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(54) Title: A MOUNTING ASSEMBLY FOR IMAGING DEVICE TO REMOTELY MONITOR ELECRONIC CABINET AND A SYSTEM THEREOF

(57) Abstract: Present disclosure discloses a mounting assembly (100) for an imaging device (102) to monitor an electronic cabinet (400) from a remote location and a system (500) thereof. The mounting assembly comprises a support structure (200) and at least one telescopic rod (104) attached to the support structure. At least one connecting rod (108) is attached to the at least one telescopic rod. An actuator unit (300) comprises a first shaft (310) and a second shaft (318) rotatably coupled to the telescopic rod and the connecting rod respectively. A first motor (304) drives the first shaft to actuate the at least one telescopic rod about an axis (A-A). A second motor (312) rotates the second shaft about a circular axis (B) to actuate the at least one telescopic rod about the axis and the circular axis to displace the support structure for positioning the imaging device at a predefined angle.

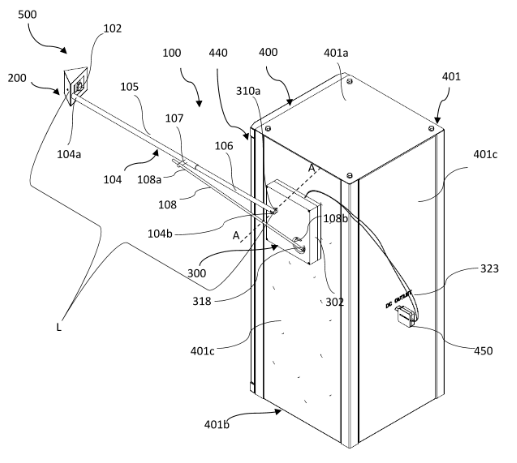

FIG. 1

<u>FORM 2</u>

THE PATENTS ACT 1970
(39 OF 1970)
&
The Patent Rules, 2003

Complete Specification

(See Section 10 and Rule 13)

1. TITLE OF THE INVENTION

A MOUNTING ASSEMBLY FOR IMAGING DEVICE TO REMOTELY MONITOR ELECRONIC CABINET AND A SYSTEM THEREOF

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3. PREAMBLE TO THE DESCRIPTION

COMPLETE

The following specification describes the invention and the manner in which it is to be performed

TECHNICAL FIELD

[0001] Present disclosure relates to a field of mechanical engineering. Particularly, but not exclusively the present disclosure relates to a mechanical device such as a mounting assembly for an imaging device and a system for monitoring an electronic cabinet with the imaging device from a remote location.

BACKGROUND

[0002] Electronic cabinets usually form part of a power distribution system and are connected to a power source such as but not limited to a transformer, a battery, an electrical system etc. The electronic cabinets are defined with an enclosure to accommodate various electrical components and electrical connections. The enclosure is isolated from the power source to provide protection to the electrical components and the electrical connections which may include a plurality of wires. The plurality of wires may be arranged in a segregated form to make connection with various components of the power distribution system. Usually, the electronic cabinets are configured with a display unit for visual representation of a plurality of parameters and readings corresponding to the power distribution system such as an input and an output voltage, frequency, power factor, input and output current etc. However, such electronic cabinets are subject to periodic maintenance by an operator to check for any damage within the electronic cabinet. Conventionally, the operator may physically visit a location of the electronic cabinet to take the readings and also to repair the electronic cabinet in case of any damage. This may be inconvenient at times and causes delay in getting the required readings to monitor the status of the power distribution system. Further, upon detecting a faulty component or any damage to the electronic cabinet, the operator must re-visit the location again for maintenance. This is a cumbersome task and proves to be time-consuming. Consequently, this increases the costs involved in maintenance and manpower.

[0003] Conventionally, in some of the electronic cabinets, an imaging device may be mounted in order to record the readings displayed on the electronic cabinet. However, such imaging devices are permanently fixed/attached to the electronic cabinet and cannot be adjusted to vary as per operators requirement or be adjusted to a best viewing angle. Moreover, the data recorded by the imaging device is temporary and cannot be accessed by the operator after a preset time period. This may hamper the process of taking readings and monitoring the electronic cabinet.

[0004] The present disclosure is directed to overcome one or more limitations stated above or any other limitations associated with the prior art. The information disclosed in this background of the disclosure section is only for enhancement of understanding of the general background of the invention and should not be taken as an acknowledgement or any form of suggestion that this information forms the prior art already known to a person skilled in the art.

SUMMARY OF THE INVENTION

[0005] One or more shortcomings of existing mounting assemblies have been overcome, and additional advantages are provided through a remote monitoring system having a mounting assembly as claimed in the present disclosure. Additional features and advantages are realized through the techniques of the present disclosure. Other embodiments and aspects of the disclosure are described in detail herein and are considered a part of the claimed disclosure.

[0006] The limitations of the prior arts are addressed by the mounting assembly for an imaging device as disclosed in the present disclosure. The mounting assembly comprises a support structure and at least one telescopic rod is defined with a first end and a second end. The at least one telescopic rod is attached to the support structure at the first end. At least one connecting rod is attached to the at least one telescopic rod. The mounting assembly further comprises an actuator unit having an enclosure. A first shaft is defined within the enclosure. The first shaft is rotatably coupled to the at least one telescopic rod at the second end. A first motor is connected to the first shaft and is configured to drive the first shaft to actuate the at least one telescopic rod about an axis of the first shaft. A second shaft is defined within the enclosure and is rotatably coupled to the at least one connecting rod. A second motor is connected to the second shaft and the second motor is configured to rotate the second shaft about a circular axis to linearly actuate the at least one telescopic rod. The at least one telescopic rod is actuated about the axis and the circular axis to displace the support structure for positioning the imaging device.

[0007] In an embodiment of the present disclosure, the mounting assembly comprises a control unit disposed within the actuator unit. The control unit is configured to receive an actuation signal from a remote location corresponding to an actuation of the at least one telescopic rod. The control unit determines a displacement of the at least one telescopic rod and the at least one connecting rod to evaluate a position of the support structure. Further, the control unit is also configured to actuate the at least one telescopic rod about the axis to rotate the support structure at various angles and actuate the at least one connecting rod to adjust a length of the at least one telescopic rod based on the actuation signal.

[0008] In an embodiment of the present disclosure, the support structure comprises at least one housing that is configured to receive the imaging device. One face of the at least one housing is defined with a cut-out. Further, a fixture is mounted to the at least one housing. The fixture is configured to securely support the imaging device. The imaging device comprises a mounting member configured to couple with the fixture using a fastener.

[0009] In an embodiment of the present disclosure, the actuator unit comprises a first worm gear disposed within the enclosure and is connected to the first motor. A first gear is coupled to the first worm gear and is configured to drive the first gear and the first shaft. A second worm gear is connected to the second motor. Further, a second gear is coupled to the second worm gear and is configured to actuate the second gear to rotate the second shaft about the circular axis. The second shaft is configured to convert the rotation of the second worm gear into the linear actuation of the first rod via the at least one connecting rod.

[0010] Present disclosure also discloses a system for remotely monitoring an electronic cabinet. The system comprises the electronic cabinet having at least one display unit to display a data. A mounting assembly is connectable to the electronic cabinet, the mounting assembly comprises a support structure configured to securely support an imaging device. The support structure is configured to orient the imaging device opposite to the at least one display unit of the electronic cabinet. At least one telescopic rod is defined with a first end and a second end, the at least one telescopic rod is coupled to the support structure at the first end. At least one connecting rod is connected to the at least one telescopic rod at the second end. The mounting assembly further comprises an actuator unit comprising an enclosure. A first shaft is defined within the enclosure. The first shaft is rotatably coupled to the at least one telescopic rod at the second end. A first motor is connected to the first shaft and is configured to drive the first shaft to actuate the at least one telescopic rod about an axis. A second shaft is connected to the at least one connecting rod and is rotatably disposed within the enclosure. A second motor is connected to the second shaft and is configured to rotate the second shaft about a circular axis to linearly actuate the at least one telescopic rod. The at least one telescopic rod actuates about the axis and the circular axis to displace the support structure for positioning the imaging device opposite to the at least one display unit to capture a data displayed on the at least one display unit. Further, a control unit is disposed within the actuator unit and is configured to receive an actuation signal from a remote location corresponding to an actuation of the at least one telescopic rod. The control unit is also configured to determine a displacement of the at least one telescopic rod and the at least one connecting rod to evaluate a position of the support structure. The control unit is further configured to actuates the at least one telescopic rod about the axis to position the support structure and also actuate the at least one connecting rod to adjust a length of the at least one telescopic rod based on the actuation signal.

