **132** extending from the base **130**.

As shown in FIG. **1**B, in some implementations, a first strike plate **162**A and a second strike plate **162**B (collectively strike plates **162**) may be secured to the first trunk tube **160**A and the second trunk tube **160**B, respectively. In some implementations, the strike plates **162** may be configured to protect the trunk tubes **160** from impacting projectiles (i.e. bullets). In some implementations, each strike plate **162** may be a single piece of material (see, e.g., FIG. **1**B). In some implementations, each strike plate **162** may be comprised of multiple pieces of material.

As shown in FIGS. **1**C and **1**D, in some implementations, the strike plates **162** may be wider than a front side of a trunk tube **160**A, **160**B thereby creating a lip **164**. In some implementations, the lip **164** extending from each side of a strike plate **162** may overhang a portion of each target plate **110** positioned adjacent thereto (see, e.g., FIG. **1**D). In this way, when a projectile impacts a target plate **110** positioned adjacent a trunk tube **160**A, **160**B any resulting spall that strikes a side of a trunk tube may be prevented from flying back at the shooter. In some implementations, the lip **164** may prevent a projectile from striking the gap between a trunk tube **160** and any of the plates positioned adjacent thereto (see, e.g., FIG. **1**D). In this way, each lip **164** may protect portions (e.g., the plate cross bars **117**) of the electronically scored target array **100** located behind the target plates **110** from damage. In some implementations, a strike plate **162** may only be as wide as the front side of a trunk tube **160**.

As shown in FIGS. **1**C and **1**D, in some implementations, a first spall plate **190**A and a second spall plate **190**B (collectively spall plates **190**) may be secured on opposite sides of the electronically scored target array **100**. In some implementations, each spall plate **190**A, **190**B may be secured to one or more of the plate cross bars **117** (see, e.g., FIG. **1**C). In some implementations, the spall plates **190** may be configured to prevent ricocheting projectiles and/or spall (resulting from a projectile impacting a target plate **110**) from striking objects located on either side of the electronically scored target array **100**. In this way, for example, the electronically scored target array **100** may be used at an indoor firing range without damaging the interior walls.

In some implementations, as shown in FIG. **1**B, each spall plate **190**A, **190**B may comprise a first side wall **192** and a

second side wall **194**. In some implementations, each spall plate **190** may have an "L" shaped profile when viewed from the side. In some implementations, each spall plate **190**A, **190**B may be a single piece of material. In some implementations, the second side wall **194** of each spall plate **190** may be at a perpendicular angle relative to the first side wall **190** (see, e.g., FIG. **1**B). In some implementations, the second side wall **194** may overhang a portion of each target plate **110** positioned adjacent thereto. In this way, when a projectile impacts on a target plate **110** positioned adjacent a spall plate **190**A, **190**B, any resulting spall that strikes the interior side of a first side wall **192** may be prevented from flying back at the shooter and/or striking a wall positioned to the side of the electronically scored target array **100**.

As shown in FIG. **1**B, the cover plate **150** may be configured to fit onto the top of the base **130**. In some implementations, the cover plate **150** may be configured to cover one or more interior compartments **105** of the base **130** (see, e.g., FIGS. **1**A and **1**B). In this way, any electronics (e.g., the target controller **175**), wiring, and/or other equipment stored within the interior compartment(s) **105** may be protected from spall resulting from projectiles impacting on and/or around the target plates **110** and/or strike plates **162**. In some implementations, the cover plate **150** may protect the base **130** from spall resulting from projectiles impacting on and/or around the target plates **110** and/or strike plates **162**.

As shown in FIG. **1**A, in some implementations, the cover plate **150** may have a first cutout **152**A and a second cutout **152**B therein (collectively cutouts **152**). In some implementations, the first cutout **152**A and the second cutout **152**B may be configured to fit about a portion of the first trunk tube **160**A and the second trunk tube **160**B, respectively (see, e.g., FIG. **1**B). In some implementations, the cutouts **152** may be any shape suitable for fitting about the trunk tubes **160**.

