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(54) **MOTORIZED MOUNT FOR SEATING SYSTEM**

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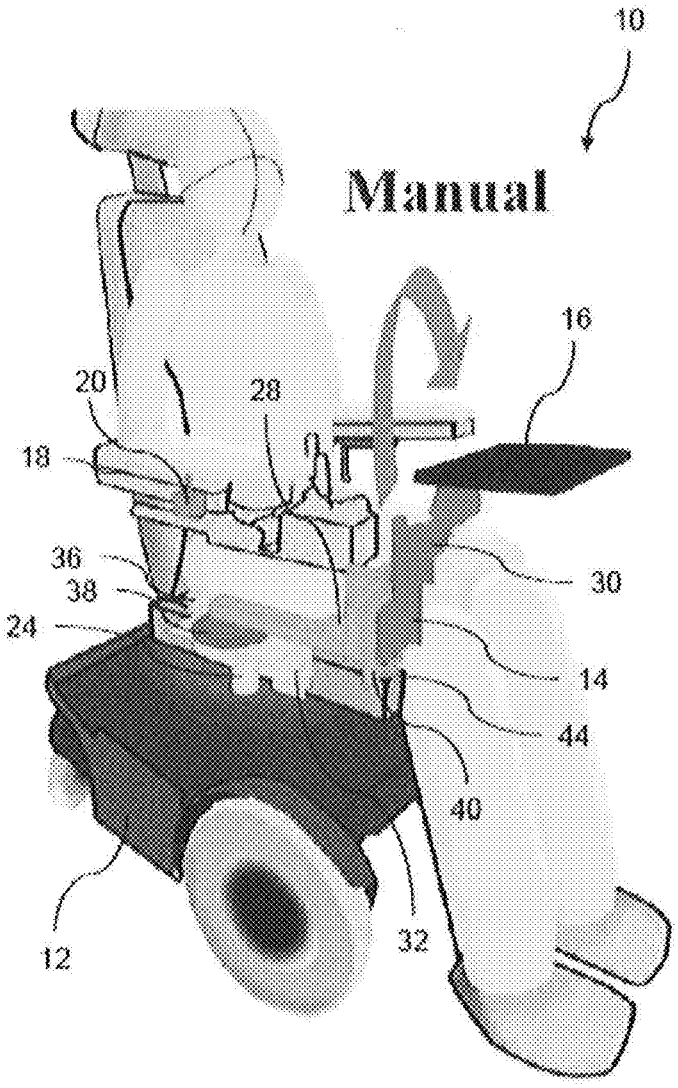
(52) **U.S. Cl.**

CPC ***F16M 13/022*** (2013.01); ***B60R 9/00*** (2013.01)

USPC **361/679.58**

(57) **ABSTRACT**

The present disclosure illustrates a motorized mount with a plurality of degrees of freedom coupled to a seating system.