[0011] In an embodiment, the control unit is configured to transmit the data recorded by the imaging device to an operator at the remote location through at least one of wired or a wireless communication device to monitor the electronic cabinet.

[0012] In an embodiment, the control unit is configured to determine an initial position of the imaging device and automatically actuate the at least one telescopic rod and the at least one connecting rod to adjust the imaging device to a required position for recording the data.

[0013] Present disclosure also discloses a method for operating and monitoring an electronic cabinet. The method comprises of establishing a connection, by a communication module between a remote device and an electronic cabinet having a control unit of a mounting assembly. Then, the remote device provides an actuation signal to the control unit. Later, the control unit actuates an actuator unit of the mounting assembly to displace a support structure at a predefined angle to position an imaging device secured within the support structure. Followed by capturing, by the imaging device, a data displayed on at least one display unit of the electronic cabinet. Lastly, the data captured by the imaging device is stored and retrieved through the communication module from a remote location to monitor the electronic cabinet.

[0014] It is to be understood that the aspects and embodiments of the disclosure described above may be used in any combination with each other. Several of the aspects and embodiments may be combined to form a further embodiment of the disclosure.

[0015] The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects and features described above, further aspects and features will become apparent by reference to the drawings and the following detailed description.

BRIEF DESCRIPTION OF ACCOMPANYING DRAWINGS

[0016] The novel features and characteristic of the disclosure are set forth in the appended claims. The disclosure itself, however, as well as a mode of use, further objectives, and advantages thereof, will best be understood by reference to the following detailed description of an embodiment when read in conjunction with reference to the accompanying drawings wherein like reference numerals represent like elements and in which:

[0017] FIG.1 illustrates a perspective view of a system for remote monitoring an electronic cabinet in accordance with an embodiment of the present disclosure.

[0018] FIG. 2a illustrates the perspective view of a mounting assembly connected to the electronic cabinet in accordance with an embodiment of the present disclosure.

[0019] FIG. 2b illustrates a front view of the mounting assembly of FIG 2a in accordance with an embodiment of the present disclosure.

[0020] FIG. 3a illustrates an exploded view of a support structure of the mounting assembly FIG 2a in accordance with an embodiment of the present disclosure.

[0021] FIG. 3b illustrates the front view of the support structure in an assembled condition in accordance with an embodiment of the present disclosure.

[0022] FIG. 4a illustrates the perspective view of an actuator unit of the mounting assembly of FIG 2a in accordance with an embodiment of the present disclosure.

[0023] FIG. 4b illustrates the front view of an actuator unit of the mounting assembly of FIG. 4a in accordance with an embodiment of the present disclosure.

[0024] FIG. 5 illustrates a method for remote monitoring an electronic cabinet of FIG. 1 in accordance with an embodiment of the present disclosure; and

[0025] FIG. 6 illustrates a block diagram of the system for remote monitoring an electronic cabinet in accordance with an embodiment of the present disclosure.

[0026] The figures depict embodiments of the disclosure for purposes of illustration only. One skilled in the art will readily recognize from the following description that alternative embodiments of the assembly, system and methods illustrated herein may be employed without departing from the objective of the disclosure described herein. It should be appreciated by those skilled in the art that any block diagrams herein represent conceptual views of illustrative systems embodying the principles of the present subject matter.

DETAILED DESCRIPTION OF THE DRAWINGS

[0027] The foregoing has broadly outlined the features and technical advantages of the present disclosure in order that the detailed description of the disclosure that follows may be better understood. Additional features and advantages of the disclosure will be described hereinafter which forms the subject of the claims of the disclosure. It should be appreciated by those skilled in the art that, the conception and specific embodiments disclosed may be readily utilized as a basis for modifying other devices, assemblies, and systems for carrying out the same purposes of the present disclosure. It should also be realized by those skilled in the art that, such equivalent constructions do not depart from the scope of the disclosure as set forth in the appended claims. The novel features which are believed to be characteristics of the disclosure, to its assembly, system and method together with further objects and advantages will be better understood from the following description when considered in connection with the accompanying figures. It is to be expressly understood, however, that each of the figures is provided for the purpose of illustration and description only and is not intended as a definition of the limits of the present disclosure.

[0028] In accordance with various embodiments of the present disclosure, a mounting assembly for an imaging device may be described. The mounting assembly comprises a support structure and at least one telescopic rod. The at least one telescopic rod is defined with a first end and a second end. The at least one telescopic rod is attached to the support structure at the first end. Further, at least one connecting rod is attached to the at least one telescopic rod. The mounting assembly further comprises an actuator unit having an enclosure. A first shaft is defined within the enclosure to rotatably couple to the at least one telescopic rod at the second end. A first motor is connected to the first shaft and is configured to drive the first shaft to actuate the at least one telescopic rod about an axis of the first shaft. A second shaft is defined within the enclosure and is rotatably coupled to the at least one connecting rod. Further, a second motor is connected to the second shaft and is configured to rotate the second shaft about a circular axis to linearly actuate the at least one telescopic rod. The at least one telescopic rod actuates about the axis and the circular axis to displace the support structure for positioning the imaging device. The forthcoming paragraphs will elucidate the configuration of the mounting assembly. Forthcoming embodiments elucidate a system and a method for remotely monitoring the electronic cabinet having the mounting assembly connected to the electronic cabinet and its working in detail in conjunction to FIGs 1 to 6.

[0029] The system comprises of the mounting assembly connected to the electronic cabinet. The system further comprises a control unit disposed within the actuator unit. The control unit is configured to receive an actuation signal from a remote location corresponding to an actuation of the at least one telescopic rod. The control unit is also configured to determine a displacement of the at least one telescopic rod and the at least one connecting rod to evaluate a position of the support structure. Further, the control unit actuates the at least one telescopic rod about the axis of the first shaft to position the support structure and also actuate the at least one connecting rod to adjust a length of the at least one telescopic rod based on the actuation signal.

[0030] In an embodiment, the system of the configuration described above enables to displace the support structure to position the imaging device at various angles. This enables the imaging device to record the data displayed on the electronic cabinet. Further, the control unit receives inputs from an operator from a remote location and selectively operates the actuator unit to position the imaging device to monitor the electronic cabinet. This enables to monitor the electronic cabinet from a remote location in real time and access the data displayed on the display unit of the electronic cabinet through a communication module. Advantageously, this enables the operator to record the data from the display unit of the electronic cabinet without visiting the location of the electronic cabinet. Additionally, the operator can identify the malfunctions or any damage in the electronic cabinet and visit the location directly with a solution to carry out repairs. This reduces the maintenance time and reduces the costs associated with the maintenance.

[0031] While the embodiments in the disclosure are subject to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the figures and will be described below. It should be understood, however, that it is not intended to limit the disclosure to the particular forms disclosed, but on the contrary, the disclosure is to cover all modifications, equivalents, and alternative falling within the scope of the disclosure.

[0032] It is to be noted that a person skilled in the art would be motivated from the present disclosure and modify the aspects of the system and construction of the mounting assembly that is connectable to the electronic cabinet. However, such modifications should be construed within the scope of the present disclosure. Accordingly, the drawings show only those specific details that are pertinent to understand the embodiments of the present disclosure, so as not to obscure the disclosure with details that will be readily apparent to those of ordinary skill in the art having benefit of the description herein.

[0033] The terms "comprise," "comprising", or any other variations thereof used in the disclosure, are intended to cover a non-exclusive inclusion, such that a system and method that comprises a list of components does not include only those components but may include other components not expressly listed or inherent to such system, method, or assembly, or device. In other words, one or more elements in a system or device proceeded by "comprises… a" does not, without more constraints, preclude the existence of other elements or additional elements in the assembly, system or device.

[0034] The following paragraphs describe the present disclosure with reference to FIG(s) 1 to 6. In the figures, the same element or elements which have similar functions are indicated by the same reference signs. With general reference to the drawings, a mounting assembly for an imaging device in accordance with the teachings of a preferred embodiment of the present disclosure is illustrated and generally identified with a reference numeral 100. The mounting assembly (100) may be employed by an operator or a technician for monitoring an electronic cabinet (400) from a remote location. It will be understood that, the teachings of the present disclosure are not limited to a particular mounting assembly (100) connected to the electronic cabinet (400) and may be used in any devices or attachments for imaging/capturing data at various angles that are customized based on the requirement.

