US010394108B2

(12) **United States Patent**
Halsey et al.

(10) **Patent No.: US 10,394,108 B2**
(45) **Date of Patent: *Aug. 27, 2019**

(54) **CORNER-ORIENTED HIGH-DEFINITION PYLON-MOUNTED CAMERAS**

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(73) Assignee: **Admiral Video, LLC**, Lancaster, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/193,764**

(22) Filed: **Nov. 16, 2018**

(65) **Prior Publication Data**

US 2019/0086774 A1 Mar. 21, 2019

Related U.S. Application Data

(63) Continuation of application No. 15/784,974, filed on Oct. 16, 2017, now Pat. No. 10,139,709, which is a (Continued)

(51) **Int. Cl.**
G03B 17/56 (2006.01)
G02B 13/02 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G03B 17/561*** (2013.01); ***A63B 71/023*** (2013.01); ***G02B 6/4246*** (2013.01); ***G02B 6/4284*** (2013.01); ***G02B 13/02*** (2013.01); ***G03B 17/02*** (2013.01); ***G03B 17/08*** (2013.01); ***G03B 17/55*** (2013.01); ***G03B 37/00*** (2013.01); ***H04N 5/2251*** (2013.01); ***H04N 5/2252*** (2013.01); ***H04N 5/2257*** (2013.01); *A63B 2220/806* (2013.01); *A63B 2225/50* (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC .. H04N 5/2251; H04N 5/2252; H04N 5/2253; G03B 17/02; G03B 17/56; G03B 17/561; G03B 17/568; A63B 63/008; A63B 69/002; A63B 71/023; A63B 2071/0694; A63B 2243/007
See application file for complete search history.

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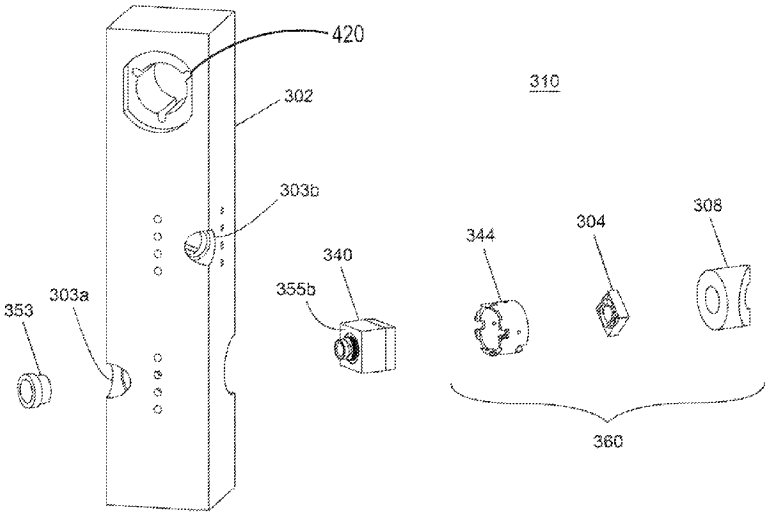
Primary Examiner — Daniel M Pasiewicz
(74) *Attorney, Agent, or Firm* — Simpson & Simpson, PLLC

(57) **ABSTRACT**

A pylon-mounted camera assembly comprising a body including a first face and a second face adjacent to the first face, such that the first face and the second face form a first corner, a first aperture arranged on a portion of and centered about the first corner, and a first camera positioned within the first aperture, the first camera facing outwardly from the body.

20 Claims, 40 Drawing Sheets



Related U.S. Application Data

continuation-in-part of application No. 15/216,989, filed on Jul. 22, 2016, now Pat. No. 9,817,299.

(60) Provisional application No. 62/449,455, filed on Jan. 23, 2017, provisional application No. 62/306,358, filed on Mar. 10, 2016, provisional application No. 62/195,894, filed on Jul. 23, 2015.

(51) **Int. Cl.**

A63B 71/02	(2006.01)
H04N 5/225	(2006.01)
G02B 6/42	(2006.01)
G03B 17/02	(2006.01)
G03B 17/08	(2006.01)
G03B 17/55	(2006.01)
G03B 37/00	(2006.01)
G02B 6/293	(2006.01)

(52) **U.S. Cl.**

CPC *A63B 2243/007* (2013.01); *G02B 6/293* (2013.01); *G02B 6/2938* (2013.01); *G03B 2217/002* (2013.01)

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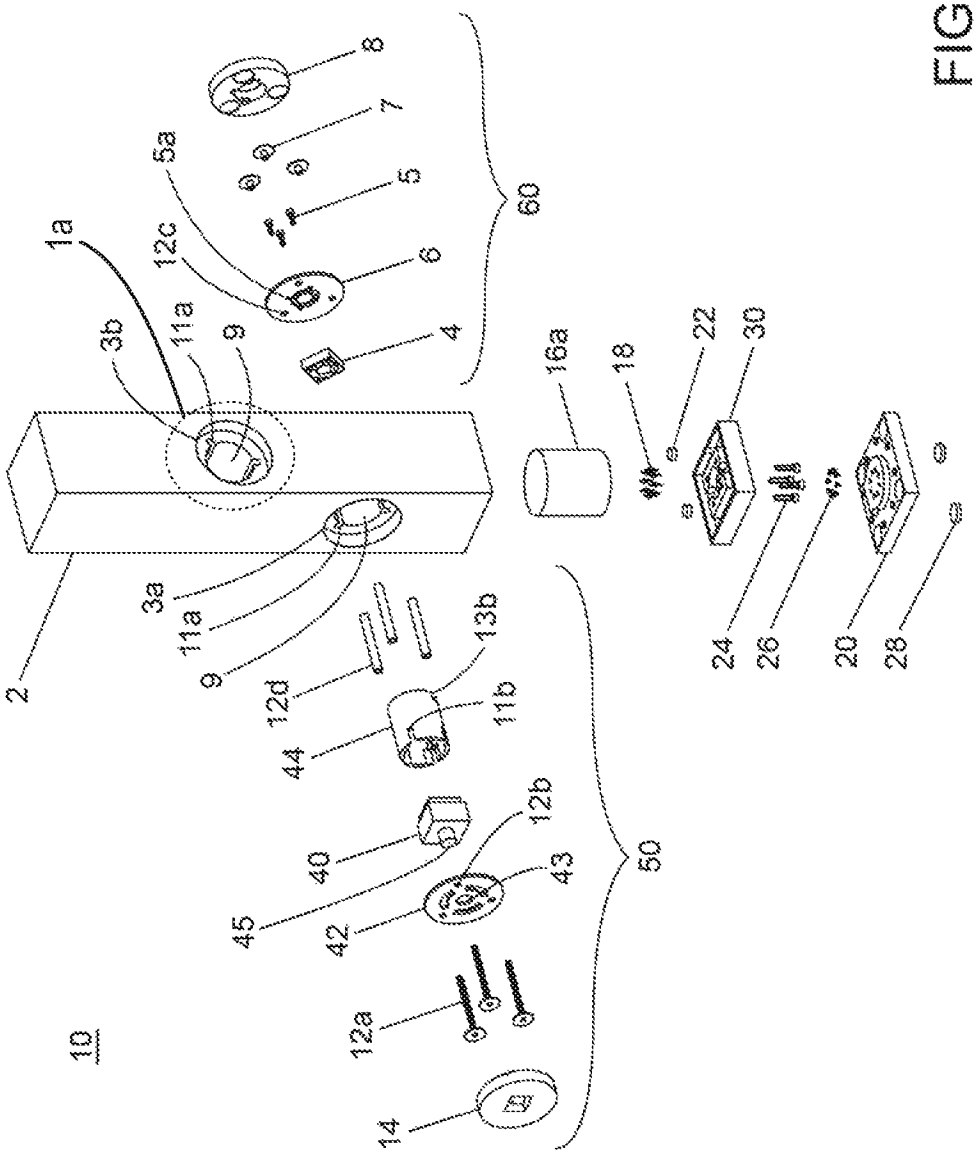
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3b
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11a
9
12c
5a
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7
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6
4
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22
30
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28
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13b
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12b
43
50
12a
14

