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(54) **MULTI CAMERA MOUNT**

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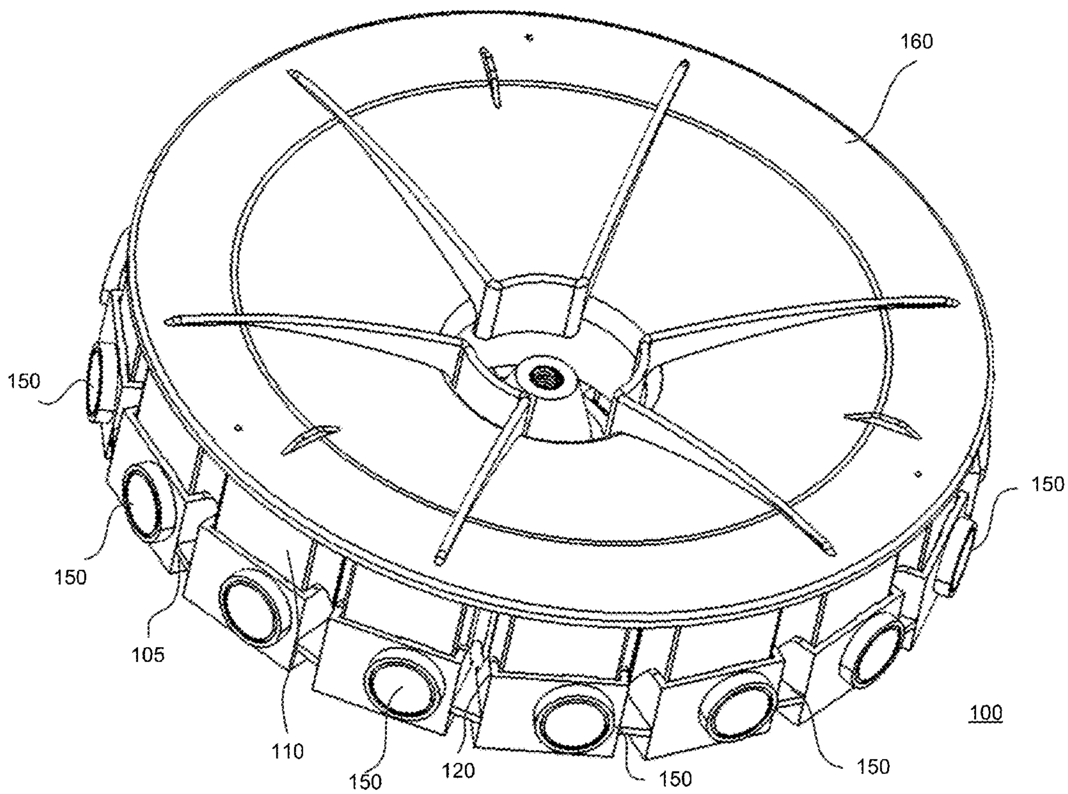
(57) **ABSTRACT**

A camera mounting assembly is disclosed for a plurality of cameras. The camera mounting structure may have a substantially circular configuration. The camera mounting structure may include a unibody base cage. One or more lens openings may be configured along the circumference of the unibody base cage. The lens openings may allow a camera lens to have an unobstructed view outside of the unibody base cage to capture an image or a video. The assembly further may include one or more sub-cages that are releasably attached to the unibody base cage. Each sub-cage may be configured to securely hold a camera via a securing mechanism such as a clamp or interlocking pin. Each sub-cage further may include an aligning pin that is configured to align the center of the camera with the center of the lens opening.