[0035] The following detailed description is merely exemplary in nature and is not intended to limit application and uses. Furthermore, there is no intention to be bound by any theory presented in the preceding background or summary or the following detailed description. It is to be understood that the disclosure may assume various alternative orientations and step sequences, except where expressly specified to the contrary. It is also to be understood that the specific assembly, devices or components illustrated in the attached drawings and described in the following specification are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions or other physical characteristics relating to the embodiments that may be disclosed are not to be considered as limiting, unless the claims expressly state otherwise. Hereinafter, preferred embodiments of the present disclosure will be described referring to the accompanying drawings. While some specific terms of "upper", "lower", "below", "above", "right", "left", "rear" or "front" and other terms containing these specific terms and directed to a specific direction will be used, the purpose of usage of these terms or words is merely to facilitate understanding of the present invention referring to the drawings. Accordingly, it should be noted that the meanings of these terms or words should not improperly limit the technical scope of the present invention.

[0036] Also, it is to be understood that the phraseology and terminology used herein is for description and should not be regarded as limiting. Unless specified or limited otherwise, the terms "mounted," "connected," "attached", "supported," and "coupled" and variations thereof are used broadly and encompass both direct and indirect mountings, connections, supports, and couplings. Further, "connected" and "coupled" are not restricted to physical or mechanical connections or couplings. It is to be understood that this disclosure is not limited to the specific devices, assemblies, methods, applications, conditions, or parameters described and/or shown herein and that the terminology used herein is to describe particular embodiments by way of example and is not intended to be limiting of the claimed invention. Hereinafter in the following description, various embodiments will be described. For purposes of explanation, specific configurations and details are outlined to provide a thorough understanding of the embodiments. However, it will also be apparent to one skilled in the art that the embodiments may be practiced without the specific details. Furthermore, well-known features may be omitted or simplified in order not to obscure the embodiment being described.

[0037] Referring to FIGs 1 to 6 in conjunction, which illustrates a system (500) for remotely monitoring the electronic cabinet (400) [hereinafter referred to as the system (500)] and various components associated with the system (500). Hereinafter, features of the system (500) along with its working may be elucidated.

[0038] Referring to FIG. 1, the system (500) among other components may comprise an electronic cabinet (400) defined as a casing (401) to accommodate a plurality of electrical components (not shown in FIGS.) of a power distribution system (not shown in FIGS.). In an embodiment, the electrical components may include a junction box, terminals, power transfer devices, fuses and also a plurality of wires in electrical connection with the power distribution system. In an embodiment, the casing (401) is defined with a top wall (401a), a base (401b) and at least four walls (401c) extending from the base (401b). However, the same shall not be considered as limitation and the casing (401) may be designed to include any number of walls and be designed in any designed shape and configuration. Further, the electronic cabinet (400) is defined with at least one display unit (440) provided on at least one of the four walls (401c) to visually indicate the readings such as an input and output voltage, frequency, power factor, input and output current etc. pertaining to the power distribution system. In an embodiment, the electronic cabinet (400) may be connected to a power source (not shown in FIGS.) and the electronic cabinet (400) may be operated on any one of an alternating current (AC) or a direct current (DC).

[0039] Referring to FIGS. 2a and 2b, a mounting assembly (100) for holding an imaging device (102) is disclosed. The mounting assembly (100) is connected to the electronic cabinet (400). In an embodiment, the mounting assembly (100) is connected to one of the at least four walls (401c) which is adjacent to the at least one display unit (440) of the electronic cabinet (400). The mounting assembly (100) comprises a support structure (200) and at least one telescopic rod (104) that is attached to the support structure (200). The at least one telescopic rod (104) is defined with a first end (104a) and a second end (104b). In an embodiment, the at least one telescopic rod (104) is attached to the support structure (200) at the first end (104a).

[0040] Referring to FIGS. 3a and 3b, the support structure (200) in an exploded and assembled view is disclosed. The support structure (200) comprises of at least one housing (230) configured to receive the imaging device (102). The at least one housing (230) is defined with a front face (231) having a cut-out (232). In an embodiment, the cut-out (232) may be installed with a transparent glass (not shown in FIGS.) to allow the imaging device (102) to capture and record a data displayed on the electronic cabinet (400). In an embodiment, at least two walls (234) extend from the front face (231) to define a provision (236). Further, at least two sidewalls (248) are connected to the at least two walls (234) to form the at least one housing (230). In an embodiment, the at least two walls (234) may be triangular in cross section and extend from a top surface and a bottom surface of the front face (231). However, such structure cannot be construed as a limitation and the at least two walls (234) may be structured in any of a rectangle, square or a polygonal shape. The provision (236) is configured to accommodate a fixture (238). In an embodiment, the fixture (238) is removably attached to one of the at least two sidewalls (248) of the at least one housing (230). The fixture (238) comprises a base plate (240) and a plurality of flanges (242) projecting perpendicularly from the base plate (240). In an embodiment, the fixture (238) comprises an aperture (238a) defined on the base plate (240) to receive a fastener (245) to secure the fixture (238) to one of the at least two sidewalls (248). In an embodiment, the plurality of flanges (242) extend away from the base plate (240) in a tapered manner defining an arcuate shape at one end opposite to the base plate (240). In an embodiment, the plurality of flanges (242) are spaced apart from each other and each of the plurality of flanges (242) are defined with at least one first hole (242a) to receive a fastener (245). In an embodiment, the at least one first hole (242a) of the plurality of flanges (242) are aligned with each other to receive the fastener (245). An imaging device (102) is connected to the fixture (238). The imaging device (102) is supported by the fixture (238) such that the imaging device (102) is positioned opposite to the cut-out (232). The fixture (238) is configured to securely support the imaging device (102). Further, the imaging device (102) comprises a mounting member (246) that is configured to align with the plurality of flanges (242) of the fixture (238). In an embodiment, the mounting member (246) may be manufactured of a flexible material and may be structured in a U-shape to align with the plurality of flanges (242) (as shown in Fig. 3a). In an embodiment, the mounting member (246) is structured in a similar shape to that of the plurality of flanges (242) of the fixture (238). The mounting member (246) is also defined with at least one second hole (242b) that is complementary to the at least one first hole (242a). The imaging device (102) is connected to the fixture (238) by passing the fastener (245) through the at least one first hole (242a) and the at least one second hole (242b). In an embodiment, the fastener (245) may be at least one of a stud, a bolt and a screw or any other suitable fastening means. The support structure (200) is configured to orient the imaging device (102) opposite to the at least one display unit (440) of the electronic cabinet (400).

[0041] Referring back to FIGS. 2a and 2b, the at least one telescopic rod (104) comprises a first rod (105) and a second rod (106). The first rod (105) is connected to the support structure (200) and the second rod (106) is connected to a first shaft (310). In an embodiment, the first rod (105) is hollow in configuration to receive the second rod (106) therewithin. The second rod (106) is slidably disposed within the first rod (105) to vary a length (L) of the at least one telescopic rod (104). In an embodiment, the first rod (105) and the second rod (106) are manufactured of a material such as a steel or any other material that is suitable to withstand a weight of the support structure (200). In an embodiment, the at least one telescopic rod (104) may be hollow in configuration. The first rod (105) is defined with a projection (107) extending away from an outer surface of the at least one telescopic rod (104). In an embodiment, the projection (107) may be defined with a slot (not shown in FIGS) to receive and support an at least one connecting rod (108). In an embodiment, the at least one connecting rod (108) is attached to the at least one telescopic rod (104) by welding or riveting process.

[0042] The at least one connecting rod (108) is defined with one end (108a) and an other end (108b) opposite to the one end (108a). The at least one connecting rod (108) is fixedly attached to the projection (107). In an embodiment, the at least one connecting rod (108) is attached to the at least one telescopic rod (104) at the one end (108a) and the other end (108b) of the at least one connecting rod (108) is rotatably coupled to a second shaft (318).