As shown in FIG. **1**B, in some implementations, a front side of the base **130** may be protected by a base guard **140**. In this way, the base **130** and the interior compartment(s) **105** thereof may be protected from impacting projectiles and/or spall. In some implementations, the base guard **140** may be removably secured to the base **130**. In some implementations, the base guard **140** may be fixedly secured to the base **130**. In some implementations, the base guard may include a strike face **142** on a front side thereof (see, e.g., FIG. **1**A). In some implementations, the strike face **142** may be angled down. In this way, an incoming projectile may be deflected away from the base **130**. In some implementations, the strike face may have an angle of between 60 and 65 degrees, inclusive of 60 and 65, relative to the base **130**. In some implementations, the strike face **142** may have an angle greater than 65 degrees or less than 60 degrees.

As shown in FIGS. **1**A-**1**D, in some implementations, the electronically scored target array **100** may include a first target plate assembly **115**A, a second target plate assembly **115**B, and a third target plate assembly **115**C (collectively target plate assemblies **115**). In some implementations, the electronically scored target array **100** may include more than three or less than three target plate assemblies **115**.

In some implementations, as shown in FIGS. **2**A-**2**B, a target plate assembly **115** may comprise three target plates **110**, a plate cross bar **117**, a plate cross bar cap **119**, three isolation blocks **121**, two isolation bars **123**, and six dampener blocks **127**. In some implementations, a target plate assembly **115** may include more than three target plates **110** or less than three target plates **110**.

As shown in FIG. **2**B, the target plates **110** of each target plate assembly **115** are spaced to not come into contact with each other. In some implementations, the strike face or front side of the target plates **110** when secured to a target plate assembly **115** may be at a 70 degree angle relative to the base **130** (see, e.g., FIG. **1**B). In this way, a projectile striking a target plate **110** may be prevented from ricocheting back towards the shooter and/or spectators. In some implementations, the angle of the target plates relative to the base **130** may be greater than, or less than, 70 degrees.

As shown in FIG. **1**B, in some implementations, the angle (e.g., 70 degrees) of the target plates **110** relative to the base **130** may be different than the angle (e.g., 65 degrees) of the trunk tubes **160** relative to the base **130**. In this way, spall resulting from a projectile impacting on a target plate **110** of the first and/or second target plate assemblies **115**A, **115**B will not be deflected downwardly along a path that would cause it to strike a target plate **110** secured to another target plate assembly **115**. This will prevent the impact of a projectile on one target plate **110** from being scored as a hit on another target plate **110**.

In some implementations, as shown in FIG. **2**A, each target plate **110** may have two screws **125** protruding from a backside thereof. In some implementations, each target plate **110** may be shaped like a rectangle (see, e.g., FIG. **2**B). In some implementations, each target plate **110** may be shaped like a square, a circle, a silhouette, and/or any other shape suitable for shooting a firearm at.

In some implementations, an isolation block **121** and/or an isolation bar **123** may be a single piece of material (see, e.g., FIG. **3**B). In some implementations, an isolation block **121** and/or an isolation bar **123** may be two or more pieces of material.

In some implementations, a dampener block **127** may be made from four stacked pieces of material (see, e.g., FIG. **2**C). In some implementations, a dampener block **127** may be made from more than four or less than four stacked pieces of material. In some implementations, additional dampener blocks **127** may be used to secure the target plate assemblies **115** (discussed below) to the trunk tubes **160** (see, e.g., FIG. **3**A).

In some implementations, the isolation blocks **121**, isolation bars **123**, and dampener blocks **127** may be made of an isolation material. In some implementations, the isolation material may be a vinyl solid sold under the name ISODAMP®. In some implementations, the isolation material may be any material suitable for the purposes discussed herein.

As shown in FIG. **2**B, in some implementations, the isolation blocks **121**, isolation bars **123**, and dampener blocks **127** may be positioned and used to isolate each target plate **110** from the plate cross bar **117** and/or to isolate the plate cross bar **117** from each trunk tube **160**. In this way, when a projectile strikes any portion of the electronically scored target array **100** the resulting forces (i.e., vibrations) are not transferred to a target plate **110** that was not directly struck by the projectile. This prevents the accelerometer **173** (discussed below) positioned on the back side of each target plate **110** from registering a hit when there was none (see, e.g., FIGS. **3**A and **3**B).