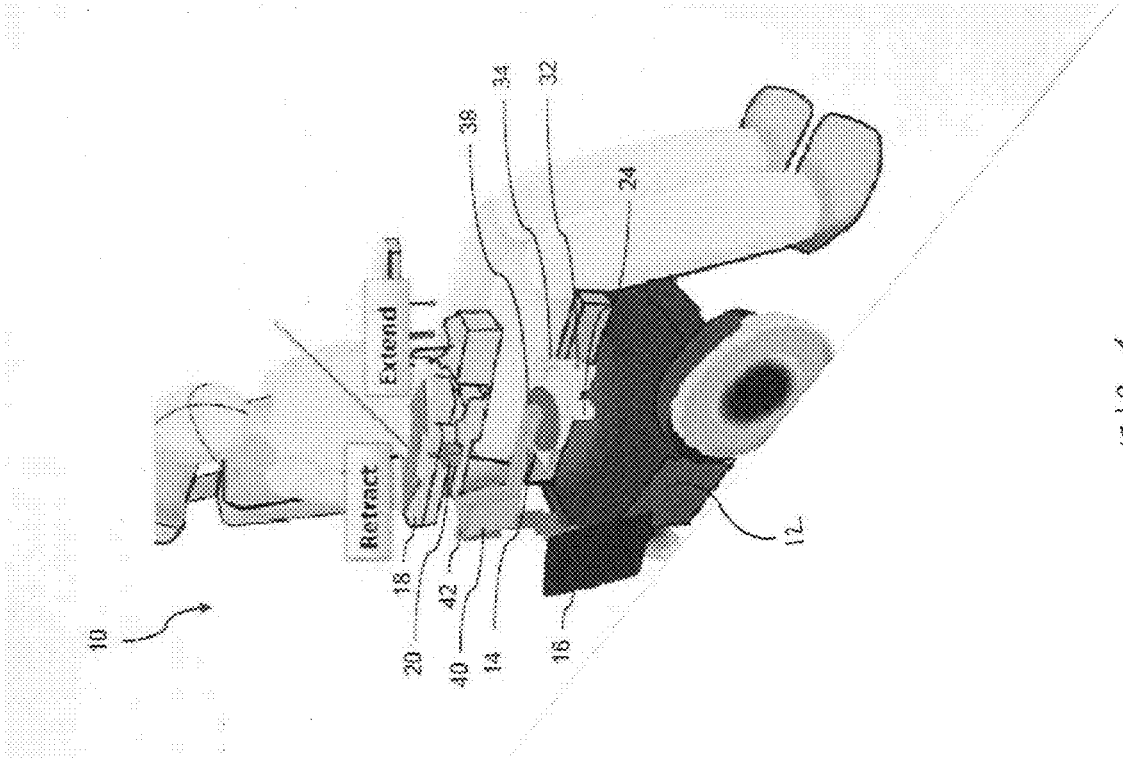


FIG. 1

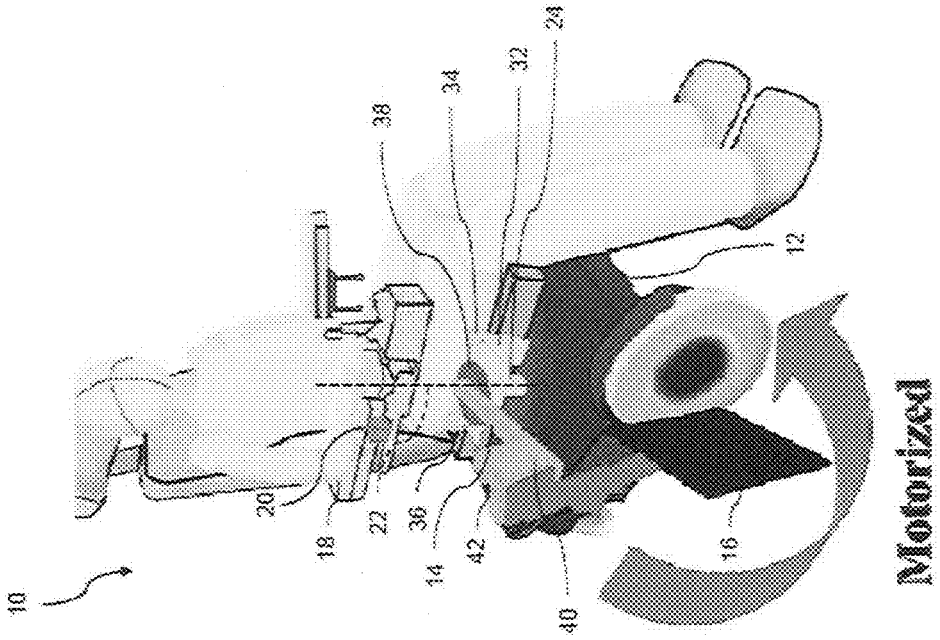


FIG. 2

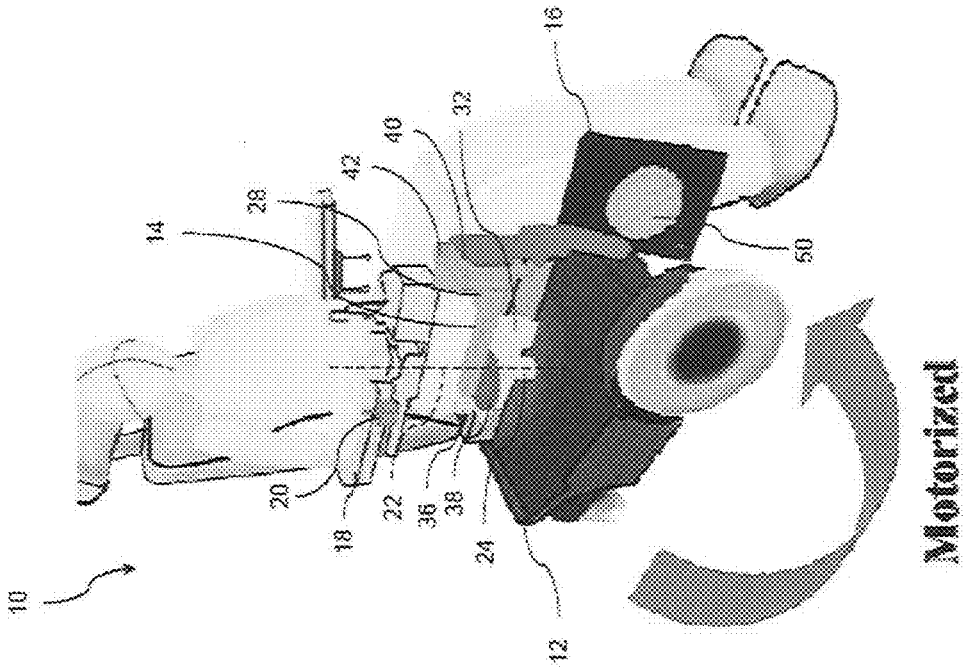


FIG. 3

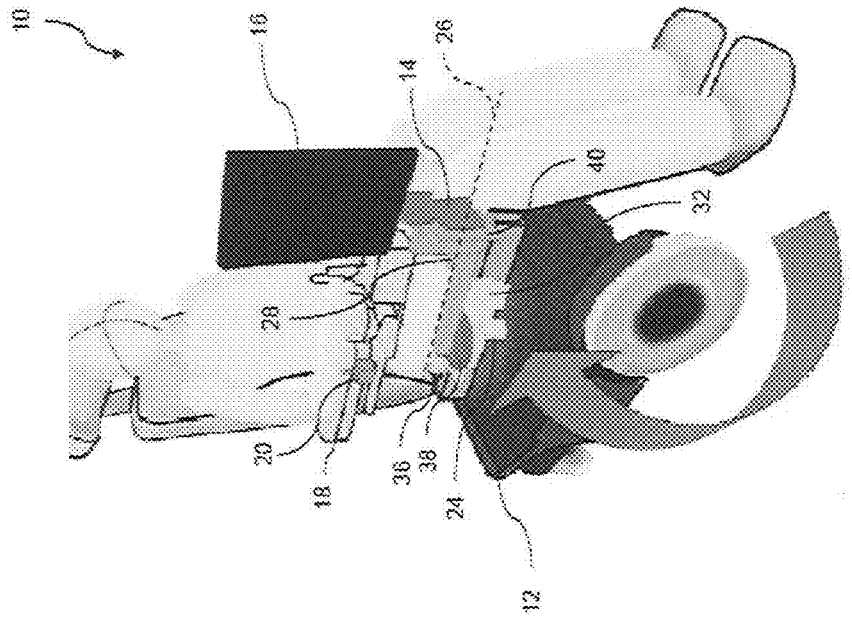


FIG. 4

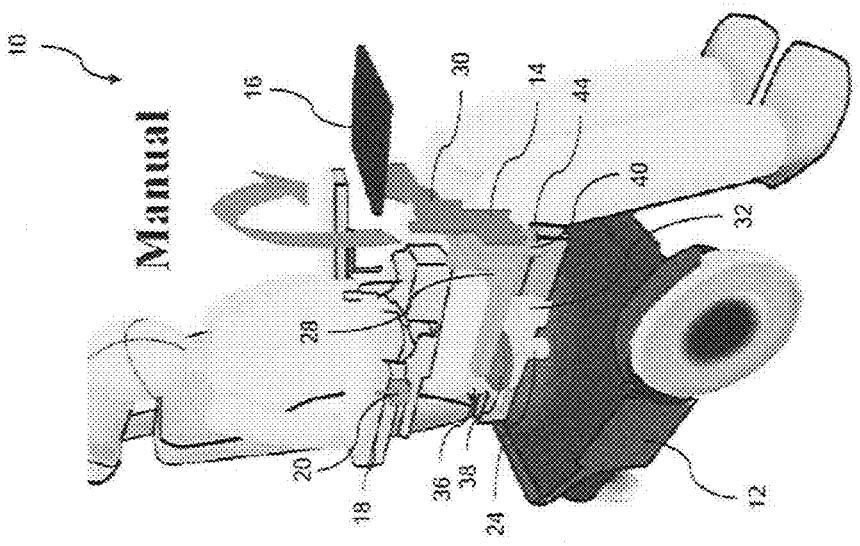


FIG. 5

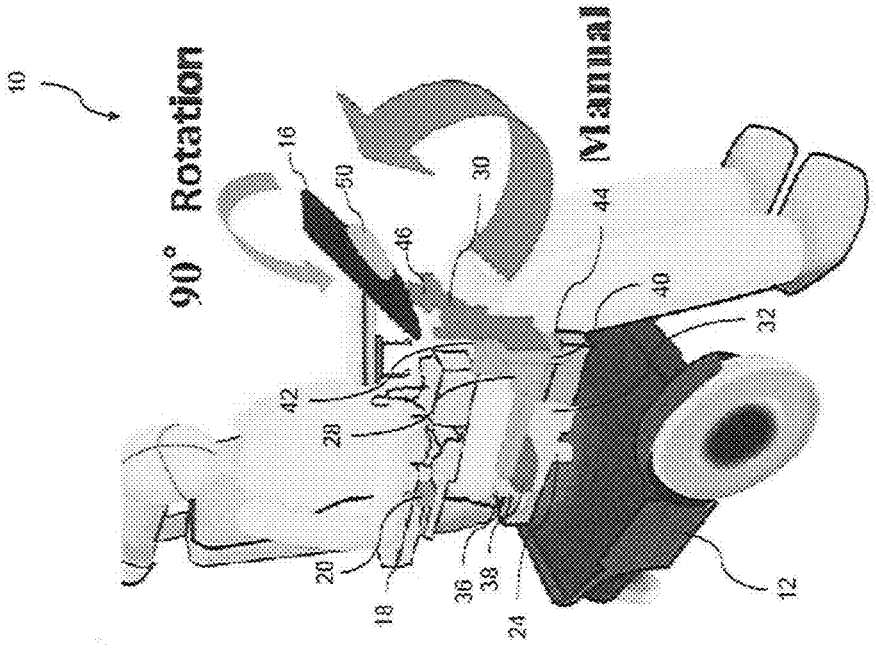