[0043] Now referring to FIGS. 4a and 4b, the mounting assembly (100) further comprises an actuator unit (300) having an enclosure (302). The enclosure (302) is defined with a wall (302a) to securely support all the components of the actuator unit (300) and a cover (302b) to enclose all the components (as shown in Fig. 2b). The first shaft (310) and the second shaft (318) are disposed within an actuator unit (300) and extends outwardly from the actuator unit (300). The first shaft (310) is defined within the enclosure (302). The first shaft (310) is rotatably coupled to the at least one telescopic rod (104) at the second end (104b) through a coupling (310a) or a bearing. A first motor (304) is disposed within the enclosure (302) and is mounted to the wall (302a). The first motor (304) is connected to a first worm gear (306). The first worm gear (306) is further coupled to a first gear (308). The first gear (308) is defined with the first shaft (310) at a central portion of the first gear (308). The first motor (304) is configured to drive the first worm gear (306) which in turn rotates the first gear (308). The first gear (308) is configured to actuate the first shaft (310) such that, the at least one telescopic rod (104) is displaced around an axis (A-A) of the first shaft (310). In other words, the at least one telescopic rod (104) is rotated around the axis (A-A) to position the imaging device (102) at a predefined angle ranging between 0-360°. In an embodiment, the imaging device (102) is positioned opposite to the at least one display unit (440) to capture a data displayed on the at least one display unit (440) of the electronic cabinet (400). A second motor (312) is connected to a second worm gear (314). The second motor (312) is mounted to the wall (302a) such that, the second motor (312) is positioned below the first motor (304). In an embodiment, the second motor (312) is oriented perpendicular to the first motor (304). The second worm gear (314) is coupled to a second gear (316). The second shaft (318) is defined on a portion of the second gear (316) and the second shaft (318) is offset from an axis (C-C) of the second gear (316). The second shaft (318) extends away from the portion of the second gear (316) to outside the enclosure (302). The second motor (312) is configured to drive the second worm gear (314) which in turn actuates the second gear (316). The second gear (316) further actuates the second shaft (318) in a circular axis (B) to displace the at least one connecting rod (108) linearly. The cover (302b) is defined with a slot (305) which conforms to the circular axis (B) to allow the actuation of the second shaft (318) by the second motor (312). The rotational motion of the second shaft (318) is converted to a reciprocating motion of the at least one connecting rod (108). Subsequently, the at least one connecting rod (108) linearly displaces the first rod (105) of the at least one telescopic rod (104) to adjust the length (L) of the at least one connecting rod (108). The actuation of the second shaft (318) enables to position the imaging device (102) at a required distance from the at least one display unit (440) of the electronic cabinet (400). In an embodiment, at least one pair of electromagnets (325) are disposed within the actuator unit (300) to magnetically attach the actuator unit (300) to the electronic cabinet (400). However, this cannot be construed as a limitation and the actuator unit (300) may be attached to the electronic cabinet (400) through any suitable connecting mechanism such as bolting, riveting, screwing etc.

Still referring to FIG. 4a, the actuator unit (300) further comprises a control unit (320) that is communicatively coupled to the first motor (304), the second motor (312) and the imaging device (102). In an embodiment, the control unit (320) is disposed within the actuator unit (300) and is electrically connected to the first motor (304), the second motor (312), the at least one pair of electromagnets (325) and the imaging device (102) through a plurality of cables or wires (326). The control unit (320) is configured to receive a command signal or an actuation signal from a remote location and actuates the first motor (304) to rotate the at least one telescopic rod (104) about the axis (A-A) to position the imaging device (102). The control unit (320) is also configured to actuates the second motor (312) to linearly displace the first rod (105) linearly to adjust a length (L) of the at least one telescopic rod (104). Further, the control unit (320) is configured to determine a displacement of the at least one telescopic rod (104) and the at least one connecting rod (108) to evaluate a position of the support structure (200). In an embodiment, the control unit (320) evaluates the position of the support structure (200) according to an operation time of the first motor (304) and the second motor (312). In an embodiment, the control unit (320) is configured to determine an initial position of the imaging device (102). Subsequently, the control unit (320) automatically actuates the at least one telescopic rod (104) and/or the at least one connecting rod (108) to adjust the imaging device (102) to a required position for recording the data. As an example, if the support structure (200) is at an angle say ‘α’ such that imaging device (102) cannot capture the data from the at least one display unit (440) i.e. if the imaging device (102) is away from a field of view of the at least one display unit (440). The control unit (320) detects the position of the support structure (200) and automatically actuates the first motor (304) and the second motor (312) to displace the at least one telescopic rod (104) in order to position the support structure (200) at a predefined angle say ‘β’ such that the imaging device (102) captures the data from the at least one display unit (440). In an embodiment, the data regarding the predefined angle is stored in the control unit (320). In an embodiment, the control unit (320) sends out a signal to an operator corresponding to the position of the support structure (200) which will be explained in detail in the following paragraphs.

[0044] Furthermore, referring to FIG. 6, the control unit (320) comprises, a processor (322) and a memory unit (323) is communicatively coupled to the processor (322). The processor (322) may be implemented as one or more microprocessors, microcomputers, microcontrollers, digital signal processors, central processing units, state machines, logic circuitries, and/or any devices that manipulate signals based on operational instructions. The memory unit (323) stores processor-executable instructions, which, on execution, causes the processor (322) to receive one or more command signals associated with the operator inputs from a user interface unit (324) of the system (500). In an embodiment, the user interface unit (324) is communicatively coupled to the control unit (320) to receive inputs from the operator to activate the actuator unit

(300) to position the imaging device (102) at a required position. The inputs received from the operator include, but are not limited to, a login credentials such as username and password and details regarding the electronic cabinet (400), area, location, angle of positioning of the support structure (200) and any essential details that are required to monitor a particular electronic cabinet (400) and actuate the mounting assembly (100). In an embodiment, the user interface unit (324) may be an input/ output device (not shown in FIGS.) to display graphical information related to the readings of the electronic cabinet (400). The user interface unit (324) displays an indication with respect to the particular electronic cabinet (400) that is required to be monitored.

[0045] Further, the system (500) includes a communication module (not shown in FIGS.) that facilitates the interaction of the system (500) with an application installable on a computing device [interchangeably referred to as a remote device (321)], through which an operation of the system (500) may be configured and controlled remotely. In an embodiment, the remote device (321) includes, but is not limited to laptop computer, a desktop computer, a notebook, a workstation, a mainframe computer, a server, a network server, cloud, hand-held device, wearable device and the like. The communication of the system (500) with the remote device (321) may occur through a wide variety of networks and protocol types, including wired networks, for example, LAN, cable, etc., and wireless networks, such as WLAN, cellular, or satellite. In an embodiment, the communication may occur via Bluetooth Low Energy, LoRa, ZigBee, and the like. In an embodiment, a display (not shown in FIGS.) of the computing device may also function as the user interface unit (324).

[0046] Referring to FIG. 5, a method (600) of operation of the system (500) is now explained. The mounting assembly (100) is connected to the at least one of the four walls (401c) of the electronic cabinet (400). Initially at step (601), a connection is established between the system (500) and the remote device operable by the operator through the communication module. After an appropriate connection is established, the control unit (320) determines the initial position of the at least one telescopic rod (104) and the support structure- (200). At step (602), the operator from the remote location provides one or more command or actuation signals through the user interface unit (324) to operate the mounting assembly (100). Based on the one or more actuation signals received from the user interface unit (324), the control unit (320) receives the one or more actuation signals corresponding to a position of the support structure (200) and the imaging device (102). The control unit (320) then compares the initial position of the support structure (200) with the actuation signal and actuates the actuator unit (300) to position the imaging device (102) at a required angle such that the imaging device (102) is opposite to the at least one display unit (440). In an embodiment, the at least one telescopic rod (104) is actuated to position the support structure (200) in the required angle. After positioning the support structure (200), at step (603), the imaging device (102) captures and records the data displayed on the at least one display unit (440) of the electronic cabinet (400). In an embodiment, the data recorded by the imaging device (102) may be in a form of photos and videos. At step (604), the data recorded by the imaging device (102) is transmitted to the operator at the remote location by the control unit (320) through the communication module. In an embodiment, the data is transmitted through at least one of wired or a wireless communication device (not shown in FIGS.) to monitor the electronic cabinet (400). Lastly, the data is stored in the memory of the control unit (320) to access upon requirement of the operator to monitor the electronic cabinet (400) in real-time from the remote location.