To assemble a target plate assembly **115** constructed in accordance with the present disclosure, in some implementations, an isolation block **121** is positioned against the backside of the target plate **110** so that the two screws **125** thereon are protruding from openings **122** in the isolation block **121** (see, e.g., FIG. **2**A). The two screws **125** are then inserted through two openings **118** in the plate cross bar **117**.

Next, one dampener block **127** is positioned against the backside of the plate crossbar **117** adjacent each of the two openings **118** therethrough so that a portion of a screw **125** is protruding from each dampener block **127** (see, e.g., FIG. **2**B). Finally, a washer may be placed about a portion of each screw **125** and a threaded nut used to secure the target plate **110** to the plate cross bar **117** (see, e.g., FIG. **2**B). This process may be repeated until all of the target plates **110** are attached to the plate cross bar **117**.

In some implementations, the plate cross bar cap **119** may be secured to the plate cross bar **117** after all of the target plates **110** are attached thereto (see, e.g., FIG. **2**B).

In some implementations, as shown in FIG. **2**A, additional pieces **129** of isolation material may be positioned between each target plate **110** and the plate cross bar **117**. In some implementations, the additional pieces **129** of isolation material may help to further isolate the target plates **110** from the plate cross bar **117**. In some implementations, the additional pieces **129** of material may be secured in place through compression of the target plate **110** against the plate cross bar **117**. In some implementations, the additional pieces **129** of material may be secured in place through the use of an adhesive.

To secure a target plate assembly **115** to the trunk tubes **160** constructed in accordance with the present disclosure, in some implementations, an isolation bar **123** may be initially positioned against the backside of each trunk tube **160** so that the two screws **166** extending from each trunk tube **160** are protruding from openings **124** in the isolation bar **123** (see, e.g., FIGS. **3**A and **3**B). The two screws **166** extending from each trunk tube **160** are then received within openings **116** in the plate cross bar **117** as the target plate assembly **115** is rested in place (see, e.g., FIG. **3**B). Next, one dampener block **127** may be positioned against the backside of the plate crossbar **117** adjacent each of the two openings **116** therethrough so that a portion of a screw **166** is protruding from each dampener block **127** (see, e.g., FIG. **3**B). Finally, a washer may be placed about a portion of each screw **166** and a threaded nut used to secure the target plate assembly **115** to the first and second trunk tubes **160**A, **160**B, respectively (see, e.g., FIG. **3**A). This process may be repeated until all of the target plate assemblies **115** are attached to the trunk tubes **160** of the electronically scored target array **100**.

As shown in FIG. **1**A, in some implementations, the nine lasers **170** may be secured to the base **130** of the electronically scored target array **100**. In some implementations, there may be one laser **170** for each target plate **110** on the electronically scored target array **100**. In some implementations, each laser **170** is positioned so that a laser beam generated thereby illuminates a single target plate **110**.

In some implementations, one or more lasers **170** may be used to designate one or more target plates **110** to be engaged by a shooter. In some implementations, each laser **170** may be positioned (e.g., angled) so that the laser beam generated thereby strikes somewhere on the top one-third of the target plate **110** strike face. In this way, a shooter may align their firearm's sights on a target plate **110** without obscuring their view of the laser beam striking the same target plate **110**. In some implementations, each laser **170** may be positioned so that the laser beam generated thereby strikes anywhere on the target plate **110**. In some implementations, there may be more than nine or less than nine lasers **170**.

In some implementations, one or more of the lasers **170** may be configured to emit a green light. In some implementations, one or more of the lasers **170** may be configured to emit any visible color light (e.g., yellow, red, orange, green, etc.). In some implementations, one or more of the lasers **170** may be configured to emit an infrared light. In this way, a user having night vision equipment may be able to use the electronically scored target array **100** in the dark.

In some implementations, a light-emitting diode (LED) may be used in place of a laser **170**. In some implementations, any illumination source suitable for illuminating a single target plate **110** at a time may be used in place of a laser **170**.