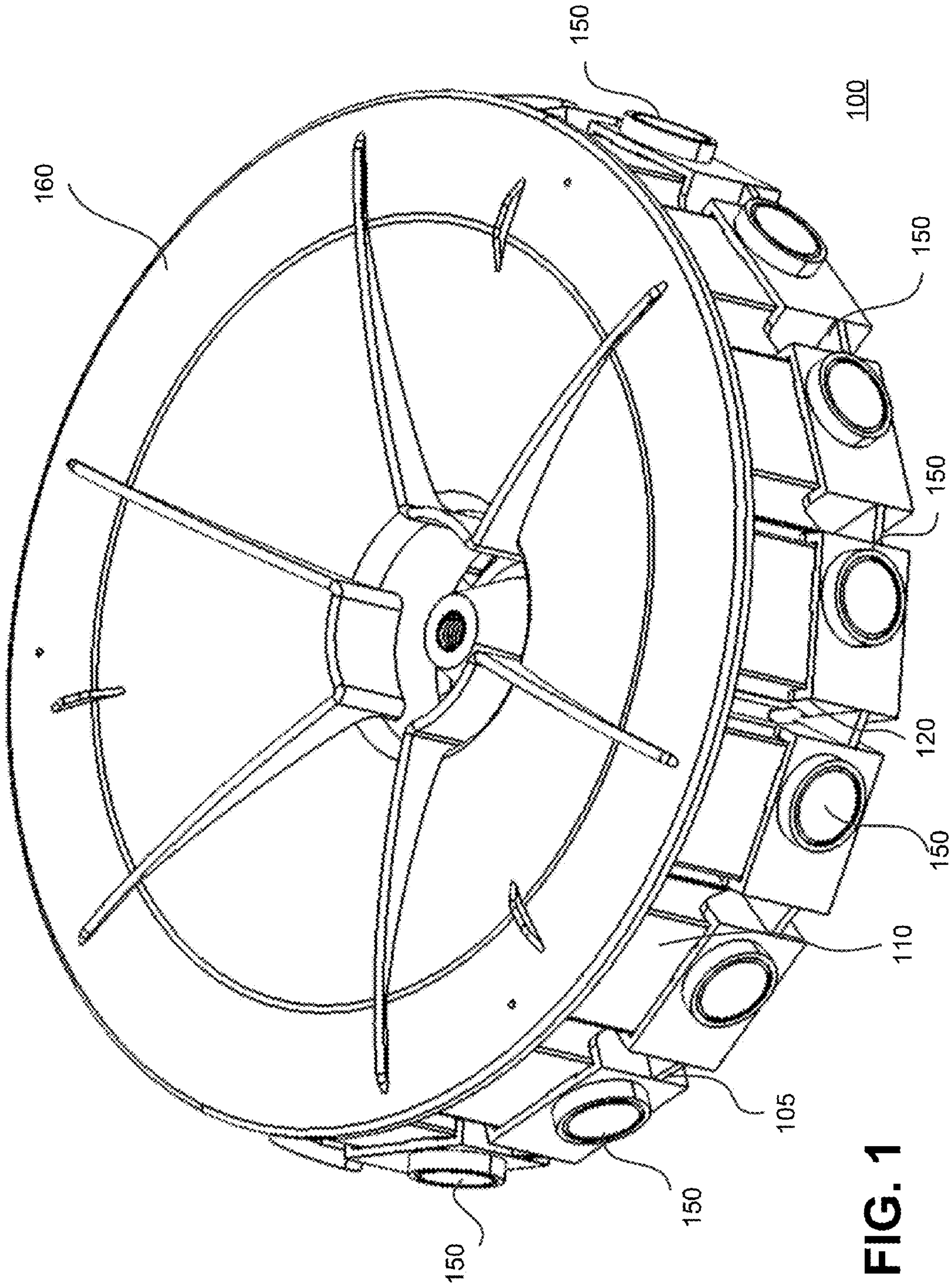


FIG. 1

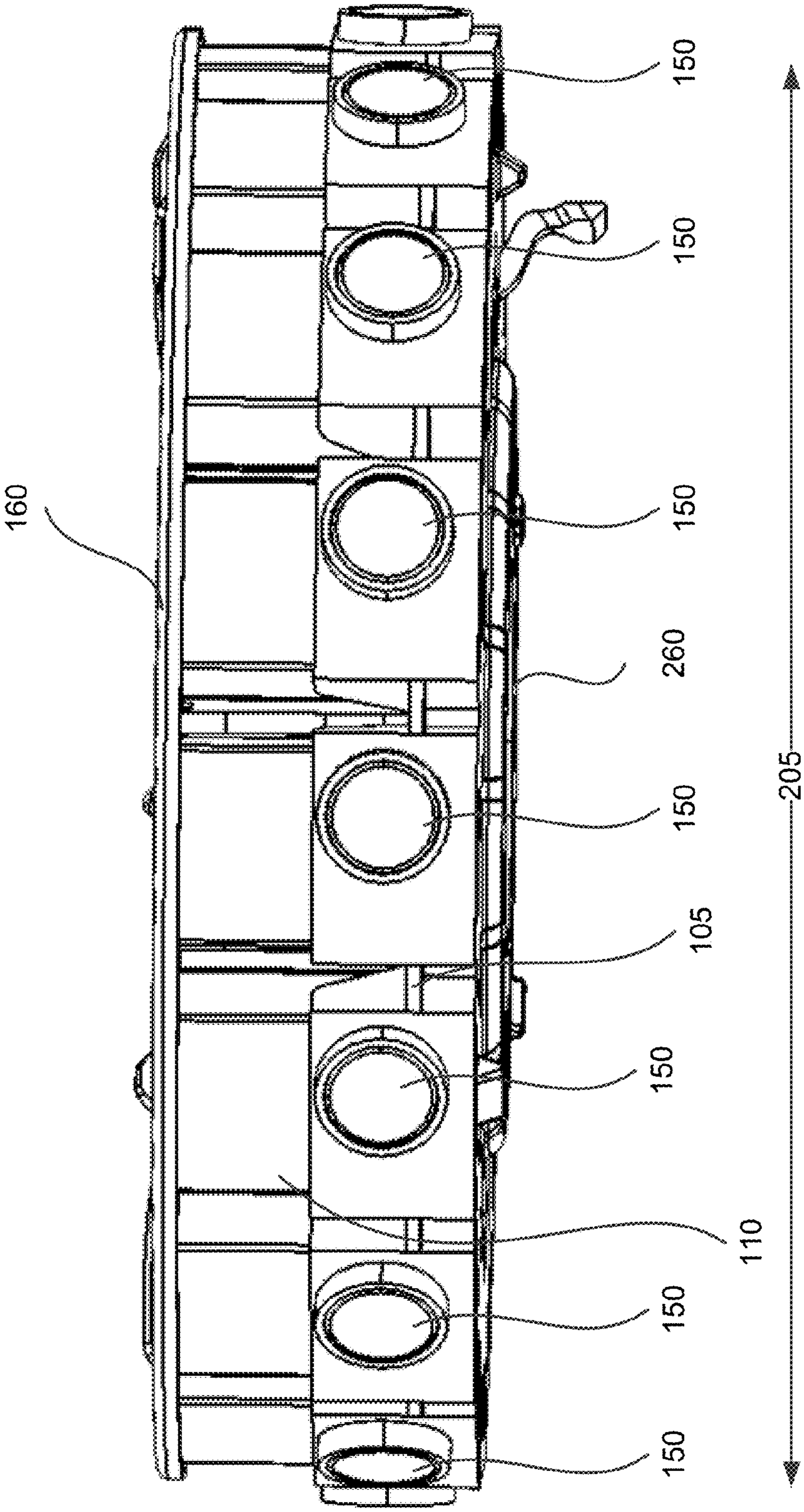


FIG. 2

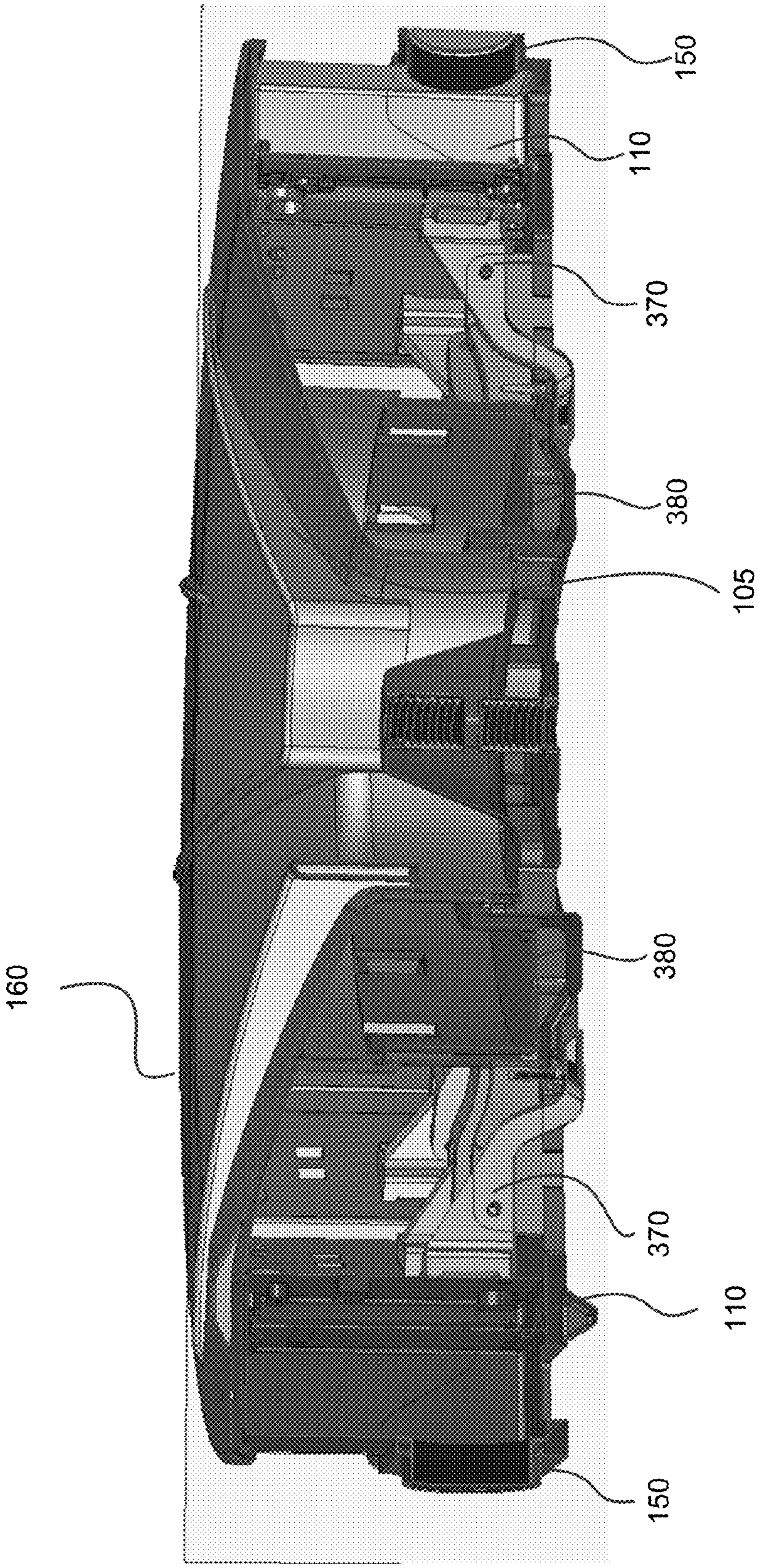


FIG. 3

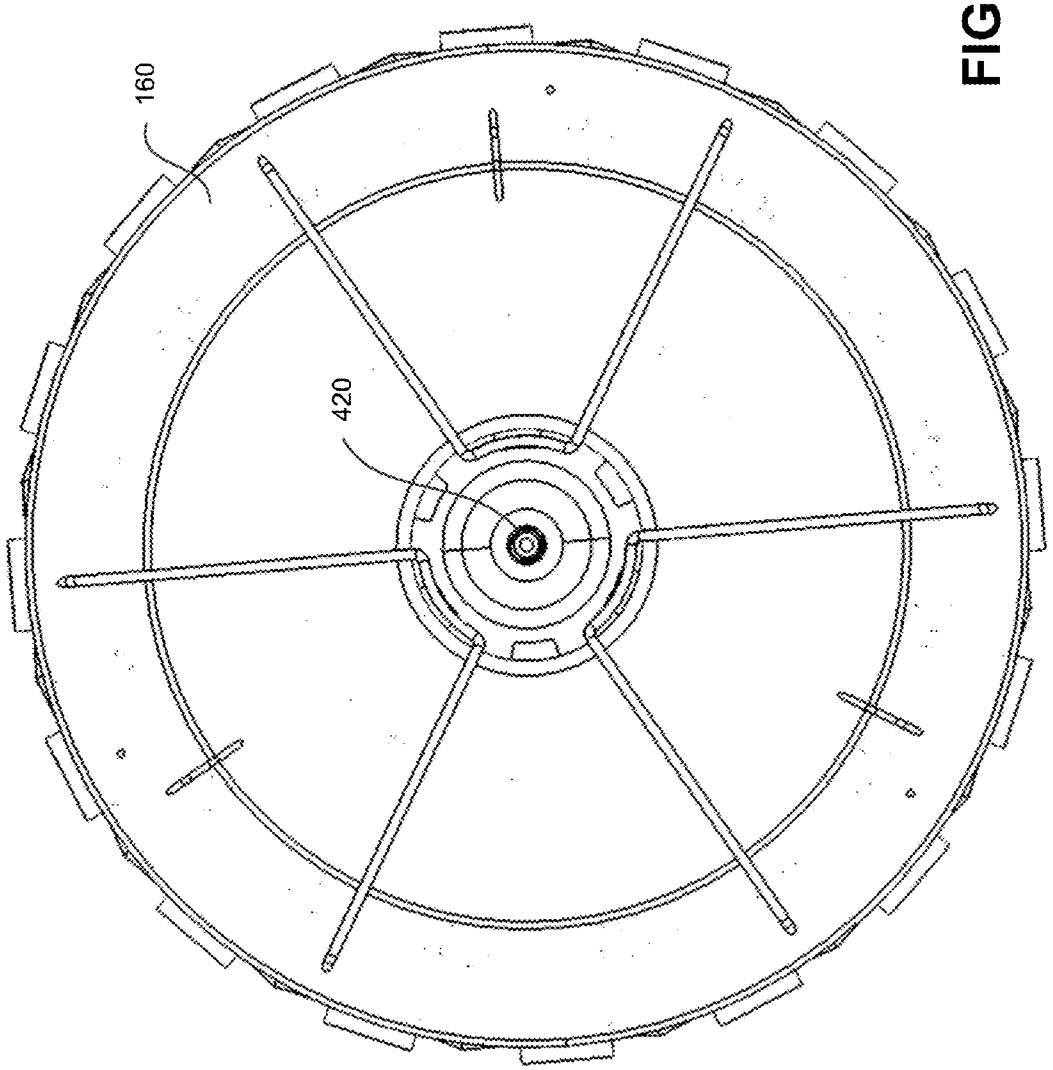


FIG. 4

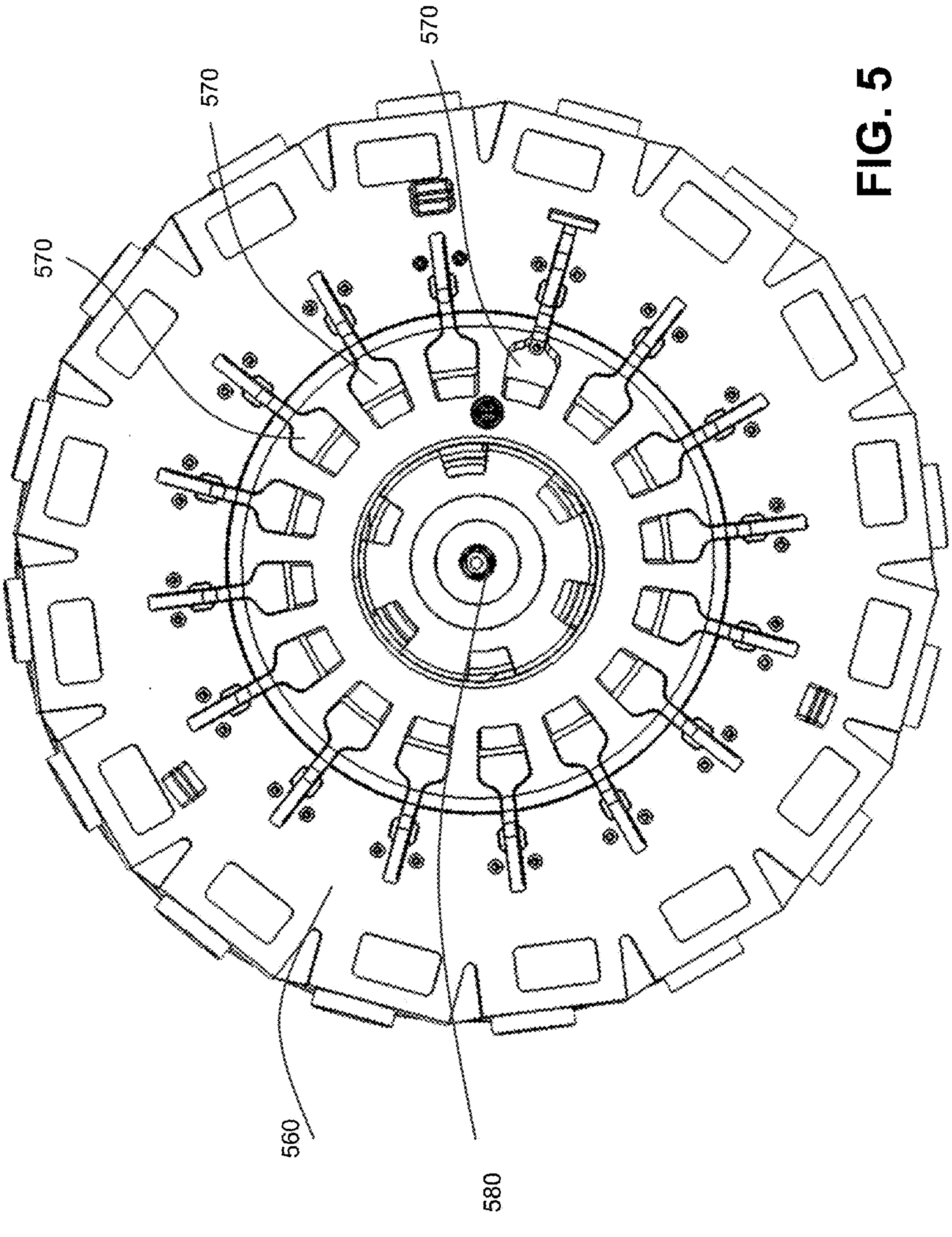


FIG. 5

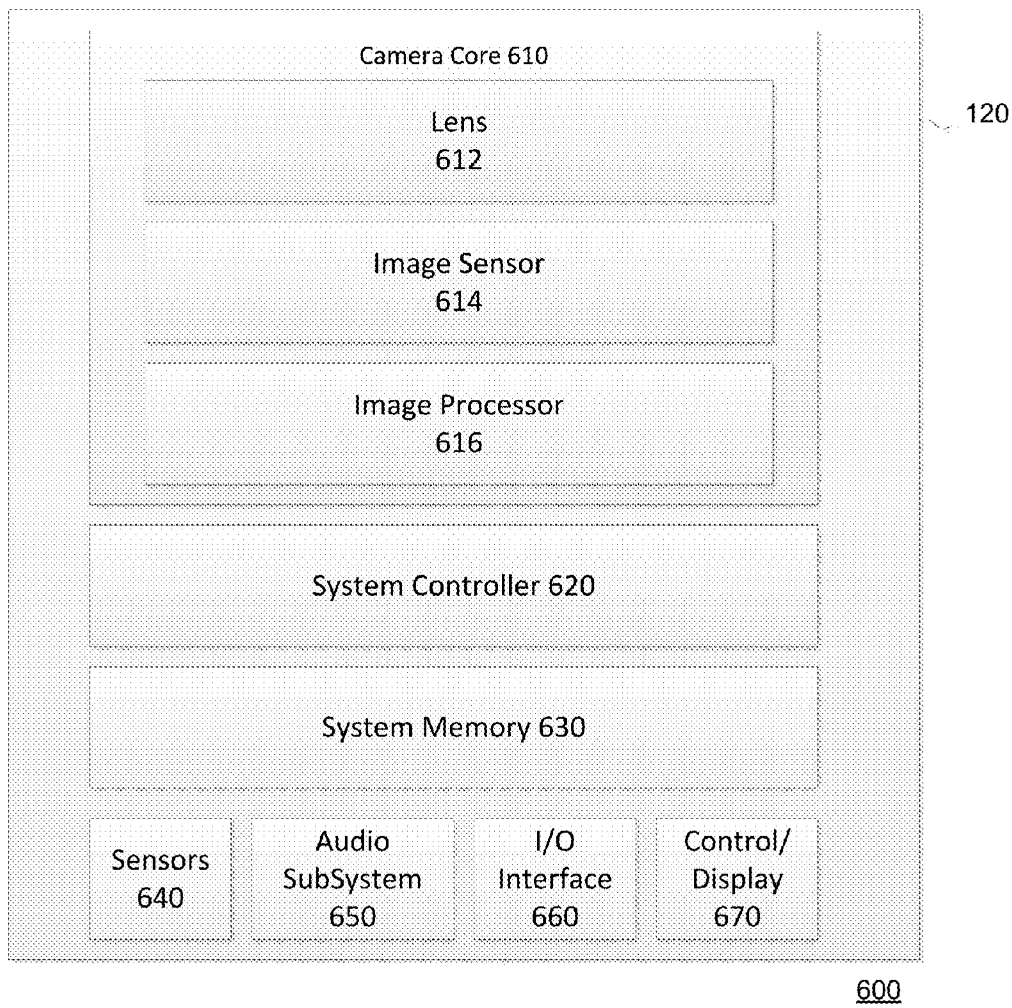

Camera Core 610
Lens
612
Image Sensor
614
Image Processor
616
System Controller 620
System Memory 630
Sensors
640
Audio
SubSystem
650
I/O
Interface
660
Control/
Display
670
120
600

FIG. 6

MULTI CAMERA MOUNT

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 62/166,584, filed May 26, 2015, the content of which is incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The disclosure generally relates to the field of camera mounts, and more particularly, a mount for securing a plurality of cameras within a releasable openable encasement.

