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(54) **AERIAL ARRESTING SYSTEM FOR UNMANNED AERIAL VEHICLE**

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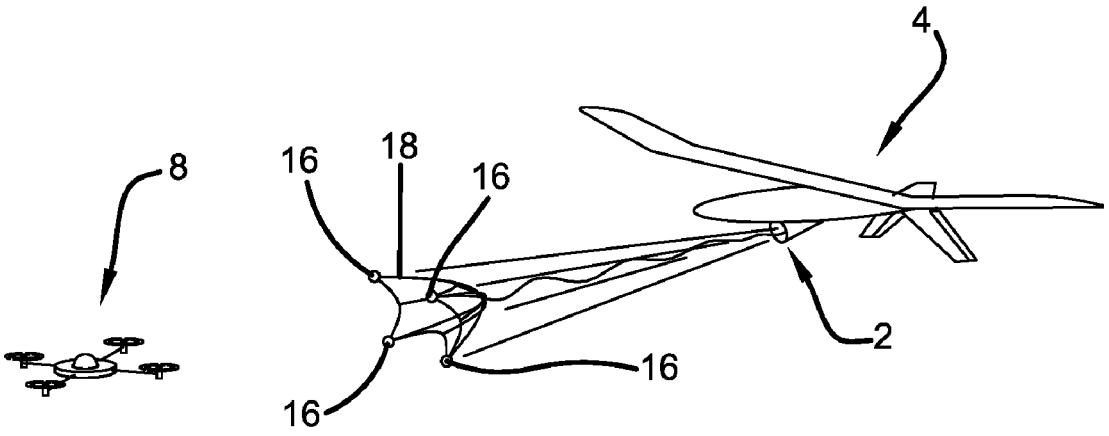
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(52) **U.S. Cl.**
CPC ***F41H 13/0006*** (2013.01)

(57) **ABSTRACT**

A device launcher can be carried and be used to launch a device by an airborne UAV against an airborne or ground target. The target can be a moving target with the device configured to slow or disable the movement of the target. The device can be triggered manually or through an automated targeting system. The launch apparatus can be configured to launch a single device or a plurality of devices. The device launched against the target can be separated from the launch vehicle or tethered to the launch vehicle. The device can be a net that entangles the rotors of a rotor-driven vehicle. The device can include a parachute to retard movement of target vehicle whether it is falling or if it continues to move. A method of patrolling a perimeter with an airborne vehicle includes the steps of moving the airborne vehicle within the perimeter to sense unauthorized targets and launching a device against those sensed targets.



