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(54) **VEHICLE ENTERTAINMENT APPARATUS**

**Publication Classification**

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(52) **U.S. Cl.**  
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(21) Appl. No.: **18/046,276**

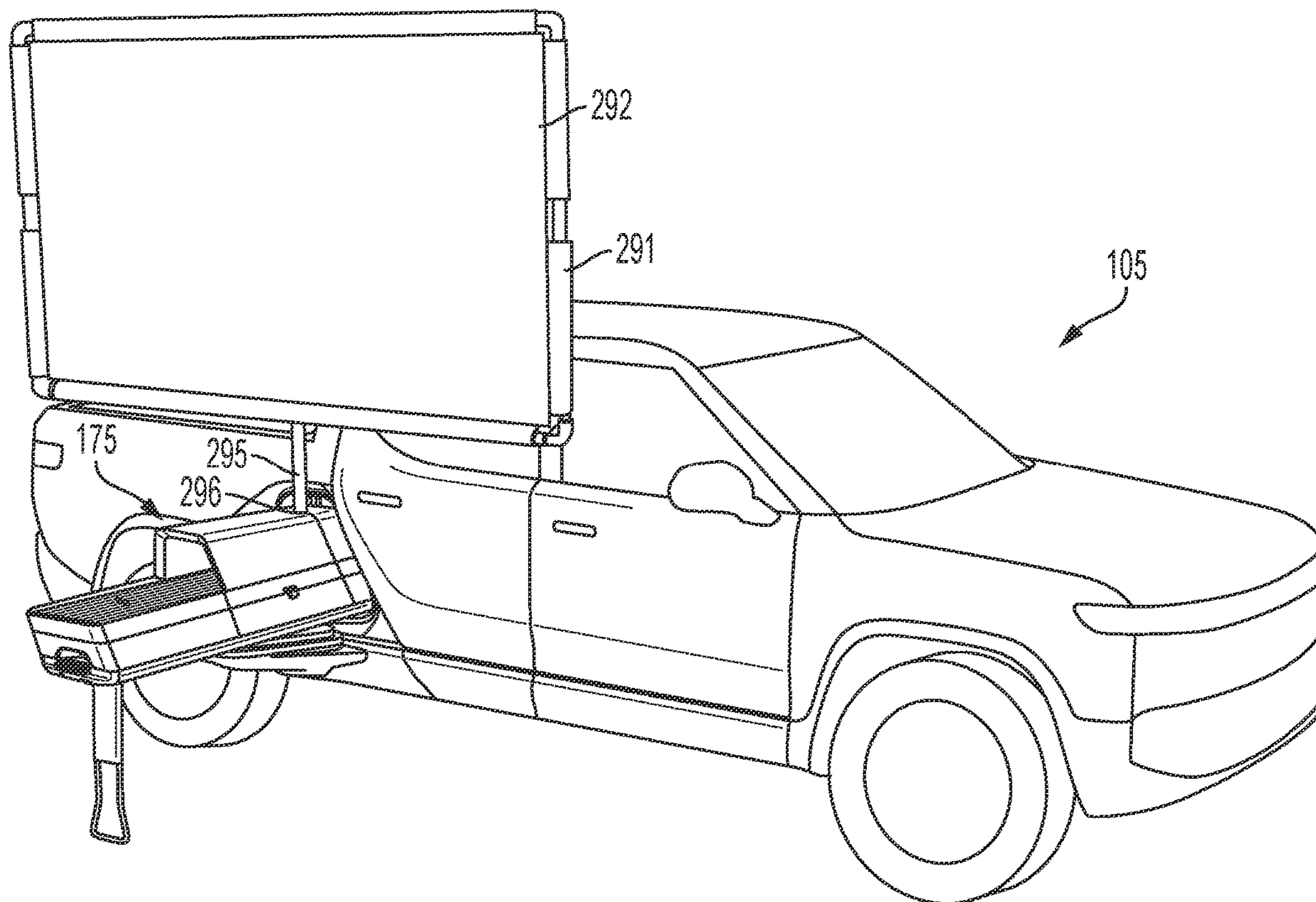
(57) **ABSTRACT**

(22) Filed: **Oct. 13, 2022**

**Related U.S. Application Data**

(60) Provisional application No. 63/343,684, filed on May 19, 2022.

Disclosed are systems and methods for a vehicle and projector module. The vehicle can include a compartment. The vehicle can include a projector module configured to extend from the compartment to provide light to a projector screen.



