US 20090057514A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2009/0057514 A1**

(43) **Pub. Date: Mar. 5, 2009**

Oh

(54) **MOUNTING SYSTEM ADAPTED TO EXTEND AND RETRACT IN A STRAIGHT LINE**

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(21) Appl. No.: **11/899,046**

(22) Filed: **Sep. 4, 2007**

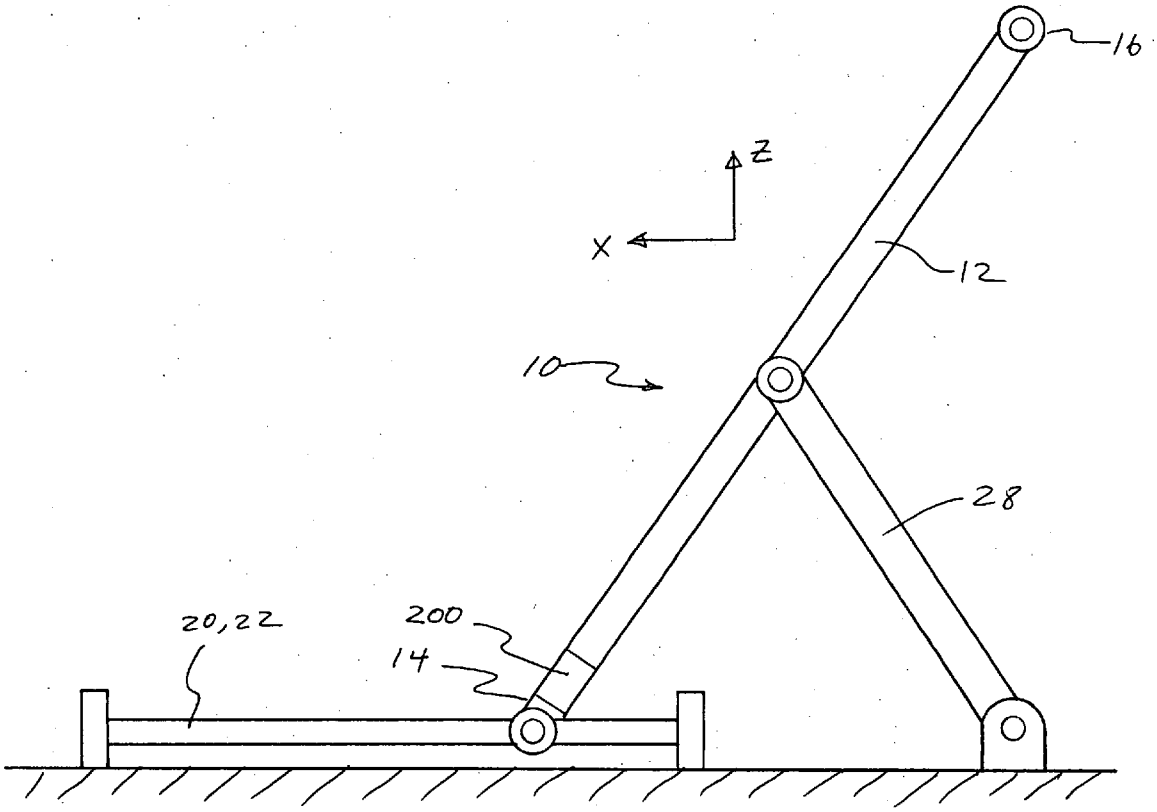
Publication Classification

(51) **Int. Cl.**
E04G 3/20 (2006.01)

(52) **U.S. Cl.** **248/282.1**

(57) **ABSTRACT**

A mount system for a monitor extends and retracts the monitor. The mount system includes a first arm pivotably coupled to a second arm so that that the monitor extends and retracts in a substantially straight line. One or more motors may be incorporated into the mount system to adjust the viewing angle of the monitor through a remote control.