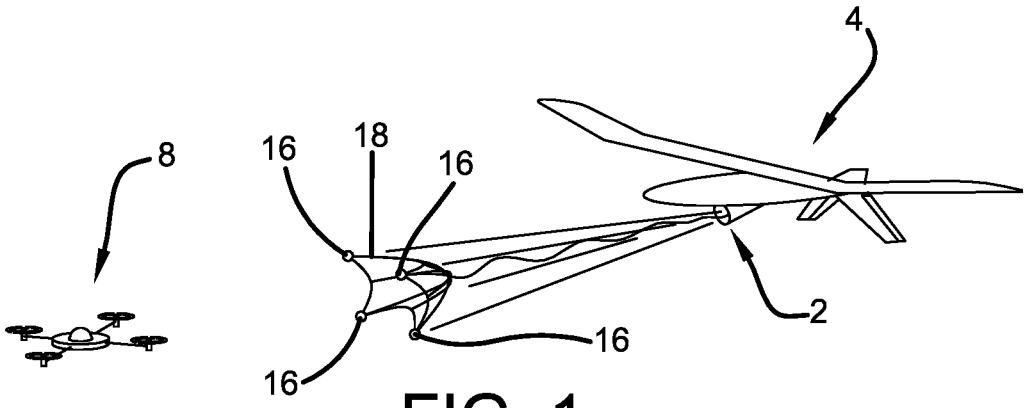


FIG. 1

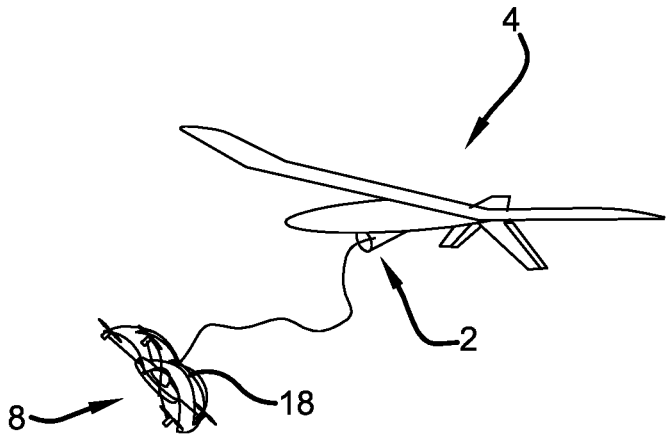


FIG. 2

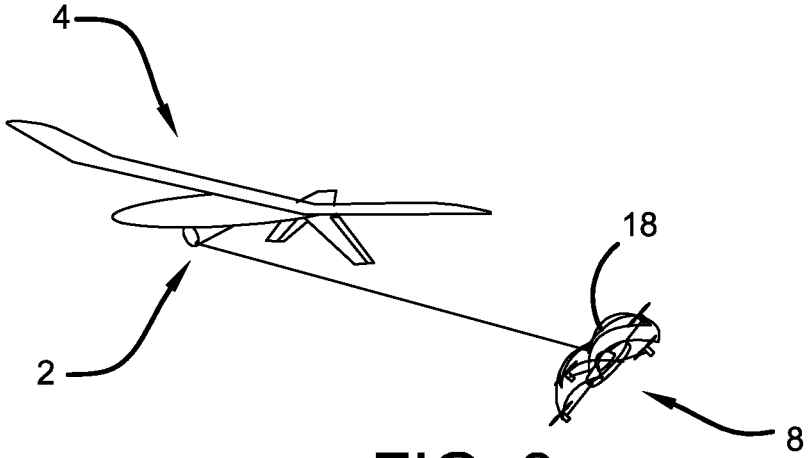


FIG. 3

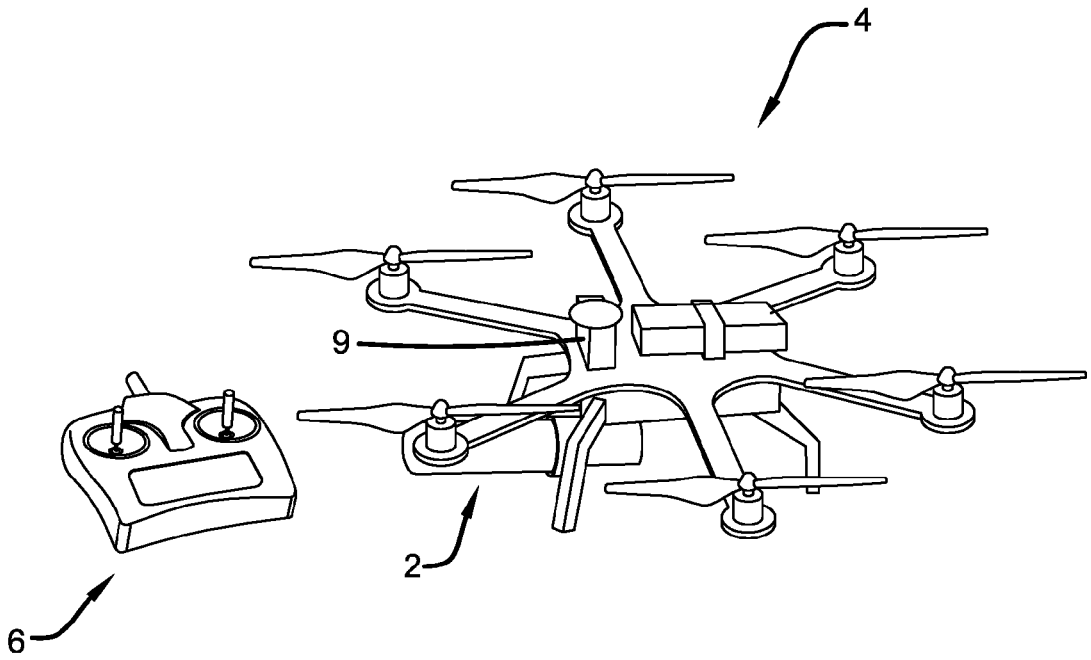


FIG. 4

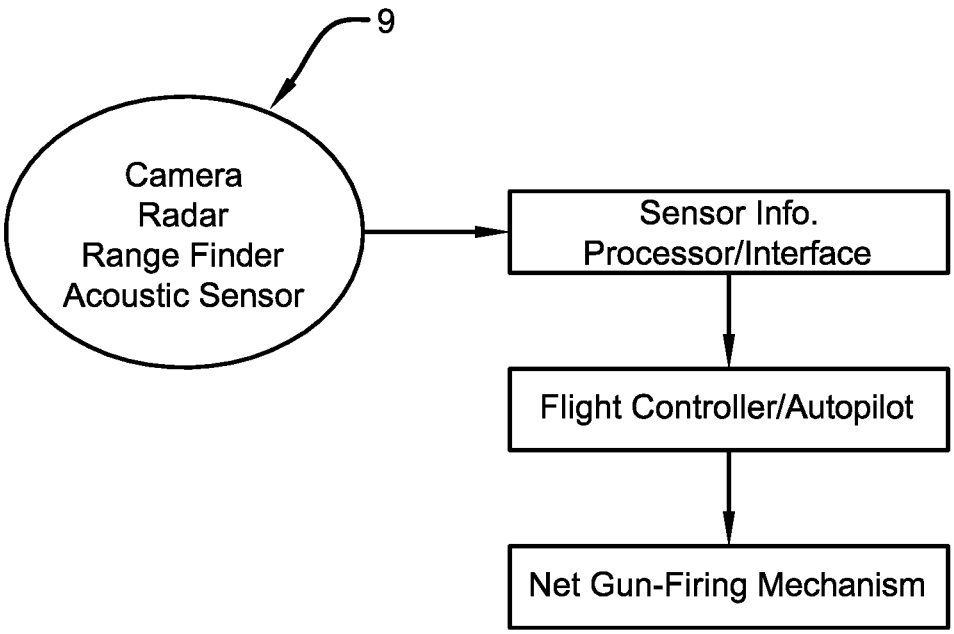

9
Camera
Radar
Range Finder
Acoustic Sensor
Sensor Info.
Processor/Interface
Flight Controller/Autopilot
Net Gun-Firing Mechanism

