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(54) **UNMANNED AERIAL VEHICLE PAYLOAD RECEIVING APPARATUS**

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B65D 30/00	(2006.01)
B65D 33/00	(2006.01)
B65D 21/08	(2006.01)

(52) **U.S. Cl.**
CPC ***B65D 33/14*** (2013.01); ***B65D 21/086*** (2013.01); ***B65D 29/00*** (2013.01); ***B65D 33/004*** (2013.01)

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USPC 232/29; 220/9.2
See application file for complete search history.

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(57) **ABSTRACT**

Described is an unmanned aerial vehicle ("UAV") payload receiving apparatus that may be secured to a side of a structure, such as a human residence, and positioned such that a UAV can deliver a payload into the UAV payload receiving apparatus without the UAV having to land or navigate into an area that includes objects that could be harmed by the UAV and/or harm the UAV. The UAV payload receiving apparatus may include a plurality of securing members for securing the UAV payload receiving apparatus to the structure. A top frame is coupled to the securing members, positioned in a substantially horizontal direction when the UAV payload receiving apparatus is secured to a structure, and forms an opening of a size sufficient for a payload to pass through when the payload is released by a UAV positioned above the UAV payload receiving apparatus. The UAV payload receiving apparatus also includes a

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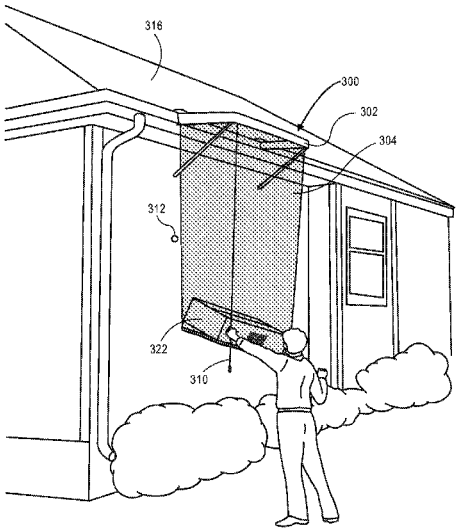

payload retainer, such as a net or bag, that is coupled to and extends in a downward direction from the top frame. The payload retainer receives and retains a payload that is placed in the UAV payload receiving apparatus.

20 Claims, 6 Drawing Sheets

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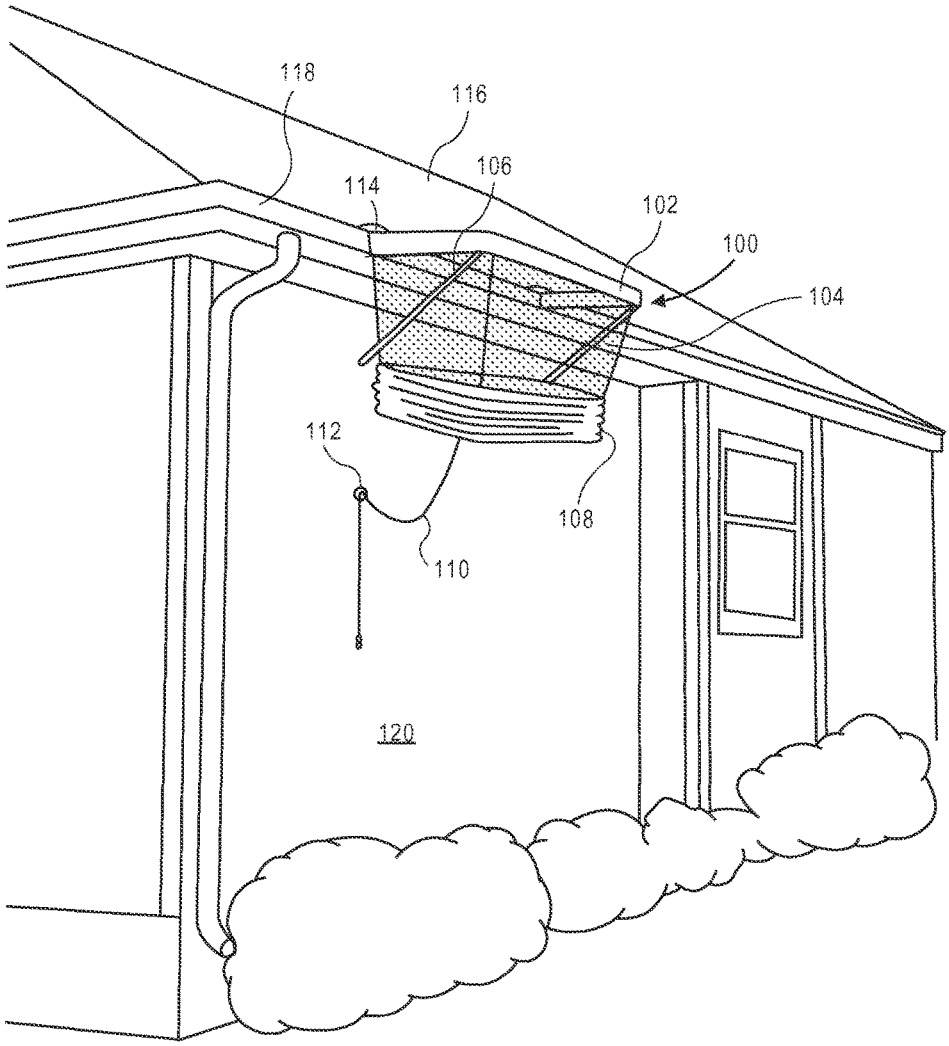