As shown in FIGS. **1**A and **1**B, in some implementations, the lasers **170** may be positioned on a front side of the base **130** behind the base guard **140**. In this way, the base guard **140** may protect the lasers **170** from being hit by a projectile (e.g., a bullet). In some implementations, the base guard **140** may include a horizontal lip **146** that extends from the strike face **142**. In some implementations, the horizontal lip **146** of the base guard **140** may include six slots **144** therein (see, e.g., FIG. **1**A). In some implementations, each slot **144** may be configured to allow a laser **170** aligned therewith to illuminate a designated target plate **110** (see, e.g., FIG. **1**B). In some implementations, the front side of the base **130** may include three slots **134** therein (see, e.g., FIG. **1**A). In some implementations, each slot **134** may be configured to allow a laser **170** aligned therewith to illuminate a single target plate **110** (see, e.g., FIG. **1**B). In some implementations, the total number of slots **134** in the front side of the base **130** in combination with the total number of slots **144** in the base guard **140** may be equal to the total number of lasers **170**. In some implementations, the slots **134** in the front side of the base **130** and the slots **144** in the base guard **140** may be configured and positioned to protect the lasers **170** from spall resulting from a projectile striking a portion of the electronically scored target array **100**.

As shown in FIGS. **4**A and **4**B, in some implementations, a target controller **175** in conjunction with a computer **172** (e.g., a laptop, desktop, tablet, and/or other portable electronic device) may be used to control the operation of the lasers **170** and/or the accelerometers **173** of the electronically scored target array **100**. While not shown, it should be understood that suitable wiring connects the lasers **170** and accelerometers **173** to the target controller **175**. In some implementations, the target controller **175** may be equipped with an antenna configured to facilitate remote communication between the target controller **175** and an RF (radio frequency) module **185** operably connected to a computer **172** (see, e.g., FIG. **4**A). In some implementations, one to nine target controllers **175** may be operated by a single computer **172**.

In some implementations, as shown in FIG. **4**B, the target controller **175** may be comprised of a microprocessor **177**, a field-programmable gate array (FPGA) **179**, laser drivers **181**, and a transceiver **183**. One of ordinary skill in the art having the benefit of the present disclosure would know how to create a target controller **175**.

In some implementations, the transceiver **183** may be configured to communicate with the one or more accelerometers **173** used with each target plate **110**. In some implementations, when an accelerometer **173** on a target plate **110** registers the impact of a projectile on that target plate, a signal is passed through the transceiver **183** to the target controller **175**. In some implementations, the target controller **175** may be configured to control when, for how long, and/or which accelerometer(s) **173** are activated. In this way, only hits on a target plate **110** with an activated accelerometer **173** are recorded.

In some implementations, the laser drivers **181** may be configured to communicate with the lasers **170** used to designate the target plates **110**. A signal may be passed from

the target controller **175** through the laser drivers **181** to the lasers **170** and thereby control when, for how long, and/or which laser(s) **170** are activated. In this way, a user may know which target plates **110** to engage (i.e., to shoot) for score.

In some implementations, gaming software **300** may be used in conjunction with a computer **172** and one or more target controllers **175**. In some implementations, the gaming software **300** may be used to control the activation of the lasers **170** and/or accelerometers **173**. In some implementations, the gaming software **300** may be used to create a preset course of fire that will control the activation of the lasers and/or accelerometers (**173**).

In some implementations, the gaming software **300** may be used to create a course of fire in which one or more target plates **110** are designated (i.e., illuminated) by a laser **170** in a preset order for a preset amount of time. In some implementations, the laser **170** and the accelerometer **173** of the designated target plate **110** may only be active for the preset amount of time.

In some implementations, the laser **170** and the accelerometer **173** of the designated target plate **110** may remain active until the shooter successfully engages the designated target plate. In some implementations, after the designated target plate **110** has been shot and a preset amount of time has passed (i.e. a delay), the accelerometer **173** of another target plate **110** may then be activated and the target plate **110** designated by its associated laser **170**. In some implementations, after the designated target plate **110** has been shot, the accelerometer **173** of another target plate **110** may be immediately activated (i.e. no delay) and the target plate **110** designated by its associated laser **170**.

In some implementations, for example, all of the target plates **110** may be simultaneously designated by a laser **170** and their respective accelerometers **173** activated. As the shooter successfully engages each target plate **110**, the laser **170** designating that target plate **110** turns off as does its accelerometer **173**. In this way, the shooter will be provided with a visual indication as to which target plates **110** have been successfully engaged (i.e. there is no laser visible on those target plates **110**) and those that have not (i.e. the laser is still visible on those target plates **110**). In some implementations, the time between the activation of each laser **170** and accelerometer **173** and when a shooter successfully engages each target plate **110** may be recorded.

