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(54) Title: ENERGY ABSORBING SYSTEM WITH ANCHOR NET

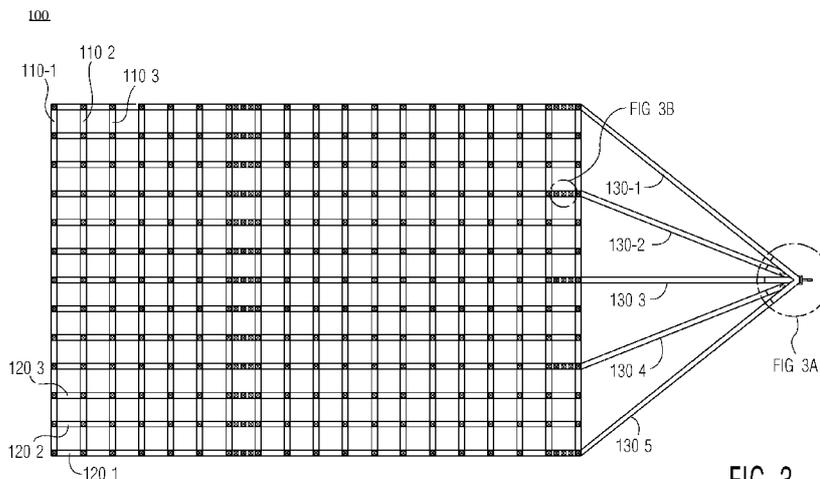


FIG. 3

(57) Abstract: An anchor for use with a vehicle restraining system. In one aspect, the anchor may include a matrix of members, where the matrix is of sufficient size to accommodate a vehicle on top thereof, and one or more connection members, where each of the one or more connection members is joined at one end to the matrix and each of the one or more connection members is joined at another end to a connector.

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Energy Absorbing System With Anchor Net

RELATED APPLICATIONS

[0001] The present application claims priority to U.S. Provisional Patent Application Ser. No. 61/199,931, filed Nov. 21, 2008, the entire contents of which are
5 incorporated herein by reference.

BACKGROUND

[0002] The present application relates to an energy absorbing system where the system can be used to dissipate unwanted energy such as, e.g., the energy of an errant vehicle. The system may be used in a variety of applications, such as a mobile
10 checkpoint, traffic control barrier, or military blockade.

SUMMARY OF THE DISCLOSURE

[0003] An anchor for use with a vehicle restraining system. In one aspect, the anchor may include a matrix of members, where the matrix is of sufficient size to accommodate a vehicle on top thereof, and one or more connection members, where each
15 of the one or more connection members is joined at one end to the matrix and each of the one or more connection members is joined at another end to a connector.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Figures IA - 1C show a system of the present disclosure in top view, front view with capture net in raised position, and front view with capture net in lowered
20 position, respectively.

[0005] Figure 2 shows a side view of the system of the present disclosure capturing an errant vehicle.

[0006] Figure 3 shows an anchor net of the system of the present disclosure.

[0007] Figures 3A and 3B show magnified portions of Figure 3.

[0008] Figures 4A and 4B show perspective and top views of an anchor vehicle atop an anchor net of the system of the present disclosure.

[0009] Figure 5 shows a front view of a capture net according to one aspect of the
5 system of the present disclosure.

[0010] Figures 5A and 5B show magnified portions of Figure 5.

[0011] Figure 6 shows a top view of a capture net according to one aspect of the system of the present disclosure.

[0012] Figure 6A shows a magnified portion of Figure 6.

10 [0013] Figure 7 shows a front view of a capture net according to another aspect of the system of the present disclosure.

DETAILED DESCRIPTION

[0014] The energy absorbing system may be described in detail using the accompanying drawings.

15 [0015] As shown in Figs. IA- 1C, the system of the present disclosure may include anchor net 100, energy absorber 200, capture net 300, raising lowering mechanism 400, and ramp assemblies 500. Figure IB shows capture net 300 raised by raising lowering mechanism 400. The capture net 300 may be coupled to energy
20 absorber 200, such as textile energy absorbing brakes that may provide for an inexpensive, reliable means of controlling vehicle deceleration upon impact. Energy absorber 200 may be coupled to anchor net 100 upon which weight such as a vehicle 4 (Fig. 2), CONEX containers, concrete barricades, or other readily available material may be placed.

[0016] The system of the present disclosure may include ramp assembly 500 as shown in Fig. 1A that may be placed in the roadway at the barrier location to provide an opening that protects capture net 300 from unnecessary contact with vehicles passing overtop. In one aspect, ramp assembly 500 may be structural injection molded material and may include a recess to accommodate the capture net 300 when in a lowered position.

