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(54) **PORTABLE BALLISTIC SHIELD**

(71) Applicant: **Thomas J. Mello**, Somerset, MA (US)

(72) Inventor: **Thomas J. Mello**, Somerset, MA (US)

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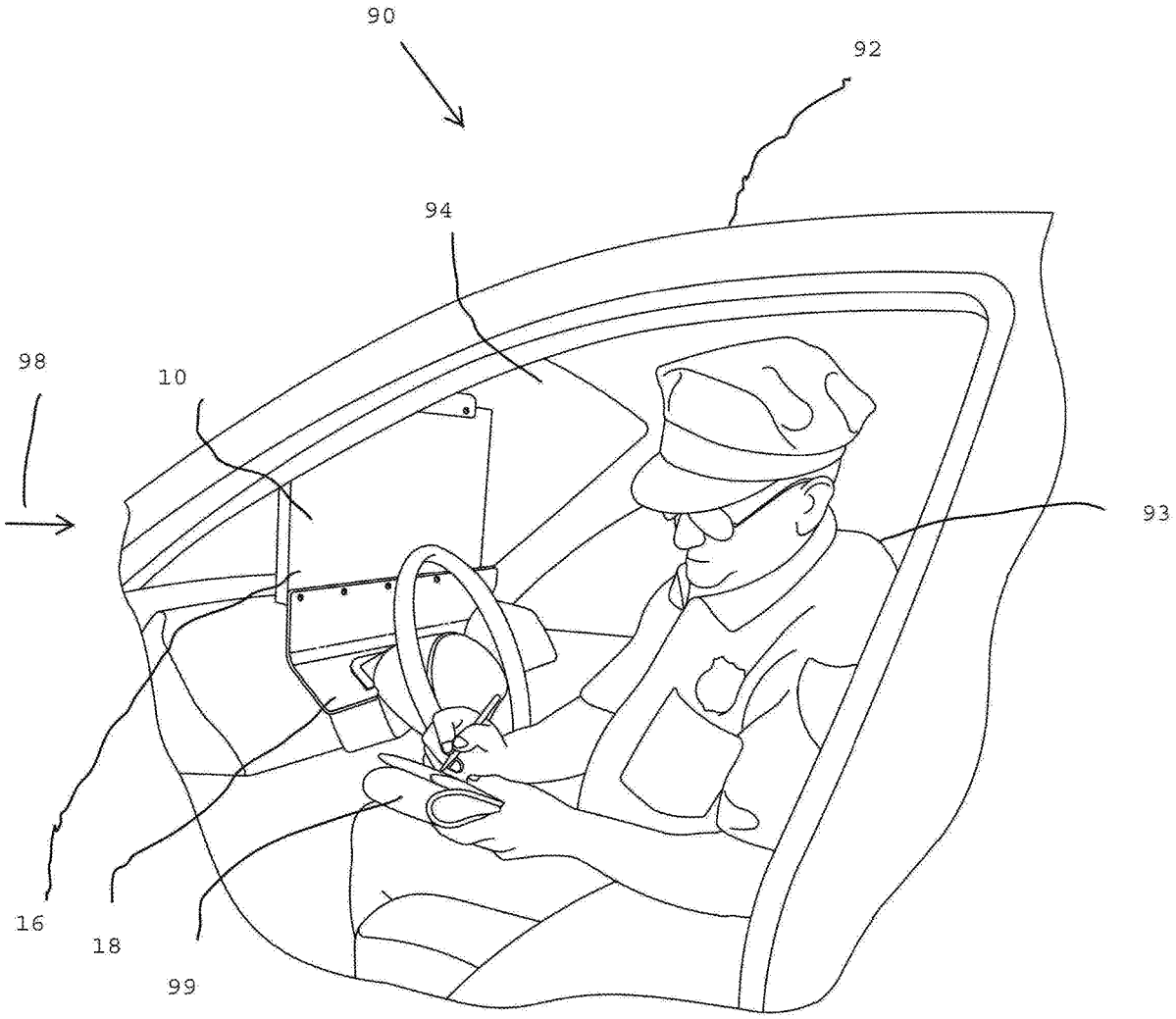
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F41H 5/04	(2006.01)
F41H 5/06	(2006.01)

(52) **U.S. Cl.**

CPC ***F41H 7/04*** (2013.01); ***F41H 5/06*** (2013.01); ***F41H 5/0407*** (2013.01)

(57) **ABSTRACT**

A Portable Ballistic Shield (PBS) is provided. The PBS includes a plurality of transparent laminated polycarbonates for absorbing the kinetic energy of a projectile. The PBS also includes a wedge bar, for mounting the PBS adjacent to a structural element of a vehicle (e.g., windshield frame). The wedge bar may also include an integral mechanical dampener for dissipating kinetic energy transferred from the projectile to the transparent laminated polycarbonates. The PBS also includes a quick release side connector connected to the transparent ballistic shield and a quick release top connector connected to the PBS. The PBS also includes a steering column yoke connected to the transparent ballistic shield for mounting the PBS on the vehicle steering column. The quick release side connector and the quick release top connector may also include integral mechanical dampeners for dissipating kinetic energy transferred from the projectile to the transparent laminated polycarbonates.