[0047] In an embodiment, system (500) is powered by an output of the electronic cabinet (400). In an embodiment, the output of the electronic cabinet (400) may be at least one of AC or DC power which may be supplied to the power distribution system. In an embodiment, a rechargeable battery (327) is disposed within the enclosure (302) of the actuator unit (300) to power the system (500).

[0048] In an embodiment, the support structure (200) may be accommodated with an alarm unit (not shown in FIGS.) that is configured to provide an alert to the operator in an event of theft or damage to the imaging device (102).

[0049] In an embodiments, a position sensor (not shown in FIGS.) may be installed on the at least one telescopic rod (104) and the position sensor may be communicatively coupled to the control unit (320) to evaluate the position of the support structure (200).

[0050] In an embodiment, the control unit (320) is configured to provide a signal to the operator when there is a defect in the electronic cabinet (400) such as power failure, failure of electrical components within the electronic cabinet (400) etc. or the electronic cabinet (400) stops working such that the operator may perform necessary maintenance and repairs.

[0051] In an embodiment, the system (500) along with the mounting assembly (100) can be operated from a remote location through at least one of a wireless communication or through an internet of things (IOT). This prevents the operator to repeatedly visit the location of the electronic cabinet (400) to take readings or to perform repairs to the electronic cabinet (400). Consequently, this reduces the costs associated with management and maintenance of the electronic cabinet (400).

[0052] It is to be understood that a person of ordinary skill in the art may develop a system (500) and a method (600) of similar configuration without deviating from the scope of the present disclosure. Such modifications and variations may be made without departing from the scope of the present disclosure. Therefore, it is intended that the present disclosure covers such modifications and variations provided they come within the ambit of the appended claims and their equivalents.

WE CLAIM:

1. A mounting assembly (100) for an imaging device (102), the mounting assembly (100) comprising:

   a support structure (200);

   at least one telescopic rod (104) defined with a first end (104a) and a second end (104b), the at least one telescopic rod (104) is attached to the support structure (200) at the first end (104a);

   at least one connecting rod (108) attached to the at least one telescopic rod (104);

   an actuator unit (300) comprising;

   an enclosure (302);

   a first shaft (310) defined within the enclosure (302), wherein the first shaft (310) is rotatably coupled to the at least one telescopic rod (104) at the second end (104b);

   a first motor (304) connected to the first shaft (310), the first motor (304) is configured to drive the first shaft (310) to actuate the at least one telescopic rod (104) about an axis (A-A);

   a second shaft (318) defined within the enclosure (302), wherein the second shaft (318) is rotatably coupled to the at least one connecting rod (108);

   a second motor (312) connected to the second shaft (318), the second motor (312) is configured to rotate the second shaft (318) about a circular axis (B) to linearly actuate the at least one telescopic rod (104); and

   wherein the at least one telescopic rod (104) actuates about the axis (A-A) and the circular axis (B) to displace the support structure (200) for positioning the imaging device (102).

2. The mounting assembly (100) as claimed in claim 1, comprises a control unit (320) disposed within the actuator unit (300) and wherein the control unit (320) is configured to:

   receive an actuation signal from a remote location corresponding to an actuation of the at least one telescopic rod (104);

   determine a displacement of the at least one telescopic rod (104) and the at least one connecting rod (108) to evaluate a position of the support structure (200);

actuate the at least one telescopic rod (104) about the axis (A-A) to rotate the support structure (200) at various angles; and

actuate the at least one connecting rod (108) to adjust a length (L) of the at least one telescopic rod (104) based on the actuation signal.

3. The mounting assembly (100) as claimed in claim 1, wherein the support structure (200) comprises:

   at least one housing (230) configured to receive the imaging device (102), wherein one face (231) of the at least one housing (230) is defined with a cut-out (232);

   a fixture (238) mounted to the at least one housing (230), wherein the fixture (238) is configured to securely support the imaging device (102),

   wherein the imaging device (102) comprises a mounting member (246) configured to couple with the fixture (238) using a fastener (245).

4. The mounting assembly (100) as claimed in claim 1, wherein the at least one telescopic rod (104) comprises a first rod (105) connected to the support structure (200) and a second rod (106) connected to the first shaft (310), wherein the second rod (106) is slidably disposed within the first rod (105).

5. The mounting assembly (100) as claimed in claim 1, wherein the actuator unit (300) comprises:

   a first worm gear (306) disposed within the enclosure (302) and connected to the first motor (304);

   a first gear (308) coupled to the first worm gear (306), wherein the first worm gear (306) is configured to drive the first gear (308) and the first shaft (310);

   a second worm gear (314) connected to the second motor (312);

   a second gear (316) coupled to the second worm gear (314), wherein the second worm gear (314) is configured to actuate the second gear (316) to rotate the second shaft (318) about the circular axis (B);

   wherein the second shaft (318) is configured to convert the rotation of the second worm gear (314) into the linear actuation of the first rod (105) via the at least one connecting rod (108).

6. The mounting assembly (100) as claimed in claim 5, wherein the actuator unit (300) comprises at least one pair of electromagnets (325) to enable connection of the actuator unit (300) with an electronic cabinet (400).

7. A system (500) for remotely monitoring an electronic cabinet (400), the system (500) comprises:

the electronic cabinet (400) having at least one display unit (440) to display a data;

a mounting assembly (100) connectable to the electronic cabinet (400), the mounting assembly (100) comprising:

a support structure (200) configured to securely support an imaging device (102); wherein the support structure (200) is configured to orient the imaging device (102) opposite to the at least one display unit (440) of the electronic cabinet (400);

at least one telescopic rod (104) is defined with a first end (104a) and a second end (104b), the at least one telescopic rod (104) is coupled to the support structure (200) at the first end (104a);

at least one connecting rod (108) is connected to the at least one telescopic rod (104) at the second end (104b);

an actuator unit (300) comprising;

an enclosure (302);

a first shaft (310) defined within the enclosure (302), wherein the first shaft (310) is rotatably coupled to the at least one telescopic rod (104) at the second end (104b);

a first motor (304) connected to the first shaft (310), the first motor (304) is configured to drive the first shaft (310) to actuate the at least one telescopic rod (104) about an axis (A-A);

a second shaft (318) connected to the at least one connecting rod (108), the second shaft (318) is rotatably disposed within the enclosure (302);

a second motor (312) connected to the second shaft (318), the second motor (312) is configured to rotate the second shaft (318) about a circular axis (B) to linearly actuate the at least one telescopic rod (104);

wherein the at least one telescopic rod (104) actuates about the axis (A-A) and the circular axis (B) to displace the support structure (200) for positioning the imaging device (102) opposite to the at least one display unit (440) to capture the data displayed on the at least one display unit (440);

a control unit (320) disposed within the actuator unit (300) and the control unit (320) is configured to:

receive an actuation signal from a remote location corresponding to an actuation of the at least one telescopic rod (104);

determine a displacement of the at least one telescopic rod (104) and the at least one connecting rod (108) to evaluate a position of the support structure (200);

actuate the at least one telescopic rod (104) about the axis (A-A) to position the support structure (200); and

actuate the at least one connecting rod (108) to adjust a length (L) of the at least one telescopic rod (104) based on the actuation signal.

8. The system (500) as claimed in claim 7, wherein the control unit (320) is configured to transmit the data recorded by the imaging device (102) to an operator at the remote location through at least one of wired or a wireless communication device to monitor the electronic cabinet (400).

9. The system (500) as claimed in claim 7, wherein the control unit (320) is configured to determine an initial position of the imaging device (102) and automatically actuate the at least one telescopic rod (104) and the at least one connecting rod (108) to adjust the imaging device (102) to a required position for recording the data.

10. A method (600) for operating and monitoring an electronic cabinet (400), the method (600) comprises:

establishing a connection, by a communication module between a remote device and the electronic cabinet (400) having a control unit (320) of a mounting assembly (100);

providing an actuation signal by the remote device to the control unit (320);

actuating by the control unit (320), an actuator unit (300) of the mounting assembly (100) to displace a support structure (200) at a predefined angle to position an imaging device (102) opposite to an at least one display unit (440) of the electronic cabinet (400);

capturing, by the imaging device (102), a data displayed on the at least one display unit (440) of the electronic cabinet (400); and

storing and retrieving data captured by the imaging device (102) through the communication module from a remote location to monitor the electronic cabinet (400).