[0017] As shown in Fig. 2, upon impact by errant vehicle 2, frangible connectors (not shown) that attach capture net 300 to raising lowering mechanism 400 may break, thereby isolating components of the barrier system, such as the raising lowering mechanism 400 and related lift arm components, from the impact forces to eliminate potential damage. Quick-disconnect couplings (not shown) may be placed between capture net 300 and energy absorber 200, and also placed between energy absorber 200 and anchor net 100 and may allow for easy replacement of the energy absorber 200 after deployment.

[0018] As shown in Fig. 3, anchor net 100 may be a matrix of vertical members 110-1, 110-2, 110-3 etc. and horizontal members 120-1, 120-2, 120-3 etc.. In one non-limiting example, vertical members 110-1, 110-2, 110-3 and horizontal members 120-1, 120-2, 120-3 which may be 2" (inch) wide 10,000 lb. strength nylon webbing spaced 10" (inches) and connected using box with cross-style stitching 150 as shown in Fig. 3B. In one aspect, anchor net 100 may be rolled or folded for storage or transport. Anchor net 100 may be large enough in size to accommodate a motor vehicle, parked atop it as shown in Figs. 4A and 4B. In one non-limiting example, anchor net 100 may be 15' 2" x

10' 2". When a weight is placed atop anchor net 100, for example, a motor vehicle, anchor net 100 may act as an anchor for energy absorber 200.

[0019] As shown in Fig. 3, connecting members 130-1, 130-2, 130-3, 130-4, and 130-5, may be nylon webbing and may be coupled to the matrix of webbing at one end
5 and may be coupled to a connector 140 at the other end as shown in Fig. 3A. Gaps or spaces may be provided in the matrix to help prevent accumulation of dirt or debris. Connector 140 may be coupled to energy absorber 200. In one non-limiting example, connector 140 may be a 2" 10,000 Ib. strength twisted forged snap hook.

[0020] In another aspect, anchor net 100 may include webbing coupled to and
10 covered in whole or in part by a blanket or sheet of the same or another material by any number of techniques including, but not limited to, chemical or thermal adhesion, stitching or any combination thereof.

[0021] As shown in Fig. 5, in one non-limiting example, capture net 300 may be a matrix of 2" (inch) wide 10,000 Ib. strength nylon webbing and may be 4' 4" high and
15 29' 4" wide. In that example, horizontal and vertical members of capture net 300 may be placed approximately 10" apart and may be coupled using 2" 5,000 Ib. strength stitch joints. Capture net 300 may have connecting members 310 attached to each side ending in connector 320 (shown in Fig. 5B) that allows capture net 300 to couple to energy absorber 200. As shown in Fig. 5B, in one non-limiting example, connecting members
20 310 may be the same material as capture net 300, and connector 320 may be a 10,000 Ib. strength ring. In another non-limiting example, connector 320 may be may be a 2" 10,000 Ib. strength twisted forged snap hook. As shown in Fig. 5A, capture net 300 may have colored reflective strips 350 attached thereto. As shown in Figs. 6 and 6A, capture net

300 may have multiple loops 330 that allow adjustable coupling to raising lowering mechanism 400 to accommodate different roadway widths. Loops 330 may be the same material as capture net 300. Capture net 300 may decouple from raising lowering mechanism 400 upon application of threshold force to capture net 300, such as the force
5 provided by impact by an errant vehicle.

[0022] Depending on implementation and arrangement, when in a raised position, capture net 300 may sag in the center while the ends of capture net 300 may not extend fully to ground. As shown in Fig. 7, capture net 300 may have vertical members 340 of different lengths to address this potential issue and prevent an errant vehicle from
10 potentially slipping under the ends of capture net 300 during operation. In the example shown in Fig. 7, capture net 300 may have vertical members 340 of four different lengths, 340-A; 340-B; 340-C; and 340-D, with vertical member length increasing from the center outward. In one non-limiting example, lengths of vertical members 340-A through 340-D may be 4' 4"; 4' 6.5"; 4' 8.5"; and 4' 11". Such an arrangement having certain longer
15 vertical members 340 may allow capture net 300 to occupy space extending to the ground at the portions of the capture net 300 near loop 330 and/or connecting member 310.

[0023] The raising lowering mechanism 400 may include one or more connection points for frangibly connecting to capture net 300 along with wireless receiver, actuator, battery, pillow block bearings, and swivel base (not shown). Depending on
20 implementation and roadway width, the frangible connectors may be moved to a different point of attachment on capture net 300 and/or raising lowering mechanism 400, and excess capture net 300 may lie outside of the roadway with reduced obstruction to vehicles in the roadway or nearby personnel. The connection between capture net 300

and energy absorber 200 may remain the same and the location of energy absorber 200 and anchor net 100 may be moved to assure that an errant vehicle may be stopped within the same distance regardless of the protected roadway width. In one aspect, in the event of a vehicle impact and arrest, the system may expend the frangible connectors and
5 energy absorber 200 on each side.

[0024] Although the weight, width, length, height, and thickness of certain structures have been described in detail herein, additional aspects of the invention of the present disclosure include increasing or decreasing these dimensions.