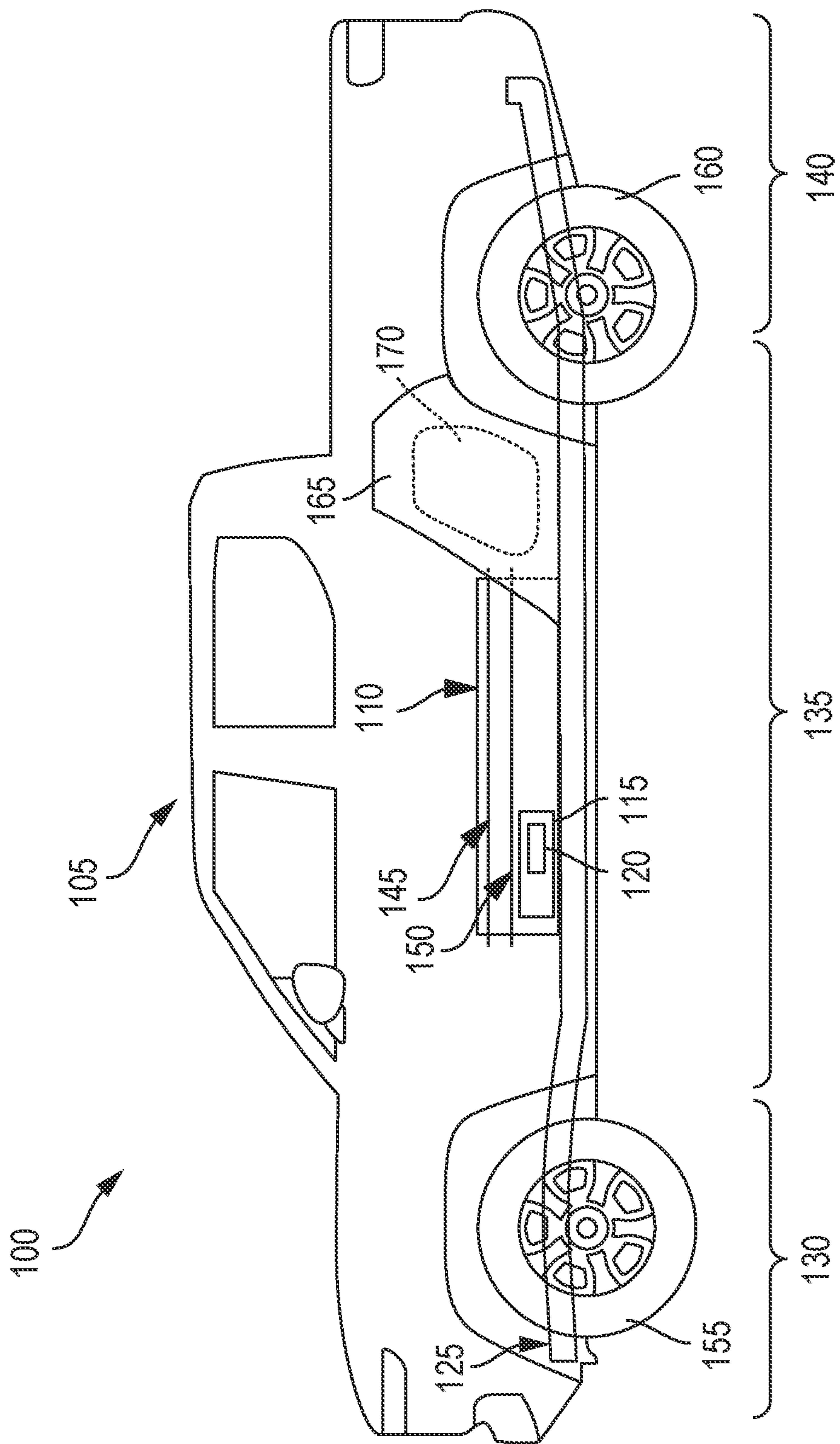


FIG. 1A

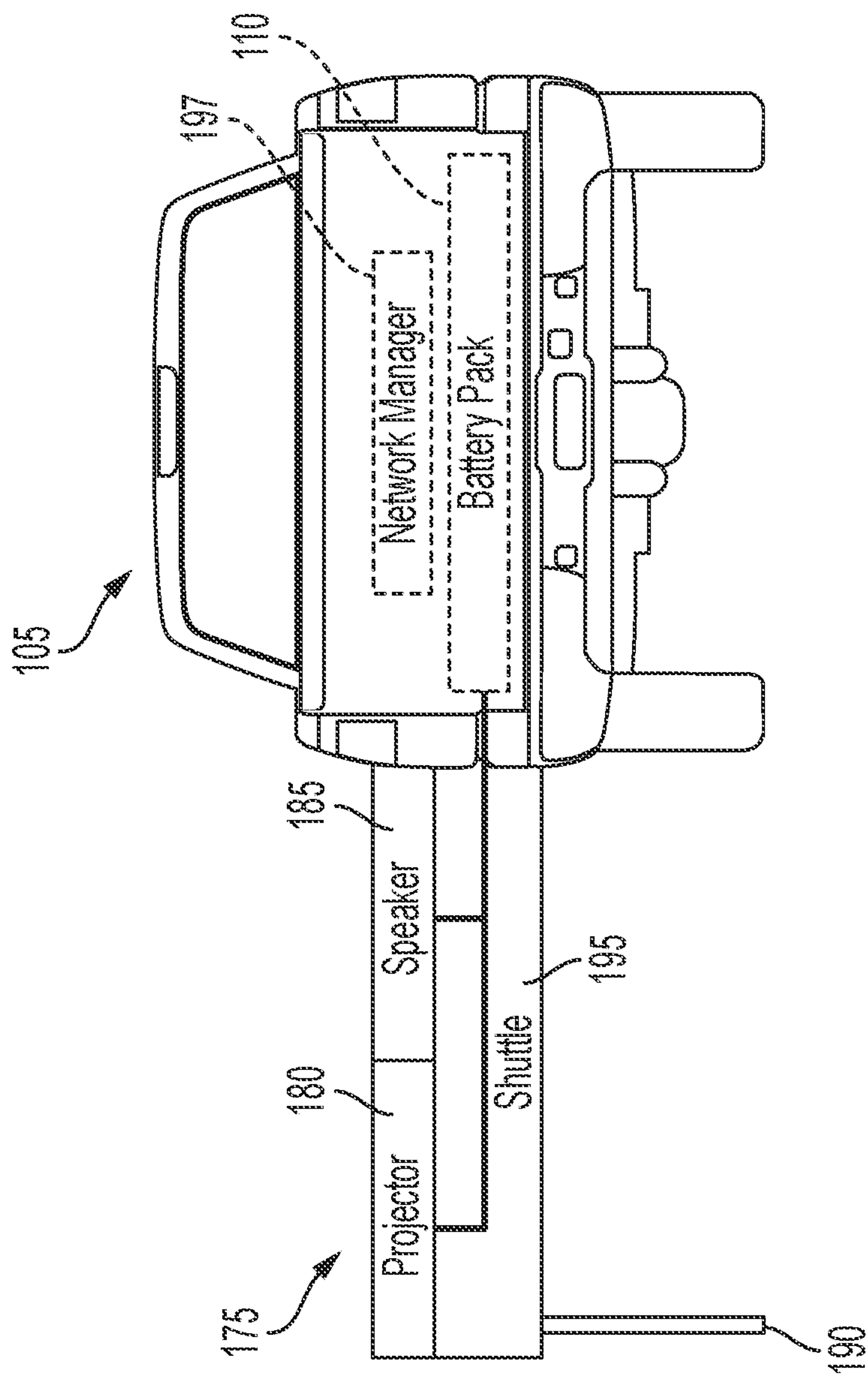


FIG. 1B

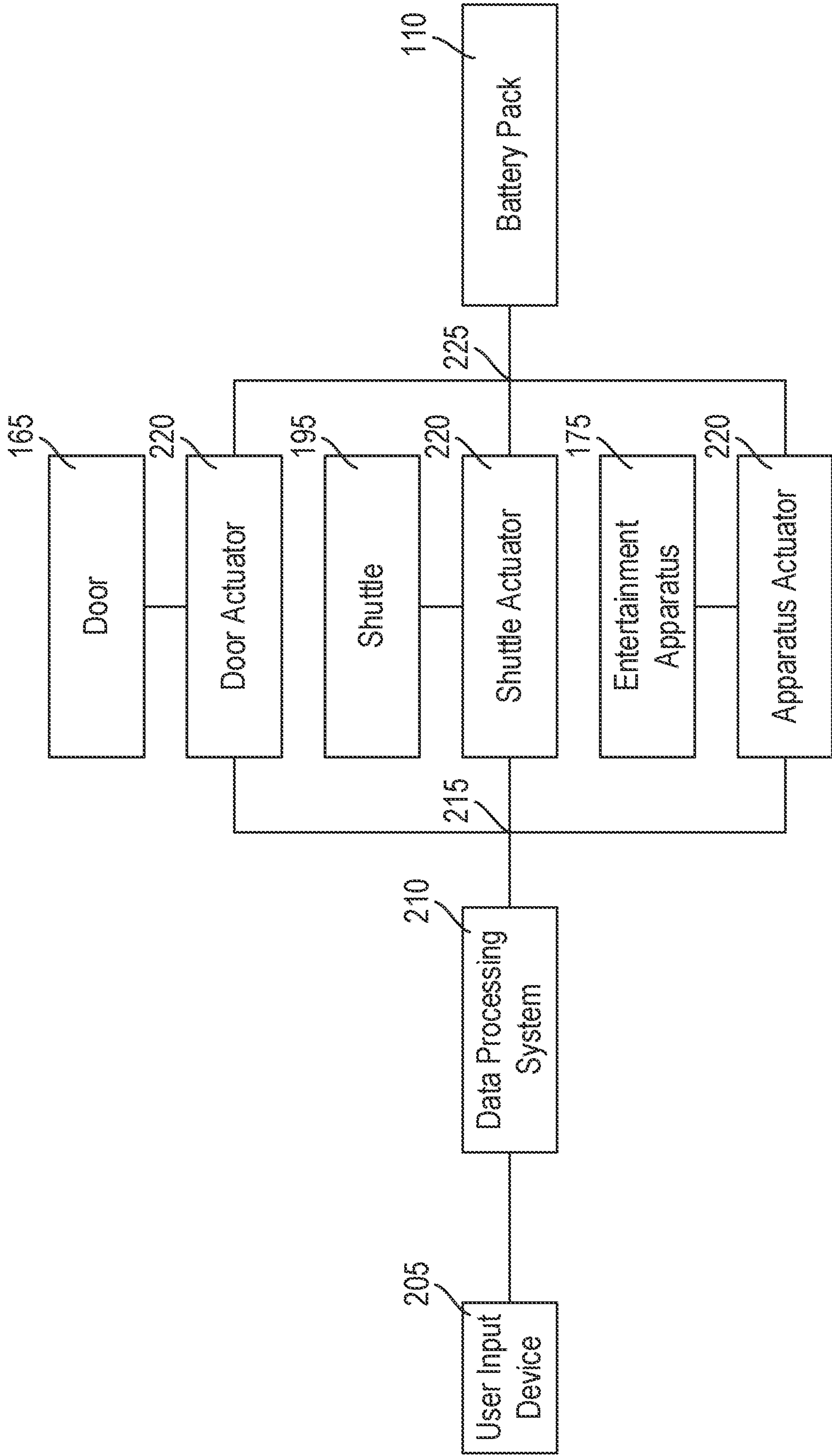


FIG. 2A



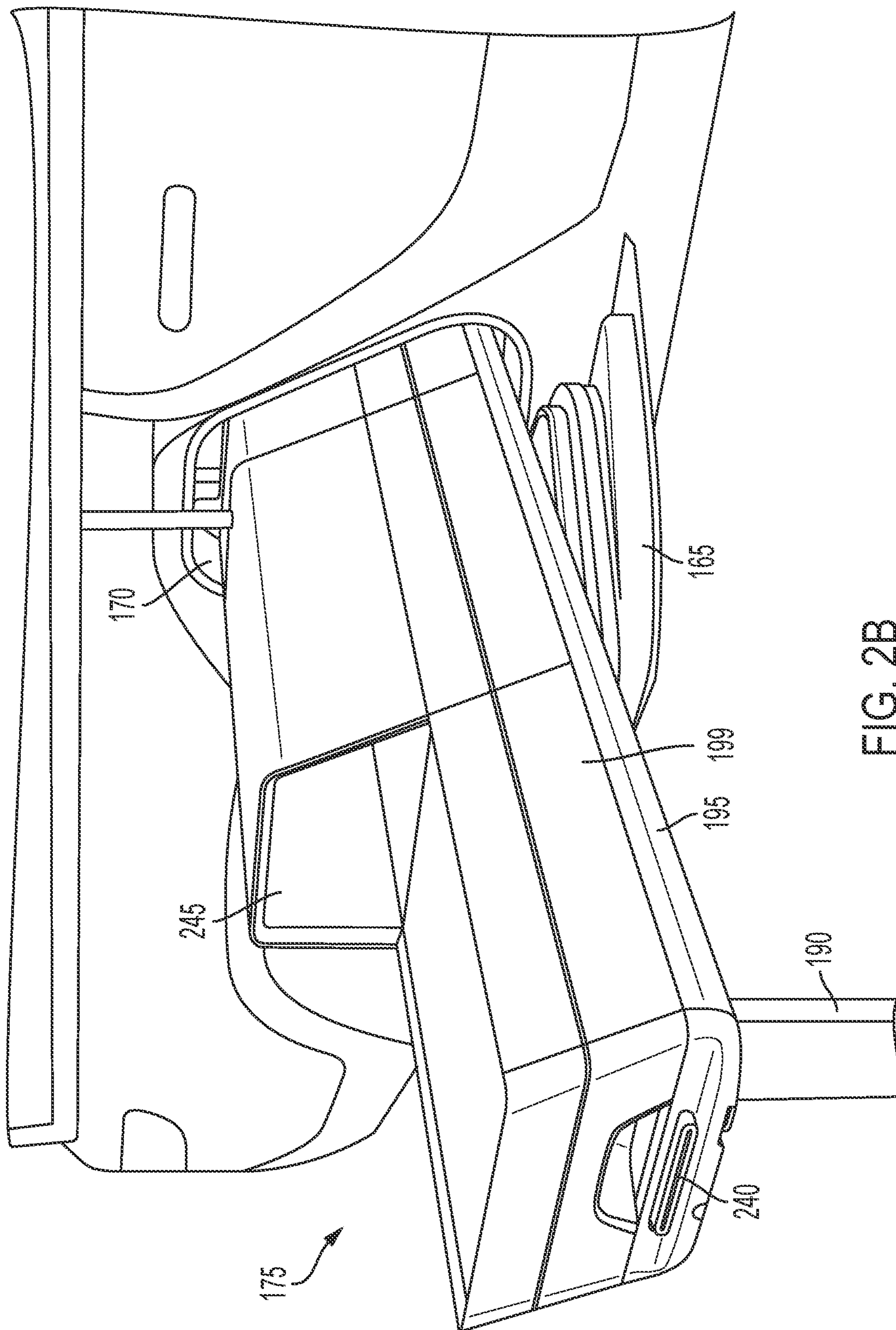


FIG. 2B

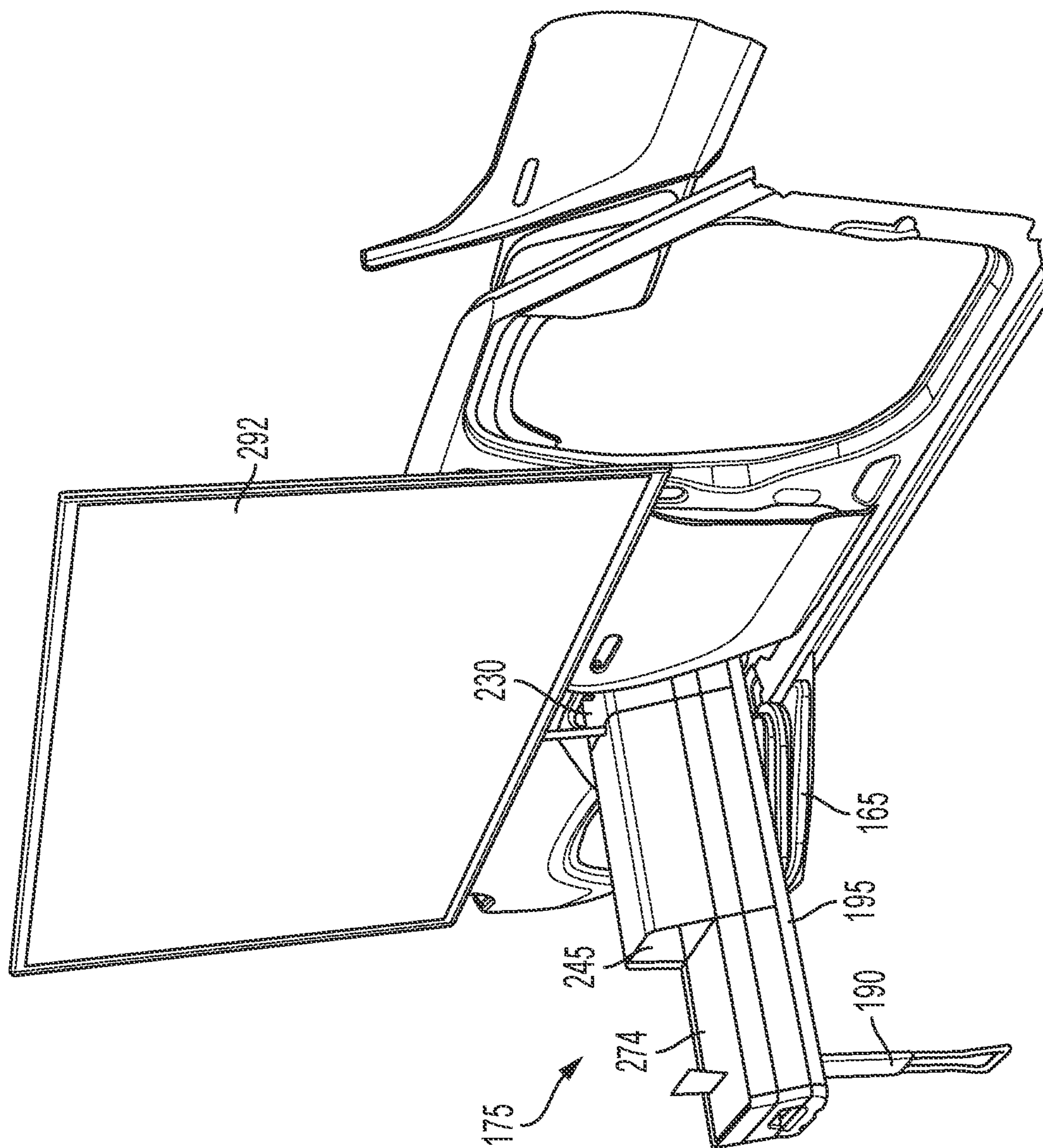


FIG. 2C



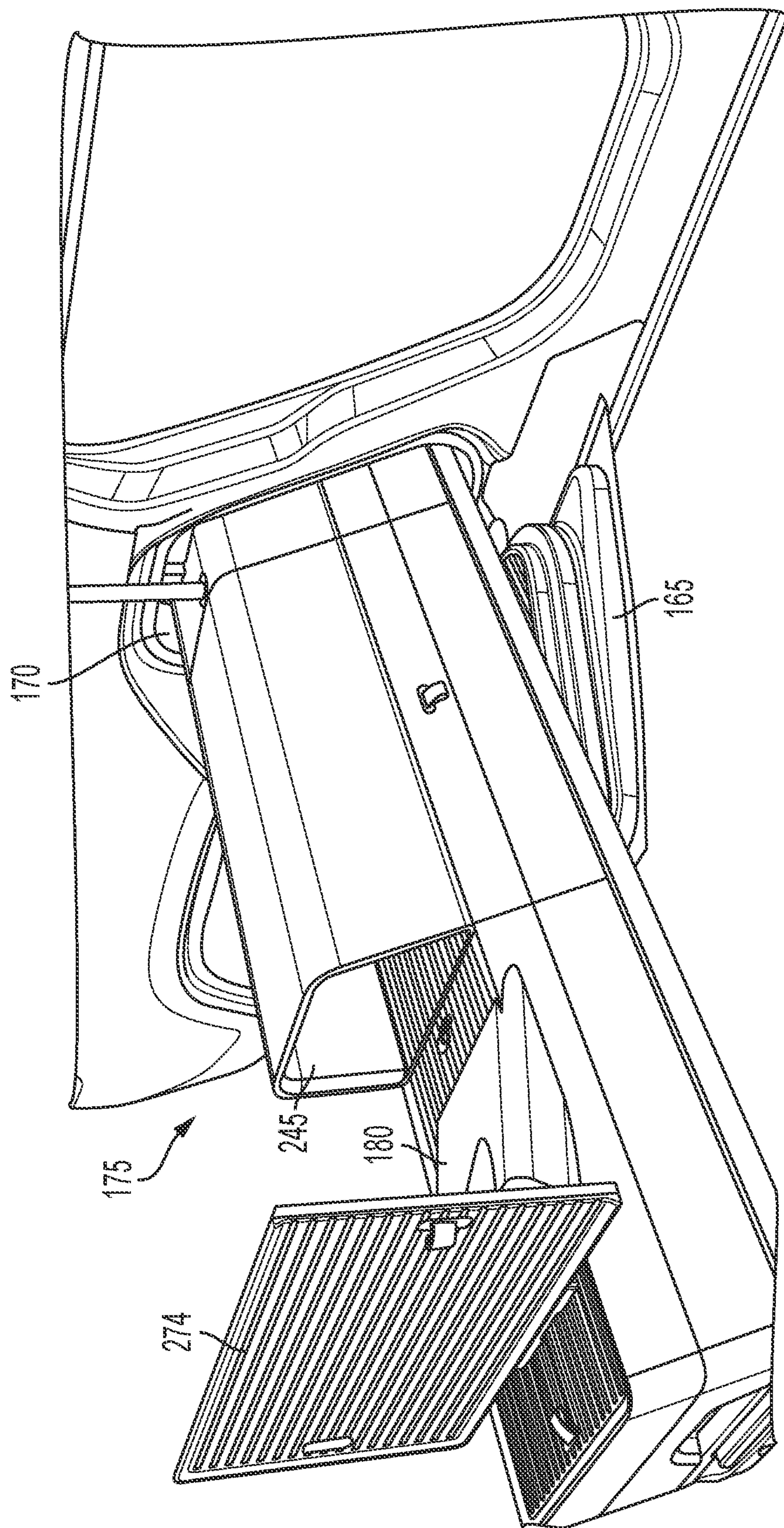


FIG. 2D

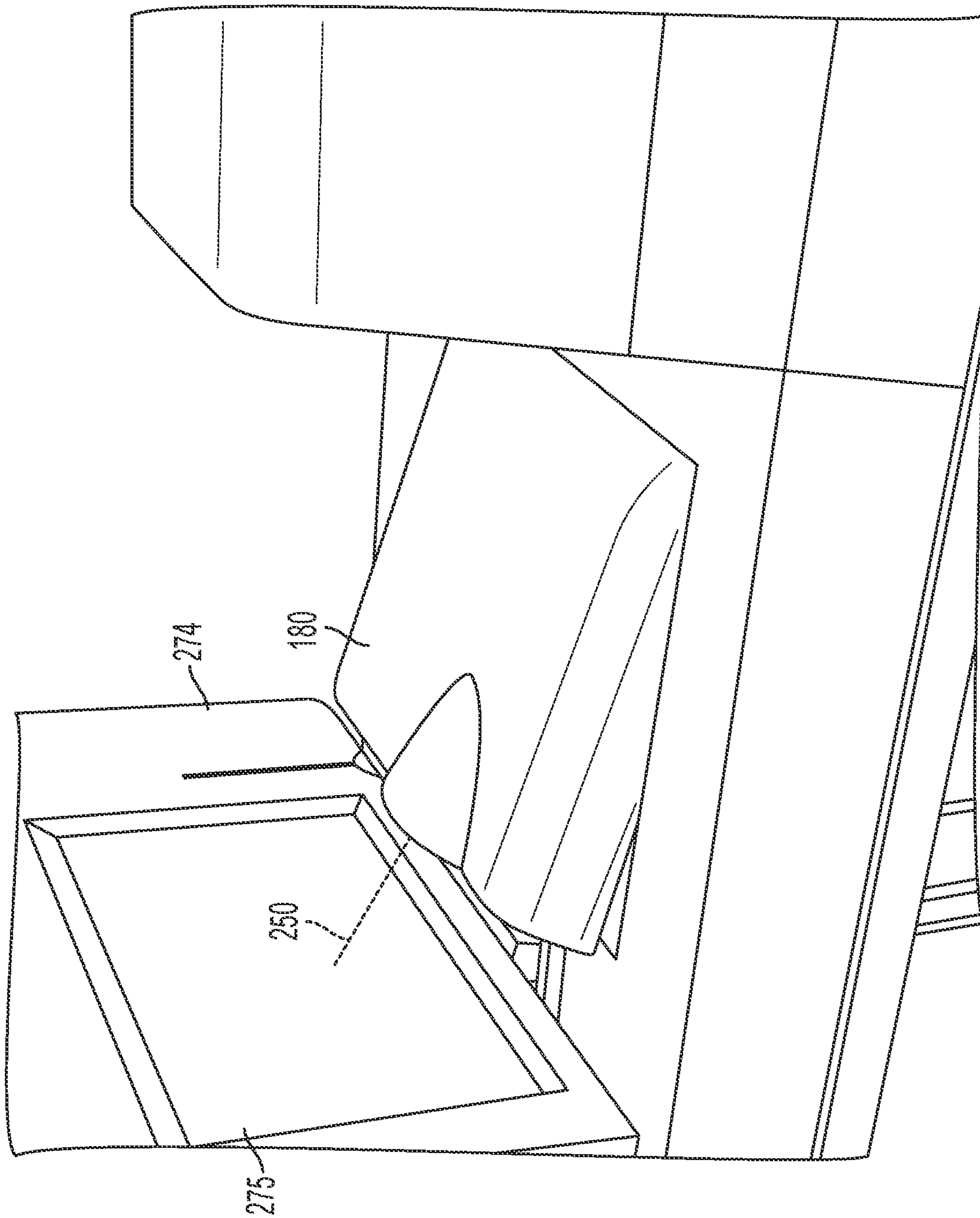


FIG. 2E



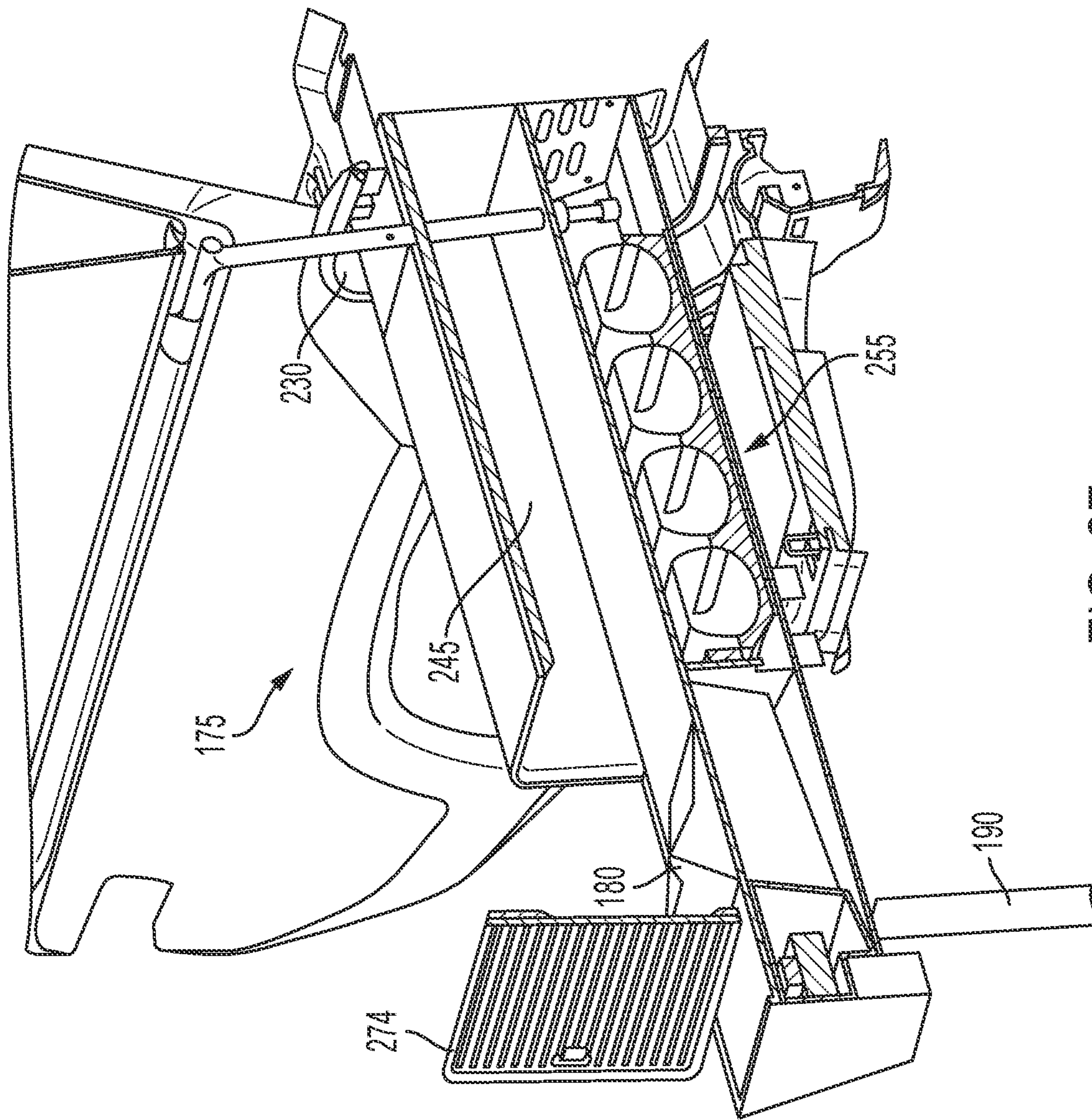


FIG. 2F

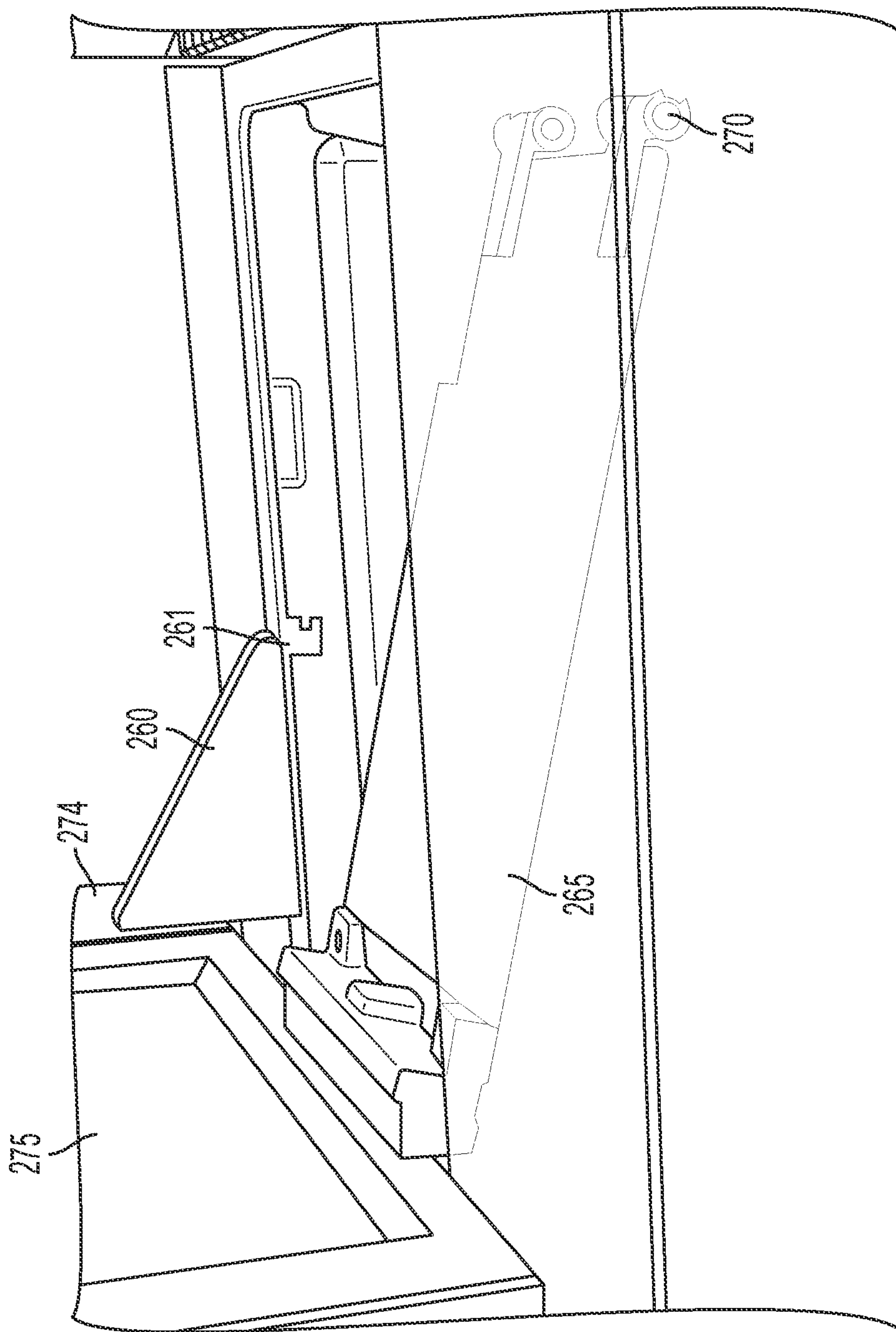


FIG. 2G

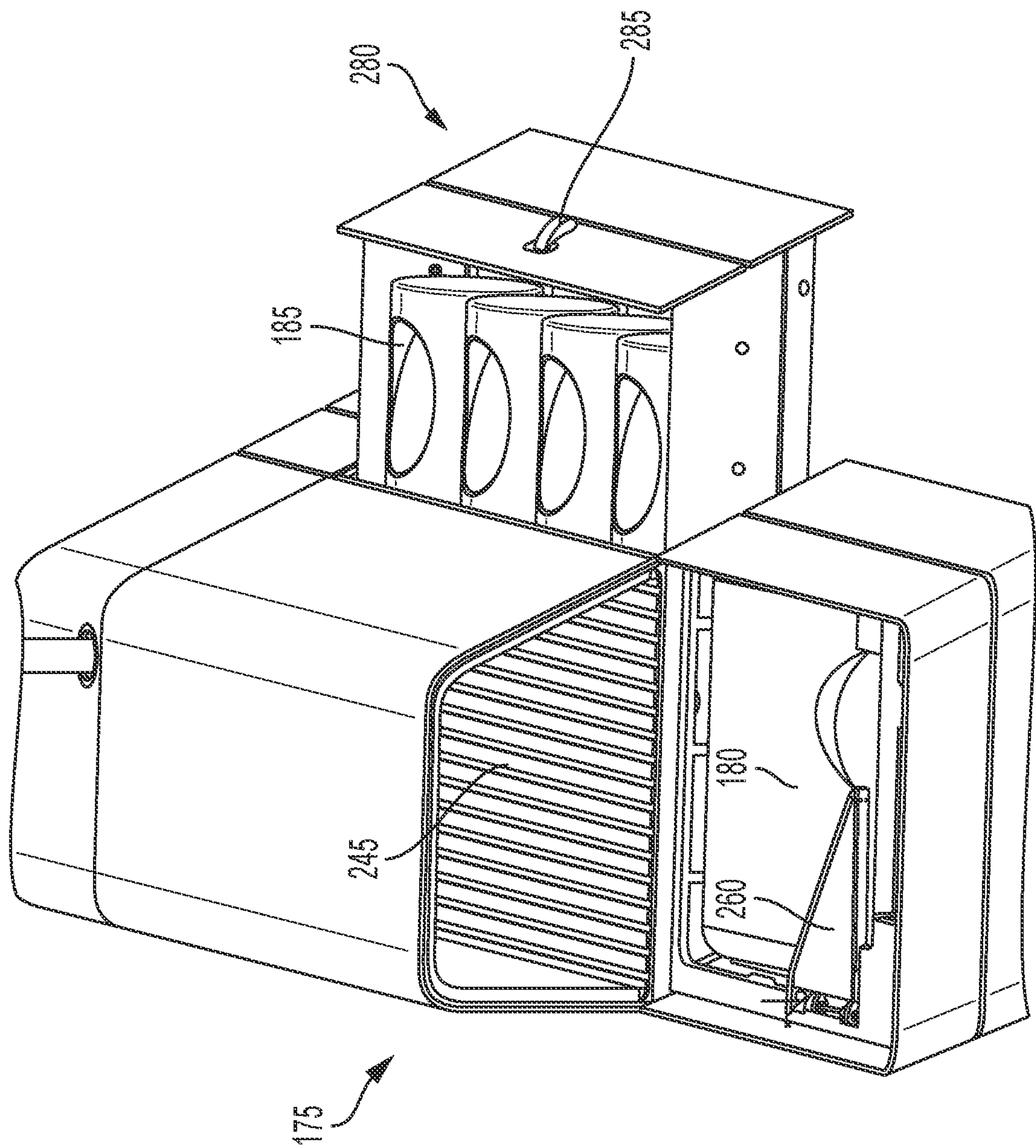


FIG. 2H



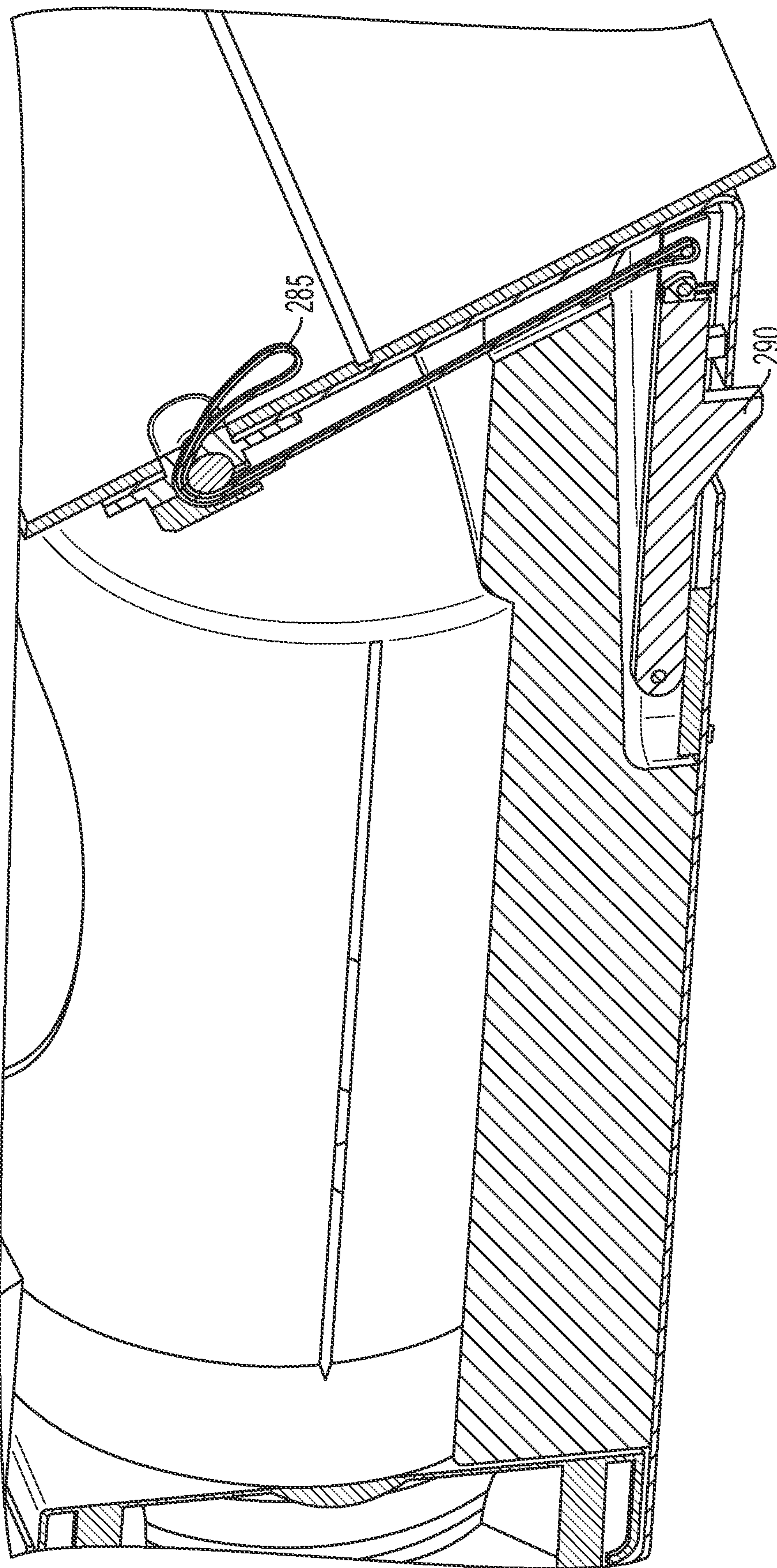


FIG. 21

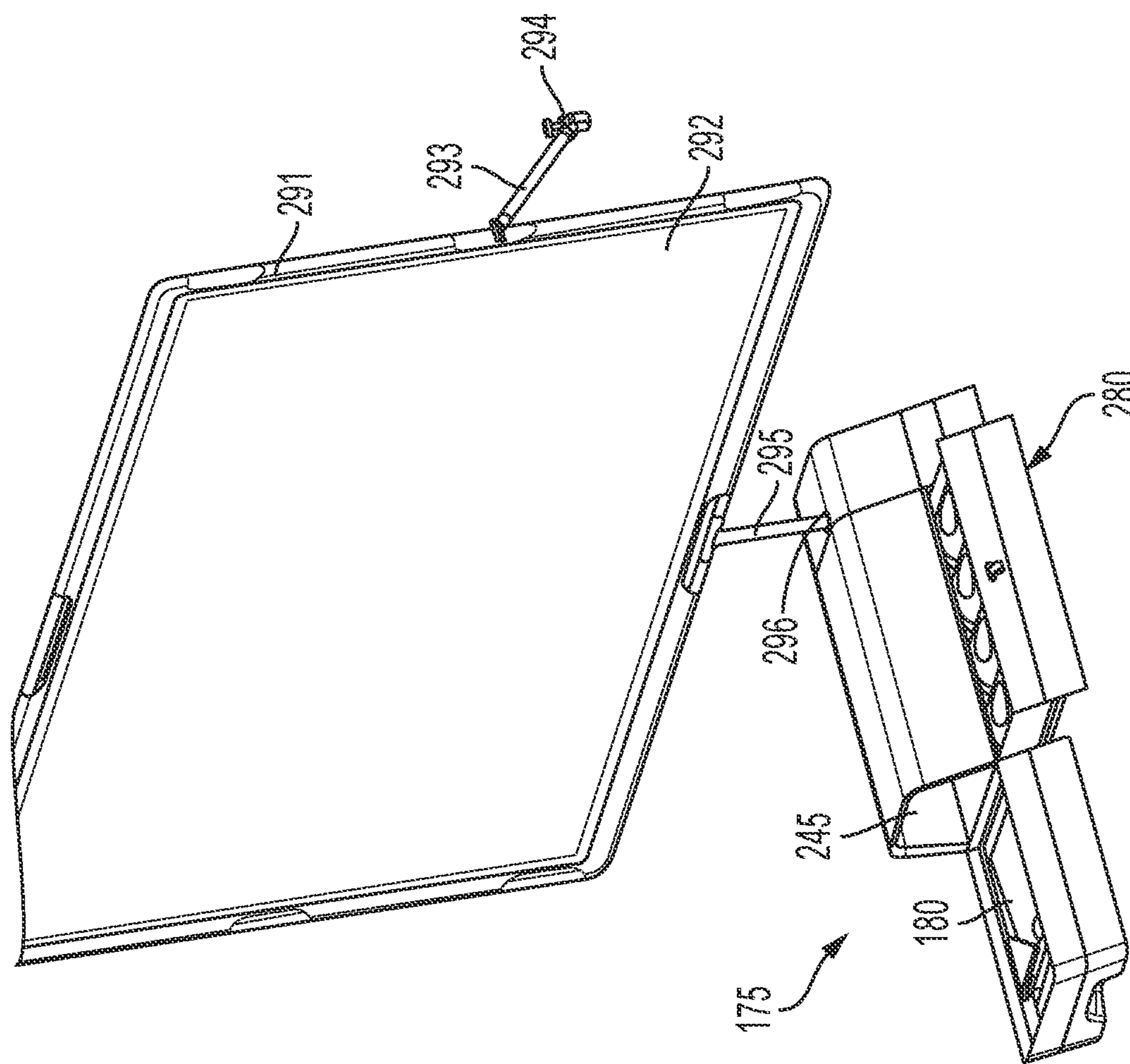


FIG. 2J

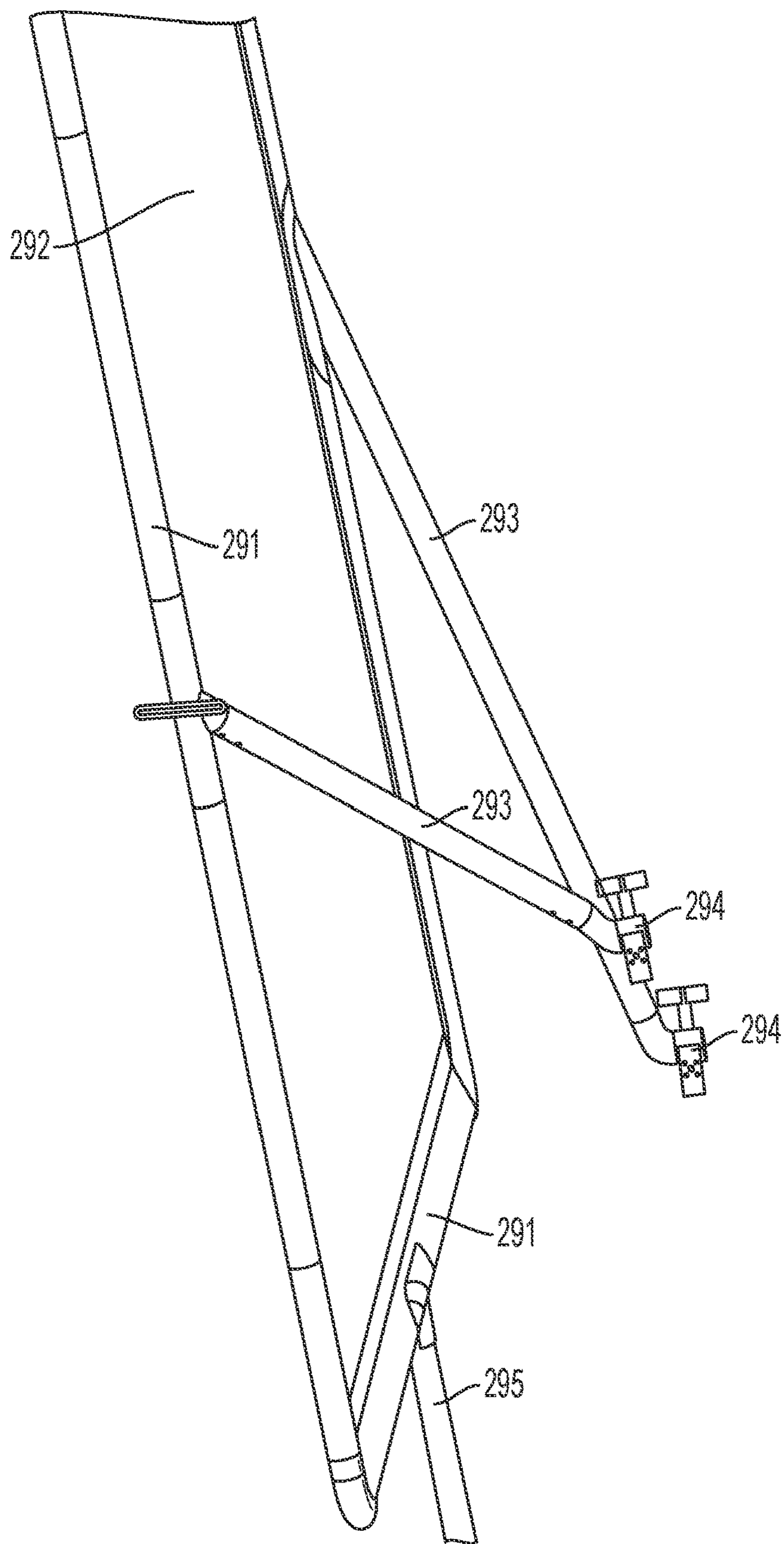


FIG. 2K



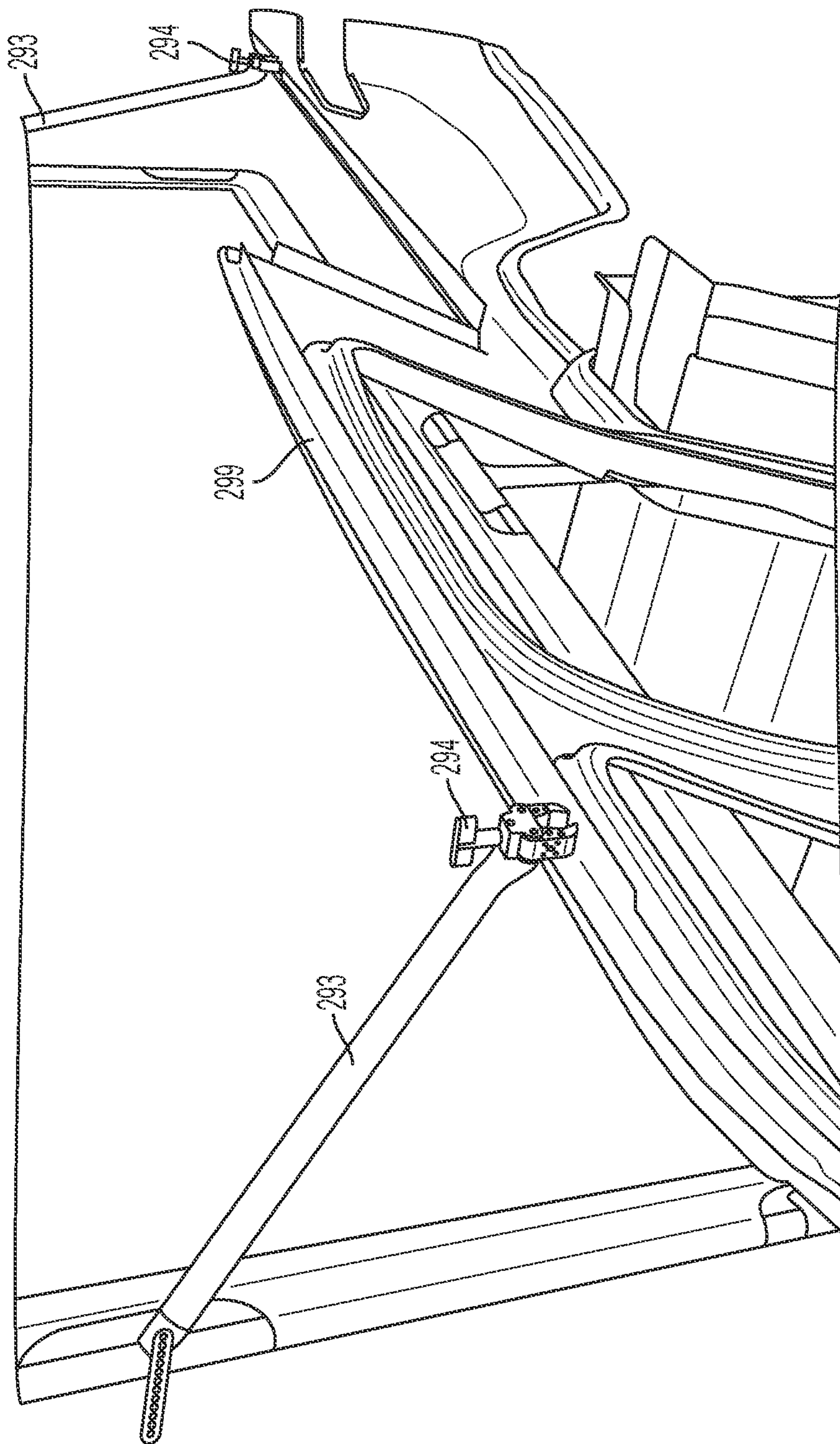


FIG. 2L