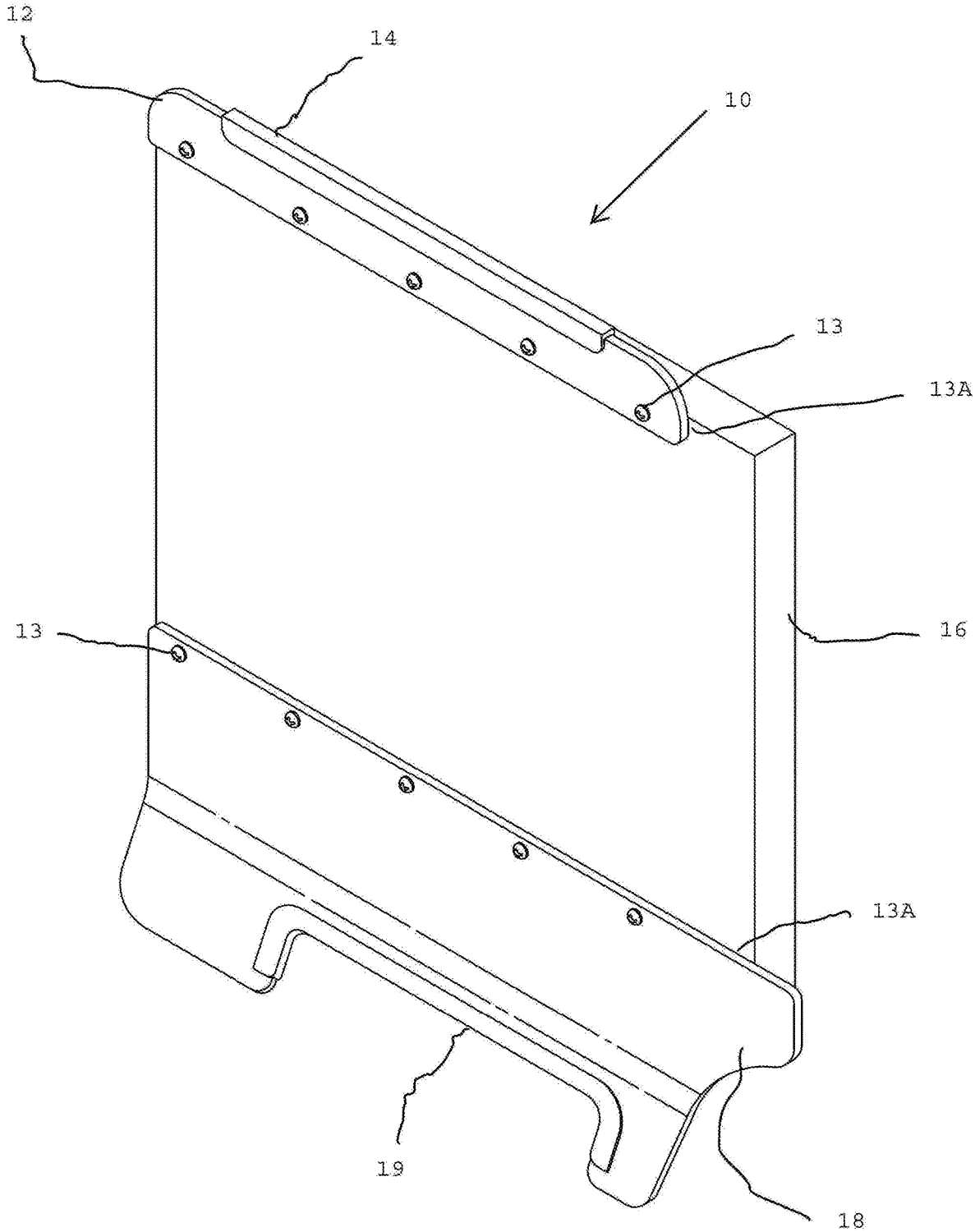


FIG. 1

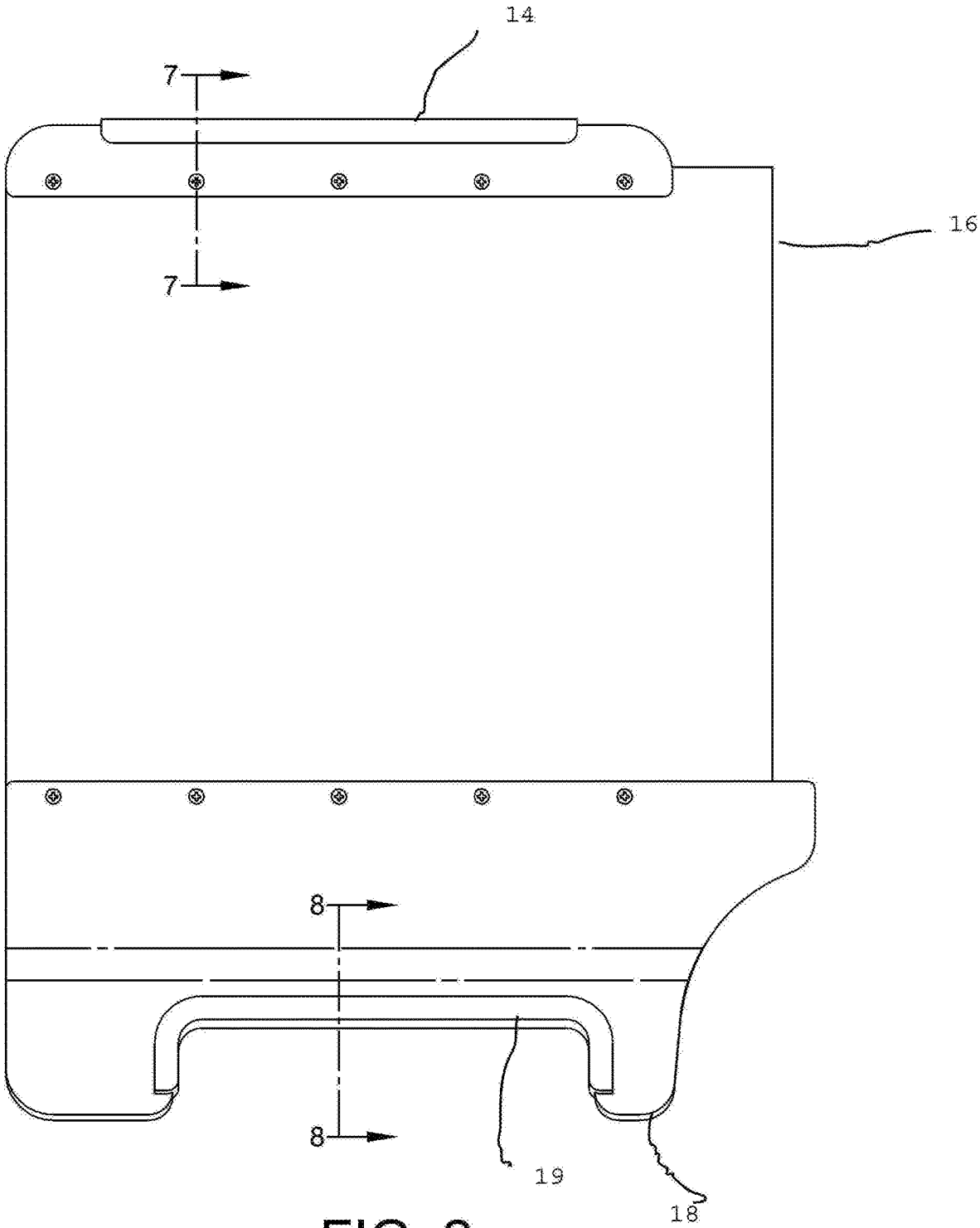


FIG. 2

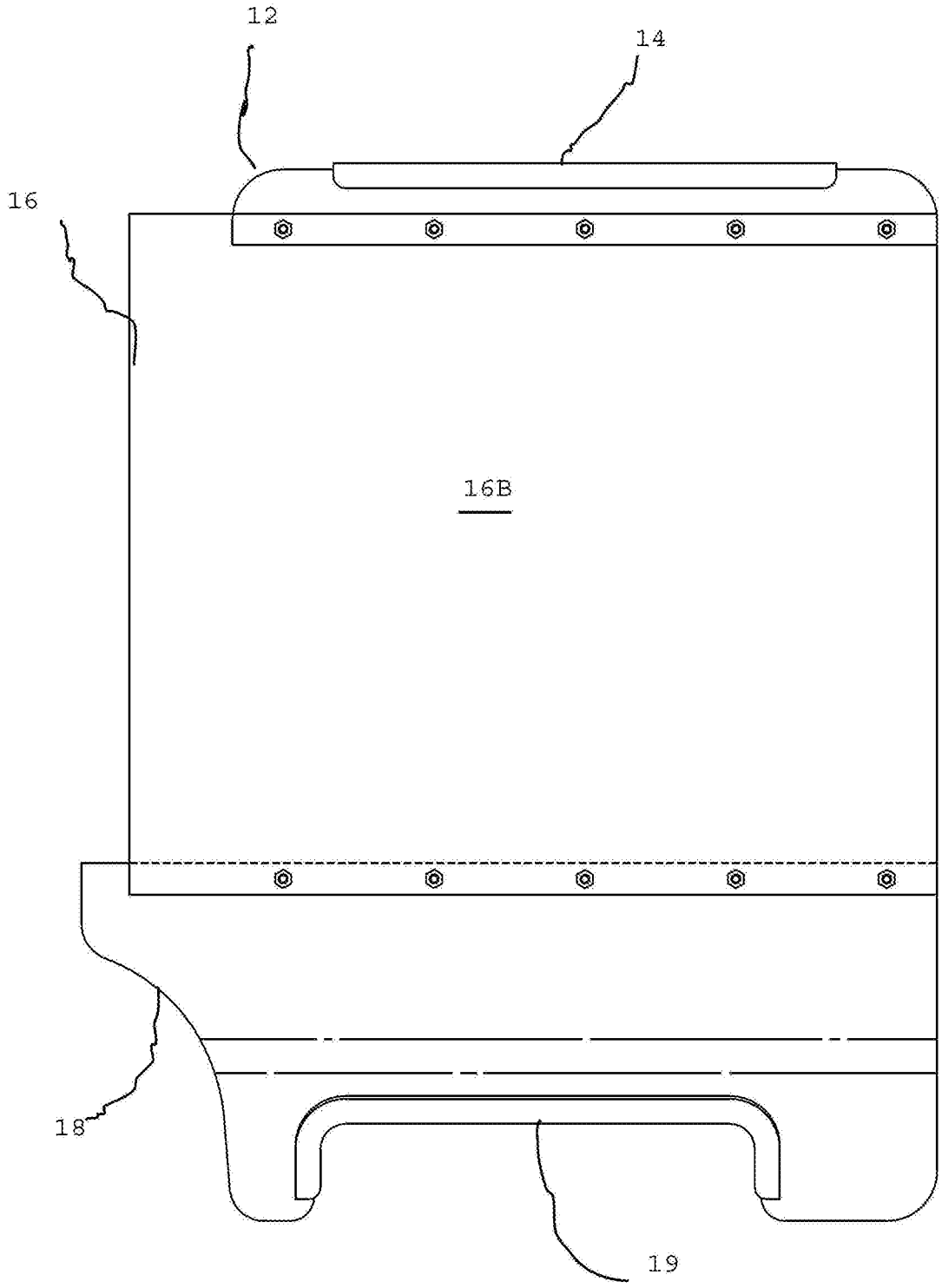


FIG. 3

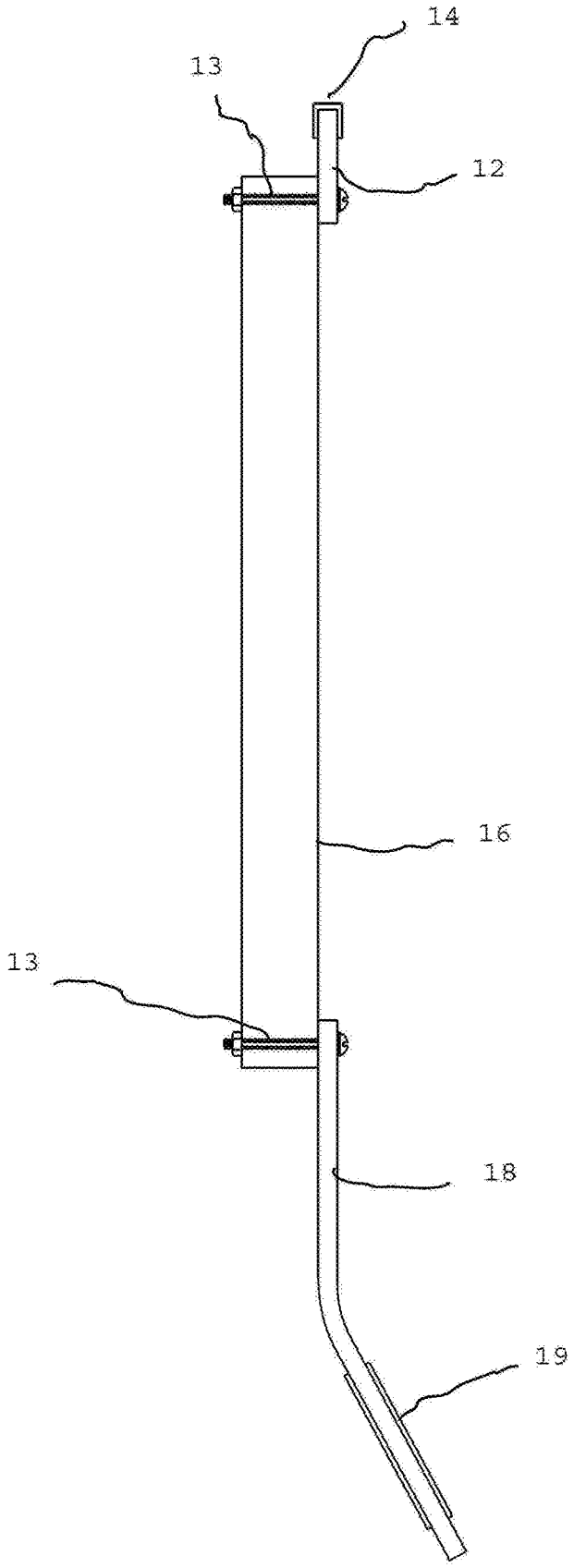


FIG. 4

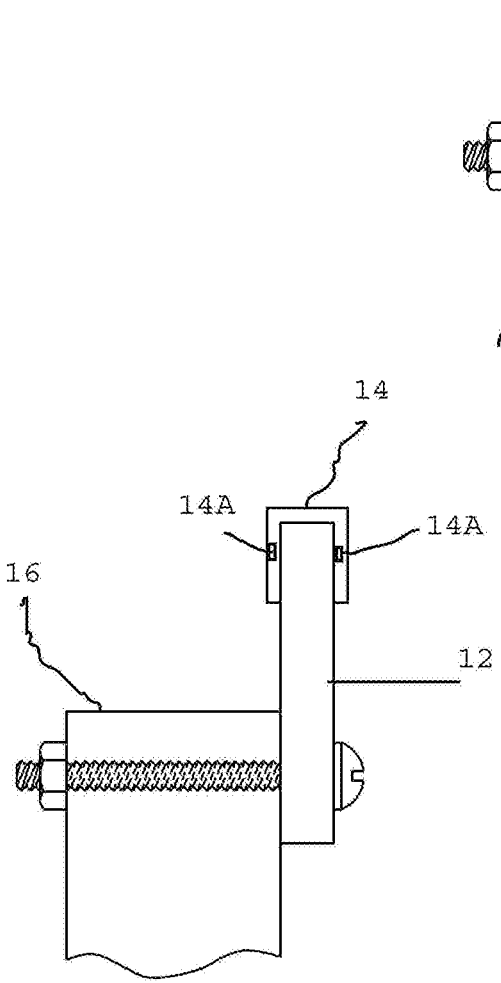


FIG. 5

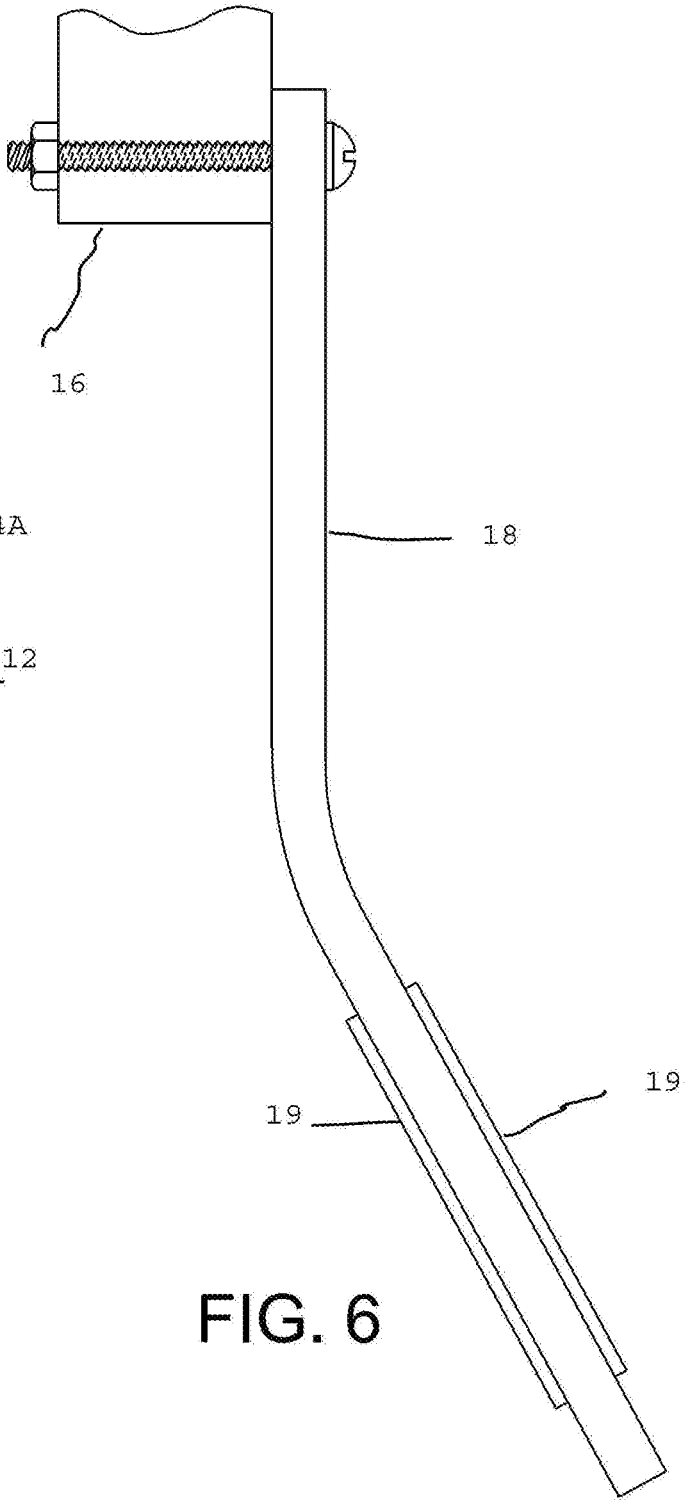


FIG. 6

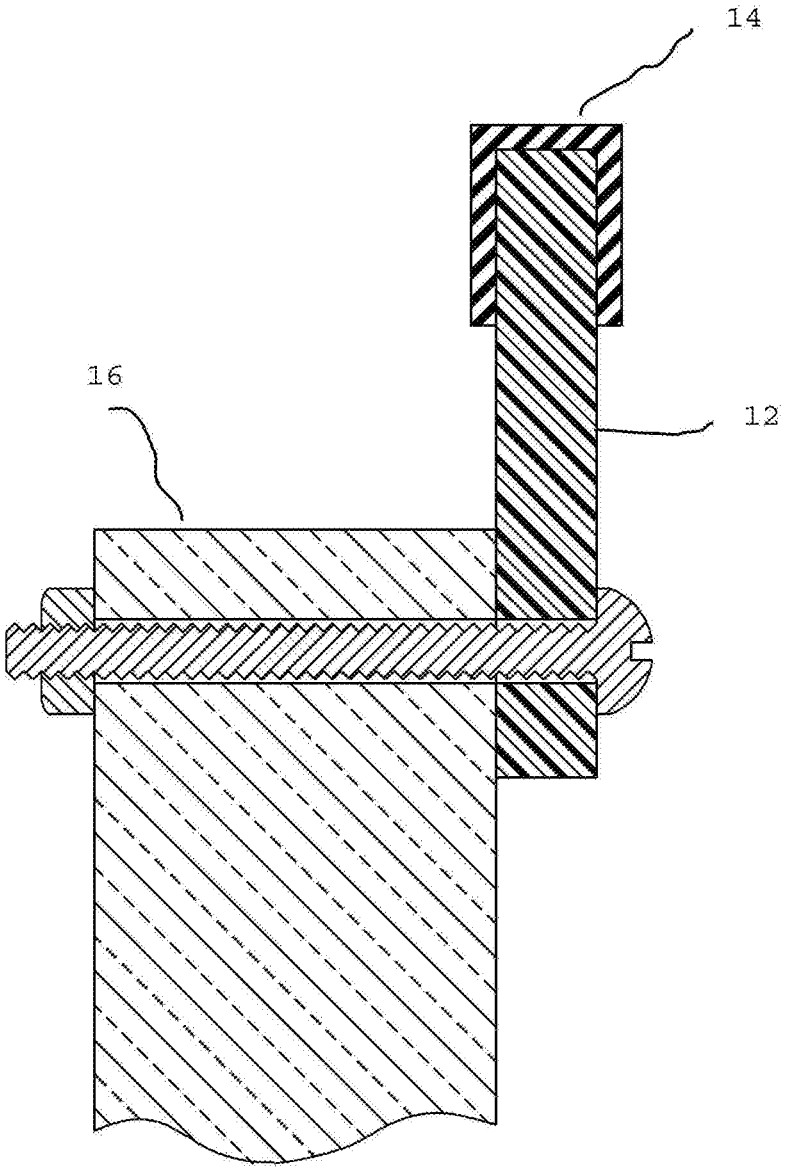


FIG. 7

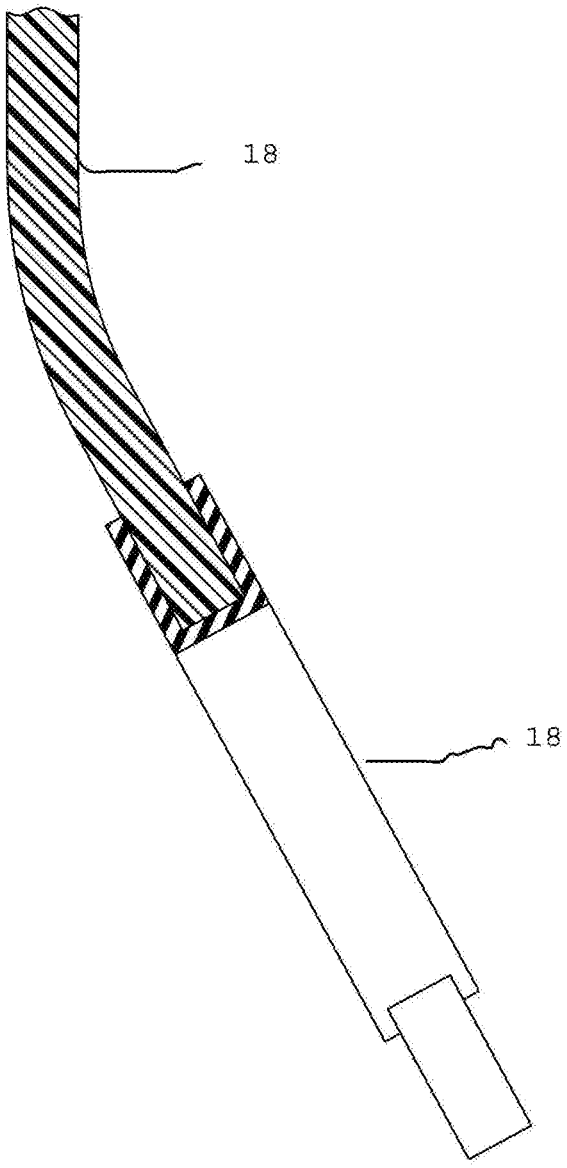


FIG. 8

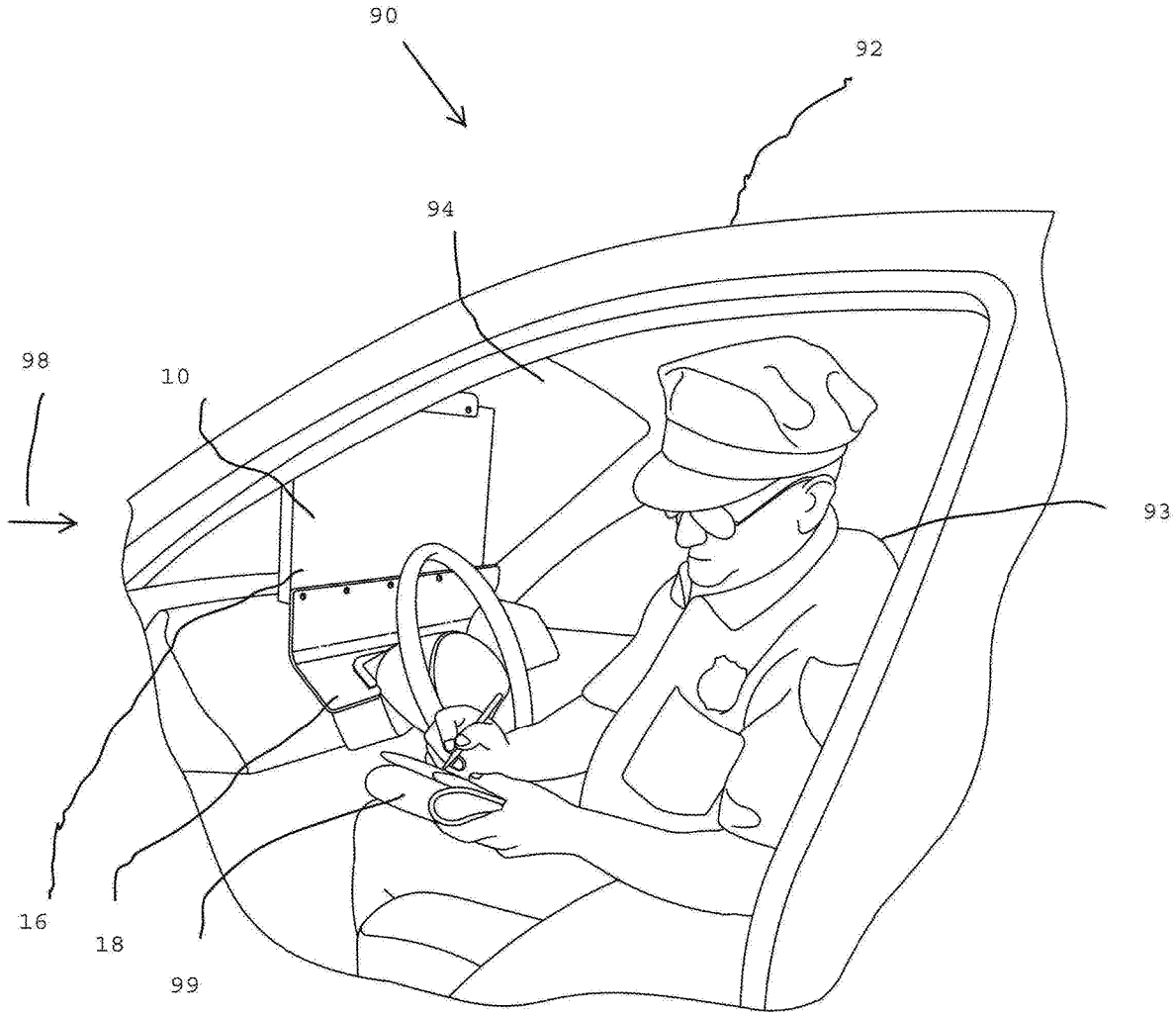


FIG. 9

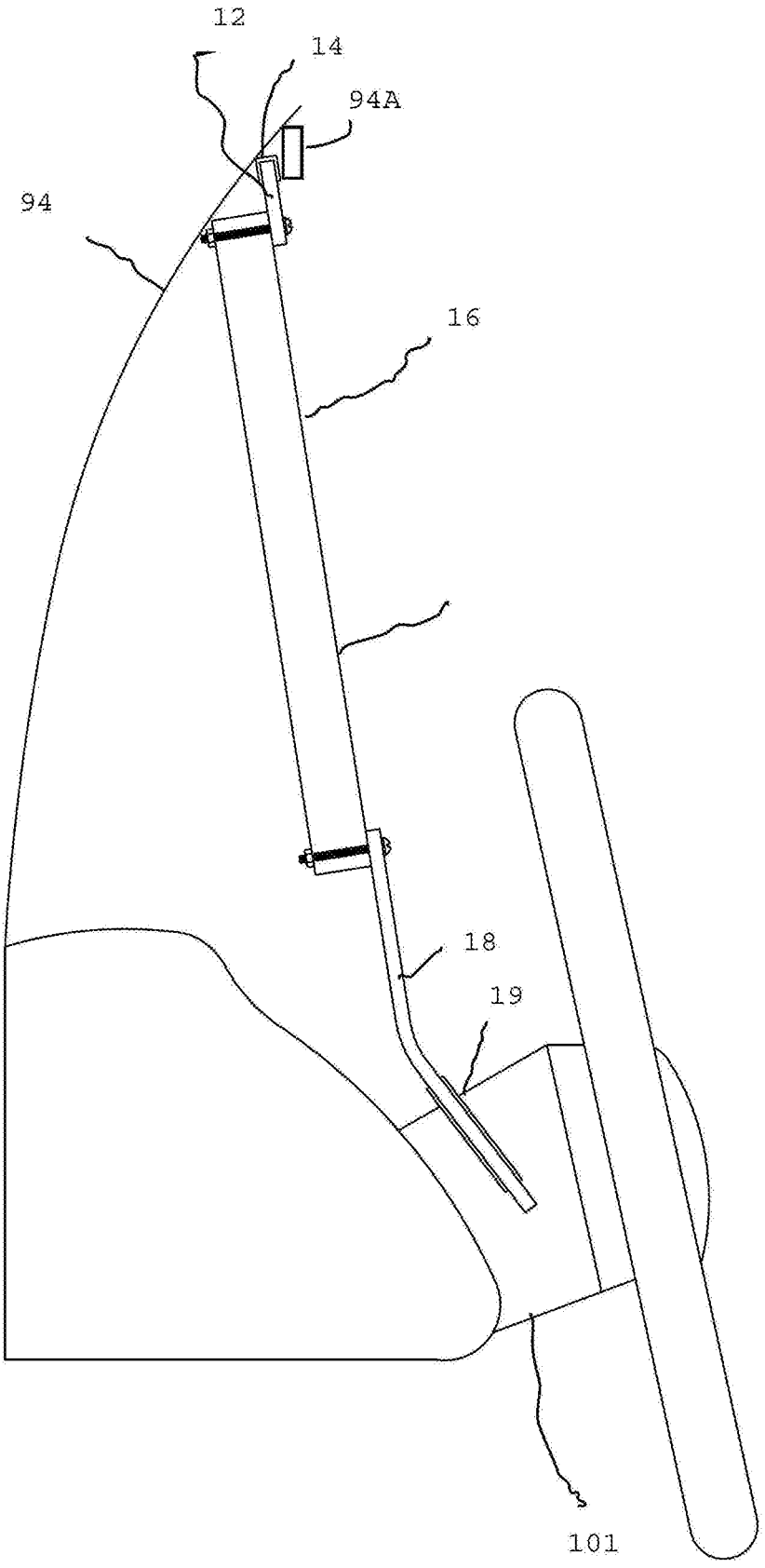


FIG. 10

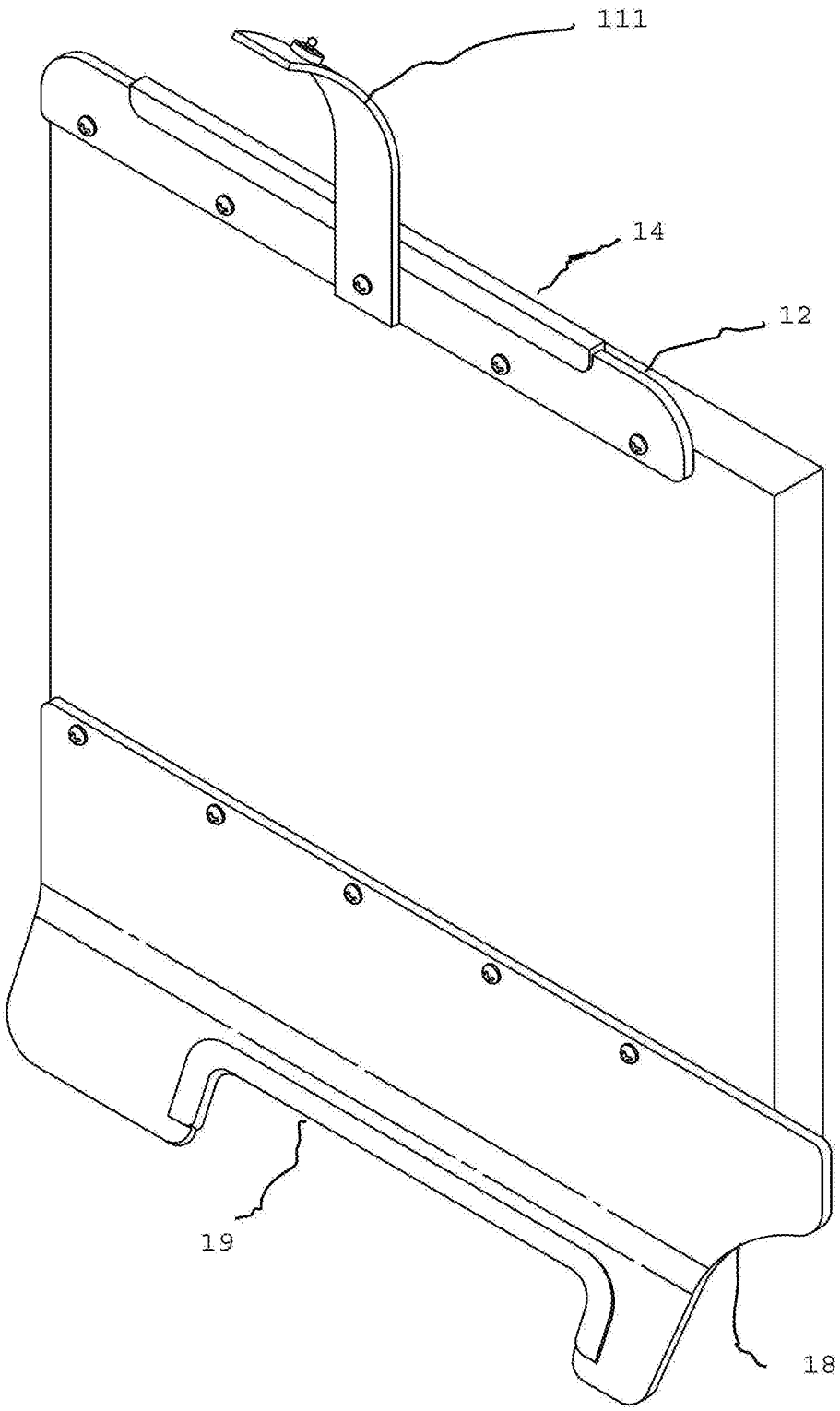


FIG. 11

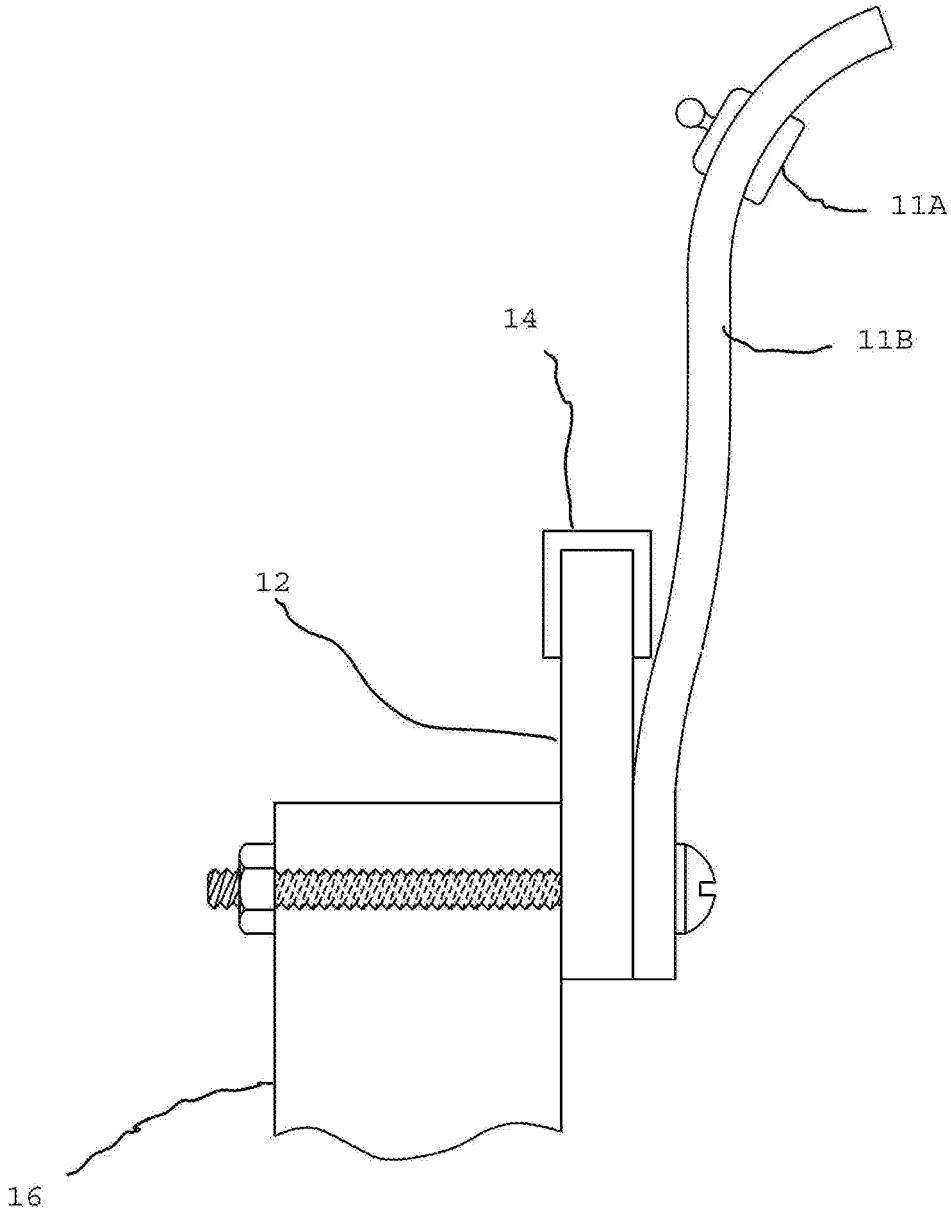


FIG. 12

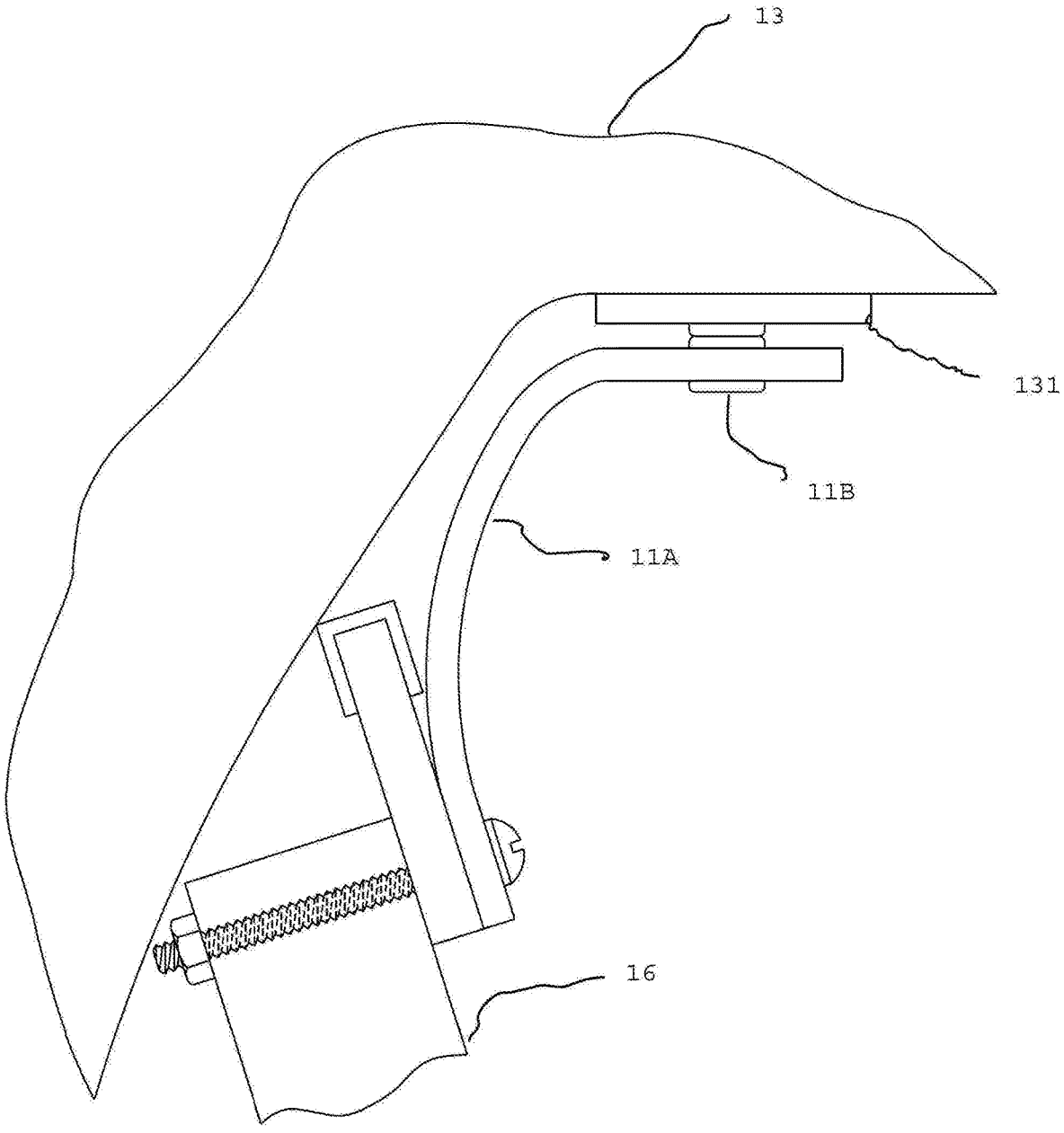


FIG. 13

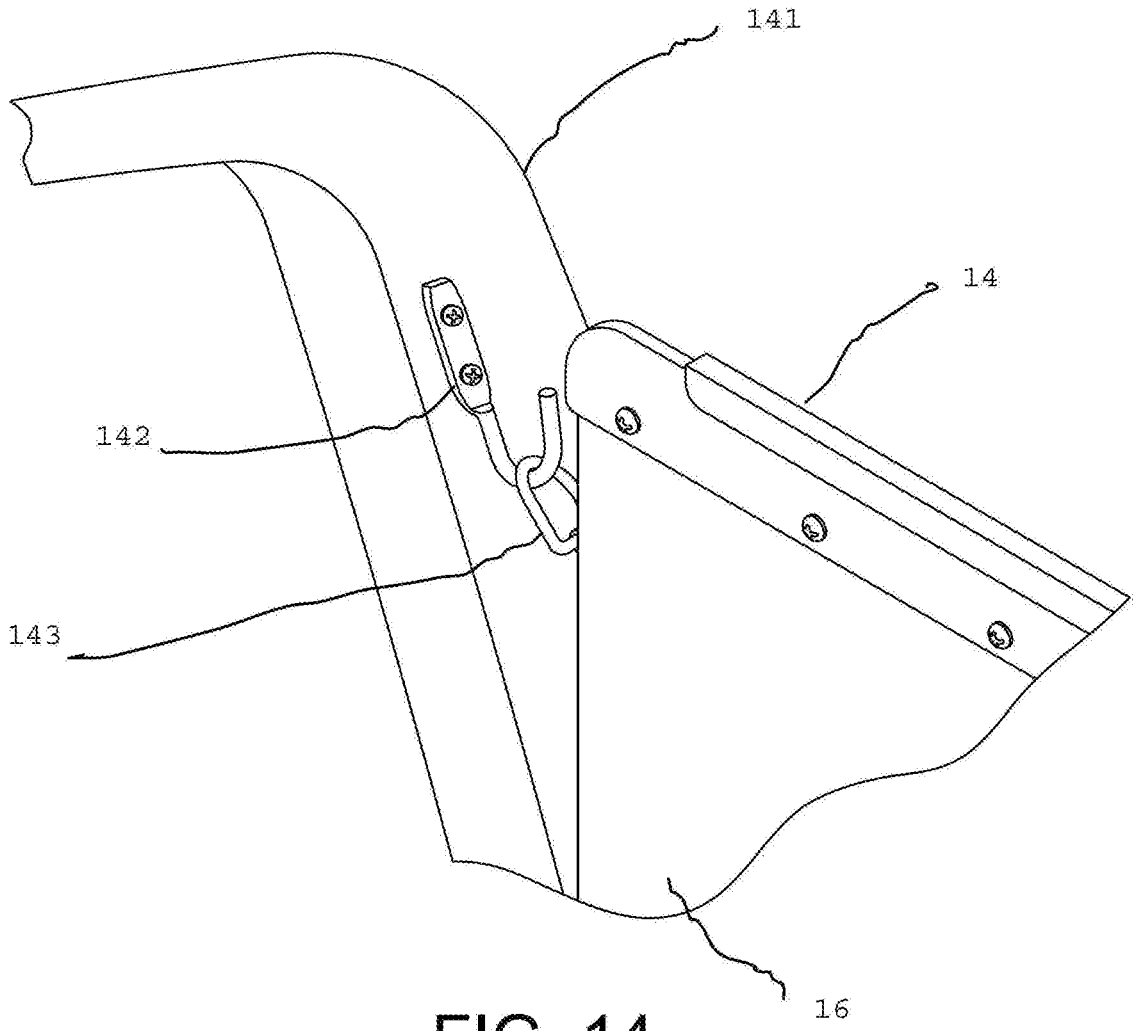


FIG. 14

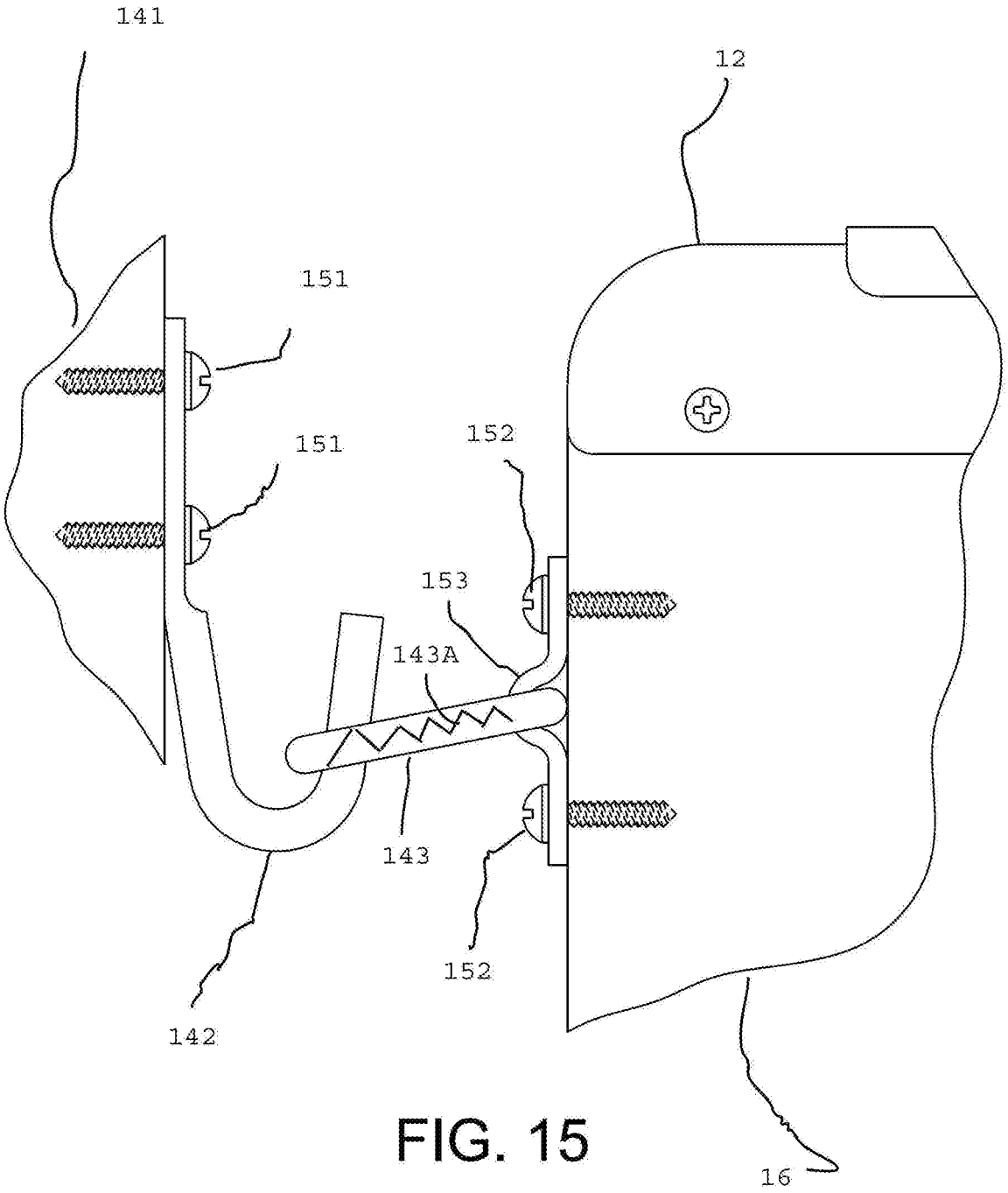


FIG. 15

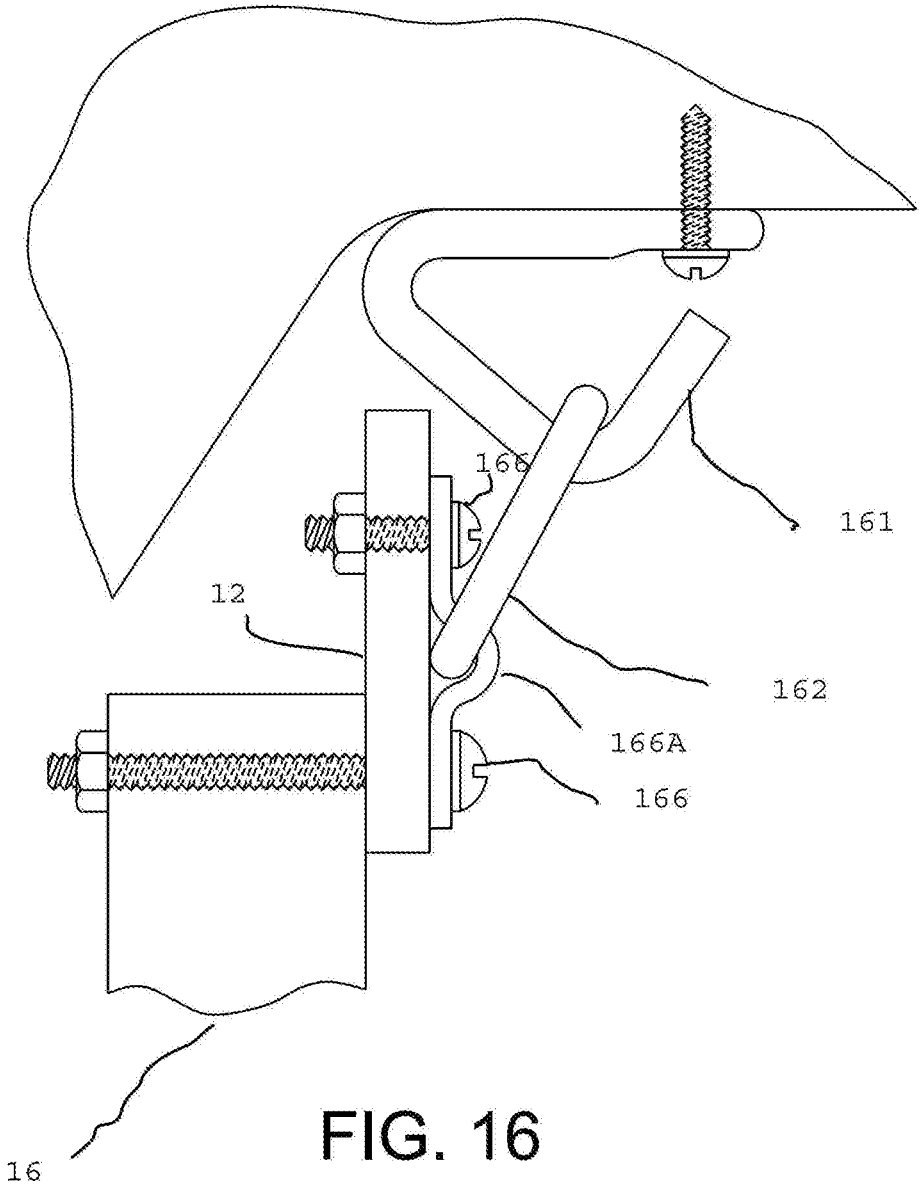


FIG. 16



FIG. 17

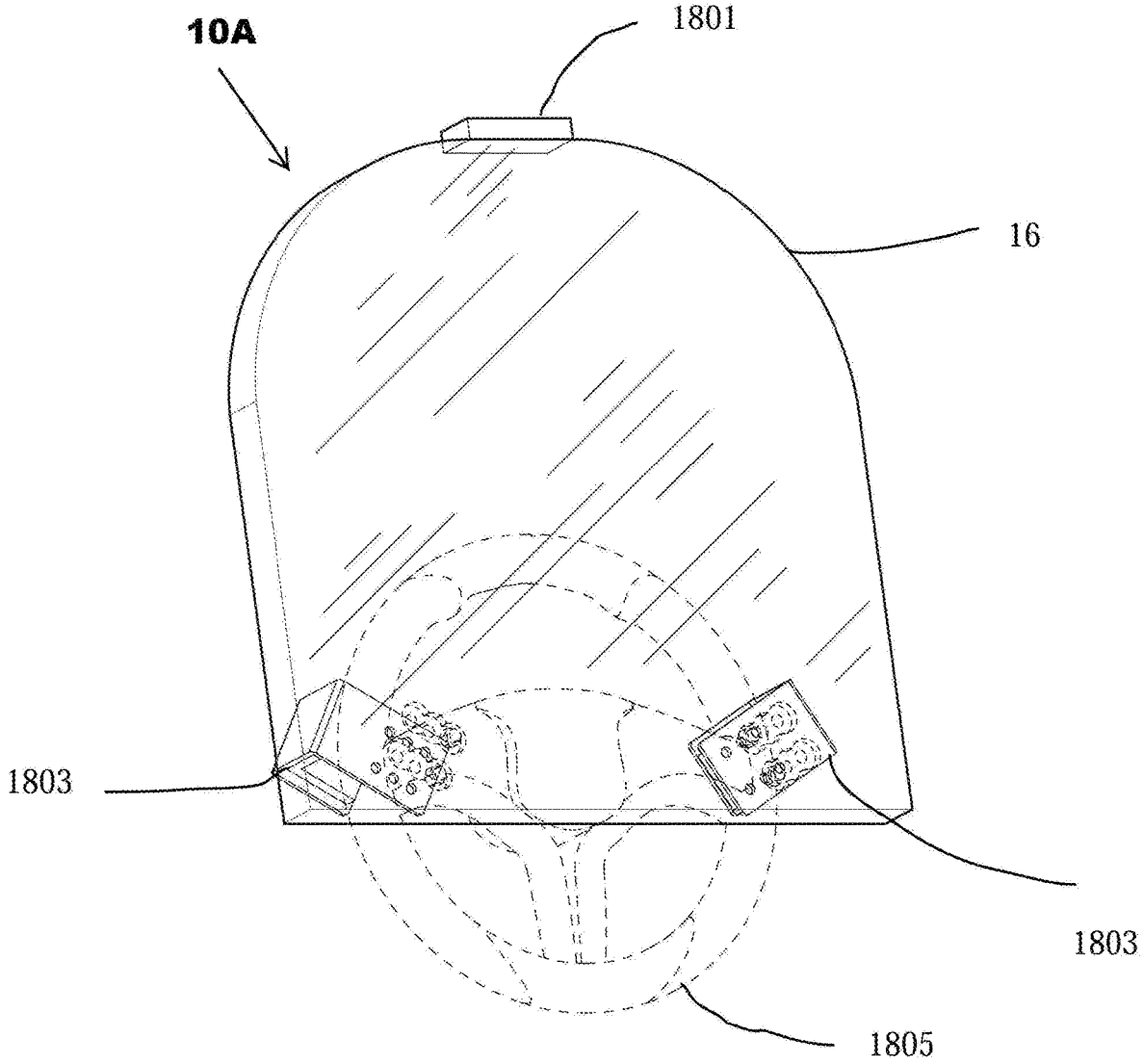


FIG. 18

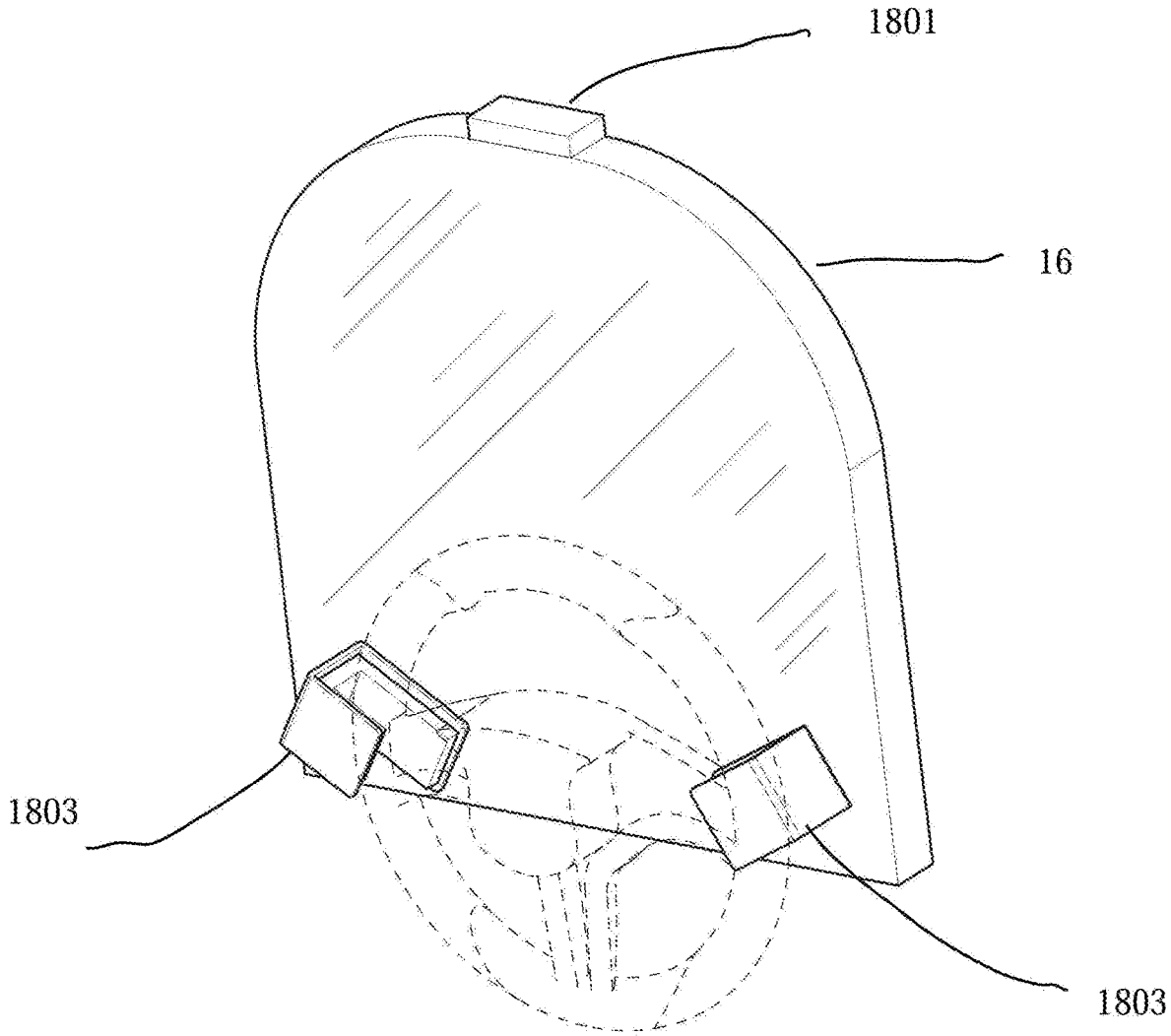


FIG. 19

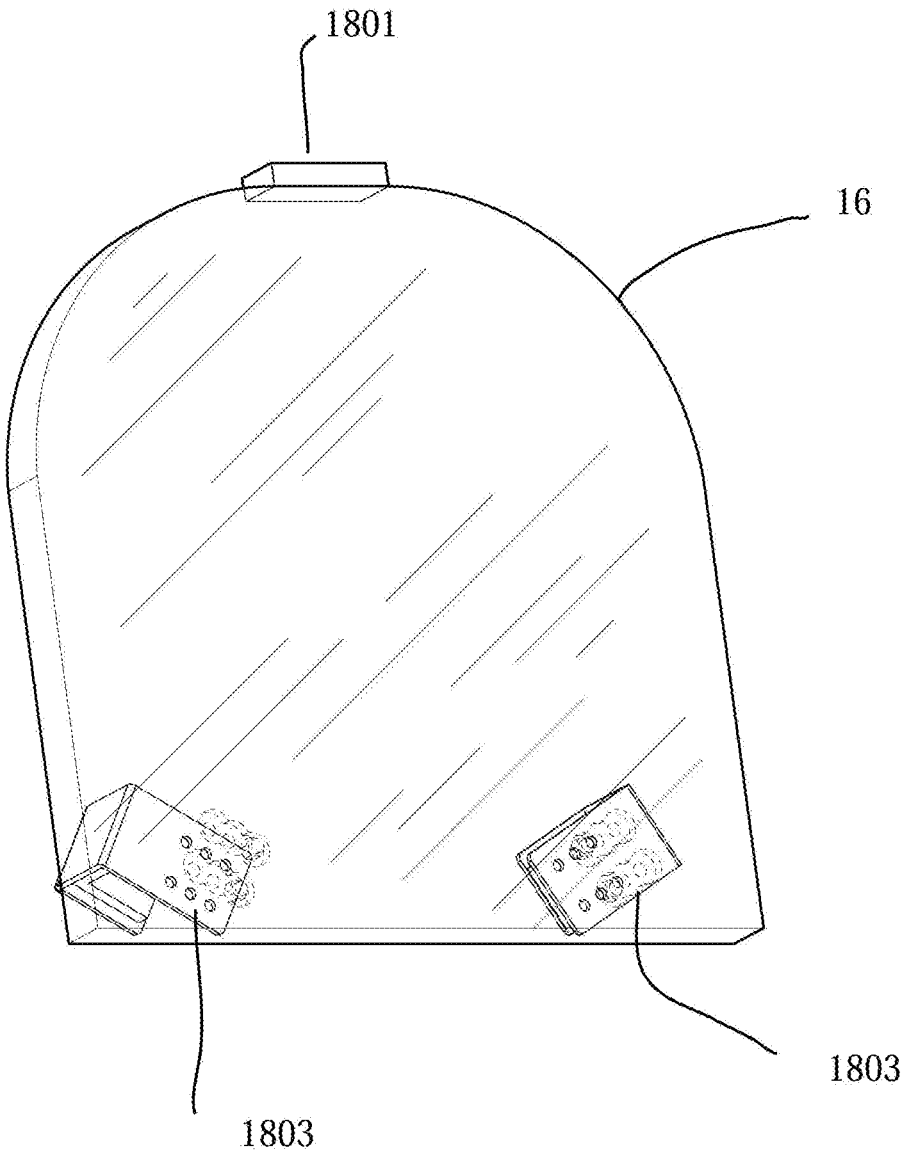


FIG. 20

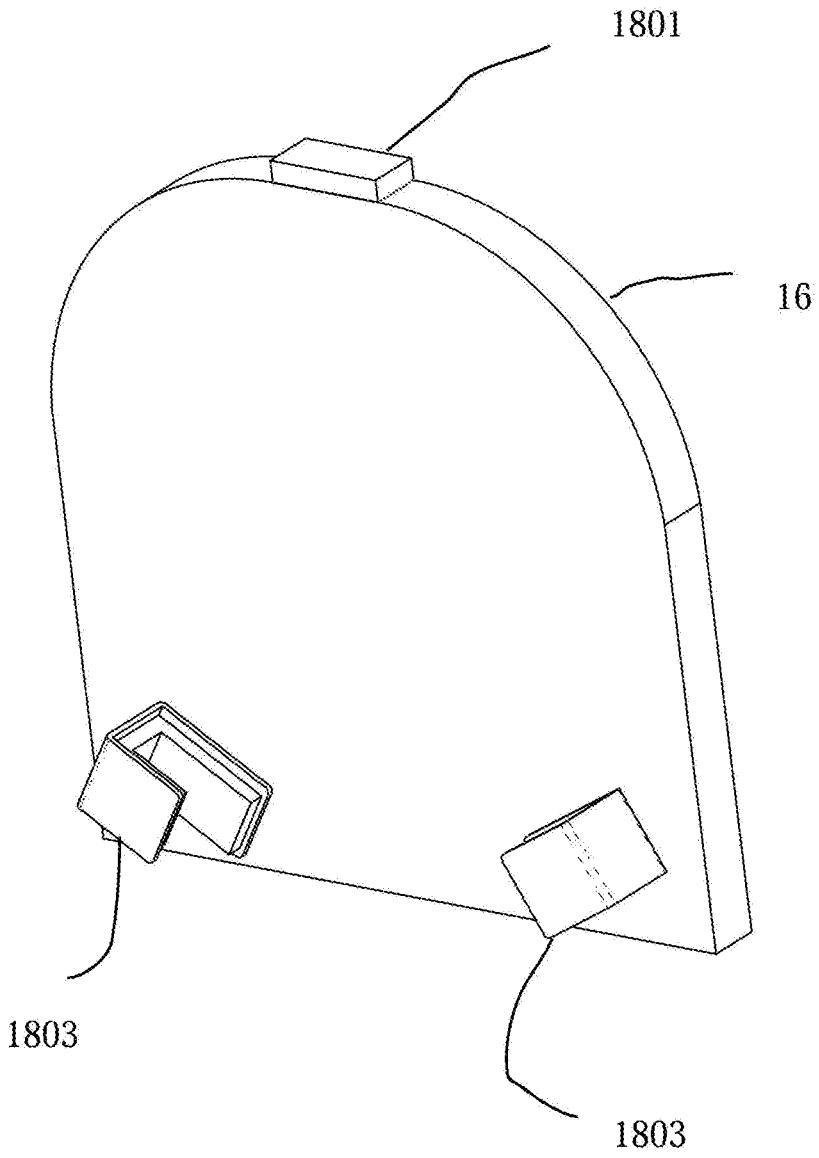


FIG. 21

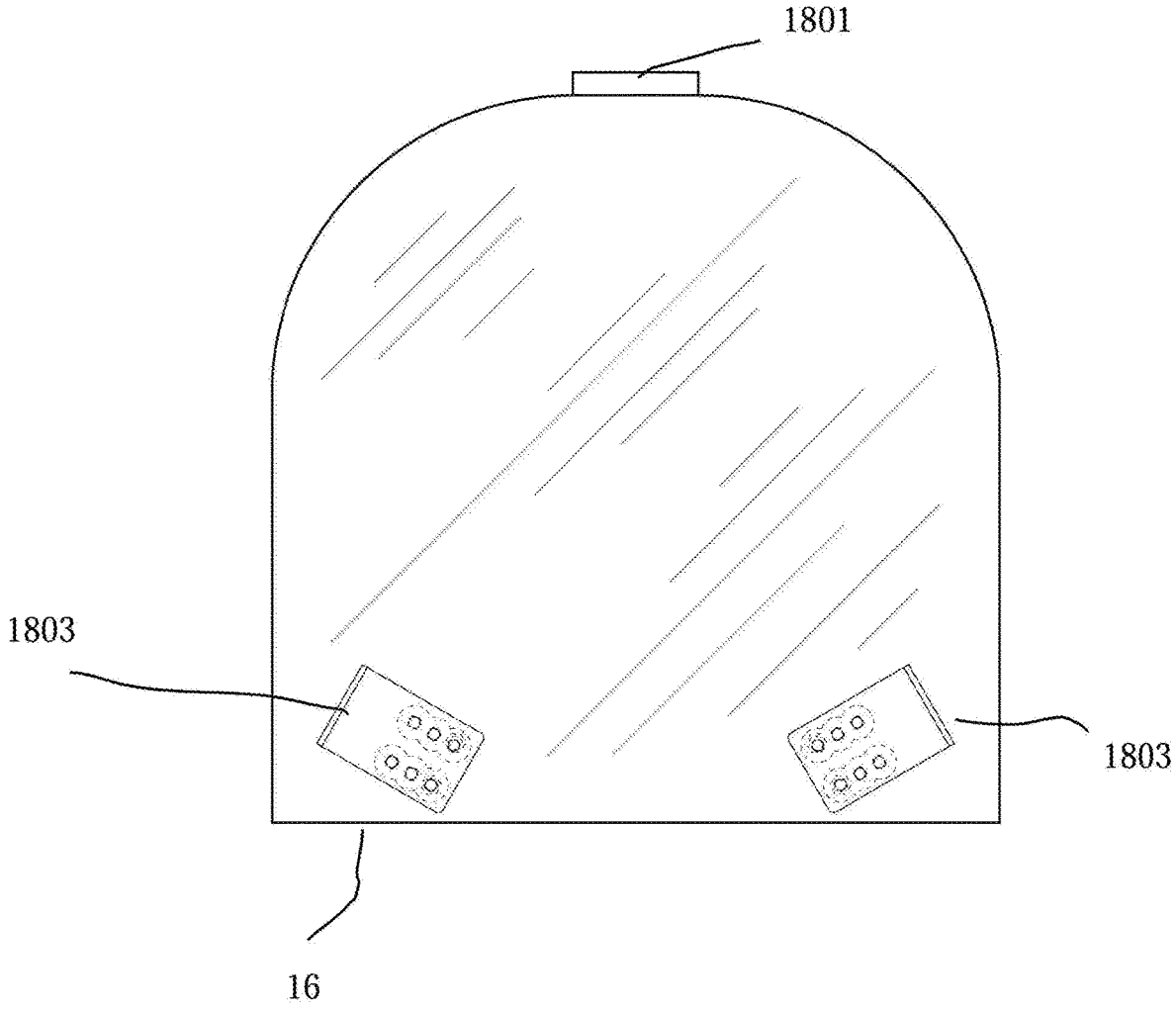


FIG. 22

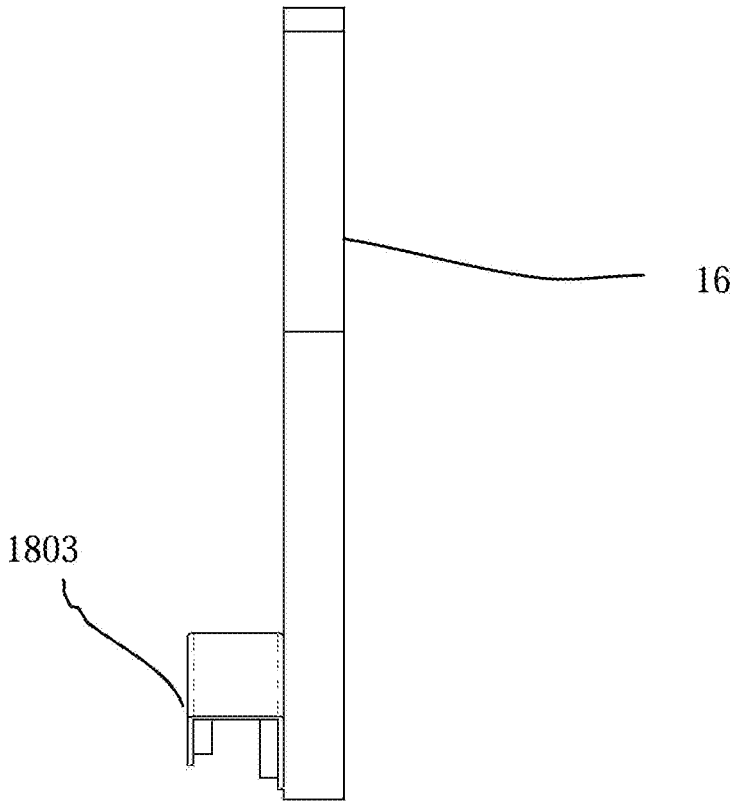


FIG. 23