BACKGROUND

[0003] A camera may be mounted on or within structures, for example to ensure that the camera is still while capturing images, thus trying to avoid out-of-focus images, leading to capture of high quality images. Most of the mounts available today are to mount a single camera. To accommodate multiple views of an object, multiple camera mounts are used to capture images from different views. Some conventional mounts that can accommodate multiple cameras. However, a problem with these conventional mounts is that they do not allow cameras to remain in specifically fixed positions resulting in misalignment of the cameras relative to images that are captured. Images captured from misaligned camera are very difficult, if not impossible, to cleanly stitch together once images are captured.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] The disclosed embodiments have advantages and features which will be more readily apparent from the detailed description, the appended claims, and the accompanying figures (or drawings). A brief introduction of the figures is below.

[0005] FIG. **1** illustrates a perspective view of a camera mounting assembly for a plurality of cameras, the structure having a substantially circular configuration, according to an example embodiment.

[0006] FIG. **2** illustrates a planar view of the camera mounting assembly for the plurality of cameras, according to an example embodiment.

[0007] FIG. **3** illustrates a top view of the camera mounting assembly for the plurality of cameras, according to an example embodiment.

[0008] FIG. **4** illustrates a bottom view of the camera mounting assembly for the plurality of cameras, according to an example embodiment.

[0009] FIG. **5** illustrates a cross sectional view of the camera mounting assembly for the plurality of cameras, according to an example embodiment.

[0010] FIG. **6** illustrates example camera architecture for use with the camera mounting assembly.

DETAILED DESCRIPTION

[0011] The Figures (FIGS.) and the following description relate to preferred embodiments by way of illustration only. It should be noted that from the following discussion, alternative embodiments of the structures and methods disclosed herein will be readily recognized as viable alternatives that may be employed without departing from the principles of what is claimed.

[0012] Reference will now be made in detail to several embodiments, examples of which are illustrated in the accompanying figures. It is noted that wherever practicable similar or like reference numbers may be used in the figures and may indicate similar or like functionality. The figures depict embodiments of the disclosed system (or method) for purposes of illustration only. One skilled in the art will readily recognize from the following description that alternative embodiments of the structures and methods illustrated herein may be employed without departing from the principles described herein.

Configuration Overview

[0013] Described are embodiments of a camera mounting assembly. The camera mounting assembly may have a substantially circular configuration. The camera mounting assembly may include N cameras used to capture a 4 pi steradian image. Each camera may be mounted within the camera mounting assembly such that each camera may capture a portion of the 4 pi steradian image. Additionally, the camera mounting assembly may include a structure to house electronics and processing elements. The processing elements may be configured to stitch the images from each camera to obtain the 4 pi steradian image.

[0014] The camera mounting assembly may include a circular unibody base cage that may include camera mounts for more than one camera. The unibody base cage may have lens openings along the circumference of the unibody base cage. A lens of a camera may be fitter within each lens opening such that the lens of the camera has an unobstructed view outside the unibody base cage to capture images. Within the unibody base cage, one or more sub-cage structures may be releasably attached to the unibody base cage. Each sub-cage structure includes a securing mechanism such as a locking gear, or screws to securely hold a camera such that the center of the camera lens aligns with the center of the lens opening. The camera mounting assembly optionally may include a top plate and a bottom plate to withstand high impact or different weather conditions. Additionally, the circular configuration may have vents and openings between the sub-cages in order to reduce thermal convection that may be caused due to mounting of more than one camera within the camera mounting assembly.

Example Multiple Camera Mount Configuration

[0015] FIG. **1** illustrates a perspective view of an example of a camera mounting assembly **100** for a plurality of cameras **120**, the structure of the assembly having a substantially circular configuration. The example embodiment of a camera mounting assembly **100** may be configured to attach two or more high definition video cameras within a high tolerance juxtaposition relative to each other. This configuration may allow performing image stitching from images captured across two or more cameras with minimal computation intensity to achieve single composite image. In one example embodiment, the camera mounting assembly **100** may be a substantially circular configuration configured to hold N number of cameras **120**, where N cameras may be two or more cameras and may provide for image capture in a panoramic field. For example, N may be three cameras **120** or N may be six cameras **120** or N may be twelve cameras

120. Each field of view may provide for capture of an equal quality of a field of view (FOV). Each camera **120** may be positioned within a sub-cage **110** coupled to a base circular camera mounting structure **105** (which also may be referenced as base cage **105**) so that the lens of the camera **120** fits into a lens opening **150**. The lens opening **150** is typically positioned on the circumference of the base cage **105**.

[0016] In one embodiment the base cage **105** may be a unibody structure that may be made of rigid material, for example, a polycarbonate, ABS, or other material capable of withstanding high impact. The unibody structure and rigid materials may help ensure minimal to no deviances in alignment between cameras. The unibody base cage **105** is a circular frame structure that may include slots to fit in sub-cages at the outer edge of the circular frame structure. The circular frame structure may have openings between the sub-cage slots to allow air to flow within the base cage **105**. Towards the inner portion of the circular frame structure, locking mechanisms, e.g., latches, clips, or gear locks, may be included for mounting the entire camera mounting assembly **100** in a fixed location.

[0017] Within the base cage **105**, cameras **120** are positioned within sub-cages **110** to secure the camera **120** within the base cage and to allow for the lens to have an unobstructed view outside the base cage **105** and the sub-cage **110**. The camera **120** may be a high definition camera (or camera). It is noted that in one embodiment the camera may be used to capture video and/or still images. It also is noted the camera may be an activity camera, for example, a GOPRO camera such as a HERO 3, HERO 4, HERO 5, or other camera with similar dimensions and functionality. In alternate embodiments, the activity camera may be, for example, a GOPRO HERO SESSION camera or other activity camera with similar dimensions and functionality. An example of a camera architecture of a camera **120** for use with the camera mounting assembly **100** is further described below, e.g., with FIG. **6**.