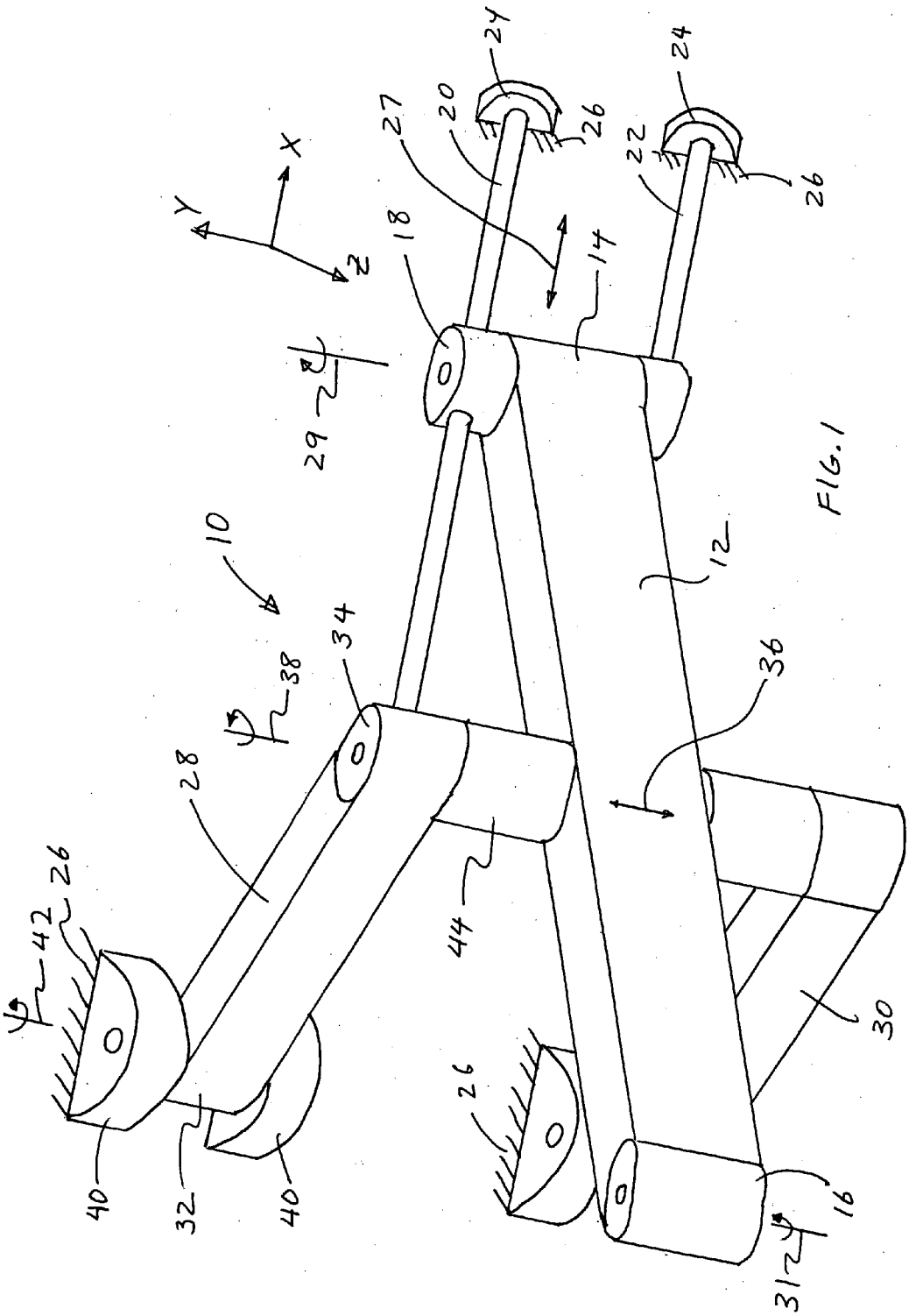


FIG. 1