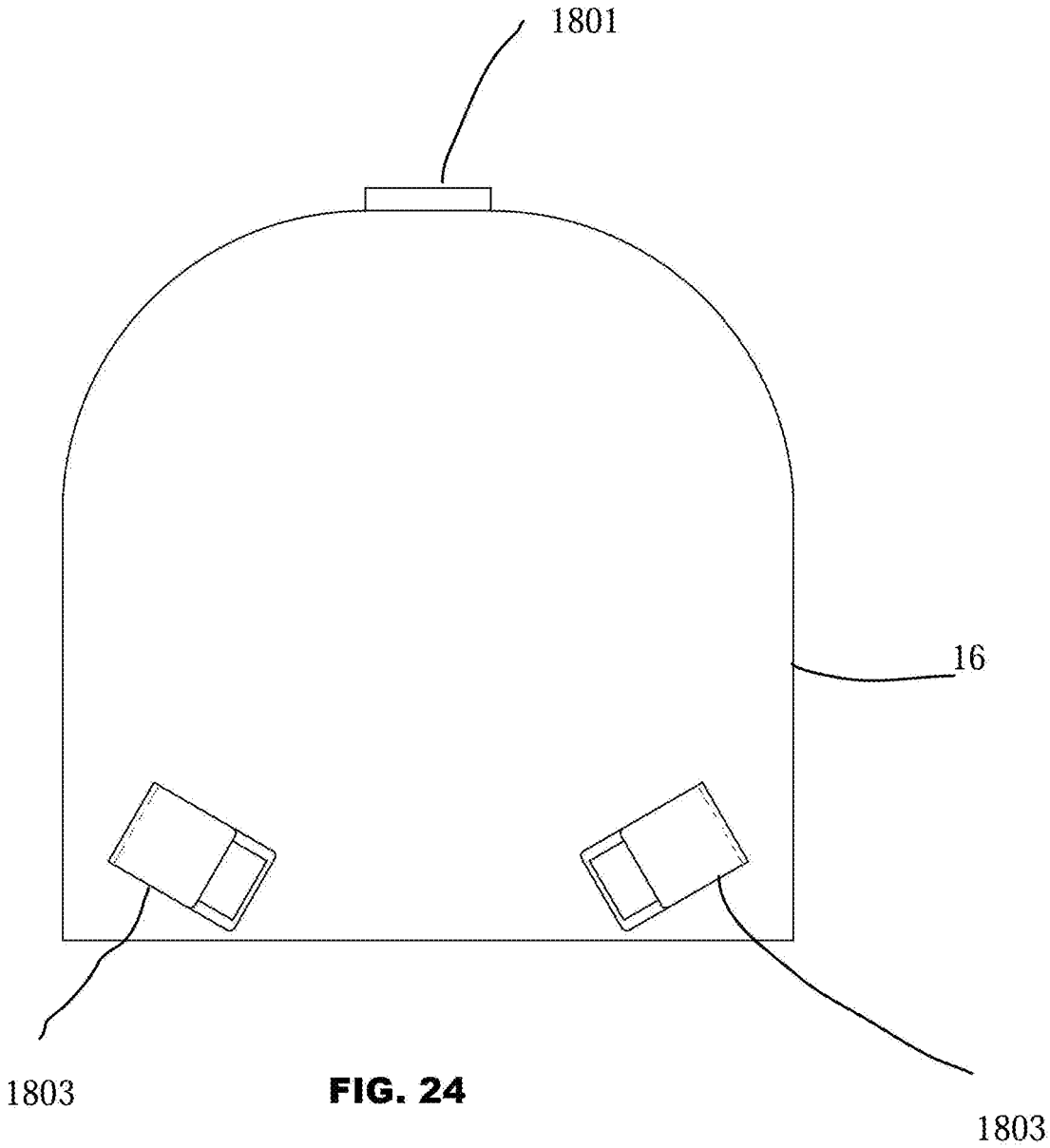


FIG. 24

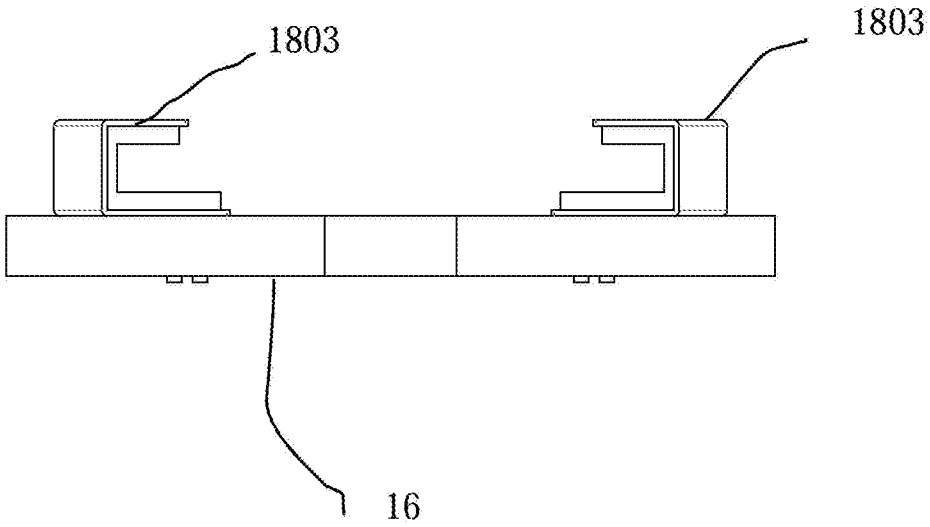


FIG. 25

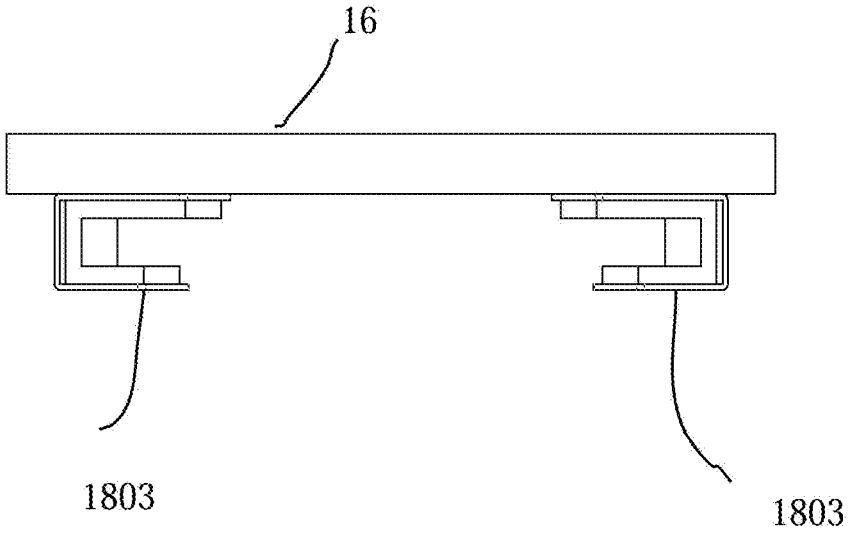


FIG. 26

PORTABLE BALLISTIC SHIELD

BACKGROUND

1. Field of Use

[0001] The instant invention relates generally to protective transparent shields and more specifically it relates to a law enforcement high risk vehicle windshield protective device. Numerous protective transparent shields have been provided in the prior art that are adapted to be utilized on windshields of motor vehicles, so as to withstand gun fire at close range. For example, U.S. Pat. No. 3,855,898 to McDonald; U.S. Pat. No. 3,866,242 to Slagel and U.S. Pat. No. 4,643,477 to Kovatch all are illustrative of such prior art. While these units may be suitable for the particular purpose to which they address, they would not be as suitable for the purpose of the present invention as hereafter described.

2. Description of Prior Art (Background)

[0002] A variety of shield devices have been proposed to protect motor vehicle occupants from gunfire including from frontal, rear and flank attack. Armored limousines, for example, are well known in the