FIG. 5

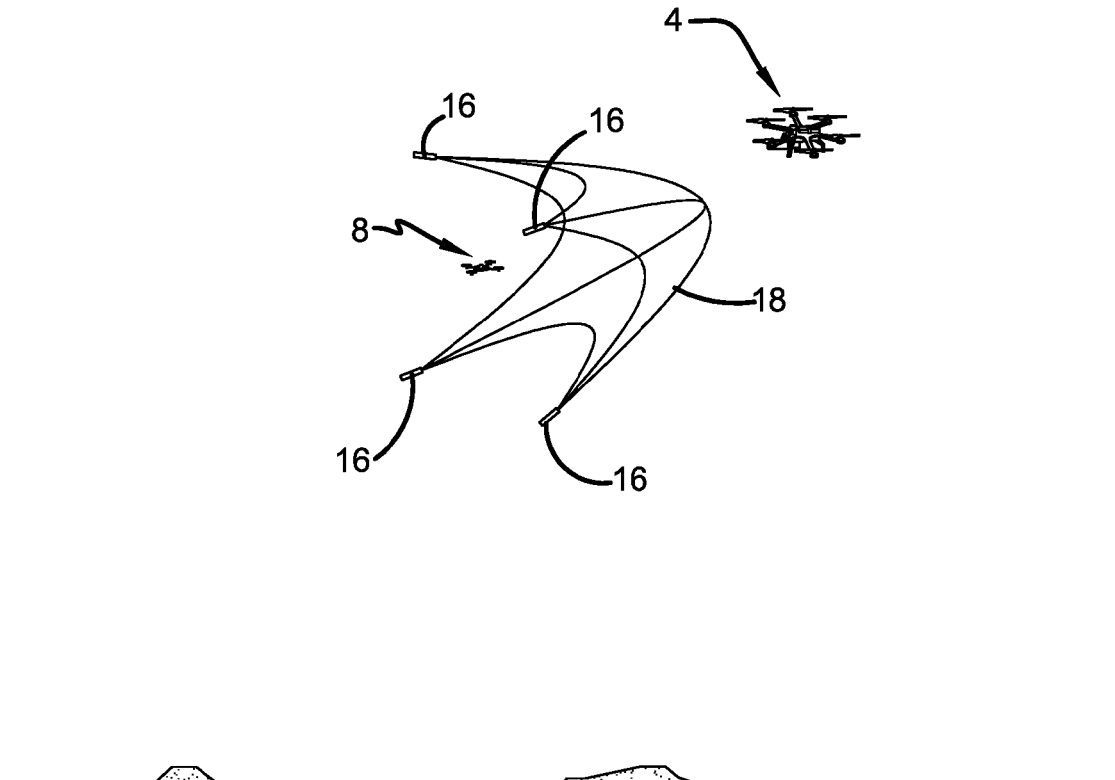


FIG. 6

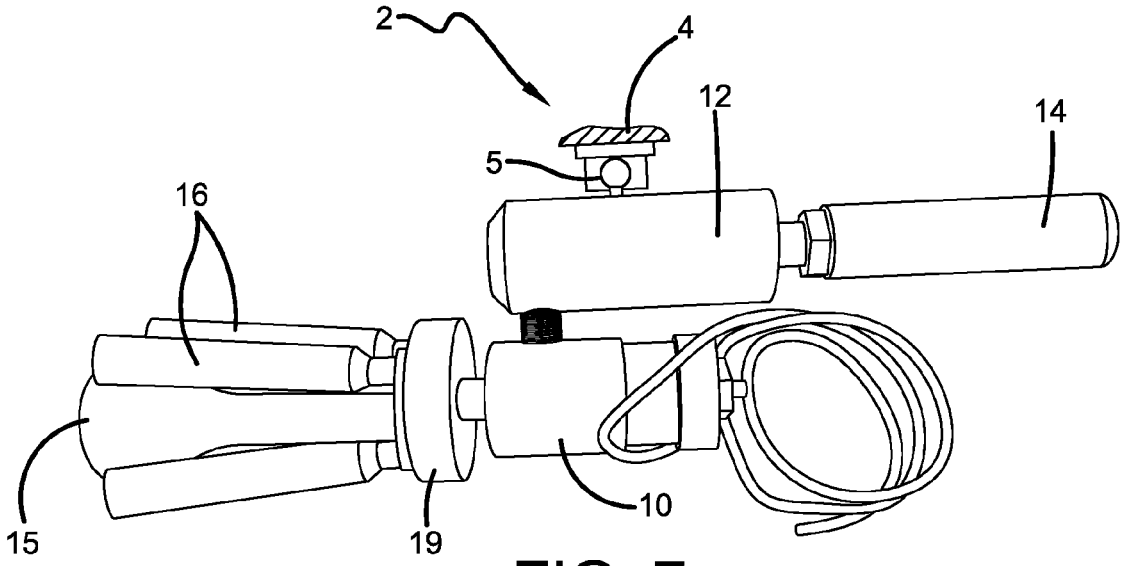


FIG. 7

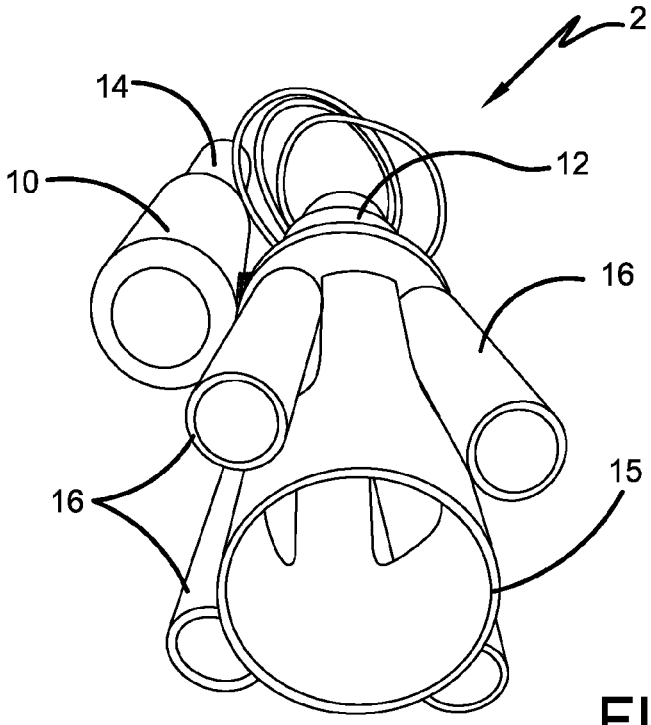


FIG. 8

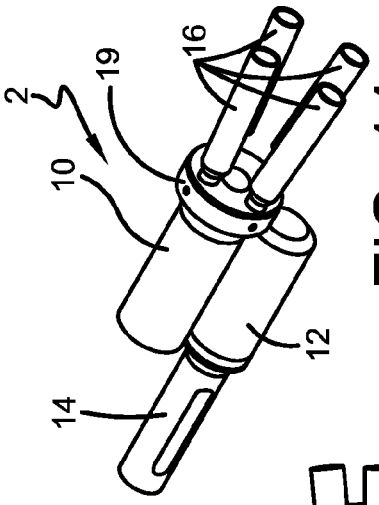


FIG. 14

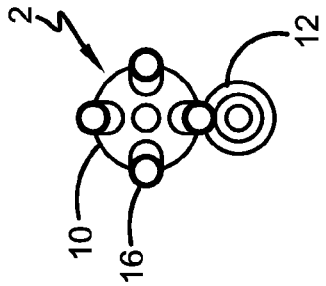


FIG. 13

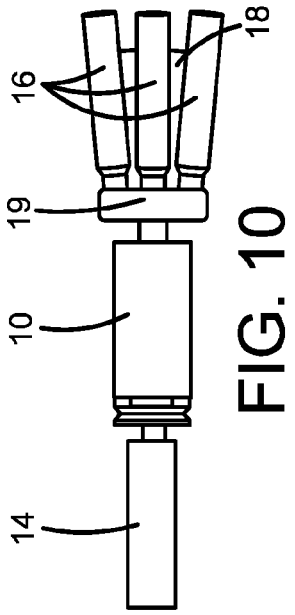


FIG. 10

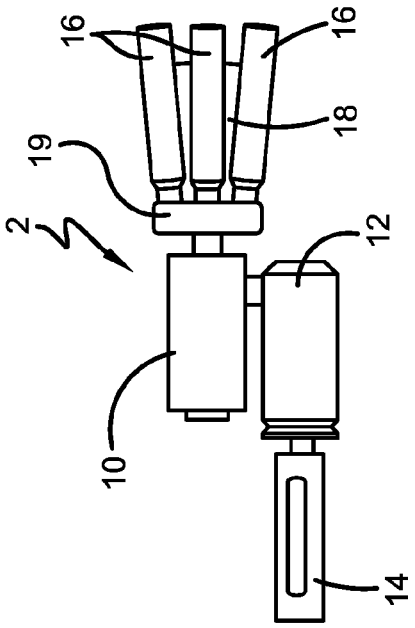


FIG. 11

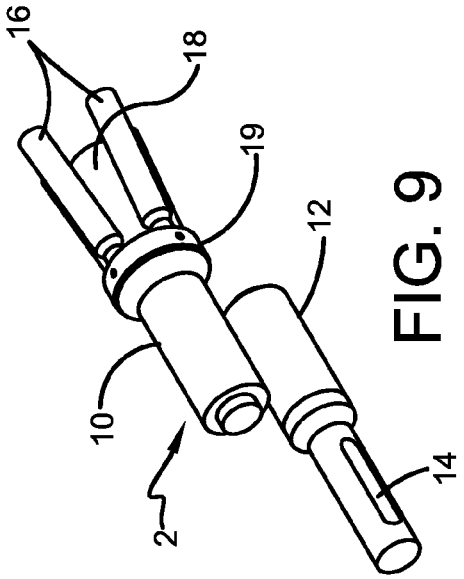


FIG. 9

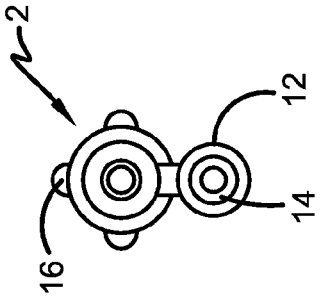


FIG. 12

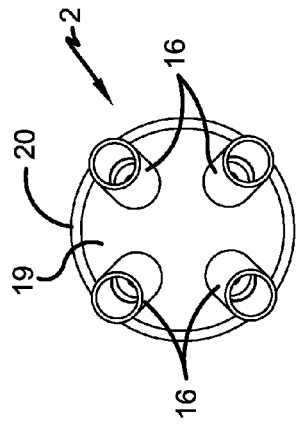


FIG. 16

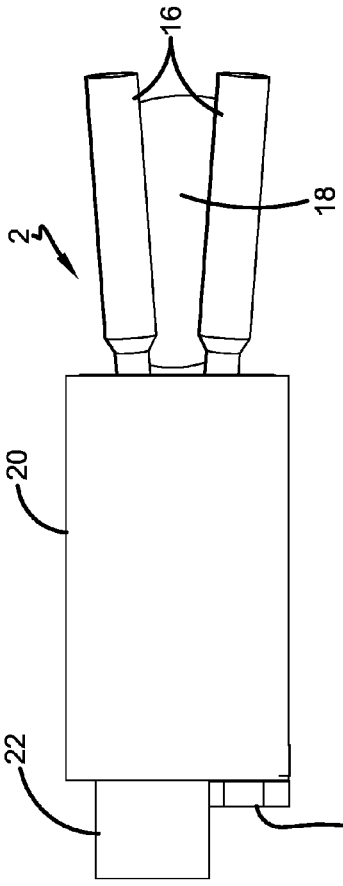


FIG. 15

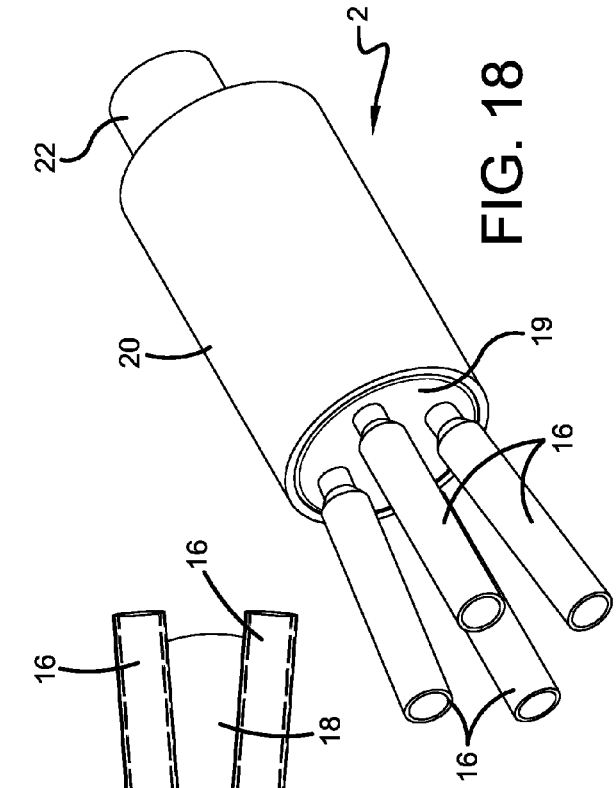


FIG. 18

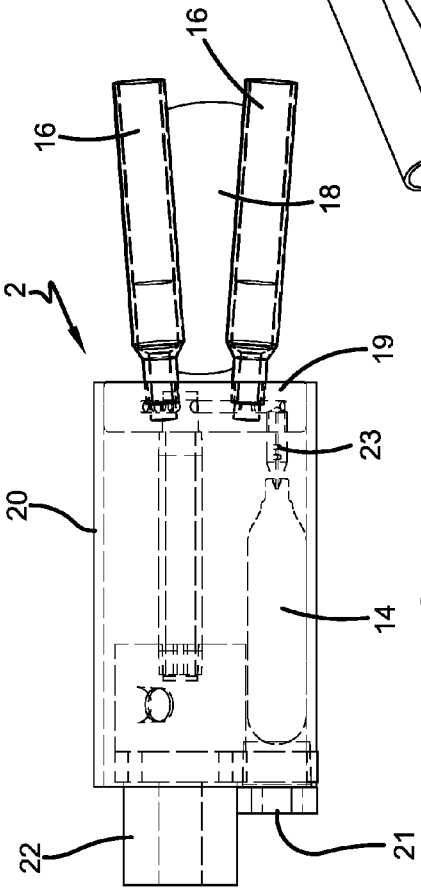


FIG. 17

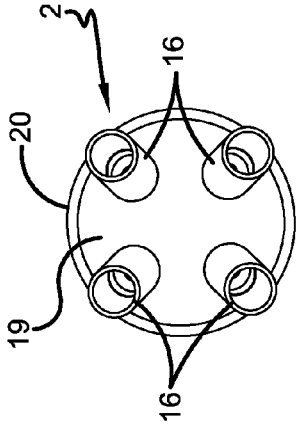


FIG. 20

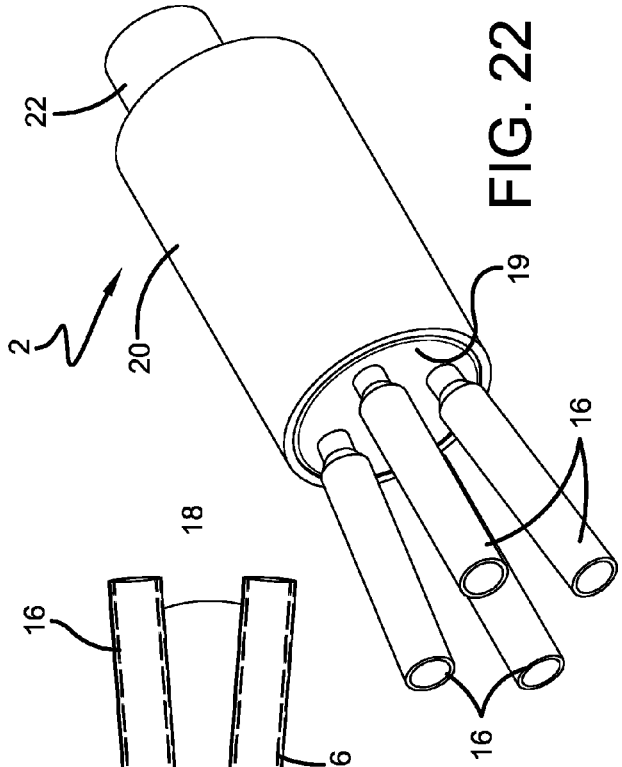


FIG. 22

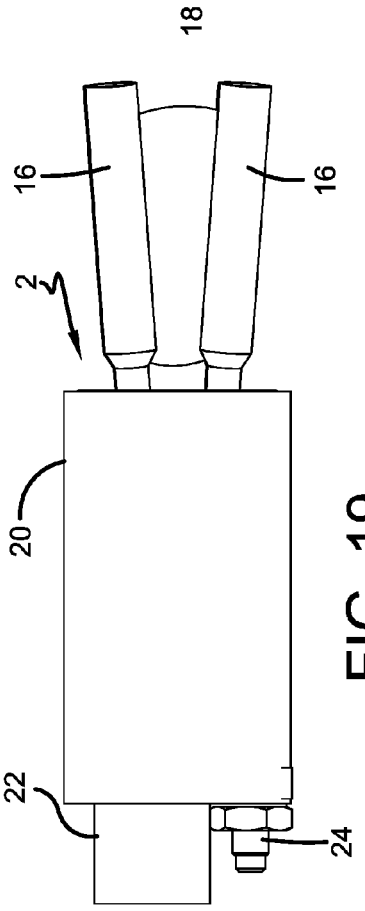


FIG. 19

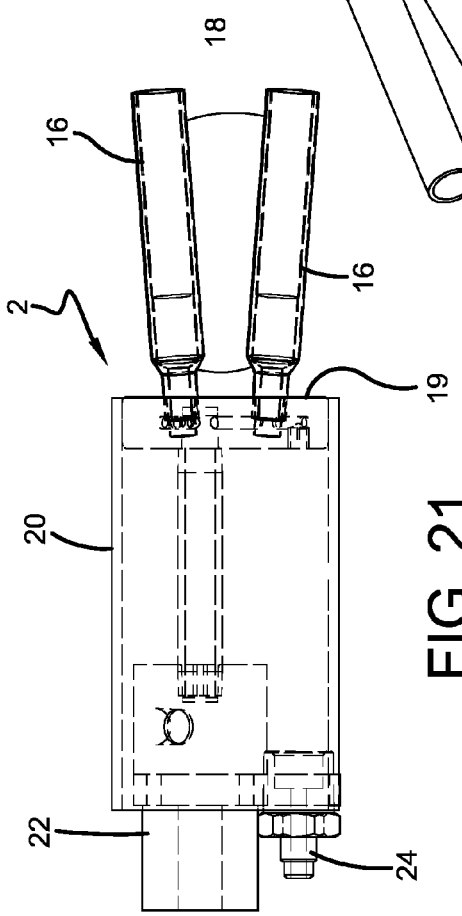


FIG. 21

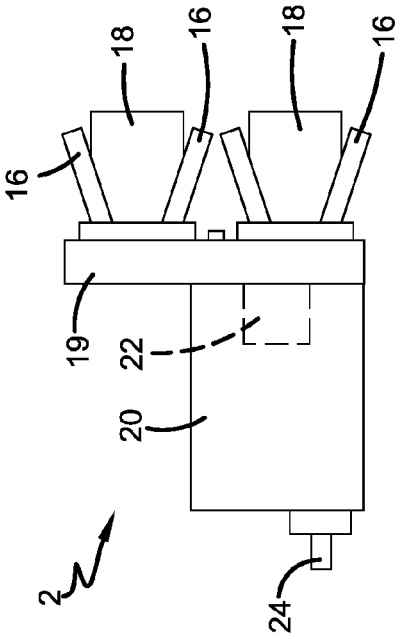


FIG. 26

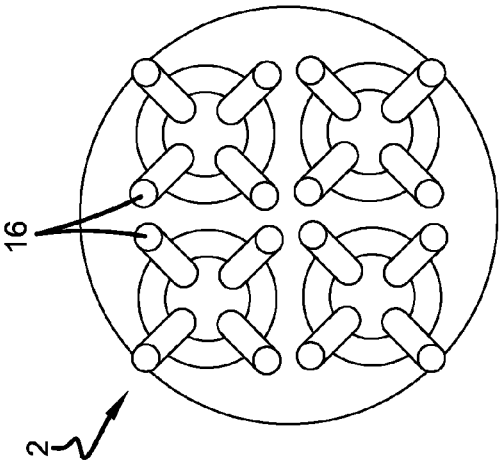


FIG. 25

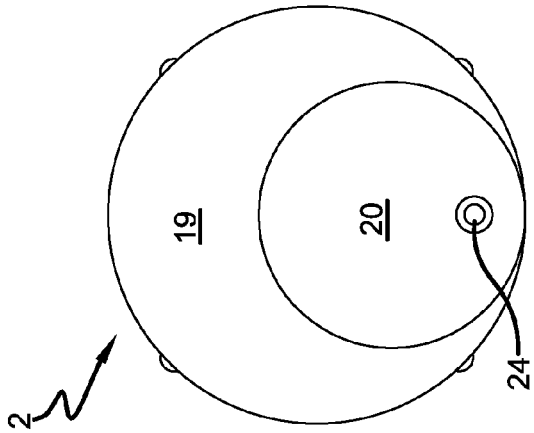


FIG. 24

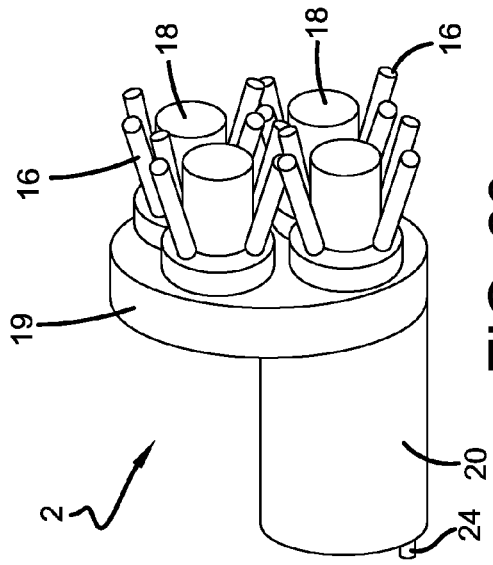


FIG. 23