Dated this 19th day of June 2023

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ABSTRACT

A MOUNTING ASSEMBLY FOR IMAGING DEVICE TO REMOTELY MONITOR ELECRONIC CABINET AND A SYSTEM THEREOF

Present disclosure discloses a mounting assembly (100) for an imaging device (102) to monitor an electronic cabinet (400) from a remote location and a system (500) thereof. The mounting assembly comprises a support structure (200) and at least one telescopic rod (104) attached to the support structure. At least one connecting rod (108) is attached to the at least one telescopic rod. An actuator unit (300) comprises a first shaft (310) and a second shaft (318) rotatably coupled to the telescopic rod and the connecting rod respectively. A first motor (304) drives the first shaft to actuate the at least one telescopic rod about an axis (A-A). A second motor (312) rotates the second shaft about a circular axis (B) to actuate the at least one telescopic rod about the axis and the circular axis to displace the support structure for positioning the imaging device at a predefined angle.

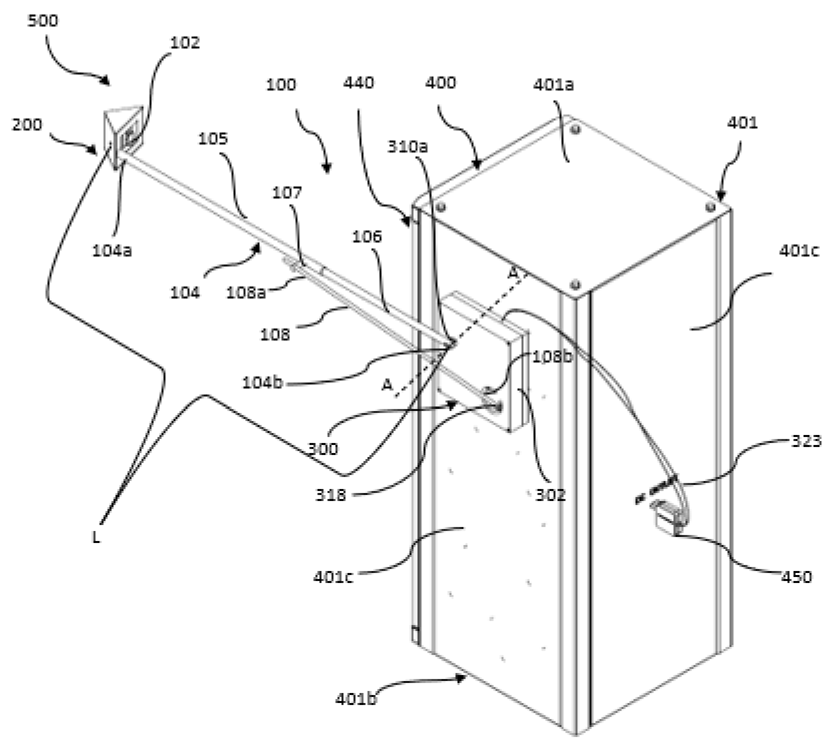

FIG. 1

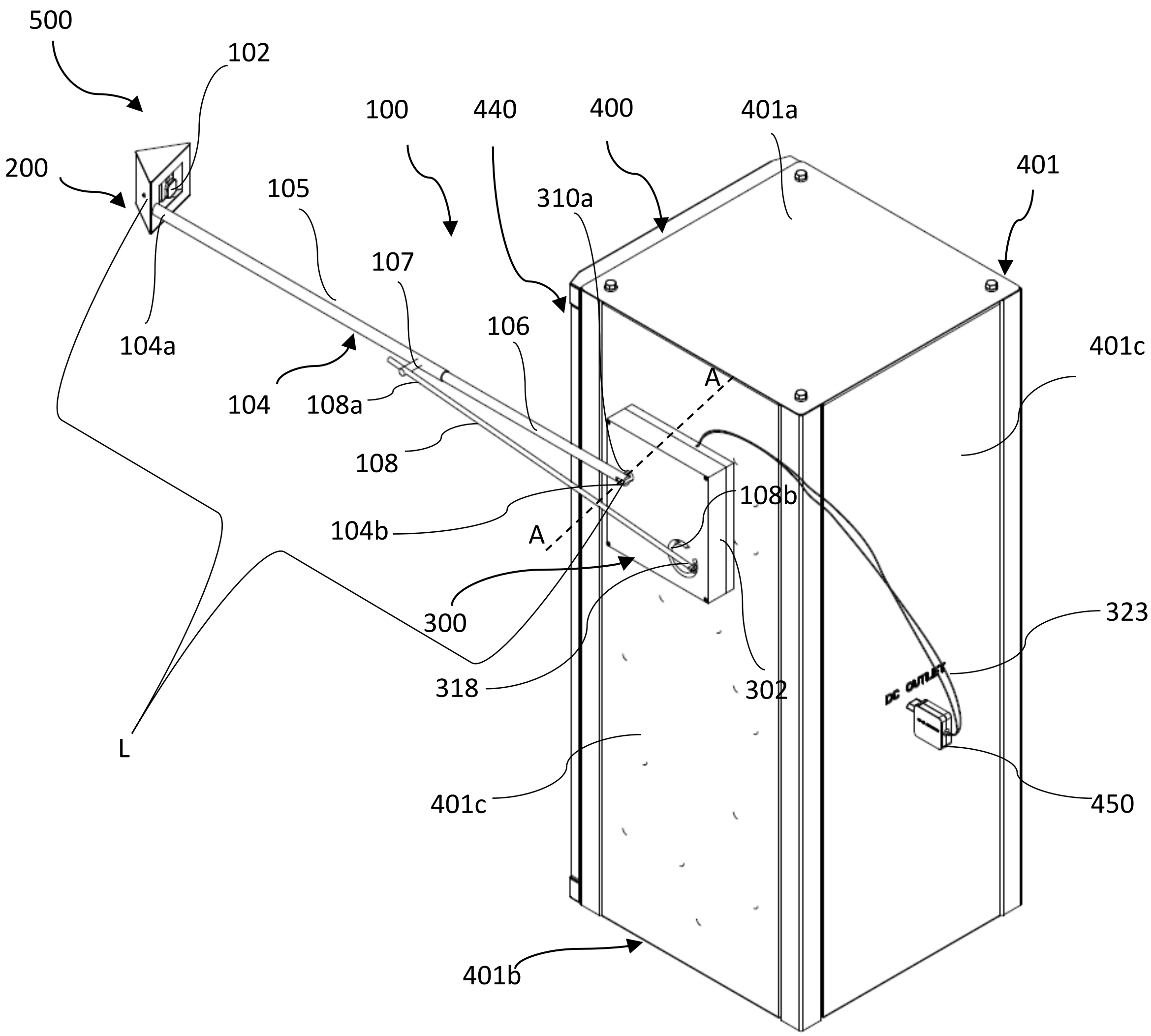

FIG. 1

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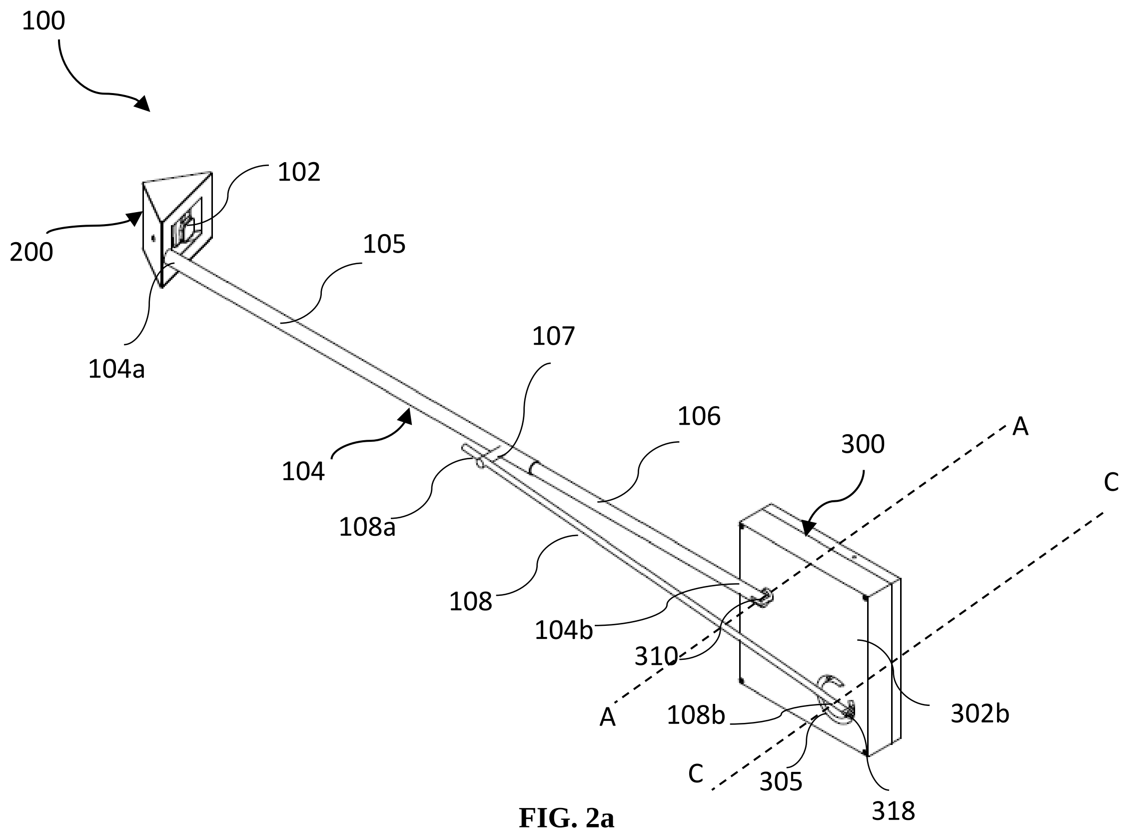