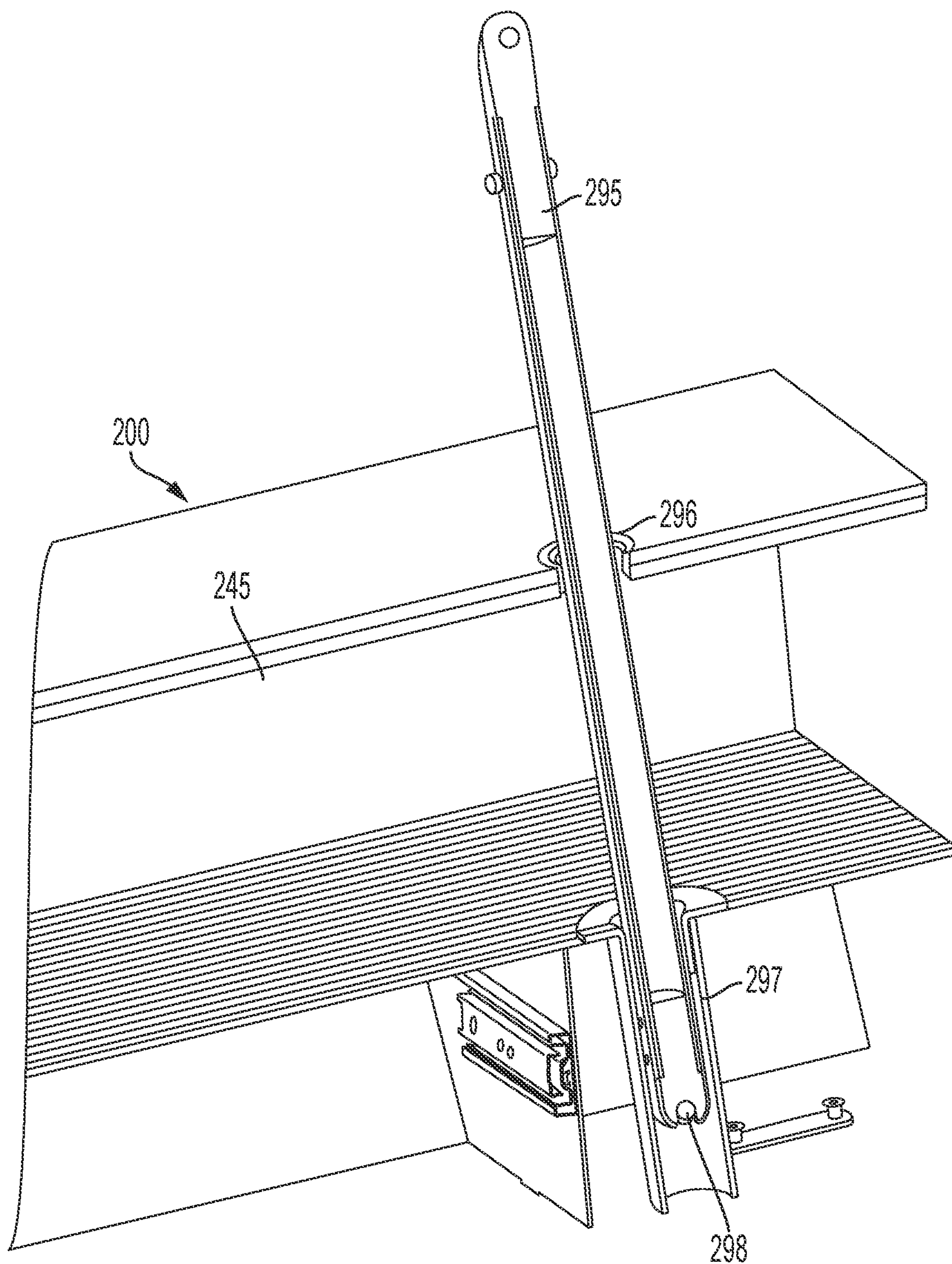


FIG. 2M

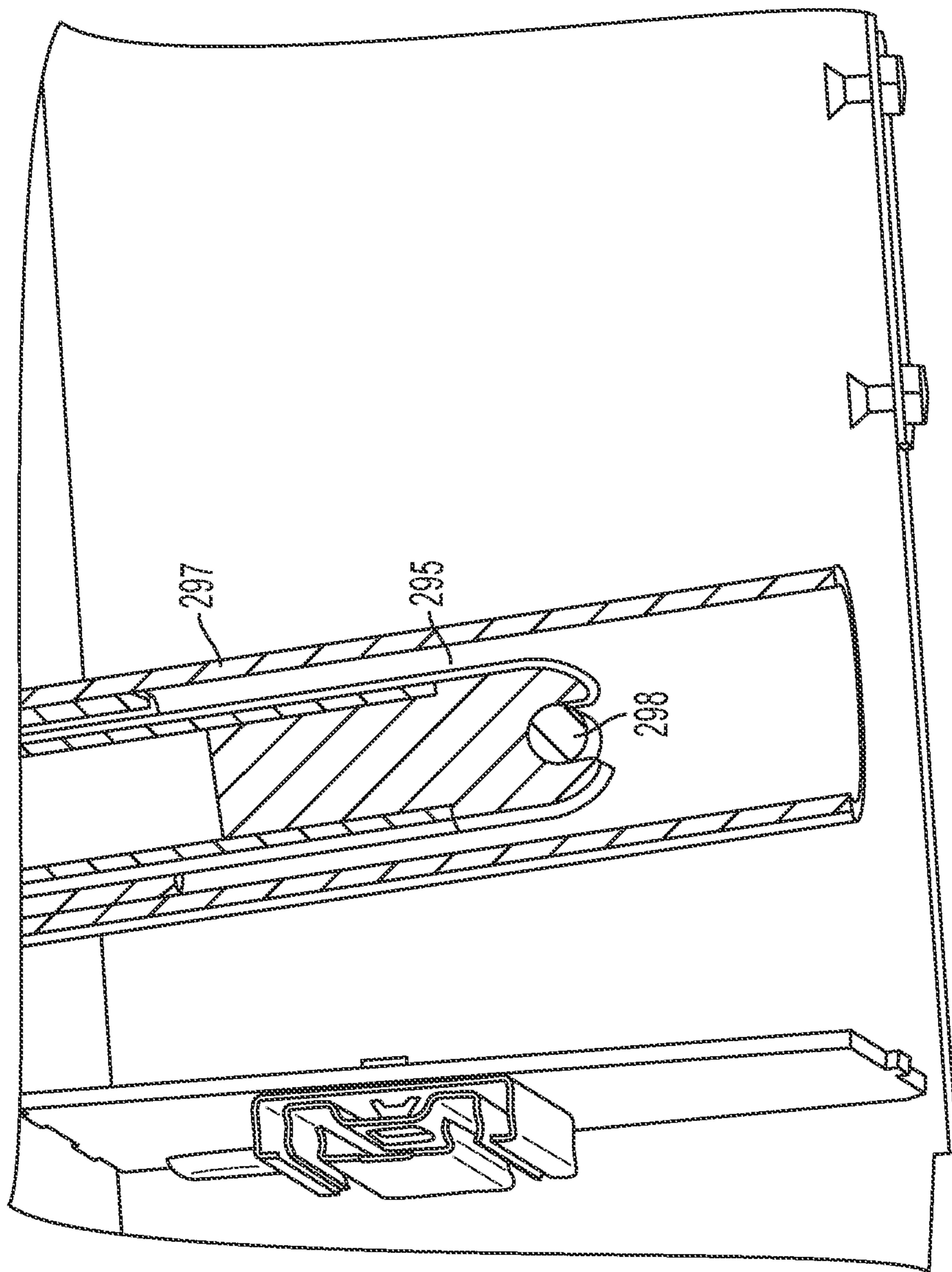


FIG. 2N



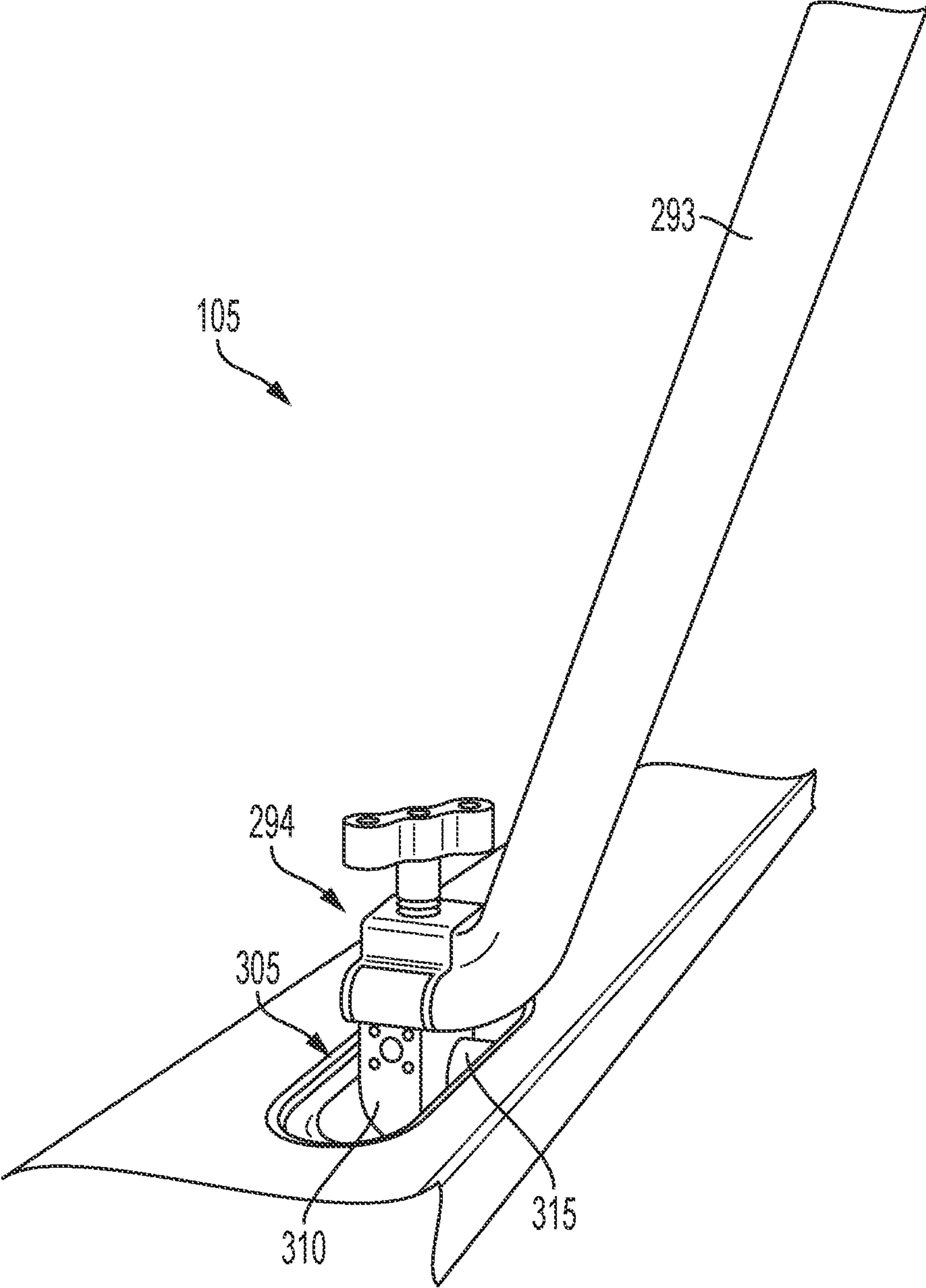


FIG. 3A

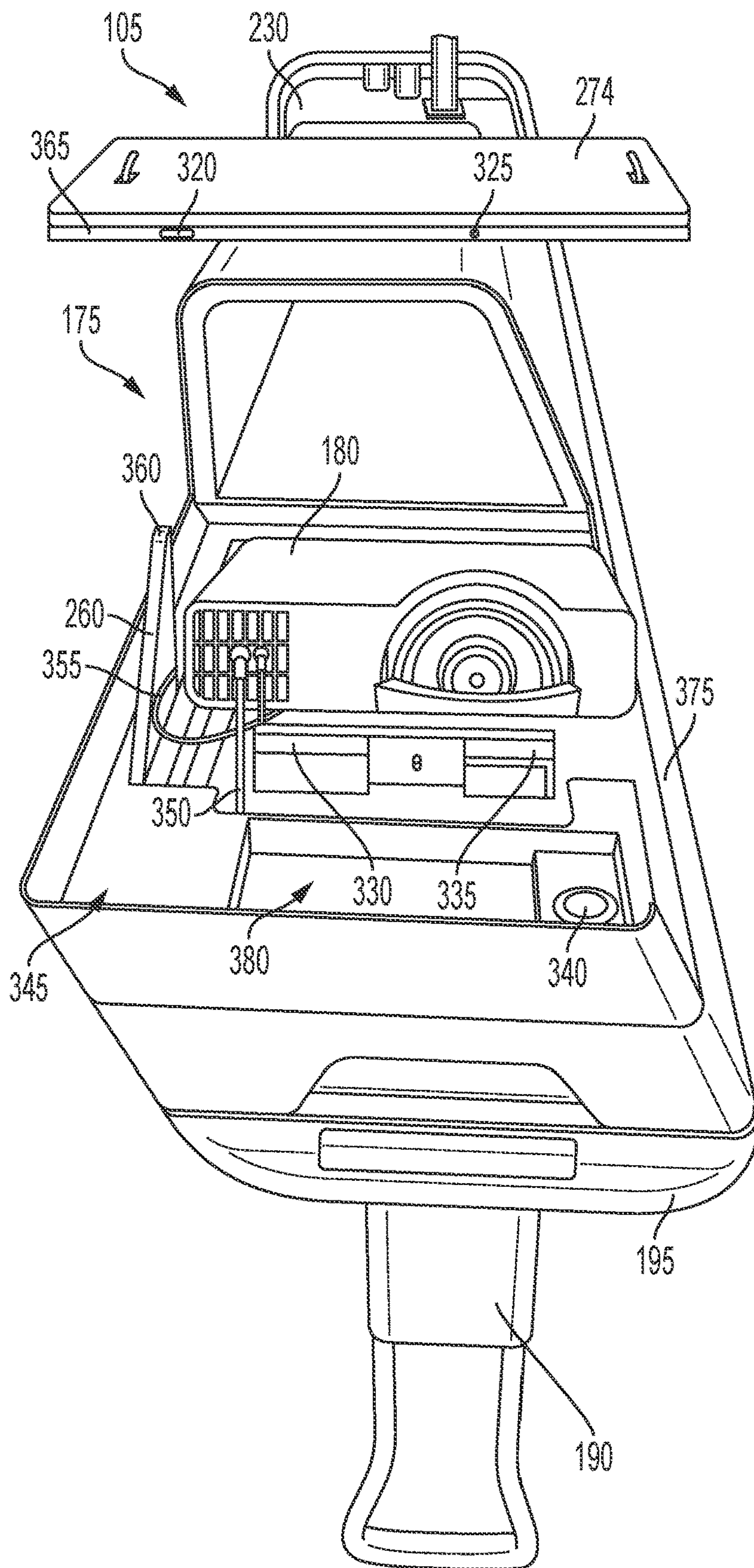


FIG. 3B

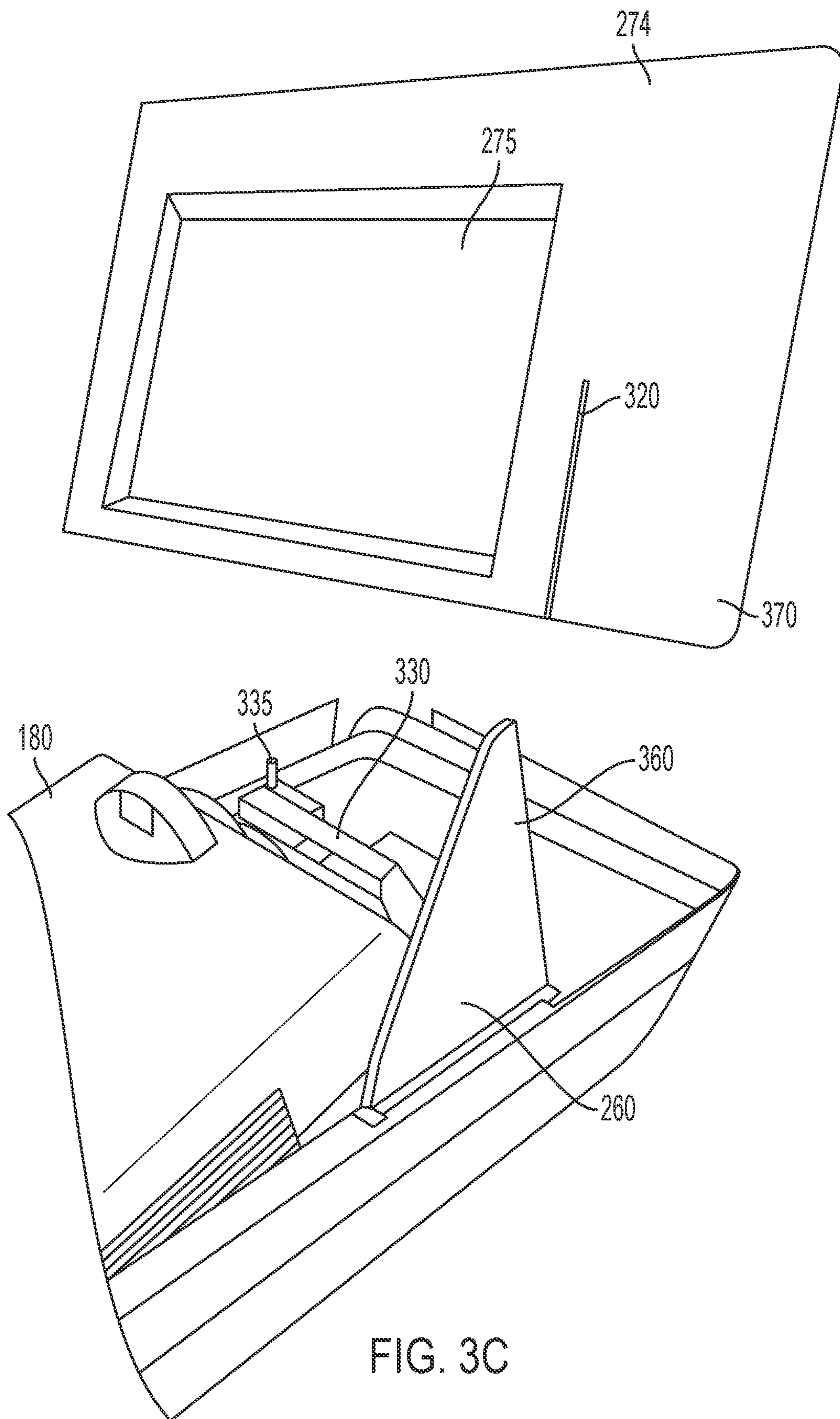


FIG. 3C



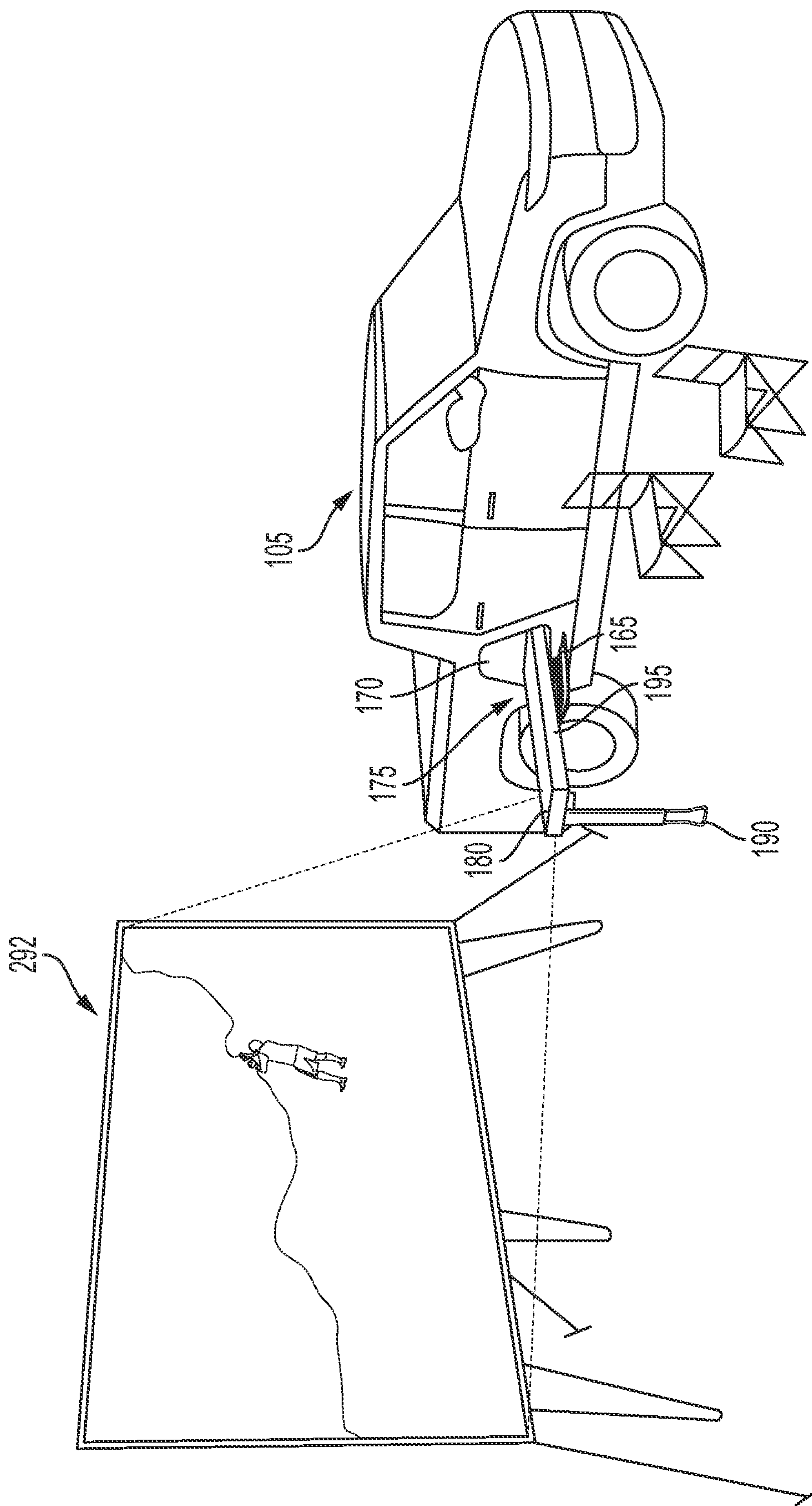


FIG. 3D

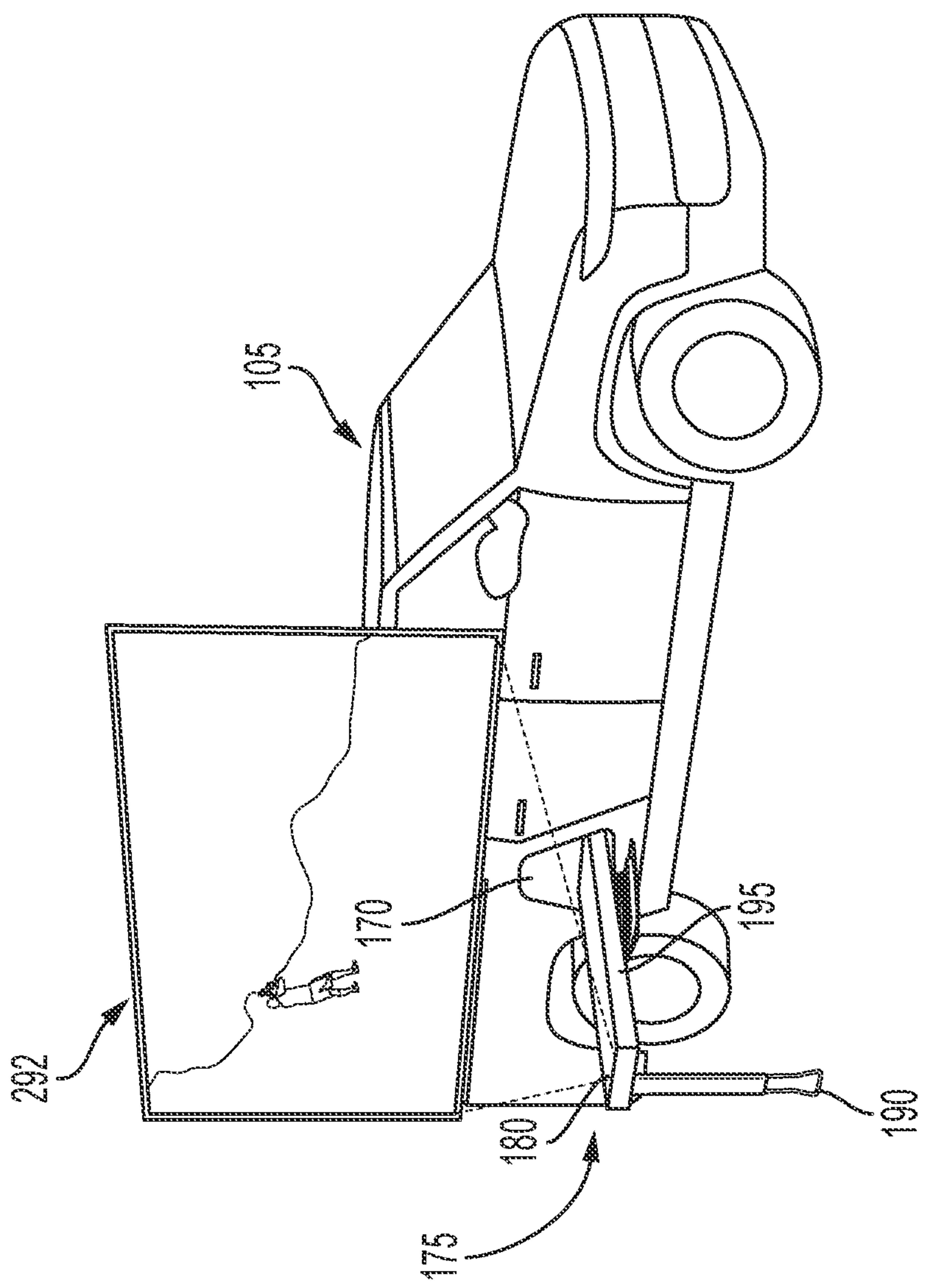
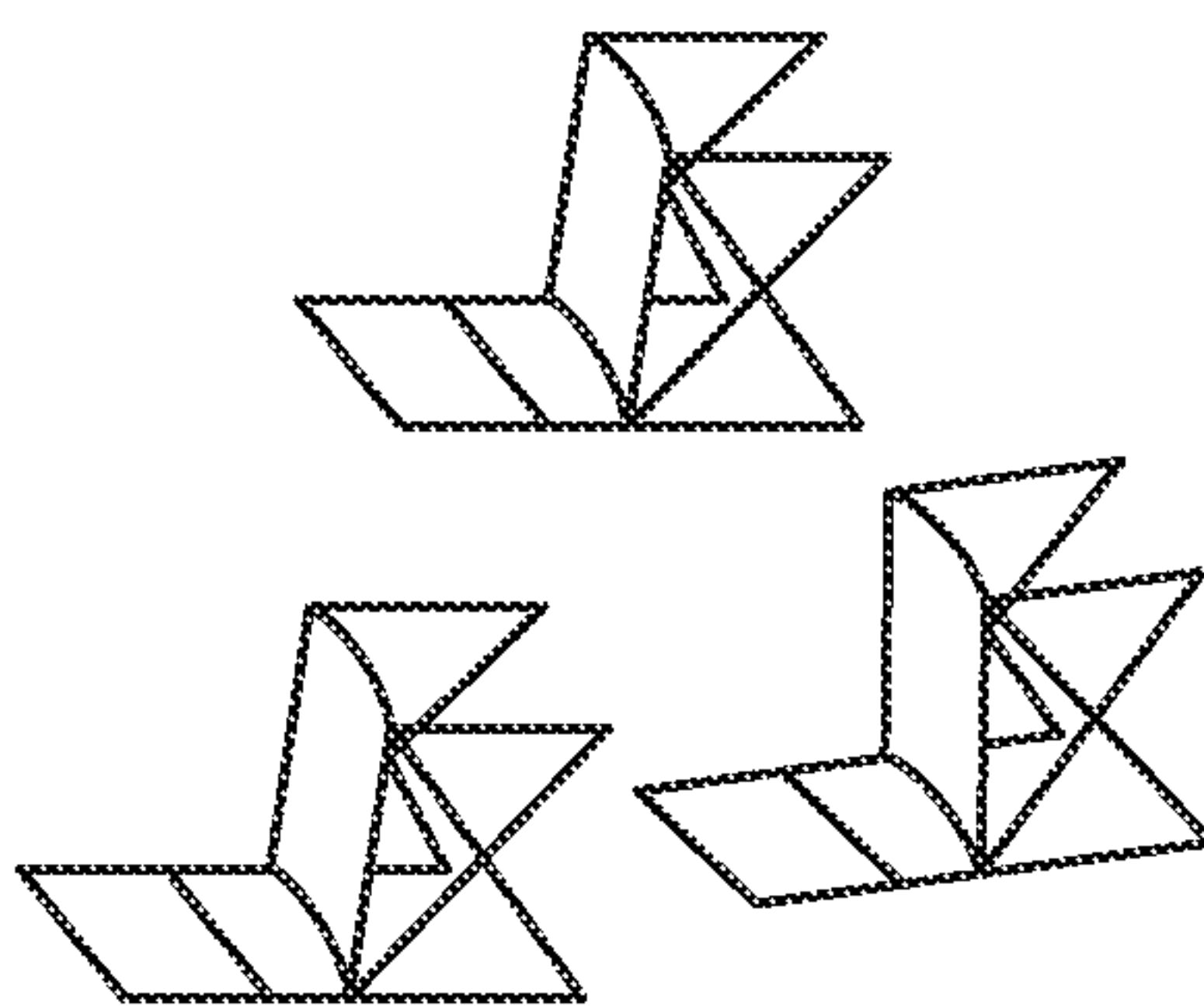


FIG. 4



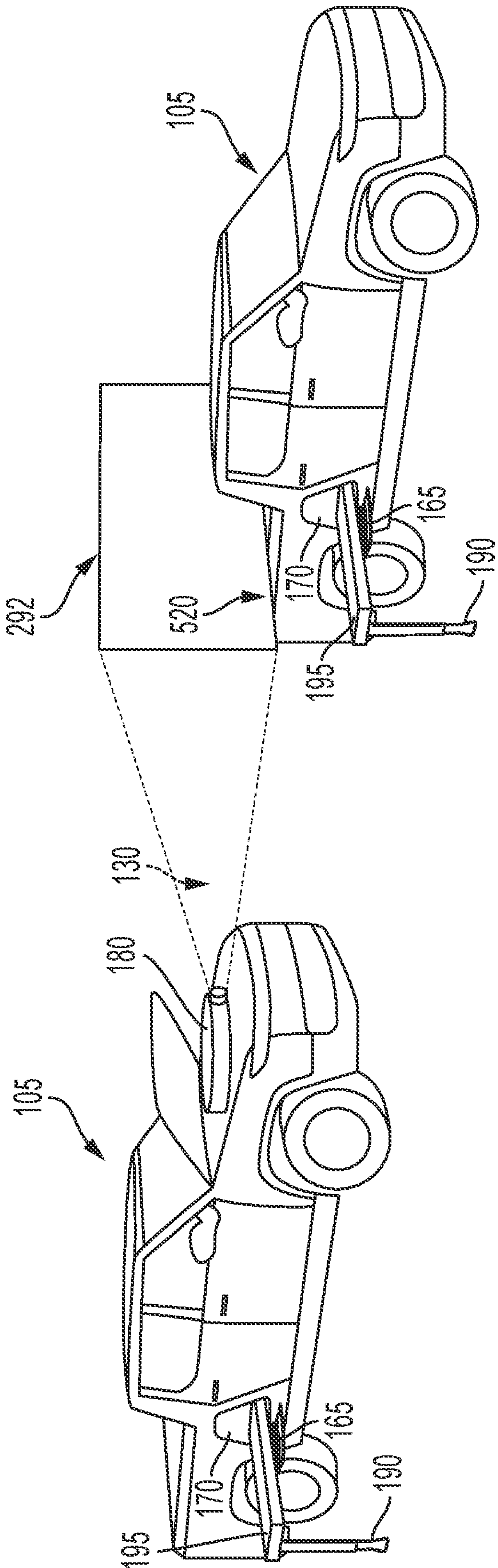


FIG. 5



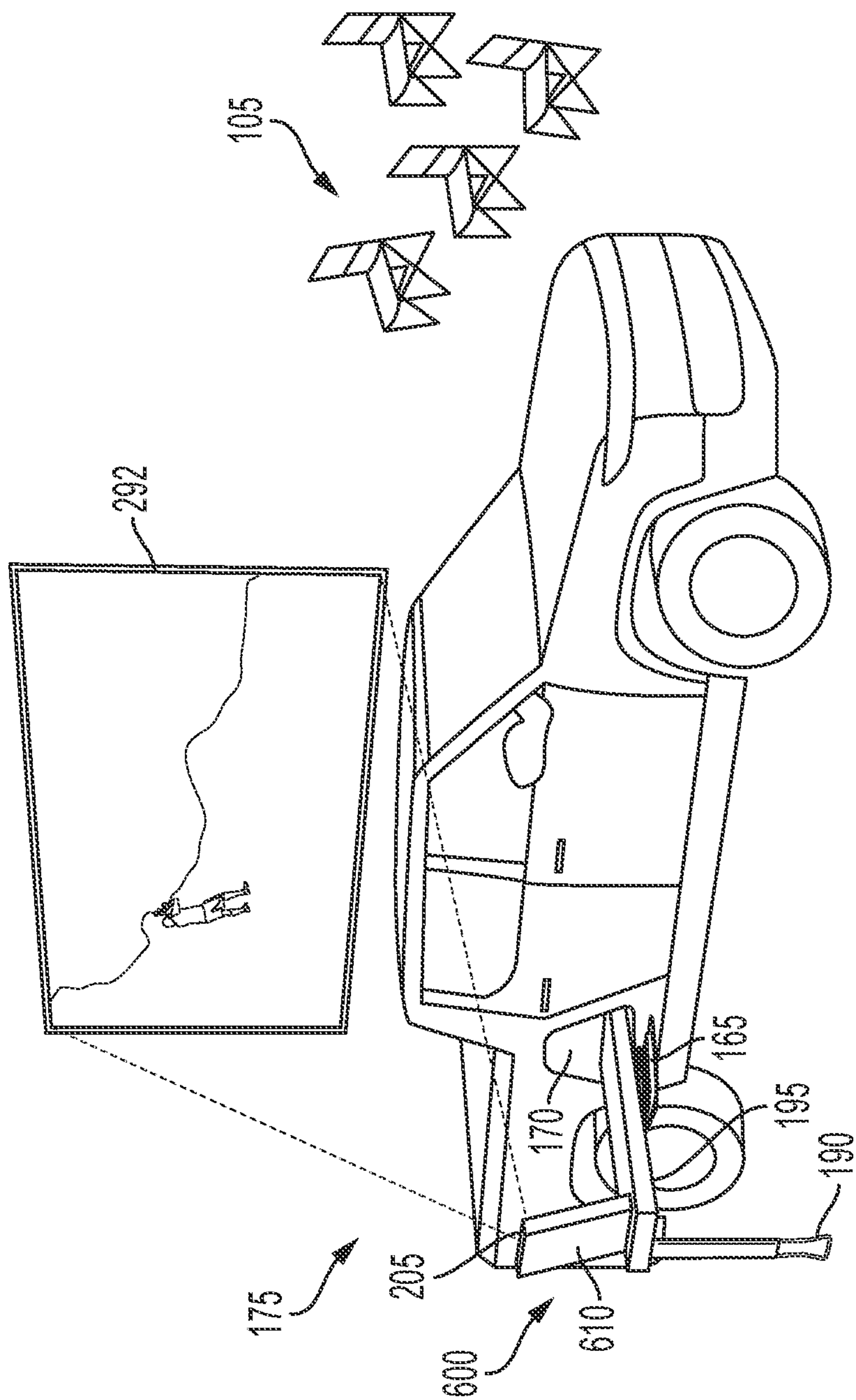


FIG. 6

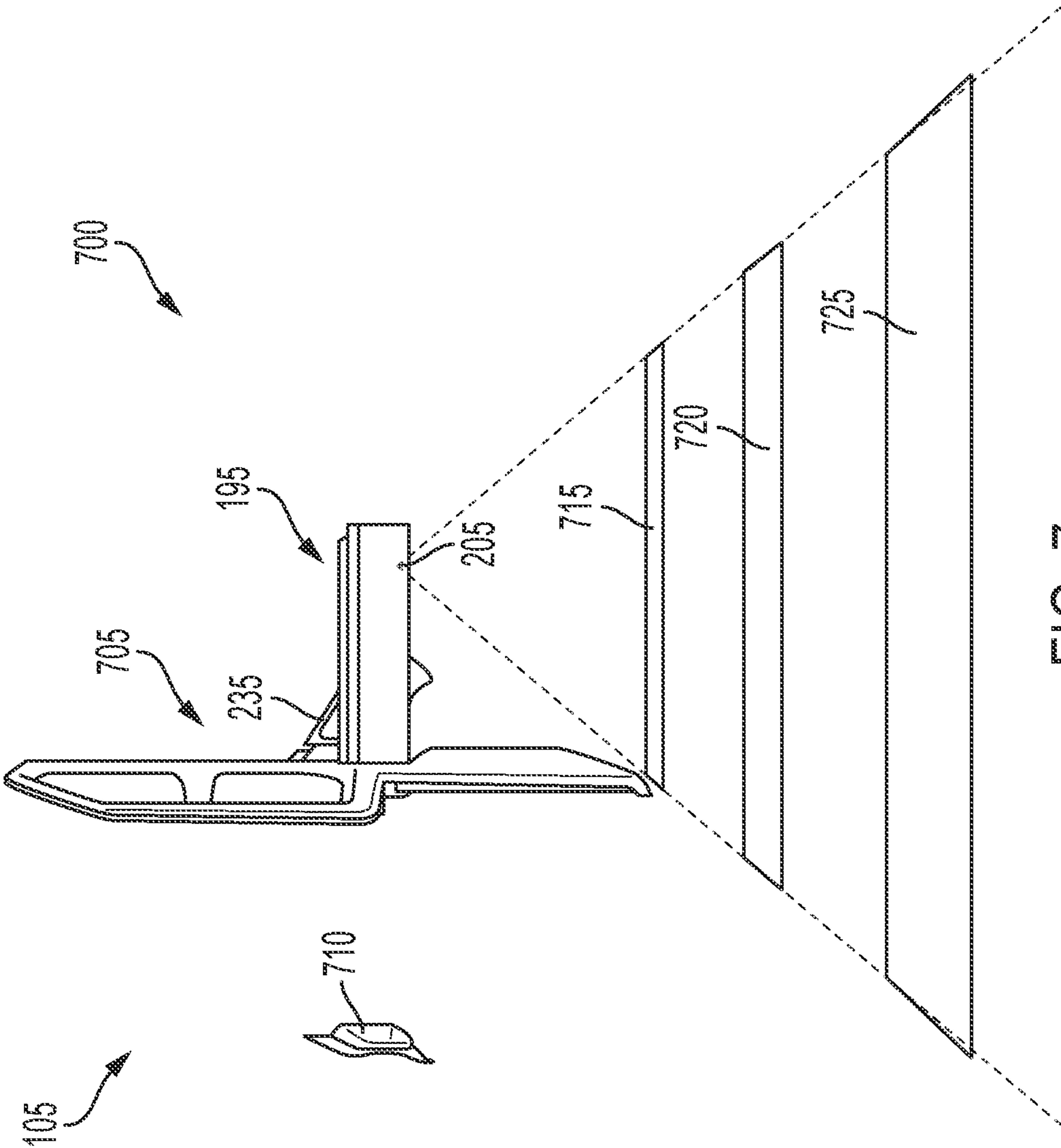


FIG. 7

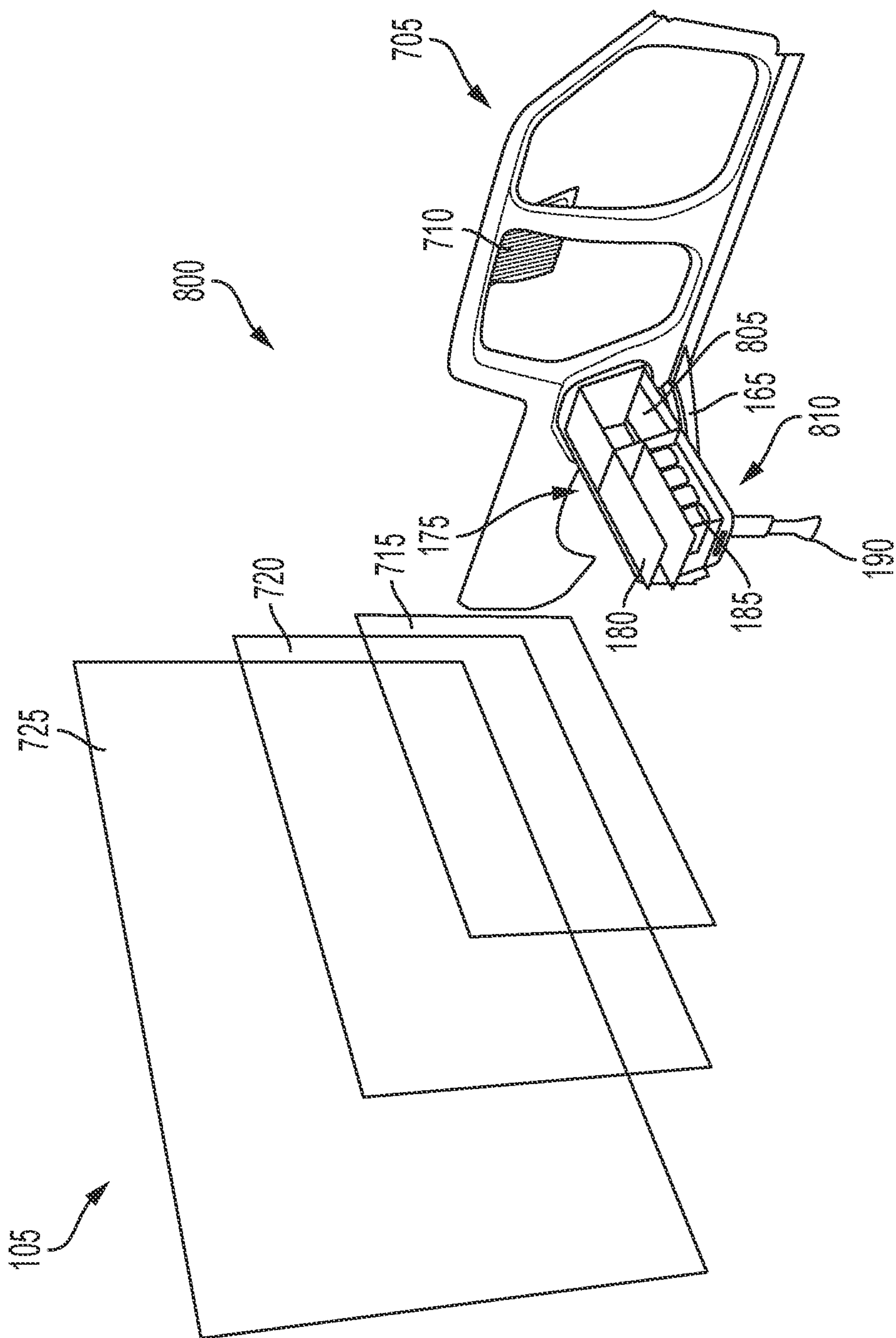


FIG. 8



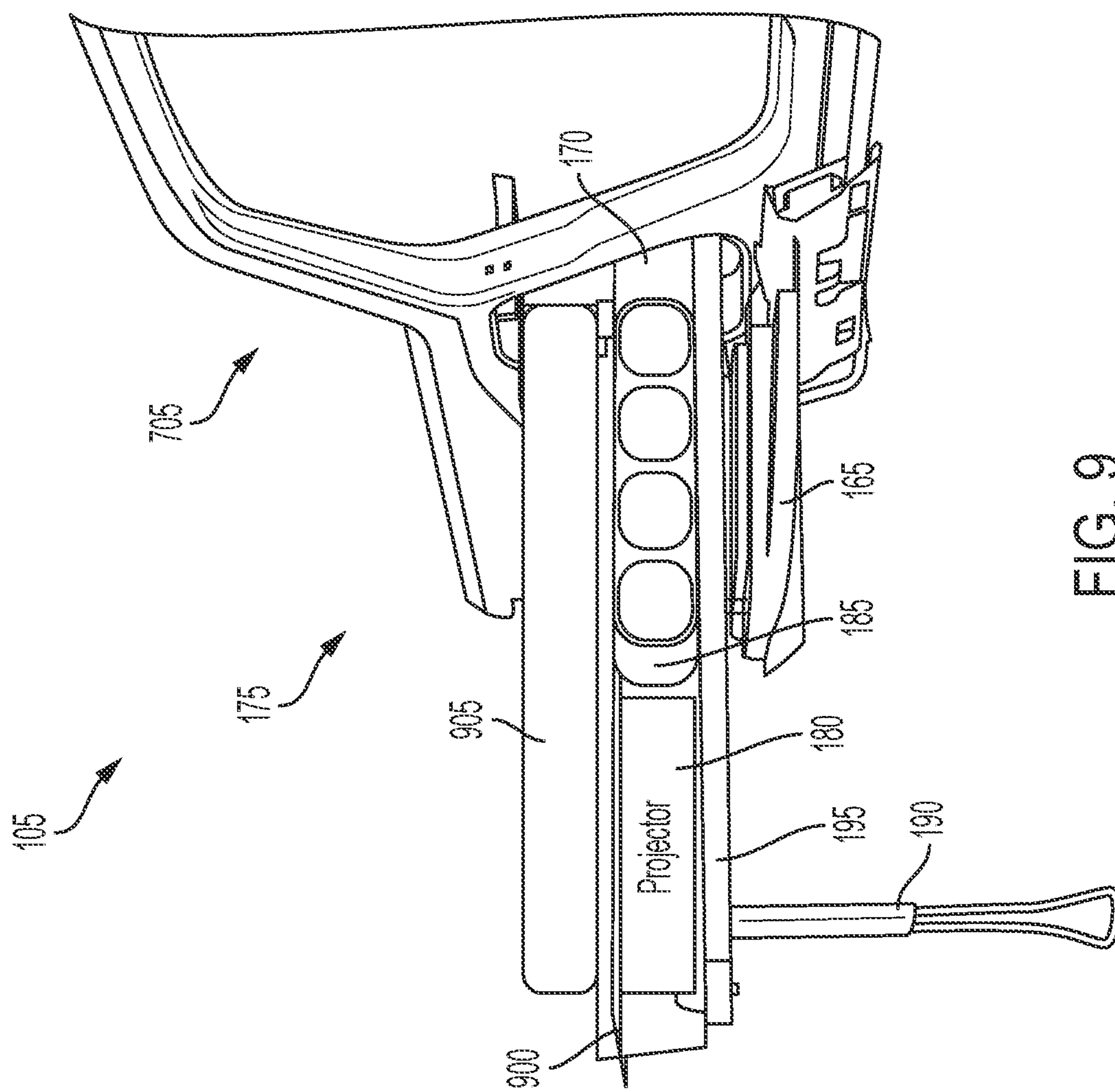


FIG. 9

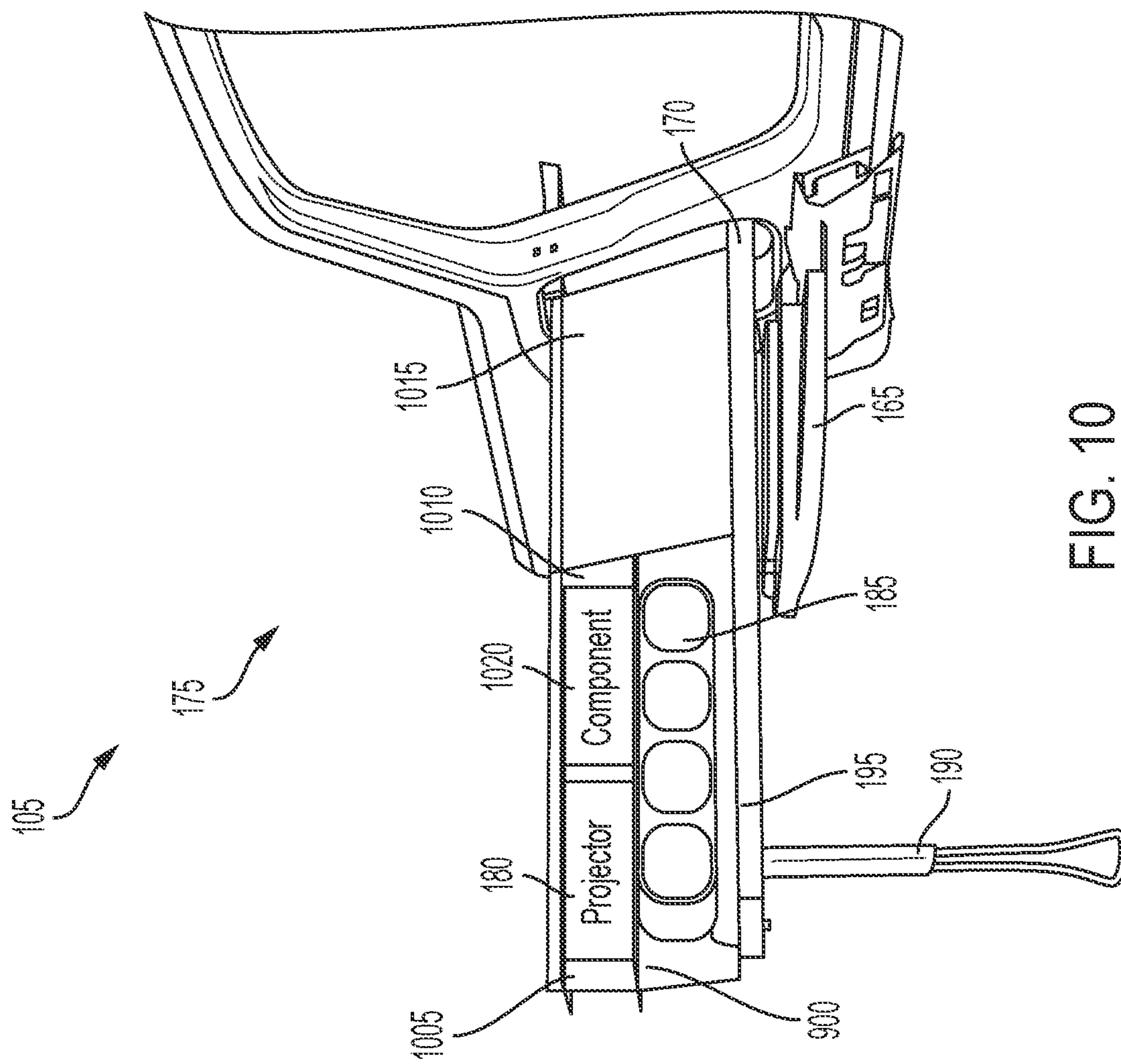
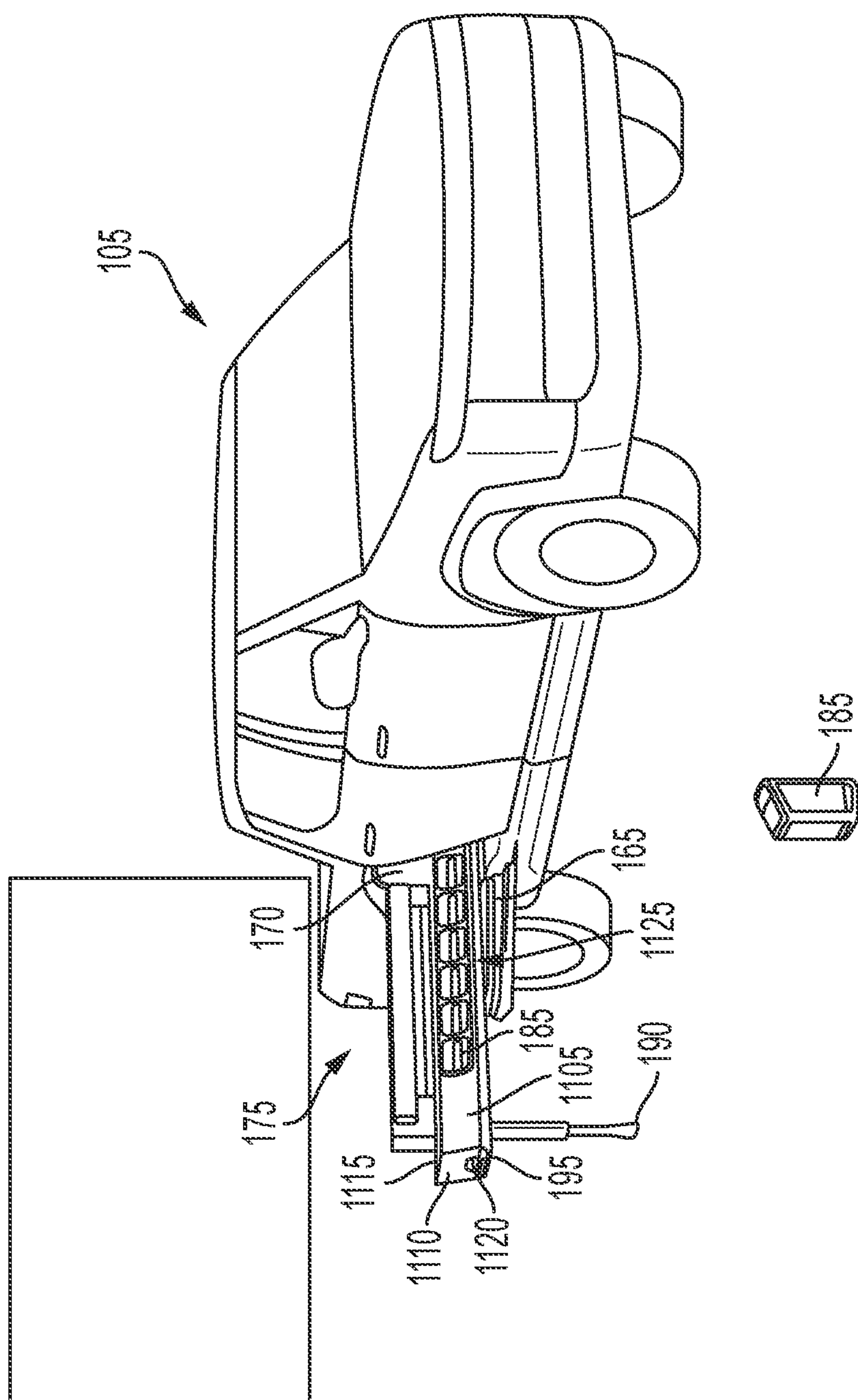