[0018] The sub-cage **110** may be a rectangular frame, approximately sized to be of a similar length and height as the length and a height of the camera **120**. The width of the sub-cage **110** frame may be at least approximately at a quarter or half of the width of the camera **120**, which may expose a portion of the camera outside of the sub-cage **110**. The camera **120** within the sub-cage **110** may be further secured within the sub-cage **110** by a securing mechanism. Examples of a securing mechanism may be a clamp, an interlocking pin, and/or spring lock to keep the camera **120** from moving back towards center of the camera mounting assembly **100**. Each sub-cage **110** may be individually detachable (or removably attachable) from the base cage **105**. The sub-cage **110** may be attached to the base cage **105** via a mechanical securing mechanism. Examples of mechanical securing mechanisms may be interlocking clips, pins, screws, spring clamps, or other such securing mechanism.

[0019] Each sub-cage **110** may further include a power, processing and communications block. These components may be embodied within a "backpack". Additional examples of a backpack are described with respect to FIG. **3**. In one example embodiment, the backpack may be a rectangular block structure that aligns with the size of the camera and may be coupled to the camera **120** via mechanical locking mechanisms. The rectangular block structure may be enclosed with ventilation or may be an open air cage structure. In another embodiment, the backpack may be attached to the sub-cage **110** and include one or more connectors. The connectors may provide electrical connectivity to access operational functionality, for example, power, communication, processing and/or global positioning system (GPS) functionality for the camera **120**.

[0020] The opening for the lens **150** may be a precision point. The precision point allows aligning the center point of the lens with the center point of the lens opening **150**. The lens opening **150** positions the lens of the camera along the horizontal plane, e.g., the X-Y axis. Aligning and positioning the lens accurately within the lens opening ensures that the stitching lines for an image are aligned for each field of view. In addition, optionally, there may be aligning pins within each sub-cage **110** to help ensure that the lenses are aligned in a precise juxtaposition relative to other lenses of other cameras secured with the sub-cages **110** of the base cage **105**. The aligning pins within each sub-cage **110** may be coupled to an inner back wall of the rectangular frame of the sub-cage **110**. Once the sub-cage **110** is aligned with the inner back wall of the rectangular frame and secured in place, the back of a lens of the camera **120** is aligned in an appropriate position relative to the lens opening **150**. In particular, the aligning pin may apply pressure towards on the back of the camera **120** to force the lens of the camera **120** to position within the lens opening of the base cage **105**. In another embodiment, the aligning pins within the sub-cage **110** may be coupled towards the outer edges of the rectangular frame of the sub-cage **110**. In this configuration, the aligning pins lock the back of the camera within the aligning pins to prevent any movement of the camera **120** and keep the lens of the camera **120** within the lens opening **150**.

[0021] It is noted that the base cage **105** is shown with panels, e.g., the sub-cage **110** that enclose the cameras **120** within a substantially enclosed assembly. There may be openings between sub-cages **110** along the sides where the cameras **120** are securely mounted. The substantially enclosed assembly of the base cage **105** allows for withstanding elements such as wind and moisture. Cooling can be achieved using heat sinks and/or vents between and/or around the sub-cages **110** as needed. In one embodiment, the base cage **105** may be made of a material that allows cooling. The material may be, for example, aluminum, copper, and/or composite material.

[0022] In alternate example embodiments, the top **160** or bottom may be comprised of just an open frame so that air can circulate through the assembly. In the example embodiment, the base cage **105** may have a more open structural cage configuration. An open structural configuration may include a physical opening between sub-cages **110** so that a camera **120** within a sub-cage **110** is exposed to air. The openings between sub-cages **110** are structured such that they may airflow between the cameras **120** allows for cooling. In some embodiments, a top **160** and a bottom of the base cage **105** can be a substantially molded unibody piece that is, for example, a plate.

[0023] FIG. **2** illustrates a planar view of the camera mounting assembly **100** for the plurality of cameras **120**. Here, the lens openings **150** are illustrated as lined up along the circumference **205** of the base cage **105** so that the lens have an unobstructed field of view, yet have some overlap with a field of view of adjacent cameras **120** that have their lenses positioned within their respective openings **150**.

[0024] FIG. **3** illustrates a cross sectional view of the camera mounting assembly **100** for the plurality of cameras **120**. The base cage **105** of the camera mounting assembly **100** includes the lens opening **150**. In one embodiment, the lens opening **150** may integrate a heat sink. The heat sink dissipates heat generated from the camera **120**. An example heat sink is in U.S. Pat. No. 9,025,080, which is incorporated by reference. In addition, the heat sink structure may allow for accommodating FOV pointing tolerances by keeping the lens of the camera **120** properly aligned within the lens opening **150**.

[0025] A mechanical lever **370** such as a nova center cam is illustrated in the cross section. The lever **370** is attached within the base cage **105** via a securing mechanism or may be held to the base cage via a bonding chemical. The mechanical lever may be structured to include a pivot point which can allow for securing a camera **120** in place within the sub-cage **110** by pushing against the back of the camera or allow for release of the camera **120** by releasing pressure off of the back of the camera. Examples of releasable mechanisms include a gear lock system, a spring tensioned system or other such mechanical lock systems that allow release of the camera. The mechanical lever **370** may be positioned at the back of each sub-cage **110** that secures a camera **120** between the front of a sub-cage **110** and a center portion of the camera mounting assembly **100**. The center portion of the camera mounting assembly **100** may form a back against which the mechanical lever **370** may be secured. Placing the mechanical lever **370** in this position allows the lens of the camera to be aligned with the lens opening **150** and remain secured in this position. In particular, the mechanical lever **370** exerts force on the camera **120** in the secured position. The force allows the lens of the camera **120** to be appropriately positioned within the lens opening **150** of the base cage **105**, specifically along the vertical plane, i.e., the Z-axis. The lever **370** may be releasable. Examples of mechanical levers include a nova center cam, clamp or any other such levers.

[0026] The camera mounting assembly **100** may include power distribution electronics **280** as well as processing and communication electronics **280**, for example, for synchronization of cameras. For example, electronics and code may be incorporated to designate one of the cameras **120** as a master clock camera against which the other cameras **120** will synchronize. Alternately, the electronics may include a master clock to which all cameras **120** within the camera mounting assembly **100** may synchronize. It is noted that although not shown, a structure that houses electronics for communications and power may be in the form of a cubic or rectangular box or prism. The electronics housing structure may be referenced as a "backpack" and may allow for superseding power sources on the camera **120** and may allow for removing such sources from the cameras **120** in some example embodiments thereby lightening the camera weight. Example electronics may include global positioning system (GPS) connectors, power connectors, power and GPS related electronics, communication protocols such as USB, Wi-Fi, camera buses, etc., and other such electronics. In some embodiments, a battery pack may be included within the backpack, or alternatively, a slot for a battery pack may be provided within the backpack.