FIG. 2a

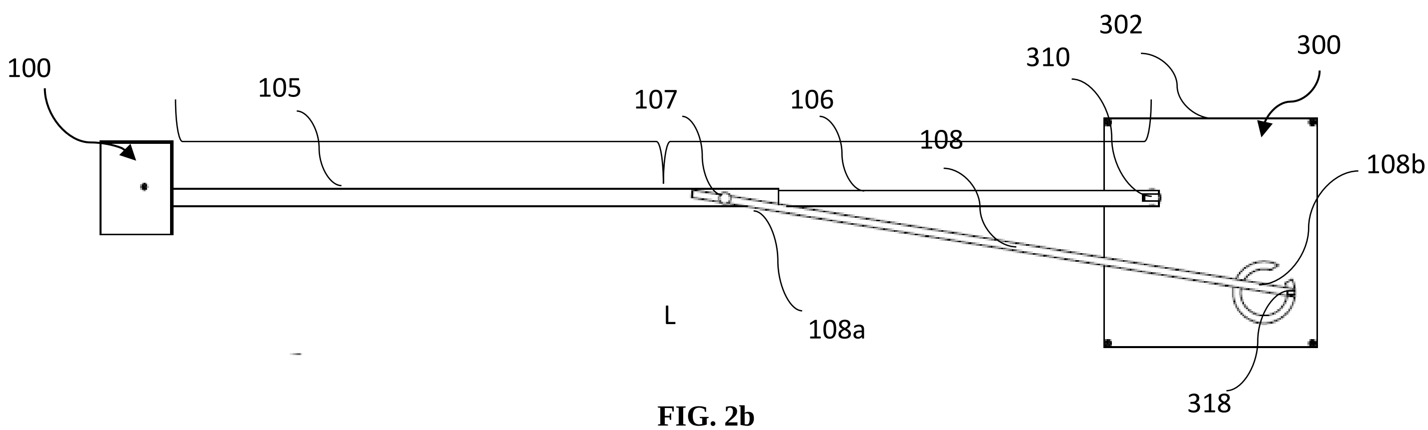

FIG. 2b

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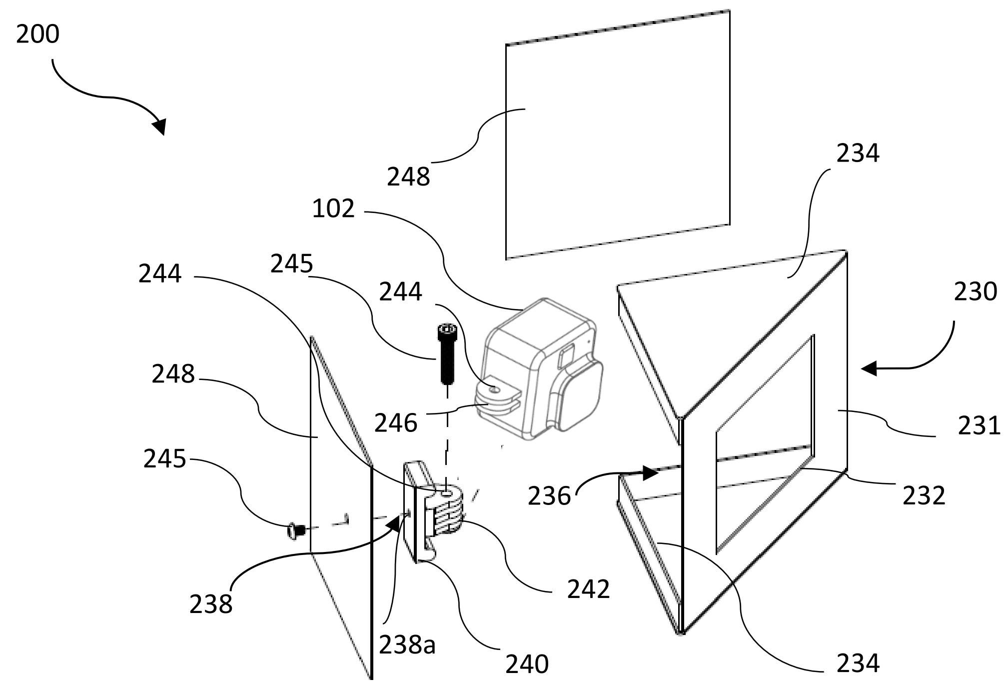

FIG. 3a

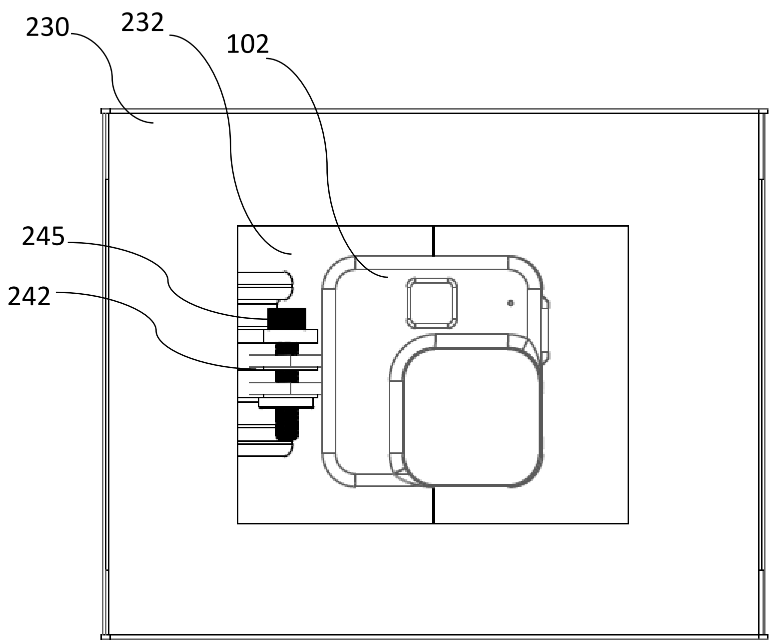

FIG. 3b

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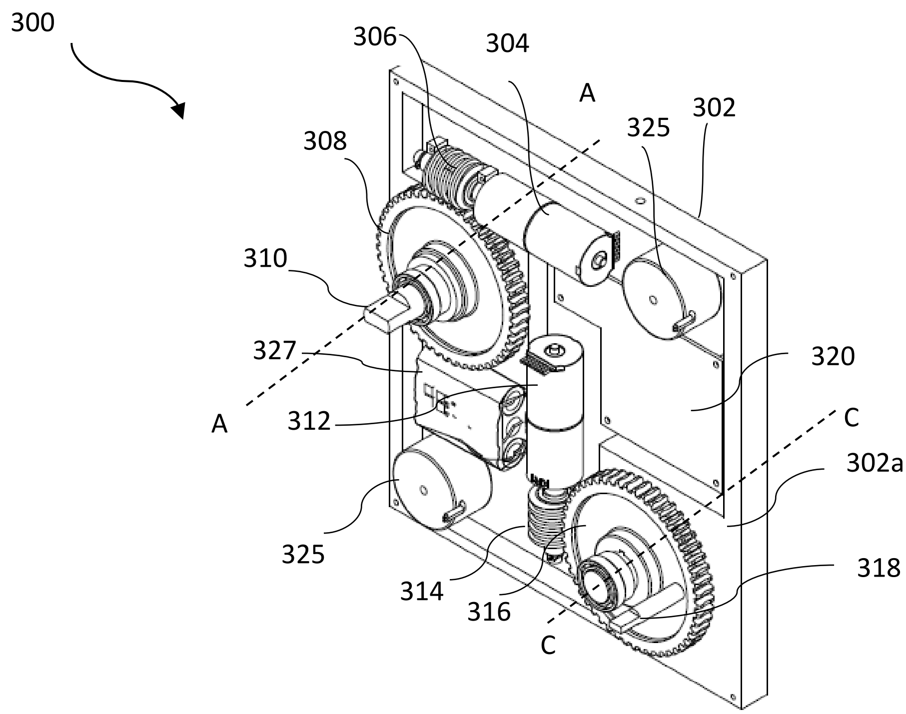