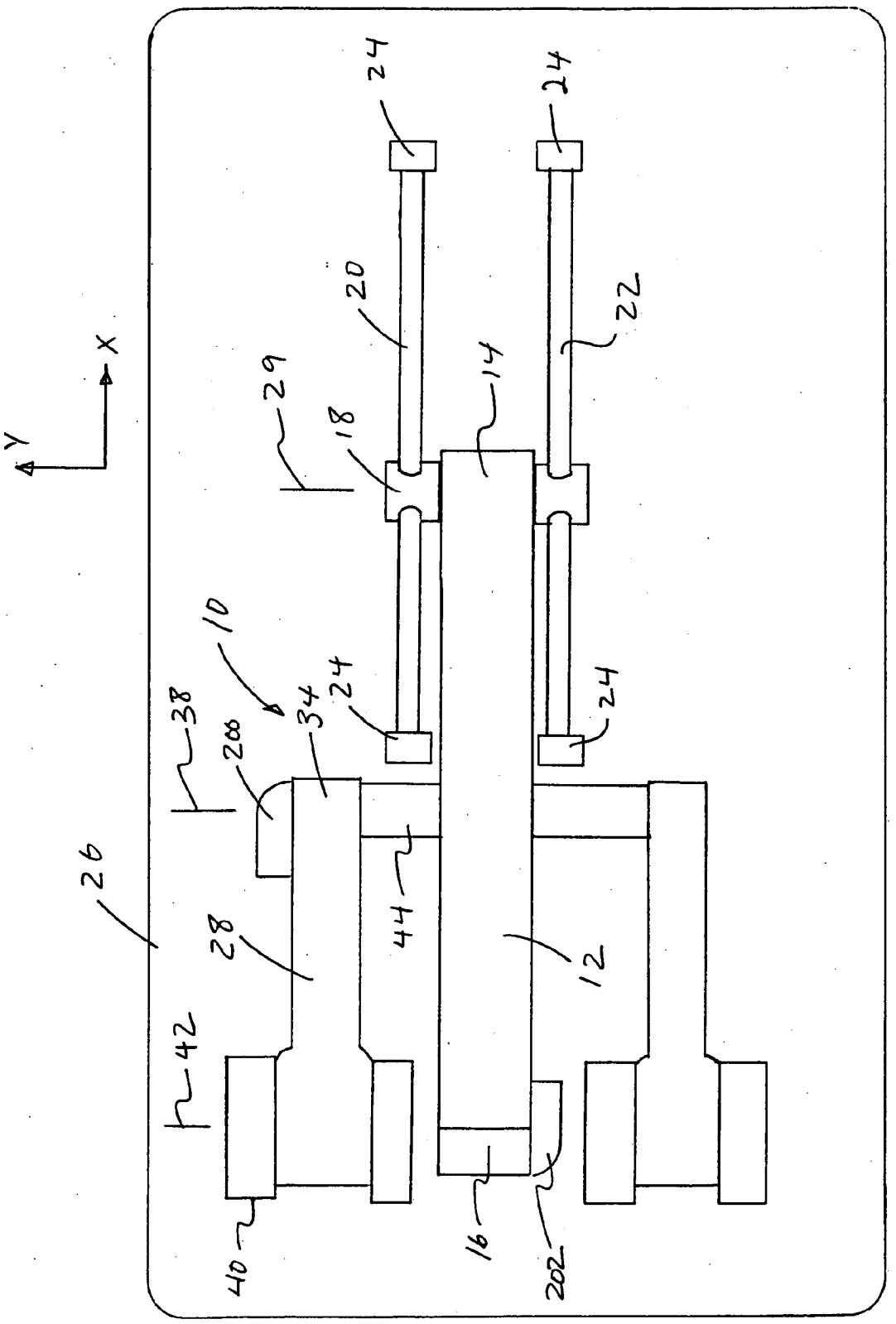


FIG. 2