[0027] A backpack may have a unibody enclosed rectangular or cubic prism structure. In some embodiments, the backpack may be a multi-bodied frame that includes a slot for a battery pack such that a battery may be inserted within the slot as required. One of the faces of the backpack prism may include connectors, either mounted on the face or embedded within the face of the backpack. In one embodiment, the backpack may be secured to the back of the camera or sub-cage via the connectors. In another embodiment, the backpack may be attached to the back of the camera via securing mechanisms such as clips, gear locks, bonding chemicals, etc.

[0028] A backpack may be secured within each sub-cage **110** and communicatively coupled with a corresponding camera **120** in the sub-cage **110**. Alternately, a backpack may be secured outside of a sub-cage **110**, e.g., secured along a center of the camera mounting assembly **100** and communicatively coupled, e.g., via a wire (or bus) with one or more cameras **120** in the base cage **105**.

[0029] FIG. **4** illustrates a top view of the camera mounting assembly **100** for the plurality of cameras **120**. In one embodiment, the top **160** may be removably attachable. The top **160** may be a circular plate structure similar in size of the base cage **105** and that secures to the base cage **105**. The top **160** plate protects the electronics and communications within the camera mounting assembly **100**. The top **160** may be made of a material that allows cooling, and withstands high impact. The top **160** may be secured through a top securing mechanism **420**. The top securing mechanism **420** may be, for example, a thumbscrew or removable locking pin. By removing the top **160**, access to the internal of the camera mounting assembly **100** is enabled to load, detach or position the cameras **120**, sub-cages **110** and/or backpacks within the camera mounting assembly **100**. In one embodiment, the top **160** may be made of a material that allows cooling, for example, aluminum.

[0030] FIG. **5** illustrates a bottom view of the camera mounting assembly **100** for the plurality of cameras **120**. The bottom **560** portion may be a circular plate structure similar in size of the base cage **105**. The bottom portion may include indicators such as LEDs, connectors for external power or memory, vents (that may perform a heat transfer function to allow cooling) and/or levers **570**. In one embodiment, the levers **570** may be internal within the base cage **105**. In one embodiment, the bottom plate may include a three-pin power supply connector to connect to an external power source. The levers **570** are on the mechanical levers **370** that may apply a force along an axis of a lens of the camera **120**. The bottom **560** may be secured through a securing mechanism **580**, which may be a thumbscrew or removable locking pin. In one embodiment, the bottom **560** may be made of a material that allows cooling, for example, aluminum.

[0031] The mechanical configuration as shown and described can allow for securing the camera within the camera mounting assembly **100** so that the lens of each camera **120** may be properly positioned within the assembly **100**. By having the camera **120** appropriately secured and positioned, two or more cameras capturing images in their respective field of view can thereafter have the images from the field of view further processed with precision. For example, images from each field of view may be stitched along respective edges allowing for a larger image capture with minimal distortion and/or loss of portions of an image.

Example Camera Architecture

[0032] FIG. **6** illustrates a block diagram of an example camera architecture **600**. The camera architecture **605** corresponds to an architecture for the camera, e.g., **120**. In one embodiment, the camera **120** is capable of capturing spherical or substantially spherical content. As used herein, spherical content may include still images or video having spherical or substantially spherical field of view. For example, in one embodiment, the camera **120** captures video having a 360° field of view in the horizontal plane and a 180° field of view in the vertical plane. Alternatively, the camera **120** may capture substantially spherical images or video having less than 360° in the horizontal direction and less than 180° in the vertical direction (e.g., within 10% of the field of view associated with fully spherical content). In other embodiments, the camera **120** may capture images or video having a non-spherical wide angle field of view.

[0033] As described in greater detail below, the camera **120** can include sensors **640** to capture metadata associated with video data, such as timing data, motion data, speed data, acceleration data, altitude data, GPS data, and the like. In a particular embodiment, location and/or time centric metadata (geographic location, time, speed, etc.) can be incorporated into a media file together with the captured content in order to track the location of the camera **120** over time. This metadata may be captured by the camera **120** itself or by another device (e.g., a mobile phone) communicatively coupled with the camera **120**. In one embodiment, the metadata may be incorporated with the content stream by the camera **120** as the spherical content is being captured. In another embodiment, a metadata file separate from the video file may be captured (by the same capture device or a different capture device) and the two separate files can be combined or otherwise processed together in post-processing. It is noted that these sensors **940** can be in addition to other sensors.

[0034] In the embodiment illustrated in FIG. **6**, the camera **120** comprises a camera core **610** comprising a lens **612**, an image sensor **614**, and an image processor **616**. The camera **120** additionally includes a system controller **620** (e.g., a microcontroller or microprocessor) that controls the operation and functionality of the camera **120** and system memory **630** configured to store executable computer instructions that, when executed by the system controller **620** and/or the image processors **616**, perform the camera functionalities described herein. In some embodiments, a camera **120** may include multiple camera cores **610** to capture fields of view in different directions which may then be stitched together to form a cohesive image. For example, in an embodiment of a spherical camera system, the camera **120** may include two camera cores each having a hemispherical or hyper hemispherical lens that each captures a hemispherical or hyper hemispherical field of view which are stitched together in post-processing to form a spherical image.

[0035] The lens **612** can be, for example, a wide angle lens, hemispherical, or hyper hemispherical lens that focuses light entering the lens to the image sensor **614** which captures images and/or video frames. The image sensor **614** may capture high-definition images having a resolution of, for example, 720p, 1080p, 4k, or higher. In one embodiment, spherical video is captured in a resolution of 5760 pixels by 2880 pixels with a 360° horizontal field of view and a 180° vertical field of view. For video, the image sensor **614** may capture video at frame rates of, for example, **30** frames per second, **60** frames per second, or higher. The image processor **616** performs one or more image processing functions of the captured images or video. For example, the image processor **616** may perform a Bayer transformation, demosaicing, noise reduction, image sharpening, image stabilization, rolling shutter artifact reduction, color space conversion, compression, or other in-camera processing functions. Processed images and video may be temporarily or persistently stored to system memory **630** and/or to a non-volatile storage, which may be in the form of internal storage or an external memory card.

[0036] An input/output (I/O) interface **660** transmits and receives data from various external devices. For example, the I/O interface **660** may facilitate the receiving or transmitting video or audio information through an I/O port. Examples of I/O ports or interfaces include USB ports, HDMI ports, Ethernet ports, audio ports, and the like. Furthermore, embodiments of the I/O interface **660** may include wireless ports that can accommodate wireless connections. Examples of wireless ports include Bluetooth, Wireless USB, Near Field Communication (NFC), and the like. The I/O interface **660** may also include an interface to synchronize the camera **120** with other cameras or with other external devices, such as a remote control, a second camera, a smartphone, a client device, or a video server.