FIG. 10





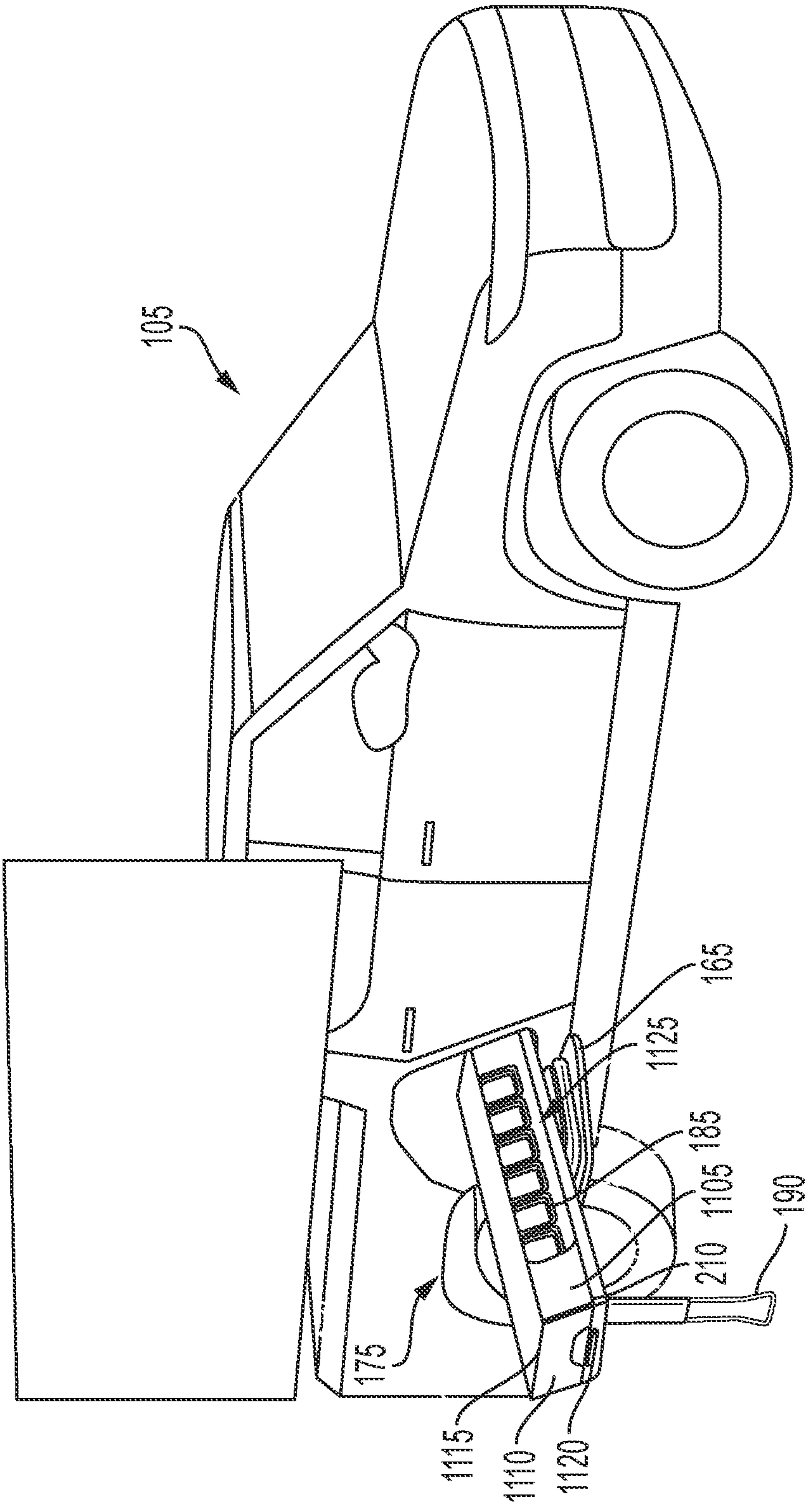


FIG. 12

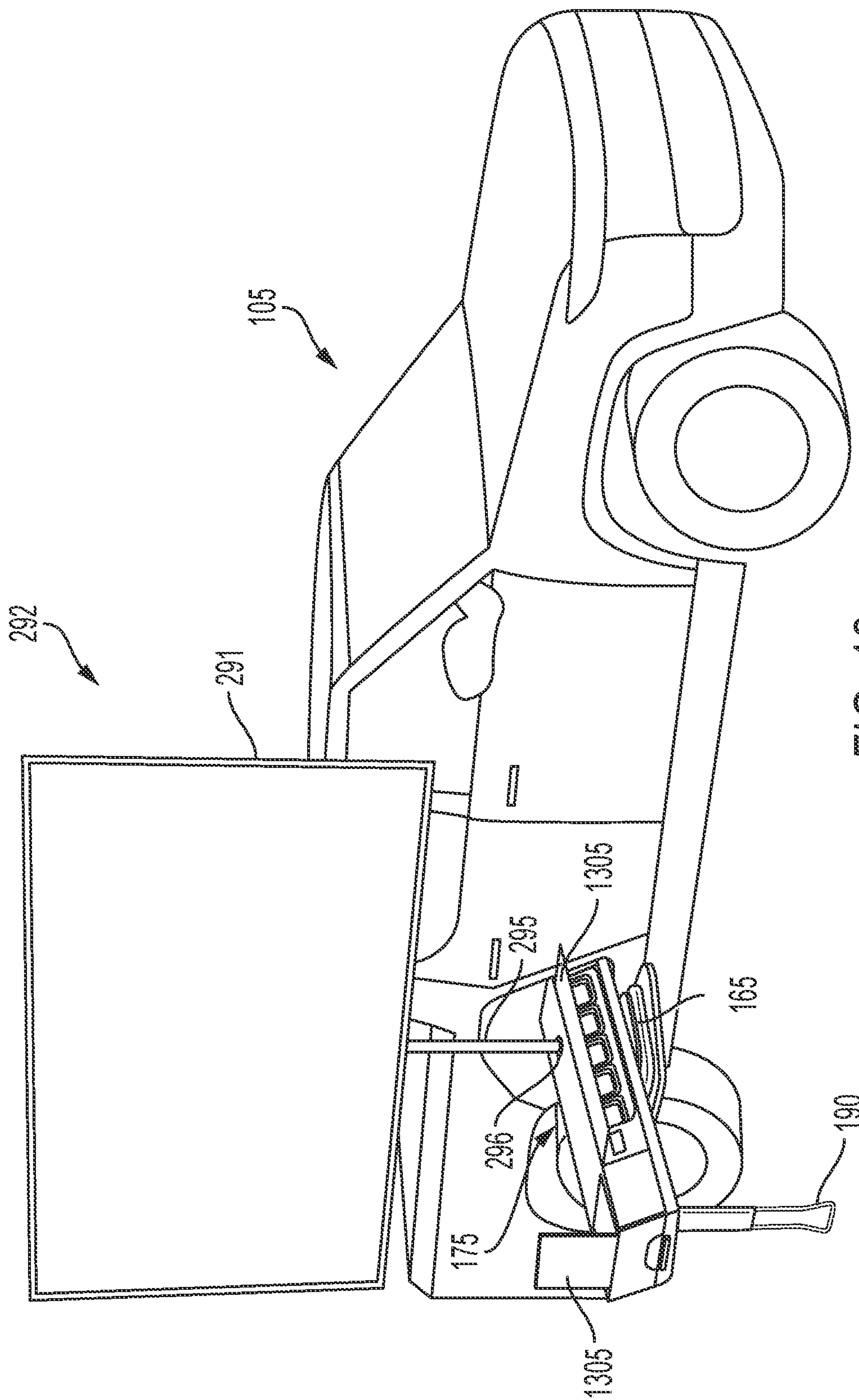


FIG. 13

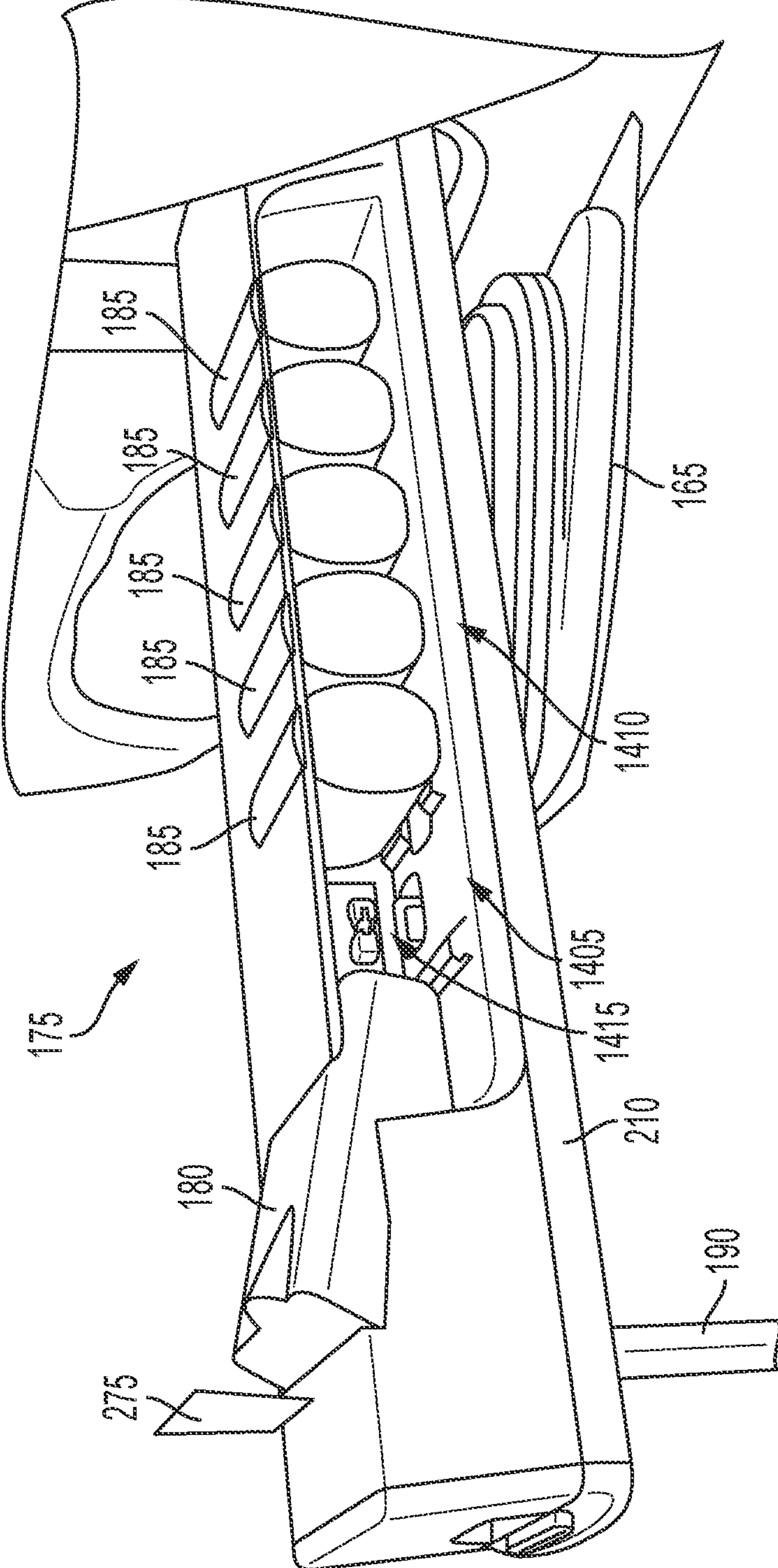


FIG. 14



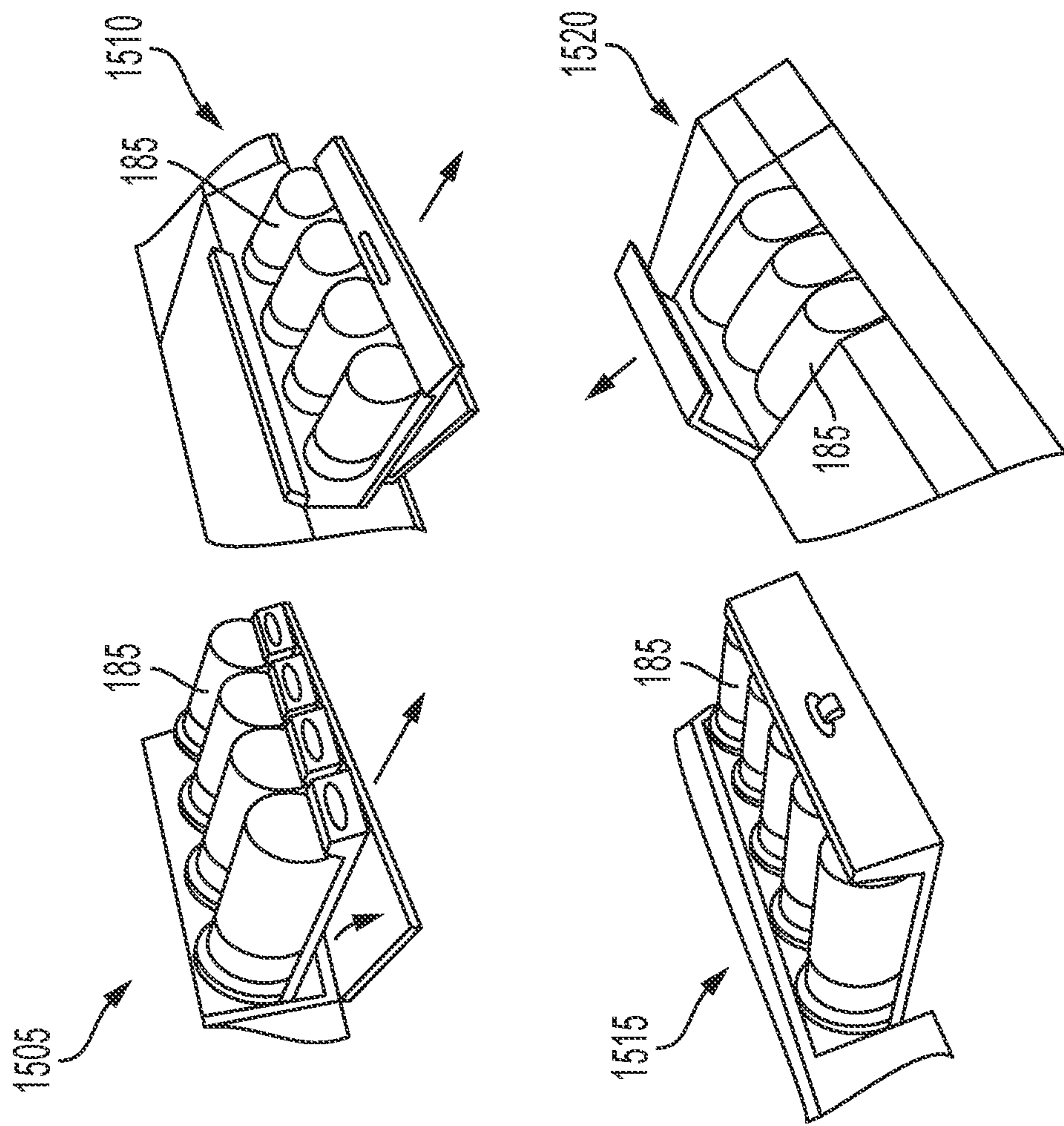


FIG. 15

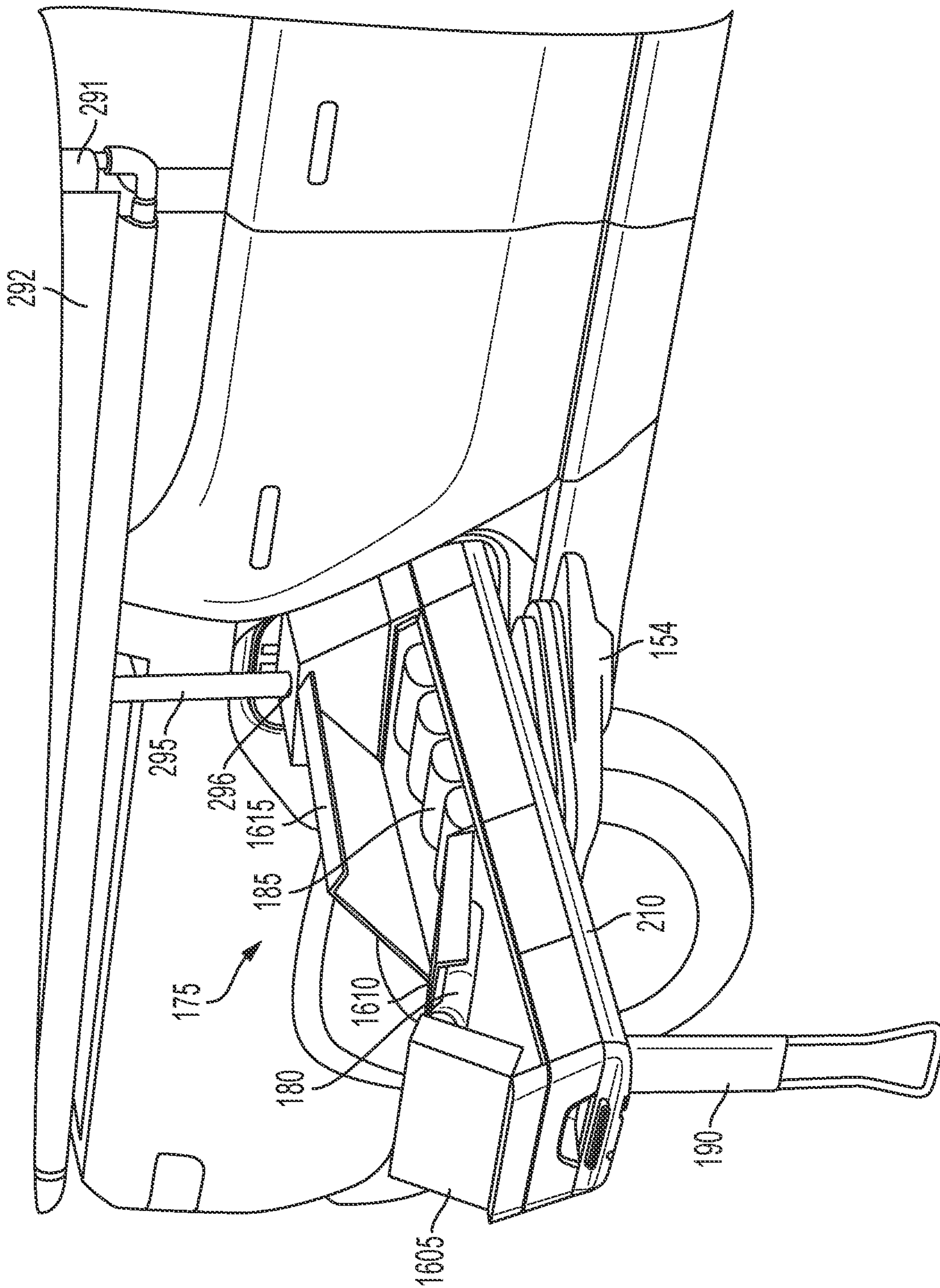


FIG. 16

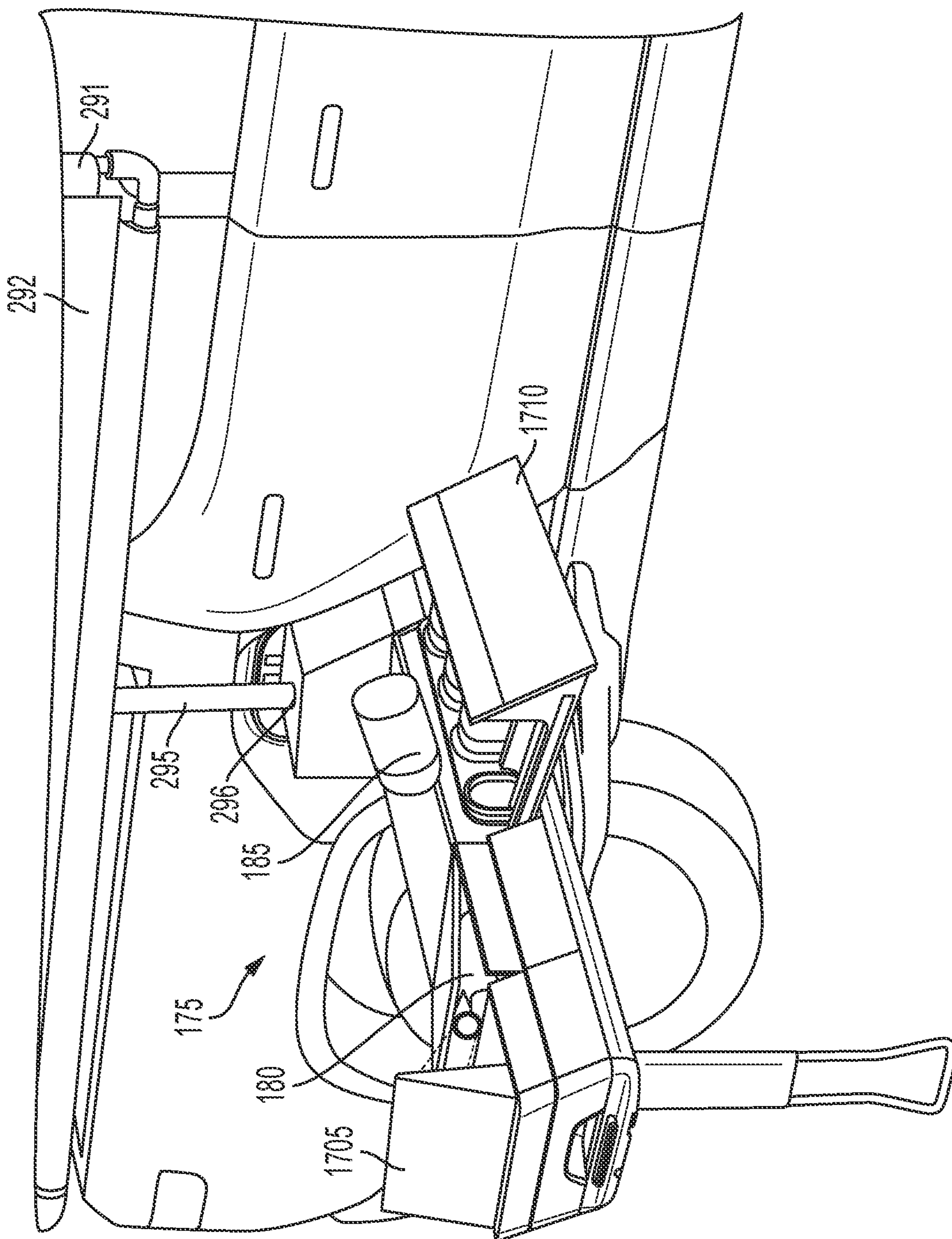


FIG. 17



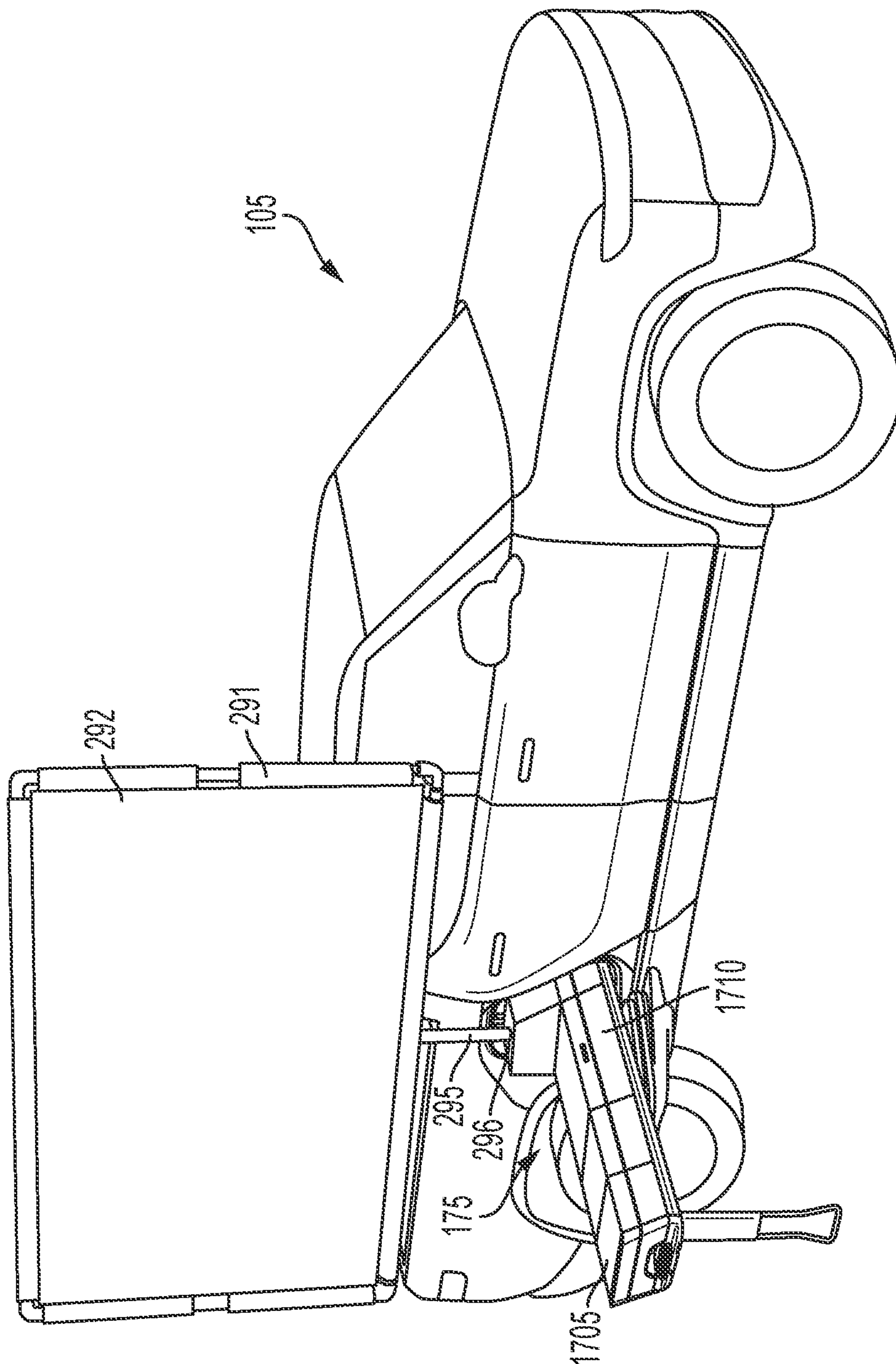


FIG. 18

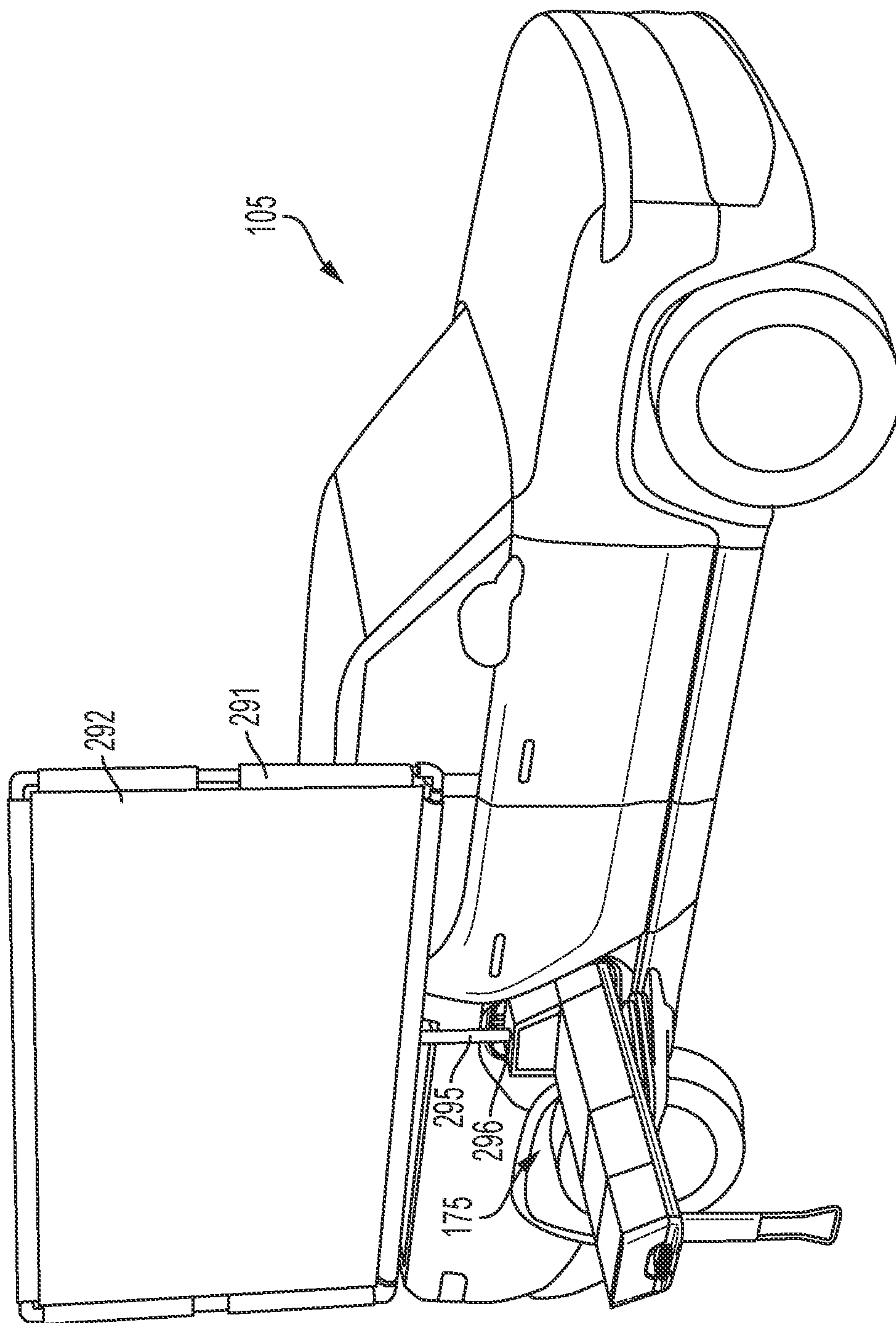


FIG. 19

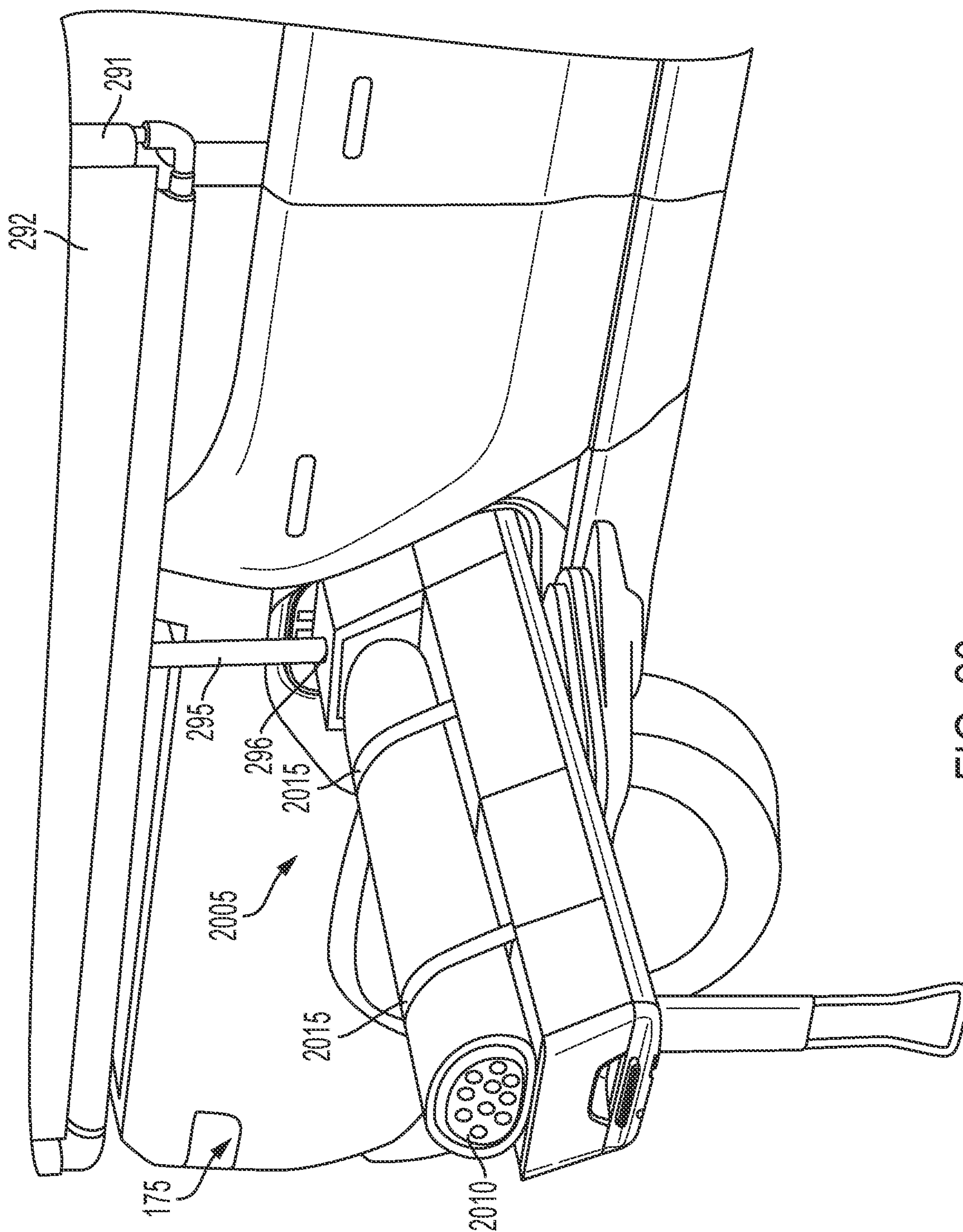


FIG. 20



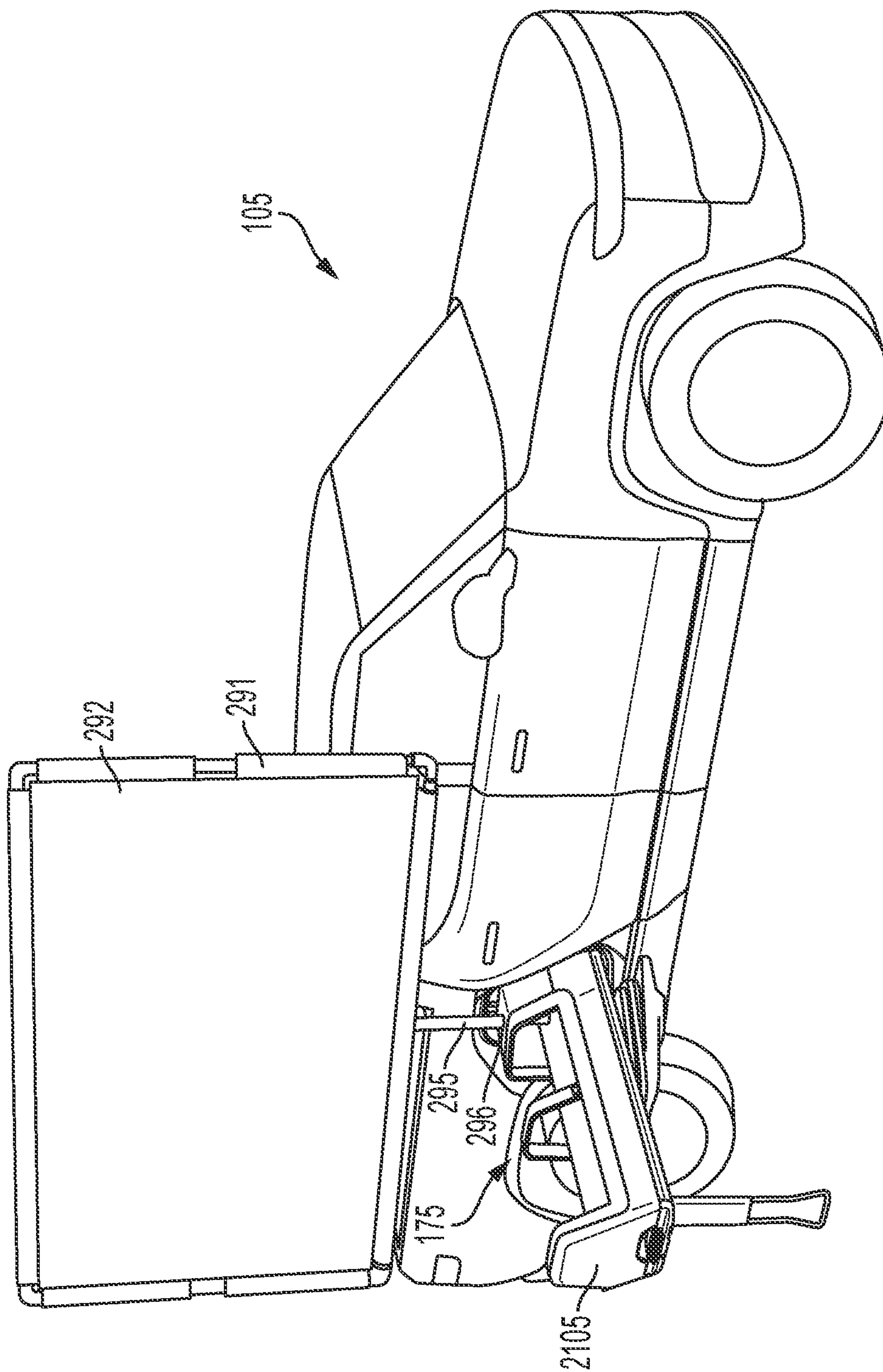


FIG. 21

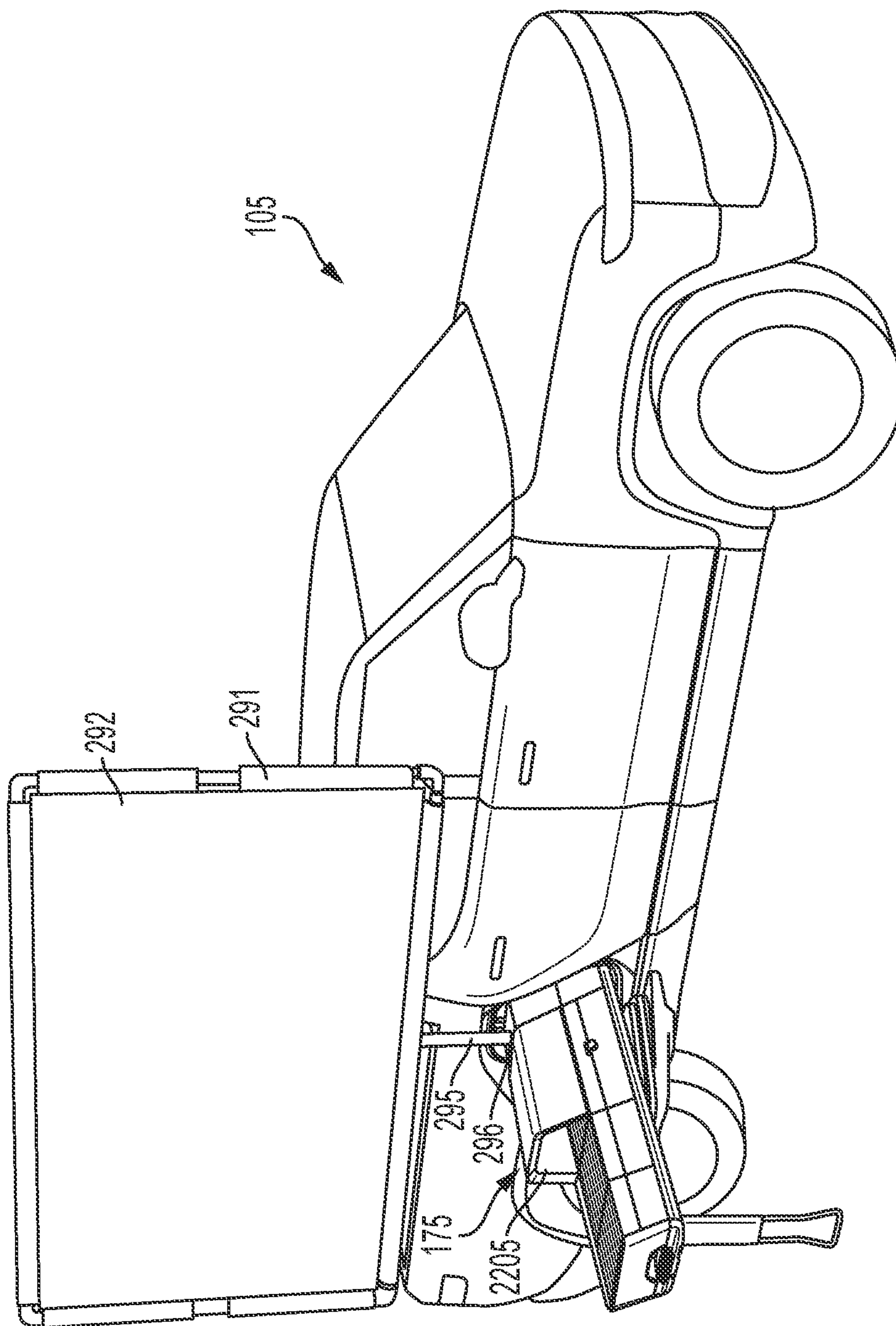


FIG. 22

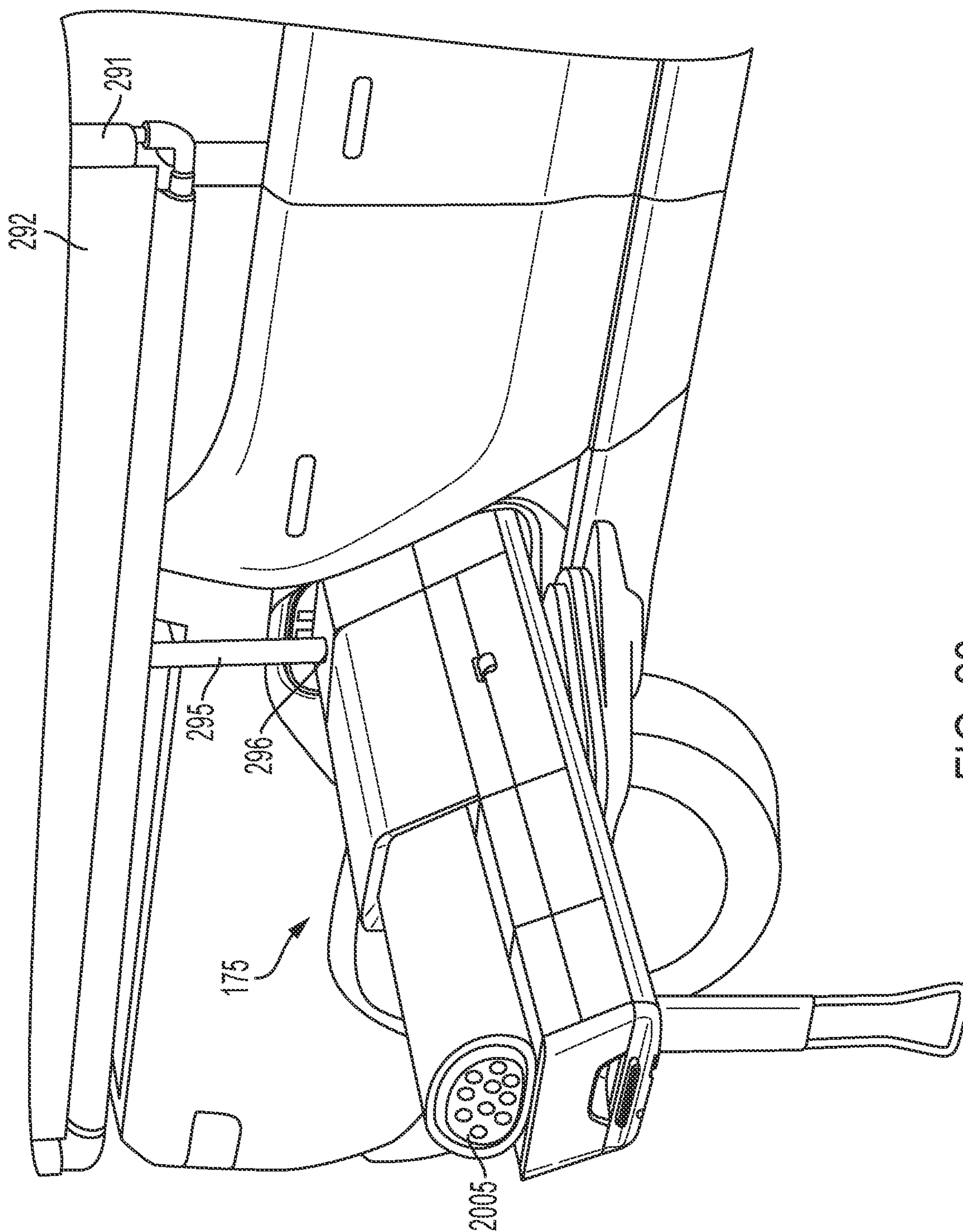


FIG. 23



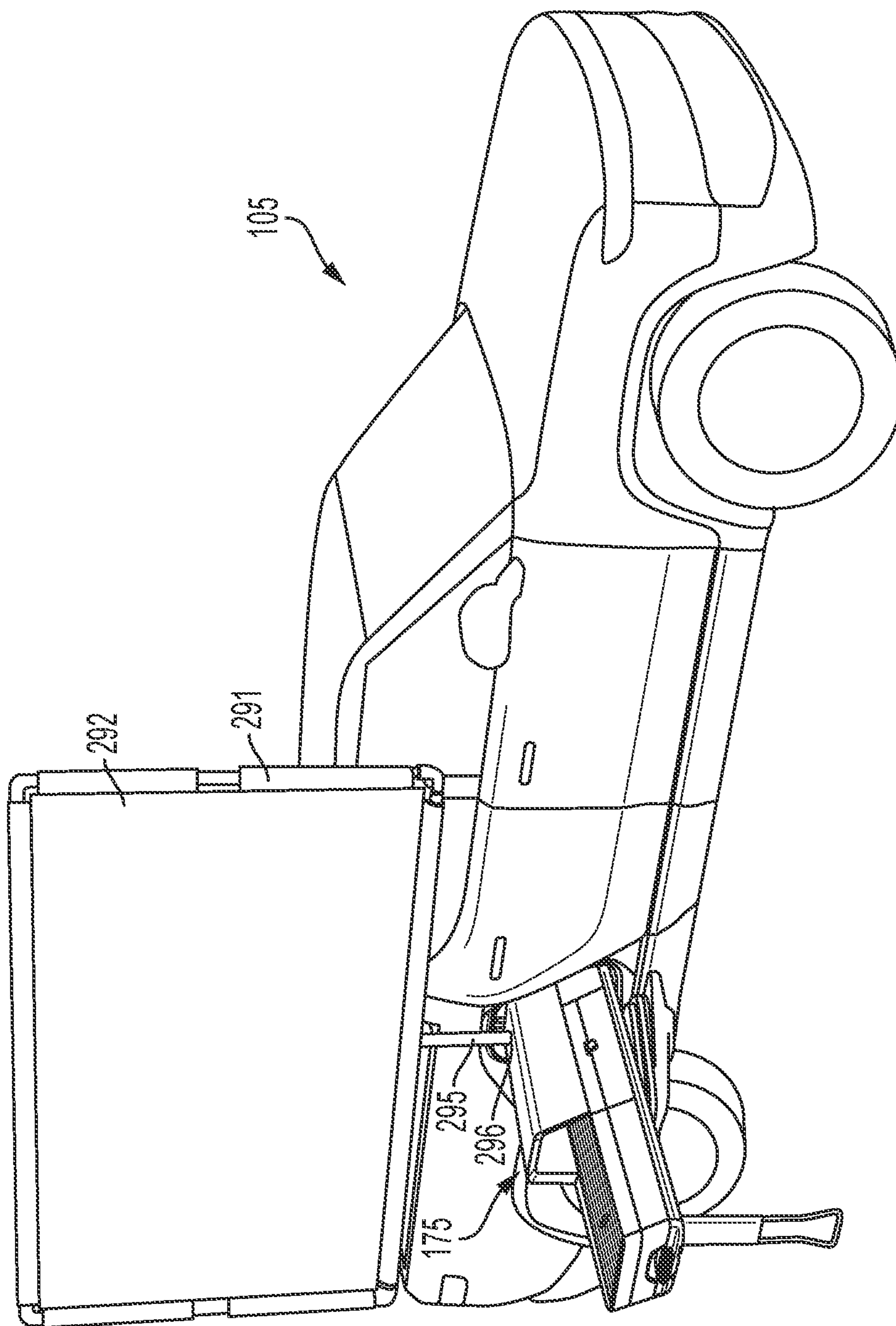


FIG. 24

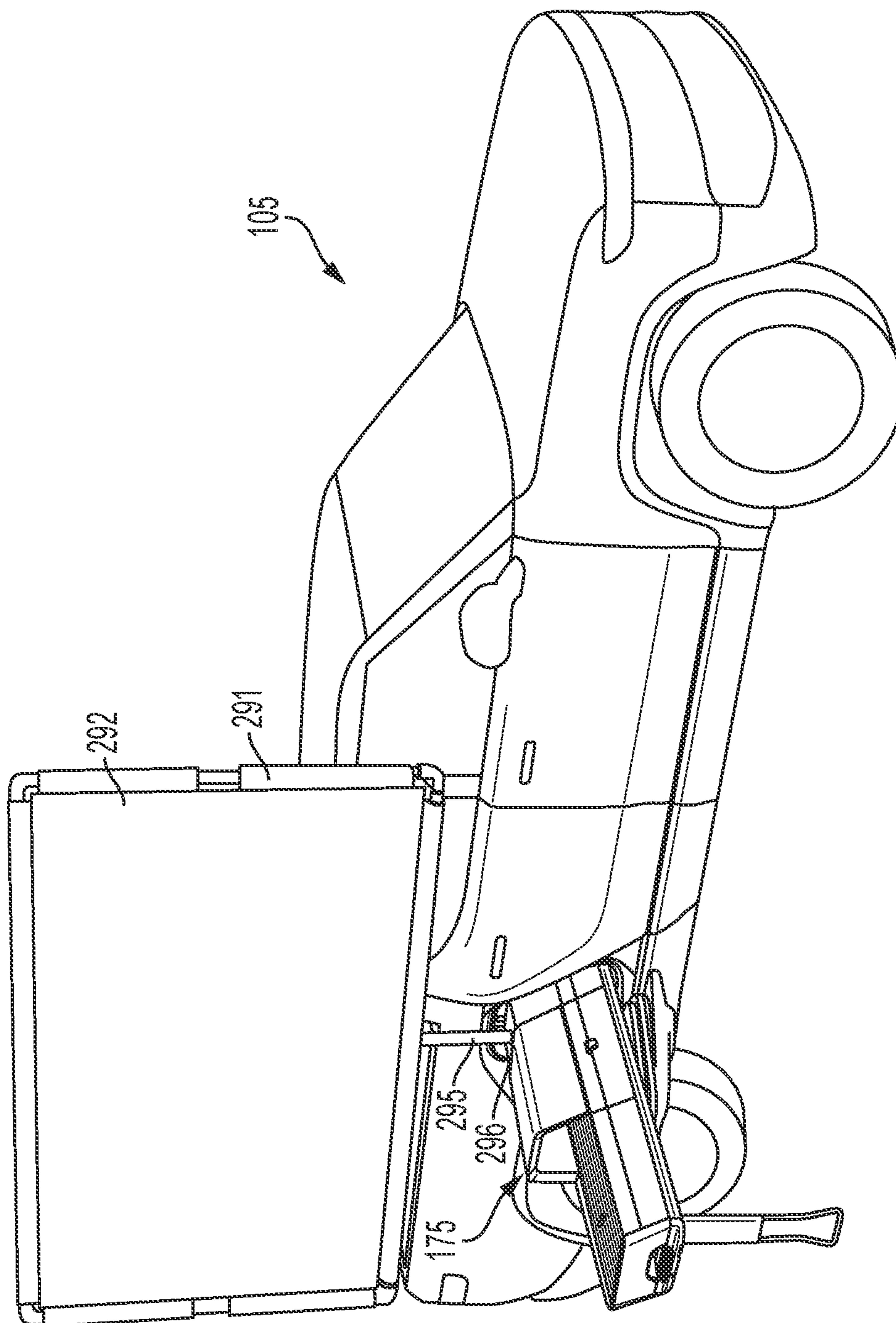


FIG. 25

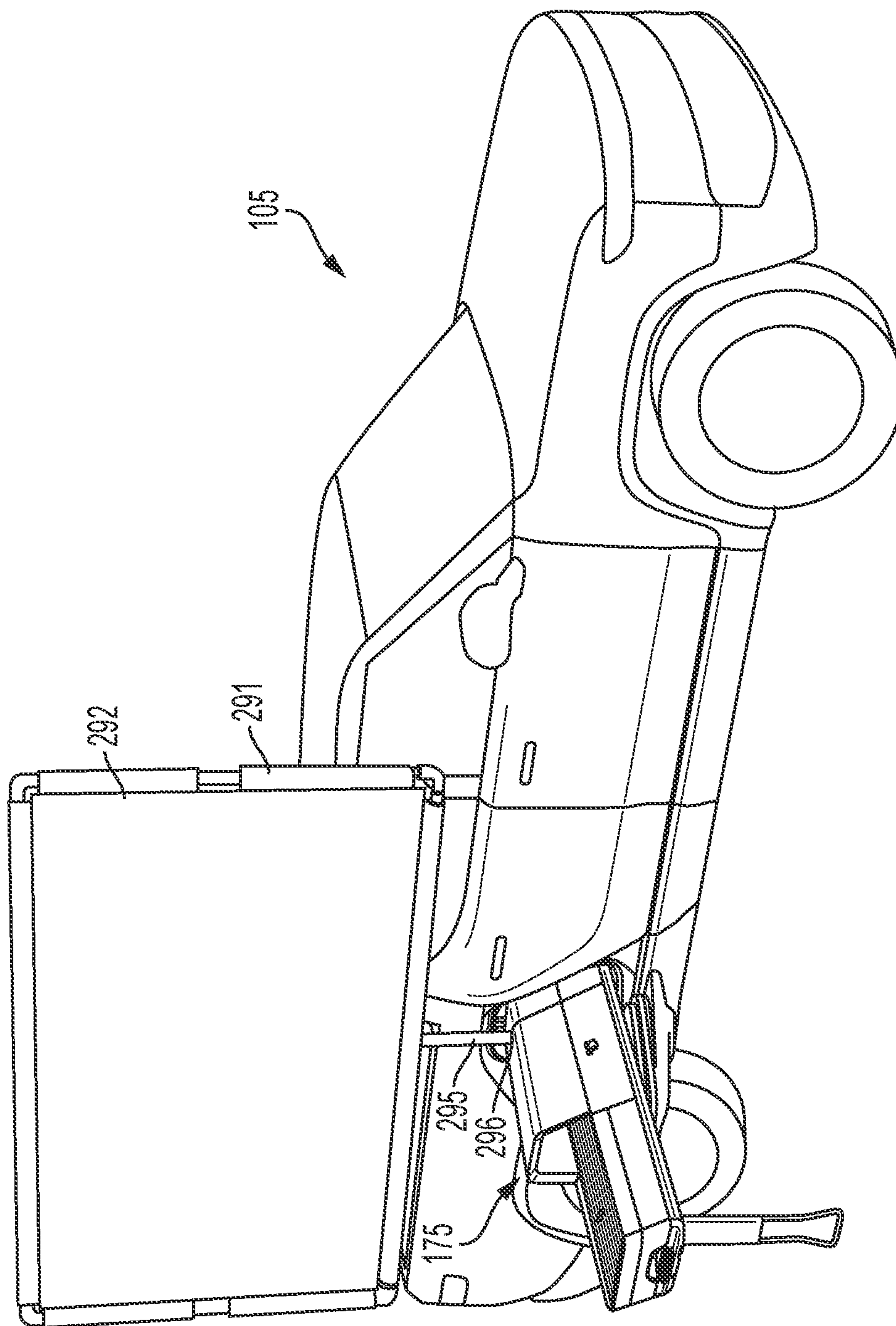


FIG. 26



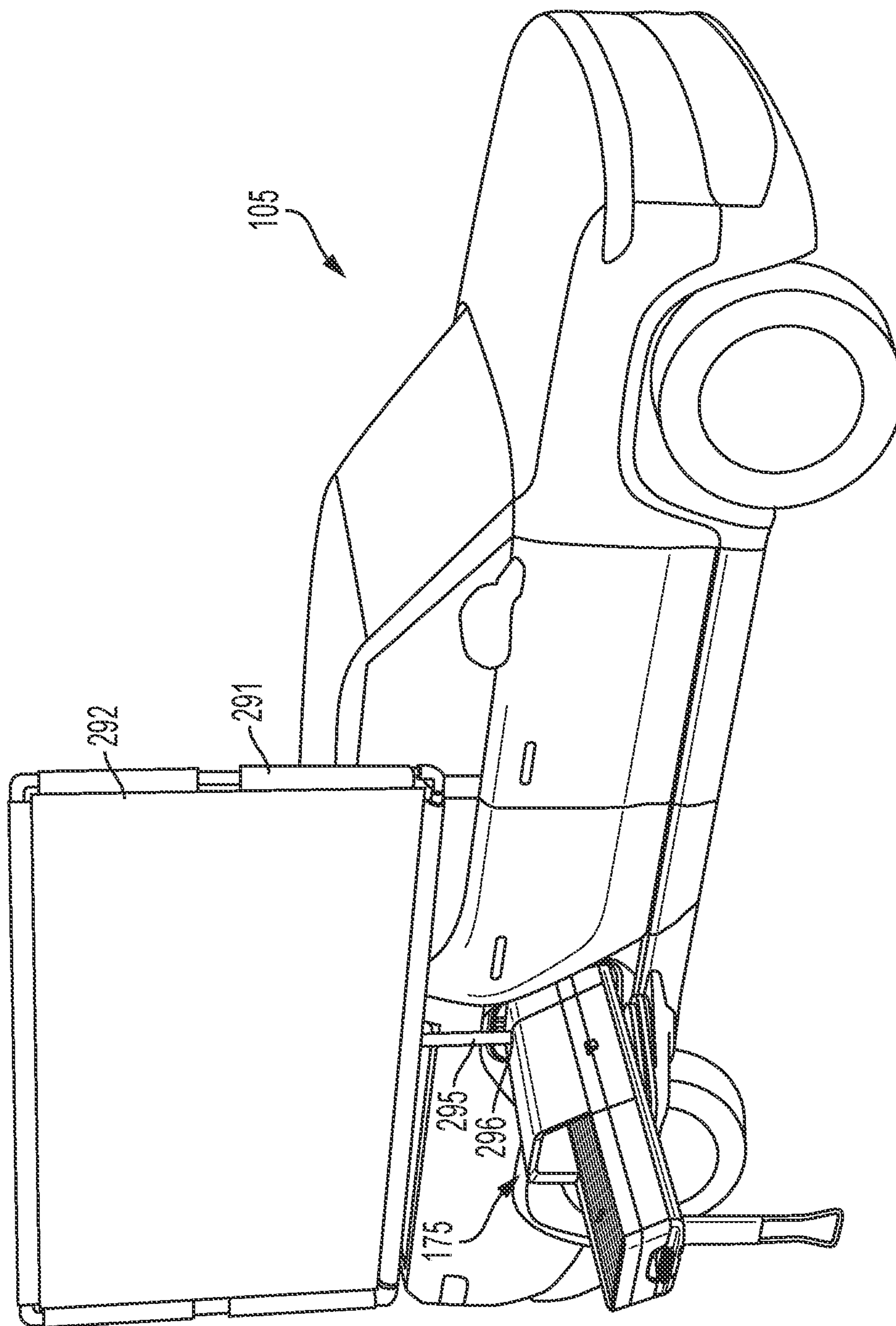


FIG. 27

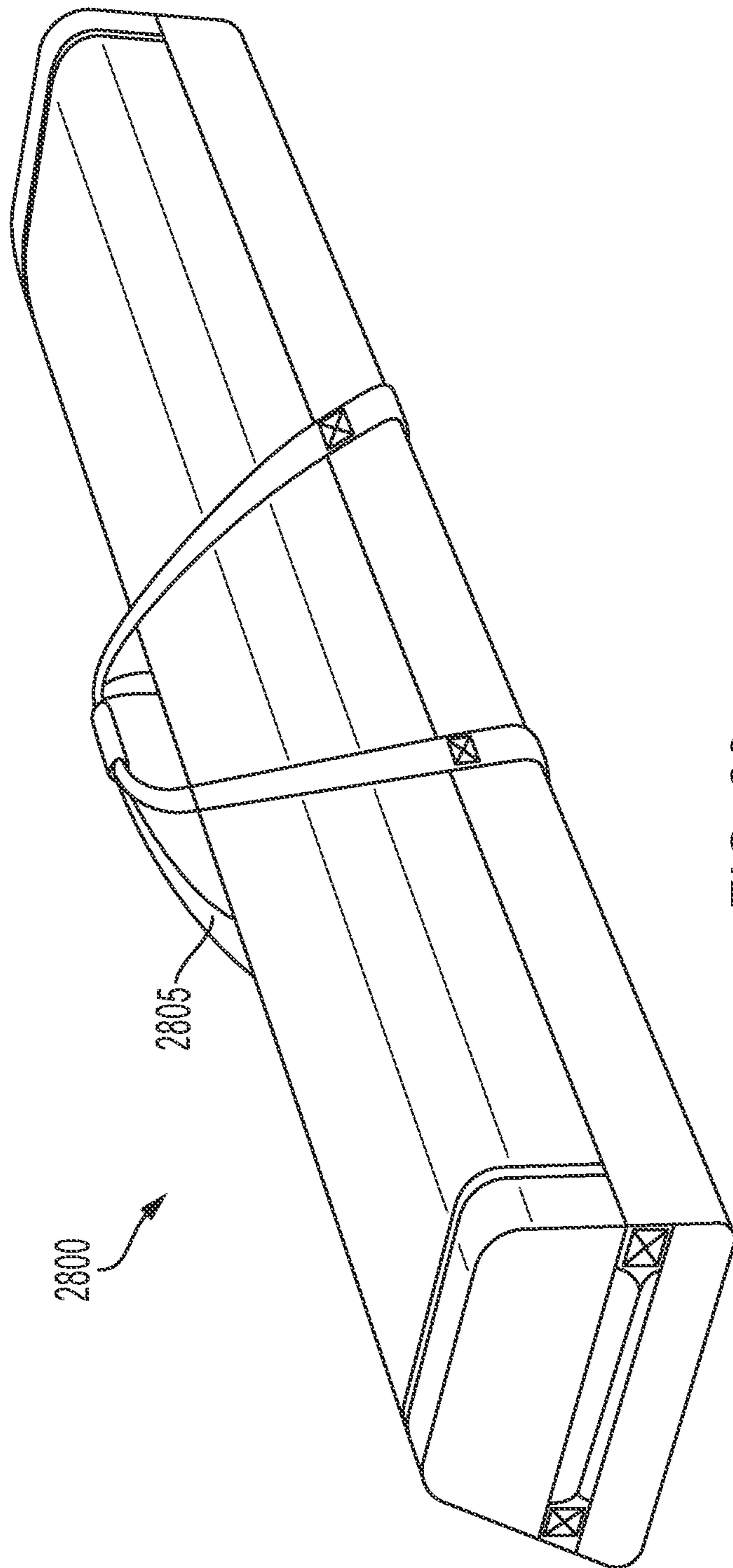


FIG. 28

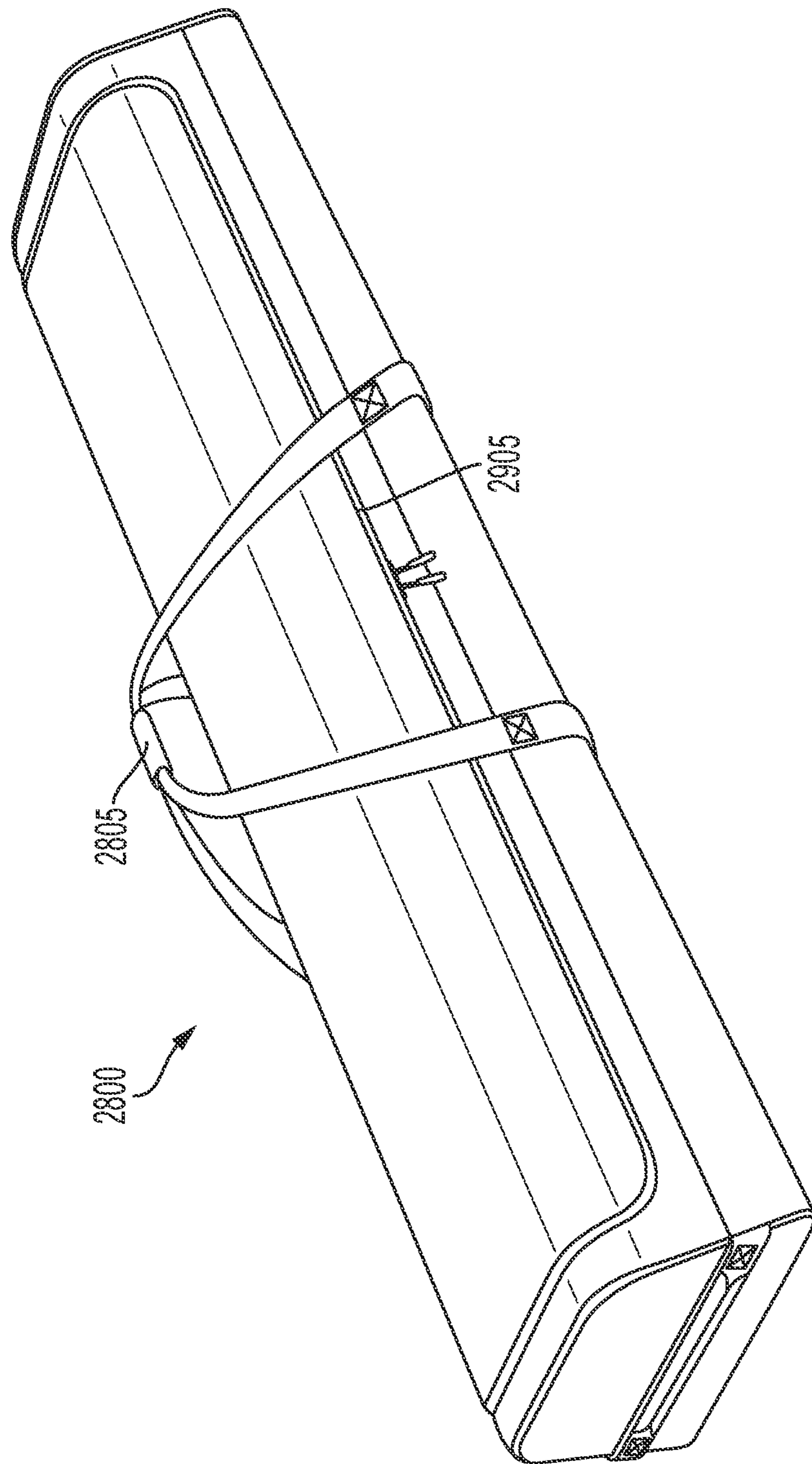


FIG. 29



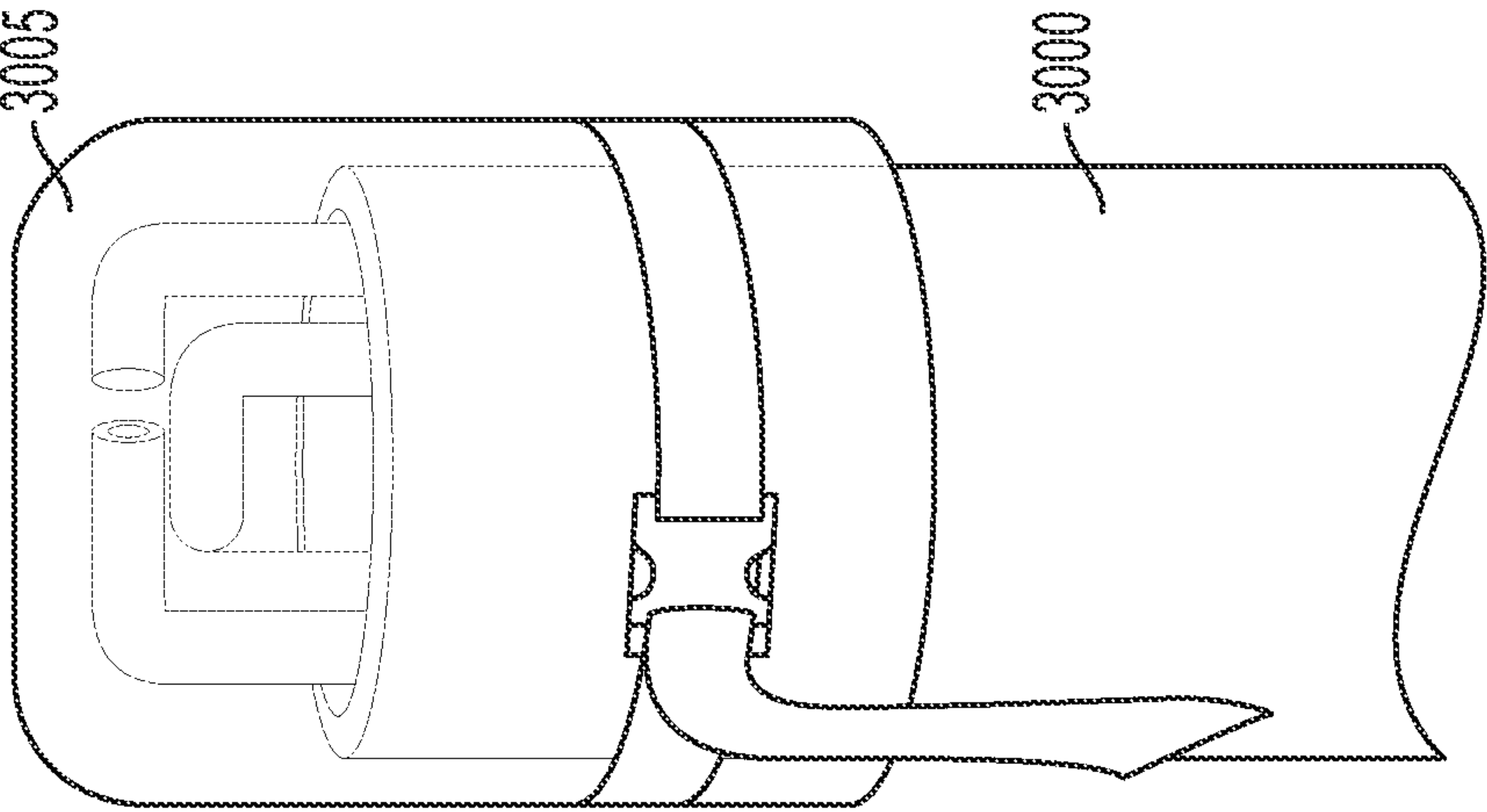


FIG. 30A

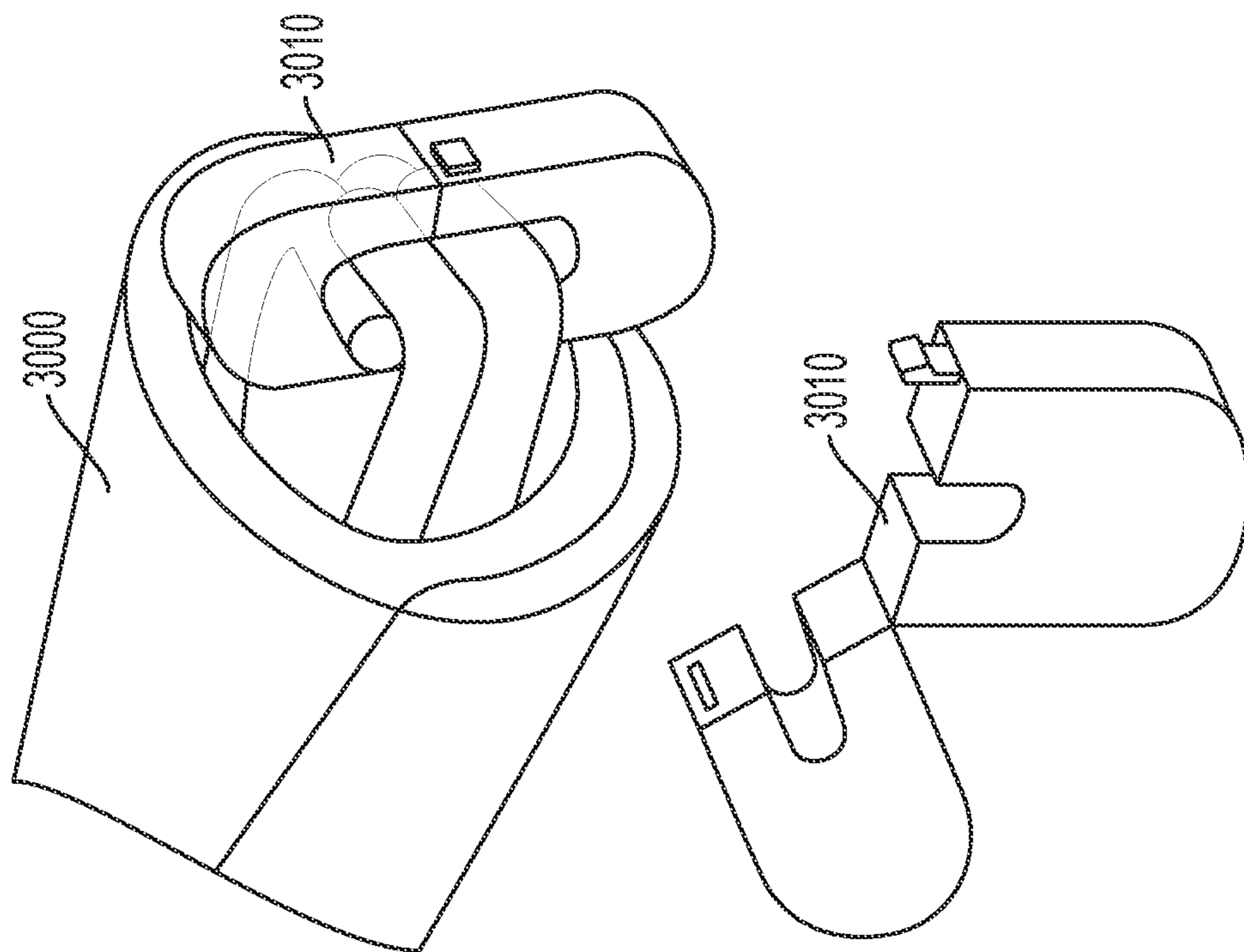


FIG. 30B

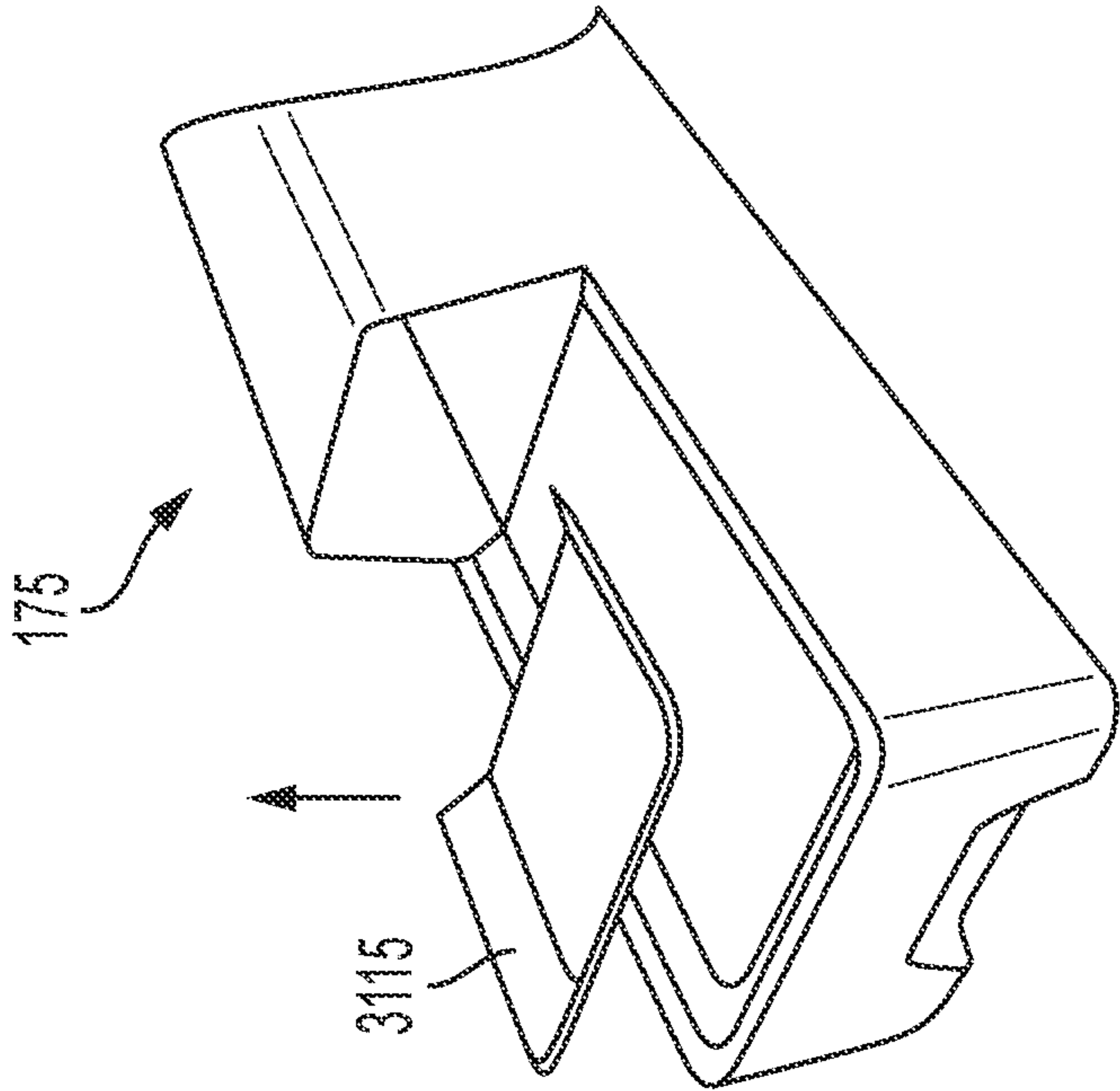


FIG. 31A



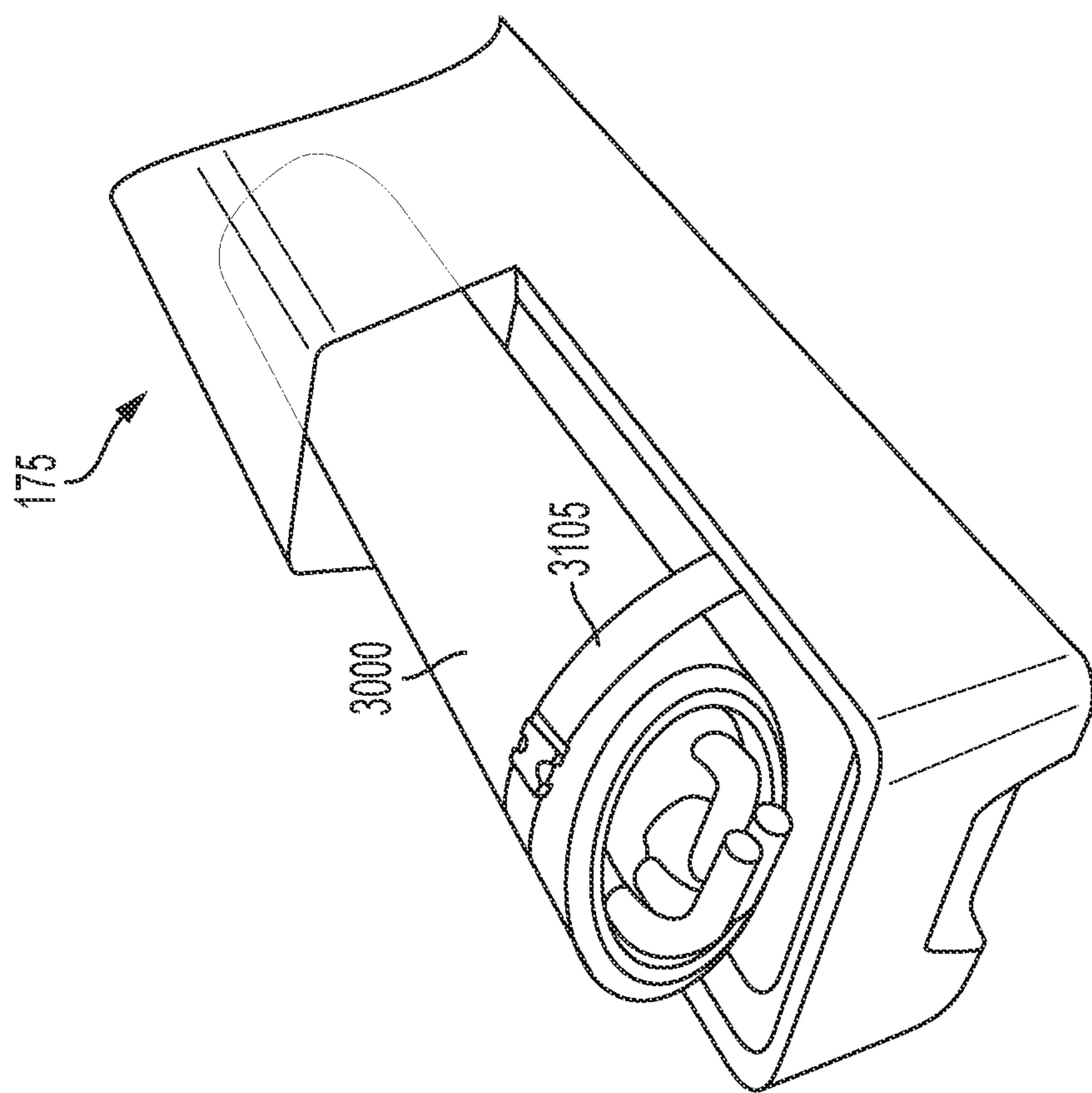


FIG. 31B

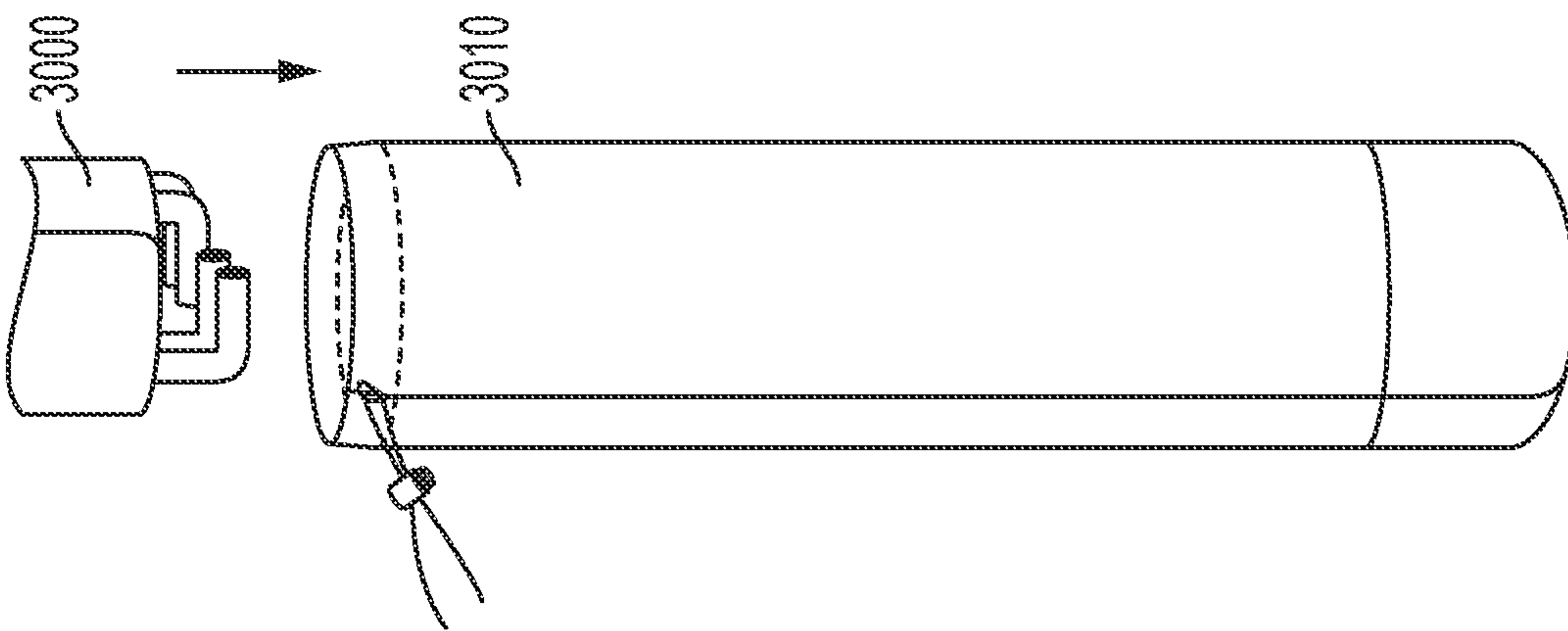


FIG. 31C

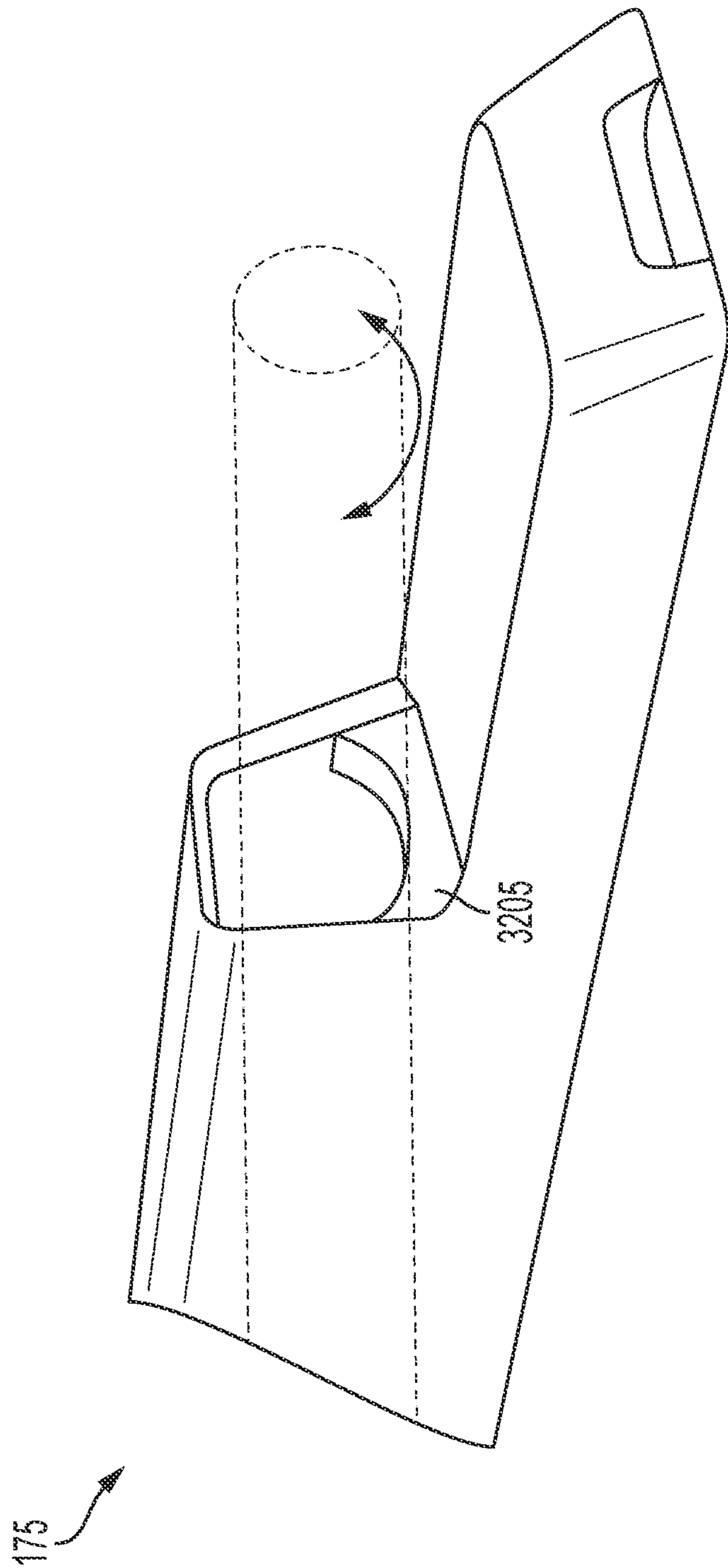


FIG. 32



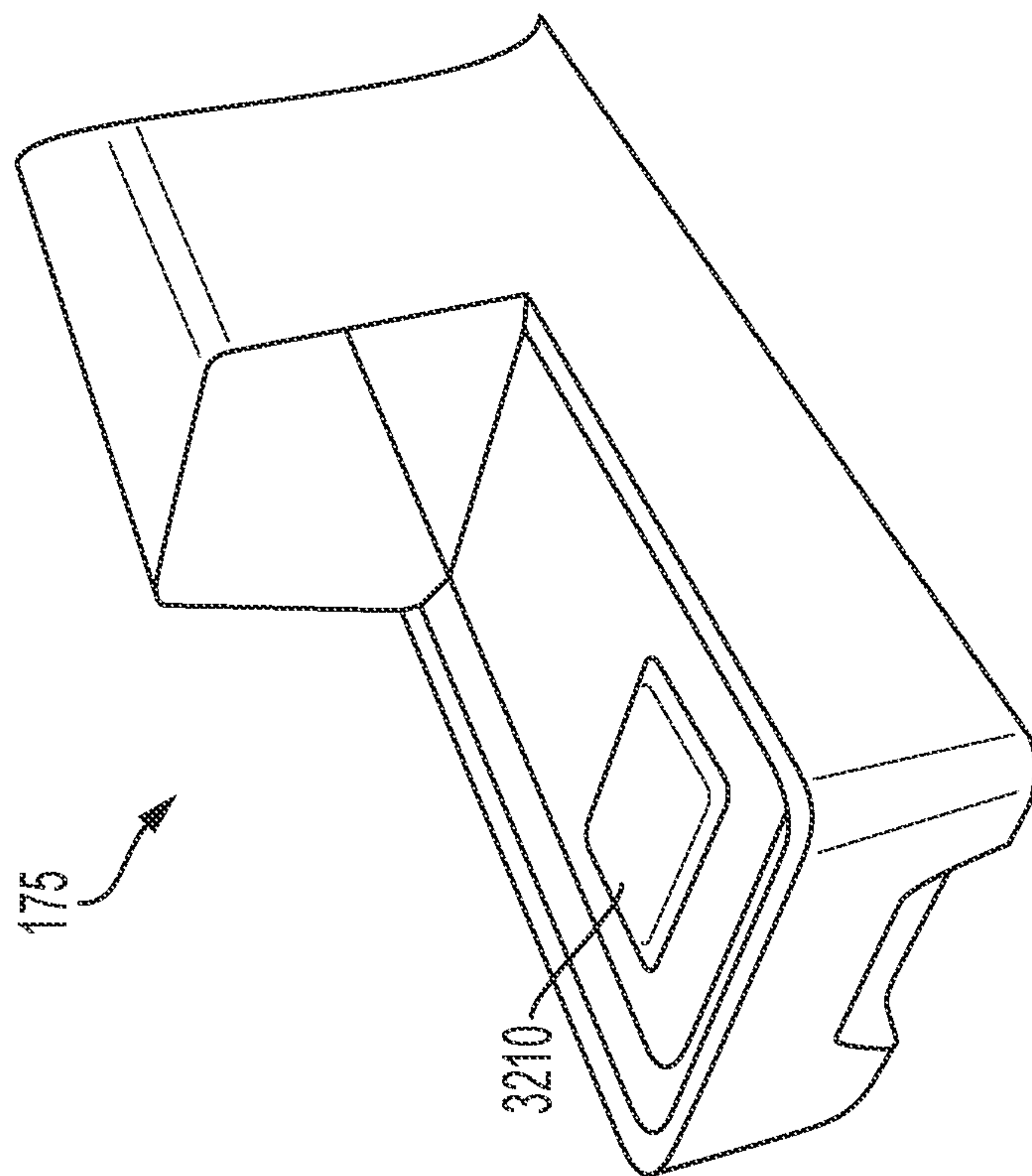


FIG. 33

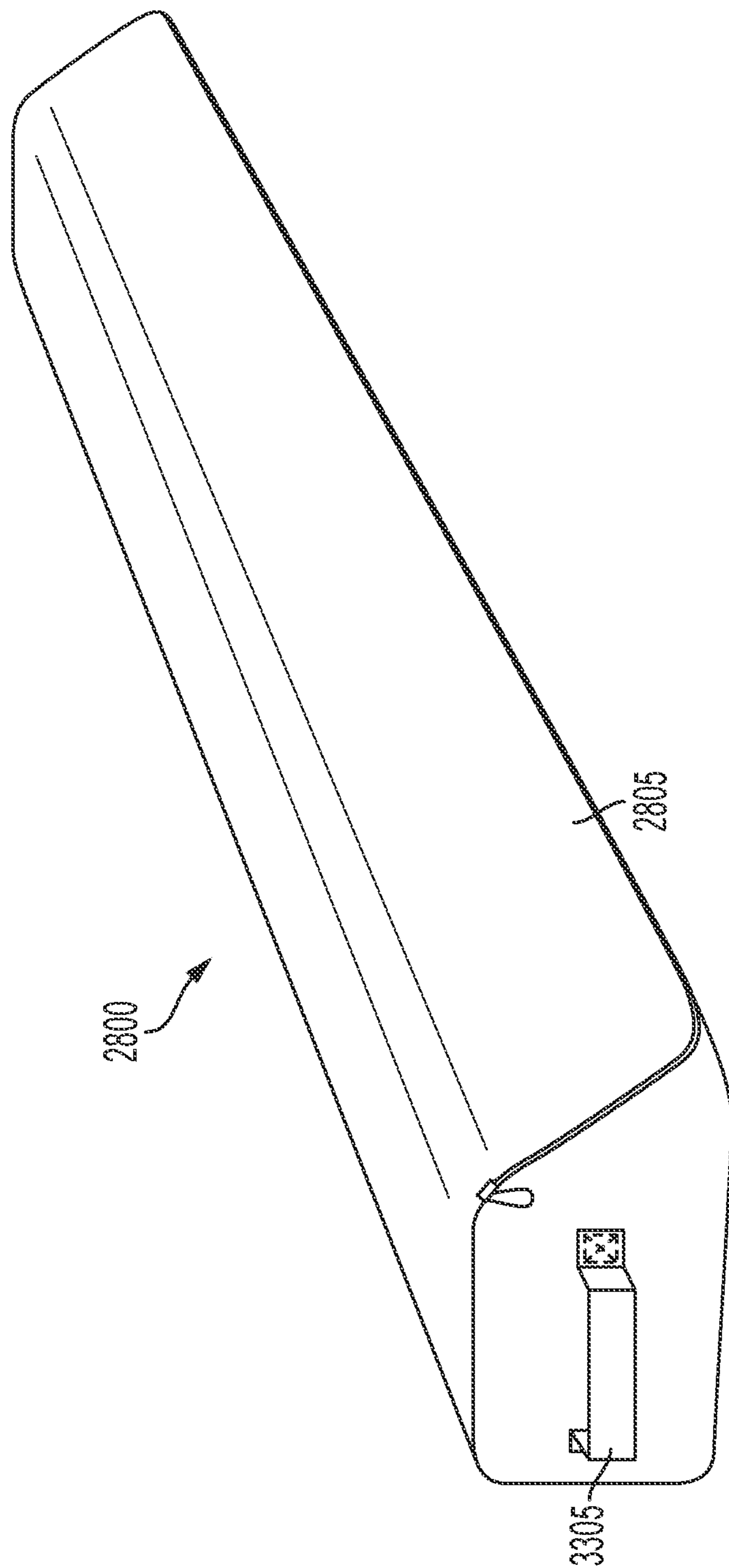


FIG. 34

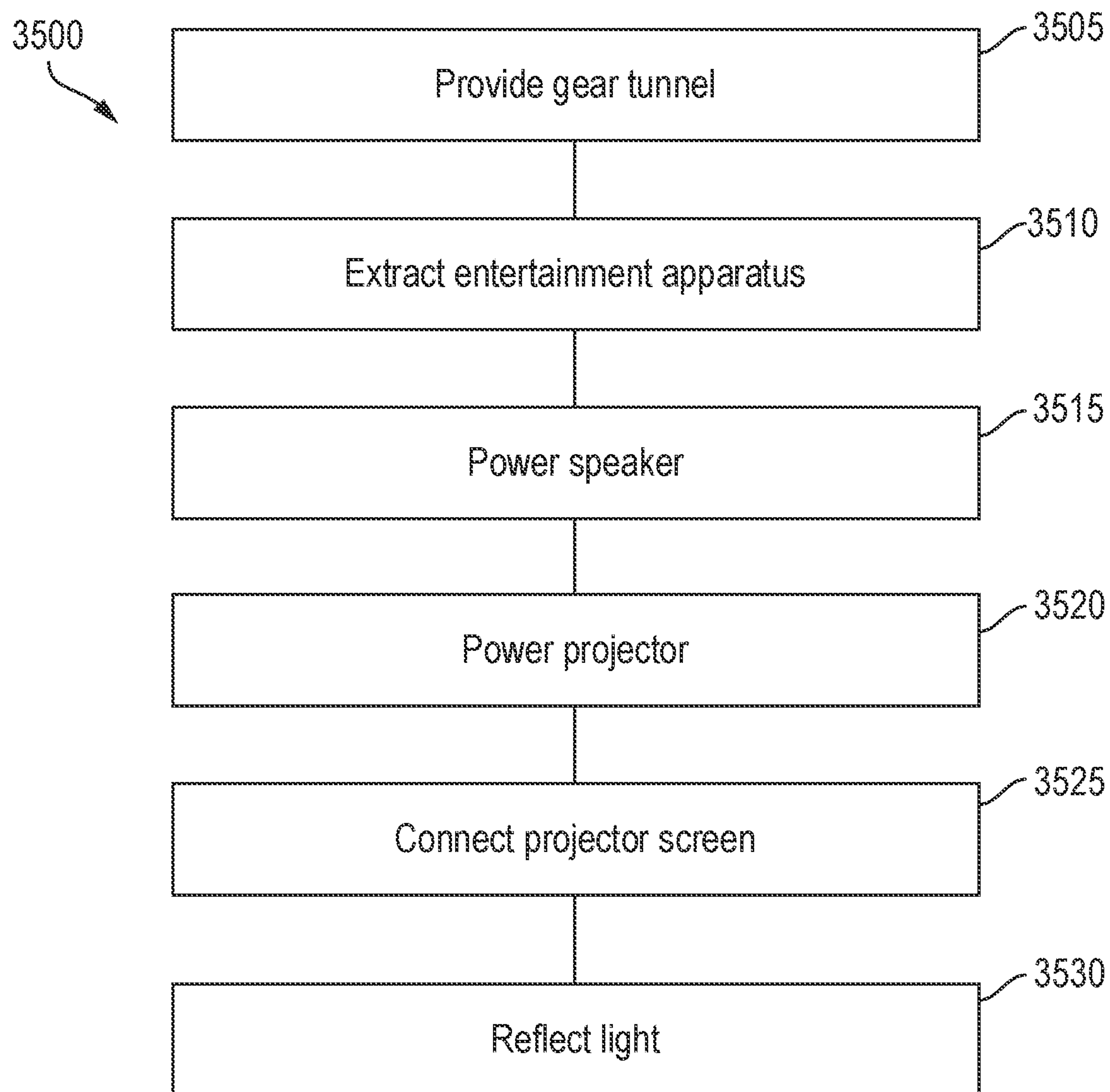


FIG. 35A



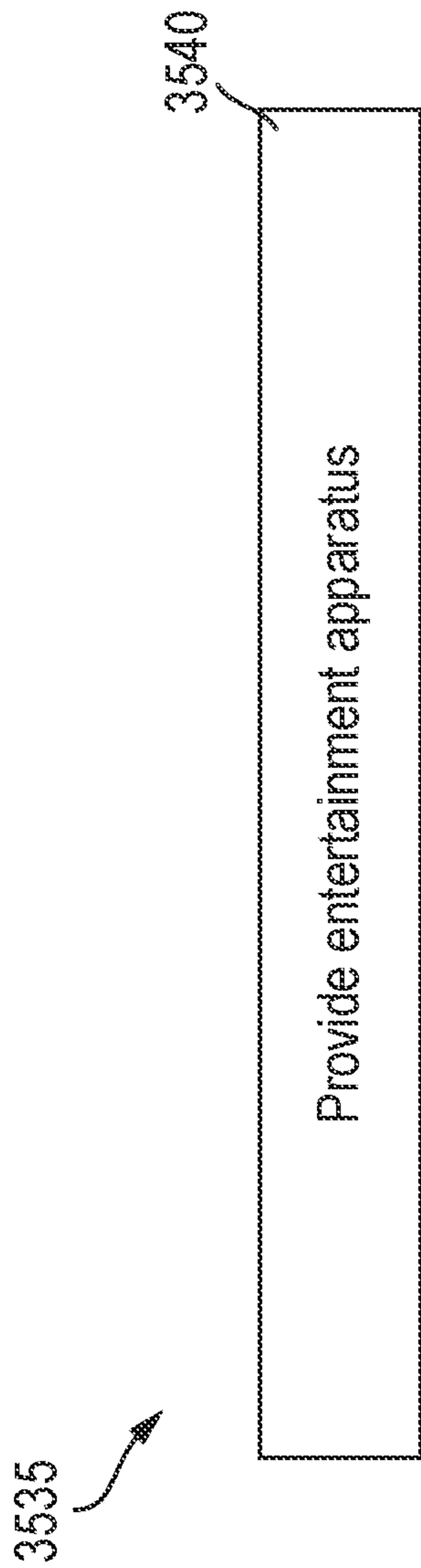


FIG. 35B

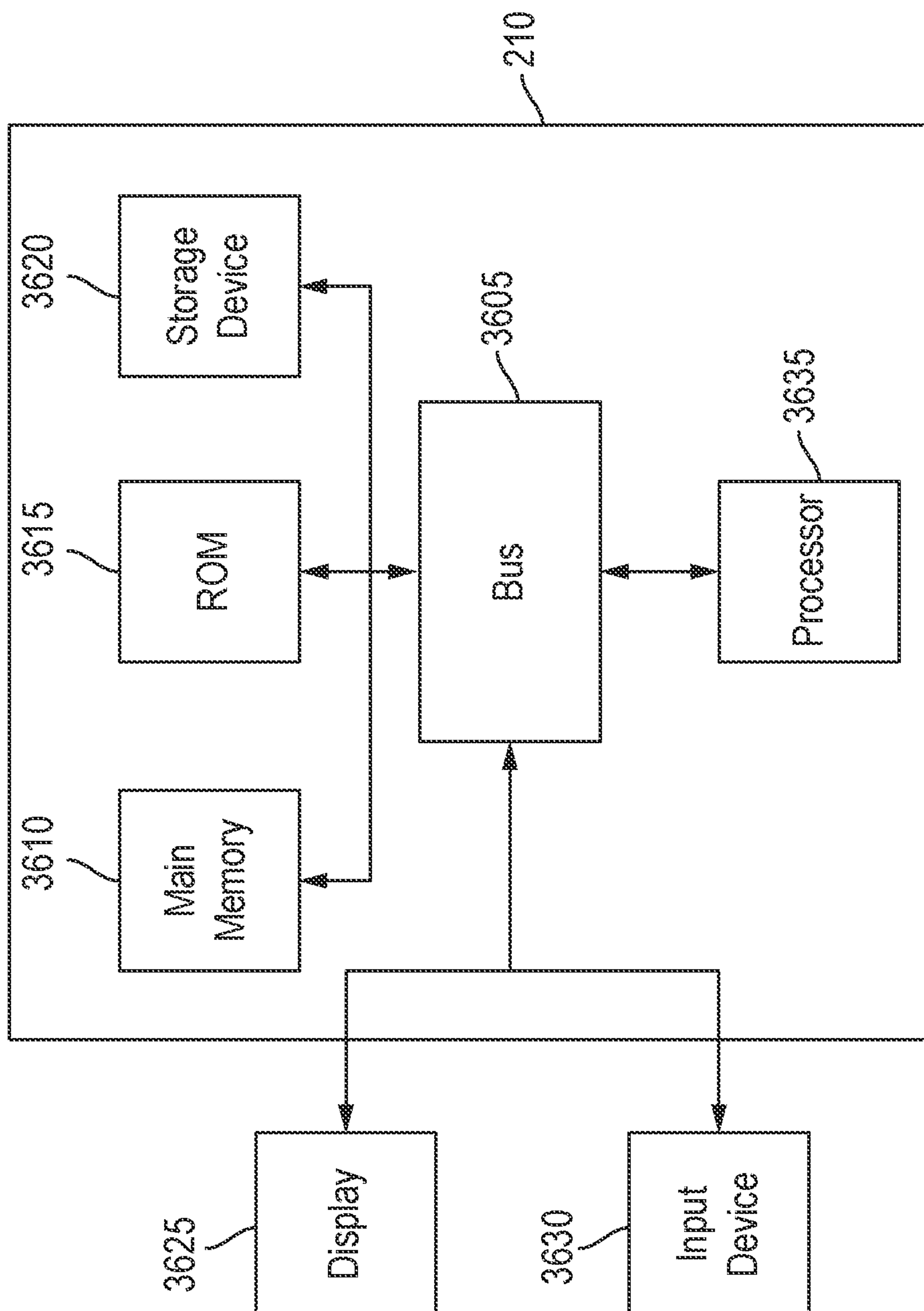


FIG. 36

**VEHICLE ENTERTAINMENT APPARATUS****CROSS-REFERENCE TO RELATED PATENT APPLICATION**

**[0001]** The present application claims the benefit of and priority to U.S. Provisional Patent Application No. 63/343,684, filed May 19, 2022, the disclosure of which is incorporated herein by reference in its entirety.

**INTRODUCTION**

**[0002]** A vehicle, such as an electric vehicle, can be powered by batteries. The vehicle can include components that operate the vehicle based on power provided by the batteries.

**SUMMARY**

**[0003]** This disclosure is generally directed to an entertainment apparatus for a vehicle, such as an entertainment apparatus. The entertainment apparatus can include entertainment components. For example, the entertainment apparatus can include at least one projector, at least one projector screen, or at least one speaker. A vehicle can store or include at least one entertainment apparatus. The entertainment apparatus can be fixed to a shuttle (e.g., a sled) that extends out of a tunnel (e.g., a gear tunnel or other storage compartment) of a vehicle. The vehicle can include a tunnel that extends from at least one side of the vehicle into the vehicle. A shuttle can be stored within the tunnel and can extend out of the tunnel. The entertainment apparatus can be fixed to a top surface of the shuttle and extend out of the tunnel along with the shuttle. Because the entertainment apparatus can be stored within the tunnel, which can be sealed by doors, electronic components of the entertainment apparatus, such as a projector or speaker, can be protected from wind, rain, mud, snow, dust or other environmental conditions. To deploy the entertainment apparatus, the shuttle can be extended out of the tunnel, a platform of the entertainment apparatus that holds the projector can rotate the projector from the storage compartment to an operational position, and the pole of the frame of the projector screen can be inserted into, and secured within, a receiving member of the entertainment apparatus. This setup process can greatly reduce or eliminate any time needed to position the projector and projector screen, adjust the lens of the projector, or perform other set-up tasks such that the resulting image is a proper size and orientation. The projector can be fixed to the entertainment apparatus in an orientation to project light in direction away from the projector screen. The projector can project light towards or onto the mirror of the entertainment apparatus. The mirror can reflect the light from the projector back towards the projector screen. This can extend the length of the optical path of light between the lens of the projector and the projector screen. This extension of the optical path can increase the size of the image that results on the projector screen and allow the size of the entertainment apparatus to be reduced without reducing, or without substantially reducing, the resulting projected image.

**[0004]** At least one aspect is directed to a vehicle. The vehicle can include a compartment. The vehicle can include a projector module configured to extend from the compartment to provide light to a projector screen.

**[0005]** At least one aspect is directed to a method. The method can include disposing a projector module within a

compartment of a vehicle. The method can include extending the projector module from the compartment of the vehicle to provide light to a projector screen.

**[0006]** At least one aspect is directed to an apparatus. The apparatus can include a component configured to extend the apparatus from a compartment of a vehicle. The apparatus can include a projector to provide light to a projector screen.

**[0007]** At least one aspect is directed to a vehicle. The vehicle can include an occupant seating area. The vehicle can include a tunnel, located between the occupant seating area and a rear portion of the vehicle, that extends from an opening on at least one side of the vehicle into the vehicle. The vehicle can include a projector apparatus configured to extend from the tunnel, the projector apparatus including a projector configured to direct light towards a mirror and the mirror configured to reflect the light onto a projector screen.

**[0008]** At least one aspect is directed to a method. The method can include disposing a projector apparatus within a tunnel of a vehicle, the tunnel extends from an opening on at least one side of the vehicle into the vehicle. The tunnel can be located between an occupant seating area of the vehicle and a rear portion of the vehicle. The method can include extending the projector apparatus from the tunnel. The method can include directing, via a projector of the projector apparatus, light towards a mirror of the apparatus. The method can include reflecting, via the mirror of the apparatus, the light onto a projector screen.

**[0009]** At least one aspect is directed to an apparatus. The apparatus can include a housing configured to extend from an opening of a tunnel on at least one side of the vehicle into the vehicle. The tunnel can be located between an occupant seating area of the vehicle and a rear portion of the vehicle. The apparatus can include a projector configured to direct light towards a mirror. The apparatus can include the mirror configured to reflect the light onto a projector screen.

**[0010]** At least one aspect is directed to a vehicle. The vehicle can include a tunnel that extends from an opening on at least one side of the vehicle into the vehicle. The vehicle can include a shuttle configured to dispose within the tunnel and to extend out of the tunnel. The vehicle can include an apparatus including at least one component, the apparatus fixed to a top surface of the shuttle that extends out of the tunnel via the shuttle.

**[0011]** At least one aspect is directed to an apparatus. The apparatus can include a top surface, a first lateral side, a second lateral side, and a bottom side. The apparatus can include a projector, at least a portion of the projector disposed within the apparatus. The apparatus can include a projector screen including a pole, the pole fixed to the apparatus. The projector can project light onto the projector screen.

**[0012]** At least one aspect is directed to an apparatus. The apparatus can include a top surface, a first lateral side, a second lateral side, and a bottom side. The apparatus can include a projector disposed on a platform within the apparatus under the top surface. The apparatus can include a rotating member that rotates the platform from a position horizontal with the top surface to a position angled relative to the top surface exposing at least a portion of the projector.

**[0013]** At least one aspect is directed to an apparatus. The apparatus can include a projector screen fixed to a receiving member of the apparatus. The apparatus can include a projector fixed to a platform of the apparatus, the projector projects light away from the projector screen. The apparatus



can include a mirror fixed to a surface of the apparatus that projects the light onto the projector screen.