FIG. 1

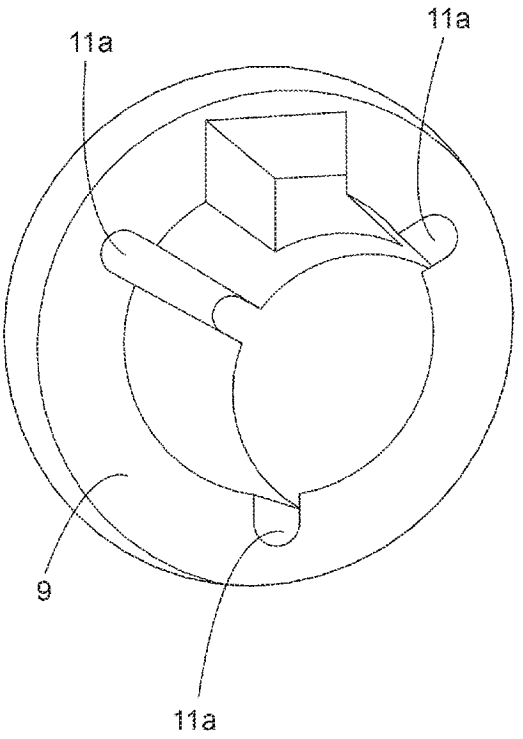


FIG. 1a

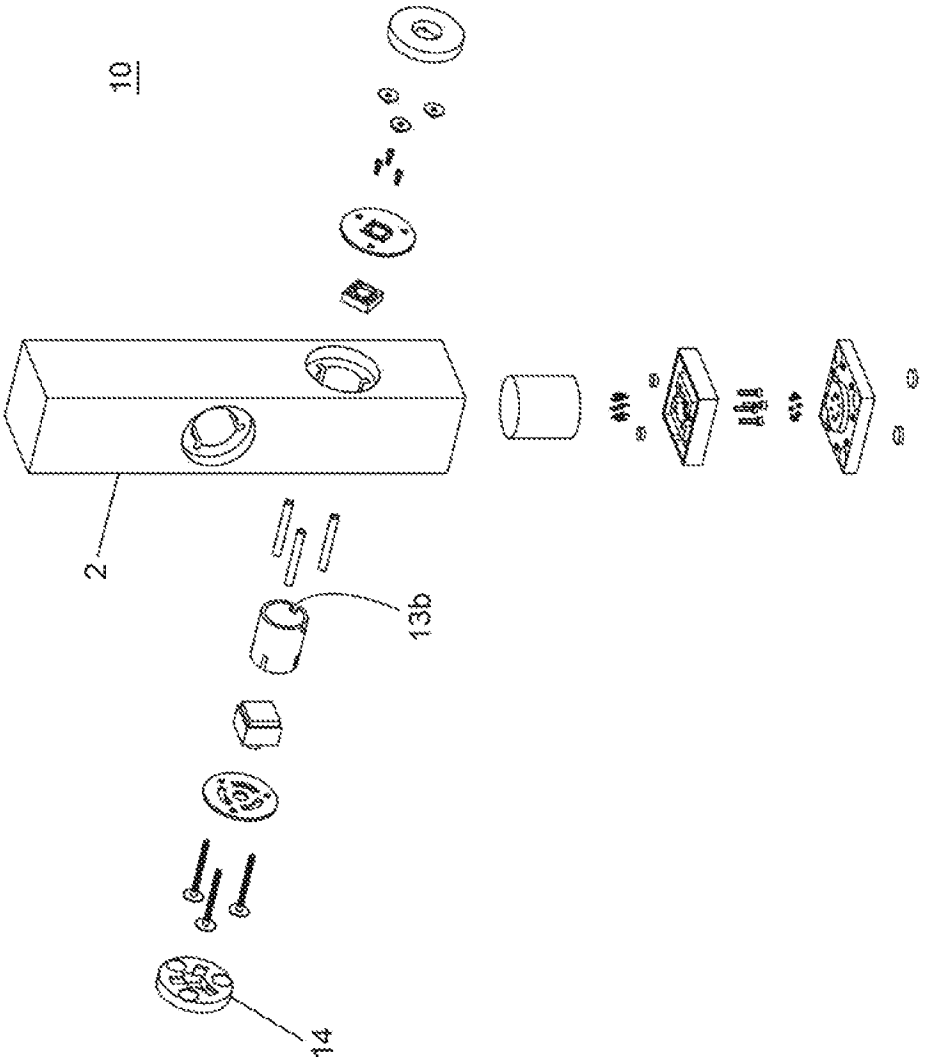


FIG. 1b

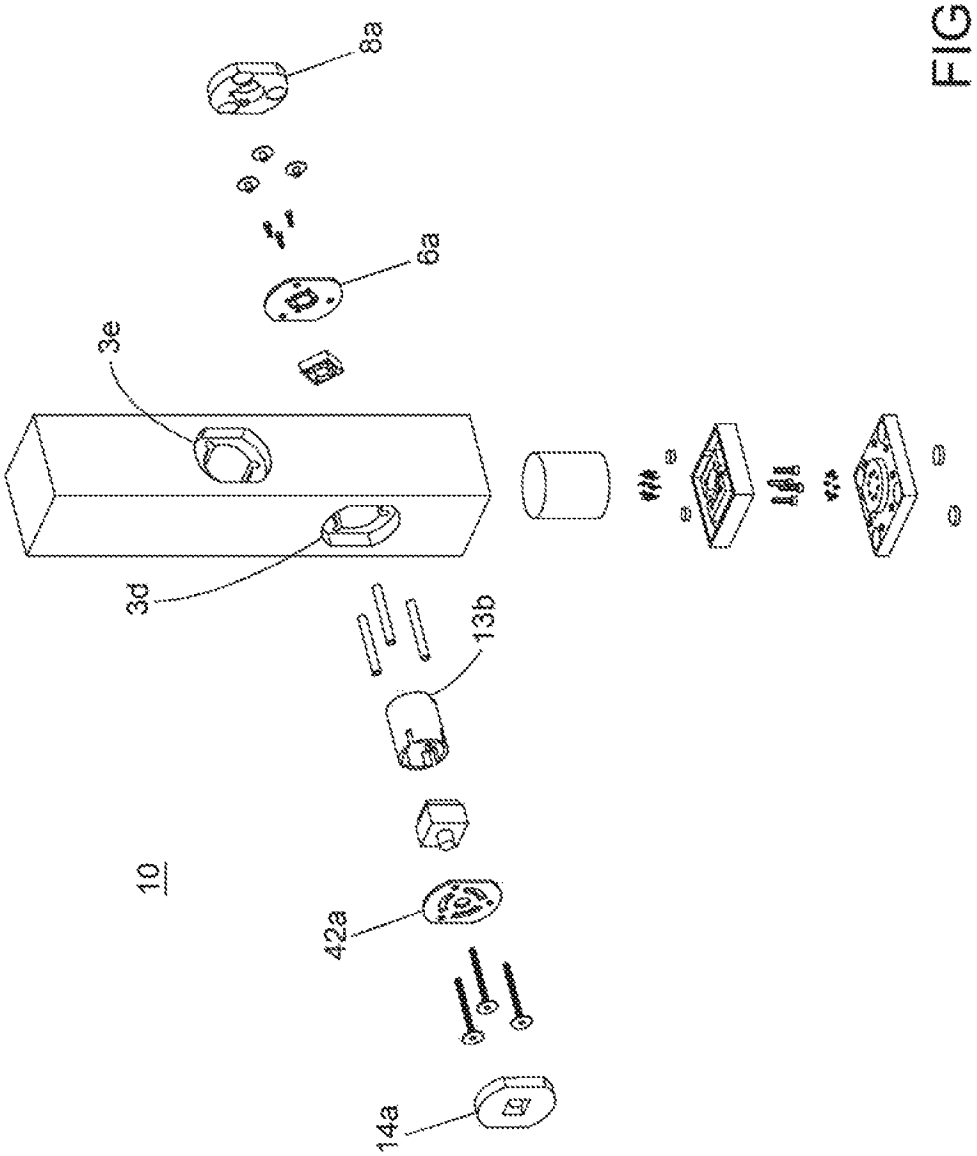


FIG. 2

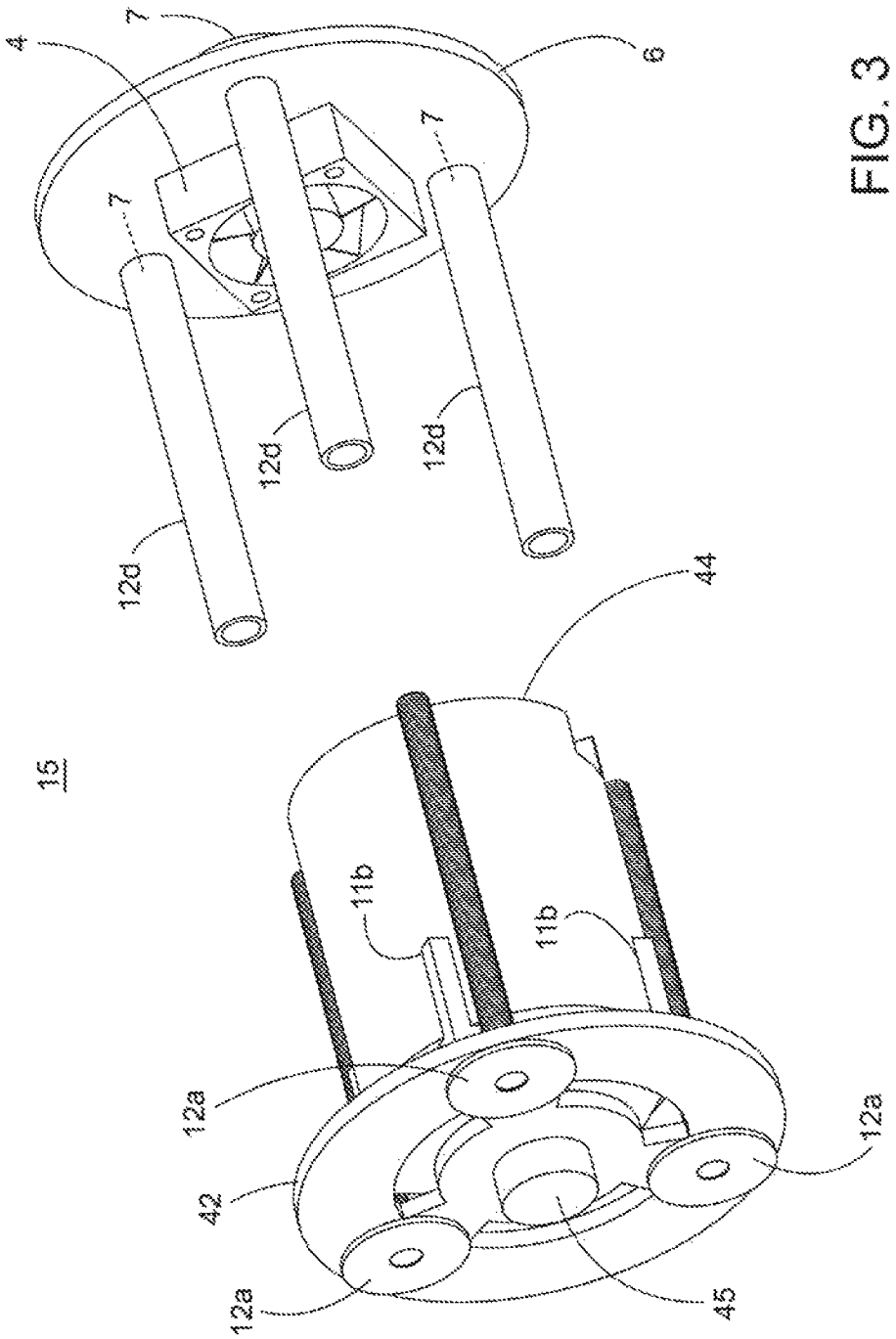


FIG. 3

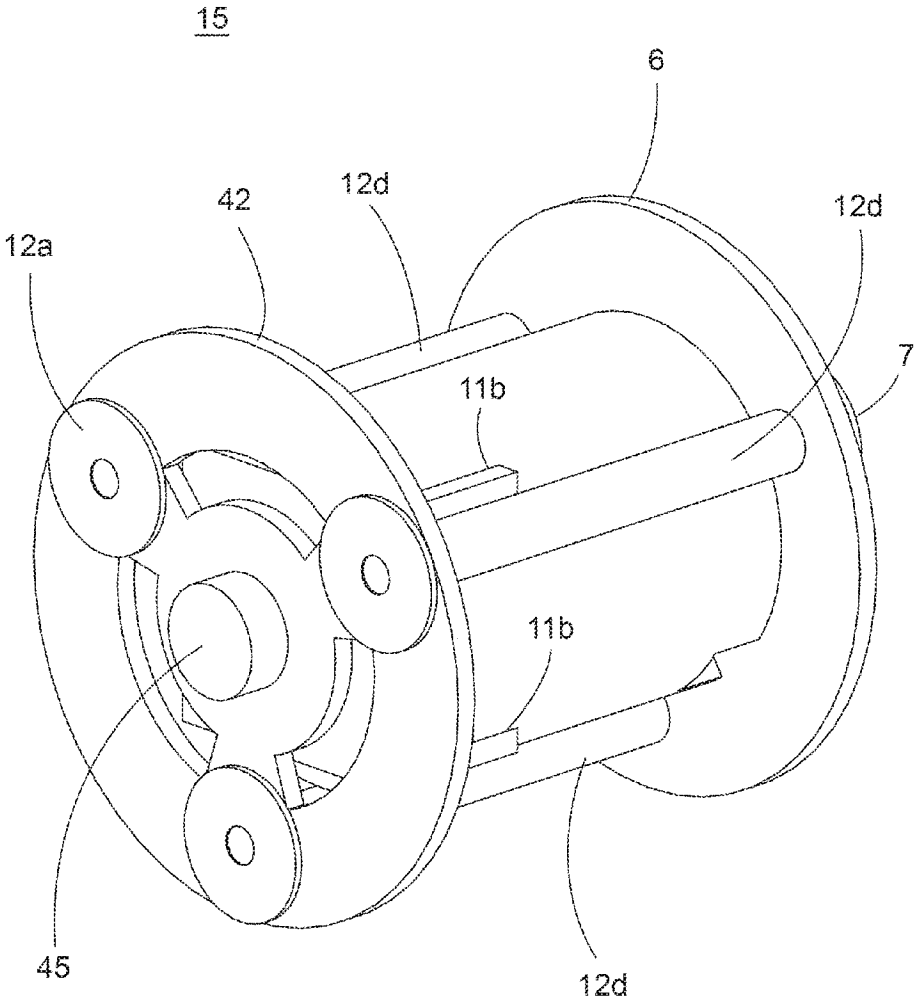


FIG. 4

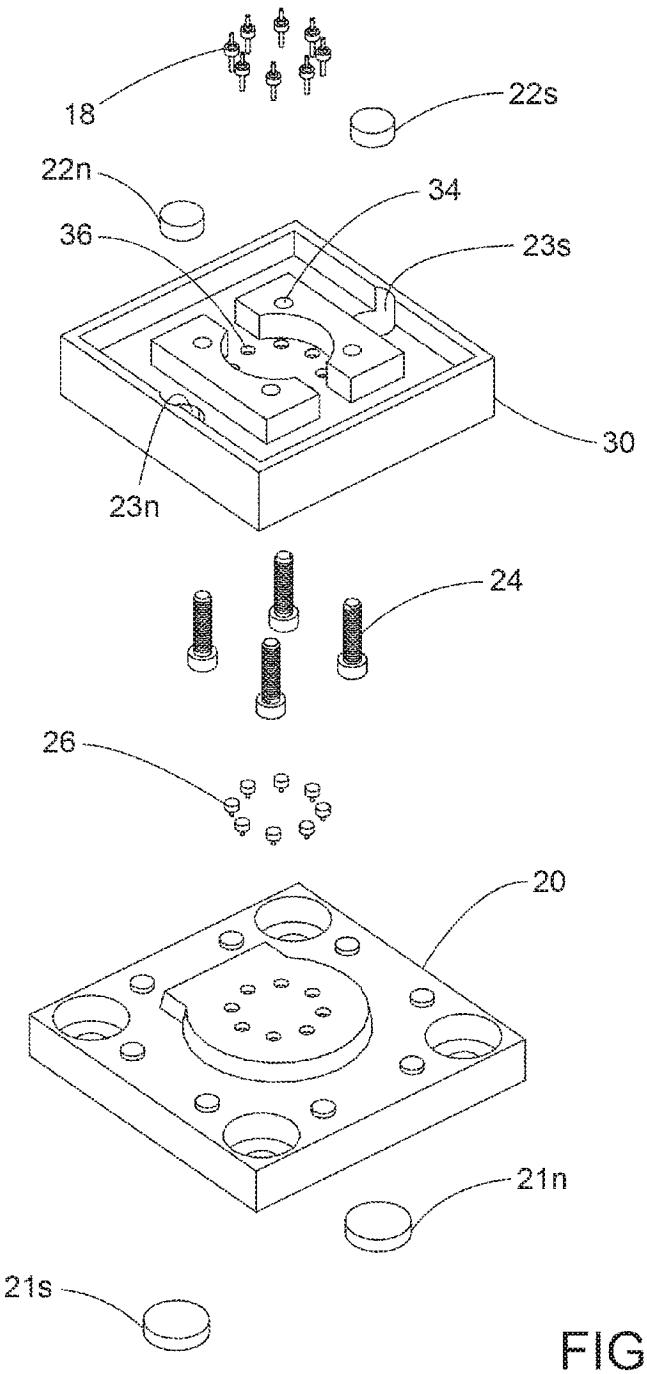


FIG. 5

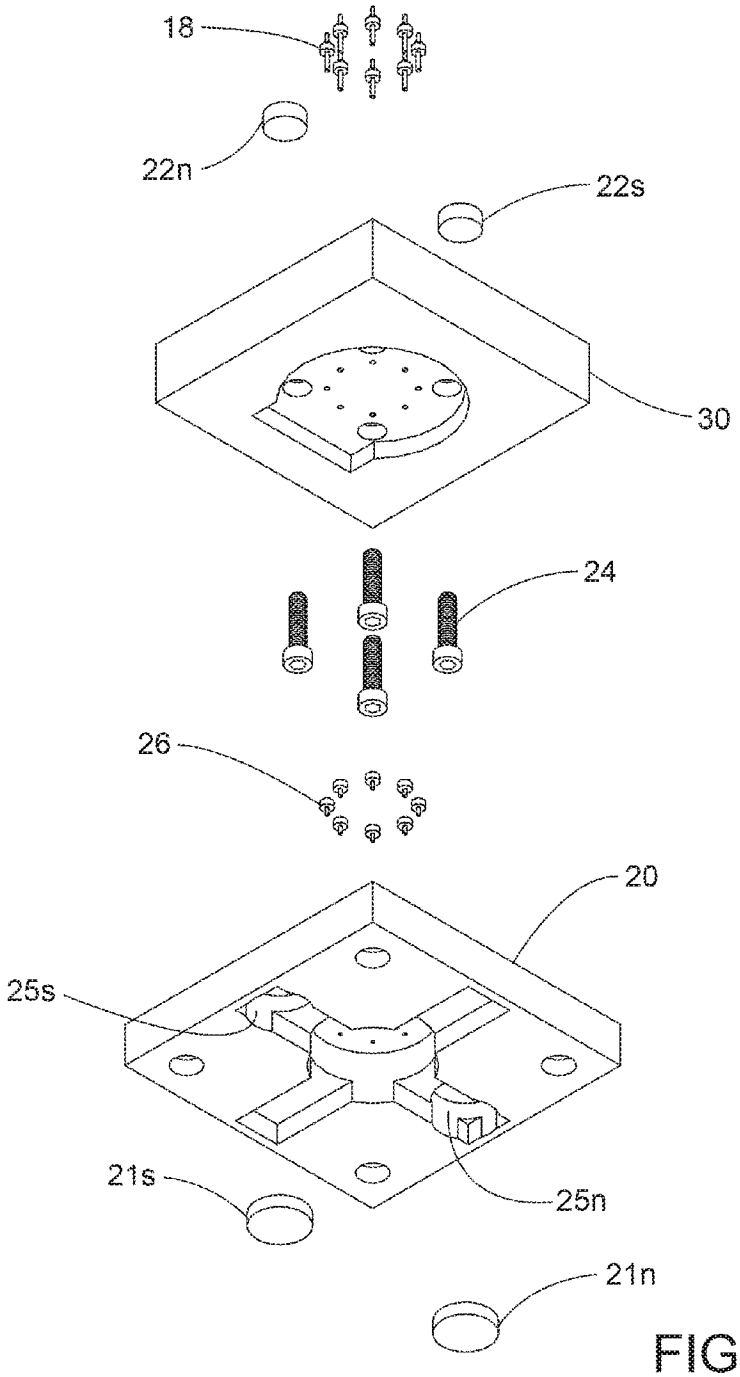
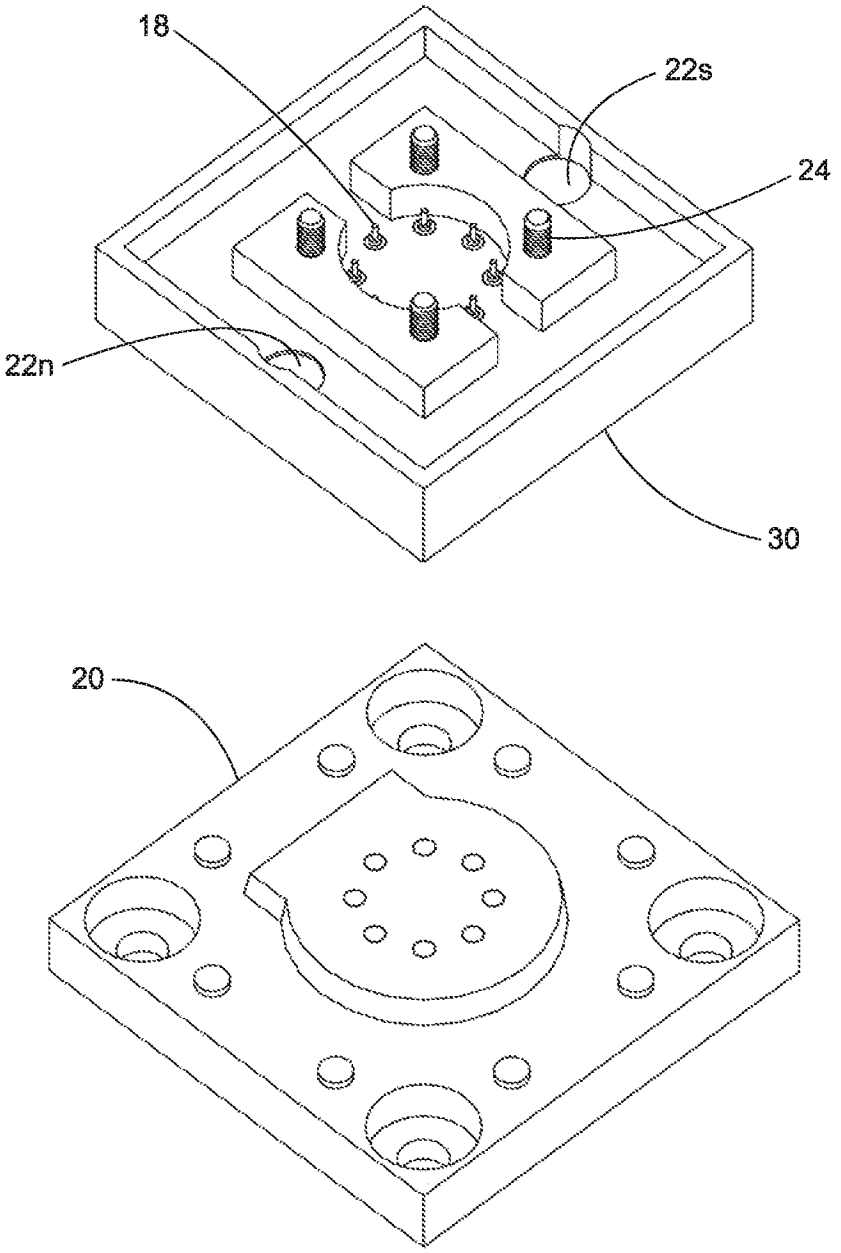


FIG. 6



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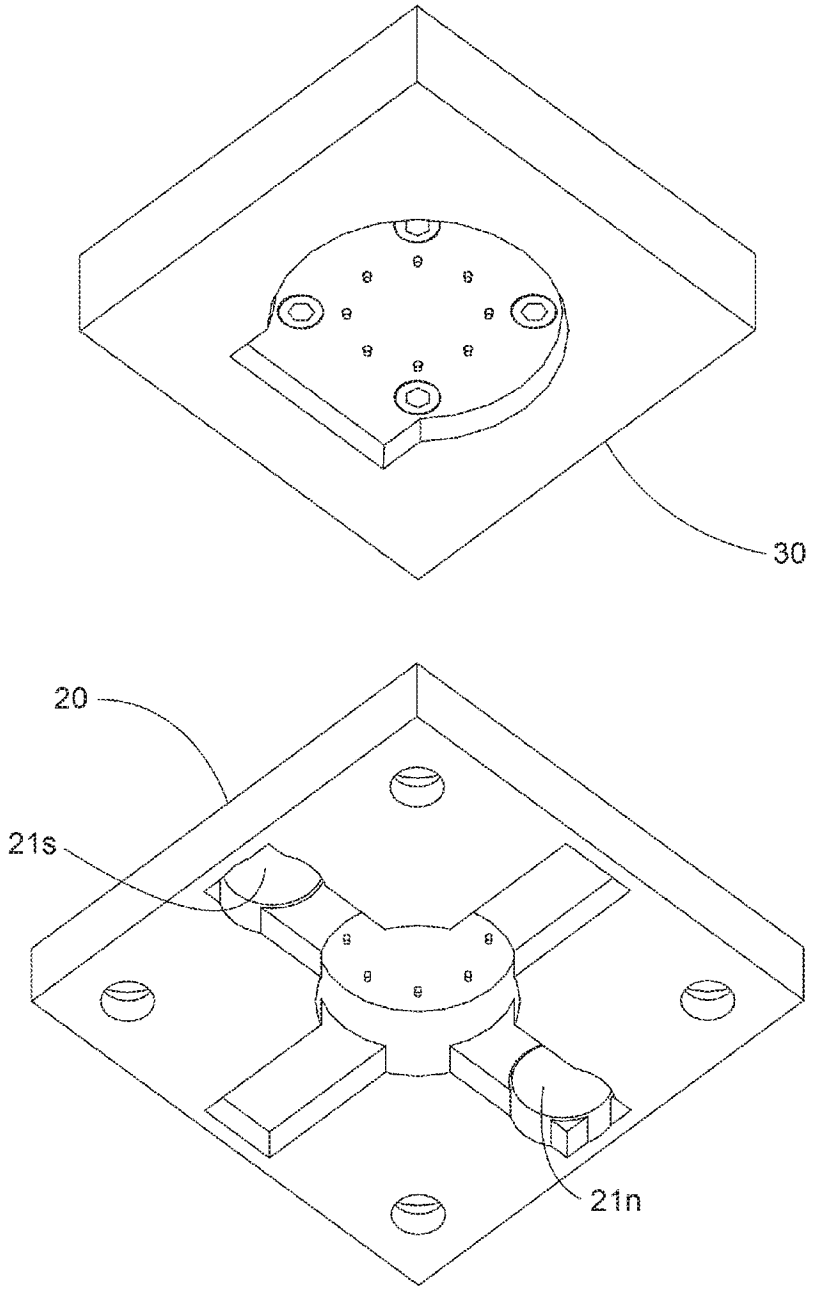

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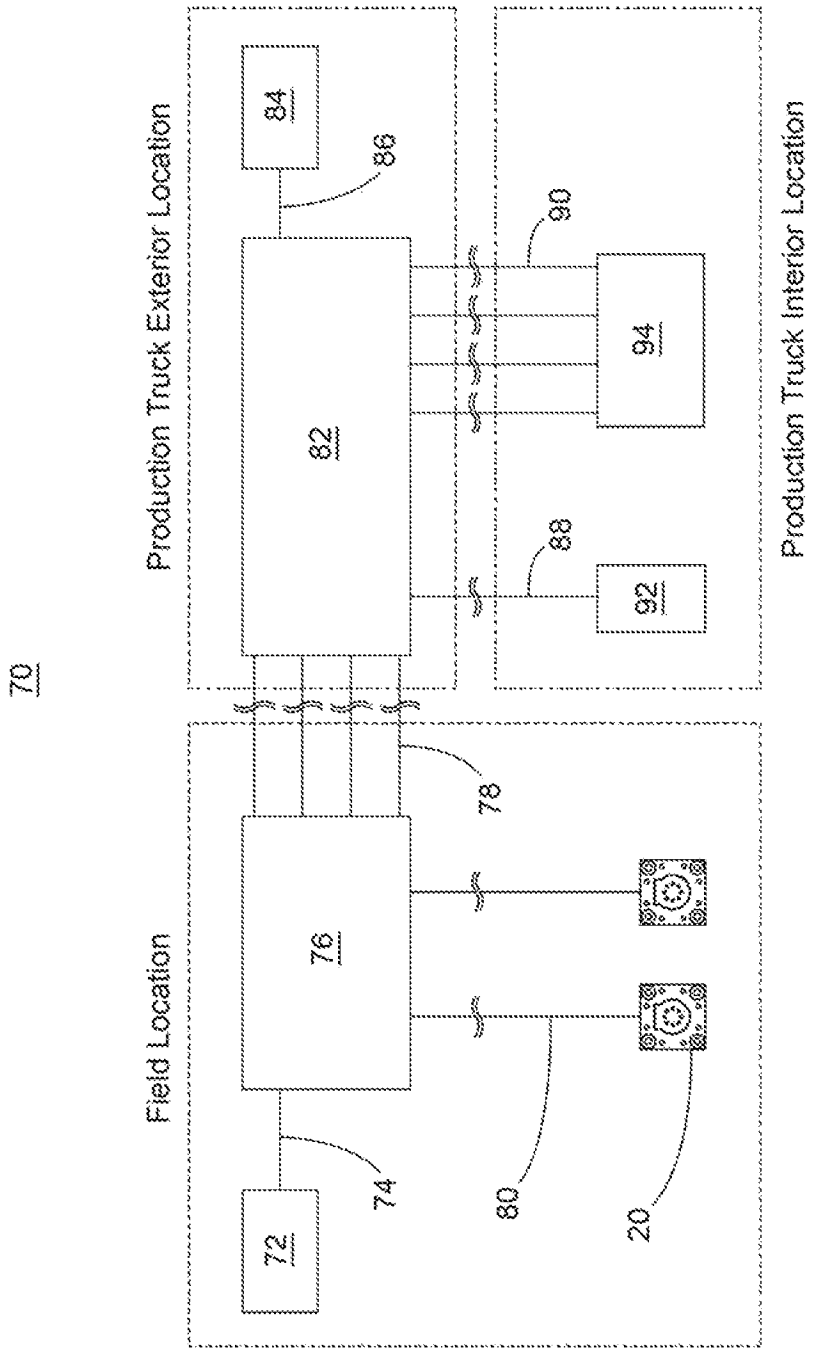
70
Production Truck Exterior Location
Production Truck Interior Location
Field Location
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FIG. 9

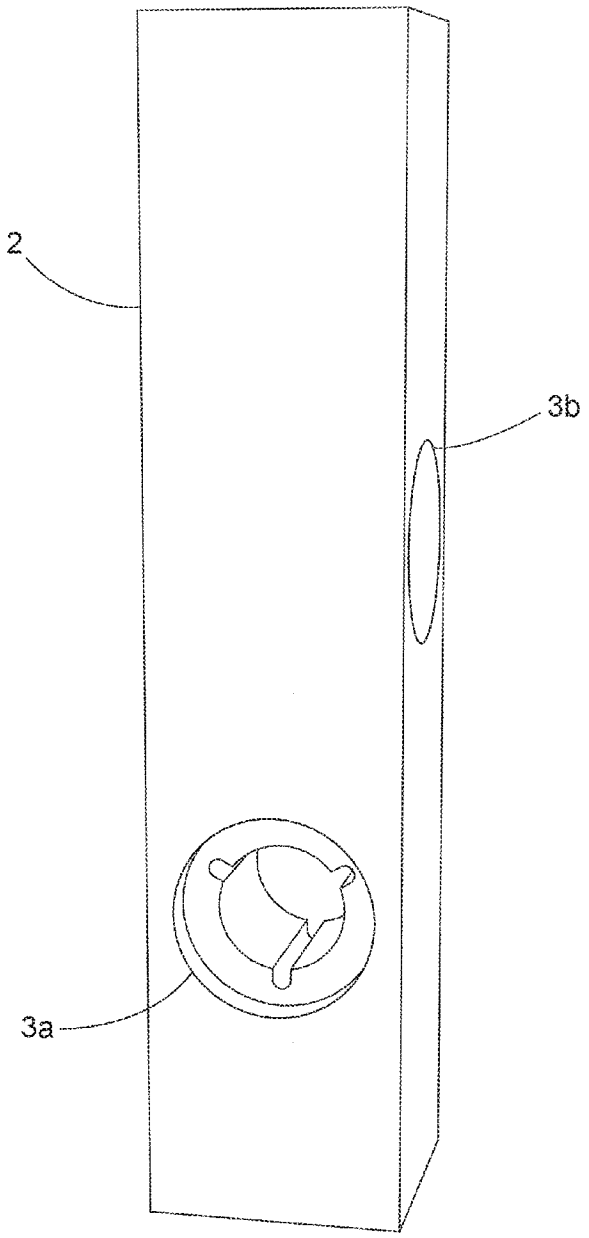
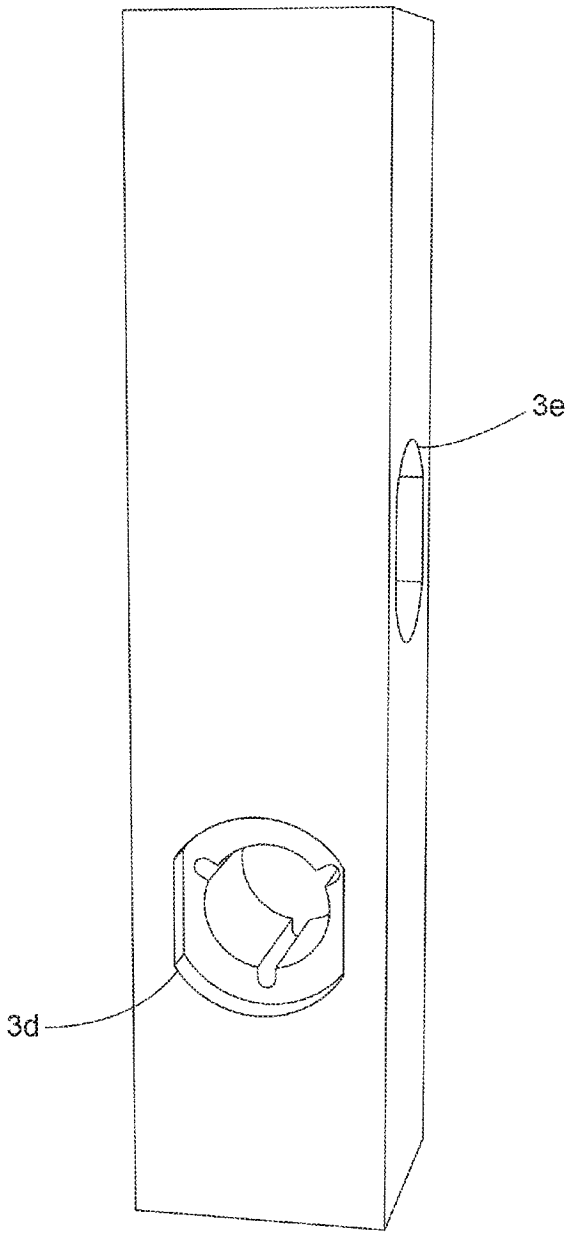