FIG. 1

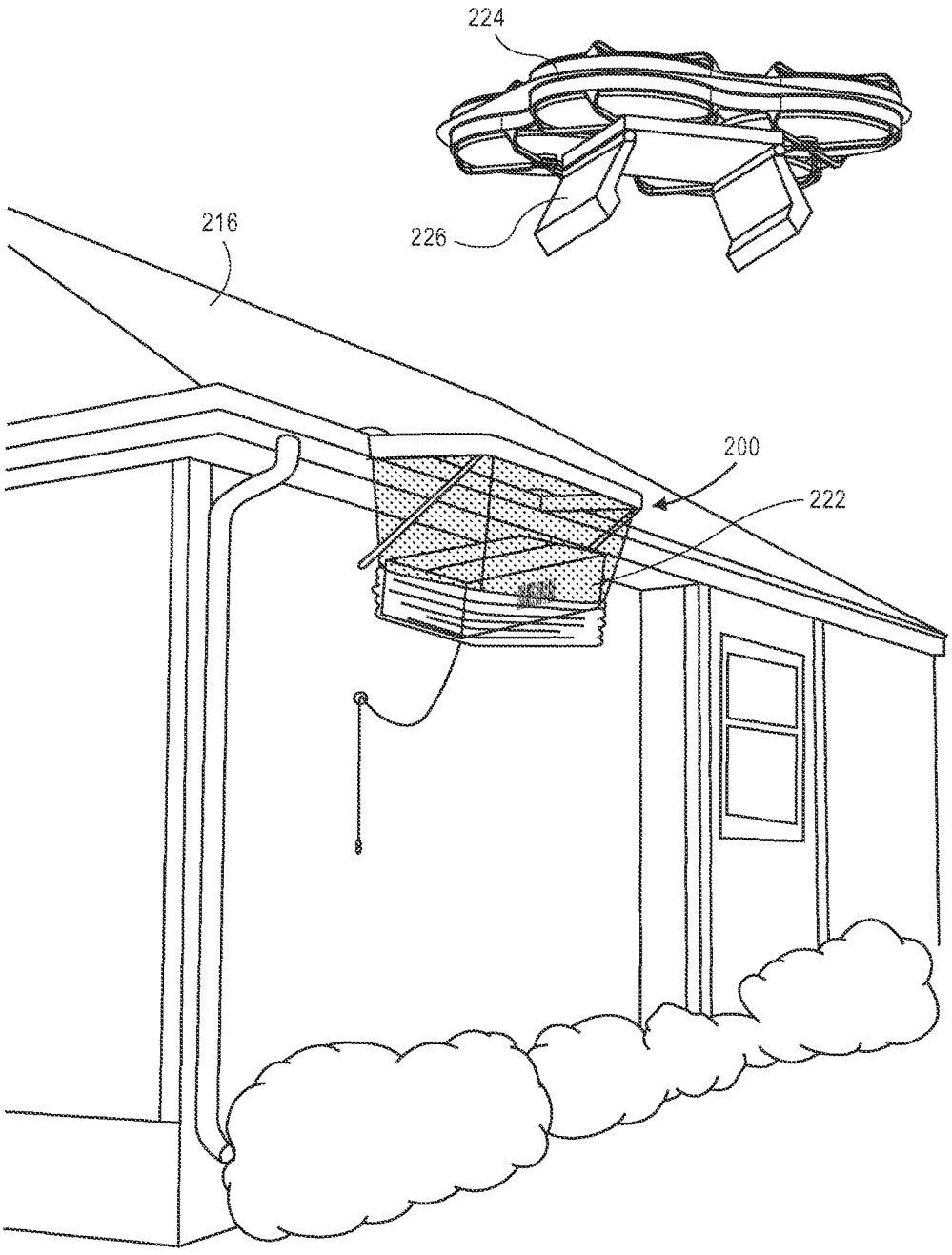

FIG. 2

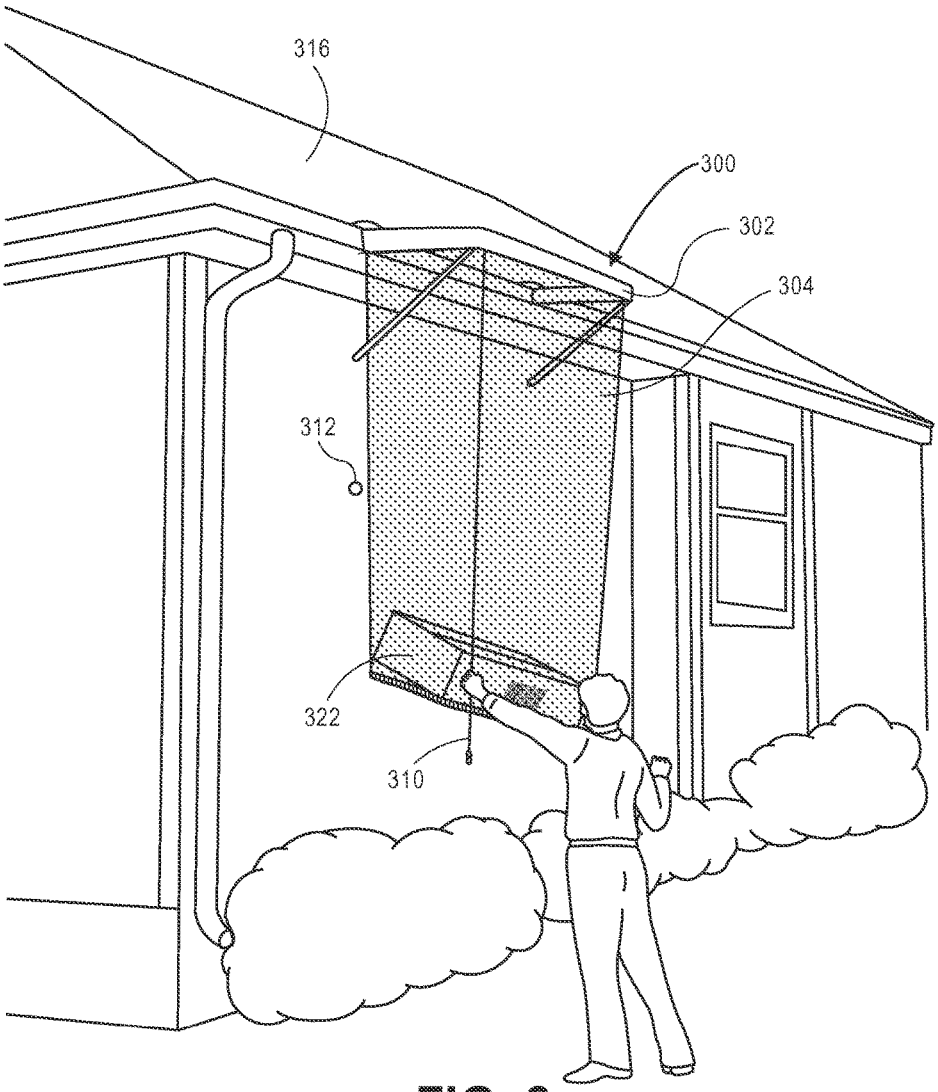

FIG. 3

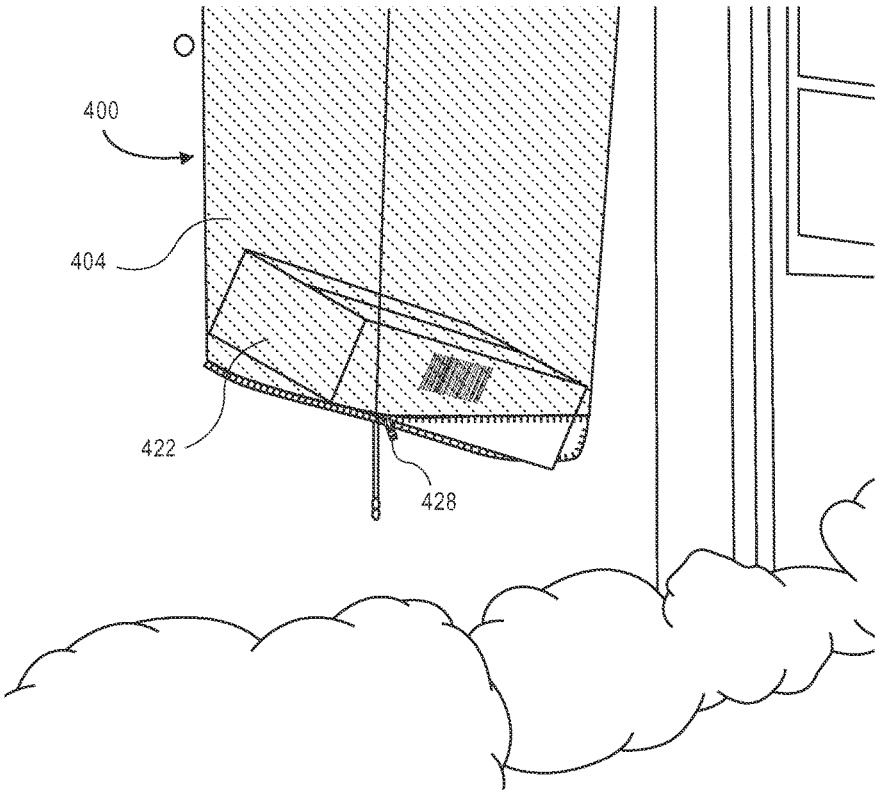

FIG. 4

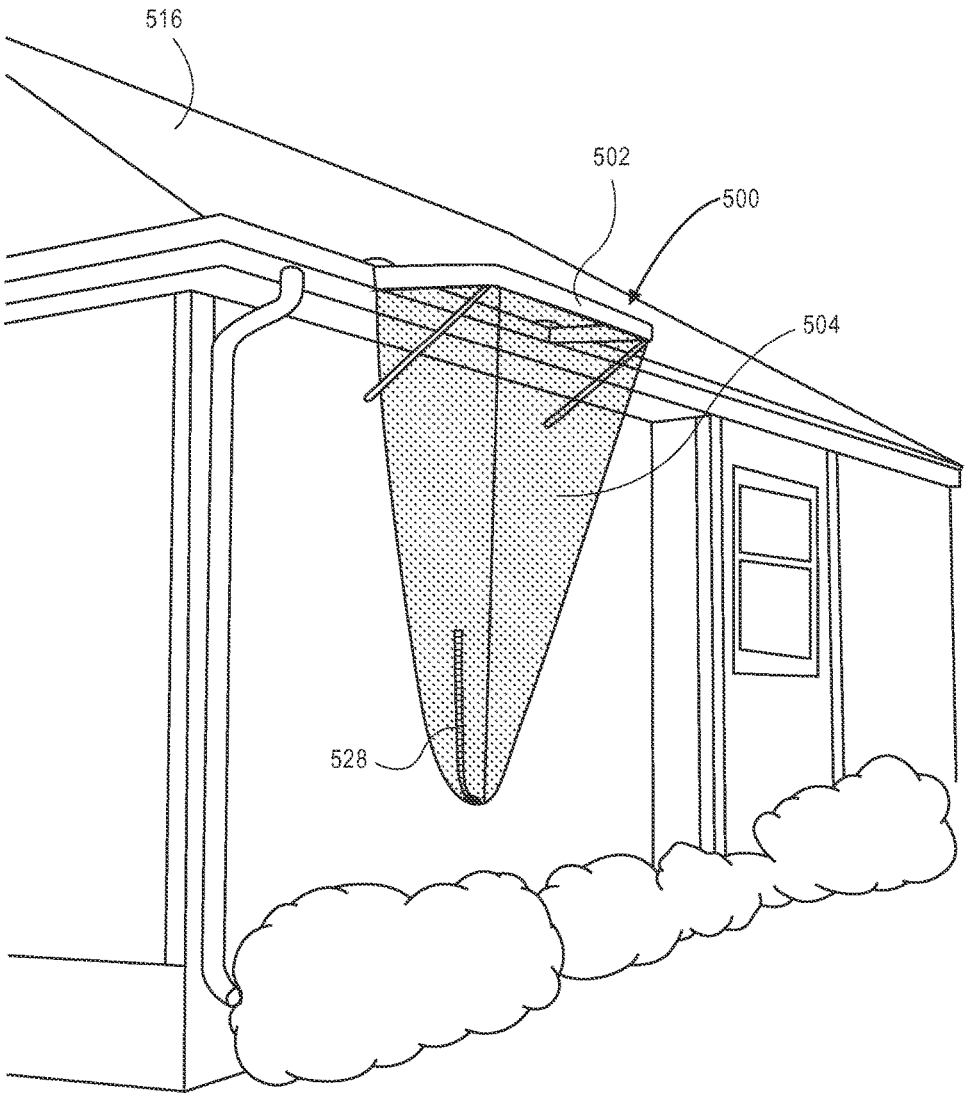

FIG. 5

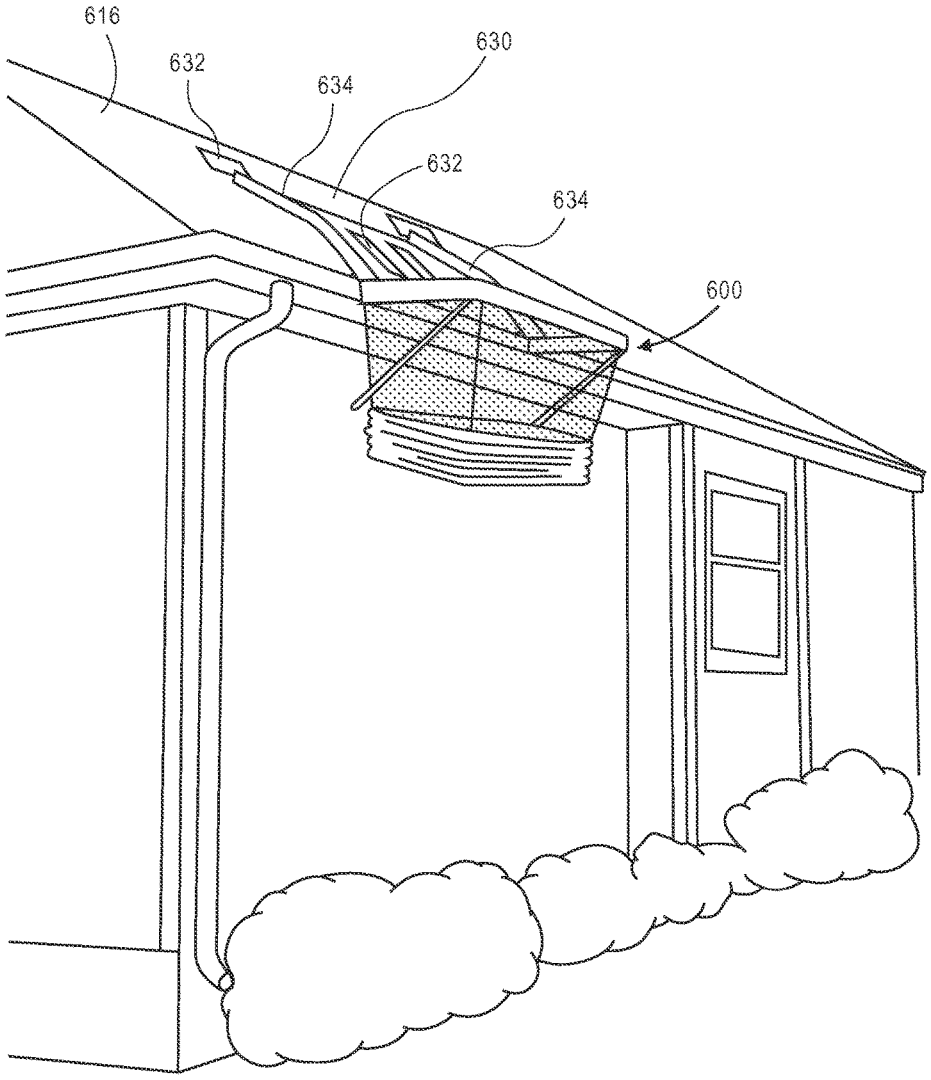

FIG. 6

UNMANNED AERIAL VEHICLE PAYLOAD RECEIVING APPARATUS

BACKGROUND

Many companies package items and/or groups of items together for a variety of purposes, such as e-commerce and mail-order companies that package items (e.g., books, CDs, apparel, food, etc.) to be shipped to fulfill orders from users. Retailers, wholesalers, and other product distributors (which may collectively be referred to as distributors) typically maintain an inventory of various items that may be ordered by users. A ground-based building, such as a materials handling facility, may maintain, process and ship such inventory.

Typically ordered items are packed in shipping packages (e.g., corrugated boxes) and shipped to the user's residence or place of business. Physical delivery of items to user specified locations has improved dramatically over the years, with some retailers offering next day delivery of ordered items. The final or last mile delivery of physical items to a user specified location is traditionally accomplished using a human controlled truck, bicycle, cart, etc. For example, a user may order an item for delivery to their home. The item may be picked from a ground-based materials handling facility, packed and shipped to the user for final delivery by a shipping carrier. The shipping carrier will load the item onto a truck that