**[0014]** At least one aspect is directed to an apparatus. The apparatus can include at least one component. The apparatus can include the component supported by a shuttle that extends out of a tunnel of a vehicle on the shuttle. The apparatus can include the tunnel, the tunnel extends from an opening of the vehicle on at least one side of the vehicle into the vehicle. The apparatus can include the shuttle disposed within the tunnel that extends out of the tunnel.

**[0015]** At least one aspect is directed to a method. The method can include providing a vehicle. The vehicle can include a tunnel that extends from an opening on at least one side of the vehicle into the vehicle. The vehicle can include a shuttle disposed within the tunnel that extends out of the tunnel. The vehicle can include an apparatus including at least one component, the apparatus fixed to a top surface of the shuttle that extends out of the tunnel via the shuttle.

**[0016]** At least one aspect is directed to a method. The method can include providing a tunnel that extends from an opening on at least one side of a vehicle into the vehicle. The method can include extending, a shuttle disposed within the tunnel out of the tunnel. The method can include powering at least one component of an apparatus fixed to a top surface of the shuttle that extends out of the tunnel on the shuttle.

**[0017]** At least one aspect is directed to a data processing system. The data processing system can include one or more processors, coupled with memory, to receive a data stream comprising a stream of image data and a stream of audio data. The data processing system can transmit, via a network, the stream of image data to a projector, the projector fixed to an apparatus that is fixed to a shuttle. The shuttle can be configured to dispose within a tunnel of a vehicle and to extend out of the tunnel. The data processing system can transmit, via the network, the stream of audio data to a speaker, the speaker configured to dispose within the apparatus.

**[0018]** At least one aspect is directed to a system. The system can include a shuttle configured to dispose within a tunnel and to extend out of the tunnel, the tunnel extends from an opening on at least one side of a vehicle into the vehicle. The shuttle can include a first electrical component to receive power from a battery pack of the vehicle and deliver the power to an apparatus. The apparatus can include at least one component, the apparatus fixed to a top surface of the shuttle, the apparatus extends out of the tunnel via the shuttle. The apparatus can include a second electrical component to receive the power from the shuttle and deliver the power to the component.

**[0019]** At least one aspect is directed to a vehicle. The vehicle can include a tunnel that extends from an opening on at least one side of the vehicle into the vehicle. The vehicle can include a shuttle configured to dispose within the tunnel and to extend out of the tunnel. The vehicle can include an apparatus fixed to a top surface of the shuttle that extends out of the tunnel via the shuttle. The apparatus can include a projector screen. The apparatus can include a projector that projects light onto the projector screen.

**[0020]** These and other aspects and implementations are discussed in detail below. The foregoing information and the following detailed description include illustrative examples of various aspects and implementations, and provide an overview or framework for understanding the nature and character of the claimed aspects and implementations. The

drawings provide illustration and a further understanding of the various aspects and implementations, and are incorporated in and constitute a part of this specification. The foregoing information and the following detailed description and drawings include illustrative examples and should not be considered as limiting.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0021]** The accompanying drawings are not intended to be drawn to scale. Like reference numbers and designations in the various drawings indicate like elements. For purposes of clarity, not every component may be labeled in every drawing. In the drawings:

**[0022]** FIG. 1A depicts an example vehicle.

**[0023]** FIG. 1B depicts an example vehicle including an entertainment apparatus.

**[0024]** FIG. 2A depicts a data processing system for deploying an entertainment apparatus of a vehicle.

**[0025]** FIG. 2B depicts an example entertainment apparatus.

**[0026]** FIG. 2C depicts an example entertainment apparatus including a projector screen.

**[0027]** FIG. 2D depicts an example entertainment apparatus including a projector and a mirror.

**[0028]** FIG. 2E depicts an example entertainment apparatus including a projector that includes a lens that projects light onto a mirror.

**[0029]** FIG. 2F depicts an interior of an example entertainment apparatus.

**[0030]** FIG. 2G depicts an example platform for a projector of an entertainment apparatus.

**[0031]** FIG. 2H depicts an example entertainment apparatus including a drawer that stores speakers.

**[0032]** FIG. 2I depicts an example latch mechanism for a drawer that stores speakers.

**[0033]** FIG. 2J depicts an example entertainment apparatus including a projector screen.

**[0034]** FIG. 2K depict an example projector screen including a frame.

**[0035]** FIG. 2L depicts an example projector screen including a frame fixed to a frame of a vehicle.

**[0036]** FIG. 2M depicts an example mechanism to fix a pole of a projector screen to an entertainment apparatus.

**[0037]** FIG. 2N depicts an example mechanism including a receiving member that receives a pole of a projector screen.

**[0038]** FIG. 3A depicts an example vehicle where a support member of a projector screen is fixed to a frame of the vehicle.

**[0039]** FIG. 3B depicts an example entertainment apparatus where a cover is removed to expose a projector.

**[0040]** FIG. 3C depicts an example entertainment apparatus where a cover including a mirror is fixed to a portion of the entertainment apparatus to fix the mirror to the portion.

**[0041]** FIG. 3D depicts an example vehicle including an entertainment apparatus and a projector that projects light onto a projector screen separate from the vehicle.

**[0042]** FIG. 4 depicts an example vehicle including a projector and a projector screen.

**[0043]** FIG. 5 depicts an example vehicle including a projector and a second example vehicle including a projector screen.

**[0044]** FIG. 6 depicts an example vehicle including a fold out projector assembly.



[0045] FIG. 7 depicts a top view of an example vehicle including a projector.

[0046] FIG. 8 depicts an angled side view of an example vehicle including a projector that projects to different sized projector screens.

[0047] FIG. 9 depicts an example vehicle including an entertainment apparatus resting on a shuttle extracted from a gear tunnel.

[0048] FIG. 10 depicts another example vehicle including an entertainment apparatus resting on a shuttle extracted from a gear tunnel.

[0049] FIG. 11 depicts an example vehicle including an entertainment apparatus and a wireless speaker.

[0050] FIG. 12 depicts an example vehicle including a projector and a projector screen.

[0051] FIG. 13 depicts an example vehicle including an entertainment apparatus with hinging flaps and a projector screen.

[0052] FIG. 14 depicts an example entertainment apparatus including a projector and speakers.

[0053] FIG. 15 depicts example storage compartments for speakers.

[0054] FIG. 16 depicts an example vehicle including an entertainment apparatus including a fold out projector and a speaker compartment with a lid that opens upwards.

[0055] FIG. 17 depicts an example vehicle including an entertainment apparatus including a fold out projector and a speaker compartment that slides out.

[0056] FIG. 18 depicts an example vehicle including an entertainment apparatus with closed compartments.

[0057] FIG. 19 depicts an example vehicle including an entertainment apparatus with an enclosure including lateral portions.

[0058] FIG. 20 depicts an example vehicle including a storage location for a projector screen.

[0059] FIG. 21 depicts an example vehicle including a transparent storage compartment for a projector screen.

[0060] FIG. 22 depict an example vehicle including a storage location for a projector screen.

[0061] FIG. 23 depicts an example vehicle including a storage location with a projector screen stowed in the storage location.

[0062] FIG. 24 depicts an example vehicle including an entertainment apparatus including an outer surface including a single material.

[0063] FIG. 25 depicts an example vehicle including an entertainment apparatus including an outer surface including a first material and a second material that forms a stripe through the first material.

[0064] FIG. 26 depicts an example vehicle including an entertainment apparatus including an outer surface including a first material on a top half and a second material on a bottom half.

[0065] FIG. 27 depicts an example vehicle including an entertainment apparatus including an outer surface including a first material on a top portion, the first material on a middle portion, and a second material on a bottom portion.

[0066] FIG. 28 depicts an example bag for holding a projector screen.

[0067] FIG. 29 depicts an example bag for holding a projector screen including a zipper.

[0068] FIG. 30A depicts an example cap for holding a rolled up projector screen.

[0069] FIG. 30B depicts an example lock for locking poles of a projector screen.

[0070] FIG. 31A depicts an example entertainment apparatus including a protection mat.

[0071] FIG. 31B depicts an example entertainment apparatus including a strap to secure a projector screen.

[0072] FIG. 31C depicts an example bag including a draw string for holding a rolled up projector screen.

[0073] FIG. 32 depicts an example entertainment apparatus including a cradle for a projector screen.

[0074] FIG. 33 depicts an example entertainment apparatus including a protective mat.

[0075] FIG. 34 depicts an example bag including a zipper to hold a projector screen.

[0076] FIG. 35A depicts an example method of an entertainment apparatus of a vehicle.

[0077] FIG. 35B depicts an example method of providing an entertainment apparatus of a vehicle.

[0078] FIG. 36 is a block diagram depicting an architecture for a computer system that can be employed to implement elements of the systems and methods described and illustrated herein.

#### DETAILED DESCRIPTION

[0079] Following below are more detailed descriptions of various concepts related to, and implementations of, methods, apparatuses, and systems of an apparatus such as an entertainment apparatus for a vehicle. The various concepts introduced above and discussed in greater detail below may be implemented in any of numerous ways.