FIG. 4a

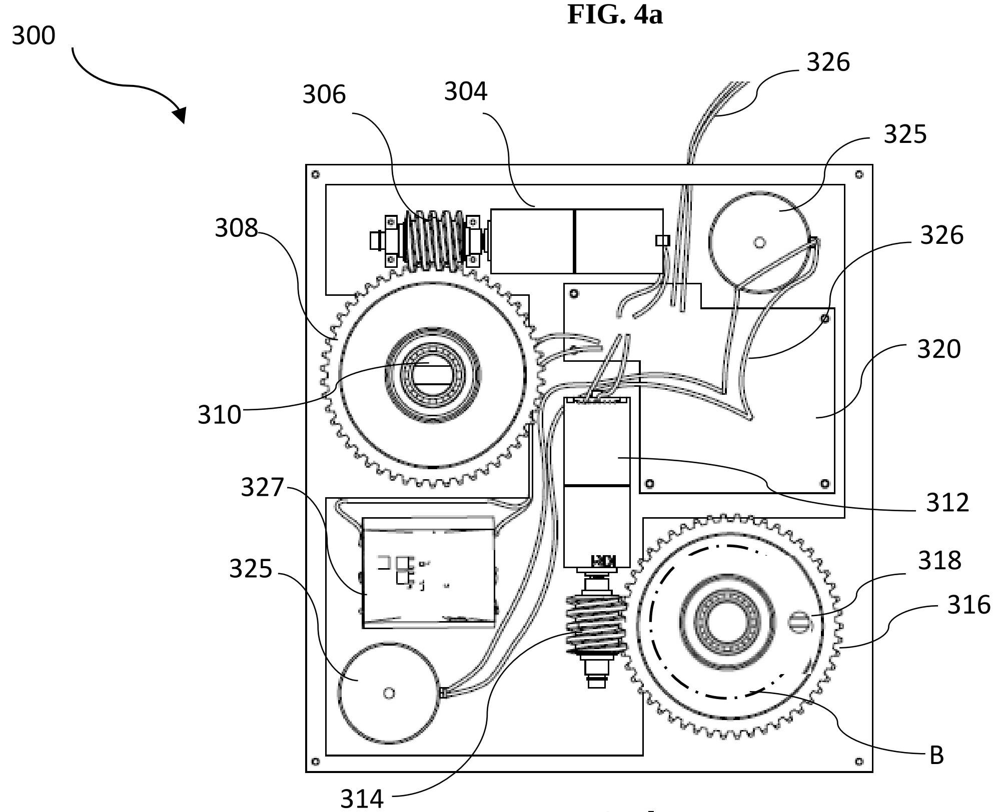

FIG. 4b

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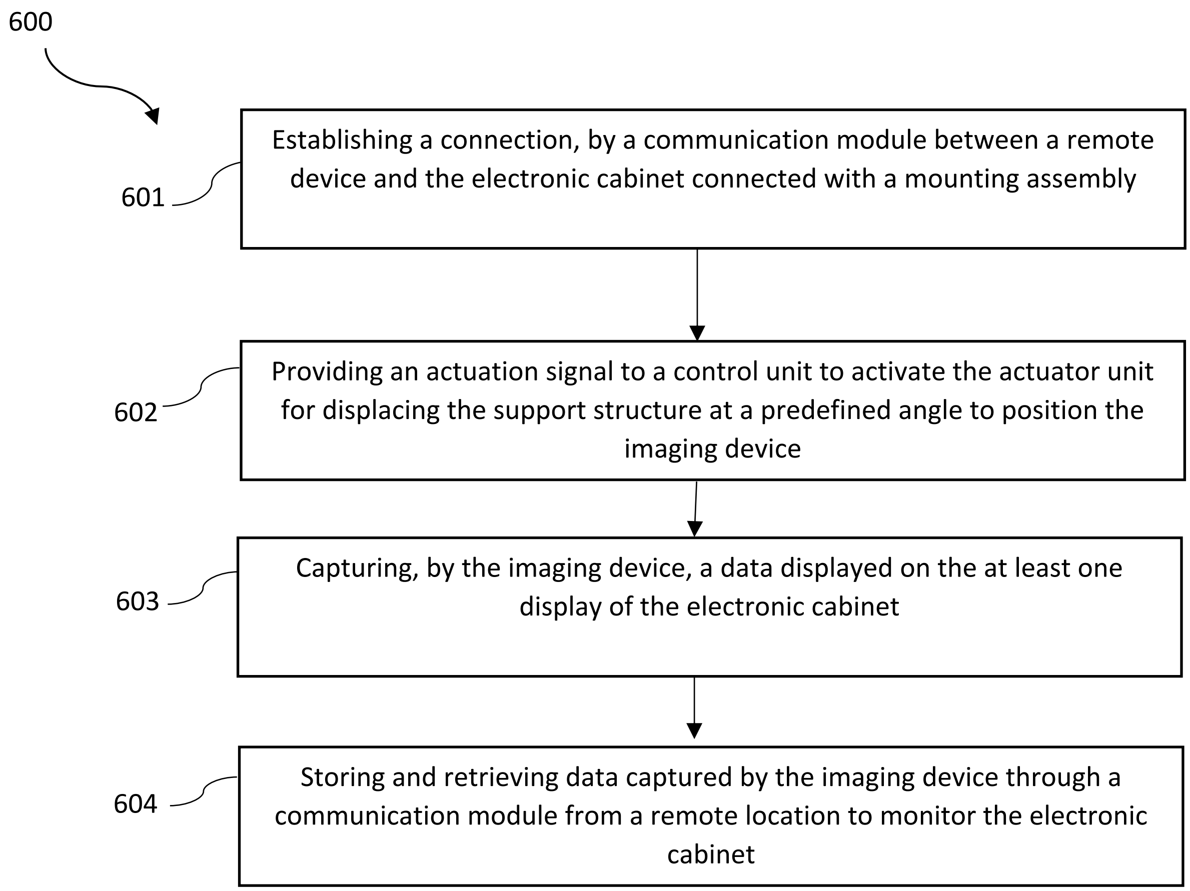

FIG. 5

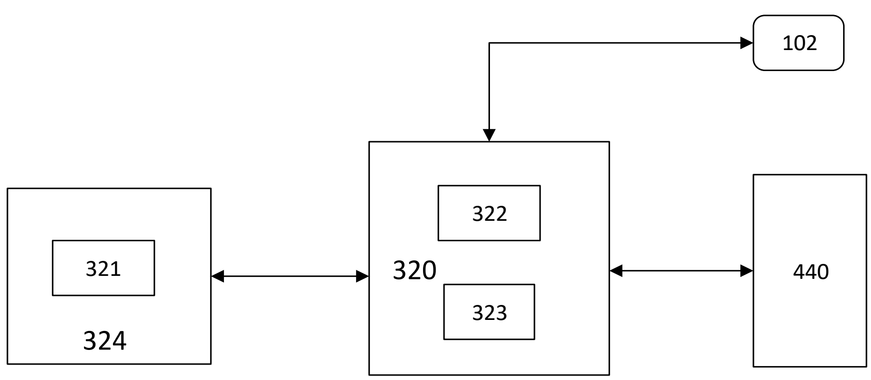

FIG. 6

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