is driven by a human to the final delivery location and the human driver, or another human companion with the driver, will retrieve the item from the truck and complete the delivery to the destination. For example, the human may hand the item to a recipient, place the item on the user's porch, store the item in a post office box, etc.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a view of an unmanned aerial vehicle payload receiving apparatus secured to a structure and in a contracted position, according to an implementation.

FIG. **2** is a view of an unmanned aerial vehicle payload receiving apparatus secured to a structure, in a contracted position and retaining a payload released by an unmanned aerial vehicle, according to an implementation.

FIG. **3** is a view of an unmanned aerial vehicle payload receiving apparatus secured to a structure, in an extended position, and retaining a payload released by an unmanned aerial vehicle, according to an implementation.

FIG. **4** is a view of a payload retainer of an unmanned aerial vehicle payload receiving apparatus secured to a structure, according to an implementation.

FIG. **5** is a view of another unmanned aerial vehicle payload receiving apparatus secured to a structure, and in an extended position, according to an implementation.

FIG. **6** is a view of an unmanned aerial vehicle payload receiving apparatus that includes a payload delivery guide, according to an implementation.

While implementations are described herein by way of example, those skilled in the art will recognize that the implementations are not limited to the examples or drawings described. It should be understood that the drawings and detailed description thereto are not intended to limit implementations to the particular form disclosed but, on the contrary, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope as defined by the appended claims. As used throughout this application, the word "may" is used in a permissive sense (i.e., meaning having the potential to), rather than the mandatory sense (i.e., meaning must). Similarly, the words "include," "including," and "includes" mean including, but not limited to. Additionally, as used herein, the term "coupled" may refer to two or more components connected together, whether that connection is permanent (e.g., welded) or temporary (e.g., bolted), direct or indirect (i.e., through an intermediary), mechanical, chemical, optical, or electrical.

DETAILED DESCRIPTION

Described is an unmanned aerial vehicle ("UAV") payload receiving apparatus that may be secured to a side of a structure, such as a human residence, and positioned so that a UAV can deliver a payload into the UAV payload receiving apparatus without the UAV having to land or navigate into an area that includes objects that could be harmed by the UAV and/or harm the UAV. For example, as discussed further below, the UAV payload receiving apparatus can be secured to an upper portion of the structure, such as the edge of the roof, gutter, etc., so that it is at a height that is above occupants of the structure and/or other objects that may be damaged by the UAV and/or damage the UAV.