FIG. 10



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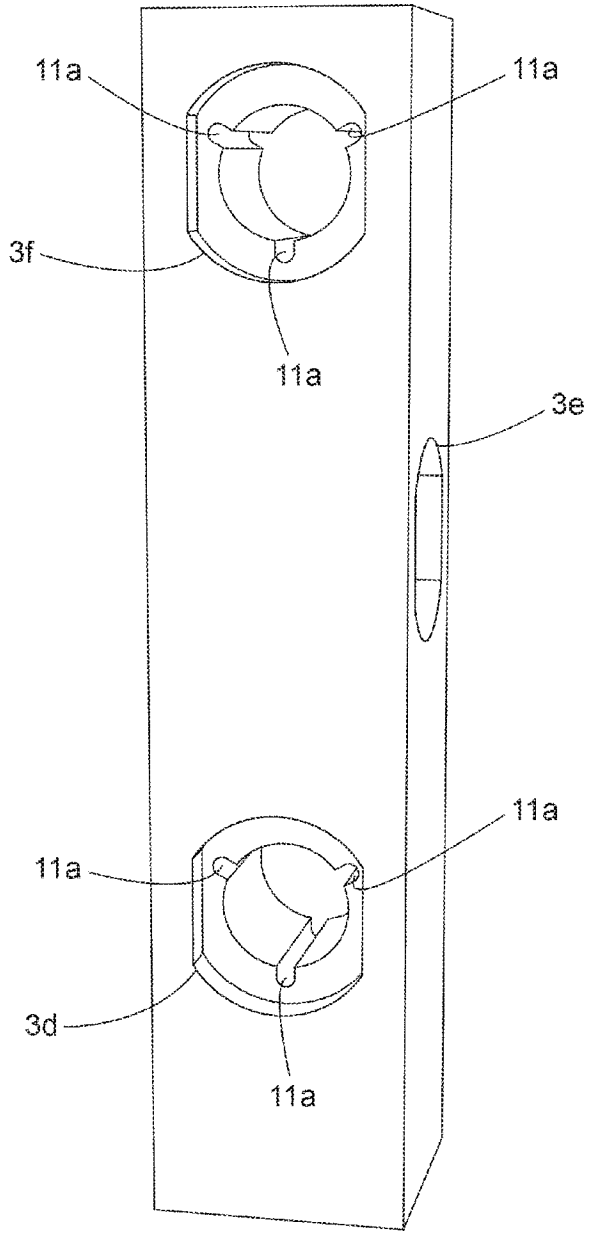

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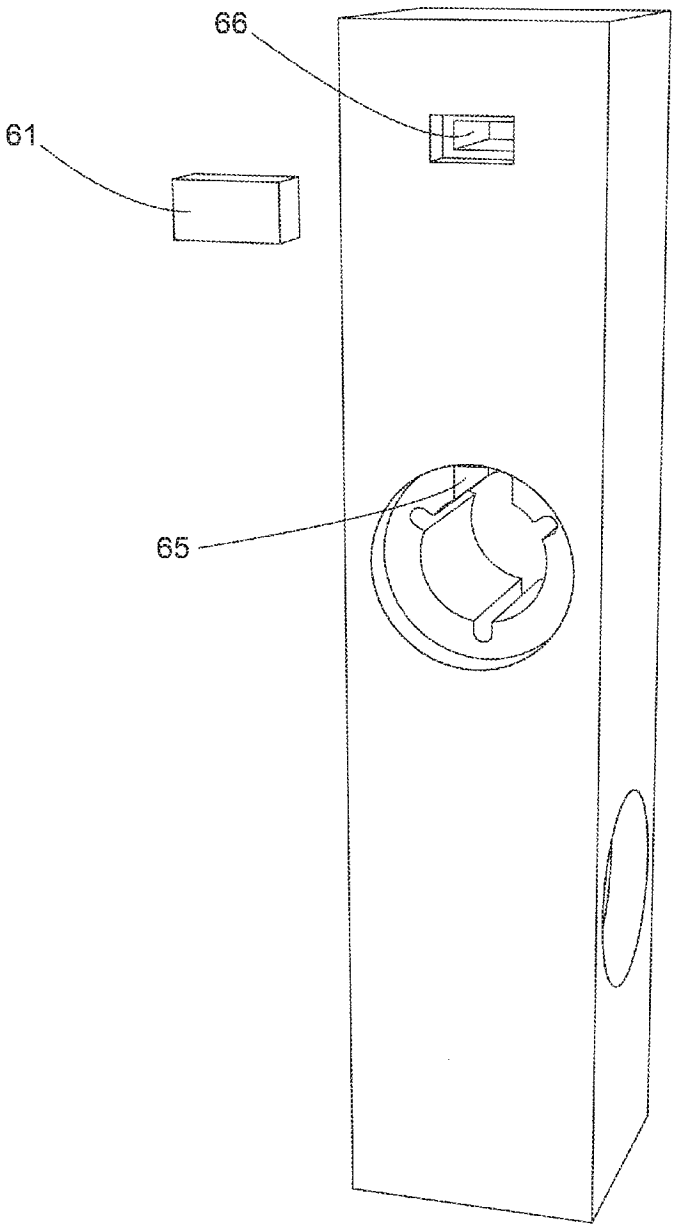

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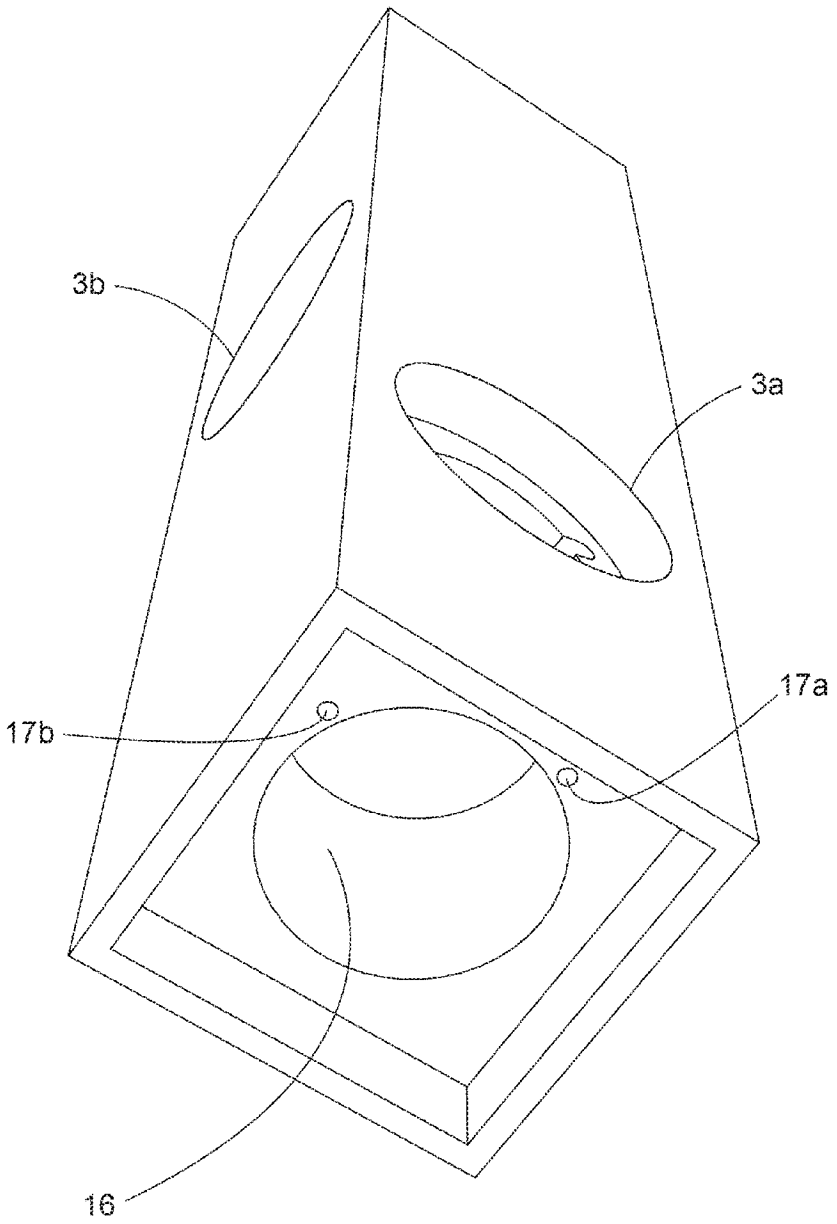

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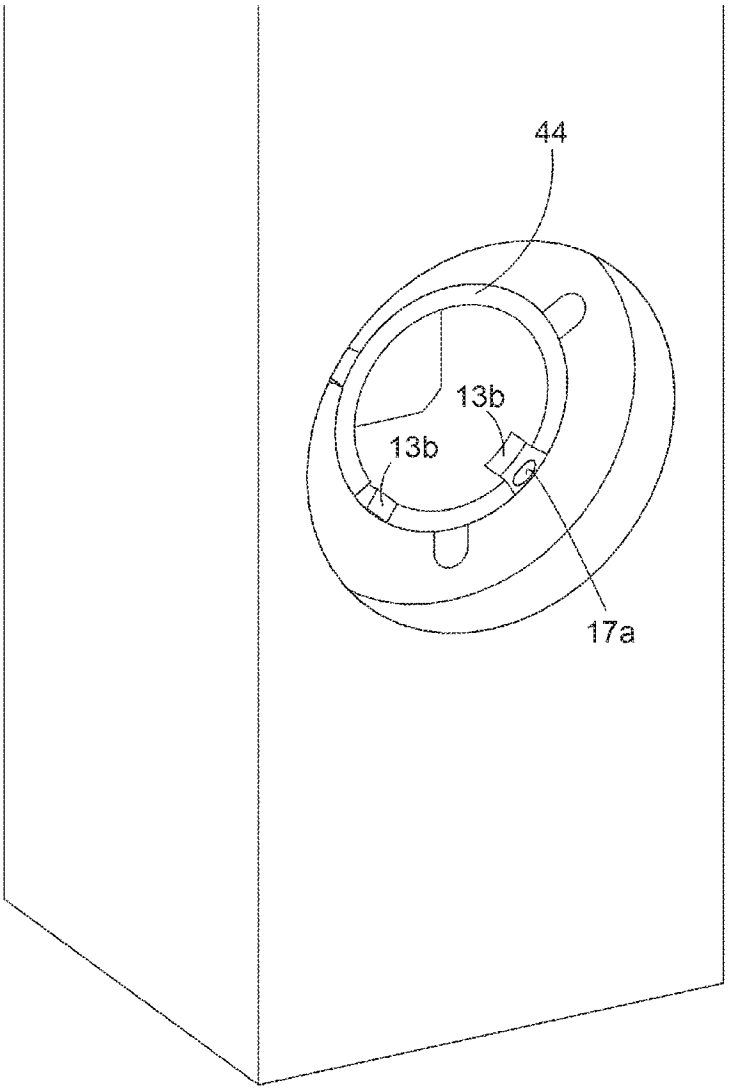

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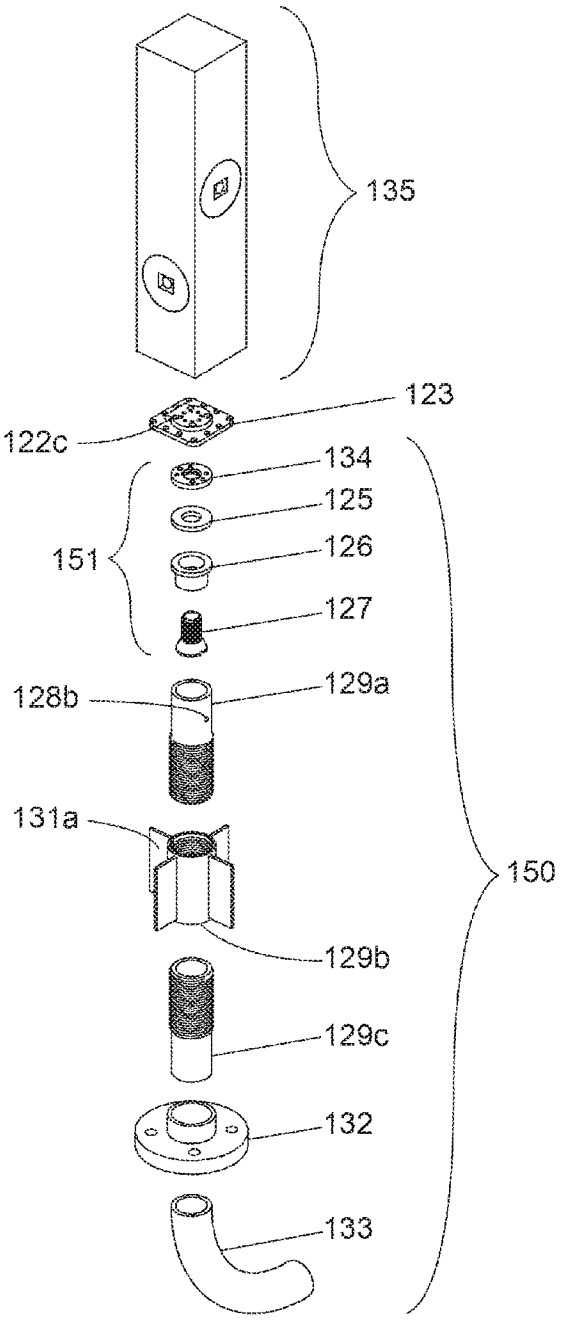
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FIG. 16

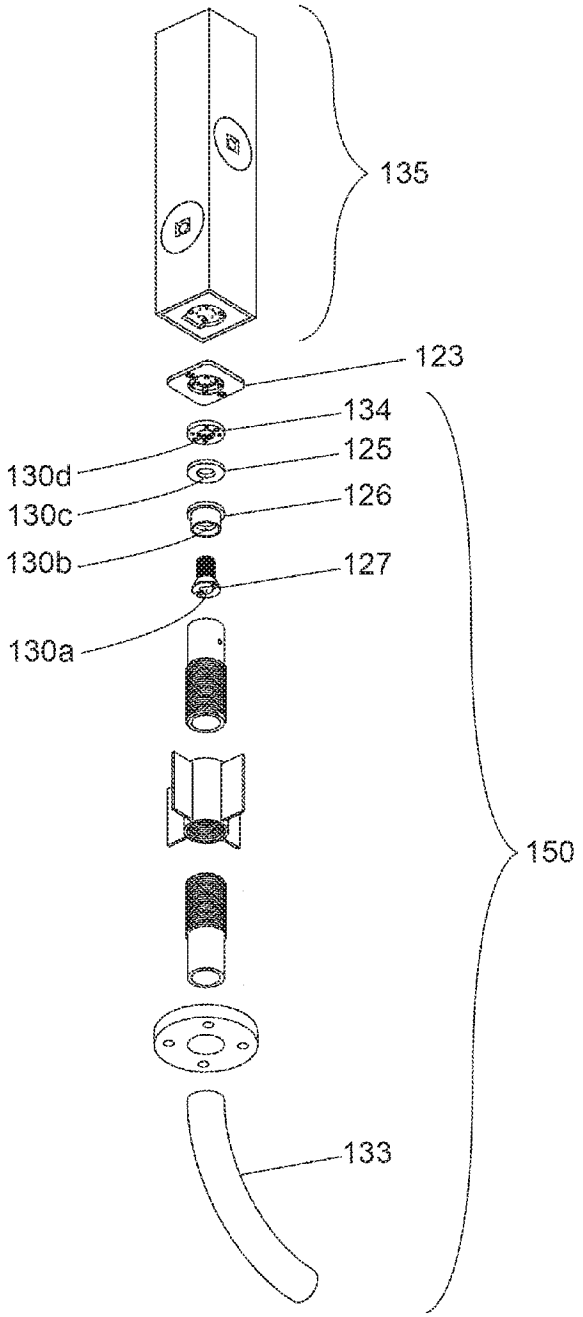


FIG. 17

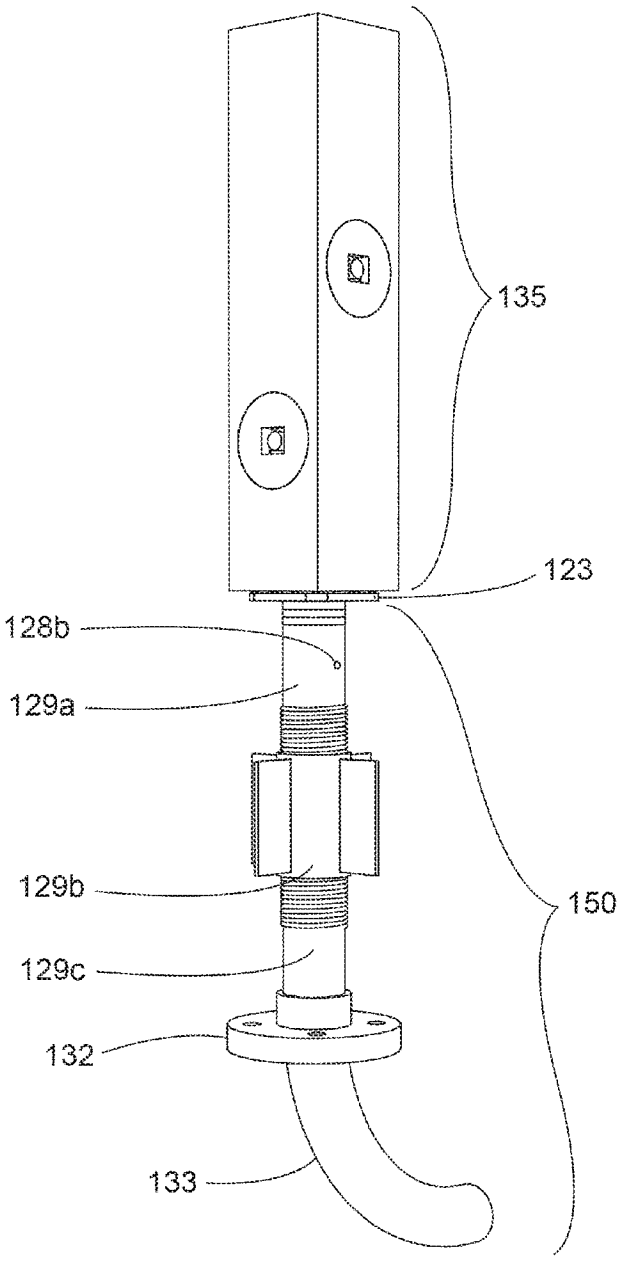
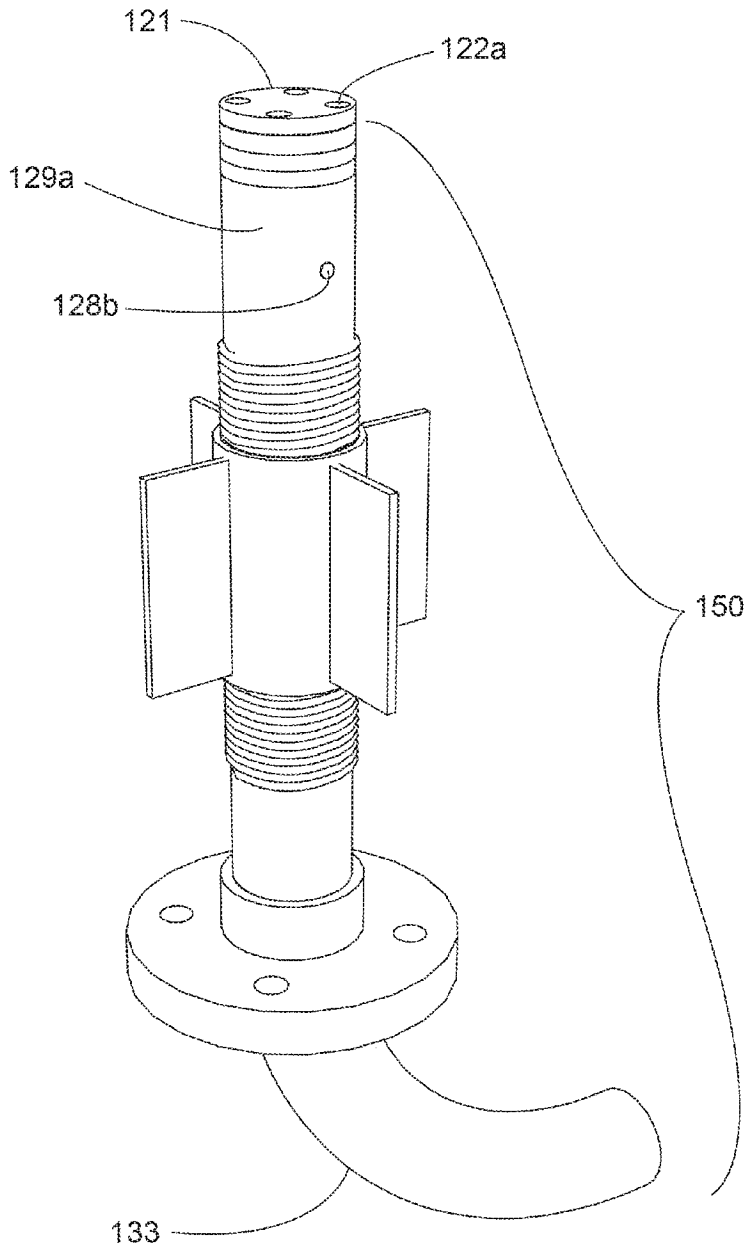