FIG. 6

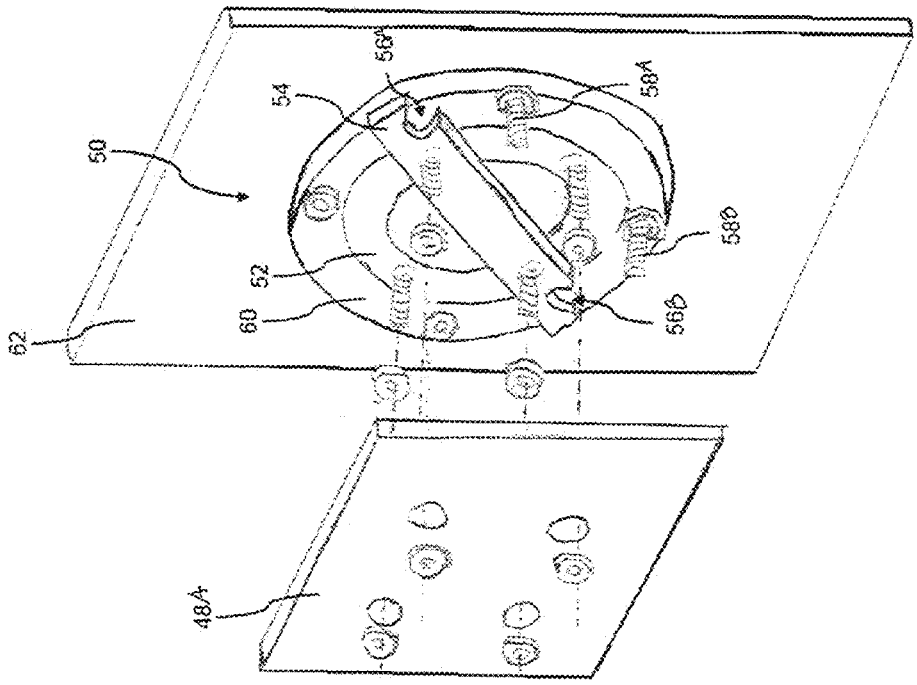


FIG. 7

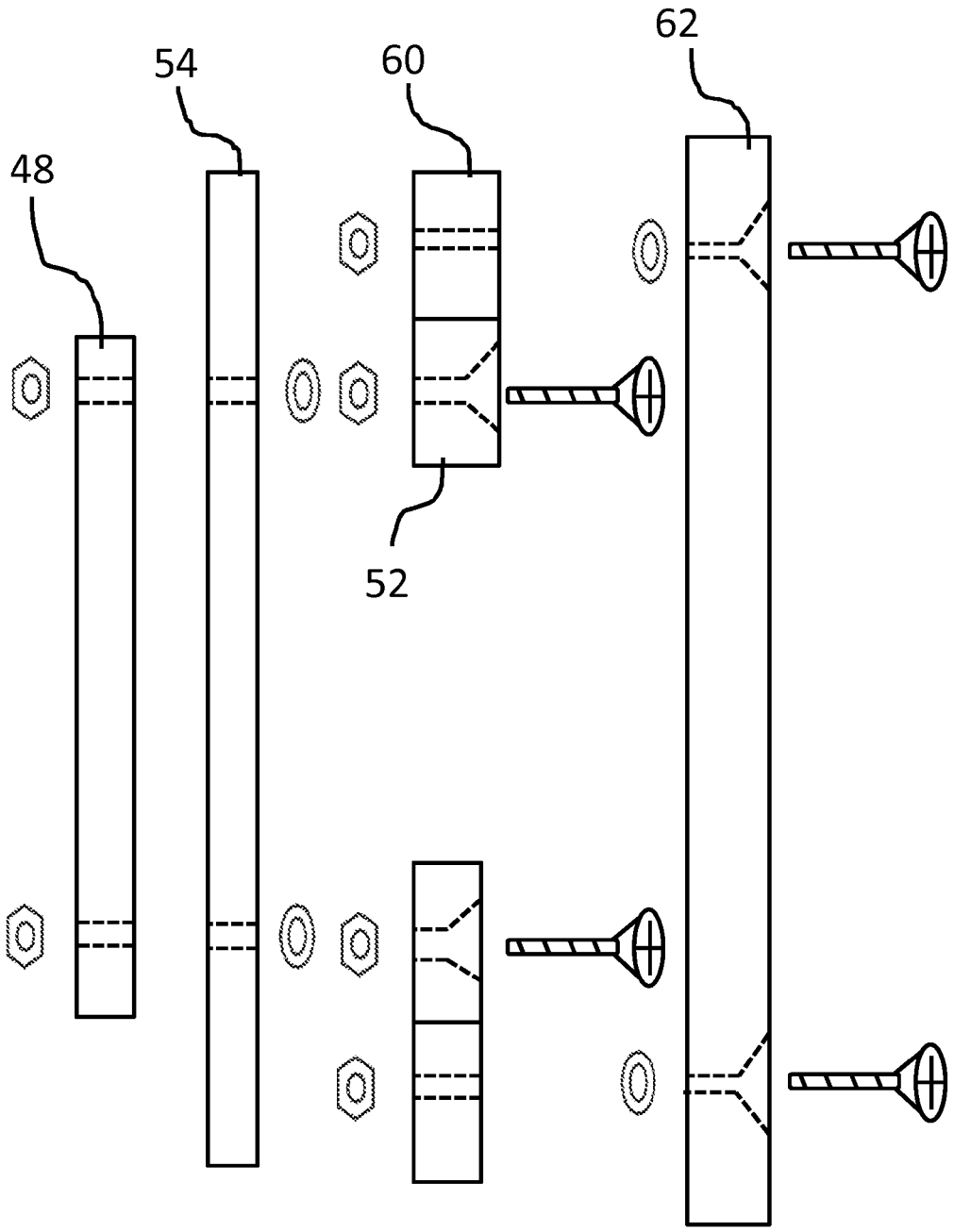


FIG. 8

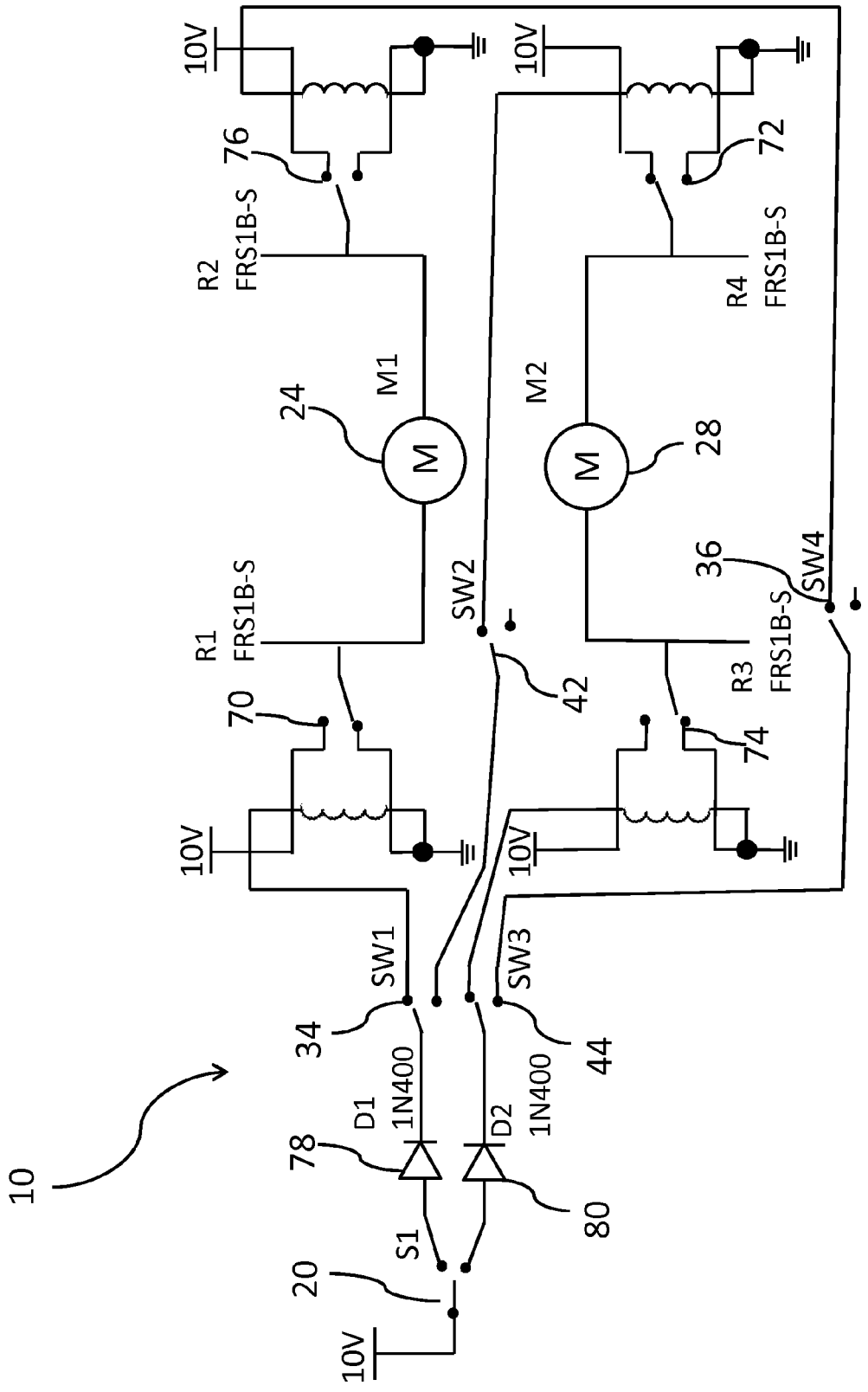

10
10V
20
S1
78
D1
1N400
80
D2
1N400
34
SW1
44
SW3
42
SW2
36
SW4
70
74
R1
FRS1B-S
R2
FRS1B-S
R3
FRS1B-S
R4
FRS1B-S
76
72
24
M1
28
M2
M