The UAV payload receiving apparatus may include a plurality of securing members for securing the UAV payload receiving apparatus to the structure. A top frame is coupled to the securing members, positioned in a substantially horizontal direction when the UAV payload receiving apparatus is secured to a structure, and forms an opening of a size sufficient for a payload to pass through when the payload is released by a UAV positioned above the UAV payload receiving apparatus. The UAV payload receiving apparatus also includes a payload retainer, such as a net or bag, that is coupled to and extends in a downward direction from the top frame. The payload retainer receives and retains a payload that is placed in the UAV payload receiving apparatus.

When a UAV arrives at the structure with an item to be delivered (generally referred to herein as a payload), the UAV positions the payload over the opening of the UAV payload receiving apparatus and releases the payload into the UAV payload receiving apparatus, thereby completing delivery of the item. The released payload is retained by the UAV receiving apparatus and the user that ordered the item can later retrieve the item from the UAV payload receiving apparatus.

FIG. **1** is a view of UAV payload receiving apparatus **100** secured to a structure **116** and in a contracted position, according to an implementation. The structure **116** may be any physical object of a size sufficient to which the UAV payload receiving apparatus **100** may be secured. For example, the structure may be a human residence, a building, a warehouse, a locker, a shed, etc.

The UAV payload receiving apparatus **100** includes a plurality of securing members **114** that removably secure the UAV payload receiving apparatus **100** to the structure **116**. The securing members **114** may be any mechanism for securing the UAV payload receiving apparatus **100** to the structure. For example, the securing members **114** may be any one or combination of hooks, latches, clamps, screws, adhesive, etc. In the illustrated example, the securing members **114** are hooks that secure the UAV payload receiving apparatus **100** to a gutter **118** of the structure.

Coupled to the securing members **114** is a top frame **102**. When UAV payload receiving apparatus **100** is secured to a structure **116**, the top frame extends from the structure in a substantially horizontal direction and provides an opening

through which a payload released by a UAV positioned above the UAV payload receiving apparatus **100** may pass. The top frame may be any shape and/or size. In the implementation illustrated in FIG. **1**, the top frame forms a substantially rectangular shape and includes a first short side, a second short side, a first long side, and a second long side. The first long side, the second long side, the first sort side, and the second short side form an opening of a size large enough for a payload released by a UAV positioned above the UAV payload receiving apparatus **100** to pass.

In one implementation, the average size of a payload may be approximately five inches, by approximately five inches, by approximately ten inches. To facilitate passage of the average size payload through the top frame, the top frame may have an opening of approximately fifteen inches by approximately thirty inches, or approximately three times the size of the average payload. In other implementations, the top frame may have other dimensions and/or shapes. For example, the top frame may be circular, square, rectangular, etc.

In some implementations, the top frame **102** may also include a displaceable cover (not shown). The displaceable cover may be hinged or otherwise moveably mounted to the top frame **102** so that in a default state the displaceable cover is positioned over the opening formed by the top frame **102**. When a payload is released by a UAV and passes through the opening formed by the top frame **102**, the weight of the payload may temporarily displace the displaceable cover when the payload contacts the displaceable cover such that the payload passes through the opening formed by the top frame **102**. After the payload has passed through the opening formed by the top frame **102**, the displaceable cover returns to the default state and covers the opening formed by the top frame **102**.

In other implementations, the displaceable cover (not shown) may be mechanically operated and provide security to a payload that is positioned within the payload receiving apparatus **100**. For example, the displaceable cover may include a security component that prohibits access to the payload retainer **104** through the opening formed by the top frame **102**. In such a configuration, the displaceable cover may include a receiver that is configured to receive a wireless transmission from a UAV that is delivering a payload. The wireless transmission may include a code or other identifier that is received by the displaceable cover. In response to receiving the code or other identifier, the displaceable cover allows access to the payload receiving apparatus **100** so that the payload can be delivered into the payload receiving apparatus **100** by the UAV. Once the payload is released and passes into the payload receiving apparatus **100**, the displaceable cover may move back to the default position and prohibit access to the payload retainer.

One or more support arms **106** may be coupled to the top frame to support the top frame in the substantially horizontal position when the UAV payload receiving apparatus **100** is secured to the structure **116**. In one implementation, the UAV payload receiving apparatus **100** includes two support arms **106**. The first support arm **106** is coupled to the first short side of the top frame **102** and extends at a first angle toward the structure **116**. The second support arm **106** is coupled to the second short side of the top frame **102** and extends at a second angle toward the structure **116**. The support arms **106** may be adjustable in length and/or the angle between the support arms and the top frame may be adjusted so that the support arms **106** contact the structure **116** and support the top frame **102** in a substantially horizontal position. In the illustrated example, the two support arms **106** extend downward from the top frame **102** at approximately at forty-five degree angle and contact the vertical wall **120** of the structure **116**.

The UAV payload receiving apparatus **100** also includes a payload retainer **104** that is coupled to the top frame, extends downward from the top frame, and is configured to receive and retain a payload released by a UAV into the UAV payload receiving apparatus **100**. The payload retainer may be removably coupled to the top frame **102**. For example, a top portion of the payload retainer **104** may include one or more buttons, adhesive, hooks, rivets, snaps, elastic, hook-and-loop fasteners, springs, clamps, slide fastener, etc. that may be used to secure the payload retainer **104** to the top frame. Because the UAV payload receiving apparatus **100** is positioned outdoors, it may be desirable to periodically remove the payload retainer for cleaning. In some implementations, the payload retainer **104** may be formed of a machine washable material so that the payload retainer **104** can be removed from the top frame **102** and machine washed.

The payload retainer **104** may be made of any flexible material. For example, the payload retainer may be formed from an ultraviolet (UV) resistant fabric formed in a mesh or net pattern. The spacing of the mesh or net pattern may be sufficient to allow water and small debris to pass through the payload retainer **104**, but small enough to retain a payload placed into the UAV payload receiving apparatus **100**.

The payload retainer **104** may have any elongated shape and extends in a downward direction from the top frame to receive a payload that passes through the opening of the top frame. In some implementations, the payload retainer **104** may have a first side, a second side, a third side, a fourth side and a bottom, all of which may be formed from the same or different flexible material.

The UAV payload receiving apparatus **100** may also include a retention cable that is configured to move the payload retainer **104** between a contracted position, as illustrated in FIG. **1**, and an extended position, as illustrated in FIG. **3** (discussed below). When the payload retainer **104** is in a contracted position, the volume of the inner portion of the payload retainer **104** is reduced because a portion of the flexible material **108** is contracted up toward the top frame. By contracting the payload retainer **104**, the payload retainer **104** is positioned out of the way of occupants, such as humans, of the structure **116**, is less obtrusive, and provides security for any payload that is placed into the UAV payload receiving apparatus **100** because the payload is out of reach of humans and other animals.