FIG. 18



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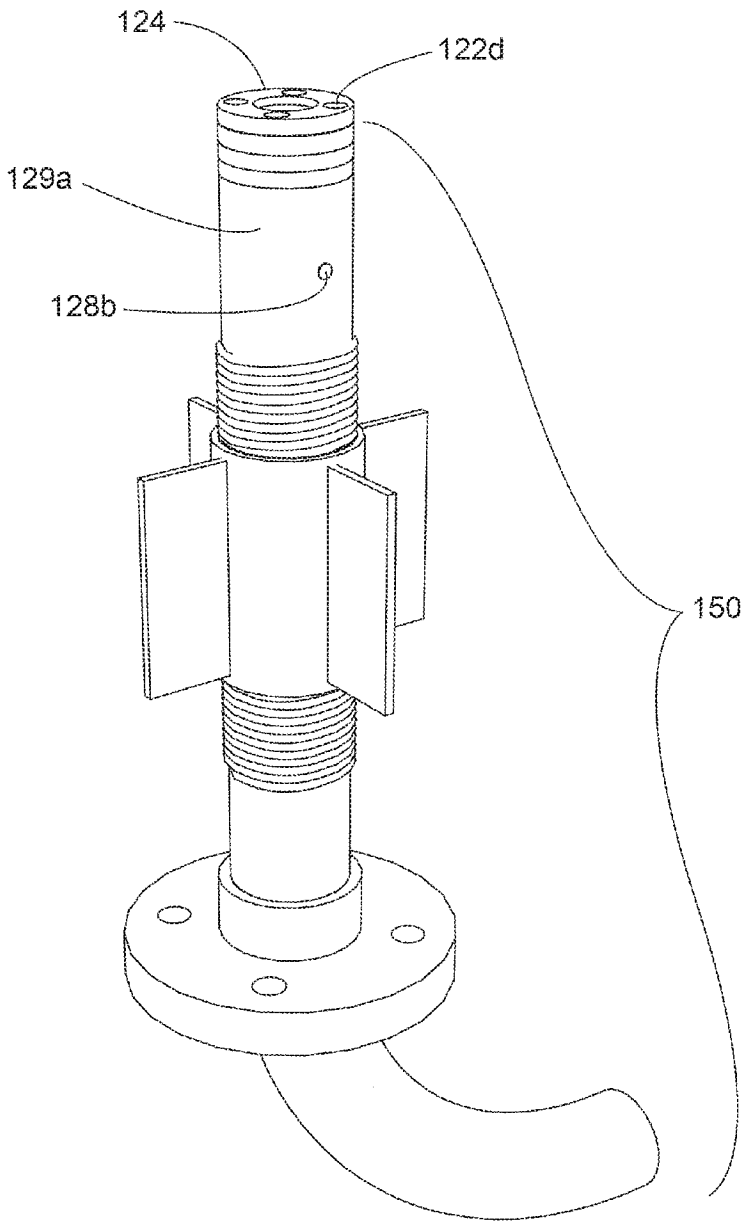
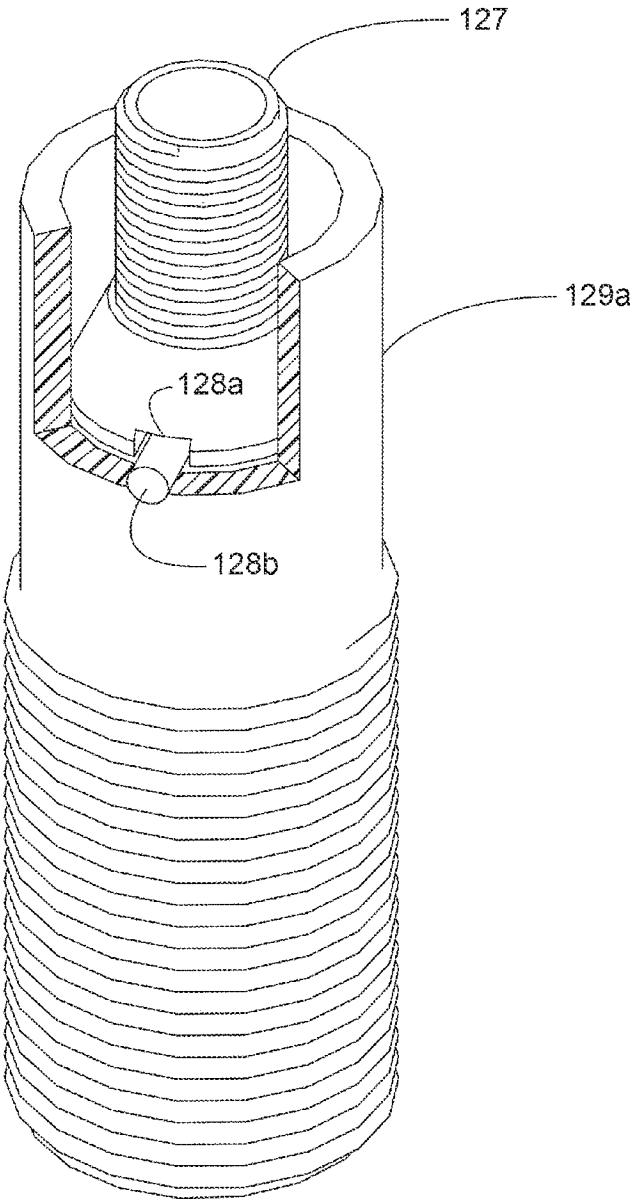


FIG. 20



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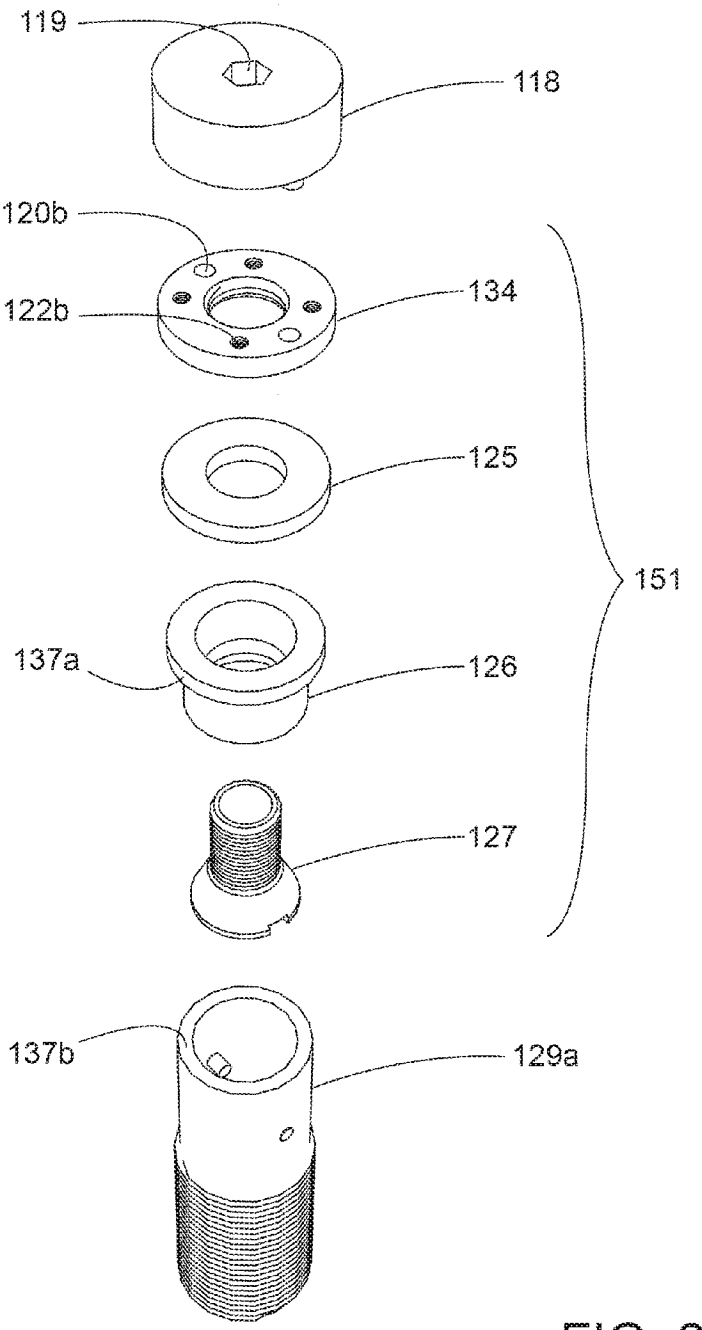


FIG. 22

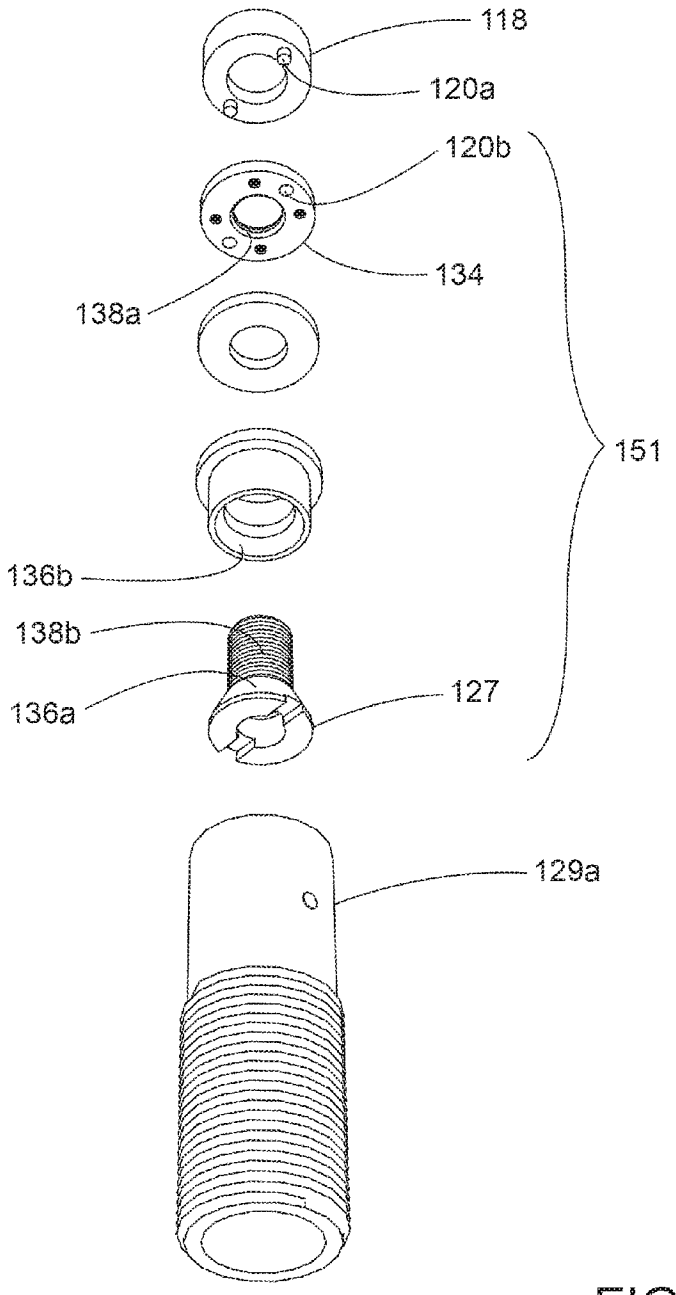
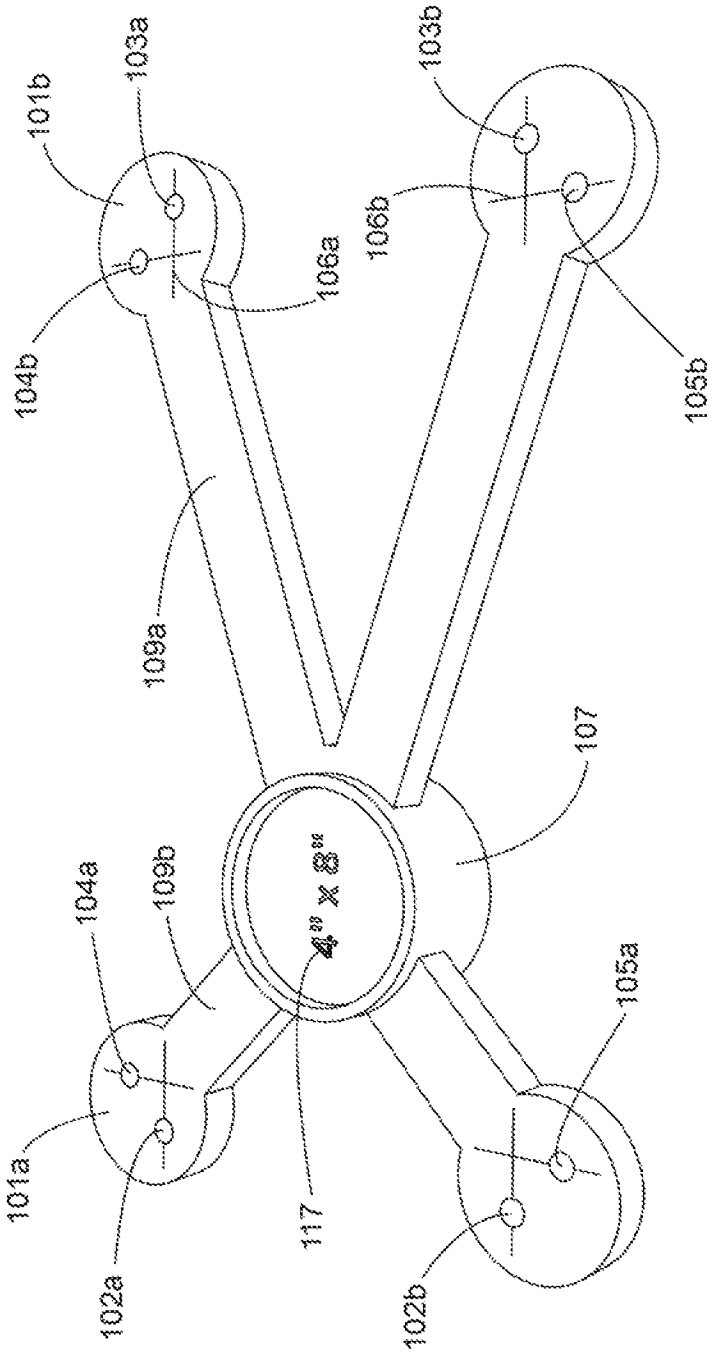


FIG. 23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103b
106a
106b
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107
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117
102a
102b