FIG. 9

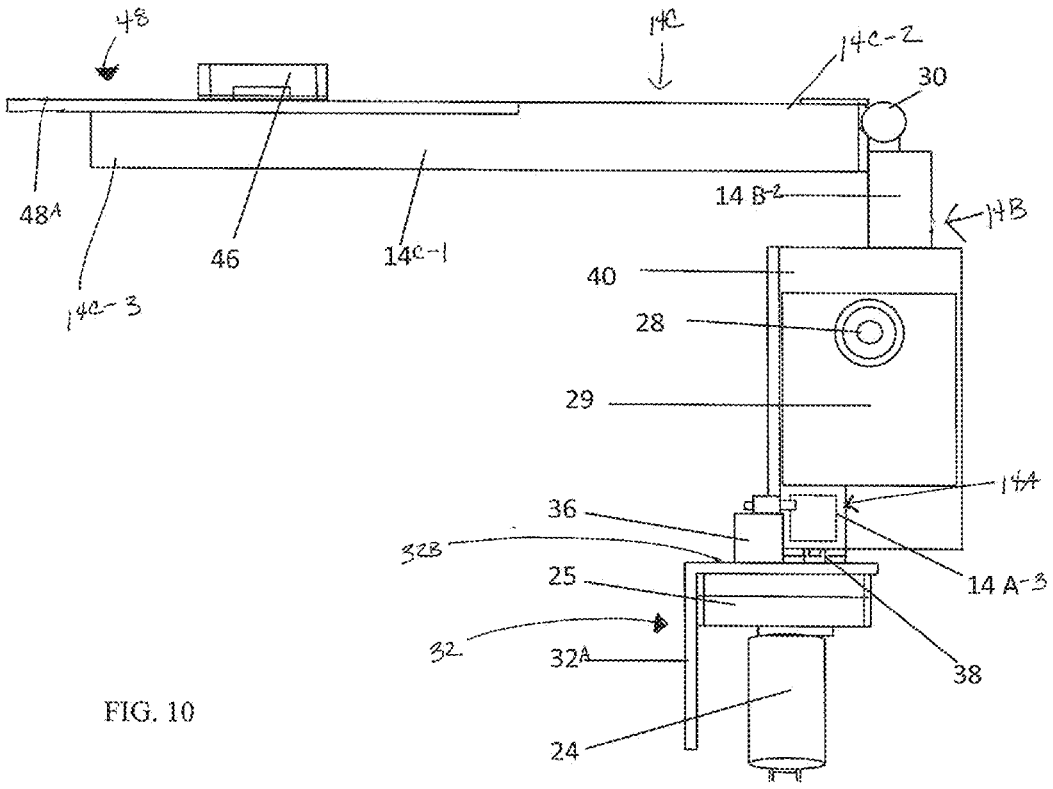

48
14C
14C-2
30
48A
46
14C-1
14B-2
14B
14C-3
40
28
29
14A
36
32B
25
14A-3
32
32A
38
24

FIG. 10

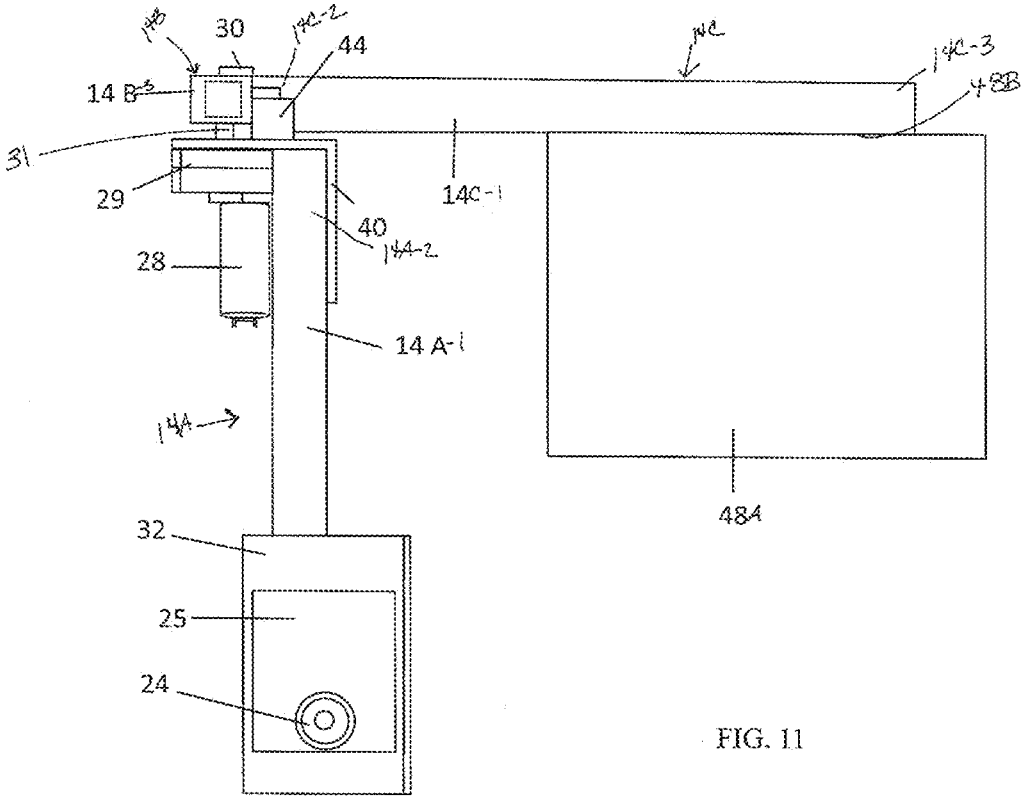


FIG. 11

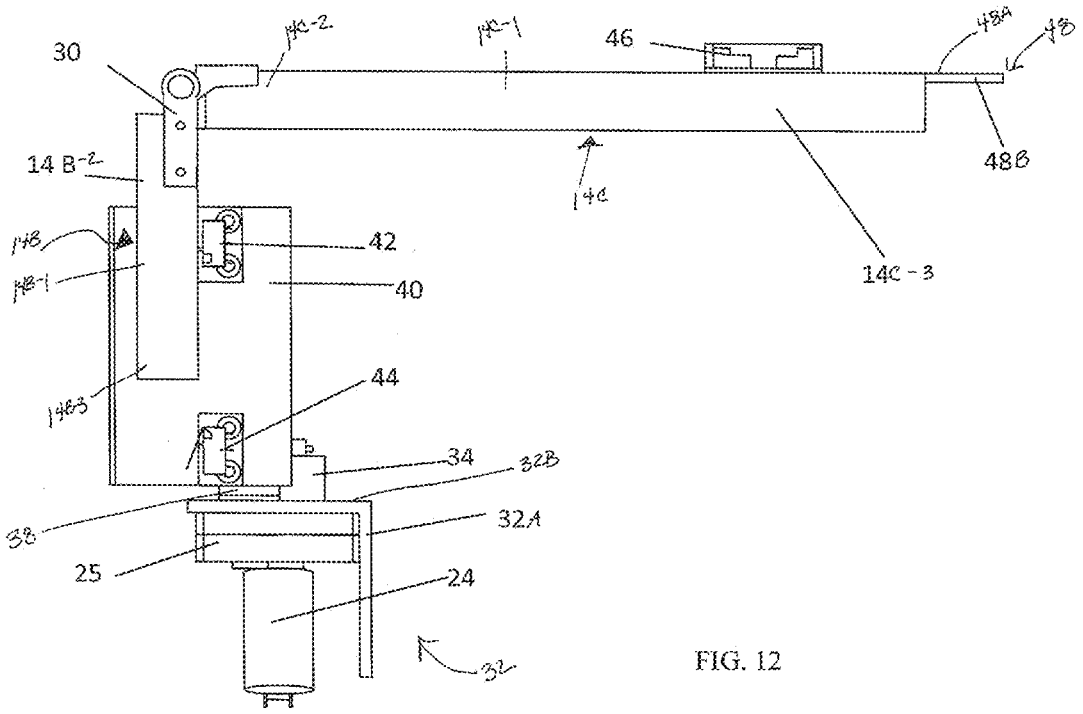


FIG. 12

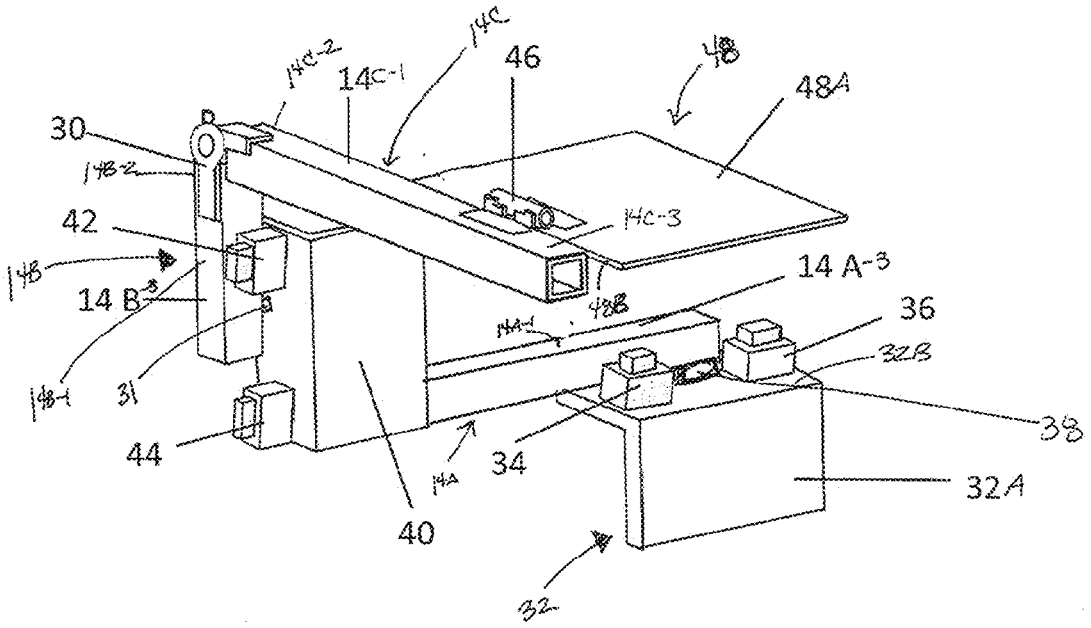

14C
14C-2
14C-1
46
48
48A
30
14B-2
42
14C-3
14B
14 A-3
14 B-3
48B
14A-1
36
32B
14B-1
31
38
44
34
14A
32A
40
32

FIG. 13

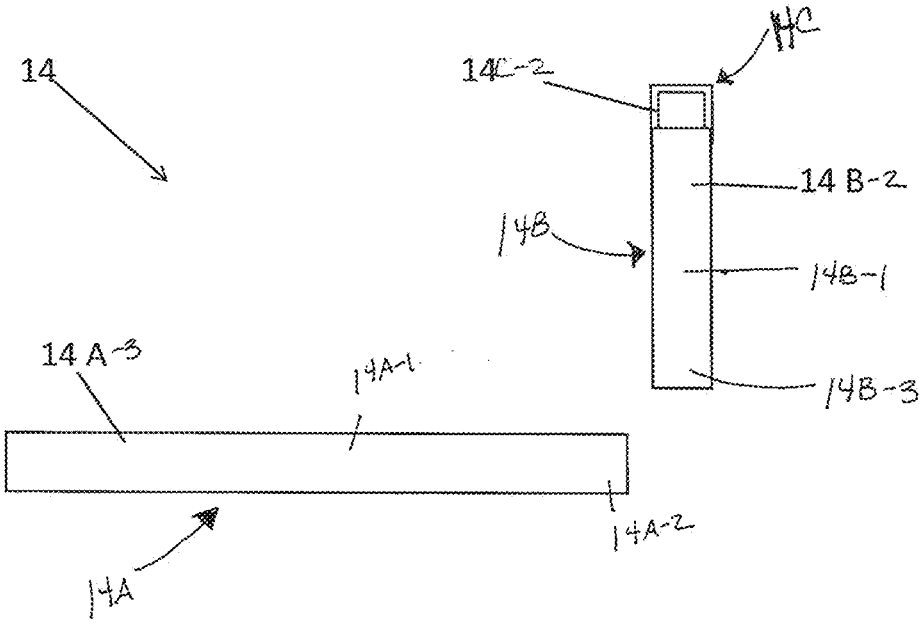


FIG. 14

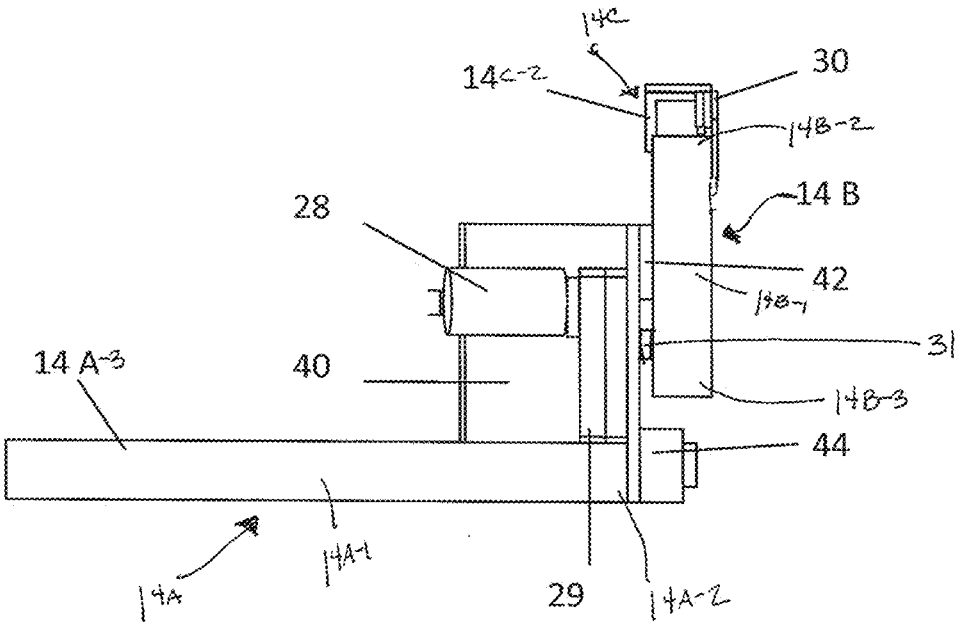

14C
14C-2
30
14B-2
14 B
28
42
14B-1
31
14 A-3
40
14B-3
44
14A
14A-1
29
14A-2

FIG. 15

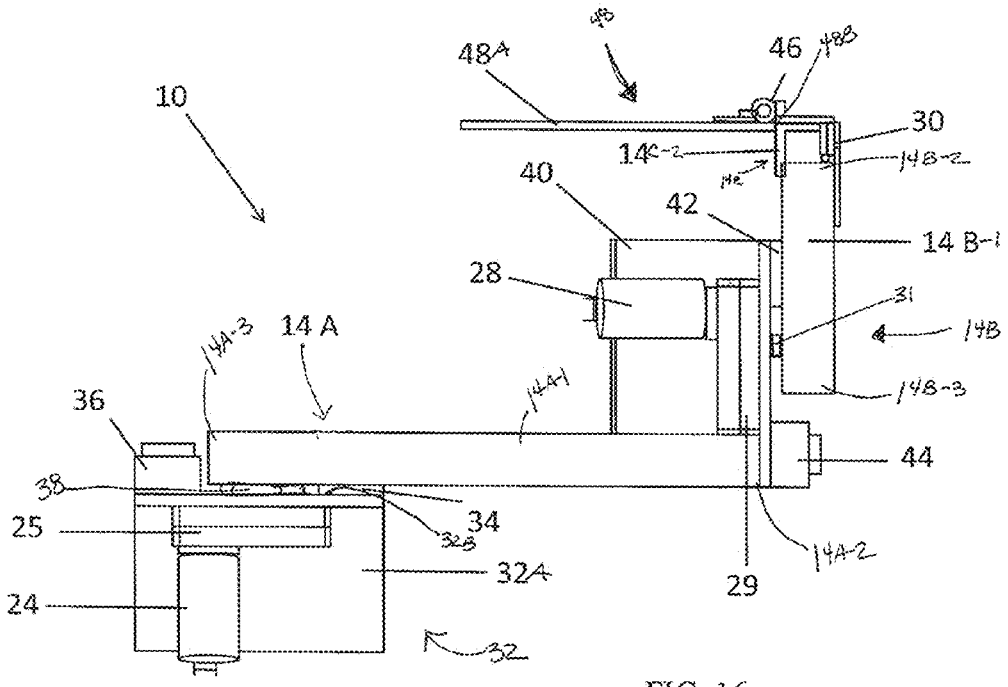


FIG. 16

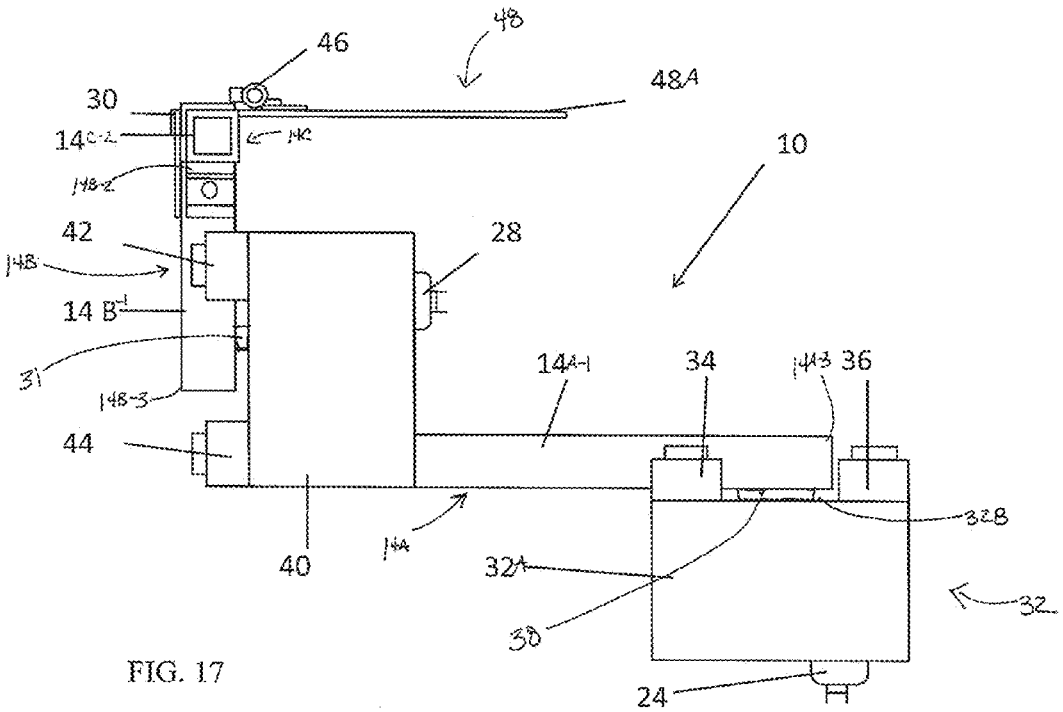


FIG. 17

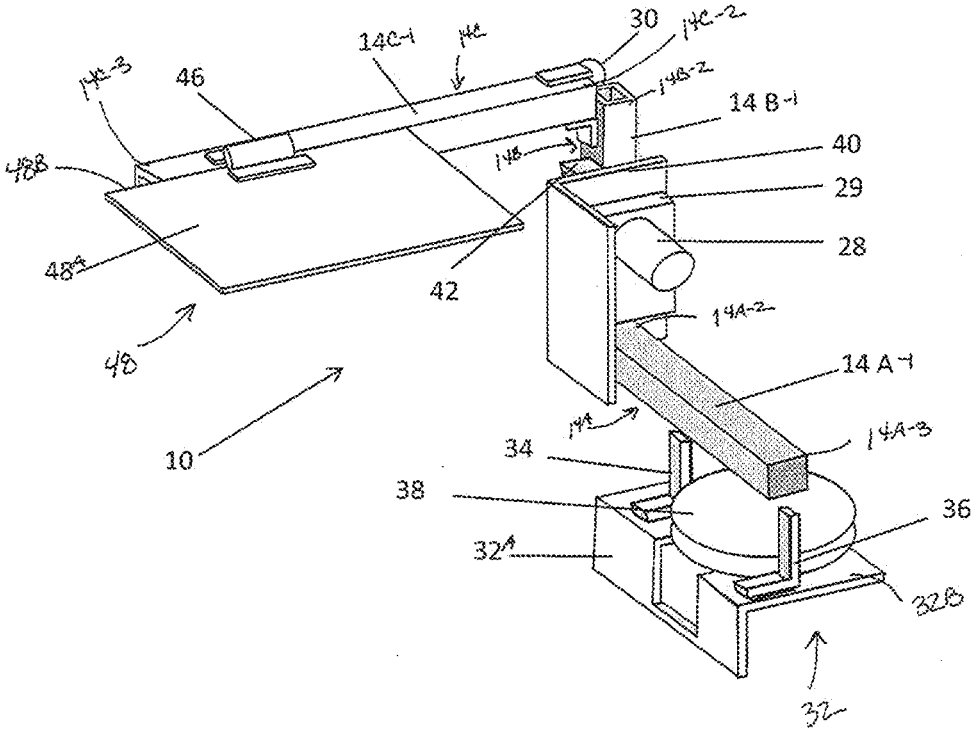


FIG. 18

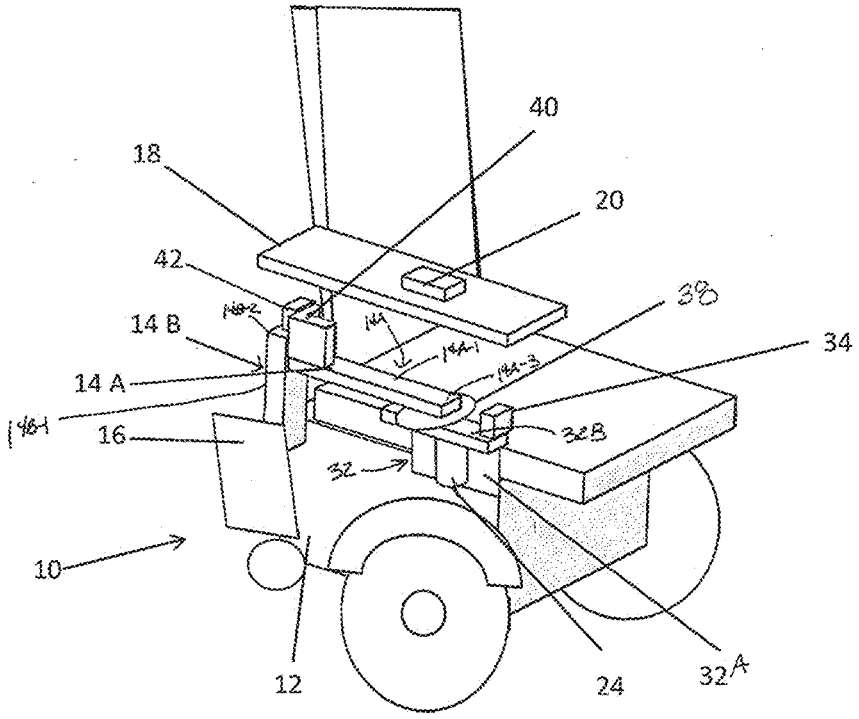


FIG. 19

MOTORIZED MOUNT FOR SEATING SYSTEM

RELATED APPLICATIONS

[0001] The present applications claims priority to U.S. provisional patent application 61/790,793 filed Mar. 15, 2013, the content of which is incorporated by reference herein in its entirety.

GOVERNMENT RIGHTS

[0002] This invention was made with government support under GM096842 awarded by the National Institutes of Health. The government has certain rights in the invention.

TECHNICAL FIELD

[0003] The invention described herein pertains to a motorized mount for a seating system, and specifically to a mount system with a plurality of degrees of freedom controlled electronically.

BACKGROUND

[0004] Computing devices may be used for a variety of communication, educational, occupational, and entertainment purposes and, as such, have become an important part of daily life. Furthermore, mobile computing devices may enable persons with disabilities, including wheelchair users, to be more independent and productive wherever they go. Persons with disabilities are often limited to using their computing devices only at a specific location (e.g., their home or office), rather than being able to employ these devices wherever they are. For quadriplegics, the ability to readily access their computing devices when and where needed has been problematic. A quadriplegic has little or no movement in their arms to carry or retrieve computing devices from a book bag, pocket, or case.