art. Many such limousines include expensive heavy-duty side armor and bullet proof glass to block entry into the passenger compartment of bullets or other projectiles fired at the occupants. Other attempted solutions have included, for example, the fixation of bulletproof glass panels adjacent to the factory installed standard glazing.

[0003] Lighter duty and less expensive solutions than the utilization of an armored limousine have also been proposed. U.S. Pat. No. 4,643,477 to Kovatch discloses a sheet of transparent armor that may be removably slid into position behind a standard windshield along rollers captured by tracks mounted to window posts thereby protecting the driver and other occupants of the vehicle. The '477 patent attempts to solve the problems of cleaning the opposed facing transparent surfaces presented by fixed add-on armor of the prior art by disclosing that the removable armor be pivoted about the rollers and away from the windshield.

[0004] In U.S. Pat. No. 5,703,316 to Madden, Jr., it was proposed that a foldable bullet resistant curtain of material is removably secured to the underside of a trunk lid of an automobile and is deployed when the trunk is opened to resist bullets fired from behind the vehicle. The curtain, however, does not protect the occupants from frontal or side attack. U.S. Pat. No. 1,443,708 (Fenton) discloses an armor system for a vehicle. The armor includes a plurality of holes, with glass elements covering some of the holes. The holes covered by glass elements comprise viewing apertures. Armor plate cover some of the holes from the interior. Some of the interior armor plate may be removed so that firearms may be used from the inside of the vehicle, shooting outwardly through the holes.

[0005] Other prior art solutions include U.S. Pat. No. 1,913,554 (Luker) which discloses a bulletproof covering for portions of a vehicle, including the radiator and tires. The bulletproof covering or armor is designed to protect the front end of a vehicle.

[0006] U.S. Pat. No. 2,363,573 (Costa) discloses what is referred to as an armor shell for a motor vehicle. Virtually the entire vehicle is covered with an armor shell. There are gun ports in the shell and viewing slits for observing outside the vehicle.