FIG. 24

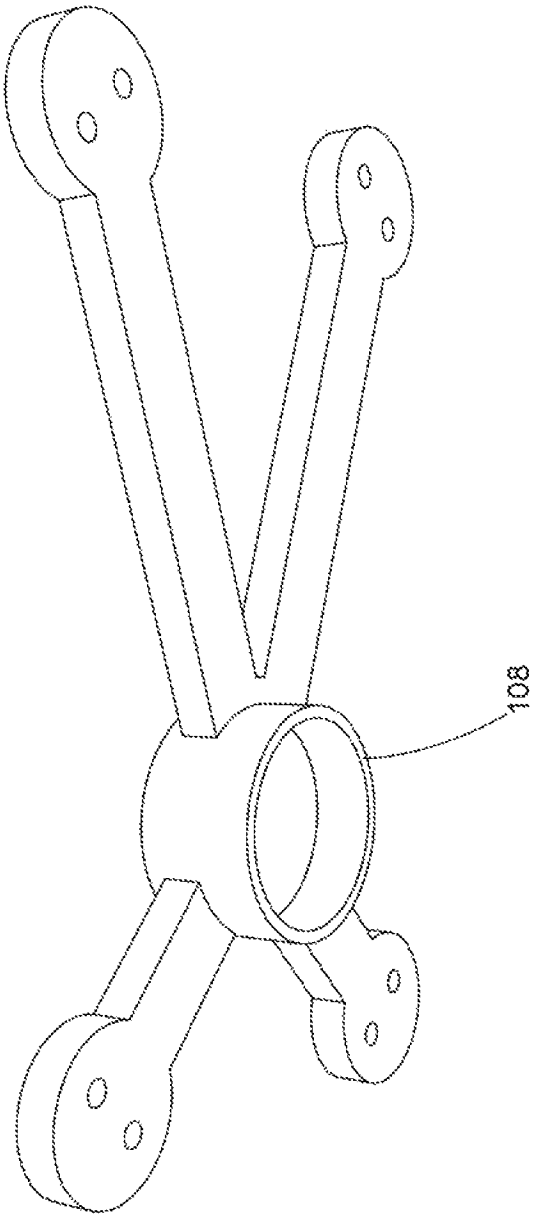


FIG. 25

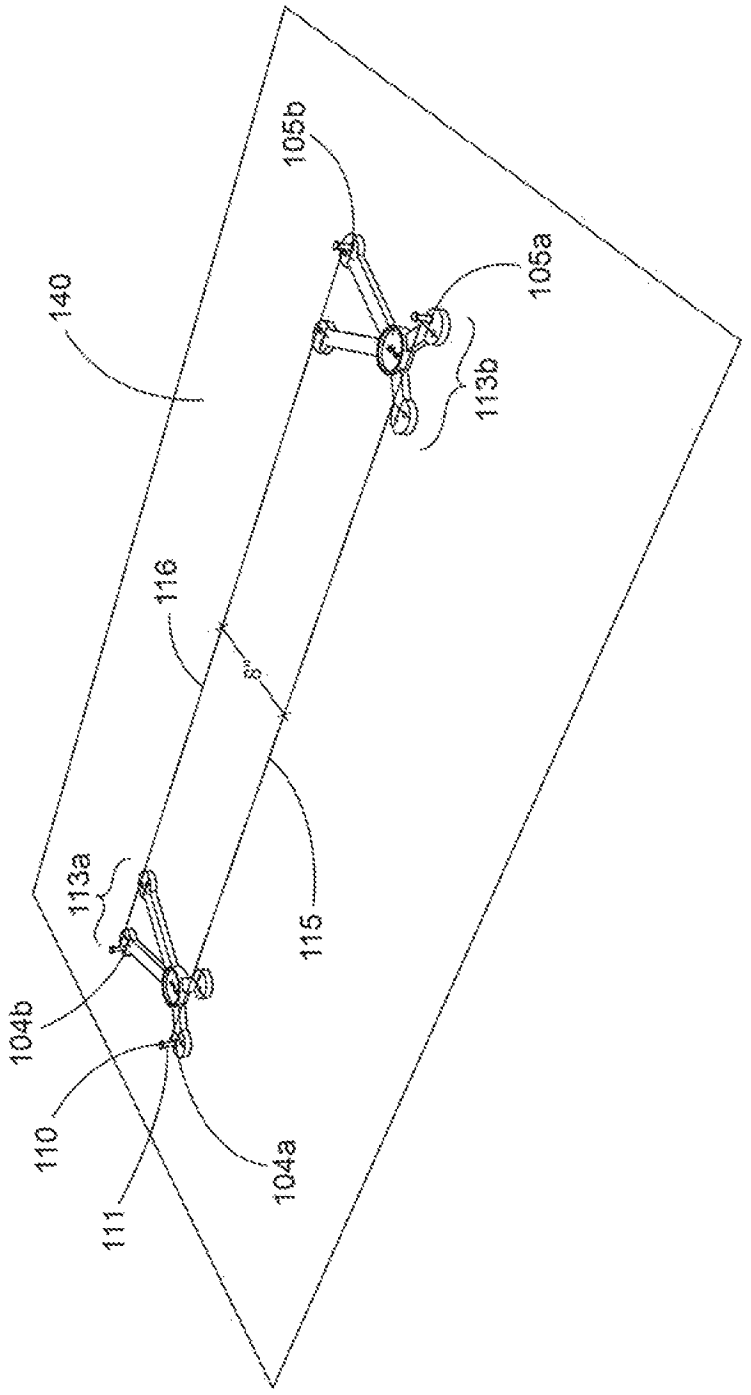


FIG. 26

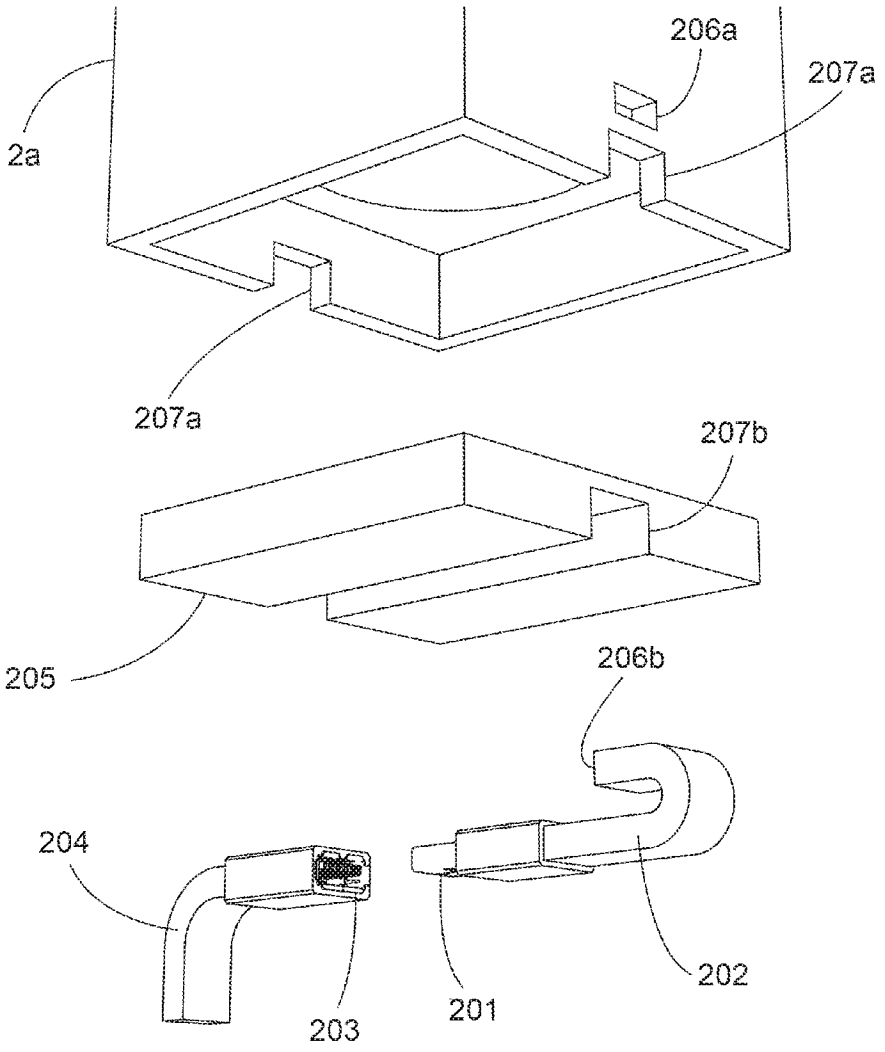


FIG. 27

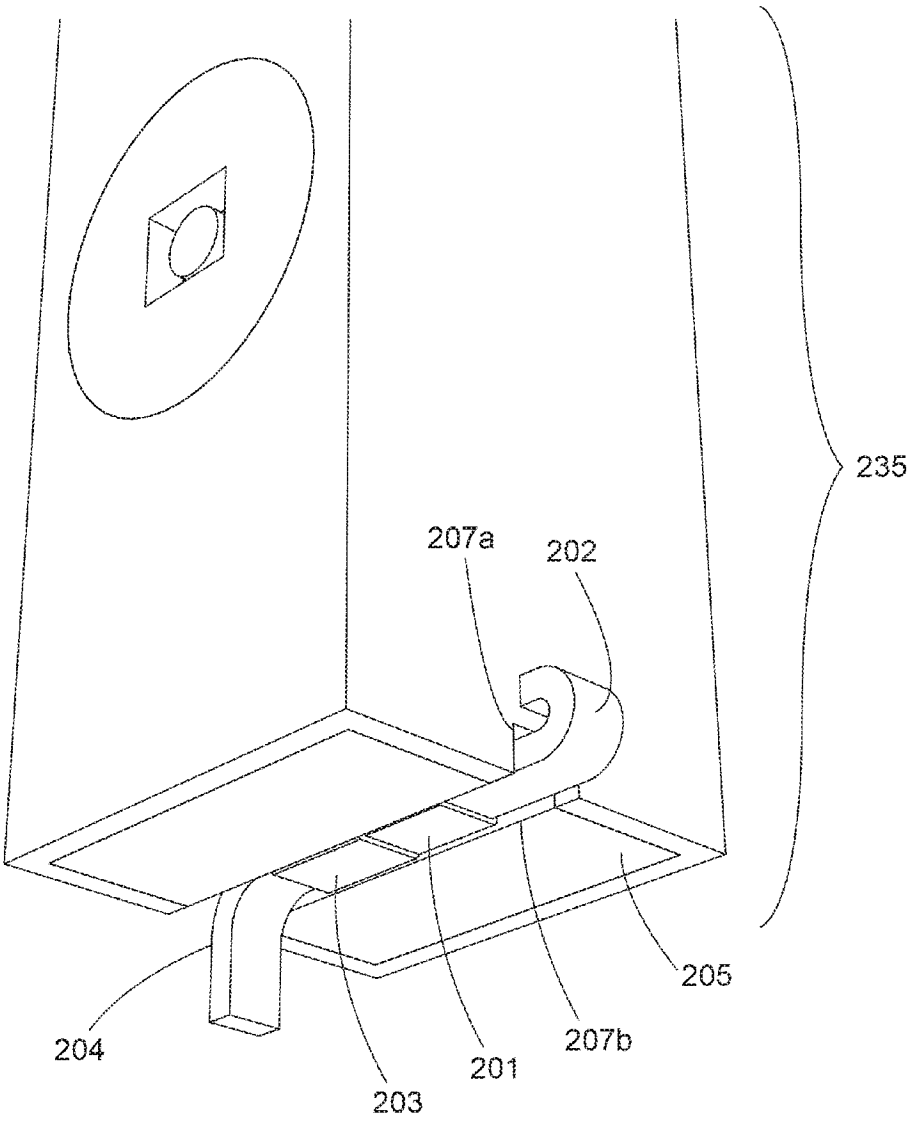


FIG. 28

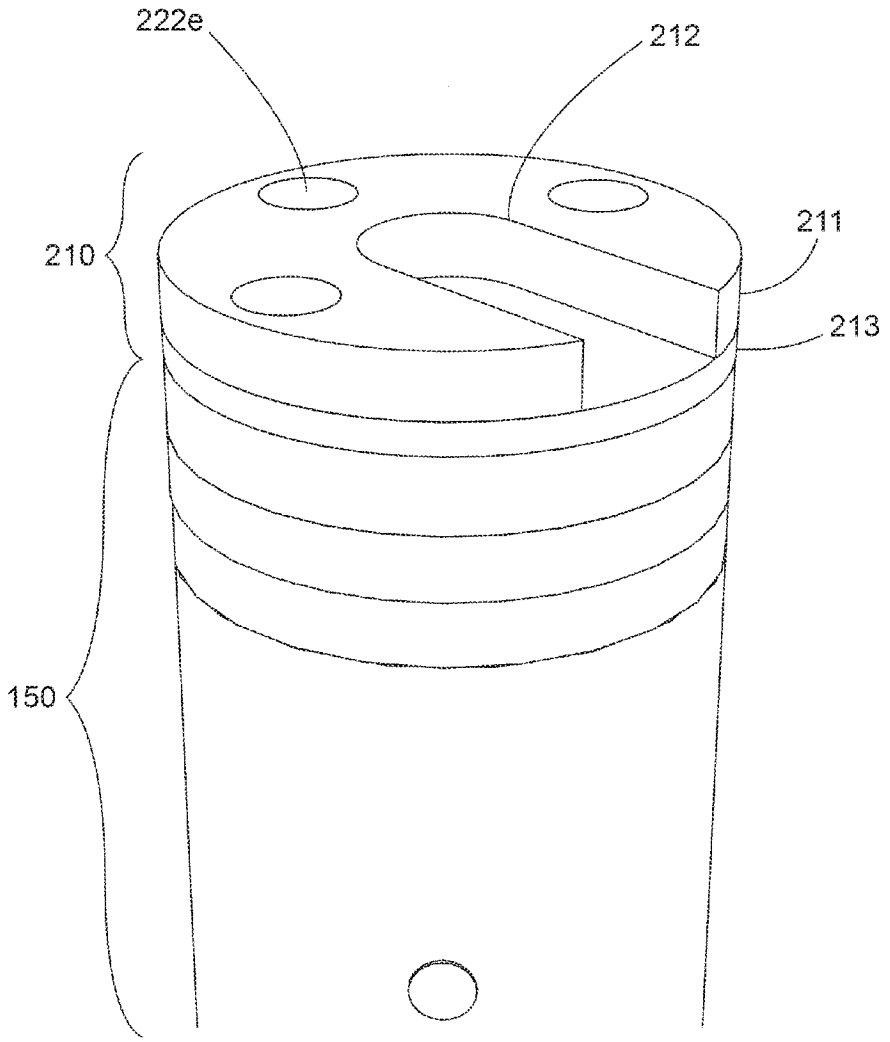


FIG. 29

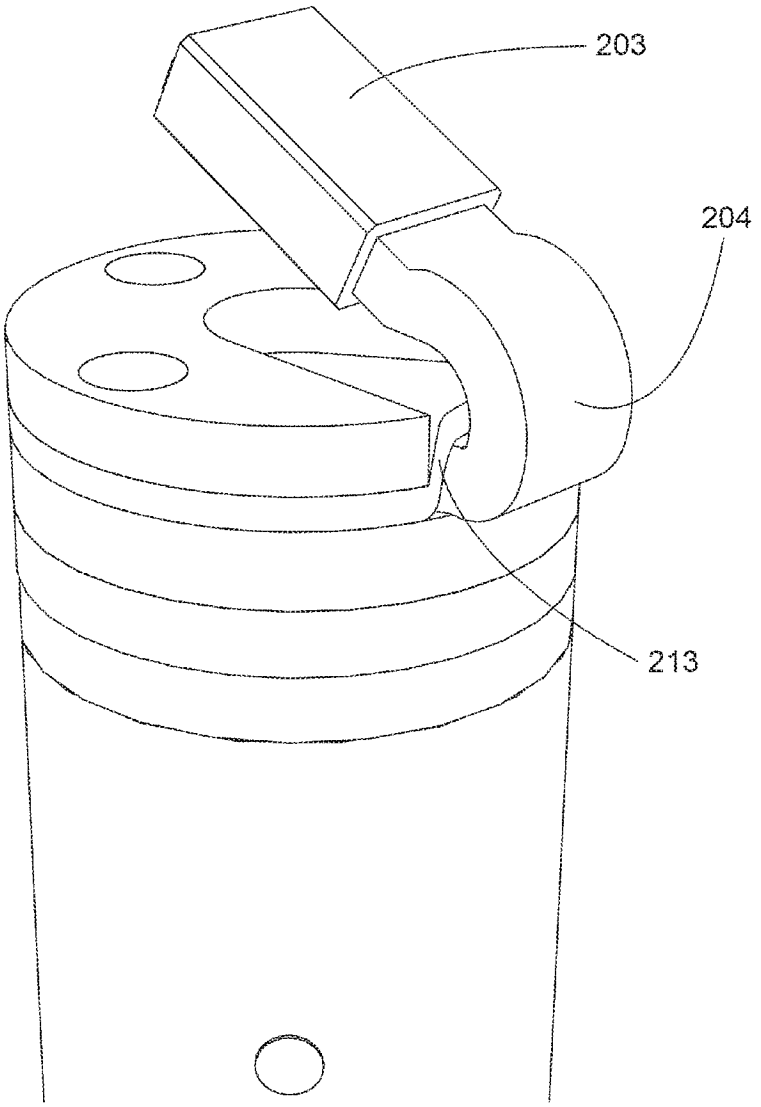
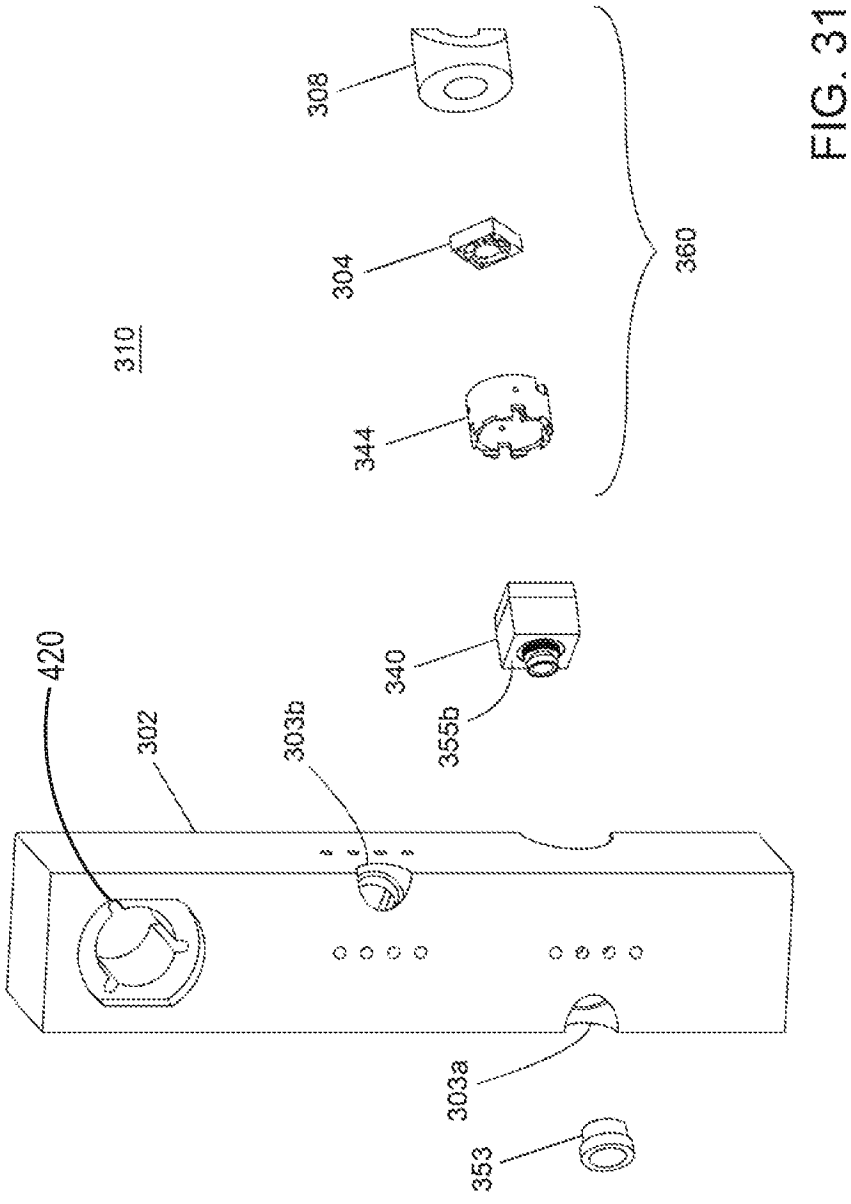


FIG. 30



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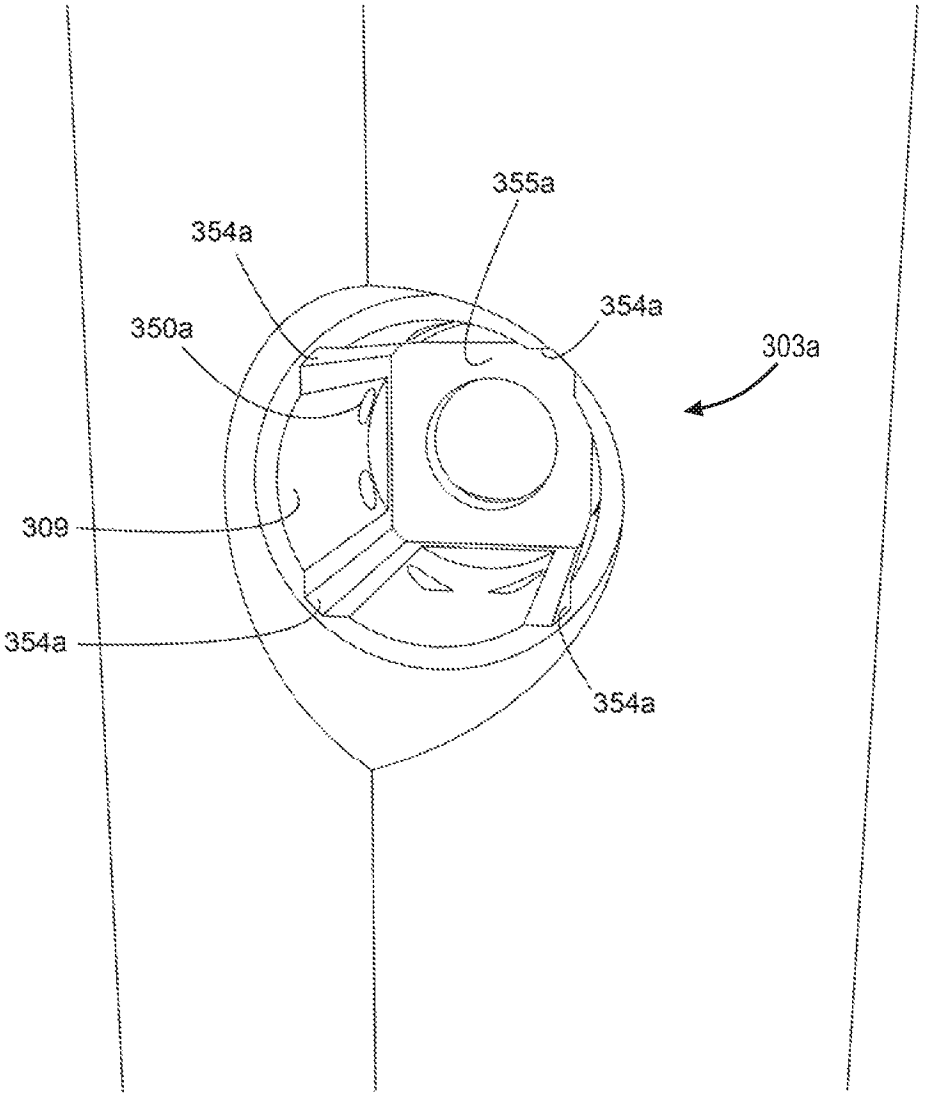