[0080] This disclosure is generally directed to an apparatus such as an entertainment apparatus for a vehicle, such as an entertainment apparatus that includes entertainment components. The entertainment components can include at least one projector, at least one projector screen, and at least one speaker. A vehicle can store or include at least one entertainment apparatus. An owner or driver of the vehicle can transport the entertainment apparatus within the vehicle and deploy and utilize the entertainment apparatus when the vehicle is parked at a home, in a parking lot, at a camp site, at a rest stop, on a trail, in an off road location. However, setting up the projector and projector screen can require a significant amount of time due to a configuration of the projector and projector screen that is performed each time the projector and projector screen are set up. For example, every time a projector system is set-up, the projector and projector screen may need to be positioned at a proper distance from each other such that the resulting size of an image projected by the projector properly fits the projector screen. Furthermore, a lens of a projector may need to be adjusted until the proper image is projected. When the vehicle is at a camp site, at a rest stop, or in an off-road or remote location, it may be difficult to angle the projector or projector screen on an uneven surface. Power cables or extension cables may need to be plugged into a power source and connected to the projector or speaker to provide power to the projector or speaker each time the entertainment apparatus is used.

[0081] The projector and the projector screen can be fixed to the entertainment apparatus such that the projector or projector screen have definite locations for operational or storage modes. To fit and store the entertainment apparatus in the vehicle, the entertainment apparatus can be a reduced or compact size. However, this reduction in size can reduce



an optical path from a lens of the projector to the projector screen. The length of an optical path can be proportional to the size of the resulting projected image. An optical path along a length of the entertainment apparatus between the lens of the projector and the projector screen may not be long enough for the projected image to be a proper size, e.g., be large enough to cover the projector screen.

**[0082]** To solve these and other technical problems, the technical solution described herein can include an entertainment apparatus that is fixed to a shuttle, such as a sled, that extends out of a tunnel of a vehicle. The vehicle can include a tunnel that extends from at least one side of the vehicle into the vehicle. A shuttle can be stored within the tunnel and can extend out of the tunnel. The entertainment apparatus can be fixed to a top surface of the shuttle and extend out of the tunnel along with the shuttle. At least one door can be fixed to the vehicle on an end of the tunnel. Another door can be fixed to the vehicle on the other end of the tunnel. The doors can close and seal the tunnel. Because the entertainment apparatus can be stored within the tunnel, which can be sealed by the doors, electronic components of the entertainment apparatus, such as a projector or speaker, can be protected from wind, rain, mud, snow, dust or other environmental conditions. This can allow the vehicle to be driven off-road or in harsh environments while protecting the entertainment components from the environment.

**[0083]** The entertainment apparatus can store the projector in a storage compartment of the entertainment apparatus. The entertainment apparatus can store the projector on a platform. The platform can rotate between an orientation where the projector is included within the storage compartment to an orientation where the projector is positioned to project light to the projector screen. Furthermore, the entertainment apparatus can include a receiving member for receiving and securing a pole of a frame of the projector screen. To deploy the entertainment apparatus, the shuttle can be extended out of the tunnel, the platform can rotate the projector from the storage compartment to an operational position, and the pole of the frame of the projector screen can be inserted into, and secured within, the receiving member. This can reduce or eliminate any time needed to position the projector and projector screen, adjust the lens of the projector, or perform other set-up tasks such that the resulting image is the correct size and orientation. A first time the entertainment apparatus is used, the projector can be positioned on the platform and the lens of the projector can be adjusted. Because the projector is fixed to the platform and does not move, during subsequent deployments of the entertainment apparatus, the positioning of the projector or adjusting of the lens may not be need to be repeated. The shuttle can include electrical connections that connect with a power source of a vehicle, e.g., a battery cell, battery module, battery pack, alternator. The projector or speakers can connect to the power source through the electrical connections of the shuttle. The projector or speaker can charge or be powered by the power source of the vehicle. This can reduce or eliminate the need to setup power cables or extension cables. This can further allow the projector and speaker to operate in remote locations, for example, off-road locations where an external power source is not present.

**[0084]** To extend the optical path between the projector and the projector screen, the entertainment apparatus can include a mirror. The projector can be fixed to the enter-

tainment apparatus in an orientation such as to project light in direction away from the projector screen. The projector can project light onto the mirror. The mirror can face towards the projector screen. The mirror can reflect the light from the projector back towards the projector screen. This can extend the length of the optical path of light between the lens of the projector and the projector screen. This extension of the optical path can increase the size of the image that results on the projector screen and allow the size of the entertainment apparatus to be reduced without reducing, or without substantially reducing, the resulting projected image.

**[0085]** FIG. 1A depicts an example cross-sectional view **100** of a vehicle **105** installed with at least one battery pack **110**. The vehicle **105** can be an electric vehicle. Electric vehicles **105** can include electric trucks, electric sport utility vehicles (SUVs), camper vans, electric delivery vans, electric automobiles, electric cars, electric motorcycles, electric scooters, electric passenger vehicles, electric passenger or commercial trucks, hybrid vehicles, or other vehicles such as sea or air transport vehicles, planes, helicopters, submarines, boats, or drones, among other possibilities. The battery pack **110** can be used as an energy storage system to power a building, such as a residential home or commercial building. Electric vehicles **105** can be fully electric or partially electric (e.g., plug-in hybrid) and further, electric vehicles **105** can be fully autonomous, partially autonomous, or unmanned. The vehicle **105** can be a gas or diesel powered vehicle. Electric vehicles **105** can be human operated or non-autonomous. Electric vehicles **105** such as electric trucks or automobiles can include on-board battery packs **110**, battery modules **115**, or battery cells **120** to power the electric vehicles. The vehicle **105** can include a chassis **125** (e.g., a frame, internal frame, or support structure). The chassis **125** can support various components of the vehicle **105**. The chassis **125** can span a front portion **130** (e.g., a hood or bonnet portion), a body portion **135**, and a rear portion **140** (e.g., a trunk, payload, or boot portion) of the electric vehicle **105**. The battery pack **110** can be installed or placed within the vehicle **105**. For example, the battery pack **110** can be installed on the chassis **125** of the vehicle **105** within one or more of the front portion **130**, the body portion **135**, or the rear portion **140**. The battery pack **110** can include or connect with at least one busbar, e.g., a current collector element. For example, the first busbar **145** and the second busbar **150** can include electrically conductive material to connect or otherwise electrically couple the battery modules **115** or the battery cells **120** with other electrical components of the vehicle **105** to provide electrical power to various systems or components of the vehicle **105**.

**[0086]** The vehicle **105** can include at least two front wheels **155** and at least two rear wheels **160**. The vehicle **105** can include one or multiple motors. The motors can drive at least one axle connected to the two front wheels **155** or an axle connected to the two rear wheels **160**. A single motor can drive an axle of the two front wheels **155**. A single motor can drive an axle of the two rear wheels **160**. Each wheel of the wheels **155** and **160** can be driven by an individual motor. For example, each of the four wheels **155** and **160** can be driven by one of four motors. The battery pack **110** can discharge stored energy to power the motors of the front wheels **155** and the rear wheels **160**. The battery pack **110** can discharge stored energy to generate power that the motors receive. Operating the motors of the wheels **155** and



**160** can cause the vehicle **105** to drive forward, reverse, or turn. Although not shown in FIG. 1, the vehicle **105** can include the various storage compartments, e.g., the cargo bed or the gear tunnel described elsewhere herein. The vehicles described herein can be service vehicles, electric vehicles, electric service vehicles, trail vehicles, government vehicles, camping vehicles.