In some implementations, the course of fire may be randomly generated by the gaming software **300** on demand.

In some implementations, the gaming software **300** may be used to record the amount of time that passes from the initial designation of a target plate **110** by a laser **170** and a shooter successfully shooting (i.e. hitting with a projectile) the target plate.

In some implementations, when a target plate **110** being designated by a laser **170** is shot its accelerometer **173** may register the hit and the gaming software **300** may record the hit for the purposes of scoring. In some implementations, the accelerometer **173** of a target plate **110** may only be active while a laser **170** is illuminating that target plate **110**. In this way, the gaming software **300** only records hits on target plates **110** to which the shooter is being directed by the lasers **170**.

In some implementations, the gaming software **300** may associate recorded times, successful hits on the target plates **110**, the number of target plates **110** not hit (i.e., missed), and/or any other recorded information with a particular shooter. In some implementations, the recorded times, successful hits on the target plates **110**, the number of target plates **110** not hit, and/or any other recorded information may be stored by the gaming software **300** in nonvolatile memory and associated with an account of the shooter's.

In some implementations, the gaming software **300** may be connected via a network to a web server. In this way, a shooter's account may be retrieved by the gaming software **300** and/or the gaming software **300** may associate information recorded during a course of fire with the shooter's account.

In some implementations, an administrator of the gaming software **300** can interact with the web server via an application, such as a web browser or a native application, residing on a computer **172**. In some implementations, the recorded times, successful hits on the target plates **110**, the number of target plates **110** not hit, and/or any other recorded information (e.g., personal information about the shooter) may be stored in a database by the gaming software **300**.

In some implementations, the communication of data and data processing may be performed in real time or non-real time by the gaming software **300**.

One of ordinary skill in the art, having the benefit of the present disclosure, could produce the gaming software **300** described herein.

In some implementations, the base **130**, base guard **140**, cover plate **150**, target plates **110**, trunk tubes **160**, and/or strike plates **162** may be manufactured from a steel and/or other metal alloy. In some implementations, the base **130**, base guard **140**, cover plate **150**, target plates **110**, trunk tubes **160**, and/or strike plates **162** may be manufactured from any material suitable for resisting repeated impacts by projectiles discharged from a firearm.

It is to be understood that, in some implementations, the electronically scored target array **100** could be used simply as a target array by omitting, for example, the target controller **175**, lasers **170**, accelerometers **173** and/or other related electrical components.

While the various implementations of the electronically scored target array **100** disclosed herein are intended to be used with a firearm (e.g., a rifle and/or handgun), in some implementations, the electronically scored target array **100** may be configured to work with alternative projectile launchers (e.g., BB guns, pellet guns, airsoft guns, etc.). In implementations configured to be used with these alternative projectile launchers, the base **130**, base guard **140**, cover plate **150**, target plates **110**, trunk tubes **160**, and/or strike plates **162** may be manufactured from a polymer material.

Reference throughout this specification to "an embodiment" or "implementation" or words of similar import means that a particular described feature, structure, or characteristic is included in at least one embodiment of the present invention. Thus, the phrase "in some implementations" or a phrase of similar import in various places throughout this specification does not necessarily refer to the same embodiment.

Many modifications and other embodiments of the inventions set forth herein will come to mind to one skilled in the art to which these inventions pertain having the benefit of the teachings presented in the foregoing descriptions and the associated drawings.

The described features, structures, or characteristics may be combined in any suitable manner in one or more embodiments. In the above description, numerous specific details are provided for a thorough understanding of embodiments of the invention. One skilled in the relevant art will recognize, however, that embodiments of the invention can be practiced without one or more of the specific details, or with

other methods, components, materials, etc. In other instances, well-known structures, materials, or operations may not be shown or described in detail.

While operations are depicted in the drawings in a particular order, this should not be understood as requiring that such operations be performed in the particular order shown, or in sequential order, or that all illustrated operations be performed, to achieve desirable results.