[0025] Numerous additional modifications and variations of the present
10 disclosure are possible in view of the above teachings. It is therefore to be understood that within the scope of the appended claims, the present disclosure may be practiced other than as specifically described herein.

CLAIMS

1. An anchor for use with a vehicle restraining system comprising:
a matrix of members, where the matrix is of sufficient size to accommodate a
vehicle on top thereof; and
5 one or more connection members, where each of the one or more connection
members is joined at one end to the matrix and each of the one or more connection
members is joined at another end to a connector.
2. The anchor of claim 1, wherein the one or more connection members are joined to
10 one side of the matrix.
3. The anchor of claim 1, wherein there are at least three connection members
including a first connection member joined to a first corner of the matrix, a second
connection member joined to an adjacent corner of the matrix, and a third connection
15 member joined to the matrix between the first corner and the adjacent corner.
4. The anchor of claim 3, wherein there are at least five connection members
including a fourth connection member joined to the matrix between the first and third
connection members, and a fifth connection member joined to the matrix between the
20 second and third connection members.
5. The anchor of claim 1, wherein the matrix is substantially square-shaped.

6. The anchor of claim 1, wherein the matrix of members is substantially flat and substantially flexible.

7. The anchor of claim 1, wherein the matrix of members includes two or more first
5 members arranged in a first direction and two or more second members arranged in a second direction that is substantially perpendicular to the first direction.

8. The anchor of claim 7, wherein a space is provided between the two or more first members.

10

9. The anchor of claim 1, wherein the members are woven material.

10. The anchor of claim 1, wherein the members and connection members are 10,000 Ib. capacity material.

15

11. The anchor of claim 1, wherein at least a portion of the matrix is coupled to and covered by a blanket.

12. An anchor for use with a vehicle restraining system comprising:
20 a portion of high-strength material of sufficient size to accommodate a vehicle on top thereof; and

one or more connection members, where each of the one or more connection members is joined at one end to the portion of material and joined to a connector at the other.

5 13. The anchor of claim 12, wherein the portion of material is woven material.

14. The anchor of claim 12, wherein the portion of material is substantially flat and substantially flexible.

10 15. The anchor of claim 12, wherein the portion of material is substantially square-shaped.

16. The anchor of claim 12, wherein the portion of material and connection members are 10,000 lb capacity material.

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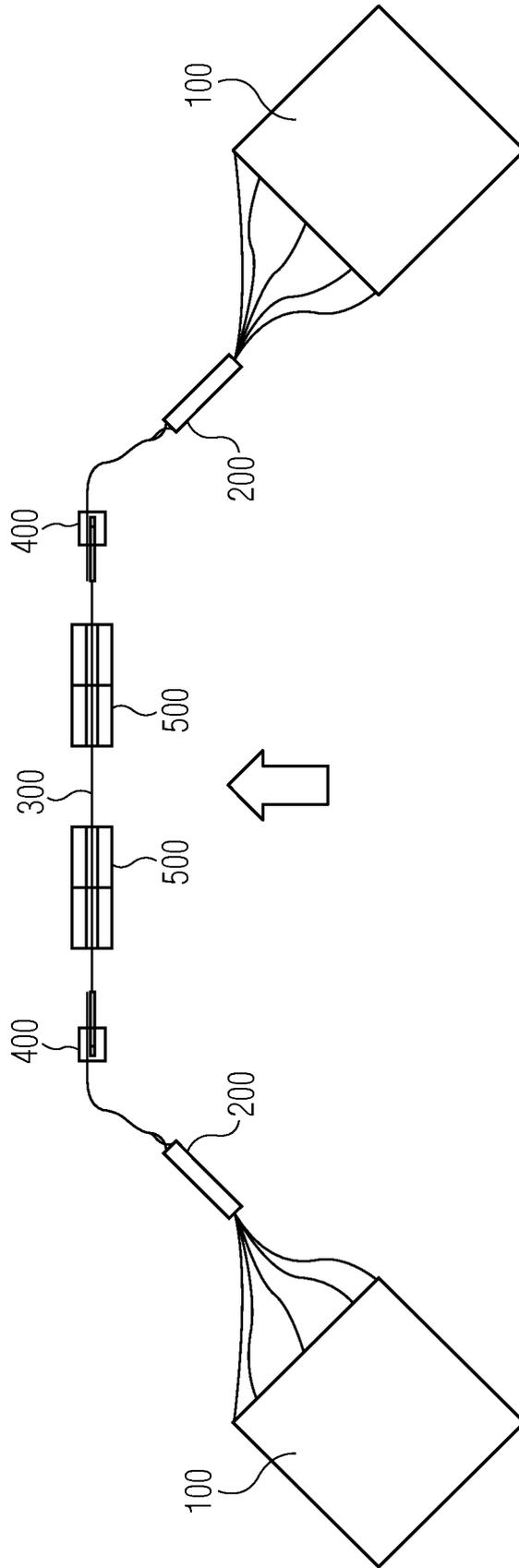