[0005] Wheelchairs typically do not provide a convenient space or location to store a computing device so that it does not impede the motion of the wheelchair or its user. Powered wheelchair users, particularly those with upper extremity disabilities, currently do not have any way to automatically place computing devices on or about their laps for use and then to retract when not needed. Many commercial wheelchair mounts are rigidly affixed to the wheelchair and must be physically repositioned or removed by someone else in order to go underneath tables or to transfer out of the wheelchair. Swinging away a tray or platform of a mount can be difficult for someone with limited hand or arm strength or dexterity. Additionally, even when the tray is in its retracted position, the mount may still cause an impediment to the wheelchair when positioned under tables or through narrow doorways.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The concepts described in the present disclosure are illustrated by way of example and not by way of limitation in the accompanying figures. For simplicity and clarity of illustration, elements illustrated in the figures are not necessarily drawn to scale. For example, the dimensions of some elements may be exaggerated relative to other elements for clarity. Further, where considered appropriate, reference labels have been repeated among the figures to indicate corresponding or analogous elements. The detailed description particularly refers to the accompanying figures in which:

[0007] FIG. **1** illustrates one embodiment of a motorized mount, in a retracted position, coupled to a wheelchair;

[0008] FIG. **2** illustrates the motorized mount of FIG. **1** in a first intermediate position, between the retracted position and a first deployed position;

[0009] FIG. **3** illustrates the motorized mount of FIG. **1** in a second intermediate position between the retracted position and the first deployed position;

[0010] FIG. **4** illustrates the motorized mount of FIG. **1** in a third intermediate position between the retracted position and the first deployed position;

[0011] FIG. **5** illustrates the motorized mount of FIG. **1** in the first deployed position;

[0012] FIG. **6** illustrates positioning of the motorized mount of FIG. **1** in a second deployed position;

[0013] FIG. **7** is a partially exploded perspective view of several components of the mounting assembly and further depicts the motorized mount of FIG. **3**;

[0014] FIG. **8** further depicts the mounting assembly of FIG. **3**, showing an exploded cross-sectional view of several components;

[0015] FIG. **9** is a schematic electrical diagram of a control system of the motorized mount of FIG. **1**.