[0087] The vehicle **105** includes a compartment or tunnel **170** that extends into the vehicle **105** on at least one side of the vehicle. The tunnel **170** can be located between a cab of the vehicle **105** and the rear portion **140**, e.g., a truck bed. The tunnel **170** can include an opening on at least one side of the vehicle **105**. The tunnel **170** can include an opening on a driver side of the vehicle **105** and another opening on a passenger side of the vehicle **105**. The vehicle **105** can include at least one door **165**.

[0088] The door **165** can rotate on an apparatus, e.g., a hinge between an open position exposing the opening of the tunnel **170** to a closed position covering the opening of the tunnel **170**. The hinge can be fastened to a bottom side of the door **165** and to the vehicle **100**. The hinge can rotate a top side of the door **165** downwards towards a surface under the vehicle **100**. When in the open position, the door **165** may be parallel to a floor of the vehicle **100** or perpendicular to a side of the vehicle **100**. Components, such as an apparatus **175**, can extend out of the tunnel **170** over the door **165** when the door **165** is opened. The components, such as the apparatus **175** can extend over the shuttle **195**. The shuttle **195** or the door **165** in the open position can support the weight of the apparatus **175**. The various electronic components of the apparatus **175**, e.g., projector, speakers, electronics, etc. can have a weight that the door **165** can support. The door **165** can support a maximum of 290-310 pounds of weight. The door can support a maximum of 280-320 pounds of weight. The door can support a maximum weight less than 280 pounds. The door can support a maximum weight more than 320 pounds.

[0089] The compartment **170** can be accessible to a user from an exterior of the vehicle **105**. The compartment **170** can be accessible to a user in an interior of the vehicle **105**. The compartment **170** can be located between an occupant seating area (e.g., a front seating area, a rear seating area, a passenger side seating area, a driver side seating area) and the rear portion **140** of the vehicle. The compartment **170** can be included under a front hood of the vehicle **105**. The compartment **170** can be included within a rear trunk of the vehicle **105**. The compartment **170** can be included within a truck bed of the vehicle **105**.

[0090] FIG. 1B depicts an example vehicle **105** including at least one apparatus **175**, such as an entertainment apparatus. The apparatus **175** can be or include an entertainment apparatus or module, a projector apparatus or module, or any other apparatus, module, device, or system. The apparatus **175** can be configured to extend from the compartment **170**. The apparatus **175** can be configured to stow or store within the compartment **170**. For example, the apparatus **175** can retract from an extended position into a stowed or stored position within the compartment **170**. The vehicle **105** can include at least one shuttle **195**. The entertainment apparatus **175** can be directly or indirectly fixed to the shuttle **195**. The shuttle **195** can be or include a sled or flat portion. The shuttle **195** can be stored within a tunnel, such as a gear tunnel for storing gear, of the vehicle **105**. The shuttle **195** can extend from the gear tunnel and be supported by at least

one support **190**. The support **190** can include a leg, multiple legs, at least one pipe, wheel, or box. The apparatus **175** can include a component, such as an entertainment component. The entertainment component can be or include a projector, a projector module, a mirror, a projector screen, a speaker, a television, a smartphone, a radio, a steaming box, a laptop computer, a desktop computer, a virtual reality (VR) headset, VR gloves. The component can be equipment, tools, camping equipment, cooking equipment. The apparatus **175** can include a mixture of components of a variety of types, e.g., entertainment components, camping supplies, groceries.

[0091] The entertainment apparatus **175**, or a housing **199**, of the entertainment apparatus **175**, can be fixed to a top surface of the shuttle **195** and supported by the shuttle **195**. The housing **199** can include a bottom side, lateral sides, a top side, storage compartments, cavities. Various connectors or components, such as one or more screws, bolts, rivets, snaps, connectors can fix the housing **199**, or a bottom side of the housing **199**, to the top surface of the shuttle **195**. The shuttle **195** can be configured to transport, extend, or move the entertainment apparatus or the housing **199** of the entertainment apparatus out of the tunnel **170**. The shuttle **195** can be 60-70 inches long. The shuttle **195** can be 55-75 inches long. The shuttle **195** can be less than 55 inches long. The shuttle **195** can be more than 75 inches long. The shuttle **195** can be 18-19 inches wide. The shuttle **195** can be 17-20 inches wide. The shuttle **195** can be less than 18 inches wide. The shuttle **195** can be more than 20 inches wide. The shuttle **195** can be 0.5-1.5 inches thick. The shuttle **195** can be 0.2-2 inches thick. The shuttle **195** can be more than 2 inches thick. The shuttle **195** can be less than 0.2 inches thick. The shuttle **195** can include a top portion, a bottom portion, at least one lateral wall, and at least one end. The shuttle **195** can be a rectangular solid or a prismatic shape.

[0092] The entertainment apparatus **175** includes at least one projector **180**. The projector **180** can be or include a digital light processing (DLP) projector, a liquid crystal display (LCD) projector, a light emitting diode (LED) projector, a lead computing optical sight (LCOS) projector, or a laser projector. The projector **180** can project an image or video onto a surface. The surface can be or include a projector screen. The surface can be or include a flat surface or a curved surface. The projector **180** can be powered by power received from the battery pack **110** through at least one electrical connection of the shuttle **195**. The projector **180** can be a battery powered projector. The projector **180** can charge from power received from the battery pack **110**. The projector **180** can be a portable projector that can be removed from the shuttle **195** and powered via a battery of the projector **180**. The projector **180** can include radio modules to perform wireless communication.

[0093] The entertainment apparatus **175** can include at least one speaker **185**. The speaker **185** can be fixed to the shuttle **195**, included within a compartment of the shuttle **195**, set on top of the shuttle **195**. The speaker **185** can be powered by power received from the battery pack **110** through the electrical connections of the shuttle **195**. The speaker **185** can be or include a battery powered speaker. The speaker **185** can charge from power received from the battery pack **110**. The speaker **185** can be a portable speaker that can be removed from the shuttle **195** and powered via a battery of the speaker **185**. The speaker **185** can include radio modules to perform wireless communication.



[0094] The shuttle 195 can include at least one electrical connection. The electrical connections of the shuttle 195 can be a hot connection and a ground connection. The electrical connections of the shuttle 195 can be a positive connection and a negative connection. The shuttle 195 or the vehicle 105 can include a transformer or converter. For example, the transformer or converter can convert power received from the battery pack 110 between alternative current (AC) power and direct current (DC) power. For example, the power provided by the battery pack 110 may be DC power. A converter can convert the power to AC power. The projector 180 or the speaker 185 may be powered via AC power. The electrical connections of the shuttle 195 can connect with at least one electrical connection of the entertainment apparatus 175. The electrical connections of the entertainment apparatus 175 can be a hot connection and a ground connection. The electrical connections of the entertainment apparatus 175 can be a positive connection and a negative connection. The electrical connections of the entertainment apparatus 175 can convey power received from the battery pack 110 and the electrical connections of the shuttle 195 to the components of the entertainment apparatus 175, e.g., the projector 180 and the speaker 185.

[0095] The electric vehicle 105 can include at least one network manager 197. The network manager 197 can generate or manage a Wi-Fi network, a mobile hot spot, a Bluetooth connection. The network manager 197 can wirelessly communicate with the projector 180 or the speaker 185 via a wireless radio. The wireless radio can include at least one antenna, transceiver, data processing system, filter, amplifier. The network manager 197 establish network connections with various networks, e.g., Internet connections to the Internet. The network manager 197 can provide Internet access to components of the vehicle 105 or devices connected to the network manager 197. The network manager 197 can connect to the Internet via cellular communication (e.g., 3G, 4G, 5G, 6G) or via another Wi-Fi network. The network manager 197 can communicate via one or more wires or electrical connections of the shuttle 195 with the projector 180 and the speaker 185. The network manager 197 can stream entertainment data to the projector 180 or the speaker 185. The entertainment data can be a video stream, a movie, a television stream, an AM radio broadcast, a FM radio broadcast, a satellite radio broadcast, an image. The projector 180 can project visual data received from the network manager 197. The speaker 185 can play audio data received from the network manager 197.

[0096] A computing system of the vehicle 105, a cellphone, a smartphone, a laptop computer, a streaming box, can access the Internet via the network manager 197. The computing system can stream audio, video, or images from a streaming service or database via the Internet. The computing system, or the network manager 197, can provide audio of the stream to the speaker 185 via the network manager 197 or an audio cable or audio/video cable. For example, the shuttle 195 could include audio/video cables to provide audio and video data to the projector 180 and the speaker 185. The computing system or the network manager 197 can provide video or images of the stream to the projector 180 via a local network generated or managed by the network manager 197 or a video cable or an audio/video cable.

[0097] FIG. 2A depicts an example data processing system 210 that controls the gear tunnel 170 of the vehicle 105. The

data processing system 210 can be a component of the vehicle 105, e.g., included as part of an infotainment system and can be located in the vehicle 105. The data processing system 210 can be located outside the vehicle 105 and communicate with computing systems of the vehicle 105. The data processing system 210 can be a cloud-based system, a server system, a smartphone, a laptop computer, a desktop computer. The data processing system 210 can connect with at least one actuator 220 of the vehicle 105. The actuators 220 can include a door actuator 220 to open or close the door 165. The actuators 220 can include a shuttle actuator 220 to transport the shuttle 195 into or out of the gear tunnel 170. The actuators 220 can include an apparatus actuator 220 to actuate an entertainment apparatus 175, e.g., deploy the projector 180. The components or actuators 220 can be included within the entertainment apparatus 175, included within the vehicle 105, included within the shuttle 195, included within the tunnel 170. The components or actuators 220 can be configured to extend the entertainment apparatus 175 from the tunnel 170. The components or actuators 220 can be configured to stow or retract the entertainment apparatus 175 within the tunnel 170. The components or actuators 220 can be operated by a user, an occupant, an electronic controller, the data processing system 210, the vehicle 110. The components can include fastening components (e.g., bolts, screws, clips, nails) that fasten the apparatus 175 to the shuttle 195 such that the apparatus 175 extends from the compartment 170 on the shuttle 195. The components can be rolling components, sliding components, telescoping members, or any other component that can allow for the apparatus 175 to extend out of the compartment 170 or to store within the compartment 170.

[0098] The actuators 220 can include various motors, electrically actuated locking assemblies, electrically actuated spring or piston assemblies, solenoids, or other components. The data processing system 210 can provide signals to the actuators 220 via electrical connections 215. The electrical connections 215 can be electrical wires, electrical traces, electrical connectors. The data processing system 210 can communicate with at least one data processing system of the actuators 220 via a communication protocol such as a controller area network (CAN), a wireless network such as a Wi-Fi network, a serial communication protocol, a Bluetooth network, a cellular network.

[0099] The actuators 220 can be powered via power received from the battery pack 110. The battery pack 110 can provide power to the actuators 220 via electrical connections 225. The electrical connections 225 can convey power from the battery pack 110 to the actuators 220. The electrical connections 225 can include busbars, power distribution boxes, high-voltage distribution boxes, electrical connections, wires, cables. At least one component of the vehicle 105 can prepare power for the actuators 220. The components can transform power from alternating current (AC) power to direct current (DC) power, convert power from DC power to AC power, adjust voltage levels. The actuators 220 can be powered by the battery pack 110 and actuate responsive to receiving a signal from the data processing system 210.

[0100] The data processing system 210 can receive a signal and deploy or retract the entertainment apparatus 175 responsive to receiving the signal. The signal can be received from at least one user input device 205. For



example, a console of the vehicle **105** can include one or more touch-screens, buttons, keyboards, microphones for voice control. A user can provide an input via the console to cause the data processing system **210** to deploy the entertainment apparatus **175**. The signal can be received from an access control device of the vehicle **105**, e.g., a key or dongle. A user can press a button on the access control device causing the access control device to send the signal to the data processing system **210** via at least one wired or wireless communications protocol. A user can send the signal to the data processing system **210** from a smartphone running an application, a laptop, a desktop computer, a voice assistant, or another personal device. The user input device **205** can receive a user input via a touch screen, a microphone, a keyboard, a mouse, or any other input device. The user input device **205** can send the signal to the data processing system **210** via a wired or wireless communications protocol responsive to receiving the user input.

[0101] Responsive to receiving a signal to deploy the entertainment apparatus **175**, the data processing system **210** can cause at least one door **165** to be actuated from a closed position to an open position by communicating a signal to the door actuator **220** causing the door actuator **220** to actuate the door **165**. The data processing system **210** can cause the door **165** to be unlocked and to move between a closed position and an open position. The data processing system **210** can cause the shuttle **195** to extend from a position within the tunnel **170** to a position extended out of the tunnel **170** by communicating a signal to the shuttle actuator **220** causing the shuttle **195** and the entertainment apparatus **175** fixed to the shuttle **195** to transport out of the tunnel **170**. The data processing system **210** can cause a component of the entertainment apparatus **175** to be actuated, for example, a platform holding the projector **180** can rotate from a storage location to a deployed location by the entertainment apparatus **175**.

[0102] The data processing system **230** can cause the support **190** to extend from a storage location along a bottom side of the shuttle **195** to a deployed position resting on a surface outside the vehicle **105** (e.g., pavement, a trail, gravel, dirt, concrete). Responsive to receiving a signal to retract the entertainment apparatus **175**, the data processing system **230** can cause the support **190** to retract to the storage location by communicating a signal to the shuttle actuator **220**. The data processing system **210** can cause the projector **180** to return to the storage location. The data processing system **210** can cause the shuttle **195** to retract back into the tunnel **170**. The data processing system **210** can cause the door **165** to move from the open position to the closed position. The data processing system **210** can cause the door **165** to lock by communicating a signal to the door actuator **220** causing the door actuator **220** to lock the door **165**.

[0103] FIG. 2B depicts an example entertainment apparatus **175**. The vehicle **105** is shown to include at least one compartment or tunnel **170**, such as a gear tunnel. The gear tunnel **170** can include a tunnel, opening, compartment, chamber, cavity, or other area internal to the vehicle **105** that can store gear such as equipment or accessories for the vehicle or equipment use by the operator or passenger of the vehicle **105**. The tunnel **170** can include a bottom side, a top side, a first lateral wall, a second lateral wall, a third lateral wall, and a fourth lateral wall. The tunnel **170** may only include one, two, or three lateral walls. The tunnel **170** can

include one or multiple openings. The gear tunnel **170** can extend horizontally, vertically, or diagonally into, across, or through the vehicle **105**. The gear tunnel **170** can extend into the vehicle **105** but not fully across the vehicle **105**. The gear tunnel **170** can extend into the vehicle **105** fully or partially across the vehicle **105**. The gear tunnel **170** can include at least one top portion, at least one bottom portion, at least one first side portion, and at least one second side portion. The first side portion can extend up from a bottom portion to a top portion at an oblique angle to the bottom portion. The first side portion and the second side portion can be oblique to each other. The first side portion and the second side portion can be parallel (e.g., parallel and oblique to the bottom portion or parallel and perpendicular to the bottom portion).

[0104] The first side portion and the second side portion can be slanted towards each other or away from each other. The first side portion can include an oblique sub-portion that extends from a bottom of the gear tunnel **170** and a perpendicular sub-portion that extends up to the top portion of the gear tunnel **170** from an end of the oblique sub-portion. The gear tunnel **170** can be disposed adjacent a cargo bed of the vehicle **105**. The gear tunnel **170** can be disposed adjacent the rear passenger area of the vehicle **105**. The gear tunnel **170** can be disposed between the cargo bed and the rear passenger area. The gear tunnel **170** can be 60-70 inches long. The gear tunnel **170** can be 55-75 inches long. The gear tunnel **170** can be less than 55 inches long. The gear tunnel **170** can be more than 75 inches long. The gear tunnel **170** can be 18-19 inches wide. The gear tunnel **170** can be 17-20 inches wide. The gear tunnel **170** can be less than 18 inches wide. The gear tunnel **170** can be more than 20 inches wide. The gear tunnel **170** can be 19-21 inches high. The gear tunnel **170** can be 18-22 inches high. The gear tunnel **170** can be less than 18 inches high. The gear tunnel **170** can be more than 22 inches high.

[0105] A first door **165** can cover a first end of the gear tunnel **170**. A second door can cover a second end of the gear tunnel **170** (for example on an opposite end of the gear tunnel **170**). The doors **165** can move between open and closed positions sealing or exposing an interior of the gear tunnel **170**. The doors **165** can hinge on a bottom side, a top side, or a lateral side. The door **165** can be lowered (e.g., via a user pulling on the door **165**, a compressed spring pushing the door **165** out, a compressed piston pushing the door **165** out, a motor that runs to transport the door **165**).

[0106] The shuttle **195** can be included within the gear tunnel **170**. The shuttle **195** can rest upon a bottom portion of the gear tunnel **170**. The shuttle **195** can be completely enclosed within the gear tunnel **170** when in a retracted position. The shuttle **195** can be secured within the gear tunnel **170** by the doors **165**. The shuttle **195** can extend out of the gear tunnel **170** and rest upon an end of the gear tunnel **170** or the door **165**. The shuttle **195** can extend out of the gear tunnel **170** by a user pulling on the shuttle **195**, a motor that transports the shuttle **195**, a compressed spring that pushes the shuttle **195** out of the gear tunnel **170**, a compressed piston that pushes the shuttle **195** out of the gear tunnel **170**. The shuttle **195** can fix to an end of the gear tunnel **170** or the door **165** via a connector, a snap, a bolt, a strap. The shuttle **195** can ride on rails, grooves, wheels, to transport between a retracted position (within the gear tunnel **170**) and an extended position (e.g., at least partially outside the gear tunnel **170**). When the shuttle **195** is removed from



the gear tunnel 170, the shuttle 195 may lock into place with an audible locking sound, clicking sound, or popping sound. A user can interact with a button 240 to unlock the shuttle 195 and a handle to retract the shuttle 195.

[0107] The entertainment apparatus 175 can connect with the shuttle 195 via an electrical connection to power the projector 180 or the speaker 185. The connection can be made automatically when the entertainment apparatus 175 is set onto the shuttle 195. A user may connect one or more cables from the shuttle 195 to the entertainment apparatus 175. The entertainment apparatus 175 can have a footprint or electrical connectors that allow the entertainment apparatus 175 to be installed on an existing shuttle 195 or fit within an existing gear tunnel 170 and integrate with the existing electrical system of the vehicle 105. This allows the entertainment apparatus 175 to work seamlessly with the shuttle 195 or the gear tunnel 170 without requiring a redesign or reconfiguration of the shuttle 195 or the gear tunnel 170.

[0108] The gear tunnel 170 can be sealed from external conditions. For example, the doors 165 can be sealed via rubber or plastic portions that surround the outer area of the door 165 or surround the opening of the gear tunnel 170. The gear tunnel 170 can protect the projector 180 or the speaker 185 from external conditions. External conditions can include rain, snow, dirt, mud, dust, wind, fire.

[0109] The opening of the gear tunnel 170 can be a pentagonal shape, a trapezoidal shape, or any other shape. The shape of the entertainment apparatus 175 can also be a pentagonal shape, a trapezoidal shape, or any other shape. The entertainment apparatus 175 can be a plastic material, metal material (e.g., aluminum, tin, steel), composite, or wooden material. The entertainment apparatus 175 can be a smaller pentagonal shape than the gear tunnel 170 allowing the entertainment apparatus 175 to fit within the gear tunnel 170. The entertainment apparatus 175 can fit within the gear tunnel 170 in a telescoping manner. The gear tunnel 170 and the entertainment apparatus 175 can be rectangular shapes, circular shapes, diamond shapes, triangular shapes, pentagonal shapes, trapezoidal shapes, etc. The entertainment apparatus 175 can include a compartment 245. The compartment 245 can store components such as a projector screen, poles of a projector frame, blankets, food, chairs. The compartment 245 can be a trapezoidal shape such that it can fit within the gear tunnel 170. The compartment 245 can include an open side, a top side, a bottom side, an end, and lateral sides. The compartment 245 can have a height of 16-17 cm. The compartment 245 can have a height of 15-18 cm. The compartment 245 can have a height of more than 18 cm. The compartment 245 can have a height less than 18 cm. The compartment 245 can include a bottom width. The bottom width can be 31-32 cm. The bottom width can be 30-33 cm. The bottom width can be more than 33 cm. The bottom width can be less than 30 cm. The compartment 245 can include a top width. The top width can be less than the bottom width. The top width can be 23-24 cm. The top width can be 22-25 cm. The top width can be more than 25 cm. The top width can be less than 22 cm.

[0110] At least a portion of the entertainment apparatus 175 can include, be in contact with, or be proximate to an insulative or vibration damping material. The material can be wrapped around the entertainment apparatus 175. The material can be disposed within the tunnel 170. For example, the material can cover at least a portion of an interior surface of the tunnel 170. The material can cover an entire surface

of the tunnel 170. The material can wrap around the apparatus 175 when the apparatus 175 is retracted within the tunnel 170. The material can contact the apparatus 175 while the apparatus 175 is disposed in the tunnel 170. The material can shield the apparatus 175 from vibrations when the vehicle 104 is driving. The material can shield the apparatus 175 from moisture or other environmental conditions.

[0111] FIGS. 2C-2E depict an example entertainment apparatus 175 including a projector 180 and a cover 274 including a mirror 275. The projector 180 can be oriented at an angle within the entertainment apparatus 175. The angle can be 12-13 degrees. The angle can be 11-14 degrees. The angle can be more than 14 degrees. The angle can be less than 11 degrees. The projector 180 can be at an angle of 40-50 degrees relative to a surface of the entertainment apparatus 175. The projector 180 can be at an angle of 35-55 degrees relative to the surface of the entertainment apparatus 175. The projector 180 can project light onto the mirror 275. The mirror 275 can include a reflective material, e.g., glass with a reflective coating, metal with a reflective coating. The mirror 275 can reflect the light projected by the projector 180 back towards the vehicle 105 and onto a projector screen 292. At least one support for the mirror 275 can be fixed to a rotating projector mount and be deployed when the projector 180 is deployed.

[0112] The cover 274 can cover a compartment of the entertainment apparatus 175. The cover 274 can be held down via magnets, snaps, connectors, latches, etc. The cover 274 can cover a cavity of the entertainment apparatus 175 that stores components, e.g., the projector 180. A user can remove the cover 274 from the entertainment apparatus 175 and can position in the cover 274 and the mirror 275 in a holding position to reflect light from the projector 180 to the projector screen 292. A back side of the cover 274 can be laid parallel to the entertainment apparatus 175 and cover the projector 180, a remote for the projector 180, a remote for the speakers 185, a remote for a streaming box. A user can remove the mirror 275 via one or more tabs. One side of the cover 274 can include a reflective coating while another side of the cover 274 can be an enclosure or housing 199 that covers the projector 180. In the holding position, the cover 274 can clip into clips of the entertainment apparatus 175, include pins that fit into holes of the entertainment apparatus 175, rest upon a support (e.g., the portion 260 or a top surface 263 in front of the portion 260) of the entertainment apparatus 175. The mirror 275 can be flat, concave, or convex. The mirror 275 can be designed to be flat, concave, or convex to control a distance or size of a projected image. The design of the mirror 275 can control the image to project properly onto a projector screen.

[0113] The mirror 275 can extend an optical path of the projector 180. For example, the mirror 275 can extend an optical path from a lens of the projector 180 to the projector screen 292. The longer the optical path, the larger the size of the projected image. Because both the projector 180 and a projector screen are included on the entertainment apparatus 175, the relative distance between the projector 180 and the projection screen may be short (e.g., 1-8 feet). The optical path can be increased by the mirror 275 to be a longer distance than the relative distance between the projector 180 and the projector screen 292. The projector 180 can project light away from the projector screen 292 towards the mirror 275 and the mirror 275 can reflect the light back towards the projector screen 292. A distance 250 between the lens of the



projector **180** and the mirror **275** can be 2-4 inches, 1-5 inches, more than five inches, less than one inch.

[0114] The projector **180** can project light directly onto the projector screen **292**. For example, the apparatus **175** may be structured without the mirror **275** (e.g., or any other mirror external to the projector **180**). The projector **180** can be oriented to project light directly onto the projector screen **292**. The projector **180** can rotate to project light onto the projector screen **292**. For example, the projector **180** can be tilted upwards via a platform from a storage location to a projecting position. The platform can include a rotating component that rotates to position the projector **180** towards the projector screen **292** such that the projector **180** projects light directly onto the projector screen **292**. The rotating component can include bearings, wheels, or other components. The rotating component can be rotated by a spring, piston, motor, or manually by a user.

[0115] FIG. 2F depicts an example entertainment apparatus **175**. The entertainment apparatus **175** is shown in an exposed view in FIG. 2F. The projector **180** is shown in two different positions, a horizontal position and an angled position (relative to a surface of the entertainment apparatus **175**). The projector **180** can be located in the horizontal position for storage. The projector **180** can be located in the angled position to project light onto the mirror **242**. The entertainment apparatus **175** can include a connector **255**. The connector **255** can include one or more slots for docking the speakers **185** with the entertainment apparatus **175**. The slots can be shaped to conform with an outer surface of the speakers **185**. For example, each slot could be or include a cylindrical portion, a rectangular portion, spherical portion. The slots can include a cork material. The slots can hold the speakers **185** via friction. The speakers **185** can be held via a latch or other connector instead of, or in addition to, a cradle with friction. A speaker can be pulled upwards to release the speaker from the slot. The slots can make electrical connections with the speakers **185**. Batteries of the speakers **185** can charge via the electrical connections via power received from the battery pack **110**. The speakers **185** can be powered based on power received from the battery pack **110**.

[0116] FIG. 2G depicts a platform **265** for the projector **180**. The entertainment apparatus **175** can include at least one platform **265**. The projector **180** can sit upon, or be fixed to, an upper surface of the platform **265**. The projector **180** can be fixed to the platform **265** via screws, snaps, clamps, wing nuts, latches. The platform **265** can rotate on at least one component, such as a hinging component **270**. The hinging component **270** can allow the platform **265** to move between a horizontal position for storing the projector **180** and an angled position for utilizing the projector **180**. The hinging component **270** can include a compressed spring, a piston, a gas spring, a motor, or another component that pushes the platform **265** from the horizontal position to the angled position. A user can press a button or flip a switch causing the hinging component **270** to raise the projector. The support (e.g., the portion **260**) for the mirror **275** can be deployed when the button is pushed. The portion **260** can move from a position parallel to the surface of the entertainment apparatus **175** to a position perpendicular to the surface of the entertainment apparatus **175** responsive to a user pressing the button or switch. The portion **260** can be actuated by a compressed spring, a piston, a gas spring, a motor, or another component. The projector **180** and the

portion **260** can be connected by a wire to the platform **265** such that when the platform **265** raises or lowers, the portion **260** is raised or lowered. Furthermore, responsive to the button press, a side panel of the entertainment apparatus **175** can kick out providing more space for the projector **180**. A user can press down on the projector **180** to unlock the platform **265** and the platform **265** can move the projector **180** from the storage position to the projecting position. The portion **260** can move from the vertical to the parallel position along with the projector **180** via one or more connecting parts. Pushing the projector down can compress a spring or piston. The platform **265** can be connected to a base of the entertainment apparatus **175** via a gas strut.

[0117] A portion **260** can hinge, via a hinge **261**, with a side of the entertainment apparatus **175**. When the platform **265** is pushed down into a horizontal position, this can compress the hinging component **270**. The hinge **261** can be a first hinge and the hinging component **270** can be a second hinge. The portion **260** can be triangular shaped, square shaped, diamond shaped, circular shaped. The portion **260** can hinge between a first position to when the platform **265** is in the horizontal position and an upright position when the portion **260** and the platform **265** are released. The hinging component **270** can actuate causing the platform **265** and the projector **180** to rise into the angled position. When the portion **260** is positioned vertically, a side of the portion **260** can support a side of the projector **180**. The portion **260** can be tied to the projector bracket (e.g., platform **265**) via a steel cable. When the latch is released, a torsion spring included in the latch can drive the portion **260** upwards. There can be a rotary latch in the bottom of the apparatus **175** that catches a striker on the projector bracket (e.g., the platform **265**).

[0118] The fixed location and angle of the projector **180**, the mirror **275**, and projector screen **292** in the entertainment apparatus **175** can allow for minimal configuration or calibration time. For example, a user can extend the shuttle, deploy the projector (e.g., release the platform **265** causing the projector **180** to move into the angled position for operation), and attach the cover **274** including the mirror **275**. A user may not need to manually adjust the position of the projector **180**, the zoom of the projector **180**, the position of the projector screen **292**. The configuration of the entertainment apparatus **175** can allow a user to quickly and efficiently set up the projector **180**. In some cases, a user may set up the projector **180** a single time, e.g., configure the zoom of the projector **180**. Since the projector **180**, the mirror **275**, and the projector screen may not move positions, the user only needs to setup the system once instead of multiple times.

[0119] The cover **274** can include a slot. The slot can be shaped as a t-slot. The mirror **267** can slide onto an edge of the portion **260** via the slot of the mirror **267** when the portion **260** is oriented perpendicular to a surface of the entertainment apparatus **175**. The edge can be configured to fit into the slot of the mirror **267**. The edge can be an "I" shape or "T" shape. Furthermore, the mirror **267** can include a pin hole. A pin of the entertainment apparatus **175** can be inserted into the pin hole securing the mirror **267** to the entertainment apparatus **175**. A user can remove the mirror **267** and lower the slot of the mirror **267** onto the portion **260** and the pin hole onto a pin of the entertainment apparatus **175** (or the platform **265**). This can secure the mirror **267** to the entertainment apparatus **175**.



[0120] FIGS. 2H-2I depict an entertainment apparatus 175 with a drawer 280 containing speakers 185. The drawer 280 can slide out of the entertainment apparatus 175. The drawer 280 can slide between a retracted position where the speakers 185 are stored within the entertainment apparatus 175 and an extended position where the speakers 185 are exposed. The drawer 280 can retract or extend on rails. A user can pull on a cord 285. The cord 285 can be webbing (rectangular shaped webbing), a cable, a piece of material, a rope. The cord 285 can unlock a latch 290 of the entertainment apparatus 175 allowing the drawer 280 to extend out of the entertainment apparatus 175. The latch 290 can hinge on a hinging member. Responsive to the cord 285 being pulled, the latch 290 can move upwards. A triangular portion of the latch 290 can catch on a member of the entertainment apparatus 175 preventing the drawer 280 from extending out of the entertainment apparatus 175. Responsive to the cord 285 being pulled, the latch 290 can move upwards on the hinging member and the triangular portion can move free of the member. This can unlock the drawer 280 allowing the drawer 280 to be pulled outwards.

[0121] FIGS. 2J-2L depicts an example entertainment apparatus 175 including a projector screen 292. The projector screen 292 can be stretched across a frame 291. The projector screen 292 can be fixed to the frame 291 via snaps, adhesive, bolts, screws, tape, clasps, nuts, belts, fabric loops. The frame 291 can include members forming a square, rectangle, circle. The frame 291 can include poles. The poles can telescope and snap together. The poles can include right angle members. The poles can surround at least one of a top side, a bottom side, a left side, or a right side of the projector screen 292. The frame 291 can be supported by a member such as at least one pole 295. The pole 295 can be inserted through an opening 296 into the entertainment apparatus 175 where the pole 295 can be fastened.

[0122] The frame 291 can be connected to at least one support member 293. The support member 293 can include poles, beams, telescoping members. An end or other portion of the support member 293 can include at least one connector 294. The connector 294 can include a clamp and a rotatable member. The rotatable member, when rotated, can tighten or loosen the clamp based on the direction that the rotatable member is turned. The connectors 294 can be attached to members of a frame of the vehicle 105. For example, a top of a cab, a side of a door, a tailgate, a bumper, a truck bed, a wall of a truck bed, can include a member that the connector 294 can connect to and support the projector screen 292. The support member 293 can be connected to the frame 291 by a strap. The strap can hold the frame 291 to the support member 293 via friction. The strap can be a rubber strap.

[0123] FIGS. 2M-2N depict an example projector screen including a pole 295 that fixes to a vehicle 105. Pole 295 can be inserted through an opening 296 of the entertainment apparatus 175. The pole 295 can be inserted through the compartment 245 of the entertainment apparatus 175. The pole 295 can be inserted into an opening of a receiving member 297. The pole 295 and the receiving member 297 can be telescoping members. The receiving member 297 can include a pin 298. The pin 298 and an end of the pole 295 can form a pin in slot connection. The end of the pole 295 can include a slot. The pin 298 can support the pole 295.

Furthermore, the pin 298 can limit the pole 295 from rotating along a longitudinal axis of the receiving member 297.

[0124] FIG. 3A depicts an example vehicle 105 where at least one support member 293 of a projector screen is fixed to a frame 299 of the vehicle 105. The frame 299 can include at least one apparatus 305, such as at least one receiving apparatus. The receiving apparatus 305 can be a portion of the frame 299 or can be fixed to the frame 299. The receiving apparatus 305 can be located on a top surface of the frame 299. One or more receiving apparatus 305 can be located on a wall of a truck bed or a roof of a cab of the vehicle 105.

[0125] The receiving apparatus 305 can include at least a portion, such as a cylindrical portion 315. The cylindrical portion 315 can include at least one side that is exposed. The receiving apparatus 305 can include at least one open portion 310 that exposes a side of the cylindrical portion 315. The connector 294 of the support member 293 can connect to the receiving apparatus 305. Ends of a clamp of the connector 294 can be inserted into the open portions 310. A portion of the connector 294 can be operated by a user to close the clamp around the cylindrical portion 315. Closing the clamp around the cylindrical portion 315 can secure the connector 294 and the support member 293 to the receiving apparatus 305.

[0126] FIGS. 3B-3C depicts an example entertainment apparatus 175 where a cover 274 is removed to expose a projector 180. The projector 180 can be stored within a compartment 345. The compartment 345 can be a cavity, opening, or interior of the entertainment apparatus 175. The compartment 345 can be formed by a bottom side, a first lateral wall, a second lateral wall, a third lateral wall, and a fourth lateral. The cover 274 can be laid across an opening of the compartment 345 to enclose the compartment 345 and cover the projector 180. The cover 274 can be removed from the entertainment apparatus 175 to expose the compartment 345.

[0127] The cover 274 can include a slot 320. The slot 320 can include an opening on an edge 365 of the cover 274. The slot 320 can be a rectangular opening, a circular opening, a triangular opening, a diamond opening. The size of the slot 320 can be sized such that an edge 360 of the portion 260 attached to the portion can fit into the slot 320. The edge 360 can be an "I" or "T" shaped edge. A surface 370 of the cover 274 can include a cut out portion for the slot 320. The cut out portion can be a width less than a width of the edge 360 but wide enough that a member between the portion 260 and the edge 360 can fit within the cut out portion. The cover 274 can be fixed to the portion 260 by fitting a top of the edge 360 into the slot 320 and sliding the cover 274 from the top of the edge 360 to a bottom or lower portion of the edge 360. The cover 274 can include at least spring steel inside the slot 320 that acts as a holding force between the cover 274 and the triangular support 260.

[0128] The edge 365 of the cover 274 can include a hole 325. The hole 325 can include a circular opening, a rectangular opening, a triangular opening. The hole 325 can form a cavity within the cover 274, such as a cylindrical cavity. When the cover 274 is fixed to the portion 260, a pin 335 can insert into the hole 325. The pin 335 can be a cylindrical shape, a rectangular solid shape. The pin 335 can limit rotation of the cover 274. The pin 335 can be mounted to a bracket 330. The bracket 330 can be fixed to an end of the platform 265 and can raise or lower with the platform 265.



The bracket **330** can be fixed to a piston **350**. The piston **350** can be a compressed spring piston, a compressed gas piston.

[0129] The compartment **345** can include at least one tray **380**. The tray **380** can store at least one remote control device for the projector **180** or a streaming box for the projector **180**. The compartment **345** can include at least one button **340**. Responsive to a user interacting with the button **340**, the projector **180** can be rotated from a horizontal orientation that is horizontal to a top surface of a housing **199** of the entertainment apparatus **175** to an angled position that is angled relative to a top surface of the entertainment apparatus **175**. The platform **265** can rotate on the hinging component **270** responsive to the button **340** being pushed. A compressed spring, piston, or other member (e.g., the piston **350**) can be unlocked by the button **240** allowing the platform **265** to rotate to move the projector **180** between the horizontal orientation to the angled position. Responsive to the button **340** being pressed, the piston **350** can push the bracket **330** and the platform **265** upwards from the horizontal orientation to the angled orientation. The entertainment apparatus **175** can include a side flap **375**. The side flap **375** can hinge or flex responsive to the button **340** being pressed. For example, a spring, compressed piston, or a motor can push the flap **375** outwards to make space for the projector **180**.

[0130] A user can press down on the projector **180**, pushing the platform **265** and the bracket **330** down from the angled position to the horizontal position. The piston **350** can become compressed by the motion of the bracket **330** and be reloaded for the projector **180** to be deployed again. Furthermore, a connector **355** can connect the portion **260** to the bracket **330**. The connector **355** can be a string, a wire, a cable or another connector. The connector **355** can exert a force on the portion **260** causing the portion **260** to move from a vertical orientation relative to an opening of the compartment **345** to a horizontal orientation relative to the opening of the compartment **345**. Furthermore, the platform **265** can connect with the flap **375**. When the platform **265** transports to the horizontal orientation, the flap **375** can be pulled inwards to be flat with an outer surface of a housing **199** of the entertainment apparatus **175**.

[0131] FIG. 3D depicts an example vehicle **105** including the entertainment apparatus **175** and the projector **180**. The vehicle **105** can be oriented, e.g., driven and parked, next to a projector screen **292**. The vehicle **105** can be oriented such that the shuttle and the projector **180** are in front of the projector screen **292** such that the projector **180** can project light onto the projector screen **292**. The projector screen **292** can be a flat surface supported above the ground by one or more legs. The projector screen **292** can include one or more anchoring cables that keep the projector screen **292** upright.

[0132] FIG. 4 depicts an example vehicle **105** including a projector **180** and a projector screen **292**. The projector screen **292** can be fixed to the vehicle **105**. The projector **180** can be oriented on the shuttle **195** to project light at the projector screen **292**. For example, the projector **180** can be oriented to project light at a position extended away from the vehicle **105** back towards the vehicle **105**. The projector screen **292** can be fixed to the vehicle via one or more poles, connectors, snaps, buckles, straps. The projector screen **292** can be fixed to a mounting portion that is fixed to a bed of the vehicle **105**, a roof of the vehicle **105**, a side of the vehicle **105**.

[0133] FIG. 5 depicts an example vehicle **105** including a projector **180** and a second example vehicle **105** including a projector screen **292**. The projector **180** can be stored or mounted within a front trunk **130** of the vehicle **105**. The vehicle **105** can include front portion **130**, such as a hood, that rotates on hinges between a closed position closing the front trunk of the front portion **130** and an open position. The hood can be locked in the open position. The projector **180** can be stored within the front trunk. The projector **180** can be stored within the gear tunnel **170** of the vehicle **105** or the gear tunnel **170** of the vehicle **105**.

[0134] The projector **180** can be mounted on top of a holding device, e.g., a tripod, a pole, a quad-pod, a box within the trunk. The projector screen **292** can be mounted on a bed **520** of the vehicle **105**. The projector screen **292** can rest on lateral walls of the bed **520**. The projector screen **292** can rest against a back of a cab of the vehicle **105**. The projector screen **292** can be fixed to the back of the cab or the lateral walls of the bed **520** via a snap, connector, strap, pole, bolt, wing nut. The projector screen **292** can be collapsible, e.g., a set of connectable poles and a screen material. The projector screen **292**, when collapsed, can be stored in the gear tunnel **170** of the vehicle **105**, in the gear tunnel **170** of the vehicle **105**, in the bed **520** of the vehicle **105**, or in the front trunk of the vehicle **105**.