FIG. 1A

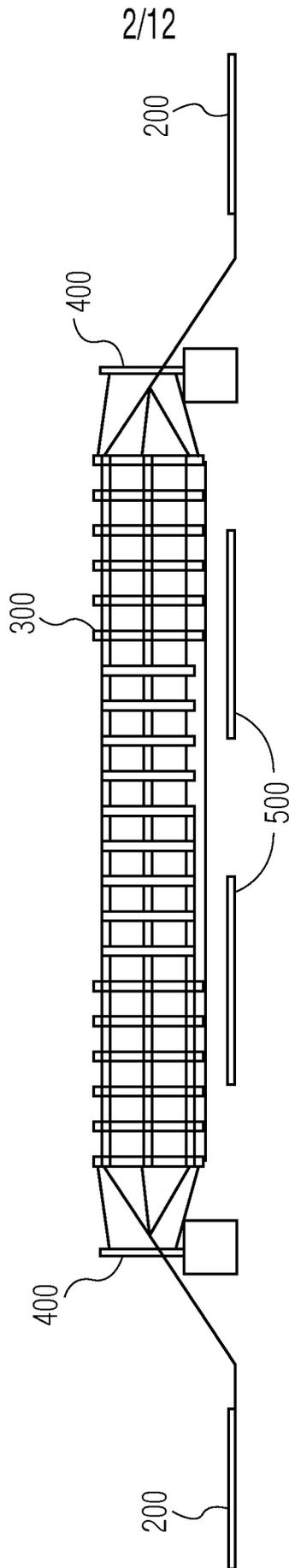


FIG. 1B

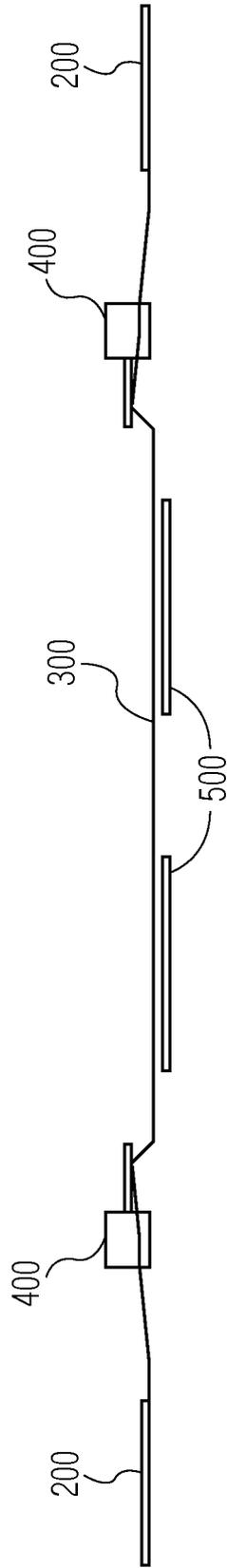


FIG. 1C

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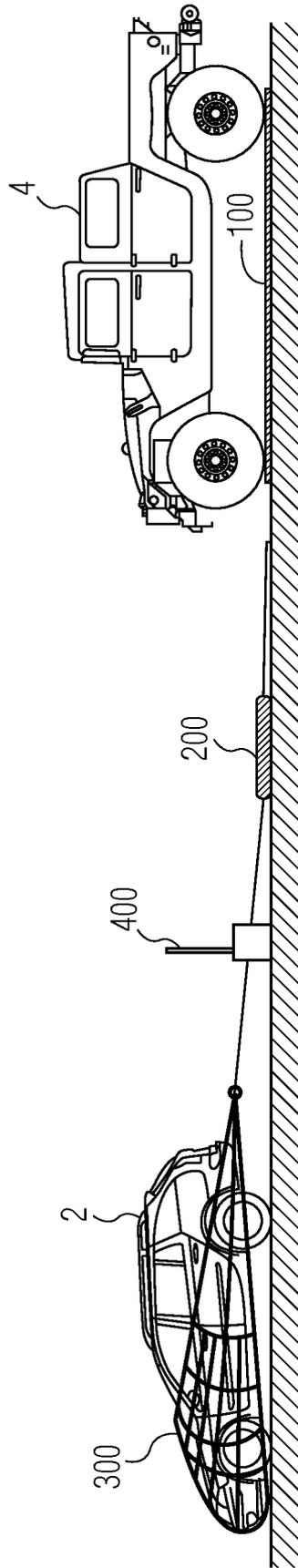