The retention cable is coupled to an adjustment member **110** that is used to extend and/or contract the retention cable and move the payload retainer **104** between the extended position and the contracted position. The adjustment member **110** may be any form of manual, mechanical, or electrical mechanism for adjusting the retention cable. For example, the adjustment member **110** may be any one of a manual cable extending from the retention cable that may be manually manipulated to adjust the retention cable, a motor, such as a servo motor, that may be controlled to adjust the retention cable, a hand crank, a shepherds hook, a pulley that may be manipulated to adjust the retention cable, spring actuated and configured to move between the contracted position and the extended position when a payload is placed in the payload retainer, etc.

In some implementations, the adjustment member **110** may be secured with one or more security components **112**. The security component **112** is configured to hinder or prohibit adjustment of the retention cable and movement of

the payload retailer from the contracted position to the extended position. For example, the security component **112** may include a lock that must be opened with a key, code, biometrics or other identifier before the adjustment member **110** can be utilized. In other implementations, the security component **112** may simply be a hook, latch, or other retainer that is used to retain the adjustment member **110** when the adjustment cable is not in use.

In other implementations, the adjustment member **110** may include a spring with one end coupled to the top frame **102** and an opposing end coupled to a base of the payload retainer **104**. In such a configuration, the adjustment member **110** may hold the payload retainer **104** in a contracted position. When a user desires to retrieve an item from the payload retainer **104**, the user may pull down on the payload retainer **104** (e.g., using a handle affixed to the base of the payload retainer **104**) to extend the payload retainer **104**. When the payload retainer **104** is in the extended position, the handle or the base of the payload retainer **104** may be secured to a fixed location (e.g., hook, latch, etc.) so that the payload retainer remains in the extended position. When the payload retainer **104** is secured in the extended position, the user can retrieve a payload from the payload retainer **104**. To return the payload retainer **104** to the contracted position, the base of the payload retainer **104** may be released from the fixed location and the adjustment member **110** causes the payload retainer to return to the contracted position.

FIG. **2** is a view of a UAV payload receiving apparatus **200** secured to a structure **216**, in a contracted position, and retaining a payload **222** released by a UAV **224**, according to an implementation. In this example, a user that resides in the structure **216** has ordered an item from an electronic commerce website and selected the structure **216** as the delivery destination for the item. As part of a delivery of the item to the user specified delivery location, the item is added as a payload to a UAV and the UAV **224** aerially navigates to the location of the structure **216**. To complete delivery of the item to the user, the UAV **224** aerially navigates to a position above the UAV payload receiving apparatus **200** and releases the payload **222** from the payload engagement mechanism **226** of the UAV **224** so that the payload **222** descends through the opening formed by the top frame of the UAV payload receiving apparatus **200** and into the payload retainer, as illustrated in FIG. **2**. The UAV **224** may then aerially navigate away from the location.

Because of the positioning of the UAV payload receiving apparatus **200** on an upper portion of the structure **216**, such as the edge of the roof, the UAV may descend in the airspace above the structure, which is typically devoid of objects such as trees, humans, wires, etc. As the UAV **224** descends over the structure **216** it may identify the UAV payload receiving apparatus **200** and aerially navigate to a position above the UAV payload receiving apparatus **200**. For example, the UAV payload receiving apparatus **200** may include one or more visual identifiers that are detectable by the UAV **224** to aid the UAV in detecting and positioning over the UAV payload receiving apparatus **200**. Once the UAV **224** is positioned over the UAV payload receiving apparatus **200** and properly oriented so the payload will pass through the opening of the UAV payload receiving apparatus **200**, the UAV may release the payload **222** and complete delivery of the payload to the destination.

By enabling the UAV to complete delivery of the payload at a higher altitude, the area around the delivery location is safer and the likelihood of the UAV contacting and/or damaging an object in or around the area is reduced. Likewise, as shown in FIG. **2**, when the UAV payload receiving apparatus **200** is in a contracted position, the delivered payload is inaccessible or not easily accessible to humans or other ground based animals. Retaining the payload in the UAV payload receiving apparatus **200** when the UAV payload receiving apparatus **200** is in a contracted position therefore increases the security of the payload and the privacy of the user that requested delivery of the payload.

When a user desires to retrieve the payload from the UAV payload receiving apparatus **200**, the user may move the payload retainer of the UAV payload receiving apparatus **200** from the contracted position (FIG. **2**) to the extended position (FIG. **3**) using the adjustment member.

FIG. **3** is a view of a UAV payload receiving apparatus **300** secured to a structure **316**, in an extended position, and retaining a payload **322** released by a UAV, according to an implementation. As illustrated, the adjustment member **310** has been removed from the security component **312** and used to move the payload retainer **304** from the contracted position to the illustrated extended position. By extending the payload retainer **304**, the retained payload is lowered downward toward a surface (e.g., ground) so that it can be removed from the UAV payload receiving apparatus **300**. In some implementations, the payload retainer **304** may be different lengths depending on the distance between the top frame **302** of the UAV payload receiving apparatus **300** and the surface (e.g., ground). When the payload retainer **304** is in the extended position, any payload retained by the payload retainer **304** may be accessed through an access point in the payload retainer **304** and removed.

FIG. **4** is a view of a payload retainer **404** of a UAV payload receiving apparatus **400**, according to an implementation. In this example, the payload retainer **404** includes an access point **428** in the form of a slide fastener. In this example, the slide fastener removably couples one or more sides of the payload retainer **404** with a bottom of the payload retainer **404**. By opening the slide fastener, a user can access an inner portion of the payload retainer **404** and remove a payload **422** retained by the payload retainer **404**.

The access point may be any form access point that can provide access to an inner portion of the payload retainer **404** so that a payload can be removed from the payload retainer **404**. For example, the access point **428** may include buttons, an elastic opening, a hook-and-loop fastener, a slide fastener, snaps, etc. Likewise, while the example illustrated in FIG. **4** shows the access point coupling a side of the payload retainer to a bottom of the payload retainer, in other implementations the access point may be at other locations on the payload retainer such that it is accessible by a user on the surface when the payload retainer is in the extended position.