The invention claimed is:

1. An electronically scored target array, the target array comprising:

a base having at least one interior compartment, and a first trunk tube and a second trunk tube secured thereto, the first trunk tube and the second trunk tube extend from the base at a first angle relative to the base;

at least one target plate assembly configured to be supported by the first trunk tube and the second trunk tube, the at least one target plate assembly comprises three target plates positioned thereon so that a front side of each target plate is at a second angle relative to the base;

a cover plate configured to fit onto a top side of the base and thereby cover the at least one interior compartment of the base;

a base guard secured to a front side of the base, the base guard is configured to protect the base and the at least one interior compartment of the base;

an accelerometer secured to a backside of each target plate, each accelerometer is configured to register only the impact of a projectile on the front side of the target plate to which the accelerometer is secured;

at least three lasers secured to the base, each laser is configured to illuminate a different target plate on the at least one target plate assembly; and

a target controller positioned within the at least one interior compartment of the base, the target controller is configured to communicate with and control the operation of each accelerometer and the at least three lasers;

wherein the first angle of the first trunk tube and the second trunk tube relative to the base is different than the second angle of the front side of each target plate relative to the base.

2. The target array of claim **1**, wherein the at least one target plate assembly further comprises a plate cross bar to which the target plates are secured, and isolation material positioned between each target plate and the plate cross bar thereby preventing forces resulting from a projectile striking one target plate from being transferred to another target plate that was not directly struck by the projectile.

3. The target array of claim **2**, wherein the at least one target plate assembly further comprises additional isolation material positioned between the plate cross bar and the first trunk tube and the second trunk tube to which it is secured.

4. The target array of claim **3**, wherein the isolation material is a vinyl solid.

5. The target array of claim **1**, comprises three target plate assemblies configured to be supported by the first trunk tube and the second trunk tube of the base, and nine lasers secured to the base.

6. The target array of claim **1**, further comprising a first strike plate secured to a first side of the first trunk tube and a second strike plate secured to a first side of the second trunk tube, the first strike plate and the second strike plate are configured to protect the first trunk tube and the second trunk tube from impacting projectiles.

7. The target array of claim **6**, wherein the first strike plate is wider than the first trunk tube and the second strike plate is wider than the second trunk tube.

8. The target array of claim **1**, further comprising a first spall plate secured to a first side of the target array and a second spall plate secured to a second side of the target array, the first spall plate and the second spall plate are configured to prevent projectile spall from striking objects located to either side of the target array.

9. The target array of claim **8**, wherein the first spall plate and the second spall plate each comprise a first side wall and a second side wall, the second side wall is at a perpendicular angle relative to the first side wall of each spall plate.

10. The target array of claim **1**, wherein the first angle of the first trunk tube and the second trunk tube relative to the base is less than the second angle of the front side of each target plate relative to the base.

11. The target array of claim **1**, wherein the base guard comprises an angled strike face having a horizontal lip extending from a back side thereof, wherein the horizontal lip of the base guard is configured to protect the at least three lasers secured to the base.

12. The target array of claim **1**, wherein each of the at least three lasers secured to the base are angled so that the laser beam generated thereby strikes somewhere on the top one-third of the front side of the target plate.

13. The target array of claim **1**, wherein each of the at least three lasers secured to the base are configured to emit an infrared light.

14. The target array of claim **1**, wherein the target controller comprises a microprocessor, a field-programmable gate array, laser drivers configured to communicate with the at least three lasers, and a transceiver configured to communicate with the accelerometer secured to each target plate.

15. The target array of claim **14**, wherein the target controller further comprises an antenna configured to facilitate remote communication between the target controller and an RF module operably connected to a computer.

16. The target array of claim **14**, further comprising gaming software for use on a computer, the gaming software is configured to control the activation of the at least three lasers and each accelerometer through the target controller, and the gaming software is configured to provide a course of fire that will control the activation of the at least three lasers and each accelerometer.

17. The target array of claim **16**, wherein the gaming software is configured to store information recorded during a course of fire.

18. The target array of claim **1**, wherein the base, the base guard, the cover plate, the target plates, the first trunk tube, and the second trunk tube are manufactured from a steel alloy.

19. The target array of claim **1**, wherein the base, the base guard, the cover plate, the target plates, the first trunk tube, and the second trunk tube are manufactured from a polymer.

* * * * *