FIG. 31a

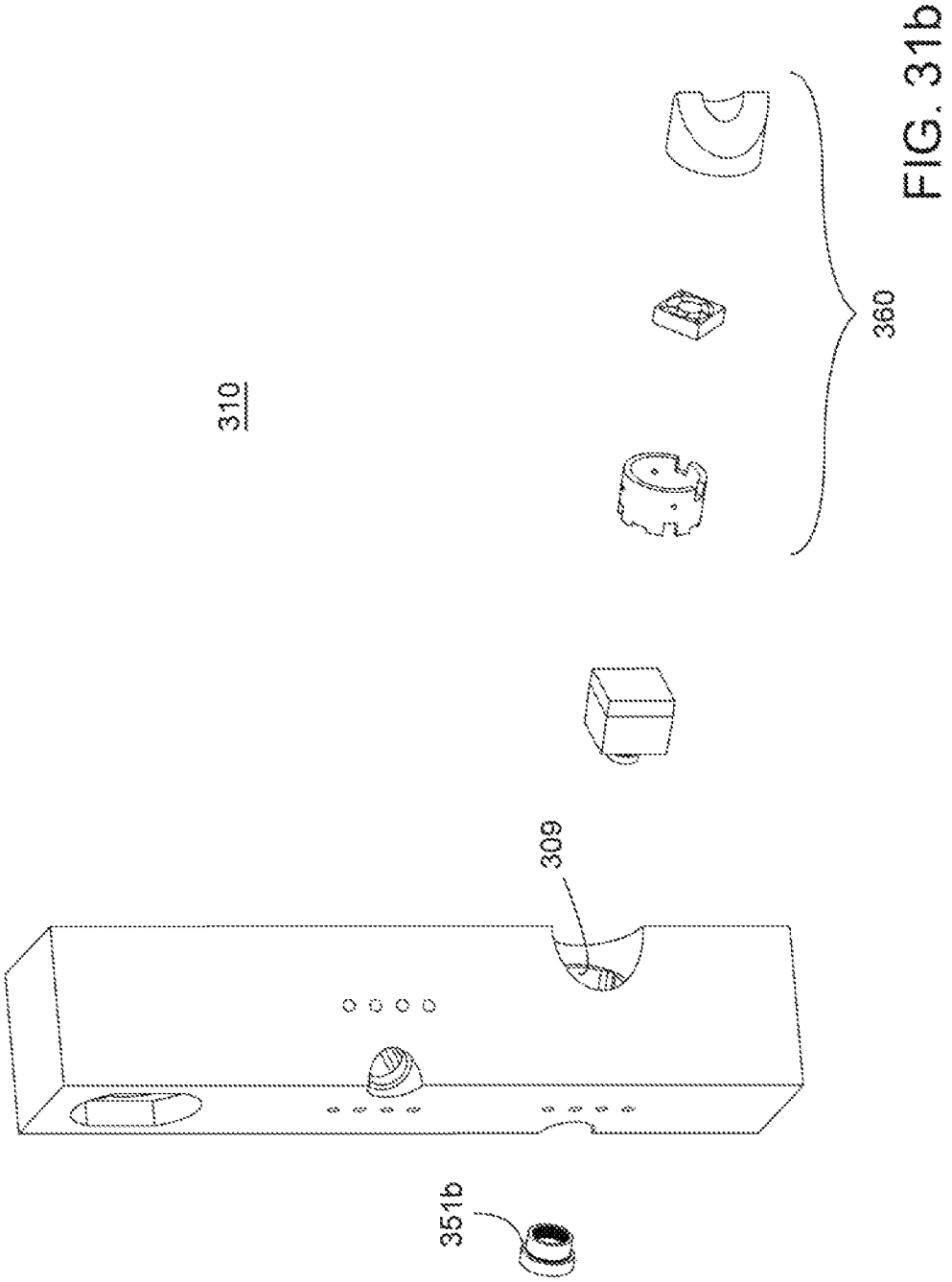


FIG. 31b

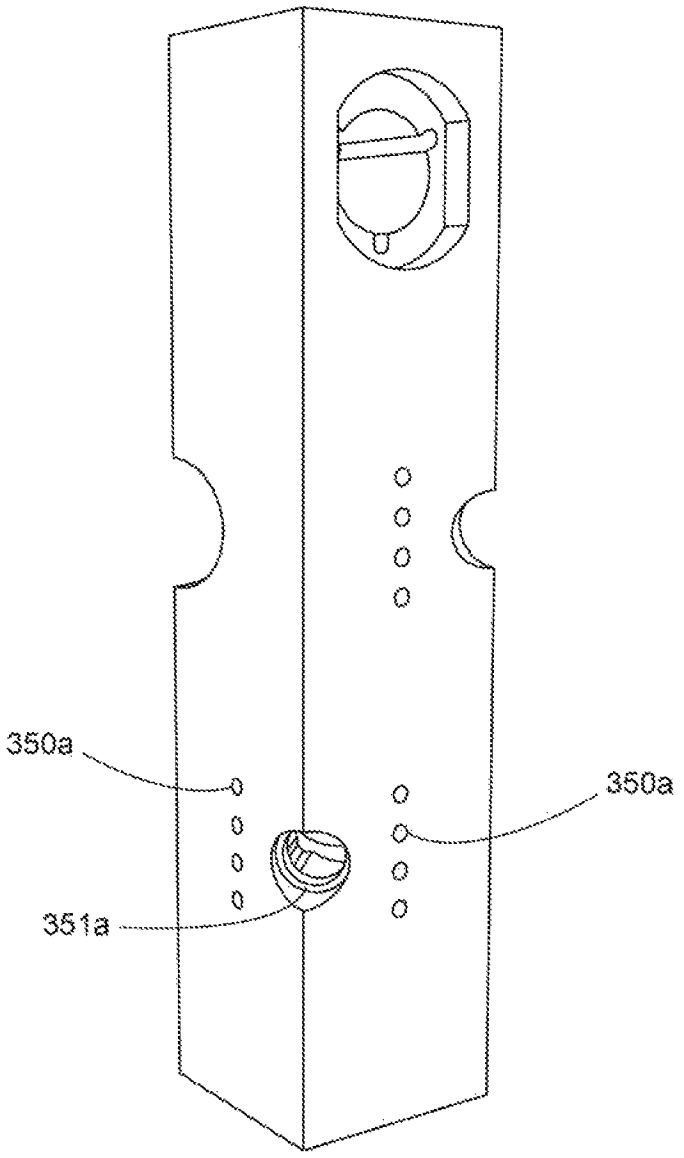


FIG. 32

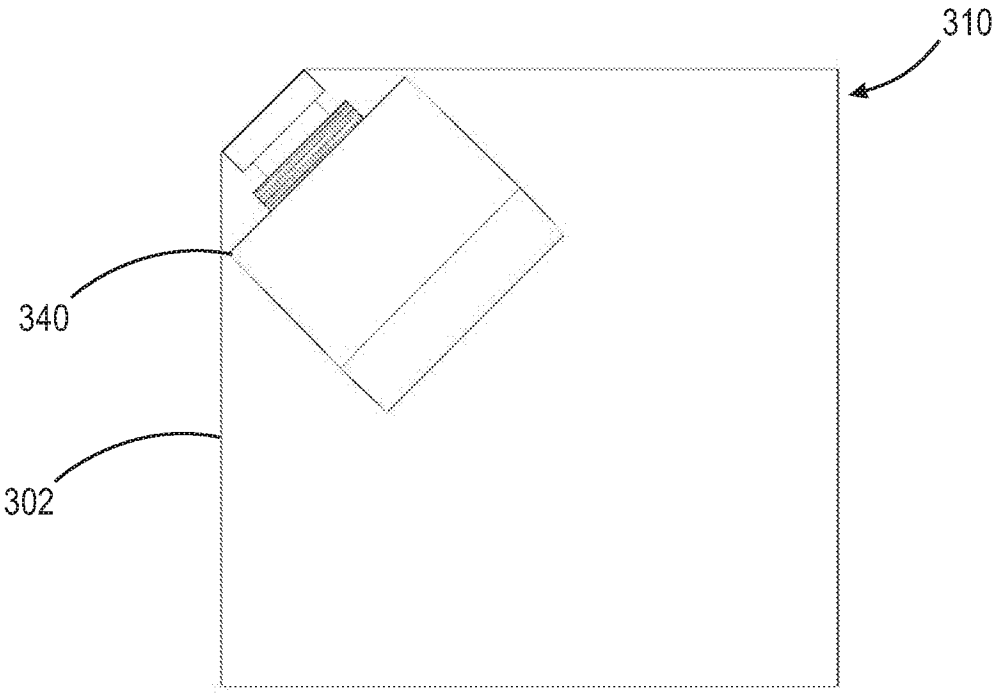


Fig. 33

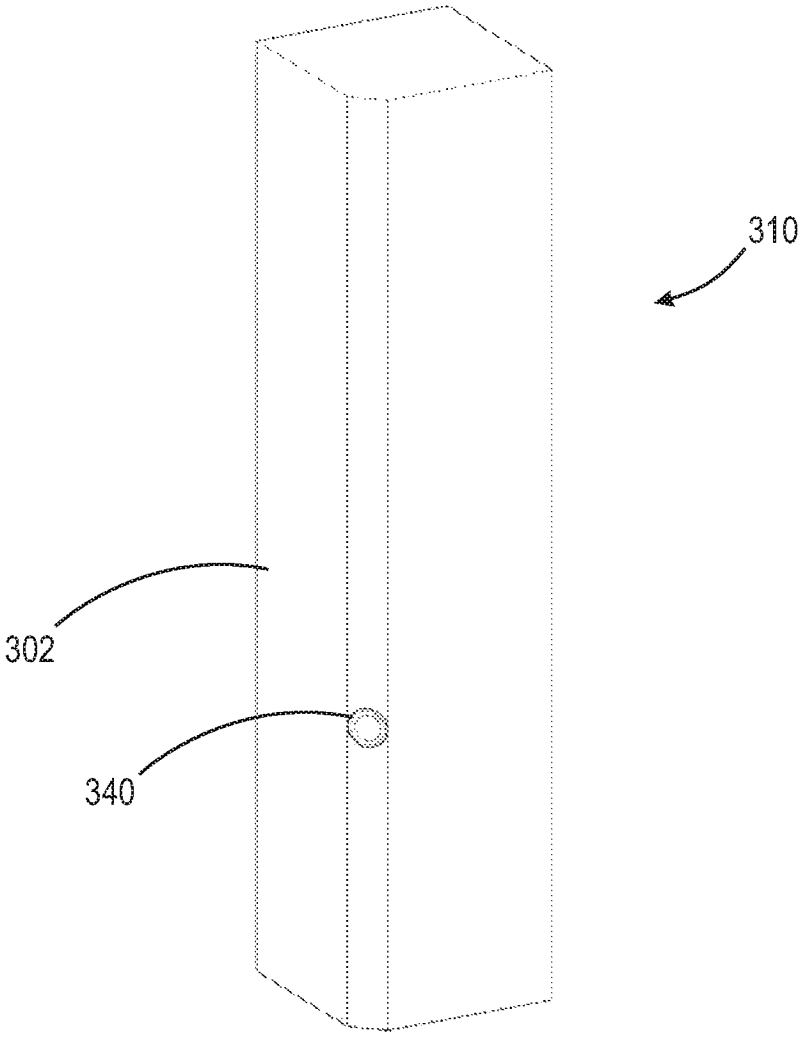


Fig. 34

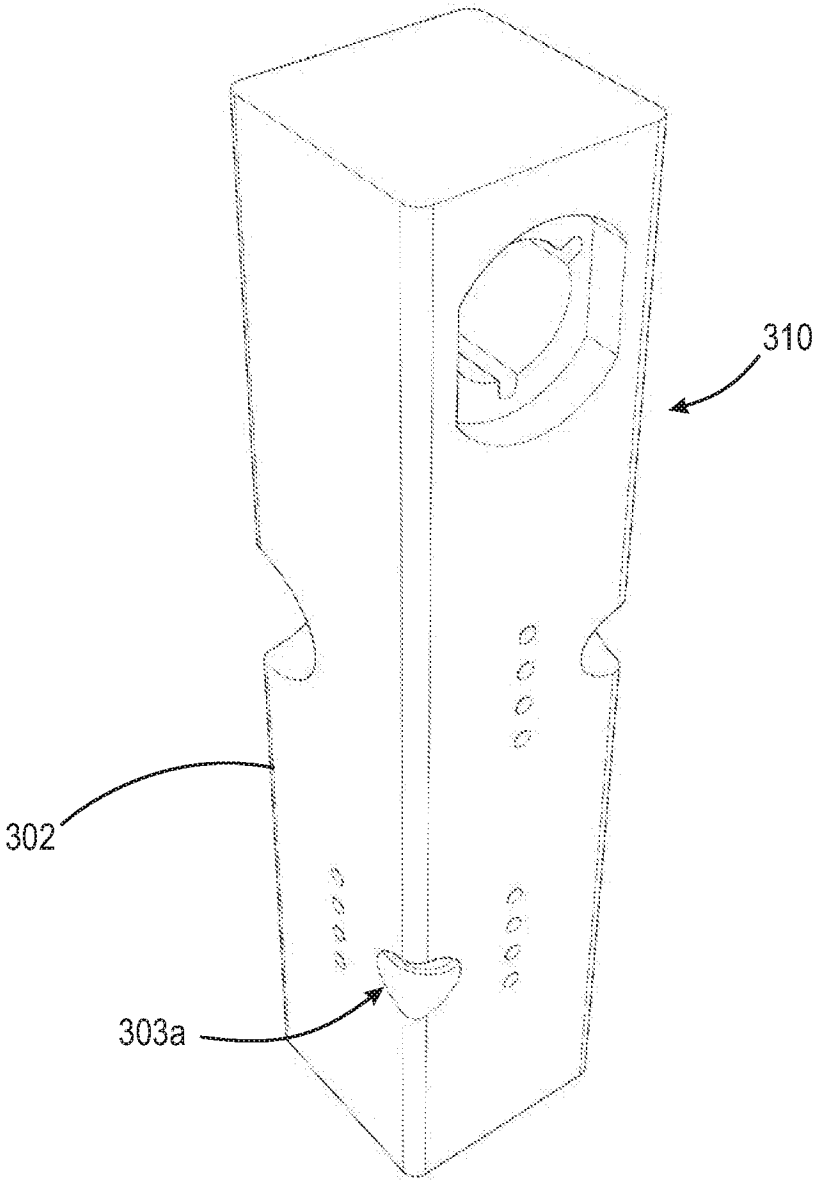
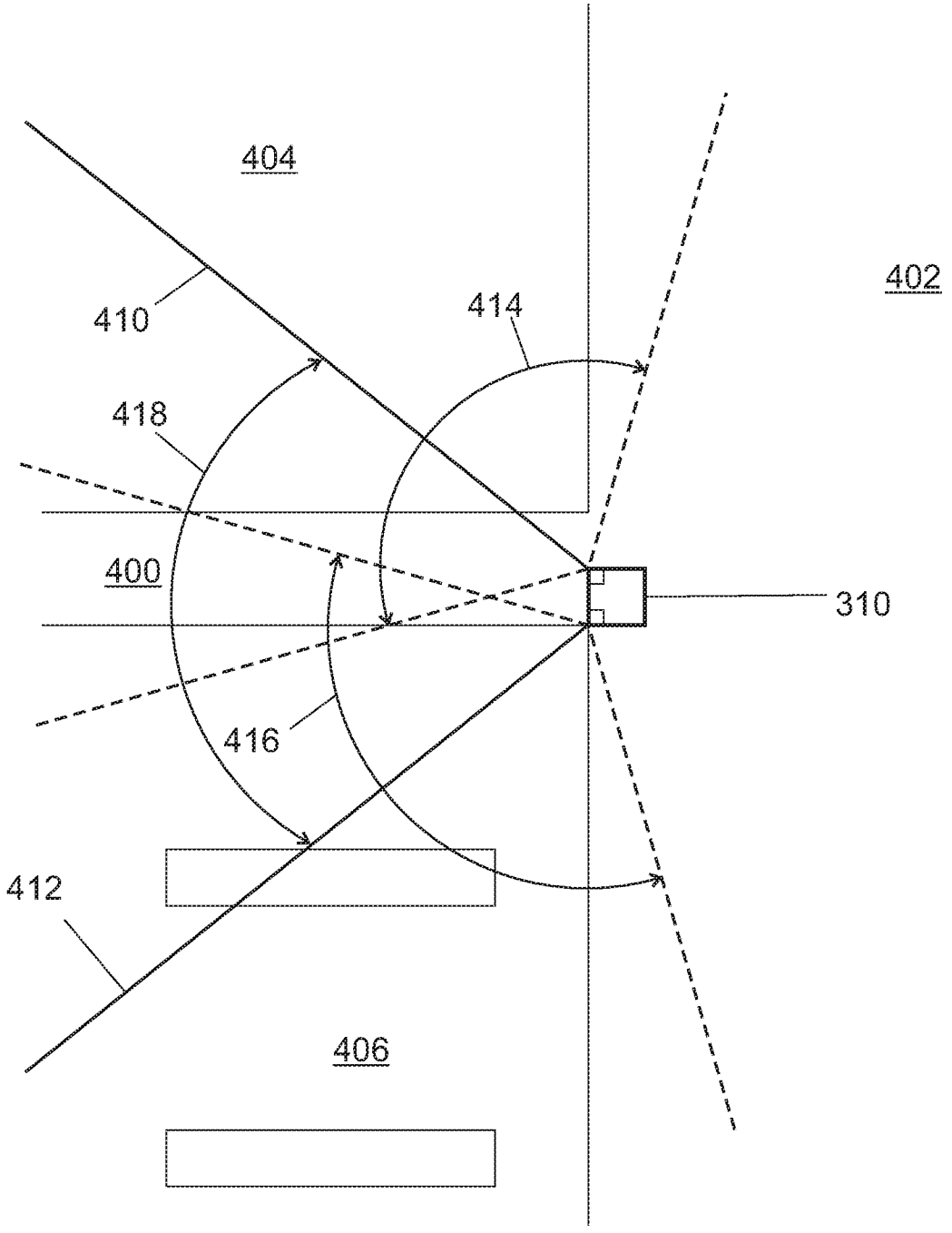


Fig. 35

FIG. 36



CORNER-ORIENTED HIGH-DEFINITION PYLON-MOUNTED CAMERAS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is filed under 35 U.S.C. §§ 111(a) and 120 as a continuation patent application of U.S. patent application Ser. No. 15/784,974, filed on Oct. 16, 2017, which application is a continuation-in-part application of U.S. Pat. No. 9,817,299, issued on Nov. 14, 2017, which patent claims priority to U.S. Provisional Patent Application No. 62/195,894 filed on Jul. 23, 2015 and U.S. Provisional Patent Application No. 62/306,358 filed on Mar. 10, 2016, which applications and patent are herein incorporated by reference in their entireties. This application also claims priority to U.S. Provisional Patent Application No. 62/449,455 filed on Jan. 23, 2017, which application is incorporated herein by reference in its entirety.

FIELD

The present disclosure relates generally to cameras, and, more particularly, to cameras mounted within a pylon used on an American football field.

BACKGROUND

Football is a game of inches. A mere inch can be the difference between a game-winning touchdown and defeat. The NFL Rulebook states a touchdown is scored "if any part of the ball is on, above, or behind the opponent's goal line while legally in possession of an inbounds player, provided it is not a touchback." Therefore, it is of the utmost importance for game officials and the audience watching on television to have the best view possible of the goal line and sideline area proximate the goal line. Reputations, glory, and money are at stake whenever an official makes a call on the field. Over the years, the National Football League, National Collegiate Athletic Association, and other professional and amateur football leagues have attempted to eliminate as many officiating errors as possible through the use of video instant replay.

The National Football League first experimented with instant replay in 1976 when Art McNally, then the director of officiating, wanted to find out how long a video review would delay a game. However, the League viewed instant replay at that point to be too costly and inefficient, and shelved instant replay until the mid-1980s.

In 1985, the National Football League began experimenting again with instant replay, adopting a rule that allowed each team to challenge an official's ruling on two plays per game. When a play is challenged, an official reviews all available video footage of the play in question to decide whether the call on the field should stand. This effective rule change helped improve officiating throughout the National Football League. Over the years, the rules regarding instant replay have changed, leading to an increased emphasis on the strategic element of challenging on-field rulings by officials. Some of these rule changes in the National Football League include mandatory reviews of each scoring play, each turnover, and every play after the two-minute warning of each half.

Today, instant replay has become a necessity for challenged plays, and television audiences have become accustomed to being able to relive and critique every play immediately after an official blows his whistle. Officials and

viewers desire the most accurate, clear, and definitive view of each play, particularly when a touchdown is scored. It is desirable to have as accurate a view of the goal line and sidelines as possible to determine if the ball has crossed the plane of the goal line, if a player with possession of the ball should be considered down, if a player carried the ball out of bounds before reaching the goal line, or if a player successfully caught a ball with both feet down in the end zone, to name a few situations.

U.S. Patent Application Publication No. 2014/0063260 (Bender et al.) discloses a video replay system constructed within a cuboid end zone pylon. Bender et al. teach a pylon comprising three high-definition cameras, one placed on the face of the pylon facing the goal line, and one on each face directed toward the sideline. This camera orientation is disadvantageous because each camera can only see down either the goal line, in the case of the camera facing the goal line, or each sideline, in the case of the cameras facing the sidelines, and it is desirable to be able to see where the goal line and sideline intersect to determine whether a touchdown has been scored. Bender et al. further teaches wireless transmission of video signals, which has been shown to be disadvantageous within an end zone pylon.

Thus, there is a long-felt need for an end zone pylon with two wide-lens corner-oriented cameras placed orthogonally in relation to one another, each capable of simultaneously visualizing the goal line and sideline, and a third camera mounted on the face of the pylon that is directly facing the goal line.

There is also a long-felt need for an end zone pylon that is wired and meets the NFL's and NCAA's safety standards.

SUMMARY

According to aspects illustrated herein, there is provided a pylon-mounted camera assembly comprising a body including a first face and a second face adjacent to the first face, such that the first face and the second face form a first corner, a first aperture arranged on a portion of and centered about the first corner, and a first camera positioned within the first aperture, the first camera facing outwardly from the body.

According to aspects illustrated herein, there is provided a pylon-mounted camera assembly comprising a body including a first face adjacent to a second face, and a third face adjacent to the first face and the second face, such that the first face and the second face form a first corner and the second and third face form a second corner, a first aperture arranged at and centered about the first corner, a second aperture arranged at and centered about the second corner, a first camera positioned within the first aperture, the first camera facing outwardly from the body, and a second camera positioned within the second aperture, the second camera facing outwardly from the body.

According to aspects illustrated herein, there is provided a pylon/camera assembly including a body having a first face and a second face adjacent to the first face, such that the first face and the second face form a first corner, a first aperture arranged at and centered about the first corner, and a first camera positioned within the first aperture, the first camera facing outwardly from the body.

According to aspects illustrated herein, there is provided a pylon/camera assembly including a body having a first face adjacent to a second face, and a third face adjacent to the first face and the second face, such that the first face and the second face form a first corner and the second and third face form a second corner, a first aperture arranged at and

centered about the first corner, a second aperture arranged at and centered about the second corner, a first camera positioned within the first aperture, the first camera facing outwardly from the body, and a second camera positioned within the second aperture, the second camera facing outwardly from the body.

A primary object is to provide a pylon-mounted camera assembly which can be used during football games to provide an improved video replay of any scoring plays.

A further object is to provide a pylon-mounted camera assembly which complies with the National Football League's and/or the National Collegiate Athletic Association's safety rules.

Still another object is to provide a pylon-mounted camera assembly that is hard-wired and able to transmit video with a reduced latency period compared to existing wireless pylon-mounted cameras.

Yet another object is to provide a pylon-mounted camera assembly that provides high-definition video.

Another object is to provide a pylon-mounted camera assembly that is able to, with one camera, visualize a football field's sideline and goal line simultaneously with a wide-angle lens.

Another object is to provide a pylon-mounted camera assembly with cameras located at the corners of the pylon facing the field of play.

Another object is to provide a pylon/camera assembly with a first camera arranged about a first optical axis and a second camera arranged about a second optical axis, where the first optical axis and second optical axis are substantially orthogonal to one another.

Another object is to provide a pylon-mounted camera assembly with cameras located at the corners of the pylon facing the field of play where both cameras have a field of view greater than 90 degrees, and may simultaneously view both the goal line and sideline.

Yet another object is to provide a pylon-mounted camera assembly to be used on a football field wherein the side of the pylon facing the goal line comprises a camera.