FIG. 2

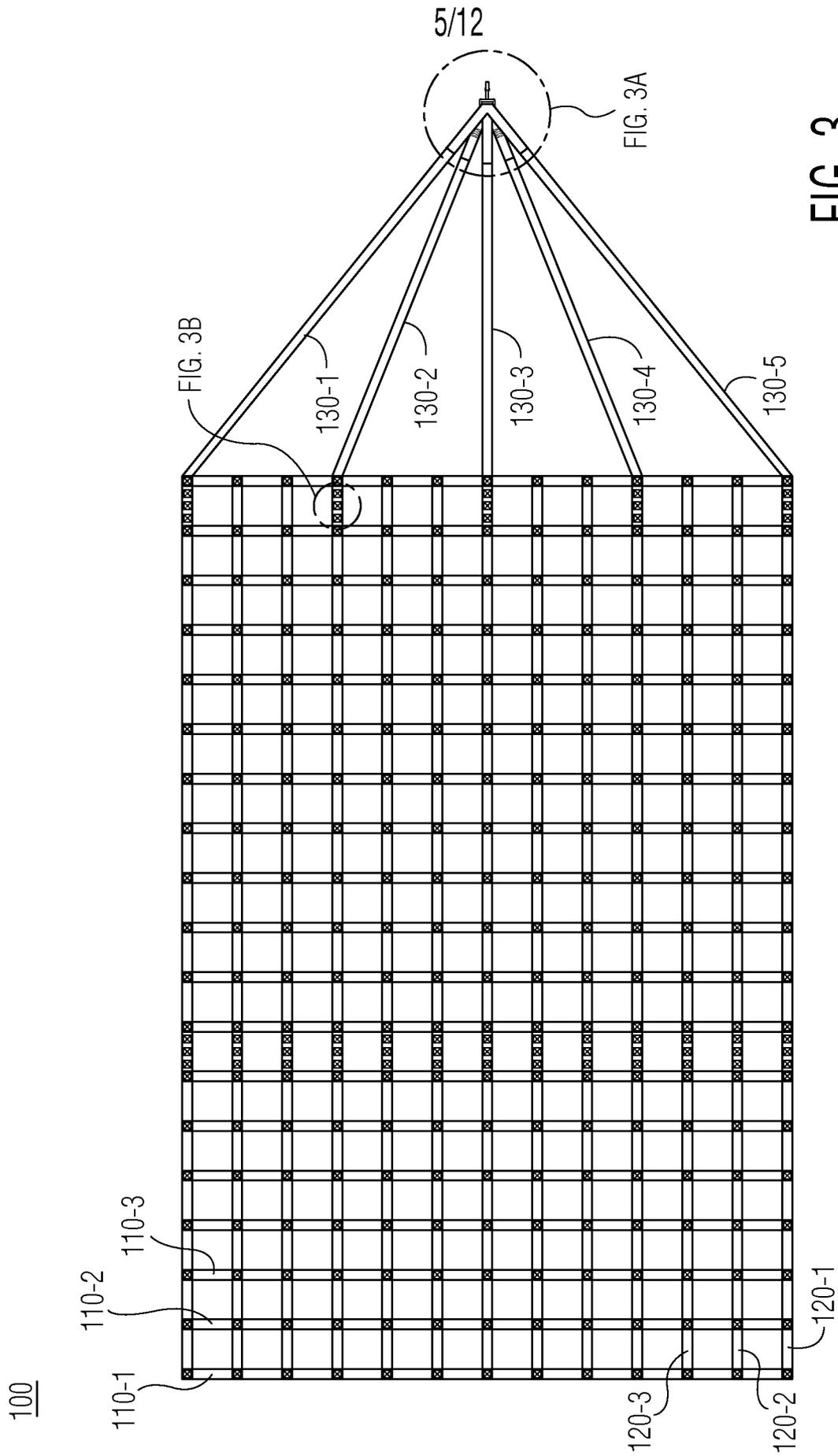


FIG. 3

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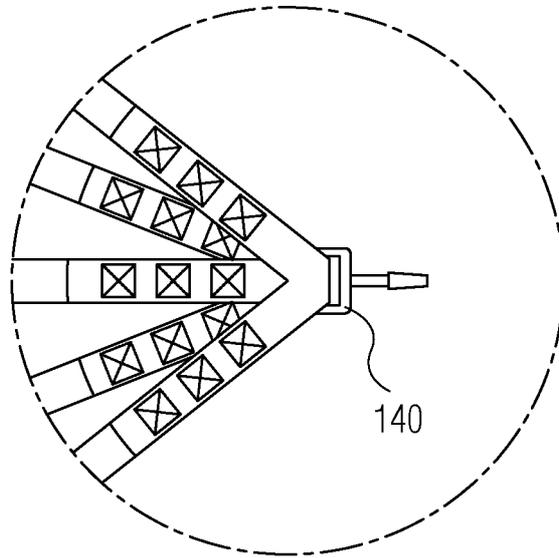