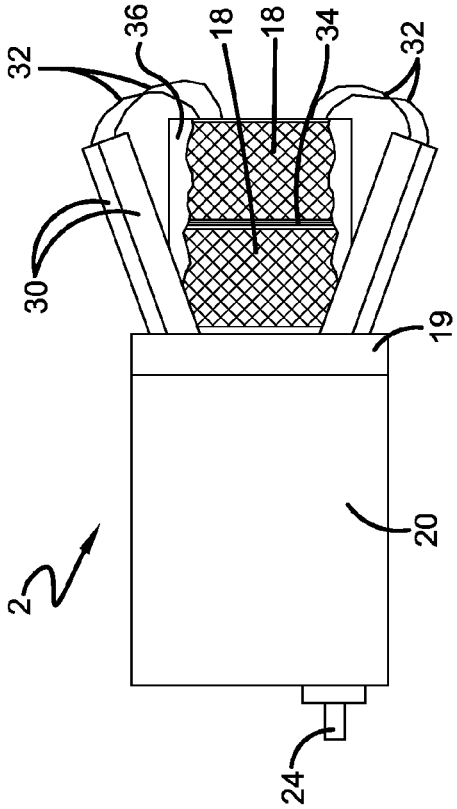


FIG. 28

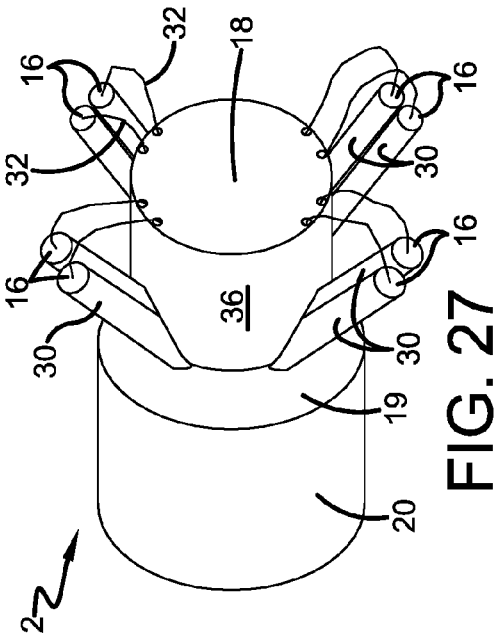


FIG. 27

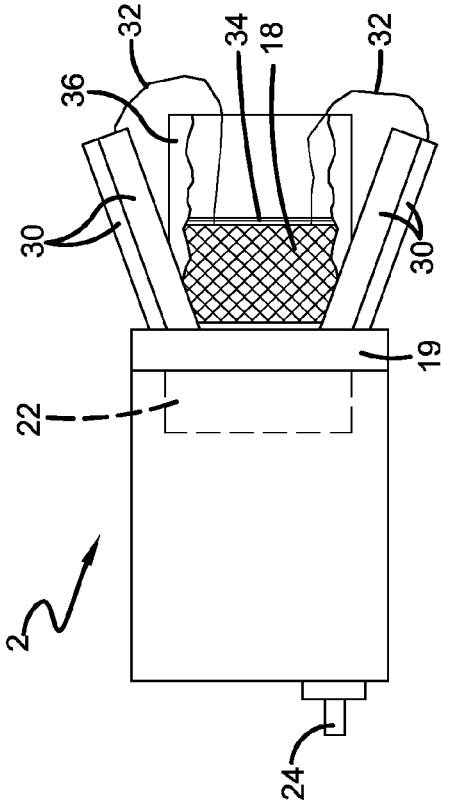


FIG. 30

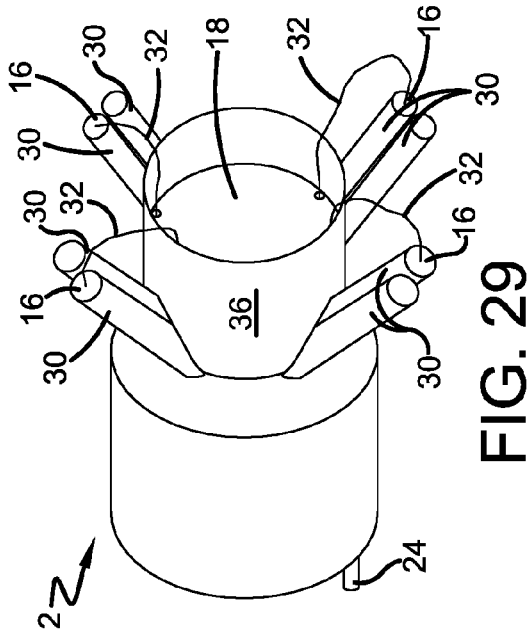


FIG. 29

AERIAL ARRESTING SYSTEM FOR UNMANNED AERIAL VEHICLE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Applications 62/176,670 filed Feb. 26, 2015 and 62/262,264 filed Dec. 2, 2015; the disclosures of both are incorporated herein by reference.

BACKGROUND OF THE DISCLOSURE

1. Technical Field

[0002] The disclosure generally relates to aerial arresting devices and methods for using the devices for eliminating or reducing an aerial device such as an unmanned aerial vehicle (UAV) or drone. More particularly, the disclosure relates to aerial arresting devices and methods that launch a device such as a net from one aerial vehicle to disrupt or discontinue the operation of another aerial vehicle. The disclosure relates to devices launched manually and automatically.

2. Background Information

[0003] Privately-owned aerial vehicles have increased in numbers especially unmanned aerial vehicles (UAVs) which are commonly referred to as drones. These vehicles have historically been for hobbyists who enjoy flying and the challenges of building airborne vehicles and controlling them with a short range radio controller. With the dramatic rise in smartphone technology, miniaturization of cameras, and fast, ubiquitous cellular communications technologies, the use of UAVs for aerial photography or the delivery of goods has increased. Although many of these uses are beneficial to society, some have found uses for drones that do not benefit the general public. One example is the delivery of contraband over borders or inside prison walls. Another example is photography of private areas at low elevations or real-time surveillance of private leisure or commercial activities from low elevation positions that were previously unattainable by a photographer. Other UAV activities are dangerous such as when a UAV flies into the airspace used by airplanes. As the uses of UAVs increases, those persons in charge of securing the facilities or activities above desire a safe device and method for disabling a UAV.