These and other objects, features, and advantages of the present disclosure will become readily apparent upon a review of the following detailed description of the disclosure, in view of the drawings and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments are disclosed, by way of example only, with reference to the accompanying schematic drawings in which corresponding reference symbols indicate corresponding parts, in which:

FIG. **1** is an exploded view of a pylon-mounted camera assembly;

FIG. **1***a* is a perspective view of section **1***a* shown in FIG. **1**, illustrating a cavity into which a camera is placed;

FIG. **1***b* is a reverse exploded view of the pylon-mounted camera assembly shown in FIG. **1**;

FIG. **2** is an exploded view of an alternative embodiment of a pylon-mounted camera assembly;

FIG. **3** is a perspective exploded view of a camera and fan structure;

FIG. **4** is a perspective view of a camera and fan structure;

FIG. **5** is an exploded top perspective view of a base section of a pylon-mounted camera assembly;

FIG. **6** is an exploded bottom perspective view of a base section of a pylon-mounted camera assembly;

FIG. **7** is an exploded top perspective view of a base section of a pylon-mounted camera assembly;

FIG. **8** is an exploded bottom perspective view of a base section of a pylon-mounted camera assembly;

FIG. **9** is a diagrammatic exemplar electric circuit of a pylon-mounted camera assembly;

FIG. **10** is a perspective view of a two-camera pylon;

FIG. **11** is a perspective view of an alternative embodiment of a two-camera pylon;

FIG. **12** is a perspective view of a three-camera pylon;

FIG. **13** is a perspective view of a two-camera pylon having spaces configured to hold an RFID chip;

FIG. **14** is a bottom perspective view of a two-camera pylon illustrating a cavity for positioning of a stabilizing weight;

FIG. **15** is a perspective view of a two-camera pylon illustrating an electrical wire conduit;

FIG. **16** is an exploded perspective view of a pylon-mounted camera assembly and a base mounting structure;

FIG. **17** is an exploded bottom perspective view of a pylon-mounted camera assembly and a base mounting structure;

FIG. **18** is a perspective view of a pylon-mounted camera assembly and base mounting structure;

FIG. **19** is a perspective view of an assembled base mounting structure;

FIG. **20** is a perspective view of an alternative embodiment of an assembled base mounting structure;

FIG. **21** is a fragmentary perspective view of the engaging portion of the assembled base mounting structure shown in FIG. **20**;

FIG. **22** is an exploded top perspective of a plug sub assembly;

FIG. **23** is an exploded bottom perspective of the plug sub assembly shown in FIG. **22**;

FIG. **24** is a top perspective view of a line marking template tool;

FIG. **25** is a bottom perspective view of a line marking template tool;

FIG. **26** is a perspective view of line marking template tools in use;

FIG. **27** is an exploded perspective view of a pylon configured with USB3 connectors;

FIG. **28** is a bottom perspective view of an assembled pylon configured with USB3 connectors;

FIG. **29** is a perspective view of an installed self-sealing cap;

FIG. **30** is a perspective view of an installed self-sealing cap with USB3 connector and cable in place;

FIG. **31** is an exploded perspective view of a corner-oriented pylon-mounted camera assembly;

FIG. **31***a* is a perspective view of a cavity into which a camera assembly as shown in FIG. **31** is placed;

FIG. **31***b* is a reverse exploded perspective view of a corner-oriented pylon-mounted camera assembly as shown in FIG. **31**;

FIG. **32** is a perspective view of one embodiment of a pylon-mounted camera assembly;

FIG. **33** is a top sectional view of one embodiment of a pylon-mounted camera assembly;

FIG. **34** is a front perspective view of one embodiment of a pylon-mounted camera assembly;

FIG. **35** is a front perspective view of one embodiment of a pylon-mounted camera assembly; and,

FIG. **36** is a top view of a corner-oriented pylon camera in use on a football field.

DETAILED DESCRIPTION

At the outset, it should be appreciated that like drawing numbers on different drawing views identify identical, or

functionally similar, structural elements. It is to be understood that the claims are not limited to the disclosed aspects.

Furthermore, it is understood that this disclosure is not limited to the particular methodology, materials and modifications described and as such may, of course, vary. It is also understood that the terminology used herein is for the purpose of describing particular aspects only, and is not intended to limit the scope of the claims.

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood to one of ordinary skill in the art to which this disclosure pertains. It should be understood that any methods, devices or materials similar or equivalent to those described herein can be used in the practice or testing of the example embodiments. The assembly of the present disclosure could be driven by hydraulics, electronics, pneumatics, and/or springs.

It should be appreciated that the term "substantially" is synonymous with terms such as "nearly," "very nearly," "about," "approximately," "around," "bordering on," "close to," "essentially," "in the neighborhood of," "in the vicinity of," etc., and such terms may be used interchangeably as appearing in the specification and claims. It should be appreciated that the term "proximate" is synonymous with terms such as "nearby," "close," "adjacent," "neighboring," "immediate," "adjoining," etc., and such terms may be used interchangeably as appearing in the specification and claims. The term "approximately" is intended to mean values within ten percent of the specified value.

Adverting now to the Figures, FIG. **1** is an exploded perspective view of pylon-mounted camera assembly **10**. Pylon-mounted camera assembly **10** comprises pylon **2**, camera sub-assembly **50**, fan sub-assembly **60**, cavities **3***a* and **3***b*, and connector base **20**. In the preferred embodiment, pylon **2** is manufactured from molded, high-density, impact resistant foam, or any other materials that meet the standards set by football organizations, such as the National Football League and the National Collegiate Athletic Association. In the preferred embodiment, the dimensions of pylon **2** are approximately 4 inches by 4 inches by 18 inches, although it should be appreciated that these dimensions may vary. Cavities **3***a* and **3***b* are each machined into a face of the pylon to create a substantially circular aperture therethrough. Pylon **2** may contain a plurality of cavities, each accepting a camera mounting sled **15** (shown in FIG. **4**). The size and position of each cavity is offset vertically from other cavities within pylon **2** to ensure that no two cavities intersect.

Camera sub-assembly **50** comprises camera-flange cover **14**, T-bolts **12***a*, camera flange **42**, camera **40**, and housing **44**. Notches **11***b* are operatively arranged to receive each of the four corners of cuboid camera **40**, although it should be appreciated that camera **40** may be any shape, and that housing **44** may be adjusted accordingly to receive camera **40**. Camera **40** is a high-definition camera, but may be any type of camera. The term "high-definition" as used herein is intended to mean any form of video encoding which utilizes more than 480 lines of horizontal resolution. It should be appreciated that since the term "high-definition" is defined herein as any resolution which utilizes more than 480 lines of horizontal resolution, the term "high-definition" can also refer to ultra-high definition resolutions such as 4K and 8K and include techniques such as High Dynamic Range (HDR) video and Standard Dynamic Range (SDR) video. It should further be appreciated that "high-definition" can also refer to a High-Speed Camera that produces High Frame Rate Video, for example, at frame rates of greater than 60 frames per second up to hundreds or thousands of frames per second. Flange **42** is operatively arranged for a friction fit into cavity **3***a*, and rests upon flange seat **9**. Aperture **43** of flange **42** is arranged such that camera lens **45** protrudes. T-bolt apertures **12***b* of flange **42** are arranged such that they may receive T-bolts **12***a*. Camera-flange cover **14** is placed over assembled camera sub-assembly **50** and is meant to protect camera sub-assembly **50**. Camera-flange cover **14** is generally made of the same material as that of pylon **2**, and contains an aperture so that camera lens **45** may protrude and visualize the area surrounding pylon **2**. Sleeves **12***d*, while not a part of camera sub-assembly **50**, may be inserted into notch **11***a*, and are secured into place by a friction-fit. Notches **11***a* are each equidistant within cavity **3***a*.

Fan sub-assembly **60** comprises fan **4**, fan flange **6**, screws **5**, T-nuts **7**, and fan flange cover **8**. Fan **4** is secured to fan flange **6** by screws **5** through apertures **5***a* in fan flange **6**. T-bolts **12***a* extend through apertures **12***b* in camera-flange **42** and through apertures **12***c* in fan flange **6** to be threaded into T-nuts **7** and torqued until they secure camera sub-assembly **50** and fan sub-assembly **60** together. Fan **4** provides cooling air to flow around the parts of the assembly that constitute sled **15**. Camera sub-assembly **50** and fan sub-assembly **60** together comprise sled **15**, which is secured within housing cavity **3***a* by camera flange **42** at one end and by fan flange **6** at the other. Friction, together with the clamping force of the camera flange **42** against pylon **2**, keeps camera sub-assembly **50** and camera fan sub-assembly **60** in place. Camera flange cover **14** and fan flange cover **8** are friction-fit into the space remaining in each respective end of housing cavity **3***a*.

Recess **16** (shown in FIG. **14**) is machined into the bottom of pylon **2**, into which weight **16***a* is embedded. Weight **16***a* intended to help anchor pylon **2** in the correct upright position when in use. Wire conduits **17***a* and **17***b* (shown in FIG. **14**) provide electrical wire access to cavity **3***a* and **3***b*, respectively.

FIG. **1***a* is a detailed perspective view of cavity **3***b*. Cavity **3***b* comprises notches **11***a* and circular flange seat **9**. Notches **11***a* allow T-bolts **12***a* (shown in FIG. **1**) to pass through pylon **2** to connect with mating T-nuts **7** (shown in FIG. **1**) to secure camera sub-assembly **50** in place. Flange seat **9** is sized such that the internal diameter of cavity **3***b* will accept housing **44** (shown in FIG. **1**), but will provide for a friction fit with camera-flange cover **14**. Camera-flange cover **14** (shown in FIG. **1**) rests upon flange seat **9** and serves to protect camera sub-assembly **50**.

FIG. **1***b* is another exploded perspective view of pylon-mounted camera assembly **10**. However, FIG. **1***b* is a reverse view of that shown in FIG. **1**, and shows in further detail the way in which camera sub-assembly **50**, fan sub-assembly **60**, connector base **20**, and pylon **2** interact.

FIG. **2** is an exploded view of an alternative embodiment of pylon-mounted camera assembly **10**, wherein cavities **3***d* and **3***e* are not circular, but are instead substantially circular with flat edges. Further, camera-flange cover **14***a*, camera-flange **42***a*, fan flange **6***a*, and fan flange cover **8***a* are all substantially circular with flat edges, to match the shape of flange seat **9** of cavities **3***d* and **3***e*. However, it should be appreciated that cavities **3***d* and **3***e*, camera-flange cover **14***a*, camera-flange **42***a*, fan flange **6***a*, and fan flange cover **8***a* may be a variety of geometric shapes, including, but not limited to, triangles, squares, pentagons, hexagons, etc.

FIG. **3** is a perspective exploded view of camera mounting sled **15**. Camera mounting sled **15** comprises camera sub-assembly **50** and fan sub-assembly **60**. When assembled, camera lens **45** protrudes through camera flange **42**, and

camera flange **42** friction fits into flange seat **9**, while housing **44** is inserted within cavity **3***a* or cavity **3***b*. Camera-flange **42** has one or more apertures **12***b* through which T-bolts **12***a* are inserted. Notches **11***b* on housing **44** engage with the corners of camera **40**. Fan sub-assembly **60**, when assembled, comprises fan **4** in the center of fan flange **6**. Fan flange **6** comprises sleeves **12***d*, which are through-bores optimally arranged to receive T-bolt **12***a*.

FIG. **4** is a perspective view of camera sub-assembly **50** and fan sub-assembly **60** connected to create camera mounting sled **15**. T-bolts **12***a* are fully inserted into sleeves **12***d*. The distal end of T-bolts **12***a* protrude through sleeves **12***d*. T-nuts **7** are then fastened to the ends of T-bolts **12***a* to secure camera sub-assembly **50** to fan sub-assembly **60**.

FIG. **5** is an exploded top perspective view of connector base **20** and pylon connector **30**. Pylon connector **30** is optimally arranged to engage pylon **2** (shown in FIG. **1**). For pylon-mounted camera assembly **10** to transmit images from camera **40** (shown in FIG. **1**) to a television production truck located some distance away from the field, the wiring of pylon-mounted camera assembly **10** must be connected to transmitter **76**. This is accomplished by connecting pylon connector **30** to connector base **20**. Extending from connector base **20** and continuing underneath and away from the field of play are cables **80** which carry video signals to the transmitter **76**, which is located close by to the field of play. The connection of pylon connector **30** and base connector **20** provides for nearly instant connection between pylon-mounted camera assembly **10** and transmitter **76**, and thus the truck. When assembled, pylon **2** is placed onto assembled base **20**, the force of magnetic attraction between magnets **22***n* and **22***s* in pylon connector **30** and magnets **21***s* and **21***n* in base connector **20**, in combination with the force of gravity, bring pylon connector **30** and connector base **20** together such that pogo pins **18** contact pads **26**, completing the electrical circuits necessary to carry power, data, and video signals between camera **40** (shown in FIG. **1**) and transmitter **76** (shown in FIG. **9**). In the preferred embodiment, pogo pins **18** and pads **26** are made of copper and are gold-plated, but it should be appreciated that they may be made of any conductive material. Pogo pins **18** are inserted through apertures **36** such that they fully protrude through apertures **36**, and may contact pads **26**, which are secured to base connector **20**.

Pogo pins **18** establish an electrical connection with pads **26**. Pogo pins **18** usually take the form of a slender cylinder containing two sharp, spring-loaded pins. Pressed between two electronic circuits, the sharp points at each end of pogo pins **18** securely contact pads **26**. Pogo pins **18** are arranged in a dense array, and are used to facilitate rapid, reliable connection with pads **26**. In one example embodiment, pogo pins **18** are only single-ended and not sharp, i.e., one end has the spring-loaded plunger with a rounded end and the other end is just a rounded cylinder to which wires are soldered or otherwise connected.

FIG. **6** is an exploded bottom perspective view of connector base **20** and pylon connector **30**. FIG. **6** comprises the same elements as those shown in FIG. **5** from a different perspective.

FIG. **7** is an exploded top perspective view of assembled connector base **20** and pylon connector **30**. Pylon connector **30** is fully assembled with pogo pins **18** secured through apertures **36** (shown in FIG. **5**), and magnets **22***n* and **22***s* inserted within space for magnet north pole **23***n* and space for magnet south pole **23***s*, respectively. Screws **24** are also in place through apertures **34** (shown in FIG. **5**) so that they may engage pylon **2** (shown in FIG. **1**). Contact pads **26** have also been secured to connector base **20**.

FIG. **8** is an exploded bottom perspective view of connector base **20** and pylon connector **30**. As in FIG. **7**, all of the elements of connector base **20** and pylon connector **30** are assembled, but this vantage point shows magnet south pole **21***s* and magnet north pole **21***n* inserted within space for magnet south pole **25***s* and space for magnet north pole **25***n*, respectively.

FIG. **9** shows diagrammatic circuit **70** of pylon-mounted camera assembly **10**. Transmitter **76** is located nearby the playing field and connected by cables **80** to connector base **20**, and housed inside transmitter **76** are data cables connected to an optical-to-electrical converter. Cables **80** carry power, data, and video signals. The video signals are connected first to re-clocking distribution amplifier **98** (not shown) and then to an electrical-to-optical converter. Power cables **74** are connected to power source **72** such as a battery or power supply, which also powers distribution amplifiers and optical converters. A typical transmitter may have more than one signal path to accommodate multiple cameras in a single pylon, and/or multiple pylons each with multiple cameras. Fiber-optic cable **78** is connected between transmitter **76** and receiver **82**. The use of Wavelength-division multiplexing (WDM) technology enables bi-directional signals to share a single, single-mode optical fiber. Wavelength-division multiplexing (WDM) in fiber-optic communications is a technology which multiplexes a number of optical carrier signals onto a single optical fiber by using different wavelengths (i.e., colors) of laser light. This technique enables bidirectional communications over one strand of fiber, as well as multiplication of capacity. It should be appreciated that the video signal paths are but one example of potential transmission paths for video signals and other example paths are contemplated herein. For example, an additional signal path which carries a video signal from a truck close to the field, to a location on or near the field can be provided. This new signal path can provide a video feed from the truck which enables multiple windows of video to one location or monitor. This allows multiple cameras from one or more pylons positioned on the field to be viewable from a single display so that a technician can confirm that multiple camera signals are being received at the truck.

Additional fiber-optic cables **78** may be used for each additional signal path from the transmitter **76**. Inside receiver **82**, an optical-to-electrical converter connects to video cables **90** which will be connected to the production truck for additional processing, if desired, and for recording by instant replay devices or for live use in a broadcast. Controller **92** connects to receiver **82** via cable **88** to send control signals to transmitter **76**, which subsequently sends those control signals to cameras **40** (shown in FIG. **1**). The optical converters are powered by power source **84** such as a battery or power supply, which connects to the receiver **82** via power cable **86**. Receiver **82** may have more than one signal path, the exact number of which would be determined by the number of camera signal paths **78** being sent from transmitter **76** and matched in quantity.

Transmitter **76** may transmit images recorded by camera **40** to receiver **82** via cables **78**, located on the outside of the production truck. The transmitted image received by receiver **82** is then sent to video recorder **94** via cables **90**. In the preferred embodiment, cables **78** are fiber-optic cables, but it should be appreciated that any cable suitable for transmission may be used.

FIG. **10** is a perspective view of a two-camera embodiment of pylon-mounted camera assembly **10**. Pylon **2** has cavities **3***a* and **3***b*, both of which may be machined through-bores.

FIG. **11** is a perspective view of another two-camera embodiment of pylon-mounted camera assembly **10**, wherein cavities **3***d* and **3***e* are substantially circular with flat edges.

FIG. **12** is a perspective view of a three-camera embodiment of pylon-mounted camera assembly **10**. In this embodiment, pylon **2** comprises cavities **3***d*, **3***e*, and **3***f*, all of which are substantially circular with flat edges, although it should be appreciated that cavities **3***d*, **3***e*, and **3***f* may be any shape. In this embodiment, cavities **3***d*, **3***e*, and **3***f* are substantially similar to those shown in FIG. **11**. Cavity **3***d* is located in the bottom third of pylon **2**, cavity **3***e* is located in the middle third of pylon **2**, and cavity **3***f* is located in the top third of pylon **2**. Cavities **3***d*, **3***e*, and **3***f* are symmetrical, so that camera mounting sled **15** (shown in FIGS. **3** and **4**) may be inserted from either end of the cavity. In use, pylon assembly **10** is oriented in such a way that cavity **3***e* would face the goal line. This would enable camera **40** inserted into cavity **3***e* to visualize the goal line, and each camera **40** inserted in opposite directions into cavities **3***d* and **3***f* to simultaneously see the sideline on either side of pylon **2**.

FIG. **13** is a perspective view of a two-camera embodiment of pylon-mounted camera assembly **10** comprising space **65** and space **66** to hold an RFID chip. Space **66** is a discrete cavity within pylon **2**, while space **65** is integrated into cavity **3***b*. Foam cover **61** covers chip holding space **66** after the chip has been inserted. It is to be understood that space **65** and space **66** can be configured to hold any type of chip. It should be appreciated that although space **66** is shown in a two camera embodiment of pylon-mounted camera assembly **10**, space **66** may also alternatively be used in the three camera embodiment shown in FIG. **12**. Space **66** may also be located on the top of pylon **2**.

FIG. **14** is a bottom perspective view of a two-camera embodiment of pylon-mounted camera assembly **10** illustrating recess **16** which is used to hold weight **16***a*. Recess **16** is machined into the bottom of pylon **2**, and weight **16***a* is embedded in pylon **2** to increase stability. The weight **16***a* may be clay, sand, metal, or any suitable material known in the art that satisfies the National Football League's and National Collegiate Athletic Association's safety guidelines. Wire conduits **17***a* and **17***b* are drilled into pylon **2** to provide one or more routes for electrical wiring to connect one or more cameras **40** with pogo pins **18** within pylon connector **30**. For example, conduit **17***a* provides electrical wire access to cavity **3***a* and conduit **17***b* provides electrical wire access to cavity **3***b*. It is to be understood that the inventive concept and principles contemplate all methods and means of situating the borehole conduits that achieve the desired result and, also, that the inventive concept and principles contemplate any number of notches and electrical wire conduits that are required for a particular use. Further, additional conduits may be added to accommodate additional cameras **40**.

FIG. **15** is a perspective view of the two-camera embodiment of pylon-mounted camera assembly **10** shown in FIG. **14**. FIG. **15** shows the interaction of conduit **17***a* with notch **13***b* of housing **44** within cavity **3***a*. Conduit **17***a* houses electrical wires (not shown) which connect directly to camera **40** (shown in FIG. **1**) mounted within housing **44**, and are connected to pylon base **30**.

FIG. **16** is an exploded perspective view of an embodiment of pylon-mounted camera assembly **10**, wherein camera sub-assembly **50** and fan sub-assembly **60** of pylon **135** are substantially similar to the embodiment described above. However, pylon **135** is connected to connector base **123**. This embodiment further comprises base mounting structure **150**, which includes sub-assembly **151**. Conduit **133** and flange **132** are seen at the bottom of the structure. Externally threaded lower conduit section **129***c* is to be threaded into the bottom of the internally threaded coupler **129***b*. Coupler **129***b* has four external fins **131***a* arranged equidistant from each other around the circumference of coupler **129***b* to provide resistance to any externally applied radial force. Externally threaded upper conduit section **129***a* comprises anti-rotation pins **128***b* inserted into the unthreaded portion of the section, and is to be threaded into the top of coupler **129***b*. Wedging plug **127** and rubber plug **126** are to be inserted into the top of conduit **129***a*. Foam rubber washer **125** sits on top of rubber plug **126**. Locking nut **134** is screwed onto wedging plug **127**. Connector base **123** is substantially similar to connector base **20** described earlier, except connector base **123** is fastened to locking nut **134** with cap head screws through apertures **122***c*. Pylon **135** sits atop connector base **123**, providing for electrical connection.

FIG. **17** is an exploded bottom perspective view of pylon-mounted camera assembly **135**, connector base **123**, and base mounting structure **150**. In this view of pylon-mounted camera assembly **135**, apertures **130***a*-**130***d* can clearly be seen, which allow wires in base mounting structure **150** to pass-through sub-assembly **151** to connect to connector base **123**.

FIG. **18** is a perspective view of pylon **135**, connector base **123**, and base mounting structure **150** fully assembled. In this embodiment, connector base **123** is flush with the surface of the playing field, and base mounting structure **150** is completely below the field of play.