[0016] FIG. **10** illustrates a front view of the motorized mount of FIG. **1** in the deployed position showing motor assemblies, an attachment assembly to a seating system, an articulating arm assembly, and an attachment member for coupling the mounting assembly;

[0017] FIG. **11** illustrates a bottom view of a deployed motorized mount showing the motor assemblies, an attachment assembly, an articulating arm assembly, and the sheet for coupling the mounting assembly;

[0018] FIG. **12** illustrates a back view of the motorized mount of FIG. **1**, in the first deployed position, providing another view of the motor assemblies, the attachment assembly, the articulating arm assembly, and hinges;

[0019] FIG. **13** illustrates a partial view of the motorized mount of FIG. **1**, in the first deployed position showing the motor assemblies and locations of limiting switches, the articulating arm assembly, the attachment assembly, the hinges, and the attachment member to couple the mounting assembly;

[0020] FIG. **14** illustrates the articulating arm assembly, of the motorized mount of FIG. **1**, showing three portions of the articulating arm assembly in a side exploded view;

[0021] FIG. **15** illustrates the articulating arm assembly of the motorized mount of FIG. **1** coupled to the hinge and the motor assembly for a motor , as well as, position of the motor between two portions of the articulating arm assembly;

[0022] FIG. **16** illustrates a side view of the motorized mount of FIG. **1** in the first deployed position showing coupling arrangement of the attachment assembly, the articulating arm assembly, the motor assemblies, to the attachment member, and locations for hinges;

[0023] FIG. **17** illustrates a side view of the motorized mount of FIG. **1** in the first deployed position, showing locations for the limiting switches, the attachment assembly, the motor assemblies, the articulating arm assembly, and the attachment member for coupling the mounting assembly;

[0024] FIG. **18**. illustrates a partial view of the motorized mount of FIG. **1**, showing the attachment assembly, the motor assemblies, the articulating arm assembly, and the attachment member; and

[0025] FIG. **19** illustrates the motorized mount of FIG. **1** coupled to a wheelchair and shown in the retracted position.

DETAILED DESCRIPTION OF THE DRAWINGS

[0026] While the concepts of the present disclosure are susceptible to various modifications and alternative forms, specific exemplary embodiments thereof have been shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that there is no intent to limit the concepts of the present disclosure to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure.

[0027] The present disclosure relates generally to a motorized mount for a wheelchair, which may be used to automatically deploy and retract a computing device (e.g., a tablet, a laptop, or other mobile computing device) coupled to an articulating arm. The motorized mount has been designed to attach to a manual or powered wheelchair and to achieve one or more of the following goals: (1) not excessively exceeding the width of the wheelchair to allow passage through standard doorways, (2) being easily attachable to and removable from the wheelchair with simple (or no) tools, (3) not impeding a wheelchair user from transferring into or out of the wheelchair, (4) being operable with a single switch, and (5) not interfering with the standard seat movements or functions of advanced powered wheelchairs with tilting, reclining, standing, and elevating seat functions. It will be appreciated that, in some embodiments, the motorized mount may achieve some, but not all, of the foregoing goals. Furthermore, although the motorized mount is described herein as being coupled (or attachable) to a wheelchair, it is contemplated that the motorized mount may also be used with other seating systems, including recliners, sofas, car seats, passenger seats on public transportation, and beds.

[0028] The motorized mount **10** is designed and built to operate according to a plurality of degrees of freedom. Specifically illustrated in FIG. **1**-**19** are five separate degrees of freedom, allowing the motorized mount to deploy and adjust for the user, and retract to a position which does not hinder any other function of the seating system.

[0029] A motorized mount **10** can be coupled to a seating system. FIG. **1** and FIG. **19** illustrate a motorized mount **10** coupled to a wheelchair **12**. The motorized mount **10** includes an articulating arm assembly **14**, a first motor assembly **100** and a second motor assembly **102**, an attachment assembly **106**, a mounting assembly **108**, and an electrical assembly **110**.

[0030] The articulating arm assembly **14** illustrated in at least FIG. **14**, FIG. **15**, and FIG.**18** includes three portions. The first portion **14**A includes three portions: a middle portion **14**A-**1**, a proximal end **14**A-**2**, and a distal end **14**A-**3**. The second portion **14**B includes three portions: a middle portion **14**B-**1**, a proximal end **14**B-**2**, and a distal end **14**B-**3**. The third portion **14**C includes three portions: a middle portion **14**C-**1**, a proximal end **14**C-**2**, and a distal end **14**C-**3**. The proximal end **14**A-**2** and part of the middle portion **14**A-**1** are coupled to a bracket **40** with one or more fasteners (not shown). The proximal end **14**B-**2** of the second portion **14**B is coupled to the proximal end of **14** C-**2** of the third portion **14**C by a hinge **30**. The distal end of **14**C-**3** and at least part of the middle portion **14**C-**1** are coupled to an attachment member **48** by a friction hinge **46**.

[0031] FIGS. **10**, **11**, **12**, **16**, and **17** illustrate an embodiment where the first motor assembly **100** includes a first motor **24** and the second motor assembly **102** includes a second motor **28**. Further, the first motor assembly **100** includes first motor **24** coupled to a gearbox **25** which is coupled to a first rotational member **38**. The second motor assembly **102** includes a second motor **28** coupled to a gearbox **29** which is coupled to a second rotational member **31**. Motor assemblies **100** and **102** are coupled to the electrical assembly **110**. The electrical assembly **110** includes limit switches **34**, **36**, **44**, and **46** (further explained below) as illustrated in FIGS. **9**, **13** and **17**. The motor assemblies **100** and **102** are coupled to a power source (not shown) and an input switch **20**. It is well understood to a person having ordinary skill in the art how to outfit the motorized mount **10** with more than two motor assemblies.

[0032] An attachment assembly **106** is used to couple the motorized mount **10** to a seating system e.g., a wheelchair. The attachment assembly **106** includes a mounting bracket **32** to couple the motorized mount to the seating system. At least FIGS. **1**, **10**, **11**, **13**, and **17** illustrate the mounting bracket **32** which is a right-angled bracket with a side **32**A and a horizontal side **32**B. The horizontal side **32**B is coupled to the distal end **14**A-**3** and at least a part of the middle portion **14**A-**1** by a first rotational member **38** of the first motor assembly **100** as shown in FIGS. **1** and **18**.

[0033] A mounting assembly **108** is used to couple a computer device **16** to the motorized mount **10**. A non-limiting example of a mounting assembly is illustrated in FIGS. **1**, **6**, **7**, and **8**. The mounting assembly **108** includes an attachment member **48** with a mounting platform **48**A and mounting edge **48**B. The mounting edge **48**B is coupled to the distal end **14**C-**3** and a part of the middle portion **14**C-**1** of the third portion **14**C of the articulating arm assembly **14**. One example of a mechanism to couple mounting edge **48**B to distal end of **14**C-**3** is the friction hinge **46**. The mounting platform **48**A is coupled to a rotational type bearing **50**. An inner portion **52** of the bearing **50** is coupled to a stopping bracket **54** (see FIG. **7**). The stopping bracket **54** may include two recesses **56**A and **56**B formed therein to interact with two screws **58**A and **58**B that protrude from an outer portion **60** of the bearing **50**. The computing device **16** may be coupled to the outer portion **60** of the bearing **50**. A platform **62** may be secured to the outer portion **60** of the bearing **50**. The computing device **16** may then be removably coupled to the platform **62**.

[0034] An electrical assembly **110** comprises relays and limit switches coupled to the motor assemblies **100** and **102**. FIG. **9** illustrates an example of a circuit diagram. A person having ordinary skill in the art will recognize that the circuit diagram may change depending on the various embodiments of the motorized mount and the coupled seating system. In one embodiment an input switch **20** is coupled to the first motor assembly **100** and limit switches **34** and **36**, and second motor assembly **102** and limit switches **42** and **44** by relays. FIG. **9** illustrates relays **70**, **72**, **74**, **76** that allow the first and second motors, **24** and **28**, to run in both forward and reverse directions.

[0035] Focusing specifically now on one preferred embodiment, FIGS. **1**-**19** illustrate how the attachment assembly **106**, mounting assembly **108**, the first motor assembly **100** and the second motor assembly **102**, the articulating arm assembly **14**, and the electrical assembly **110** are coupled together and

to a seating system. FIGS. **1** and **19** illustrate the motorized mount **10** coupled to the wheelchair **12** by the attachment assembly **106**.

[0036] An input switch **20** may be mounted on an armrest **18**. Depending on the input switch it may be mounted in different locations on the seating system to be accessible to a user. The input switch **20** is coupled to the motor assemblies **100** and **102** by the electrical assembly **110**. FIG. **9** provides a circuit diagram illustrating the electrical assembly **110** coupling the motor assemblies **100** and **102** to the input switch **20**.

[0037] FIGS. **16**, **17**, and **18** illustrate the motor assemblies **100** and **102** coupled to the articulating arm assembly **14**, mounting assembly **108**, and attachment assembly **106**. The first motor assembly **100** including motor **24**, gearbox **25**, and the first rotational member **38**, are coupled to the mounting bracket **32**. The limit switches **34** and **36** are positioned near gearbox **25**. The distal end **14**A-**3** and at least a portion of the middle portion **14**A-**1** of articulating arm **14**A is coupled to the shaft of motor **24** by first rotational member **38**. The proximal end **14**A-**2** and a portion of the middle portion **14**A-**1** are coupled to the bracket **40**. The second motor assembly **102** including the second motor **28**, gearbox **29**, and second rotational member **31** are coupled to bracket **40** as shown in FIG. **18**. The limit switches **42**, **44** are positioned near gearbox **29**. The middle portion **14**B-**1** of second portion **14**B of articulating arm assembly **14** is coupled to the bracket **40** by the second rotational member **31**. The proximal end **14**B-**2** is coupled to the hinge **30**.