SUMMARY OF THE DISCLOSURE

[0004] The disclosure provides devices and methods for disabling airborne vehicles using a device or devices launched from another airborne vehicle. In particular, the devices and methods relate to the disabling a multi-prop unmanned aerial vehicle (UAV) with a net launched from another UAV in order to entangle the rotors of the target vehicle. The net can be tethered to the launch vehicle to allow the launch vehicle to retrieve the target. Alternatively or selectively, the net can be released from the launch vehicle to allow the launch vehicle to proceed unencumbered or to proceed operations when the target is too large to carry.

[0005] The disclosure also provides a device launcher that can be carried by and used to launch a device by an airborne UAV against an airborne or ground target. The target can be a moving target with the device configured to slow or disable the movement of the target. The device can be triggered manually by the operator or through an automated targeting system using data from one or more sensors. The launch apparatus can be configured to launch a single device or a plurality of devices. The device launched against the target can be separated from the launch vehicle or tethered to the launch vehicle. The device can be a net that entangles the rotors of a rotor-driven vehicle. The device can include a parachute to retard movement of target vehicle whether it is falling or if it continues to move.

[0006] The disclosure provides different configurations of the device launcher with different options for providing charges to the device launcher. Devices with quick-refill and quick reload capabilities include configurations with removable and replaceable compressed gas cartridges and embodiments with gas valves selectively connectable to sources of compressed gas (such as compressors or large storage tanks) for refill.

[0007] The disclosure provides an adjustable launching platform that allows the direction of launch to be adjusted with respect to the launch vehicle.

[0008] The disclosure provides a method for patrolling an area against unauthorized incursions by an aerial vehicle and arresting the vehicle which makes the unauthorized incursion.

[0009] The preceding non-limiting aspects, as well as others, are more particularly described below. A more complete understanding of the processes and equipment can be obtained by reference to the accompanying drawings, which are not intended to indicate relative size and dimensions of the assemblies or components thereof. In those drawings and the description below, like numeric designations refer to components of like function. Specific terms used in that description are intended to refer only to the particular structure of the embodiments selected for illustration in the drawings, and are not intended to define or limit the scope of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. **1** depicts an exemplary fixed wing aircraft launching a tethered device at an airborne target.

[0011] FIG. **2** depicts the successful arrest and capture of the airborne target of FIG. **1** by the fixed wing aircraft of FIG. **1**.

[0012] FIG. **3** depicts the fixed wing aircraft of FIG. **1** using the tethered device to retrieve the target.

[0013] FIG. **4** depicts an exemplary multi-rotor UAV carried an exemplary device launcher with an exemplary wireless radio frequency controller.

[0014] FIG. **5** is an overview flowchart describing an exemplary autonomous system for tracking a target and firing the system of the present disclosure.

[0015] FIG. **6** depicts a device in the form of a net being launched from an airborne UAV at a target airborne UAV with the net being spread out by a plurality of projectile weights connected to the net.

[0016] FIG. **7** is a side view of an exemplary configuration for the device launcher.

[0017] FIG. **8** is an end view of the device launcher of FIG. **7**.

[0018] FIG. **9** is a perspective view of the device launcher of FIGS. **7** and **8**.

[0019] FIG. **10** is a top plan view of FIG. **9**.

[0020] FIG. **11** is a side view of FIG. **9**.

[0021] FIG. **12** is an end view from the left side of FIG. **11**.

[0022] FIG. **13** is an end view from the right side of FIG. **11**.

[0023] FIG. **14** is another perspective view of the device launcher of FIGS. **7** and **8**.

[0024] FIG. **15** is a side view of another configuration for the device launcher.

[0025] FIG. **16** is an end view of FIG. **15**.

[0026] FIG. **17** is a side view similar to FIG. **15** depicting the internal components.

[0027] FIG. **18** is a perspective view of the configuration of FIG. **15**.

[0028] FIG. **19** is a side view of another configuration for the device launcher.

[0029] FIG. **20** is an end view of FIG. **19** (net not shown for clarity).

[0030] FIG. **21** is a side view similar to FIG. **19** depicting the internal components.

[0031] FIG. **22** is a perspective view of the configuration of FIG. **19** (net not shown for clarity).

[0032] FIG. **23** is a perspective view of another configuration for the device launcher that carries multiple launchable devices.

[0033] FIG. **24** is an end view from the left side of FIG. **23**.

[0034] FIG. **25** is an end view from the right side of FIG. **23**.

[0035] FIG. **26** is a side view of the device launcher of FIG. **23**.

[0036] FIG. **23** is a perspective view of another configuration for the device launcher that carries multiple launchable devices.

[0037] FIG. **24** is an end view from the left side of FIG. **23**.

[0038] FIG. **25** is an end view from the right side of FIG. **23** (nets not shown for clarity).

[0039] FIG. **26** is a side view of the device launcher of FIG. **23**.

[0040] FIG. **27** is a perspective view of another configuration for the device launcher that carries multiple launchable devices.

[0041] FIG. **28** is a side view of FIG. **27**.

[0042] FIG. **29** is a perspective view of the configuration of FIG. **27** with a first device already launched from the device.

[0043] FIG. **30** is a side view of FIG. **29**.

[0044] Similar numbers refer to similar elements.

DETAILED DISCLOSURE

[0045] The different configurations of the launch devices are indicated generally by the numeral **2** in the accompanying drawings. Launch devices **2** are carried by airborne vehicles **4** such as the fixed wing device depicted in FIGS. **1-3** or the rotor-type device depicted in FIGS. **4** and **6**. Different vehicles can be used including manned aircraft or unmanned aircraft, fixed wing, rotorcraft, ducted-fan, ornithopter or orthopter, rocket/missile, and/or lighter-than-air. The rotor-type vehicle can be a multiple-rotor unmanned aerial vehicle (UAV) or drone which is controlled by a user through a controller **6** such as a radio frequency controller or a mobile computer such as a smart phone using cellular, WIFI, ZigBee®, Bluetooth®, WiMAX, communications protocols or a combination of both. The target **8** can be another airborne vehicle or a ground-based target. The ground-based target can be a vehicle, a person, or an animal. Launch device **2** is configured to be operated while vehicle **4** is airborne and in motion. Launch device **2** can launch its device in the same direction as vehicle **4** is traveling. Launch device **2** can be manually triggered by the user or can be automatically triggered in response to a sensor signal generated from a sensor carried by vehicle **4**.

[0046] Vehicle **4** can be a type vehicles having a range of less than 10 kilometers. Vehicle **4** also can be the type that must be in line of sight with the user for operation.

[0047] Launch device **2** can be mounted in a fixed or adjustable position on vehicle **4**. For example, device **2** in FIG. **4** can be mounted in a fixed position to the frame of vehicle **4** with the device to be launched extended under the front two rotors of vehicle **4**. The mount that secures launch device **2** to vehicle **4** can include a mount **5** that can be a swivel mount or a pivot mount or both to allow launch device **2** to be aimed by the user or the automatic targeting system. Launch device **2** can be mounted to vehicle **4** in a configuration that allows launch device **2** to swivel in either direction through an entire 360 degree arc or rotate in either direction in continuous 360 degree circles. Launch device **2** also can pivot up and down so that its device can be launched directly upward or directly downward. The upward launch direction uses a mount that positions the device to be launched between rotors or radially outwardly of the rotors so that the launch does not disrupt the operation of vehicle **4**. The movements of launch device **2** can be powered by motors carried by vehicle **4** and controlled by the user or by the automatic targeting system. Launch device **2** can be configured to allow the user to trigger the launch at any time after launch device **2** is armed.

[0048] Vehicle **4** can carry a camera that is used to provide live video data to the user. The camera can be fixed with vehicle **4** and move with vehicle **4** or the camera can be mounted with launch device **2** and move together with launch device **2**. The person controlling the flight of vehicle **4** or the position of launch device **2** uses the images from the video camera to position vehicle **4** (or manipulate the mount of launch device **2**) before triggering the launch of its device. Gauge lines can be provided on the video screen or a gauge can be positioned in front of the camera lens in order to allow the user to estimate the distance to target **8**. The video images can be used alone or in combination with data from other sensors such as those described below.