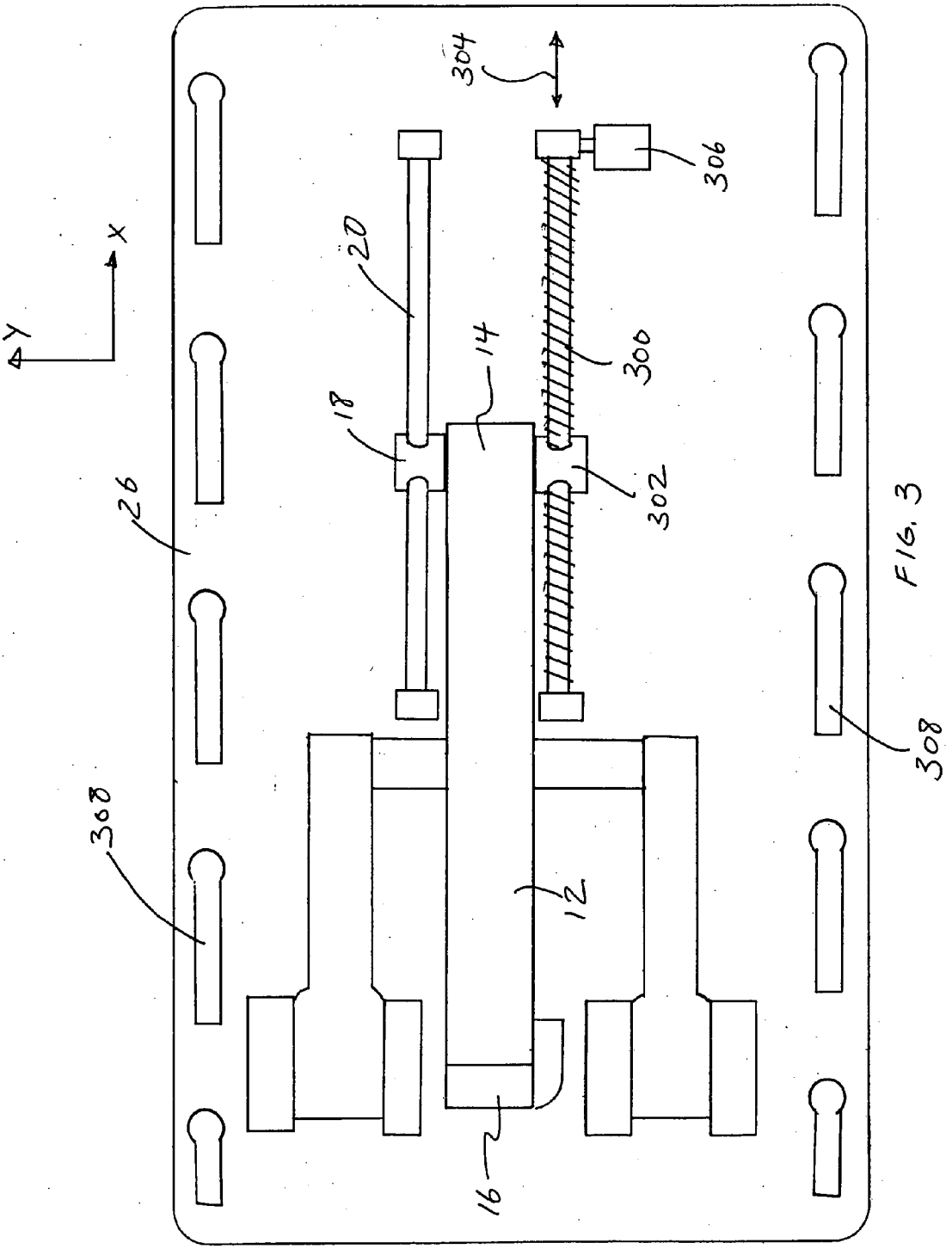


FIG. 3