FIG. 3A

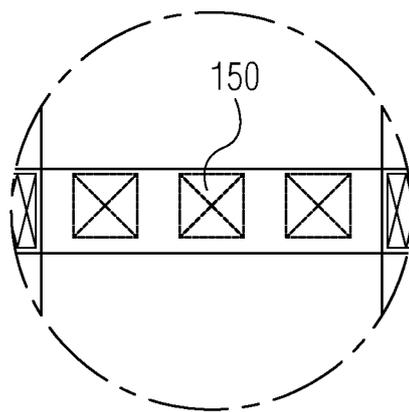


FIG. 3B

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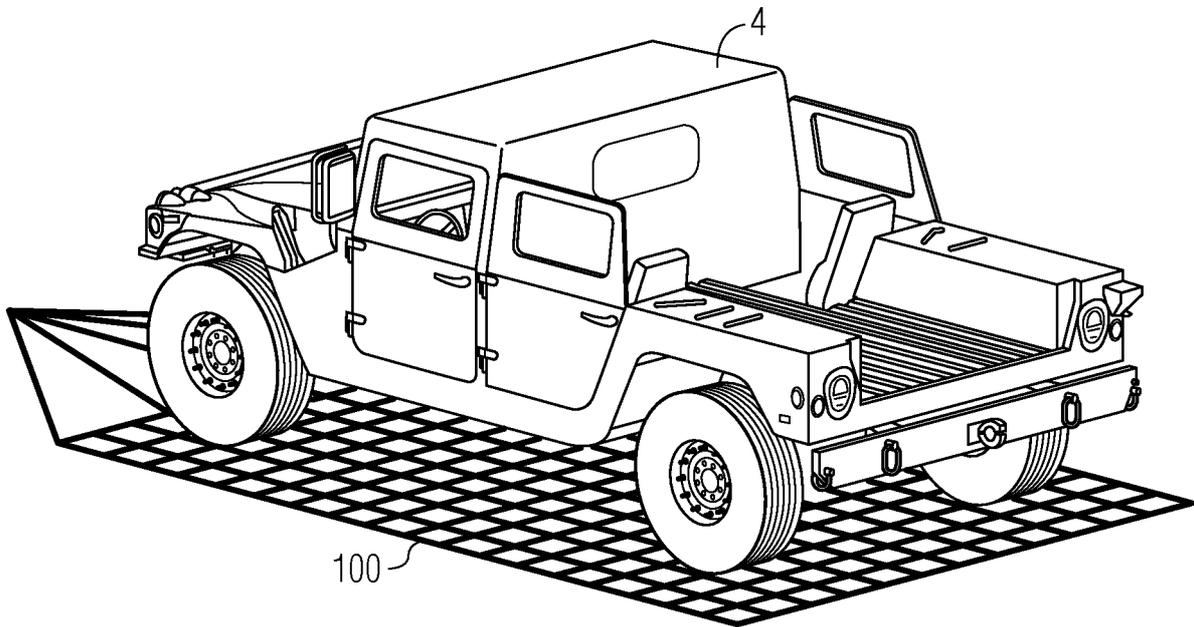