[0135] FIG. 6 depicts an example vehicle **105** including a fold out projector assembly **600**. The fold out projector assembly **600** can include a projector **180** that projects light. The fold out projector assembly **600** can include an arm **610**. The arm **610** can be fixed to an end of the shuttle **195** via a hinge. The arm **610** can lay flat against a surface of the shuttle **195**. The arm **610** can rotate on the hinge from horizontal position to a vertical position. When in the vertical position, the arm **610** can position the projector **180** to project onto the projector screen **292**. The arm **610** can be locked into a variety of positions such that the projector **180** projects at a variety of angles. The positions can be discrete locking positions, e.g., the arm **610** can lock at 60 degrees, 70 degrees, 80 degrees, 90 degrees, 100 degrees, 110 degrees. The arm **610** can be locked in any location, e.g., there may not be any discrete locking positions and the arm **610** can be locked into any angled position.

[0136] FIG. 7 depicts a top view **700** of a portion **705** of an example vehicle **105** including a projector **180**. The portion **705** can be a frame of the vehicle **105**. The portion **705** can be a side frame of the vehicle **105** that includes doors, windows, wheel wells. The portion **705** can include at least one end piece **710** of the gear tunnel **170**. The end piece **710** can be located on either end of the gear tunnel **170** of the example vehicle **105**. The shuttle **195**, when in a retracted position, can be located between the two end pieces **710** on either end of the gear tunnel **170**. The projector **180** can project onto projector screens of various sizes. An image **715-725** created by the projector **180** can be of various sizes. For example, the further the light travels from the projector **180**, the larger the image may be. The projector **180** can include lenses that adjust the projector image between the various sizes of images **715-725**. The sizes can be set sizes. The sizes can be a continuous range of sizes between a minimum size and a maximum size. The size of the image **715** can be 9-10 feet, greater than 10 feet, or less than 9 feet. The images **720** can be 13-15 feet, greater than 15 feet, or less than 13 feet. The image **725** can be 19-21 feet, greater than 21 feet, or less than 19 feet.



[0137] FIG. 8 depicts an angled side view **800** of the portion **705** of the example vehicle **105** including the projector **180**. The projector **180** can project light over a horizontal or vertical angle. The angle can be 70-90 degrees, 60-100 degrees, greater than 100 degrees, or less than 60 degrees. The entertainment apparatus **175** can be an apparatus that houses the projector **180** or the speakers **185**. The entertainment apparatus **175** can include a compartment **810**. The compartment **810** can store the speakers **185**. The compartment **810** can include a bottom portion, a top portion, a first lateral wall, a second lateral wall, a third lateral wall, and a fourth lateral wall. At least one wall or portion of a wall can open exposing the speakers **185**. The entertainment apparatus **175** can include a compartment **805**. The compartment **805** can include a bottom portion, a top portion, a first lateral wall, a second lateral wall, a third lateral wall, and a fourth lateral wall. At least one wall or portion of a wall can open exposing components stored within the compartment **805**. For example, a projector screen could be collapsed and stored within the compartment **805**.

[0138] FIG. 9 depicts an example vehicle **105** including the entertainment apparatus **175** resting on the shuttle **195** extracted from the gear tunnel **170**. The entertainment apparatus **175** can include at least one compartment. The compartments can include bottoms, first lateral walls, second lateral walls, third lateral walls, fourth lateral walls, doors, windows, openings. The projector **180** or the speakers **185** can be disposed within at least one compartment of the entertainment apparatus **175**. The compartment, or another portion of the entertainment apparatus **175**, can include a horizontal portion **900**. The portion **900** can be horizontal and run across a length of at least a portion of the shuttle **195**. The portion **900** can form a shelf for components to be stored. For example, a rolled up or collapsed projector screen can be located on the portion **900**. The projector screen **905** can be stowed within the gear tunnel **170** on top of the portion **900**.

[0139] FIG. 10 depicts another example vehicle **105** including an entertainment apparatus **175** resting on a shuttle **195** extracted from a gear tunnel **170**. The entertainment apparatus **175** includes a top portion **1005**. The top portion **1005** can be parallel with the portion **900**. The top portion **1005** and the portion **900** can be oblique or slightly oblique (e.g., 0.5-10 degrees oblique). The entertainment apparatus **175** can include a lateral wall **1010**. The entertainment apparatus **175** can include a lateral wall **1015**. The lateral wall **1010**, the portion **900**, and the portion **1005** can form a compartment. The compartment can store a projector **180**. The compartment can store other components **1020**. The other components **1020** can include food, groceries, blankets, clothing, tools, camping supplies, cooking supplies, camping supplies.

[0140] The lateral wall **1010**, the lateral wall **1015**, and a top surface of the shuttle **195** (or another horizontal portion) can form another compartment. The compartment can store a projector screen. The projector screen may be stuffed or folded up in the compartment. The lateral wall **1010**, the portion **900**, a top surface of the shuttle **195** (or another horizontal portion) can form another compartment. The speakers **185** can be stored within the compartment. The compartment can include at least one charging contact for

charging the speakers **185**. The compartment can include a docking station or other device that the speakers **185** connect to.

[0141] FIG. 11 depicts an example vehicle **105** including the entertainment apparatus **175** and a wireless speaker **185**. The entertainment apparatus **175** can include a bottom portion, a first lateral side **1105**, a second lateral side **1110**, a third lateral side, and a top side **1115**. The first lateral side **1105** can be perpendicular with a bottom side of the entertainment apparatus **175** or a top surface of the shuttle **195**. The second lateral side **1110** can oblique to the bottom side of the entertainment apparatus **175**, the top surface of the shuttle **195**, or the top side **1115**. The second lateral side **1110** can include an opening **1120**.

[0142] The opening **1120** can be or include a handle that a user can use to lift the entertainment apparatus **175** and push the entertainment apparatus **175** into the gear tunnel **170** or pull the entertainment apparatus **175** out of the gear tunnel **170**. The first lateral side **1105** can include an opening to a cavity **1125**. The cavity **1125** can include a bottom, a top, and lateral walls. The speakers **185** can be stored, charged, or docked with a docking element of the cavity **1125**. A user can remove a speaker **185** from the cavity **1125** and place the speaker **185** outside the cavity **1125**. The speaker **185** can be a wireless speaker that communicates with the vehicle **105**, e.g., the network manager **197**, or communicate with the projector **180**. Various components, e.g., a projector screen, boxes, supplies, tools, equipment, food, camping equipment can be stored on the top side **1115** of the entertainment apparatus **175**. In FIG. 11, the projector screen is shown separate from the vehicle **105**. In FIG. 12, the projector screen is shown attached to the vehicle **105**.

[0143] FIG. 13 depicts an example vehicle **105** including the entertainment apparatus **175** including hinging flaps **1305** and a projector screen **292**. The entertainment apparatus **175** includes hinging flaps **1305** that open to expose a compartment. For example, one hinging flap **1305** may hinge on a first side to expose the projector **180**. The hinging flap **1305** can hinge via a hinge member to open vertically. Another hinging flap **1305** can expose a compartment that stores the speakers **185**. The hinging flaps **1305** can lock closed via locking members. The hinging flaps **1305** can lock open via the locking members. For example, a hinging flap **1305** can be opened and locked open so that the projector **180** can project from the entertainment apparatus **175** without being removed from the entertainment apparatus **175**. The hinging flap **1305** can include a mirror that reflects light of the projector onto the projector screen **292**.

[0144] The entertainment apparatus **175** can include at least one opening **296** in a top surface of the entertainment apparatus **175**. A pole **295** of the projector screen **292** can be inserted into the opening **296**. The pole **295** can extend an inch, a foot, two feet, into through the opening **296** into the entertainment apparatus **175**. A pipe can be included below the opening **296**. The pole **1235** can be inserted into the pipe. The pipe can hold the pole **295** in an upright position. A frame **291** can be supported by the pole **295**. The frame **291** can include at least one side, e.g., a top side, a bottom side, lateral sides. A projector screen material can be stretched by the frame **291**. The projector screen material can be snapped, locked, latched, or connected to the frame **291**. The screen material can be connected to the frame **291** via a reusable



snap, via a belt latch, via a rivet, via an adhesive, via a bolt, nut, screw, or nail for example.

[0145] FIG. 14 depicts an example entertainment apparatus 175 including a projector 180 and speakers 185. The entertainment apparatus 175 includes a cavity 1405. The cavity 1405 can include a bottom surface, a top surface, a first lateral wall, a second lateral wall, a fourth lateral wall. The cavity 1405 can be open on one side. The opening of the cavity can be covered by a door. The speakers 185 can be disposed within the cavity 1405. The cavity 1405 can include a docking connection 1410. The speakers 185 can clip or snap into the docking connection 1410. The docking connection 1410 can make one or more electrical connections with the speakers 185 via pins, plugs, wires, connectors. The electrical connections can provide power from the battery pack 110 to the speakers 185. The speakers 185 can charge batteries of the speakers 185 via the power. A spring latch can hold the speakers into the docking connection 1410. A user can remove the speakers from the docking connection 1410. For example, a user could pull the speaker 185. The user could press the speaker 185 in, activating the spring latch which causes the spring latch to push the speaker 185 out of the cavity 1405.

[0146] The projector 180 can be included within the cavity 1415. The projector 180 can slide between a contained location under a top surface of the entertainment apparatus 175 and an exposed location where at least a portion of the projector 180 (e.g., the lens or lamp output portion) can be exposed. The projector 180 can connect to a docking connection of the cavity 1415. The docking connection of the cavity 1415 can lock or latch the projector 180. The docking connection of the cavity 1415 can include one or more electrical pins, plugs, connections, wires. The projector 180 can be powered or charge batteries of the projector 180 via the power provided by the docking connection.

[0147] FIG. 15 depicts example storage compartments 1505-1520 for speakers 185. The compartments 1505-1520 can be compartments of the entertainment apparatus 175. The compartment 1505 can include a flap that flips down and an individual trays that extends out and hold each apparatus. The compartment 1510 can include a single tray that holds all of the speakers 185 and extends out. The compartment 1515 includes a drawer that holds the speakers and pulls out of the entertainment apparatus 175. The compartment 1520 includes a lid that lifts up exposing the speakers 185.

[0148] FIGS. 16-18 depicts an example vehicle 105 including an entertainment apparatus 175 including a fold out projector 180 and a side folding speaker compartment. The compartment can include a lid 1615 that opens upwards to expose the speakers 185. The entertainment apparatus 175 includes lids 1605 and 1610 that can flip up allowing the projector 180 to be raised out of the entertainment apparatus 175.

[0149] In FIG. 17, the projector 180 projects towards an extended flap 1705. The extended flap 1705 can include a mirror or reflecting device that reflects light of the projector onto a screen. The mirror can extend an optical path of the projector 180. The length of the optical path can define the size of the image projected onto the projector screen. The longer the optical path, the greater the size of the projected image. A drawer 1710 can store the speakers 185 and include docking connections for charging the speakers 185. FIG. 18 illustrates an example of the entertainment apparatus where

the flap 1705 is closed covering the projector 180 and the drawer 1710 is in a closed position within the entertainment apparatus 175.

[0150] FIG. 19 depicts an example vehicle 105 including an entertainment apparatus 175 with an enclosure or housing including lateral portions. The lateral portions can be wood, plastic, metal, or another material. FIG. 20 depicts an example vehicle 105 including a storage location 2005 for a projector screen 2010. The projector screen 2010 can be rolled up. For example, a frame for a projector screen can be collapsed into individual poles. The projector screen 2010 can be rolled up around the individual poles. The storage location 2005 can include at least one strap 2015. The strap 2015 can fix the projector screen 2010 to a top surface of the entertainment apparatus 175 in the storage location 2005.

[0151] FIG. 21 depicts an example vehicle 105 including a transparent storage compartment 2105 for a projector screen. For example, the projector screen 2010 can be contained within the transparent storage compartment 2105. The compartment 2105 can be a compartment that includes one or more flaps, a removable end, or other portions that open allowing a user to place components within the compartment 2105 or remove components from the compartment 2105. The compartment 2105 can be a compartment formed with a bottom surface, one or more lateral sides, and a top side. At least a portion of the compartment 2105 can be a transparent material such as plastic or glass.

[0152] FIGS. 22-23 depict an example vehicle 105 including a storage location 2205 for a projector screen 292. The storage location 2205 can be a compartment, cavity, or tunnel. The compartment can include an open side, a bottom, a first lateral side, a second lateral side, and a top. The projector screen 292 can be inserted into the storage location 2205 through the open side. The other sides can hold the projector screen 292 within the storage location 2205. FIGS. 24-27 depict examples vehicles 105 including an enclosure or housing for an entertainment apparatus in a variety of colors and configurations. The enclosures or housings can be black, red, white, tan, grey, or other color. The enclosures or housings can be or include plastic, metal, wood. Various portions of the enclosures or housings can be a first color or a first material while another portion of the enclosure or housing can be a second color or a second material. In FIG. 24, the entertainment apparatus 175 can include an outer surface including a single material. The single material can be a solid color. In FIG. 25, the entertainment apparatus 175 can include an outer surface including a first material and a second material that forms a stripe through the first material. In FIG. 26, the entertainment apparatus 175 can an outer surface including a first material on a top half and a second material on a bottom half. In FIG. 27, the entertainment apparatus 175 can include an outer surface including a first material on a top portion, the first material on a middle portion, and a second material on a bottom portion.

[0153] FIGS. 28-29 depict an example bag 2800 for holding a projector screen. The bag 2800 can include a handle for carrying the bag 2800. A projector screen can be folded up or rolled up to fit within the bag 2800. A projector screen frame can be broken down to fit within the bag 2800. The bag 2800 can have a perpendicular side, an oblique side, front and back sides, a bottom side, and a top side. The bag 2800 can include a zipper 2905 that allows a user to open the bag 2800. The bag 2800 can include an end handle 3305.



[0154] FIG. 30A depicts an example cap 3005 for holding a rolled up projector screen 3000. A cap 3005 can be placed over at least one end of the rolled up projector screen 300 to keep the projector screen 300 rolled up. The cap 3005 can be fixed with a strap. Poles of a frame of the projector screen 300 can be included within a center of the projector screen material. FIG. 30B depicts an example lock 3010 for locking poles of a projector screen 3000. The lock 3010 can lock the poles of the frame together. The lock 3010 can be a soft or rubberized material that does not scratch a top surface of the entertainment apparatus 175. The lock 3010 can be rubber. The lock 3010 can lift the poles off of the surface of the entertainment apparatus 175 to prevent the surface from being scratched by the poles.

[0155] FIG. 31A depicts an example entertainment apparatus 175 including a protection mat 3115. The surface of the entertainment apparatus 175 can include the protection mat 3115 to prevent the poles of the projector screen from scratching the entertainment apparatus 175. The mat 3115 can be a rubber mat. The mat 3115 can be a removable mat that is molded to fit a curved surface of the entertainment apparatus 175. FIG. 31B depicts an example entertainment apparatus 175 including at least one strap 3105 to secure a projector screen 3000. The strap 3105 can fix the projector screen 3000 to a surface of the entertainment apparatus 175. FIG. 31C depicts an example bag 3110 including a draw string for holding a rolled up projector screen. The projector screen 3000 could be inserted into a bag 3110 and the draw string can be pulled to secure the projector screen 3000. FIG. 32 depicts an example entertainment apparatus 2000 including a cradle 3205 for a projector screen. The cradle 3205 can hold the projector screen off a surface of the entertainment apparatus 175 preventing poles of the projector screen from scratching the surface. FIG. 33 depicts an example entertainment apparatus including a protective mat 3210. The mat 3210 can be a protective mat that protects a surface of the entertainment apparatus 175 from being scratched. FIG. 34 depicts an example bag 2800 including a zipper 2805 to hold a projector screen.

[0156] FIG. 35A depicts an example method 3500 of providing an entertainment apparatus 175 of a vehicle 105. At least one ACT of the method 3500 can be performed by the vehicle 105. At least one ACT of the method 3500 can be performed by the apparatus 175. At least one ACT of the method 3500 can be performed by a user, such as an owner or passenger of the vehicle 105. The method 3500 can include an ACT 3505 of providing a gear tunnel. The method 3500 can include an ACT 3510 of extracting an entertainment apparatus. The method 3500 can include an ACT 3515 of powering a speaker. The method 3500 can include an ACT 3520 of powering a projector. The method 3500 can include an ACT 3525 of connecting a projector screen. The method 3500 can include an ACT 3530 of reflecting light.

[0157] The method 3500 can include an ACT 3505 of providing a gear tunnel 170. The gear tunnel 170 can include an opening, compartment, chamber, or other area internal to the vehicle 105 that can store the entertainment apparatus 175 on a shuttle 195. The gear tunnel 170 can extend fully across the vehicle 105. The gear tunnel 170 can extend into the vehicle 105 but not fully across the vehicle 105. The gear tunnel 170 can include at least one top portion, at least one bottom portion, at least one first side portion, and at least one second side portion.

[0158] The method can include an ACT 3510 of extracting the entertainment apparatus 175. The entertainment apparatus 175 can be extracted out of the gear tunnel 170. For example, a user can pull on a handle of the entertainment apparatus 175 or the shuttle 195 to pull the entertainment apparatus 175 partially or completely out of the gear tunnel 170. A motor, compressed spring, compressed piston, or other actuating component can extract the entertainment apparatus 175 from the gear tunnel 170.

[0159] The method can include an ACT 3515 of powering the speaker 185. For example, the battery pack 110 can power the speaker 185. The battery pack 110 can power the speaker 185 or charge a battery of the speaker 185. The battery pack 110 can provide power to the speaker 185 via electrical connections included within the shuttle 195 or entertainment apparatus 175. The speaker 185 can receive power from the battery pack 110 when the entertainment apparatus 175 is included within the gear tunnel 170 or when the entertainment apparatus 175 is extended out of the gear tunnel 170.

[0160] The method can include an ACT 3520 of powering the projector 180. For example, the battery pack 110 can power the projector 180. The battery pack 110 can power the projector 180 or charge a battery of the projector 180. The battery pack 110 can provide power to the projector 180 via electrical connections included within the shuttle 195 or entertainment apparatus 175. The projector 180 can receive power from the battery pack 110 when the entertainment apparatus 175 is included within the gear tunnel 170 or when the entertainment apparatus 175 is extended out of the gear tunnel 170.

[0161] The method can include an ACT 3525 of connecting a projector screen 292. The projector screen 292 can be connected to the entertainment apparatus 175 or the shuttle 195. A pole 295 of the projector screen 292 can support a frame 291 of the projector screen 292. The frame 291 can support the projector screen 292. The pole 295 can be inserted into an opening 296 of the entertainment apparatus 175. The pole 295 can connect to a pin 298 of the receiving member 297 of the entertainment apparatus 175. The pin 298 or the receiving member 297 can support the pole 295 and prevent the pole 295 from rotating.

[0162] The method can include an ACT 3530 of reflecting light. The projector 180 can project light that is reflected by a mirror 275. The mirror 275 can reflect the light onto the projector screen 292. The projector 180 can project the light away from the projector screen 292. For example, the projector 180 can project the light away from the projector screen 292 at an angle perpendicular to the surface of the projector screen 292. The projector 180 can project the light at the mirror 275. The mirror 275 can reflect the light back onto the projector screen 292. By projecting the light away from the screen and then reflecting the light back to the projector screen, a path of travel of light can be extended as compared to the projector 180 projecting light directly onto the projector screen 292. By increasing the path of travel, the resulting size of the projected image can be increased.

[0163] FIG. 35B depicts an example method 3535 of providing an entertainment apparatus. The method 3535 can include an ACT 3540 of providing the entertainment apparatus 175. The entertainment apparatus 175 can be fixed to a top surface of a shuttle 195. The shuttle 195 and the entertainment apparatus 175 can be disposed within the tunnel 170. The tunnel 170 can extend from an opening on



a side of the vehicle into the vehicle. The tunnel 170 can extend from a first opening on a first side of the vehicle to a second opening on a second side of the vehicle. The openings of the tunnel 170 can be covered by doors 165 that can unlock and rotate between a position covering the openings to a position exposing the openings. The shuttle 195 can be transported out of the tunnel 170 along with the entertainment apparatus 175.

[0164] When the entertainment apparatus 175 is transported out of the tunnel 170, various entertainment components of the entertainment apparatus 175 can be deployed or operated. For example, a pole 295 of a projector screen can be inserted through an opening 296 in a housing of the entertainment apparatus into the receiving member 297 of the entertainment apparatus 175. The receiving member 297, or a pin 298 that an end of the pole 295 is fixed to, can limit rotation of the pole 295 about a longitudinal axis of the receiving member 297.

[0165] The entertainment apparatus 175 can include the projector 180. The projector 180 can be stored within a compartment of the entertainment apparatus 175. The projector 180 can be fixed to the platform 265. The platform 265 can rotate via the hinging component 270. The platform 265 can rotate from a position horizontal to a top surface of the entertainment apparatus 175 to a position angled relative to the top surface of the entertainment apparatus. A portion 260 can secure the projector 180 within the compartment of the entertainment apparatus 175 can limit the rotation of the hinging component 270 or allow the hinging component 270 to rotate the platform 265. The portion 260 can be fixed to an edge of the compartment and can rotate from a position horizontal to the top surface of the entertainment apparatus over an opening of the compartment to a vertical position. In the horizontal position, the portion 260 can lock. In the horizontal position, the portion 260 can fix the projector 180 in the horizontal position on the platform 265. For example, because the portion 260 is fixed over a top surface of the projector 180, the platform 265 cannot rotate. A bottom side of the portion 260 can be in physical contact with a top surface of the projector 180.

[0166] The opening of the compartment that stores the projector 180 can be covered by a cover 274 including the mirror 275. The cover 274 can include the mirror 275 on one side of the cover 274. The cover 274 can include a hole 325, such as a pin hole. The cover 274 can include a slot, for example a t-shaped slot. The cover 274 can be removed from covering the opening of the compartment and fixed in a vertical position. The position can angle the mirror 275 to reflect light of the projector 180 located in the angled position on the platform 265 towards the projector screen 292. The cover 274 can be fixed to the portion 260. For example, an edge of the portion 260 can fit into the slot of the cover 274. For example, when the portion 260 is positioned vertically, the cover 274, via the slot, can be slid from a top of the edge of the portion 260 to a bottom of the edge of the portion 260, fixing the cover 274 to the portion 260. A pin located on a surface of the entertainment apparatus 175 can enter the hole 325 on the bottom side of the cover 274 fixing the cover 274 to the entertainment apparatus 175.

[0167] FIG. 36 depicts an example block diagram of a data processing system 210. The data processing system 210 can be a data processing system 210 of the vehicle 105. The data processing system 210 can be a data processing system of

the battery pack 110 or the network manager 197. The data processing system 210 can be a system that transmits audio to the speaker 185 or images or video to the projector 180. The data processing system 210 can be a component of a vehicle, a component of a smartphone, a component of a tablet, a component of a laptop computer, a component of a video streaming box.

[0168] The data processing system 210 can include or be used to implement a data processing system or its components. The data processing system 210 can include at least one bus 3605 or other communication component for communicating information and at least one processor 3635 or processing circuit coupled to the bus 3605 for processing information. The data processing system 210 can include one or more processors 3635 or processing circuits coupled to the bus 3605 for processing information. The data processing system 210 can include at least one main memory 3610, such as a random access memory (RAM) or other dynamic storage device, coupled to the bus 3605 for storing information, and instructions to be executed by the processor 3635. The main memory 3610 can be used for storing information during execution of instructions by the processor 3635. The data processing system 210 can further include at least one read only memory (ROM) 3615 or other static storage device coupled to the bus 3605 for storing static information and instructions for the processor 3635. A storage device 3620, such as a solid state device, magnetic disk or optical disk, can be coupled to the bus 3605 to persistently store information and instructions.

[0169] The data processing system 210 can be coupled via the bus 3605 to a display 3625, such as a liquid crystal display, or active matrix display. The display 3625 can display information to a user such as a driver of the first vehicle 105 or other end user. An input device 3630, such as a keyboard or voice interface can be coupled to the bus 3605 for communicating information and commands to the processor 3635. The input device 3630 can include a touch screen of the display 3625. The input device 3630 can include a cursor control, such as a mouse, a trackball, or cursor direction keys, for communicating direction information and command selections to the processor 3635 and for controlling cursor movement on the display 3625.

[0170] The processes, systems and methods described herein can be implemented by the data processing system 210 in response to the processor 3635 executing an arrangement of instructions contained in main memory 3610. Such instructions can be read into main memory 3610 from another computer-readable medium, such as the storage device 3620. Execution of the arrangement of instructions contained in main memory 3610 causes the data processing system 210 to perform the illustrative processes described herein. One or more processors in a multi-processing arrangement can be employed to execute the instructions contained in main memory 3610. Hard-wired circuitry can be used in place of or in combination with software instructions together with the systems and methods described herein. Systems and methods described herein are not limited to any specific combination of hardware circuitry and software.

[0171] Although an example computing system has been described in FIG. 36, the subject matter including the operations described in this specification can be implemented in other types of digital electronic circuitry, or in computer software, firmware, or hardware, including the



structures disclosed in this specification and their structural equivalents, or in combinations of one or more of them.

**[0172]** Some of the description herein emphasizes the structural independence of the aspects of the system components or groupings of operations and responsibilities of these system components. Other groupings that execute similar overall operations are within the scope of the present application. Modules can be implemented in hardware or as computer instructions on a non-transient computer readable storage medium, and modules can be distributed across various hardware or computer based components.

**[0173]** The systems described above can provide multiple ones of any or each of those components and these components can be provided on either a standalone system or on multiple instantiation in a distributed system. In addition, the systems and methods described above can be provided as one or more computer-readable programs or executable instructions embodied on or in one or more articles of manufacture. The article of manufacture can be cloud storage, a hard disk, a CD-ROM, a flash memory card, a PROM, a RAM, a ROM, or a magnetic tape. In general, the computer-readable programs can be implemented in any programming language, such as LISP, PERL, C, C++, C#, PROLOG, or in any byte code language such as JAVA. The software programs or executable instructions can be stored on or in one or more articles of manufacture as object code.

**[0174]** Example and non-limiting module implementation elements include sensors providing any value determined herein, sensors providing any value that is a precursor to a value determined herein, datalink or network hardware including communication chips, oscillating crystals, communication links, cables, twisted pair wiring, coaxial wiring, shielded wiring, transmitters, receivers, or transceivers, logic circuits, hard-wired logic circuits, reconfigurable logic circuits in a particular non-transient state configured according to the module specification, any actuator including at least an electrical, hydraulic, or pneumatic actuator, a solenoid, an op-amp, analog control elements (springs, filters, integrators, adders, dividers, gain elements), or digital control elements.

**[0175]** The subject matter and the operations described in this specification can be implemented in digital electronic circuitry, or in computer software, firmware, or hardware, including the structures disclosed in this specification and their structural equivalents, or in combinations of one or more of them. The subject matter described in this specification can be implemented as one or more computer programs, e.g., one or more circuits of computer program instructions, encoded on one or more computer storage media for execution by, or to control the operation of, data processing apparatuses. Alternatively or in addition, the program instructions can be encoded on an artificially generated propagated signal, e.g., a machine-generated electrical, optical, or electromagnetic signal that is generated to encode information for transmission to suitable receiver apparatus for execution by a data processing apparatus. A computer storage medium can be, or be included in, a computer-readable storage device, a computer-readable storage substrate, a random or serial access memory array or device, or a combination of one or more of them. While a computer storage medium is not a propagated signal, a computer storage medium can be a source or destination of computer program instructions encoded in an artificially generated propagated signal. The computer storage medium

can also be, or be included in, one or more separate components or media (e.g., multiple CDs, disks, or other storage devices include cloud storage). The operations described in this specification can be implemented as operations performed by a data processing apparatus on data stored on one or more computer-readable storage devices or received from other sources.

**[0176]** The terms “computing device,” “component,” or “data processing apparatus” or the like encompass various apparatuses, devices, and machines for processing data, including by way of example a programmable processor, a computer, a system on a chip, or multiple ones, or combinations of the foregoing. The apparatus can include special purpose logic circuitry, e.g., an FPGA (field programmable gate array) or an ASIC (application specific integrated circuit). The apparatus can also include, in addition to hardware, code that creates an execution environment for the computer program in question, e.g., code that constitutes processor firmware, a protocol stack, a database management system, an operating system, a cross-platform runtime environment, a virtual machine, or a combination of one or more of them. The apparatus and execution environment can realize various different computing model infrastructures, such as web services, distributed computing and grid computing infrastructures.

**[0177]** A computer program (also known as a program, software, software application, app, script, or code) can be written in any form of programming language, including compiled or interpreted languages, declarative or procedural languages, and can be deployed in any form, including as a stand-alone program or as a module, component, subroutine, object, or other unit suitable for use in a computing environment. A computer program can correspond to a file in a file system. A computer program can be stored in a portion of a file that holds other programs or data (e.g., one or more scripts stored in a markup language document), in a single file dedicated to the program in question, or in multiple coordinated files (e.g., files that store one or more modules, sub programs, or portions of code). A computer program can be deployed to be executed on one computer or on multiple computers that are located at one site or distributed across multiple sites and interconnected by a communication network.

**[0178]** The processes and logic flows described in this specification can be performed by one or more programmable processors executing one or more computer programs to perform actions by operating on input data and generating output. The processes and logic flows can also be performed by, and apparatuses can also be implemented as, special purpose logic circuitry, e.g., an FPGA (field programmable gate array) or an ASIC (application specific integrated circuit). Devices suitable for storing computer program instructions and data can include non-volatile memory, media and memory devices, including by way of example semiconductor memory devices, e.g., EPROM, EEPROM, and flash memory devices; magnetic disks, e.g., internal hard disks or removable disks; magneto optical disks; and CD ROM and DVD-ROM disks. The processor and the memory can be supplemented by, or incorporated in, special purpose logic circuitry.

**[0179]** The subject matter described herein can be implemented in a computing system that includes a back end component, e.g., as a data server, or that includes a middle-ware component, e.g., an application server, or that includes



a front end component, e.g., a client computer having a graphical user interface or a web browser through which a user can interact with an implementation of the subject matter described in this specification, or a combination of one or more such back end, middleware, or front end components. The components of the system can be interconnected by any form or medium of digital data communication, e.g., a communication network. Examples of communication networks include a local area network (“LAN”) and a wide area network (“WAN”), an inter-network (e.g., the Internet), and peer-to-peer networks (e.g., ad hoc peer-to-peer networks).

**[0180]** While operations are depicted in the drawings in a particular order, such operations are not required to be performed in the particular order shown or in sequential order, and all illustrated operations are not required to be performed. Actions described herein can be performed in a different order.

**[0181]** Having now described some illustrative implementations, it is apparent that the foregoing is illustrative and not limiting, having been presented by way of example. In particular, although many of the examples presented herein involve specific combinations of method acts or system elements, those acts and those elements may be combined in other ways to accomplish the same objectives. Acts, elements and features discussed in connection with one implementation are not intended to be excluded from a similar role in other implementations or implementations.

**[0182]** The phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of “including” “comprising” “having” “containing” “involving” “characterized by” “characterized in that” and variations thereof herein, is meant to encompass the items listed thereafter, equivalents thereof, and additional items, as well as alternate implementations consisting of the items listed thereafter exclusively. In one implementation, the systems and methods described herein consist of one, each combination of more than one, or all of the described elements, acts, or components.

**[0183]** Any references to implementations or elements or acts of the systems and methods herein referred to in the singular may also embrace implementations including a plurality of these elements, and any references in plural to any implementation or element or act herein may also embrace implementations including only a single element. References in the singular or plural form are not intended to limit the presently disclosed systems or methods, their components, acts, or elements to single or plural configurations. References to any act or element being based on any information, act or element may include implementations where the act or element is based at least in part on any information, act, or element.

**[0184]** Any implementation disclosed herein may be combined with any other implementation or embodiment, and references to “an implementation,” “some implementations,” “one implementation” or the like are not necessarily mutually exclusive and are intended to indicate that a particular feature, structure, or characteristic described in connection with the implementation may be included in at least one implementation or embodiment. Such terms as used herein are not necessarily all referring to the same implementation. Any implementation may be combined

with any other implementation, inclusively or exclusively, in any manner consistent with the aspects and implementations disclosed herein.

**[0185]** References to “or” may be construed as inclusive so that any terms described using “or” may indicate any of a single, more than one, and all of the described terms. References to at least one of a conjunctive list of terms may be construed as an inclusive OR to indicate any of a single, more than one, and all of the described terms. For example, a reference to “at least one of” ‘A’ and ‘B’ can include only ‘A’, only ‘B’, as well as both ‘A’ and ‘B’. Such references used in conjunction with “comprising” or other open terminology can include additional items.

**[0186]** Where technical features in the drawings, detailed description or any claim are followed by reference signs, the reference signs have been included to increase the intelligibility of the drawings, detailed description, and claims. Accordingly, neither the reference signs nor their absence have any limiting effect on the scope of any claim elements.

**[0187]** Modifications of described elements and acts such as variations in sizes, dimensions, structures, shapes and proportions of the various elements, values of parameters, mounting arrangements, use of materials, colors, orientations can occur without materially departing from the teachings and advantages of the subject matter disclosed herein. For example, elements shown as integrally formed can be constructed of multiple parts or elements, the position of elements can be reversed or otherwise varied, and the nature or number of discrete elements or positions can be altered or varied. Other substitutions, modifications, changes and omissions can also be made in the design, operating conditions and arrangement of the disclosed elements and operations without departing from the scope of the present disclosure.

**[0188]** For example, the vehicles described herein can be various types of vehicles, e.g., internal combustion engine vehicles, hybrid vehicles, or electric vehicles. For example, the vehicles described herein and shown in the figures can be the same type of vehicle or different types of vehicles. For example, the systems and methods described herein can be implemented on internal combustion engine vehicles, hybrid vehicles, electric vehicles or various combinations thereof. The entertainment apparatus described herein can be fully detachable from the vehicle. For example, the entertainment apparatus can be stored within the vehicle and completely removed from the vehicle for use. One end of the shuttle holding the entertainment apparatus can be connected to a wall of a building, a garage door, a tree. The shuttle can include two, three, or four feet and can support itself. Further relative parallel, perpendicular, vertical or other positioning or orientation descriptions include variations within  $\pm 10\%$  or  $\pm 10$  degrees of pure vertical, parallel or perpendicular positioning. References to “approximately,” “substantially” or other terms of degree include variations of  $\pm 10\%$  from the given measurement, unit, or range unless explicitly indicated otherwise. Coupled elements can be electrically, mechanically, or physically coupled with one another directly or with intervening elements. Scope of the systems and methods described herein is thus indicated by the appended claims, rather than the foregoing description, and changes that come within the meaning and range of equivalency of the claims are embraced therein.



What is claimed is:

**1.** A vehicle, comprising:

a compartment; and

a projector module configured to extend from the compartment to provide light to a projector screen.

**2.** The vehicle of claim **1**, comprising:

a shuttle;

wherein the projector module is configured to move on the shuttle over a door of the compartment, the door comprising a hinge fixed to a bottom side of the door configured to rotate a top of the door from a closed position down towards a surface under the vehicle to open the door; and

wherein the projector module is configured to stow into and extend out from the compartment of the vehicle based at least on the movement on the shuttle.

**3.** The vehicle of claim **1**, comprising:

the projector module comprising a speaker compartment, wherein the speaker compartment is configured to stow into and extend out from the compartment of the vehicle based on movement on a shuttle.

**4.** The vehicle of claim **1**, comprising:

the projector module comprising:

a compartment to store a projector;

a removable cover, wherein the removable cover includes a mirror to reflect the light onto the projector screen; and

a portion configured to hinge from a first position above the projector to a second position to hold the removable cover removed from an opening of the compartment of the projector module.

**5.** The vehicle of claim **1**, comprising:

the projector module comprising:

a projector disposed on a platform within the projector module under a top surface of the projector module; and

a rotational member to rotate the platform from a first position to a second position to expose at least a portion of the projector through an opening of the top surface of the projector module.

**6.** The vehicle of claim **1**, comprising:

the projector module comprising:

a top surface;

a projector disposed on a platform within the projector module under the top surface of the projector module;

the platform to rotate from a first position horizontal with the top surface of the projector module to a second position angled relative to the top surface of the projector module to expose at least a portion of the projector through an opening of the top surface of the projector module; and

a portion fixed to the top surface of the projector module to rotate on a hinge from a first position horizontal to the top surface of the projector module to a second position to allow the platform to rotate to the second position angled relative to the top surface.

**7.** The vehicle of claim **1**, comprising:

the projector module comprising:

a projector configured to direct the light towards a mirror;

the mirror configured to reflect the light onto the projector screen;

wherein an optical path of the light from the projector to the mirror and from the mirror to the projector screen is longer than a distance between the projector and the projector screen.

**8.** The vehicle of claim **1**, comprising:

a shuttle disposed within the compartment of the vehicle that extends out of the compartment of the vehicle, the shuttle comprising a support to extend from a bottom surface of the shuttle to a surface below the vehicle with the shuttle extended out of the compartment of the vehicle; and

the projector module configured to extend out of the compartment of the vehicle over the shuttle.

**9.** The vehicle of claim **1**, comprising:

the projector screen comprising:

a frame;

a screen fixed to the frame; and

a support member, a first end of the support member fixed to the frame of the projector screen and a second end of the support member fixed to a frame of the vehicle.

**10.** The vehicle of claim **1**, comprising:

the projector module comprising:

a compartment that stores a speaker, the compartment of the projector module comprising an electrical connection to provide power to the speaker and a dock that holds the speaker.

**11.** The vehicle of claim **1**, comprising:

the projector module comprising:

a drawer, the drawer comprising:

a cord that extends through an opening of the drawer, the cord connected to a latch, the latch configured to actuate responsive to a force applied to the cord to cause the drawer to transport out of the projector module.

**12.** The vehicle of claim **1**, comprising:

the projector module comprising:

a top surface including an opening;

a pole of the projector screen configured to extend through the opening into the projector module; and

a member to receive an end of the pole and fix the pole within the member.

**13.** The vehicle of claim **1**, comprising:

the projector module comprising:

a member to receive an end of a pole of the projector screen, the member including a pin that fixes a slot shaped end of the pole within the member; and

the pin configured to limit rotation of the pole along a longitudinal axis of the member.

**14.** The vehicle of claim **1**, comprising:

the projector module, comprising:

a surface; and

a compartment fixed to the surface to store the projector screen, the compartment of the projector module comprising:

a first lateral side to extend from the surface to a top surface of the compartment of the projector module;

a second lateral side to extend from the surface to the top surface of the compartment of the projector module; and

ends of the first lateral side, the second lateral side, and the top surface of the compartment of the

projector module form an opening to insert the projector screen into the compartment for storage.

**15.** The vehicle of claim **1**, comprising:

a battery pack;

a shuttle disposed within the compartment of the vehicle to extend out of the compartment of the vehicle, the shuttle comprising:

an electrical connection that connects the shuttle with the battery pack;

the projector module fixed to a top surface of the shuttle, the projector module comprising an electrical connection between a projector of the projector module and the shuttle; and

the battery pack configured to power the projector via the electrical connection that connects the shuttle with the battery pack and the electrical connection between the projector and the shuttle.

**16.** A method, comprising:

disposing a projector module within a compartment of a vehicle; and

moving the projector module from the compartment of the vehicle to provide light to a projector screen.

**17.** The method of claim **16**, comprising:

rotating, via a first hinge, a portion fixed to a top surface of the projector module from a first position horizontal to the top surface of the projector module to a second position to allow a platform to rotate to a position angled relative to the top surface of the projector module; and

rotating, via a second hinge, the platform from a first position horizontal with the top surface of the projector module to the position angled relative to the top surface of the projector module to expose at least a portion of a projector fixed to a top surface of the platform through an opening of the top surface of the projector module.

**18.** The method of claim **16**, comprising:

receiving, via a member of the projector module, an end of a pole of the projector screen, the member including a pin that fixes a slot shaped end of the pole within the member; and

limiting, by the pin, rotation of the pole along a longitudinal axis of the member.

**19.** An apparatus, comprising:

a housing fixed to a shuttle configured to extend the apparatus from a compartment of a vehicle; and a projector to provide light to a projector screen.

**20.** The apparatus of claim **19**, comprising:

a compartment to store the projector;

a removable cover that extends across an opening of the compartment of the apparatus, a side of the removable cover including a mirror; and

a portion to actuate from a first position above the projector to a second position to hold the removable cover removed from the opening of the compartment of the apparatus.

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