FIG. **19** is a perspective view of assembled base mounting structure **150** with cap **121** installed. Cap **121** is installed atop base mounting structure **150**. The cap has flathead screw apertures **122***a*, through which flathead screws engage sub-assembly **151** (see FIG. **16**) of base **150**. Cap **121** is installed in place of connector base **123** when the pylon camera assemblies are not in use, preventing unnecessary wear on the base mounting structure's interior, e.g. water damage.

FIG. **20** is a perspective view of an alternative embodiment of assembled base mounting structure **150** wherein pass-through cap **124** is installed atop base mounting structure **150**. The pass-through cap has flathead screw apertures **122***d*, through which flathead screws engage sub-assembly **151** (shown in FIG. **16**) of base **150**. Pass-through cap **124** is installed in place of connector base **123** when use of a pylon, or other device, that does not have a pylon connector is desired, but where exposure to elements is not a factor, e.g., when the pylon is installed indoors. Self-sealing cap **210** (shown in FIG. **29**) serves a similar purpose to pass-through cap **124** of allowing a pylon or other device without a pylon connector to be connected to wires within the base mounting structure **150**, but provides the additional benefit of sealing the interior of the base mounting structure from the elements.

FIG. **21** is a fragmentary perspective view of the engaging portion of assembled base mounting structure **150** and sub-assembly **151** shown in FIG. **16**. Externally threaded upper conduit section **129***a* has wedging plug **127** inserted. Pin **128***b* engages with notch **128***a* to prevent the rotation of plug **127**, and acts as a depth stop when wedging plug **127** is inserted, preventing plug **127** from being inserted too far into upper conduit section **129***a*.

FIG. **22** is an exploded top perspective view of plug sub-assembly **151**. Cylinder **118** comprises a hexagonal cavity **119**, into which a hex key may be inserted to provide torque. Cylinder **118** sits on locking nut **134**, which comprises screw apertures **122***b* and pin aperture **120***b*. Locking nut **134** sits on foam rubber washer **125**, which sits on the top surface of flange **137***a* of rubber plug **126**. This provides impact force absorption. Rubber plug **126** sits on conduit top surface **137***b* of upper conduit section **129***a*. It should be appreciated that cylinder **118** is used as an installation tool and is removed to allow installation of **121**, **123**, or **124** discussed supra.

FIG. **23** is an exploded bottom perspective view of plug sub assembly **151** shown in FIG. **22**. Externally threaded surface **138***b* engages with internally threaded section **138***a*. Pin **120***a* engages pin aperture **120***b*, and when engaged, pin **120***a* transmits the torque applied to cylinder **118** through pins **120***a* to locking nut **134** to secure together the different aspects of plug sub assembly **151**. Plug sub-assembly **151** is positioned inside top conduit section **129***a* and tapered section **136***a* wedges against tapered cavity **136***b*, deforming rubber plug **126** such that its circumference increases and force is applied radially to the interior of upper conduit section **129***a*, securing plug sub-assembly **151** in place.

In the current example of a football field, the location where the assembly is being installed must be precisely located. The precisely located pylon, in turn, can be helpful for the grounds crew who paint the boundaries onto the field as they can use the location of the installed assembly as a reference point for applying paint, chalk, or a similar compound to the field to mark the boundaries. Thus, the inventive concept includes providing for a line marking template tool. FIG. **24** is a perspective tilted view looking down on the top of an exemplar line-marking template tool. The line marking template tool is made of a material that provides the durability desired to withstand frequent handling. In this example, the material used to make the tool is aluminum, and as the tool may frequently be coated by paint overspray in the course of its normal use, the aluminum has a smooth surface finish that will allow this paint, should it become built up, to be easily cleaned from the surface by use of abrasives and/or chemical solvents. Four arms, exemplified by arms **109***a* and **109***b*, extend radially from the tool's center section **107**. At the end of each arm is a pod, such as pods **101***a* and **101***b*. Each pod has multiple channels **102***a* therethrough, through which a common duplex nail **110** is to be inserted. Opposite pairs of channels are typically spaced so that their centers are either 4" or 8" apart (4" and 8" are common widths for painted lines on athletic fields), but may be spaced closer or farther for different applications. To illustrate, channels **102***a* and **102***b* and **103***a* and **103***b* are spaced 4" apart on center. Channels **104***a* and **104***b* and **105***a* and **105***b* are spaced 8" apart on center. A set of perpendicularly intersecting positioning lines **106***a* and **106***b* are engraved, or otherwise permanently marked, on the surface of each pod and centered on the channels. The positioning lines serve as a reference to indicate the alignment of the lines to be painted. Label **117** indicates the spacing of the channels, 4" and 8" in this example, and, to wit, the line dimensions for which the tool may be used, and is engraved or otherwise permanently marked on the surface of center section **107**.

FIG. **25** is a perspective view looking up to the bottom of an exemplar line marking template tool. Flange **108** forms the bottom surface of the rim edge of the tool's center section and has an inside diameter that matches the outside diameter of cap **121**, enabling the flange **108** to be placed over cap **121**, thus correctly locating the line marking template tool at the pylon position.

FIG. **26** is a perspective tilted view of an example scenario of marking an 8" wide line as a goal line using paint applied to the field surface. The ground surface finished grade **140** represents the field surface. One line marking template tool **113***a* would be placed at the pylon position at one end of the line and a second tool **113***b* placed at the position at the other end of the line with each tool's flange over the cap at their respective positions. The tools are oriented so that the eight inch dimensions of each opposite tool are parallel. A common duplex nail **110** is placed in each aperture **104***a* and aperture **104***b* of one tool **113***a* and in each aperture **105***a* and aperture **105***b* of the other tool **113***b*. The nails are pushed into the ground, securing the tool in its orientation. A string **115** is affixed to the top section **111** of the nail in aperture **104***a* of the first tool and stretched taut across the field to aperture **105***a* of the second tool, where it is secured. A second string **116** is similarly affixed to the nail in aperture **104***b* of the first tool and stretched taut across the field to aperture **105***b* of the second tool. The area between the strings will measure 8", and serve to indicate the area where paint should be applied to the field to create the marking. Upon completion of the marking, the strings and nails are removed and the tools are removed.

FIG. **27** is an exploded perspective view of pylon **2***a* configured with USB3 connectors. In this embodiment, pylon-mounted camera assembly **10** does not comprise pylon connecter **30** or base connector **20**, but rather, the electrical connection between camera **40** (shown in FIG. **1**) and transmitter **76** (shown in FIG. **9**) is made through the connection of USB3 plug **201** and USB3 receptacle **203**. Flexible cable **204** is connected at one end to transmitter **76** (shown in FIG. **9**) and at pylon **2***a*, the terminal end of flexible cable **204** has USB3 receptacle **203**. USB3 receptacle **203** engages USB3 plug **201**, which terminates at one end of flexible cable **202**. Cable pass-through aperture **206***a* allows end **206***b* of cable **202** to enter inside pylon **2***a* and connect to cameras **40** (shown in FIG. **1**). Insert **205** fills the space in the bottom of pylon **2***a* otherwise filled by pylon connector **30**. Insert **205** is placed such that its bottom is flush with the bottom of pylon **2***a* and any remaining space above insert **205** inside the pylon allows room to make electrical connections to the wiring throughout the pylon. Notch **207***b* of insert **205** matches notch **207***a* of pylon **2***a*.

FIG. **28** illustrates the bottom portion of pylon-mounted camera assembly **235** configured with a USB3 connection. Notches **207***a* and **207***b* create a space into which USB3 plug **201**, USB3 receptacle **203**, and cables **202** and **204** fit so that protrusion outside of pylon **2***a* is minimized, and pylon **2***a* is allowed to stand fully upright. Cables **202** and **204** are flexible to facilitate the mating of USB3 plug **201** and USB3 receptacle **203**.

FIG. **29** is a perspective view of self-sealing cap **210** installed on base mounting structure **150** (see FIG. **18**). Self-sealing cap **210** comprises cap **211** with notch **212** and gasket **213**. To use self-sealing cap **210**, cap **121** is removed and all electrical wiring is aligned with notch **212**. Self-sealing cap **211** is then secured to the structure with flathead screws through apertures **222***e*.

FIG. **30** is a perspective view of flexible cable **204** with USB3 receptacle **203** on its terminal end. Gasket **213** is flexible and conforms around cable **204**, creating a seal that prevents water and other debris from entering the conduit.

FIG. **31** is an exploded perspective view of corner-oriented pylon-mounted camera assembly **310**. Apertures **303***a* and **303***b* are complete through-bores located on the

corners of pylon **302**. Cameras **340** are inserted into apertures **303***a* and **303***b*. Cameras **340** are fitted with wide-angle lenses with approximately 122 degrees of horizontal vision, but the field of view may be wider or narrower. As used herein, "approximately 122 degrees" should be interpreted to mean any field of view within 15 degrees of 122 degrees, i.e., from 107-137 degrees. Sled **360** is inserted behind camera **340**, and comprises camera housing **344**, fan **304**, and fan cover **308**. Similarly, camera **345** (not shown) may also be inserted into aperture **420**. Camera **345** (not shown) is a narrow-angle lens with approximately 45 degrees of vision, but the field of view may be wider or narrower. The camera assembly surrounding camera **345** is similar to that of previously described embodiments of camera **340**.

In an example embodiment, the optical axes of each camera **340** located within apertures **303***a* and **303***b* are orthogonal, but it should be appreciated that they may be oriented at an angle greater than or less than 90 degrees as well. There may also be also only a single corner-oriented camera, or more than two.

FIG. **31***a* is a perspective view of aperture **303***a*. Camera **340** is inserted into aperture **303***a* such that face **355***b* of camera **340** contacts camera face seat **355***a*. Notches **354***a* accept the edges of camera **340** and prevent camera **340** from rotating within aperture **303***a*. Camera housing **344** is then inserted, contacting cavity **303***a* and held in place by both a friction fit and, if desired, the addition of an adhesive, providing additional anti-rotation measures and securely holding face **355***b* of camera **340** against camera face seat **355***a*. Fan **304** resides within housing **344** and is secured thereto. Fan cover **308** rests against flange seat **309**. Fan cover **308** is made of the same material as pylon **302**, and comprises a through bore. Ventilation channels **350***a* extend from a face of pylon **302** and provide a path by which air can be moved across camera **340** and through aperture **303***a* by fan **304** to cool camera **340**. The through bore in fan cover **308** provides a continuation of the path of airflow. The lens of camera **340** is covered by removable camera lens tube **353** with a front element made of glass or of a type of optically clear, impact-resistant material.

FIG. **31***b* is a reverse exploded perspective view of corner-oriented pylon-mounted camera assembly **310** shown in FIG. **1**.

FIG. **32** is a perspective view of corner-oriented pylon-mounted camera assembly **310**. Rear face **351***b* (shown in FIG. **31***b*) of camera lens tube **353** is seated upon flange **351***a* when installed. Ventilation channels **350***a* may provide additional ventilation to the camera assembly.

FIG. **33** is a top sectional view of pylon camera assembly **310**. In this example embodiment, the corners of pylon **302** are beveled or chamfered, i.e., they form a flat surface between two adjacent faces of pylon **302**. This beveled face, formed on the corner of pylon **302**, is slightly larger in width than the diameter of the lens of camera **340**. This would allow a substantial portion of pylon **302** to remain flush with sideline **402** and goal line **400** (shown in FIG. **36**). It should be appreciated that the first and second faces of the pylon can be connected by a third and fourth face forming a substantially cuboid pylon structure. It should also be appreciated that a single additional face, i.e., a third face could connect the first and second faces forming substantially a prism pylon structure. It should also be appreciated that the third face does not have to be planar, e.g., it could be rounded or any other shape that can connect the first and second faces to complete the pylon structure. As shown in FIG. **31**, pylon **302** also includes a third aperture **420** arranged to receive a third camera which faces the goal line **400** discussed infra. The third camera is substantially similar to camera **340** described supra. FIG. **34** is a front perspective view of one embodiment of a pylon-mounted camera assembly **310**.

FIG. **35** is a front perspective view of pylon-mounted camera assembly **310**. In this example embodiment, pylon **302** comprises rounded corners between adjacent pylon faces.

FIG. **36** is a top view of pylon-mounted camera assembly **310** in use. Pylon **302** is positioned such that corner of pylon **302** that included aperture **303***b* is positioned at the intersection of goal line **400** and sideline **402**. Camera **340** positioned in aperture **303***b* (shown in FIG. **31**) has field of view **416** that enables it to visualize sideline **402**, field of play **406**, goal line **400**, and parts of endzone **404**. Optical axis **412** of camera **340** positioned in aperture **303***b* is arranged to bisect the area created between goal line **400** and sideline **402**. In an example embodiment, field of view **416** is 122 degrees horizontally. Camera **340** positioned in aperture **303***a* (shown in FIG. **31**) has optical axis **410** that is substantially orthogonal to optical axis **412** such that angle **418** is 90 degrees. Field of view **414**, in an example embodiment, is also 122 degrees horizontally, and can view sideline **402**, end zone **404**, goal line **400**, and field of play **406**. For the sake of clarity, camera **345** in aperture **420** has been omitted from FIG. **36**. However, it should be noted that the optical axis of camera **345** runs substantially parallel to goal line **400**, and the field of view of camera **345** is narrower than that of cameras **340** to provide clarity for images directly down goal line **400**. It should also be appreciated that, although not shown, it is possible to mount a microphone on the corners of pylon **302** which include apertures **303***a* and/or **303***b* such that the microphone can register sound emanating from action taking place on the field. It should further be appreciated that these microphones can also be mounted on the planar faces of pylon **302**. In one example embodiment aperture **303***a* is positioned lower on pylon **2**, i.e., closer to the ground, than aperture **303***b*. However, it should be appreciated that aperture **303***a* can also be positioned higher on pylon **2**, i.e., farther away from the ground, than aperture **303***b*. The lower mounted camera that is mounted within the lower aperture can see more of the field closer to the pylon, and therefore, should face the field of play. Furthermore, it should be appreciated that two or more pylons can be used on a playing field at a time and it may be desirable to alter the positions of the apertures to match the side of the field the pylon is positioned on.

It will be appreciated that various aspects of the disclosure above and other features and functions, or alternatives thereof, may be desirably combined into many other different systems or applications. Various presently unforeseen or unanticipated alternatives, modifications, variations, or improvements therein may be subsequently made by those skilled in the art which are also intended to be encompassed by the following claims.

LIST OF REFERENCE NUMERALS

1*a* Section View
2 Pylon
2*a* Pylon
3*a* Cavity
3*b* Cavity
3*d* Cavity
3*e* Cavity
3*f* Cavity
4 Fan

5*a* Aperture
6 Fan flange
6*a* Fan flange
7 T-nut
8 Fan flange cover
8*a* Fan flange cover
9 Circular flange seat
10 Pylon-mounted camera assembly
11*a* Notch
11*b* Notch
12*a* T-bolt
12*b* Aperture
12*c* Aperture
12*d* Sleeve
13*b* Notch
14 Camera-flange cover
14*a* Camera-flange cover
15 Camera mounting sled
16 Recess
16*a* Weight
17*a* Wire conduit
17*b* Wire conduit
18 Pogo pin
20 Connector base
21*n* Magnet North pole
21*s* Magnet South pole
22 Magnet
22*n* Magnet North pole
22*s* Magnet South pole
23*n* Space for Magnet North Pole
23*s* Space for Magnet South Pole
24 Screw
25*n* Space for Magnet North Pole
25*s* Space for Magnet South Pole
26 Pad
28 Magnet
30 Pylon connector
34 Aperture
36 Aperture
40 Camera
42 Camera-flange
42*a* Camera-flange
43 Aperture
44 Housing
45 Camera lens
50 Camera sub-assembly
60 Fan sub-assembly
61 Foam cover
65 Cavity
66 Cavity
70 Diagrammatic circuit
72 Power supply/battery
74 Power cable
76 Transmitter
78 Fiber-optic cable
80 Cable
82 Receiver
84 Power supply/battery
86 Cable
88 Cable
90 Cable
92 Controller
94 Video recorder
98 Re-clocking distribution amplifier
101*a* Pod
101*b* Pod
102*a* Aperture
102*b* Aperture
103*a* Aperture
103*b* Aperture
104*a* Aperture
104*b* Aperture
105*a* Aperture
105*b* Aperture
106*a* Positioning lines
106*b* Positioning lines
107 Center section
108 Flange
109*a* Arm
109*b* Arm
110 Nail
111 Nail top
113*a* Tool
113*b* Tool
115 String
116 String
117 Label
118 Cylinder
119 Cavity
120*a* Pin
120*b* Aperture
121 Cap
122*a* Aperture
122*b* Aperture
122*c* Aperture
122*d* Aperture
123 Connector base
124 Pass-through cap
125 Washer
126 Plug
127 Plug
128*a* Cavity
128*b* Pin
129*a* Upper conduit section
129*b* Coupler
129*c* Lower conduit section
130*a* Aperture
130*b* Aperture
130*c* Aperture
130*d* Aperture
131*a* Fin
132 Flange
133 Conduit
134 Nut
135 Pylon-mounted camera assembly
136*a* Tapered section
136*b* Cavity
137*a* Flange
137*b* Conduit top surface
138*a* Threaded portion
138*b* Threaded portion
140 Field surface
150 Base mounting system
151 Plug sub-assembly
201 USB3 plug
202 Cable
203 USB3 receptacle
204 Cable
205 Insert
206*a* Aperture
206*b* Cable end
207*a* Notch
207*b* Notch
210 Self-sealing cap

211 Cap
212 Notch
213 Gasket
222*e* Aperture
235 Pylon-mounted camera assembly
302 Pylon
303*a* Aperture
303*b* Aperture
304 Fan
308 Fan cover
309 Seat
310 Pylon-mounted camera assembly
340 Camera
344 Housing
345 Camera
350*a* Channel
351*a* Flange
351*b* Camera rear
353 Tube
354*a* Notch
355*a* Flange
355*b* Face
360 Camera mounting sled
400 Goal line
402 Sideline
404 Endzone
406 Field of play
410 Optical axis
412 Optical axis
414 Field of view
416 Field of view
420 Cavity

What is claimed is:

1. A pylon-mounted camera assembly, comprising:

a pylon positionable on a ground surface, the pylon including a first face and a second face adjacent to the first face, the first face and the second face forming a first corner;

a first aperture arranged on a portion of and centered about the first corner; and,

a first camera positioned within the first aperture, the first camera facing outwardly from the pylon.

2. The pylon-mounted camera assembly of claim **1**, wherein the first camera is arranged about a first optical axis.

3. The pylon-mounted camera assembly of claim **1**, wherein the first corner is chamfered or rounded.

4. The pylon-mounted camera assembly of claim **3**, wherein the chamfer forms a surface between said first and second faces, and the first camera is mounted in said first aperture in the chamfered formed surface.

5. The pylon-mounted camera assembly of claim **1**, wherein the first camera comprises a wide-angle lens.

6. The pylon-mounted camera assembly of claim **5**, wherein the wide-angle lens comprises a first field of view where the first field of view is approximately 122 degrees.

7. The pylon-mounted camera assembly of claim **1**, wherein the first face further comprises a second aperture and a second camera operatively arranged to be held within the second aperture.

8. The pylon-mounted camera assembly of claim **7**, wherein the first camera and the second camera comprise a first telephoto lens and a second telephoto lens, respectively.

9. The pylon-mounted camera assembly of claim **1**, wherein the first face comprises a plurality of ventilation channels operatively arranged to provide airflow to the first camera.

10. The pylon-mounted camera assembly of claim **1**, wherein the first corner comprises a through-bore, wherein the through-bore is substantially defined by the first aperture.

11. The pylon-mounted camera assembly of claim **1**, wherein the first face is substantially planar and the second face is substantially planar.

12. A pylon-mounted camera assembly comprising:

a pylon positionable on a ground surface, the pylon including a first face adjacent to a second face, and a third face adjacent to the second face, the first face and the second face forming a first corner and the second face and the third face forming a second corner;

a first aperture arranged at and centered about the first corner;

a second aperture arranged at and centered about the second corner;

a first camera positioned within the first aperture, the first camera facing outwardly from the pylon; and,

a second camera positioned within the second aperture, the second camera facing outwardly from the pylon.

13. The pylon-mounted camera assembly of claim **12**, wherein the first camera is arranged about a first optical axis and the second camera is arranged about a second optical axis, wherein the first optical axis and second optical axis are substantially orthogonal to one another.

14. The pylon-mounted camera assembly of claim **12**, wherein the first corner and/or the second corner are chamfered or rounded.

15. The pylon-mounted camera assembly of claim **12**, wherein the first camera and/or the second camera further comprise a first wide-angle lens and a second wide-angle lens, respectively.

16. The pylon-mounted camera assembly of claim **15**, wherein the first wide-angle lens and the second wide-angle lens have a first field of view and a second field of view, respectively, and the first field of view and the second field of view are approximately 122 degrees.

17. The pylon-mounted camera assembly of claim **12**, further comprising a third camera operatively arranged to pass through the first face or the second face.

18. The pylon-mounted camera assembly of claim **17**, wherein the third camera comprises a telephoto lens.

19. The pylon-mounted camera assembly of claim **12**, wherein the first face or the second face further comprise a plurality of ventilation channels operatively arranged to provide airflow to the first and/or second camera.

20. The pylon-mounted camera assembly of claim **12**, wherein the first corner comprises a first through-bore, wherein the first through-bore is substantially defined by the first aperture and the second corner comprises a second through-bore, wherein the second through-bore is substantially defined by the second aperture.

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