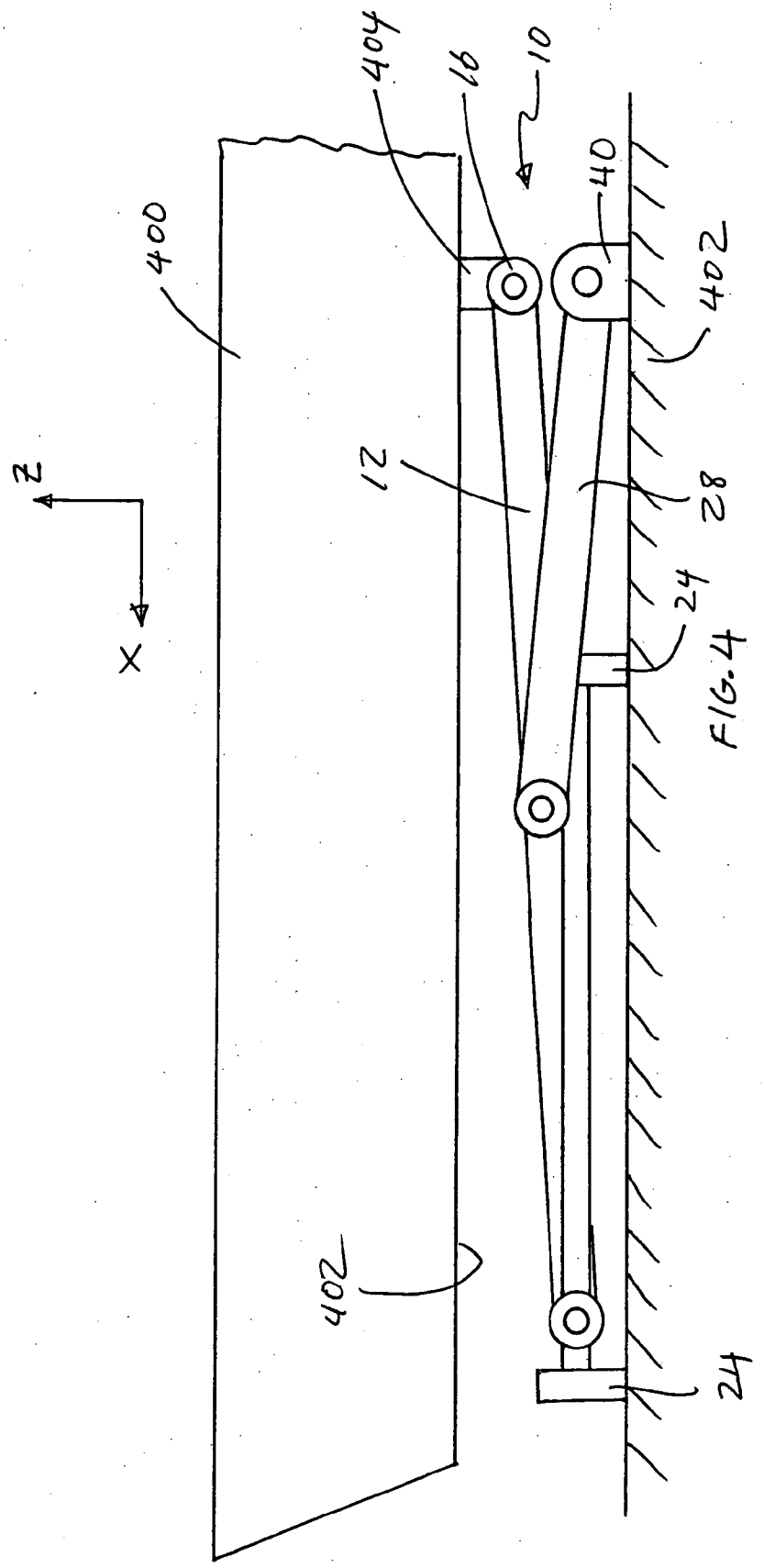


FIG. 4