For example, in some implementations, the access point **428** may be an opening in the payload retainer **404** that is positioned part way up the payload retainer **428**, such as at a position from the bottom of the payload retainer **404** that is approximately one-third of the total length of the payload retainer. In such a configuration, when the payload retainer **404** is in the contracted position, the opening is not accessible. However, when the payload retainer **404** is in the extended position, any payload retained in the payload retainer **404** will be below the opening and the opening will be accessible by a user to enable removal of the payload from the payload retainer **404**.

In still another example, the payload retainer **104** may be formed as a cylindrical or other shaped coil such that the inner portion of the coil forms a cavity into which the payload may be placed. When the payload retainer is in a

contracted position, the coils of the payload retainer **104** are positioned together such that the payload retainer **104** forms a cavity to retain the payload. When the payload retainer **104** is moved to an extended position, the coils of the payload retainer **104** separate, thereby allowing access to and removal of a retained payload from within the payload retainer **104**. Specifically, a user may reach between two separated coils of the payload retainer **104** and retrieve a retained payload.

FIG. **5** is a view of another a UAV payload receiving apparatus **500** secured to a structure **516**, and in an extended position, according to an implementation. In this example, the access point **528** is along a lower side of the payload retainer **504**. Likewise, the payload retainer has an elongated tapered shape. In such an implementation, the payload retainer **504** may not be movable between an extended position and a contracted position. Instead, the payload retainer may remain in an extended position. When a payload is released into the UAV payload receiving apparatus **500** and passes through the opening of the top frame **502**, the payload will contact the inner sides of the tapered payload retainer **504**. The flexible material of the payload retainer and the tapered shape will slow the descent of the payload and safely retain the payload until it is retrieved by a user.

FIG. **6** is a view of a UAV payload receiving apparatus **600** that includes a payload delivery guide **630** positioned on the structure **616** to which the UAV payload receiving apparatus **600** is secured, according to an implementation. As illustrated, the payload delivery guide is positioned on a top of the structure, in this example on a roof of the structure **616**, and adjacent to the top frame of the UAV payload receiving apparatus **600**.

The payload delivery guide is used to guide a released payload into the UAV payload receiving apparatus **600**. In such an implementation, rather than the UAV having to position the payload directly over the UAV payload receiving apparatus **600** and release the payload directly into the UAV payload receiving apparatus **600**, the UAV can position the payload over the payload delivery guide **630** and release the payload onto the payload delivery guide **630**. Because of the slope of the payload delivery guide and the vertical guides **634**, the payload, under the force of gravity, will slide along the payload delivery guide **630** and into the UAV payload receiving apparatus **600**.

The payload delivery guide **630** includes at least two vertical guides **634** that extend from the top frame of the UAV payload receiving apparatus **600** and along the top of the structure **614**. In some implementations, the vertical guides **634** may extend in an outward angle from the top frame so the surface area of the payload delivery guide is lager and the vertical guides **634** act as funnels directing payloads into the opening of the top frame of the UAV payload receiving apparatus **600**. The payload delivery guide **630** may also include a flat surface between the vertical guides **634** that has a low coefficient of friction so that the payload will slide over the flat surface and into the UAV payload receiving apparatus **600** under the force of gravity. For example, the flat surface may be aluminum, stainless steel, plastic, etc.

The payload delivery guide may also include one or more visual markers **632** that are detectable by the UAV to aid the UAV in identification of the payload delivery guide and/or alignment of the payload. For example, the visual markers **632** may be reflective markers, characters, colors, etc. that are detectable from an altitude to aid in the identifier of the payload delivery guide by a UAV.

While the examples discussed herein illustrate a payload receiving apparatus coupled, mounted, or otherwise secured to a structure, in some implementations the payload receiving apparatus may be a stand-alone unit. In such a configuration, the payload receiving apparatus may include a stand, legs, and/or other support members that are coupled to the top frame and aid in supporting the top frame in a substantially horizontal position so that a payload can be delivered into the payload receiving apparatus by a UAV. In such a configuration, the payload retainer may not move between contracted and extended positions, as the user may be able to retrieve the payload by reaching through the top frame and removing the payload. In other implementations, the payload retainer may still include one or more access points and/or may move between contracted and extended positions.

Although the disclosure has been described herein using exemplary techniques, components, and/or processes for implementing the apparatus of the present disclosure, it should be understood by those skilled in the art that other techniques, components, and/or processes or other combinations and sequences of the techniques, components, and/or processes described herein may be used or performed that achieve the same function(s) and/or result(s) described herein and which are included within the scope of the present disclosure. The dimensions, types, or sizes of the cross-sectional areas or shapes of the UAV payload receiving apparatuses disclosed herein are not limited. Furthermore, while some of the labels assigned to sides or bottoms of the UAV payload receiving apparatuses described herein may represent lengths or positions (e.g., "long" or "short"), other labels may be purely arbitrary (e.g., "side" or "end").

It should be understood that, unless otherwise explicitly or implicitly indicated herein, any of the features, characteristics, alternatives or modifications described regarding a particular implementation herein may also be applied, used, or incorporated with any other implementation described herein, and that the drawings and detailed description of the present disclosure are intended to cover all modifications, equivalents and alternatives to the various implementations as defined by the appended claims. Further, the drawings herein are not drawn to scale.

Disjunctive language such as the phrase "at least one of X, Y, or Z," or "at least one of X, Y and Z," unless specifically stated otherwise, is otherwise understood with the context as used in general to present that an item, term, etc., may be either X, Y, or Z, or any combination thereof (e.g., X, Y, and/or Z). Thus, such disjunctive language is not generally intended to, and should not, imply that certain implementations require at least one of X, at least one of Y, or at least one of Z to each be present.

Language of degree used herein, such as the terms "about," "approximately," "generally," "nearly" or "substantially" as used herein, represent a value, amount, or characteristic close to the stated value, amount, or characteristic that still performs a desired function or achieves a desired result. For example, the terms "about," "approximately," "generally," "nearly" or "substantially" may refer to an amount that is within less than 10% of, within less than 5% of, within less than 1% of, within less than 0.1% of, and within less than 0.01% of the stated amount.

Although the invention has been described and illustrated with respect to illustrative implementations thereof, the foregoing and various other additions and omissions may be made therein and thereto without departing from the spirit and scope of the present disclosure.