[0037] A control/display subsystem **670** includes various control and display components associated with operation of the camera **120** including, for example, LED lights, a display, buttons, microphones, speakers, and the like. The audio subsystem **650** includes, for example, one or more microphones and one or more audio processors to capture and process audio data correlated with video capture. In one embodiment, the audio subsystem **650** includes a microphone array having two or microphones arranged to obtain directional audio signals.

[0038] Sensors **640** capture various metadata concurrently with, or separately from, video capture. For example, the sensors **640** may capture time-stamped location information based on a global positioning system (GPS) sensor, and/or an altimeter. Sensor data captured from the various sensors **640** may be processed to generate other types of metadata. For example, sensor data from the accelerometer may be used to generate motion metadata, comprising velocity and/or acceleration vectors representative of motion of the camera **120**. In one embodiment, the sensors **640** are rigidly coupled to the camera **120** such that any motion, orientation or change in location experienced by the camera **120** is also experienced by the sensors **640**. The sensors **640** furthermore may associates a time stamp representing when the data was captured by each sensor. In one embodiment, the sensors **640** automatically begin collecting sensor metadata when the camera **120** begins recording a video.

[0039] The camera **120** can be enclosed within a camera mounting assembly **100**, such as the one depicted in FIGS. **1** through **5**. The camera mounting assembly **100** can include electronic connectors which can couple with the corresponding camera (not shown) when a power and/or communication source is incorporated into the camera mounting assembly **100**.

Additional Considerations

[0040] By way of example, a circular array mounting structure envelop the camera and provide for a thermal contact with one or more heat dissipation surfaces of said camera in order to provide for efficient thermal dissipation out of the camera into the sub structure of the mount. The circular mount will comprise one or more cable management structures for retaining synchronizing connections. The system of N cameras will be identified sequentially, synchronized and hot swappable. The data captured by said cameras will be identified with the sequence and synchronization such that the aggregated data can be stitched in accordance to the cameras position within the mount and thus accurately represent the rendering of the 4PI (caged) or less than 4Pi circular composite field of view or a full range panoramic view.

[0041] The disclosed configurations allows for heat dissipation, particularly when powering the cameras within it. For example, the camera mounting assembly **100** can be configured with an open air top or bottom. The open air designs increase airflow around the cameras allowing for cooling.

[0042] Moreover, because the disclosed embodiments allow for an array of cameras **120** to be run on external power from a source on the cages, the batteries of the camera can be removed. This reduces heat generated by the cameras and also decreases weight of the overall assembly when cameras are mounted within the cages.

[0043] Throughout this specification, plural instances may implement components, operations, or structures described as a single instance. Although individual operations of one or more methods are illustrated and described as separate operations, one or more of the individual operations may be performed concurrently, and nothing requires that the operations be performed in the order illustrated. Structures and functionality presented as separate components in example configurations may be implemented as a combined structure or component.

[0044] Similarly, structures and functionality presented as a single component may be implemented as separate components. These and other variations, modifications, additions, and improvements fall within the scope of the subject matter herein.

[0045] As used herein any reference to "one embodiment" or "an embodiment" means that a particular element, feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. The appearances of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment.

[0046] Some embodiments may be described using the expression "coupled" and "connected" along with their derivatives. For example, some embodiments may be described using the term "coupled" to indicate that two or more elements are in direct physical or electrical contact. The term "coupled," however, may also mean that two or more elements are not in direct contact with each other, but yet still co-operate or interact with each other. The embodiments are not limited in this context.

[0047] In addition, use of the "a" or "an" are employed to describe elements and components of the embodiments herein. This is done merely for convenience and to give a general sense of the invention. This description should be read to include one or at least one and the singular also includes the plural unless it is obvious that it is meant otherwise.

[0048] Upon reading this disclosure, those of skill in the art will appreciate still additional alternative structural and functional designs for a multi-camera mount. Thus, while particular embodiments and applications have been illustrated and described, it is to be understood that the disclosed embodiments are not limited to the precise construction and components disclosed herein. Various modifications, changes and variations, which will be apparent to those skilled in the art, may be made in the arrangement, operation and details of the method and apparatus disclosed herein without departing from the spirit and scope defined in the appended claims.

What is claimed is:

1. A camera mounting assembly for a plurality of cameras, the camera mounting assembly comprising:

- a camera mounting structure including a circular unibody base cage;
- one or more lens openings within the circular unibody base cage, configured along the circumference of the circular unibody base cage, each lens opening structured to provide a lens of the camera to have an unobstructed view outside the circular unibody base cage; and
- one or more sub-cage structures releasably attachable to the circular unibody base cage via a securing mechanism each sub-cage structure including a securing mechanism configured to securely hold a camera, the sub-cage structure further including an aligning pin configured to position a center of the lens of the camera in alignment with a center of the lens opening.

2. The multiple camera mounting assembly of claim **1**, further comprising a detachable top plate secured to the circular unibody base cage by a securing mechanism.

3. The multiple camera mounting assembly of claim **1**, further comprising a detachable bottom plate secured to the circular unibody base cage by a securing mechanism.

4. The multiple camera mounting assembly of claim **1**, further comprising a mechanical lever positioned at a back portion of the sub-cage, and attached within the circular unibody base cage structure via a securing mechanism, the mechanical lever configured to apply force along an axis of a lens of a camera to allow positioning of the lens within the lens opening.

5. The multiple camera mounting assembly of claim **4**, wherein the mechanical lever is releasable.

6. The multiple camera mounting assembly of claim **4**, wherein the lens opening is positioned at a precision point corresponding to a center point of the lens of the camera. The multiple camera mounting assembly of claim **1**, further comprising an enclosed box structure coupled to the sub-cage via a securing mechanism, the box structure configured to house one or more electronic elements for distributing power within the sub-cage.

8. The multiple camera mounting assembly of claim **7**, wherein the box structure is configured to house one or more processing and communication elements to synchronize the plurality of cameras secured within the sub-cages.

9. The multiple camera mounting assembly of claim **7**, wherein the box structure is rectangular prism.

10. The multiple camera mounting assembly of claim **7**, wherein the box structure is cubic prism.

11. The multiple camera mounting assembly of claim **7**, wherein the box structure further includes a connector that can plug in to a power source.

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