[0007] U.S. Pat. No. 3,855,898 (McDonald) discloses sheeting material applied to the interior of a vehicle. The sheeting includes transparent coverings for the windows and panels which extend over the doors. The door panels are pre-formed in a particular configuration and are permanently secured in place.

[0008] U.S. Pat. No. 4,316,404 (Medlin) discloses a light-weight armored vehicle and a method of making the light-weight armored vehicle. The disclosed method comprises stripping a vehicle interior, and using different types of bulletproof material for the interior of the vehicle and also for the gasoline tank of the vehicle.

[0009] U.S. Pat. No. 4,352,316 (Medlin) comprises a continuation-in-part patent of the '404 patent. It accordingly contains virtually the same method and apparatus, but with different materials involved.

[0010] The patents discussed in the preceding paragraphs all utilize a permanent or semi-permanent installation of bulletproof or bullet resistant material in a prepared vehicle. Accordingly, substantial changes are made in the vehicles to bulletproof them. The substantial changes include substantial costs involvement, as may be understood and expected.

[0011] Moreover, the time required for removal of a semi-permanent installation of a bulletproof shield in a law enforcement vehicle may impede the law enforcement officer's actions (e.g., giving chase to a fleeing felon) or placing the law enforcement officer in a life-threatening situation.

[0012] Therefore, a portable ballistic shield not permanently or semi-permanently attached to a vehicle is needed for protection of law enforcement officers. What has been absent in the protective arts is a convenient, readily deployable and undeployable, bullet protective shield for protecting vehicle occupants from gunfire.

BRIEF SUMMARY

[0013] The apparatus of the present invention comprises a portable ballistic shield (PBS) which includes a transparent bullet resistant shield, a steering column yoke for mounting the PBS atop a vehicle's steering column. The PBS includes quick release attachments such as, for example, top and side D rings, snap hooks, or button snaps for engaging corresponding hooks and buttons attached to the law enforcement vehicle. The PBS also includes a wedge bar for wedging the PBS against a structural element of a vehicle.