What is claimed is:

1. An unmanned aerial vehicle ("UAV") payload receiving apparatus, comprising:

a plurality of securing members to removably secure the UAV payload receiving apparatus to a structure;

a top frame including a first long side, a second long side, a first short side, and a second short side, wherein:

the top frame is coupled to the plurality of securing members and is laterally offset from the structure when the UAV payload receiving apparatus is secured to the structure; and

the first long side, the second long side, the first short side, and the second short side form a perimeter having a size that allows a payload released by a UAV to pass through;

a first support arm coupled to the top frame and extending at a first angle toward the structure, wherein the first support arm supports at least a portion of the top frame in the laterally offset position when the UAV payload receiving apparatus is secured to the structure;

a second support arm coupled to the top frame and extending at a second angle toward the structure, wherein the second support arm supports at least a portion of the top frame in the laterally offset position when the UAV payload receiving apparatus is secured to the structure; and

a payload retainer defined by a first side, a second side, a third side, a fourth side, and a bottom, wherein:

the payload retainer has an elongated shape, is coupled to the top frame and extends in a downward direction from the top frame to receive the payload that passes through the perimeter of the top frame;

each of the first side, the second side, the third side, the fourth side, and the bottom is formed from a flexible material; and

the bottom forms a portion of the payload retainer distinct from each of the first side, the second side, the third side, and the fourth side; and

a retention cable configured to move the bottom of the payload retainer in a vertical direction toward or away from the top frame between a contracted position and an extended position.

2. The UAV payload receiving apparatus of claim 1, wherein in the contracted position, the retention cable is configured to contract one or more of the first side, the second side, the third side, and the fourth side toward the top frame.

3. The UAV payload receiving apparatus of claim 1, wherein in the extended position, the retention cable is configured to extend one or more of the first side, the second side, the third side, and the fourth side such that the bottom is within a reach of a user standing on a surface.

4. The UAV payload receiving apparatus of claim 1, further comprising:

a slide fastener connecting the first side and the bottom, wherein:

the payload is retained in the payload retainer when the slide fastener is in a closed position; and

the payload is removable through an opening formed between the first side and the bottom when the slide fastener is in an open position.

5. The UAV payload receiving apparatus of claim 1, wherein the payload retainer is configured to receive the payload that is delivered and released by the UAV, the payload including an item ordered by a user of an electronic commerce website for delivery to a residence.

6. An unmanned aerial vehicle ("UAV") payload receiving apparatus, comprising:

a plurality of securing members to removably secure the UAV payload receiving apparatus to a structure;

a top frame coupled to the plurality of securing members, wherein:

the top frame extends from the structure when the UAV payload receiving apparatus is secured to the structure; and

the top frame forms an opening having a size that allows a payload released by a UAV to pass through; and

a payload retainer coupled to the top frame that extends in a downward direction from the top frame to receive the payload that passes through the opening of the top frame; and

a retention cable configured to move a bottom of the payload retainer in a direction toward or away from the top frame between a contracted position and an extended position wherein the bottom forms a portion of the payload retainer distinct from sides of the payload retainer.

7. The UAV payload receiving apparatus of claim 6, further comprising:

a first support arm coupled to the top frame and extending at a first angle toward the structure, wherein the first support arm supports at least a portion of the top frame when the UAV payload receiving apparatus is secured to the structure; and

a second support arm coupled to the top frame and extending at a second angle toward the structure, wherein the second support arm supports at least a portion of the top frame when the UAV payload receiving apparatus is secured to the structure.

8. The UAV payload receiving apparatus of claim 7, wherein the first support arm and the second support arm are each adjustable in length.

9. The UAV payload receiving apparatus of claim 6, wherein the payload retainer is formed from a flexible material in a mesh pattern.

10. The UAV payload receiving apparatus of claim 6, further comprising:

an adjustment member coupled to the retention cable to extend or contract the retention cable;

wherein the retention cable is configured to move the payload retainer between the contracted position in which a volume of an inner portion of the payload retainer is reduced and the extended position in which a volume of the inner portion of the payload retainer is increased.

11. The UAV payload receiving apparatus of claim 10, wherein the adjustment member is at least one of a manual cable extending from the retention cable that is manually manipulated to adjust the retention cable, a hand crank, a shepherds hook, a motor that is controlled to adjust the retention cable, a pulley that is manipulated to adjust the retention cable, or spring actuated and configured to move between the contracted position and the extended position when a payload is placed in the payload retainer.

12. The UAV payload receiving apparatus of claim 10, wherein the adjustment member includes a security component to resist unauthorized adjustment of the retention cable.

13. The UAV payload receiving apparatus of claim 10, wherein the retention cable is configured to move the bottom of the payload retainer closer to the top frame when the payload retainer is in the contracted position.

14. The UAV payload receiving apparatus of claim 10, wherein the retention cable is configured to move the bottom of the payload retainer farther from the top frame when the payload retainer is in the extended position.

15. The UAV payload receiving apparatus of claim 10, wherein the payload retainer includes at least one of a button, an adhesive, a rivet, a snap, an elastic, a hook-and-loop fastener, a spring, a clamp, or a slide fastener to removably attach the payload retainer to the top frame.

16. The UAV payload receiving apparatus of claim 6, further comprising:

a visual marker positioned on the top frame.

17. An unmanned aerial vehicle ("UAV") payload receiving apparatus, comprising:

a plurality of securing members to removably secure the UAV payload receiving apparatus to a structure;

a top frame coupled to the plurality of securing members, wherein:

the top frame extends from the structure when the UAV payload receiving apparatus is secured to the structure; and

the top frame forms an opening having a size that allows a payload released by a UAV to pass through; and

a payload retainer having an open end that is coupled to the top frame and positioned to receive the payload, and an opposing end configured to retain the payload in the payload retainer, wherein the opposing end forms a portion of the payload retainer distinct from sides of the payload retainer; and

a retention cable configured to move the opposing end of the payload retainer in a direction toward or away from the top frame between a contracted position and an extended position.

18. The UAV payload receiving apparatus of claim 17, further comprising:

an access point at a location along the payload retainer to provide access to an inner volume of the payload retainer.

19. The UAV payload receiving apparatus of claim 18, wherein the access point includes at least one of an opening, a button, a hook-and-loop, an elastic, a placket, a slide fastener, or a snap.

20. The UAV payload receiving apparatus of claim 6, further comprising:

a cover moveably coupled to the top frame, the cover configured to cover the opening of the top frame in a default state and configured to uncover the opening to receive the payload that passes through the opening of the top frame.

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