[0038] The third portion **14**C of the articulating arm assembly **14** may include a single piece or multiple pieces of metal coupled by a plurality hinges providing a plurality of degrees of freedom as illustrated in FIGS. **3**, **5**, **6**, **14**, and **15**. In one illustrative embodiment the third portion **14**C includes a single piece of metal coupled to a friction hinge **46**. The friction hinge **46** couples distal end **14**C-**3** and part of the middle portion **14**C-**1** of the third portion **14**C to the mounting edge **48**B of the attachment member **48**. The friction hinge **46** may couple the third portion **14**C and mounting edge **48**B in several orientations and is not limited to a single placement (e.g., the friction hinge may connect underneath the third portion **14**C and attachment member **48**, from the bottom of both of third portion **14**C and mounting edge **48**B, or on the top of third portion **14**C and the bottom of mounting edge **48**B).

[0039] The movements of the motorized mount **10** may be partially or entirely controlled by the motor assemblies **100** and **102**. The movements are based on distinct degrees of freedom. The first degree of freedom is illustrated by the movement of the articulating arm assembly **14** moving first portion **14**A coupled to the first motor assembly **100**, in a first degree of freedom of up to 180 degrees. This first movement may move the mounting assembly from near the back tire of a wheelchair **12**, for example, to the near the front tire in a deploying manner. In the first degree of freedom, the mounting assembly **108** moves horizontally in the 'x' direction about the y-axis , **22**, as illustrated in FIG. **2**. Alternatively, the first portion **14**A may move the coupled mounting assembly **108** from near the front tire of a wheelchair **12**, as an example, to near the back tire in a retracting manner. The second degree of freedom is illustrated when second portion **14**B moves vertically up to 180 degrees from near the front tire of wheelchair **12**, to near the arm rest **18**. In the second degree of freedom, the mounting assembly **108** moves vertically in the 'y' direction about the x-axis, **26**, as illustrated by FIG. **4**. The third degree of freedom is illustrated in FIG. **5**. The third portion **14**C moves down vertically in a 90 degree rotation in the 'y' direction. This results in the mounting assembly **108** stopping parallel to the seat of wheelchair **12**. In one example, this movement is achieved by hinge **30**. The fourth degree of freedom is achieved by the friction hinge **46**. Friction hinge **46** is coupled to mounting edge **48**B of the attachment member **48** and distal end **14**C-**3** and a portion of the middle portion **14**C-**1** to control the movement and position of the attachment member **48**. The fifth degree of freedom is produced by the mounting assembly **108** and is illustrated in FIGS. **6** and **7**. The rotational type bearing **50** provides the ability to rotate the attached computer device **16** at least 90 degrees from its starting position. The stopping bracket **54** and screws **58**A and **58**B provide the braking mechanism to stop the rotation of the computer device **16**.

[0040] Referring now to FIGS. **1**-**6**, one illustrative embodiment of a motorized mount **10** is shown coupled to a power wheelchair **12**. The motorized mount **10** is illustrated as coupled to a right side of the wheelchair **12**, the motorized mount **10** may be mounted on a left side of the wheelchair **12** in other embodiments. As described further below, the motorized mount **10** includes an articulating arm assembly **14** that can move in two or more degrees of freedom. A computing device **16** may be coupled at or near one end of the articulating arm assembly **14**. Collectively, FIGS. **1**-**6** illustrate a movement of the articulating arm assembly **14** from a retracted position (FIG. **1**) to a deployed position (FIG. **6**). As illustrated in the figures, this movement of the articulating arm assembly **14** is operable to move the computing device **16** from a retracted position (FIG. **1**) to a deployed position. Beginning in FIG. **1**, the articulating arm assembly **14** and the computing device **16** are in the retracted position. In this position, both the articulating arm **14** and the computing device **16** do not substantially exceed a width of the wheelchair **12**, allowing the wheelchair **12** to travel through doorways and other narrow passages. Further, when in the retracted position, both the articulating arm assembly **14** and the computing device **16** are positioned below an arm rest **18** of the wheelchair **12**, allowing the wheelchair **12** to travel under tables, desks, and the like.

[0041] In the illustrative embodiment, when a user activates an input switch **20** that is mounted on the arm rest **18**, the articulating arm assembly **14** will rotate using the first motor assembly **100** including the first rotational member **38** about an axis **22**, as shown in FIG. **2**. As illustrated in FIG. **1**, pushing the input switch **20** forward may cause the first portion **14**A to extend and move toward the deployed position, while pulling the input switch **20** back may cause the first potion **14**A of articulating arm assembly **14** to move toward the retracted position. In the illustrative embodiment, if the input switch **20** is in at its center (default) position, the articulating arm assembly **14** will not move until the switch is moved in either direction. It is contemplated that, in other embodiments, the motorized mount **10** may be controlled by other input methods, such as sip-and-puff, eye gazing, brain-controlled interfaces. In such embodiments, alternative input devices may plug into an optional controller to operate the motorized mount **10**. The articulating arm assembly **14** will continue rotating about the axis **22** until it reaches the second intermediate position shown in FIG. **3**. As described further below, the rotational movement of the articulating arm assem-

bly l4 shown in FIGS. **1-3** may be controlled by a first motor assembly **100** of the motorized mount **10**.

[0042] After reaching the second intermediate position shown in FIG. **3**, a portion of the articulating arm assembly **14**, second portion **14**B, will rotate about an axis **26**, as shown in FIG. **4**. The second portion **14**B will continue rotating about the axis **26** until it reaches the third intermediate position shown in FIG. **4**. As described further below, the rotational movement of the second portion **14**B shown in FIG. **4** may be controlled by second motor assembly **102** of the motorized mount **10**. As shown in FIG. **5**, the articulating arm assembly **14** may also include a hinge **30** that allows manual movement of the computing device **16** from the third intermediate position shown in FIG. **4** to the first deployed position in the wheelchair **12** user's lap. Once in the first deployed position, the third portion **14**C may allow for further manual positioning of the computing device **16**, such as tilting and rotating, as shown in FIG. **6**. In other embodiments, the movements of the third portion **14**C shown in FIGS. **5**,**6**, **18** may be motorized (rather than manually controlled).

[0043] The motorized mount **10** may be coupled to the wheelchair **12** by the attachment assembly **106** using any number of mechanisms. In the illustrative embodiment, a mounting bracket **32** of the attachment assembly **106** is coupled to a seating system of the wheelchair **12**. One example includes a number of bolts placed through a number of holes formed in the mounting bracket **32** to secure it to the wheelchair **12**. The mounting assembly **106** (as well as any other components of the motorized mount **10**) may comprise any durable substance, such as aluminum, titanium, iron, steel, resin, or the like. In some illustrative embodiments, the mounting bracket **32** may have a length of 1 to 7 inches, a diameter of 0.25 to 3 inches, a depth of 0.25 to 3 inches. It will be appreciated that the attachment of the motorized mount **10** will vary according to the style of wheelchair **12** and/or the seating system used. Those skilled in the art will recognize that adjustments may be made to the motorized mount **10**, including the mounting bracket **32**, to fit different brands and models of wheelchairs **12** (as well as other seating systems).

[0044] The first motor **24**, as well as limit switches **34**, **36** are coupled to the mounting bracket **32**. The limit switch **34** is mounted to the forward side of the mounting bracket **32**, as shown in FIGS. **1** and **2**. For instance, a right angle piece of aluminum may be coupled to the mounting bracket **32** and used to mount the limit switch **34** such that its button points toward the right side of the wheelchair **12** (from the perspective of the user shown in FIGS. **1-6**). The limit switch **36** is mounted in the same manner but on rear side of the mounting bracket **32**, as shown in FIGS. **2-6**, and FIG. **17**.

[0045] The first motor **24** is illustratively embodied as a cylindrical member with a depth of about two inches and a diameter of about 1.4 inches. The first motor **24** may be powered by any electrical power source (e.g., of 10 to 24 V DC). In the illustrative embodiment, the first motor **24** is coupled to a steal gear box **25** with the length-width-height dimensions of 3×2.8×0.8 inches. The first motor **24** may be mounted such that a shaft of the motor **24** is oriented generally perpendicular to the surface on which the wheelchair **12** sits (e.g., the ground). The first portion **14**A of articulating arm assembly **14** is coupled to the shaft of the first motor **24** via a first rotational member **38**, which may be made of plastic, metal, metal alloy, and the like.

[0046] As shown in FIGS. **1-3**, the first motor **24** may be operable to swing the first rotational member **38**, articulating arm assembly **14**, second motor assembly **102**, attachment member **48**, and mounting assembly **108** about the axis **22** over the 180 degrees bounded by the limit switches **34**, **36**. In other embodiments, the first motor **24** might be operable to cause translation of the articulating arm assembly **14** relative to the wheelchair **12** (rather than rotation). For stability and strength, the first portion **14**A may illustratively be formed of a hollow 1×1 inch square prism of 0.15 inch thick aluminum. In other embodiments, other materials and/or structures may be used to form the first portion **14**A. The second motor **28** is coupled to bracket **40**. In the illustrative embodiment, the first portion **14**A of the articulating arm assembly **14** between the motors **24**, **28** may be about 11.5 inches in length. In the illustrative embodiment, the second motor **28** is coupled to the second portion **14**B of the articulating arm assembly **14** by a right angle bracket **40** formed of 0.15 inch thick aluminum and having length-width-height dimensions of 4.7×1×1 inches.