[0014] The invention is also directed towards a Portable ballistic shield (PBS) comprising a plurality of transparent laminated polycarbonates. The PBS also includes a wedge bar, for mounting the PBS adjacent to a structural element of a vehicle (e.g., windshield frame). The wedge bar may also include an integral mechanical dampener for dissipating kinetic energy. The PBS also includes a quick release side connector connected to the transparent ballistic shield and a quick release top connector connected to the PBS. The PBS also includes a steering column yoke connected to the transparent ballistic shield for mounting the PBS on the vehicle steering column.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The subject matter which is regarded as the invention is particularly pointed out and distinctly claimed in the

claims at the conclusion of the specification. The foregoing and other objects, features, and advantages of the invention are apparent from the following detailed description taken in conjunction with the accompanying drawings in which:

[0016] FIG. **1** is an isometric front view of the portable ballistic shield;

[0017] FIG. **2** is a front view of the PBS shown in FIG. **1**;

[0018] FIG. **3** is a rear view of the PBS shown in FIG. **1**;

[0019] FIG. **4** is a right-side view of the PBS shown in FIG. **1**;

[0020] FIG. **5** is an enlarged top right-side view of the PBS shown in FIG. **1**;

[0021] FIG. **6** is an enlarged bottom right side view of the PBS shown in FIG. **1**;

[0022] FIG. **7** is a cross sectional view of the PBS shown in FIG. **2**;

[0023] FIG. **8** is cross sectional view of the PBS shown in FIG. **2**;

[0024] FIG. **9** is a pictorial view of the PBS shown in FIG. **1** in operational use;

[0025] FIG. **10** is a side view of the PBS shown in FIG. **1** in operational use;

[0026] FIG. **11** is an isometric view of the PBS shown in FIG. **1** illustrating a top quick release feature;

[0027] FIG. **12** is a side view of FIG. **11**;

[0028] FIG. **13** is a side view of FIG. **11** illustrating the top quick release feature in operational use;

[0029] FIG. **14** is an isometric view of the PBS shown in FIG. **1** illustrating a side quick release feature;

[0030] FIG. **15** is a side view of the quick release feature shown in FIG. **14**;

[0031] FIG. **16** is a side view of the quick release feature shown in FIG. **14** attached to the top portion of the PBS;

[0032] FIG. **17** is a second pictorial view of the PBS shown in FIG. **1** in operational use;

[0033] FIG. **18** is an isometric front view of an alternate embodiment of the portable ballistic shield (PBS);

[0034] FIG. **19** is an isometric rear view of the alternate embodiment of the portable ballistic shield (PBS);

[0035] FIG. **20** is an isometric see thru front view of the alternate embodiment of the portable ballistic shield (PBS);

[0036] FIG. **21** is second isometric rear view of the alternate embodiment of the portable ballistic shield (PBS);

[0037] FIG. **22** is a plan see thru front view of the alternate embodiment of the portable ballistic shield (PBS);

[0038] FIG. **23** is a side view of the alternate embodiment of the portable ballistic shield (PBS);

[0039] FIG. **24** is a plan front view of the alternate embodiment of the portable ballistic shield (PBS);

[0040] FIG. **25** is a plan top view of the alternate embodiment of the portable ballistic shield (PBS); and

[0041] FIG. **26** is a plan bottom view of the alternate embodiment of the portable ballistic shield (PBS).

DETAILED DESCRIPTION

[0042] The following brief definition of terms shall apply throughout the application:

[0043] The term "comprising" means including but not limited to, and should be interpreted in the manner it is typically used in the patent context;

[0044] The phrases "in one embodiment," "according to one embodiment," and the like generally mean that the particular feature, structure, or characteristic following the phrase may be included in at least one embodiment of the present invention, and may be included in more than one embodiment of the present invention (importantly, such phrases do not necessarily refer to the same embodiment);

[0045] If the specification describes something as "exemplary" or an "example," it should be understood that refers to a non-exclusive example; and

[0046] If the specification states a component or feature "may," "can," "could," "should," "preferably," "possibly," "typically," "optionally," "for example," or "might" (or other such language) be included or have a characteristic, that particular component or feature is not required to be included or to have the characteristic.

[0047] Referring now to FIG. **1** through FIG. **8** of the drawings, there are shown multiple views of the portable ballistic shield (PBS) **10**. The PBS **10** includes upper flange **12**, wedge bar **14**, transparent bullet resistant shield **16**, steering column yoke **18**, lower reinforcing flange **19**. PBS **10** also includes fasteners **13** for attaching the shield **16** to the upper flange **12** and the steering column yoke **18**.

[0048] Still referring to FIG. **1** through **8**, transparent bullet resistant shield **16** may be any suitable transparent bullet resistant material; such as for example: a plurality of transparent laminated polycarbonates, acrylics, glass-clad polycarbonate glazed with bullet resistant material, aluminum oxynitride (i.e., a transparent aluminum based ceramic), and/or bullet proof material derived from magnesium aluminates The thickness of the shield **16** will vary in accordance with the degree of bullet resistant characteristics desired.

[0049] Still referring to FIG. **1** through **8**, fasteners **13** may be any suitable fasteners such as screws or bolts for fastening yoke **18** and upper flange **12** to resistant shield **16**. It will also be appreciated yoke **18** and upper flange **12** may be also attached to resistant shield **16** with a suitable epoxy or structural adhesive **13**A.

[0050] Still referring to FIG. **1** through **8**, wedge bar **14** is a suitably sized bar attached to the upper flange. Wedge bar **14** wedges against a structural member of a vehicle (e.g., windshield frame) discussed herein. When wedge against the structural member of the vehicle wedge bar **14** negates movement of the PBS in the direction of a bullet striking the PBS shield **16** (i.e., striking the rear face **16**B shown in FIG. **3**). Wedge bar **14** may be a single bar or multiple stacked bars to accommodate for vehicle variations. Furthermore, wedge bar **14** may include mechanical dampener **14**A (see FIG. **5**) for dissipating kinetic energy resulting from a bullet striking shield **16**.

[0051] Still referring to FIG. **1** through **8**, steering column yoke **18** may be any suitably shaped yoke for resting on a vehicle steering column (see FIG. **10**-**101**). Steering column yoke **18** also includes lower reinforcing flange **19** which may be sized to custom fit the steering column.

[0052] Referring also to FIG. **9** and FIG. **10** there is shown a pictorial view of the PBS **10** shown in FIG. **1** through FIG. **8** in operational use. A law enforcement officer **93** is engaged with preparing a ticket/summons **99**. A bullet **98** traveling in the direction shown pierces windshield **94** affixed to vehicle **92**. Bullet **98** strikes the rear face of PBS shield **16**B. The bullet is stopped by shield **16** and the bullet's kinetic energy is partially absorbed by shield **16** and also transferred to wedge bar **14** to be dissipated against a vehicle **92** structural element **94**A holding windshield **94**. The bullet's kinetic energy is also transferred to yoke/flange **18**/**19** to be dissipated against the vehicle steering column **101**.

[0053] Referring also to FIGS. **11** and **12** there is shown an isometric view of the PBS shown in FIG. **1** illustrating a top quick release mechanism **111**. The top quick release mechanism **111** includes strap **11**B and snap button **11**A. For clarity only one snap button is shown, however it will be appreciated that strap **11**B could include any suitable number of snap buttons. Strap **11**B may be any suitable strap sufficient to hold the PBS **10** in place. Furthermore, strap **11**B may be woven from shock absorbing fiber composites including polymers, visco-elastic polymers, visco-polymers, simple polymers, neoprene, silicon, and/or rubber material to assist the dissipation of the bullet's kinetic energy.

[0054] Referring also to FIG. **13** there is shown a side view of FIG. **11** illustrating the top quick release feature in operational use. Snap button **11**B is connected to corresponding button receptacle **131** attached to vehicle **13**.

[0055] Referring also to FIG. **14** and FIG. **15** there is shown an isometric and side view, respectively, of the PBS **10** shown in FIG. **1** illustrating a side quick release mechanism. The side quick release mechanism includes connector **143** and corresponding hook **142**. Connector **143** may be attached to shield **16** via clamp **153** and fasteners **152**. It will be appreciated that hook **142**, connector **143**, and/or clamp **153** combine to form a kinetic energy dissipation system. For, example, connector **143** may include mechanical dampener **143**A. It will be appreciated that connector **143** may be any suitable connector such as a D ring and/or spring connector for absorbing kinetic energy.

[0056] Referring also to FIG. **16** there is shown a side view of the quick release feature shown in FIG. **14** attached to the top portion of the PBS. The side quick release feature includes connector **162** and corresponding hook **161**. Connector **162** may be attached to shield **16** via clamp **166**A and fasteners **166**. It will be appreciated that hook **161**, connector **162**, and/or clamp **166**A combine to form a kinetic energy dissipation system. It will be appreciated that connector **162** may be any suitable connector such as a D ring and/or spring connector for absorbing kinetic energy.

[0057] FIG. **17** is a second pictorial view of the PBS **10** shown in FIG. **1** in operational use. Shown in FIG. **17** is law enforcement officer **171**, and bullet **172** traveling in direction shown. PBS **10** deflects bullet **171** by depleting bullet **172** of its kinetic energy. First, the bullet's kinetic energy is transferred to and partially absorbed by shield **16**. The kinetic energy not absorbed by shield **16** is transferred to wedge **14** and yoke **18** and is dissipated against the structural members of the vehicle as described herein. The bullet's kinetic energy may also be dissipated via the quick release features described herein. It will be appreciated that distributing the dissipation of bullet's kinetic energy allows for a thinner shield **16** and less weight of the PBS overall.

[0058] Referring also to FIGS. **18-27** there is shown an alternate embodiment of the portable ballistic shield (PBS) **10**A. Shield **16** is as described earlier. Top member **1801** wedges against windshield **94** and steering wheel clips **1803** mount on steering wheel **1805**. Clips **1803** may attach to shield **16** by any suitable means, including adhesives and/or mechanical fasteners. Top member **1801** may also function as an energy dampener.

[0059] It should be understood that the foregoing description is only illustrative of the invention. Thus, various alternatives and modifications can be devised by those skilled in the art without departing from the invention. Accordingly, the present invention is intended to embrace all such alternatives, modifications and variances that fall within the scope of the appended claims.

What is claimed is:

1. A Portable ballistic shield (PBS), the PBS comprising:
- a transparent ballistic shield;
- a wedge bar;
- an upper flange connecting the transparent ballistic shield to the wedge bar; and
- a steering column yoke connected to the transparent ballistic shield.

2. The PBS as in claim **1** wherein the transparent ballistic shield comprises a plurality of transparent laminated polycarbonates.

3. The PBS as in claim **1** wherein the transparent ballistic shield comprises aluminum oxynitride.

4. The PBS as in claim **1** wherein the transparent ballistic shield comprises magnesium aluminates.

5. The PBS as in claim **1** wherein the transparent ballistic shield comprises glass-clad polycarbonate glazed with bullet resistant material.

6. The PBS as in claim **1** wherein the wedge bar further comprises a first mechanical dampener.

7. The PBS as in claim **1** further comprises a side kinetic energy dissipation system.

8. The PBS as in claim **7** wherein the side kinetic energy dissipation system comprises:
- a connector, wherein the connector comprises a second mechanical dampener;
- a clamp, wherein the clamp attaches the connector to the transparent ballistic shield.

9. The PBS as in claim **1** further comprising a quick release side connector.

10. The PBS as in claim **1** further comprises a top kinetic energy dissipation system.

11. The PBS as in claim **10** wherein the top kinetic energy dissipation system comprises:
- a strap connected to the upper flange, wherein the strap comprises a snap button for connecting the strap to a vehicle, and wherein the strap comprises a third mechanical dampener.

12. The PBS as in claim **1** wherein the strap is woven from shock absorbing composites.

13. A Portable ballistic shield (PBS), the PBS comprising:
- a transparent ballistic shield, wherein the transparent ballistic shield comprises a plurality of transparent laminated polycarbonates;
- a wedge bar, wherein the wedge bar further comprises a first mechanical dampener;
- an upper flange connecting the transparent ballistic shield to the wedge bar;
- a quick release side connector connected to the transparent ballistic shield;
- a quick release top connector connected to the upper flange; and
- a steering column yoke connected to the transparent ballistic shield.

14. The PBS as in claim **13** wherein the quick release side connector comprises:
- a ring for hooking a hook attached to a vehicle; and
- a clamp for clamping the ring to the upper flange.

15. The PBS as in claim **14** wherein the quick release top connector comprises:
- a second ring for hooking a hook attached to the vehicle; and

a second clamp for clamping the second ring to the upper flange.

16. The PBS as in claim **14** wherein the quick release top connector comprises:

a strap connected to the upper flange, wherein the strap comprises a snap button for connecting the strap to the vehicle and wherein the strap is woven with energy absorption fibers.

17. A Portable ballistic shield (PBS), the PBS comprising:

a transparent ballistic shield (TBS);

a top member connected to the TBS for wedging the TBS against a windshield; and

a plurality of steering clips connected to the TBS.

18. The PBS as in claim **17** wherein the transparent ballistic shield comprises a plurality of transparent laminated polycarbonates.

19. The PBS as in claim **17** wherein the transparent ballistic shield comprises aluminum oxynitride.

20. The PBS as in claim **17** wherein the transparent ballistic shield comprises magnesium aluminates.

21. The PBS as in claim **17** wherein the transparent ballistic shield comprises glass-clad polycarbonate glazed with bullet resistant material.

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