[0049] An automatic targeting system can be used to operate launch device **2**. The system includes one or more sensors **9** carried by vehicle **4** to provide data to a computer (either carried by vehicle **4** or at a remote location) that can trigger launch device **2** when criteria are met for a launch that has a high chance of success. The user controls the parameters used such that device **2** will only launch in situations wherein the chance of a successful capture is above a controllable threshold. For example, the user may set device **2** and the automated system to only launch when there is a 95% of a capture. Sensors **9** include the camera discussed above, a communications signal detector such as a radio frequency or WIFI detector, a radar device, a sonar device, a motion detector such as an infrared motion detector, a range finder, and/or an acoustic sensor. Any one of these or any combination of these sensors can be carried by vehicle **4** and provide data to a computer that is programmed with software or instructions that creates the launch signal when certain criteria are met. For example, the criteria can be a distance measurement between sensor **9** and target **8** or a combination of a video image from camera in combination with a distance measurement. Another example, is a com-

bination of a distance measurement in combination with a comparison of relative speeds and directions between vehicle **4** and target **8**. This configuration relies on the remote human operator to pilot vehicle **4**.

[0050] The aerial vehicle **4** can be provided with an autopilot and/or an auto-launch mode wherein the computer controls the flight commands of vehicle **4** to bring itself within launch range of target **8** and then automatically launching its device when a position is acquired that has a high probability of a capture. Vehicle **4** can turn its controls back to the operator automatically after launching its device or only when a signal is received from the operator.

[0051] Another feature of the autopilot system is a sentinel mode which instructs vehicle **4** to patrol (via a fixed pattern or a random pattern control) an area inside a security perimeter or patrol along a security perimeter or security line. The position of vehicle **4** can be controlled based on Global Positioning System (GPS) signals or other location data. The autopilot system continually or periodically senses the area around its location for unauthorized devices. Upon acquisition of a signal indicating an unauthorized device, the autopilot system controls the movement of vehicle **4** to position vehicle **4** for a successful launch. The autopilot system also sends an alert signal to the user. Such sentinels are programmed to recognize another aerial vehicle from birds and airborne debris using data from additional sensors.

[0052] The configurations of launch device **2** depicted in FIGS. **7-30** are configured to launch one or more devices in the form of weighted nets **18**. Net **18** includes at least one projectile weight **16** upon which the launch force from device **2** acts to project net **18** away from device **2**. Projectile weights **16** can be connected directly to the net structure or by cable (such as cables **32** shown in FIGS. **27-30**). The relatively light-weight netting is carried by the flight of projectile weights **16**. Projectile weights **16** are launched at trajectories away from on another to cause net **18** to spread out for effective target capture. Projectile weights **16** can be carried in tubes or on guides both of which help direct weights **16** in a desired direction from device **2**. The launch of net **18** is triggered by an electric switch that controls a valve that releases pressurized gas to launch projectile weights **16**. In other configurations, projectile weights **16** are launched with one or more explosive charge.

[0053] Net **18** can be made from textile or polymer cords or metal cords or a combination of materials as need to prevent tearing and breaking of net **18** when encountering fast spinning rotors.

[0054] Net **18** can be provided with electronic disablement, chemical disablement, and/or explosive disablement to act against target **8**. These features can be carried by the net material or by weights **16**. For example, weights **16** can be batteries that provide a current to the net to interfere or disable target **8**. In another configuration, weights **16** can be explosive charges with timers.

[0055] Net **18** can be tethered to vehicle **4** with a tether as shown in FIGS. **1-3** or fired as an individual element as shown in FIG. **6**. When net **18** is tethered, a winch can be provided to pull target **8** toward vehicle **4**. When net **18** is tethered, a cutter can be provided to break the tethered by command if needed.

[0056] The switch receives a signal that triggers the launch of net **18**. The signal can originate from the remote human operator of vehicle **4** or from a sensor **9** or a computer receiving data from sensor **9**. Using an electrically-controlled valve to launch net **18** provides for remote operation while minimizing external force that could move launch device **2** off target.

[0057] FIGS. **7-14** depict an exemplary configuration for the launch device **2** which includes an electronically controlled valve **10** in selective fluid communication with an expansion chamber **12** and a supply of gas such as the compressed carbon dioxide container **14** depicted. Expansion chamber **12** is used to ensure there is a sufficient volume of compressed gas that can be immediately provided against weights **16** to launch weights **16** as needed. Although some configurations of container **14** release their compressed gas fat enough to multiple weights **16**, expansion chamber **12** allows weights **16** to be launched using standard compressed gas canisters such as those used in pellet guns. Net **18** can be disposed within an optional cone-shaped sleeve **15** that minimizes tangling of net **18** with projectile weights **16**. FIGS. **7** and **8** depict configurations with sleeve **15** while FIGS. **9-11** depict net **18** packed directly between weights **16**. FIGS. **13** and **14** have net **18** removed for clarity. When net **18** is to be deployed, valve **10** is opened to allow the compressed gas in the expansion chamber **12** to launch projectile weights **16** which are connected to different portions of net **18** to help it spread out to its full area to be an effective capture device. A gas distribution block **19** evenly distributes the compressed gas to each of projectile weights **16** causing them to launch at the same time with the same amount of force. Valve **10** can be controlled by the operator of the aerial vehicle by sending a command through a radio frequency signal. Valve **10** can be controlled automatically from a sensor carried by the aerial vehicle. In one configuration, almost all of the gas from container **14** is used to fill expansion chamber **10** when container **14** as connected to chamber **10**. In configurations wherein all of this compressed gas is not needed for a launch, valve **10** controls the release of the gas so that multiple launches can be achieved (after loading a net **18** each time) without changing container **14**. In another configuration, a valve can be used to fill chamber **10** and hold compressed gas in container **14** so that device **2** can be fired again when another net **18** is loaded for launch. In this configuration, all of the compressed gas in expansion chamber **10** can be used for a single launch because it can be refilled from container **14**.

[0058] FIG. **8** is an end view of the system of FIG. **7**. Although four projectile weights **16** are depicted in FIGS. **7** and **8**, different numbers, arrangements, and shapes of projectile weights **16** can be used with net **18**. Projectile weights **16** can number from a single projectile weight **16** to a plurality as needed to carry and spread net **18**.

[0059] FIGS. **15-18** depict another configuration for device launcher **2** that is more compact and thus easier to carry by vehicle **4**. In this configuration, housing **20** receives the compressed gas supply container **14** such as the carbon dioxide canister. A plug **21** can be used to push container **14** against a valve release pin **23** to release the gas into the chamber of housing **20** such that housing **20** functions as the expansion chamber for the gas. Plug **21** can be threaded to housing or fit in with a push and twist bayonet-style locking motion. Plug **21** seals the chamber of housing **20**. Housing **20** also carries the electrically-controlled switch **22** that opens a valve to release the compressed gas to launch the projectile weights **16**. Housing **20** defines a chamber that is filled with compressed gas from container **14** so that enough volume of gas is provided to launch projectile weights **16** a

desired distance. Switch **22** causes the release of the pressurized gas from the chamber of housing **20** to block **19**. This configuration is more compact than the configuration of FIG. **7** and is easier to mount for gimbaled movement on vehicle **4**.

[0060] FIGS. **19-22** depict another configuration for device **2** wherein a canister of compressed gas is not carried by device **2**. In this configuration, the chamber of housing **20** charged with compressed gas through a recharging valve **24**. Recharging valve **24** can be a ball valve that provides for quick connect and quick disconnect for fast recharging of housing **20**. This system can work with compressed air or other compressed gas. This system is lighter because the gas canister is not carried by the aerial vehicle **4**. This system also allows for quick recharging of device **2** for more rapid reloading and deployment. In this configuration, the chamber of housing **20** can be large enough to hold a volume of compressed gas sufficient to launch multiple devices **2**.

[0061] In these configurations, valves **10** and **22** can carry their own power supplies, communications and control links with the user's controller **6** or the onboard computer. In other configurations, valves **10** and **22** use the power and control features of the onboard computer or controller that is controlling vehicle **4**.