FIG. 4A

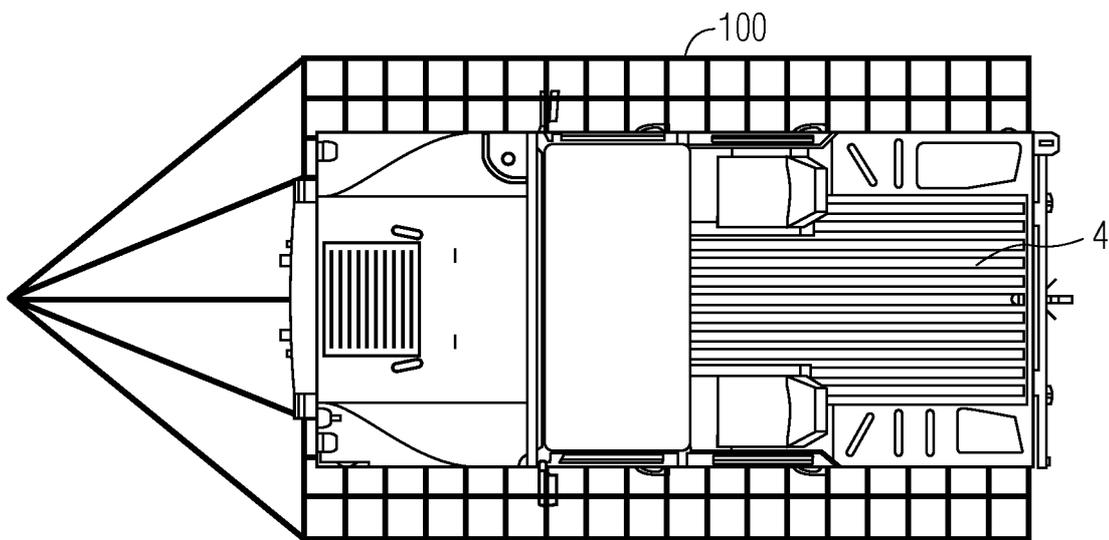


FIG. 4B

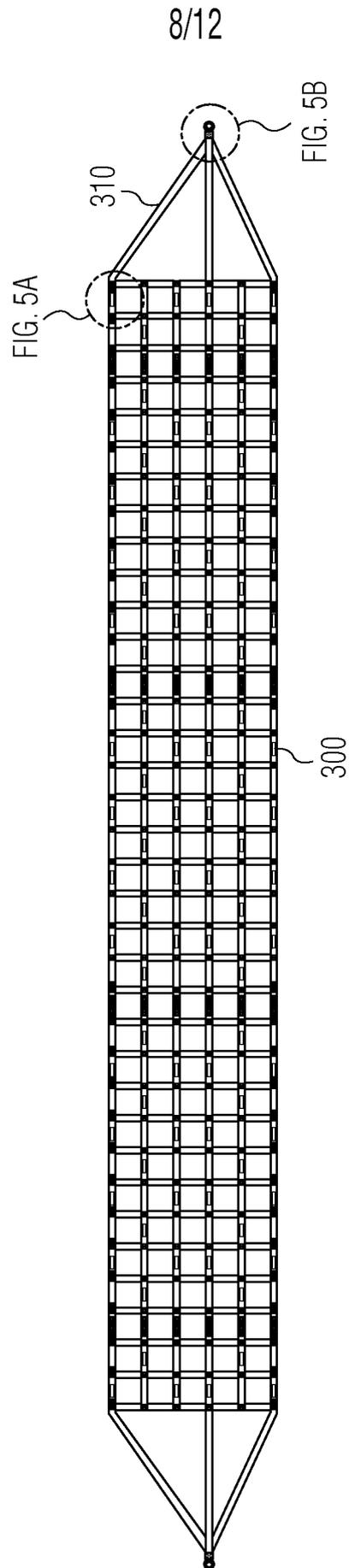


FIG. 5

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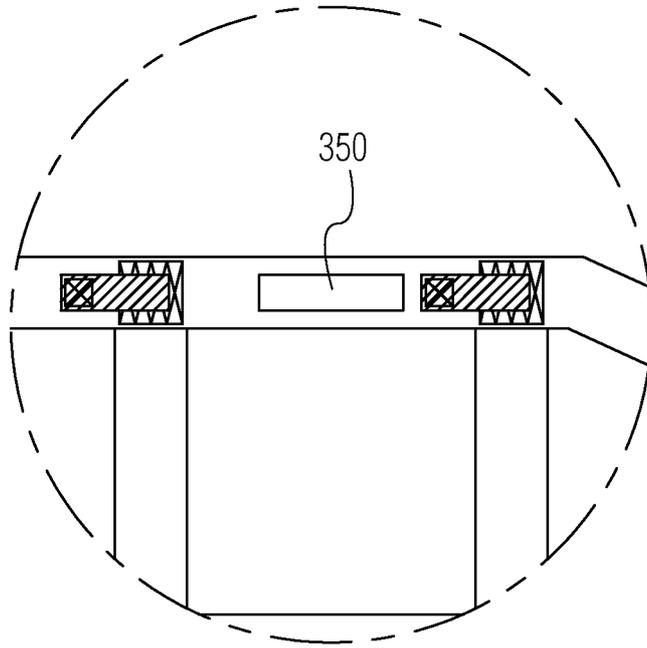