[0047] The second motor **28** is illustratively embodied as an aluminum cylindrical motor with a depth of about 1.4 inches and a diameter of about 1 inch Like the first motor **24**, the second motor **28** may be powered by any electrical power source (e.g., of 10 to 24 V DC). In the illustrative embodiment, the second motor **28** is coupled to a steal gear box **29** with the length-width-height dimensions of 3×2.8×0.8 inches and a second rotational member **31**. Limit switch **42**, **44** are also mounted to the bracket **40** supporting the second motor **28**. As shown in FIGS. **1-3**, **6** and **17**, the limit switches **42**, **44** are positioned near a gearbox **29** of the motor **28** such that a button of each of the limit switches **42**, **44** faces towards the wheelchair **12** (when the motorized mount **10** is in the retracted position) or away from the wheelchair **12** (when the motorized mount **10** is in the deployed position). As described further below, the limit switch **42** is activated (by the articulating arm **14**) during deployment of the motorized mount **10**, while the limit switch **44** is activated (by the articulating arm **14**) during retraction of the motorized mount **10**.

[0048] For mobility and functionality, second portion **14**B and third portion **14**C are coupled by hinge **30**. In the illustrative embodiment, second portion **14**B is coupled to second motor **28** by the second rotational member **31** and will not rotate more than 180 degrees about the axis **26** (FIG. **4**) due to the limit switches **42**, **44**. In the illustrative embodiment, second portion **14**B is formed of 0.15 inch thick aluminum and has length-width-height dimensions of 4.7×1×1 inches. Second portion **14**B ensures the limit switches **42**, **44** are pressed when the upper and lower limits have been reached. The proximal end **14**B-**2** of the the second portion **14**B is coupled to the proximal end of **14** C-**2** of the third portion **14**C by by a hinge **30** to allow the computing device **16** of mounting assembly **108** to be rotated 90 degrees from the third intermediate position shown in FIG. **4** to the first deployed position shown in FIG. **5**. In the illustrative embodiment, second portion **14**B is formed of 0.15 inch thick aluminum and has length-width-height dimensions of 2.4×1.75×1 inches. As best seen in FIG. **6**, third portion **14**C supports a friction hinge **46** that allows a user to tilt the computing device **16** upward to improve a viewing angle. In the illustrative embodiment, third portion **14**C is formed of 0.15 inch thick aluminum and has length-width-height dimensions of 4.5× 1×1 inches. The friction hinge **46** may have a range of 180 degrees and may use a screw to set the friction/ease of mobility for the hinge **46**. The friction hinge **46** may be coupled to and attachment member **48** of plastic, metal, metal alloy, or

the like, such as that shown in FIGS. **7** and **8**. In one illustrative embodiment, the attachment memeber **48** is comprised of Plexiglass.

[0049] In the illustrative embodiment, the mounting assembly **108** includes attachment member **48** coupled to a rotational type bearing **50** that allows the computing device **16** to be rotated 90 degrees. As best seen in FIG. **7**, an inner portion **52** of the bearing **50** is coupled to a stopping bracket **54**. In the illustrative embodiment, the stopping bracket **54** is 5×0.7 inch piece of aluminum. The stopping bracket **54** includes two recesses **56**A and **56**B formed therein to interact with two screws **58**A and **58**B that protrude from an outer portion **60** of the bearing **50**.

[0050] The screws **58**A and **58**B are orientated about 90 degrees apart and provide stops of the stopping bracket **54** and the bearing **50**.

[0051] The computing device **16** may be coupled to the outer portion **60** of the bearing **50** in a number of ways (which helps to accommodate a variety of different types of computing devices **16**). In some embodiment, a platform **62** of plastic, metal, metal alloy, or the like may be secured (via a number of fasteners) to the outer circle **60** of the bearing **50**. The computing device **16** may then be removably coupled to the platform **62** via VELCRO, magnets, suction, snaps, adhesive, or other suitable mechanisms. In other embodiments, a case of the computing device **16** may be directly coupled to the outer circle **60** of the bearing **50**. In still other embodiments, specific adaptors could be developed to mount various computing devices **16** to the outer portion **60** of the bearing **50**. FIGS. **7** and **8** illustrate a partially exploded perspective view and an exploded cross-sectional view, respectively, of the bearing **50** and its neighboring components. In some embodiments, the platform **62** may be used for multiple purposes besides holding a computing device **16**, such as holding alternative and augmentative communication (AAC) devices, environmental control units, a camera mount, a writing desk, a cup holder, an umbrella holder, etc.

[0052] Referring now to FIG. **9**, a schematic diagram of the illustrative embodiment of the motorized mount **10** is shown. The input switch **20**, the first and second motors **24**, **28**, and the limit switches **34**, **36**, **42**, **44** discussed above are all illustrated in FIG. **9**. The motorized mount **10** also includes relays **70**, **72**, **74**, **76** that allow the first and second motors **24**, **28** to run in both forward and reverse directions. The input switch **20** is illustratively embodied as a momentary single pole double throw (SPDT) input switch **20** that controls whether the motorized mount **10** moves toward the retracted position, moves toward the deployed position, or remains neutral. In other embodiments, the user might instead utilize a sip and puff, a brain-controlled interface, voice recognition, gesture recognition, a touch screen interface, and/or other commercial switches to control operation of the motorized mount **10**. In any case, the user's input will control the articulating arm assembly **14** via the relays **70**, **72**, **74**, **76** and the limit switches **34**, **36**, **42**, **44**.

[0053] When the articulating arm assembly **14** is moving toward the deployed position (as illustrated across FIGS. **1**-**6**) by first portion **14**A, the input switch **20** connects a diode **78** to the supply voltage (which may be 10 V to **24** V, as noted above). This activates relay **70**, causing the first motor **24** to run until the limit switch **34** is reached. When the limit switch **34** flips, the first motor **24** breaks and relay **72** activates. When activated, relay **72** powers the second motor **28** until the limit switch **42** is reached. When the articulating arm assembly **14** is moving toward the retracted position, the input switch **20** connects a diode **80** to the supply voltage. This activates relay **74**, causing the second motor **28** to run in the opposite direction from above, until the limit switch **44** is reached. When the limit switch **44** flips, the second motor **28** breaks and relay **76** activates. When activated, relay **76** powers the first motor **24** in the opposite direction, until the limit switch **36** is reached.

[0054] While one illustrative embodiment of the motorized mount **10** for a wheelchair **12** has been described above with reference to FIGS. **1**-**19**, it is contemplated that other embodiments of the motorized mount **10** may have additional or different features. For instance, while several portions of the articulating arm assembly **14** are described above as having manual hinges or bearings, it would also be possible to add additional motors to move the portions automatically. This would likely add more weight to the motorized mount **10**, but may be desirable for individuals who cannot manually move portions of the articulating arm assembly **14**. The mechanics of the motorized mount **10** (e.g., the motors) might also be made more rugged by using higher gear ratio motors and stronger materials. This upgrade may be desirable for carrying larger computing devices **16** (e.g. laptop computers) and other equipment heavier than approximately five pounds. Where an alternative input device (e.g. a sip and puff, a touch switch, a magnetic switch, electromyography, etc.) is used in place of the input switch **20**, the motorized mount **10** may include an electronic controller for interpreting signals from the alternative input device. This controller might process other signal related to the wheelchair **12** as well (e.g., a video feed from a camera mounted on the chair). It is contemplated that the motorized mount **10** may be powered by either the batteries of the wheelchair **12** or an external power source, including, but not limited to, separate batteries, solar power, or kinetic power.

[0055] While certain illustrative embodiments have been described in detail in the drawings and the foregoing description, such an illustration and description is to be considered as exemplary and not restrictive in character, it being understood that only illustrative embodiments have been shown and described and that all changes and modifications that come within the spirit of the disclosure are desired to be protected. There are a plurality of advantages of the present disclosure arising from the various features of the apparatus, systems, and methods described herein. It will be noted that alternative embodiments of the apparatus, systems, and methods of the present disclosure may not include all of the features described yet still benefit from at least some of the advantages of such features. Those of ordinary skill in the art may readily devise their own implementations of the apparatus, systems, and methods that incorporate one or more of the features of the present invention and fall within the spirit and scope of the present disclosure.

1. A motorized mount comprising;

a mounting bracket configured to attach to a seating system;

an articulating arm configured to attach to the mounting bracket having a first potion and a second portion, and a computer device coupled to one end of the articulating arm ;

a first motor configured to attach to the mounting bracket configured to move the articulating arm based on a first degree of freedom; and

a second motor configured to attach between the first and second portion of the articulating arm configured to move the articulating arm based on a second degree of freedom;

2. The motorized mount of claim **1** further comprising a hinge to move the computer device based on a third degree of freedom.

3. The motorized mount of claim **2** further comprising, a friction hinge configured to move the computer device based on a fourth degree of freedom.

4. The motorized mount of claim **3** further comprising a bearing to move the computer device based on a fifth degree of freedom.

5. The motorized mount of claim **1** further comprising; an input switch configured to control the motor and motor having the ability to move the articulating arm and computer device to a deployed position or a retracted position.

6. The motorized mount of claim **5**, wherein the switch is a single throw double pole switch, a sip and puff switch, a brain-controlled interface, a voice recognition switch, a gesture recognition switch, or a touch screen interface.

7. The motorized mount of claim **1**, wherein the mounting bracket is configured to attach to a wheelchair, furniture, or hospital bed.

8. The motorized mount of claim **1**, wherein the computer device is a tablet, camera, laptop, and alternative and augmentative communication devices.

9. The motorized mount of claim **1**, wherein the first degree of freedom is in a range from 0 to 180 degrees.

10. The motorized mount of claim **1**, wherein the second degree of freedom is in a range of 0 to 180 degrees.

11. A motorized mount comprising; a mounting bracket configured to attach to a seating system;

an articulating arm configured to attach to the mounting bracket having a proximal end and a distal end, and a computer device coupled to one end of the articulating arm;

a first motor configured to attach to the mounting bracket configured to move the articulating arm based on a first degree of freedom;

a second motor configured to attach between the proximal end and the distal end of the articulating arm configured to move the articulating arm based on a second degree of freedom; and

a hinge configured to attach to the distal end of the articulating arm to thereby move the computer device based on a third degree of freedom;

12. The motorized mount of claim **11** further comprising, a friction hinge configured to move the computer device based on a fourth degree of freedom.

13. The motorized mount of claim **12** further comprising a bearing to move the computer device based on a fifth degree of freedom.

14. A motorized mount of claim **11**, wherein every element is controlled electronically.

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