[0062] In these configurations, device launcher **2** can be provided with an individual tether line for each projectile weight **16**. Each individual tether line is connected to a winch disposed within or behind gas distribution block **19** or on or within the tube or guide for weight **16**. These individual tether lines may be of any length and material necessary to allow net **18** to be launched to its maximum distance without interference from the individual tether lines. The individual tether lines remain attached to projectile weights **16** and/or net **18** after launch, and may serve to keep net **18** attached to vehicle **4** for the purpose of relocating or carrying off target **8** after being successfully netted. However, should target **8** be missed, the individual tether lines allow projectile weights **16** and net **18** to be pulled back to gas distribution block **19**, thereby reloading projectile weights **16** into block **19** or the firing tubes/guides to allow device **2** to be fired again. The individual tether lines may be pulled back by use of one or more winches (with pulleys or guides), springs, or compressed air. As they are pulled back to device **2**, projectile weights **2** are realigned and reloaded with guides or rails.

[0063] FIGS. **23-26** depict a configuration for device **2** wherein a plurality of nets **18** can be launched one after another by moving gas distribution block **19** with respect to the pressurized chamber of housing **19**. These configurations are depicted with recharging **24** but they can also carry compressed gas canisters as above. In the configuration of these drawings, gas distribution block **19** rotates through four firing positions. Gas distribution block **19** can also be configured to slide between firing positions or slide across and then down through an array of firing positions. A minimum of two firing positions are provided with the maximum number being defined by the size of net **18**, block **19**, and vehicle **4**.

[0064] Block **19** defines the passageways for the compressed gas that lead from valve **22** (which can be in the configuration of FIGS. **7-22** or disposed entirely within housing **20**) to the seats that receive the inner ends of projectile weights **16**. Block **19** can be turned with a motor or with a portion of the compressed gas.

[0065] Another configuration similar in appearance to FIGS. **23-26** does not rotate or move block **19**. Instead, valve **22** or a series of valves downstream of valve **22** within block **19** or housing **20** are used to selectively deliver the compressed gas to the different firing positions. These are controlled electronically such that only one is open at a time for each single launch. Alternatively, the valves can be configured to automatically close (after initial use) and open (prior to initial use—having started in a closed configuration) during a launch such that the next burst of compressed gas is delivered to the next valve in line. This system can thus be electronically controlled or mechanically/pneumatically controlled.

[0066] In the configuration of FIGS. **27-30** a plurality of nets **18** are stacked one on top of the other with the valves configured to launch weights **16** from the outermost net **18** first and before switching the next net **18** in line. The delivery of the pressurized gas can be controlled with valves as above or by moving block **19** as above. FIGS. **27** and **28** show two nets **18** stacked with FIGS. **29** and **30** showing the configuration after the first net **18** is launched. In these configurations, weights **16** are disposed in launch tubes **30**. Cables **32** are depicted here as connecting weights **16** to nets **18**. An optional net separation disc **34** can be disposed between nets **18**. Disc **34** can be dragged out by the first launch or can remain for the second launch. Nets **18** are packed within a net container **36** to maintain their packed configuration.

[0067] The example shows eight launch tubes **30** for the purpose of launching two nets **18**, however there can be any number of tubes **30** and Net Containers for firing any number of nets. In an alternative configuration, nets **18** can be stacked in an array such as two-by-two and two deep to provide eight nets **18** for launch.

[0068] The device launcher and arresting system of the disclosure is capable of the following:

[0069] 1. Able to be mounted to and launched from an airborne platform such as an unmanned aerial vehicle (UAV) that can be fixed wing or rotor-style;

[0070] 2. Able to launch a net for the purpose of capturing, arresting, detaining, obstructing, and/or relocating another aircraft, including but not limited to manned aircraft or unmanned aircraft, fixed wing, rotorcraft. ducted-fan, ornithopter, rocket/missile, lighter-than-air, and/or ground vehicles (manned or unmanned), and/or humans whether on the ground or in the air, and/or animals whether on the ground or in the air (cumulatively known as the "target");

[0071] 3. Able to launch the net for "air-to-air" or "air-to-ground" applications against a target;

[0072] 4. Able to launch the net manually, and/or through a remote controlled system, and/or through an autopilot system, and/or through a sensor system;

[0073] 5. Once the net is deployed, it may be immediately released/separated from the launch platform, or may be tethered/attached to the launch platform for the purpose of dragging or lifting the "target" to another location, with the tether able to be released from the launch platform as required at a later time;

[0074] 6. The net may include an aerodynamic retardation system (i.e. parachute) to prevent an airborne "target" from continuing its operation/movement, or to retard the target's decent;

[0075] 7. The aerial capturing/arresting system may be capable of a single net launch or may have multiple net launching capabilities;

[0076] 8. The aerial capturing/arresting system may be mounted in such a way that allows launching the net forward, backward, to either side, up, down, or any combination thereof to allow a net launch in any direction from the platform;

[0077] 9. The aerial capturing system may have means of disabling the "target" in addition to the physical capturing/disruption. This may include, but is not limited to electronic disablement, chemical disablement, and/or explosive disablement.

[0078] In the foregoing description, certain terms have been used for brevity, clearness, and understanding. No unnecessary limitations are to be implied therefrom beyond the requirement of the prior art because such terms are used for descriptive purposes and are intended to be broadly construed. Moreover, the description and illustration of the embodiments are examples and the invention is not limited to the exact details shown or described. Modifications and alterations of those embodiments will be apparent to one who reads and understands this general description. The present disclosure should be construed as including all such modifications and alterations insofar as they come within the scope of the appended claims or equivalents thereof. Throughout the description and claims of this specification the words "comprise" and "include" as well as variations of those words, such as "comprises," "includes," "comprising," and "including" are not intended to exclude additives, components, integers, or steps.

1. An airborne vehicle and launch device comprising:

an airborne vehicle;

a launch device carried by the airborne vehicle; and

the launch device carrying at least one device that can be launched by the launch device away from the vehicle; the device being a net.

2. The vehicle and launch device of claim **1**, wherein the launch device is selectively repositionable with respect to the vehicle so that it can be aimed.

3. The vehicle and launch device of claim **1**, wherein the launch device is an unmanned vehicle.

4. The vehicle and launch device of claim **1**, further comprising a sensor that provides data related to the target.

5-8. (canceled)

9. The vehicle and launch device of claim **1**, wherein the launch device carries a plurality of nets.

10-19. (canceled)

20. The vehicle and launch device of claim **1**, wherein the net is tethered to the vehicle.

21. The vehicle and launch device of claim **1**, wherein the net can be launched by at least one of a manual system, through a remote controlled system, and an autopilot system.

22. The vehicle and launch device of claim **1**, further comprising an aerodynamic retardation system connected to the net.

23. An airborne vehicle and launch device comprising:

an airborne vehicle;

a launch device carried by the airborne vehicle; and

the launch device carrying a plurality of nets that can be selectively launched by the launch device away from the vehicle.

24. The vehicle and launch device of claim **23**, wherein the plurality of nets are stacked within a net container.

25. The vehicle and launch device of claim **24**, further comprising a net separation disc disposed between the stacked nets.

26. The vehicle and launch device of claim **23**, wherein each net is connected to a plurality of weights.

27. The vehicle and launch device of claim **23**, wherein the launch device carries the plurality of net assemblies carried by a selectively movable block.

28. The vehicle and launch device of claim **23**, wherein the launch device includes a housing that defines a chamber that holds compressed gas used to launch the nets.

29. The vehicle and launch device of claim **28**, further comprising a canister of compressed gas connected to the housing.

30. The vehicle and launch device of claim **28**, further comprising a recharging valve connected to the housing that allows the chamber to be filled with compressed gas.

31. The vehicle and launch device of claim **29**, further comprising an electronically-controller valve that can be opened to deliver compressed gas from the chamber of the housing to weights connected to one of the nets.

32. The vehicle and launch device of claim **31**, further comprising a gas distribution block that evenly distributes the compressed gas from the electronically-controlled valve to the weights.

33. The vehicle and launch device of claim **32**, wherein the gas distribution block is selectively movable with respect to the housing.

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