FIG. 5A

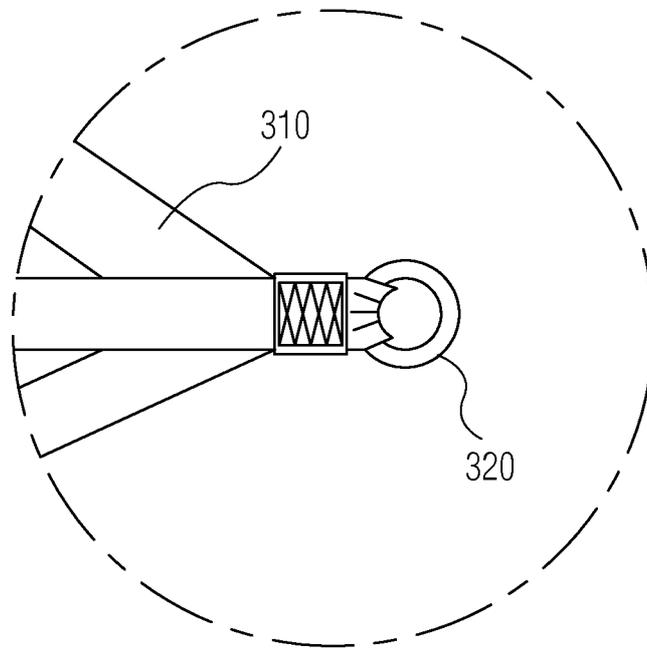


FIG. 5B

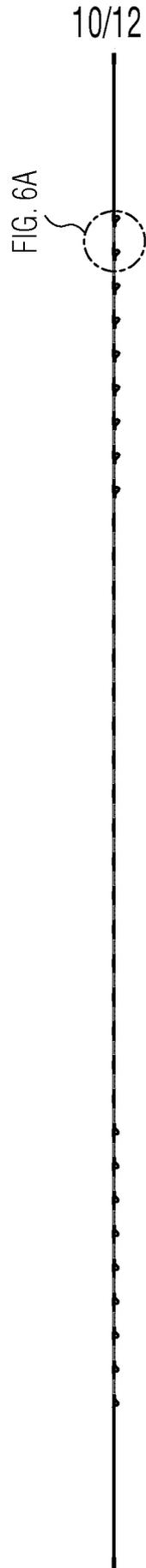


FIG. 6

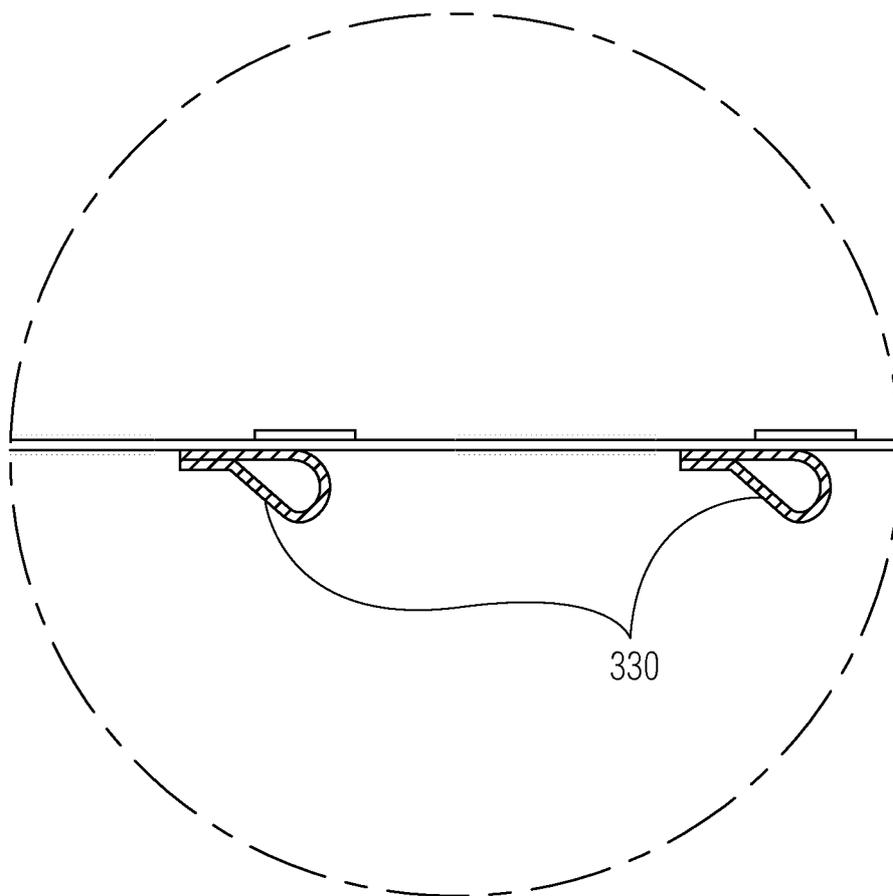


FIG. 6A

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/065418

A CLASSIFICATION OF SUBJECT MATTER IPC(8) - E01 F 13/12 (2010 01) USPC - 404/6 According to International Patent Classification (IPC) or to both national classification and IPC		
B FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC(8) - E01F 13/12, 13/00, 13/02, 15/00 (2010 01) USPC - 404/6, 244/1 10c, 110r, 256/13 1, 49/9, 131, 34 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) USPTO EAST System (US, USPG-PUB, EPO, DERWENT)		
C DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X -- Y Y Y Y A	WO 1992/002688 A1 (UOTILA) 20 February 1992 (20 02 1992) entire document US 2,675,197 A (HOSPERS) 13 April 1954 (13 04 1954) entire document US 2007/0237577 A1 (GELFAND et al) 11 October 2007 (11 10 2007) entire document US 5,605,414 A (FULLER et al) 25 February 1997 (25 02 1997) entire document US 5,310,277 A (UOTILA) 10 May 1994 (10 05 1994) entire document	1, 2, 5-8, 10, 12, 14-16 ----- 3, 4, 9, 11, 13 3, 4 9, 13 11 1-16
D Further documents are listed in the continuation of Box C <input type="checkbox"/>		
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Date of the actual completion of the international search 11 January 2010		Date of mailing of the international search report 21 JAN 2010
Name and mailing address of the ISA/US Mail Stop PCT, Attn ISA/US, Commissioner for Patents P O Box 1450, Alexandria, Virginia 22313-1450 Facsimile No 571-273-3201		Authorized officer Blaine R Copenheaver PCT Helpd Desk 571 272-4300 PCT OSP 571 272 7774