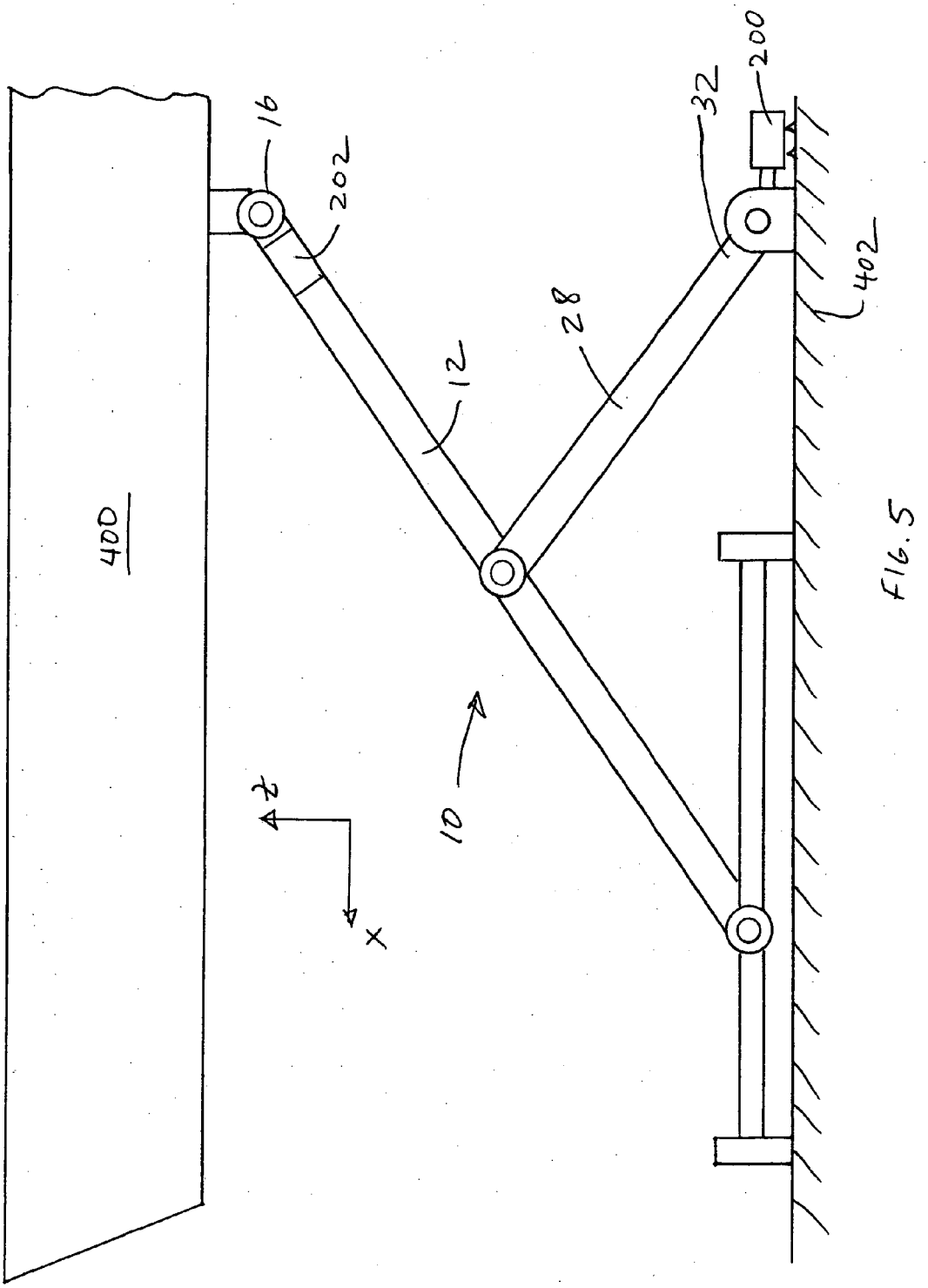


FIG. 5

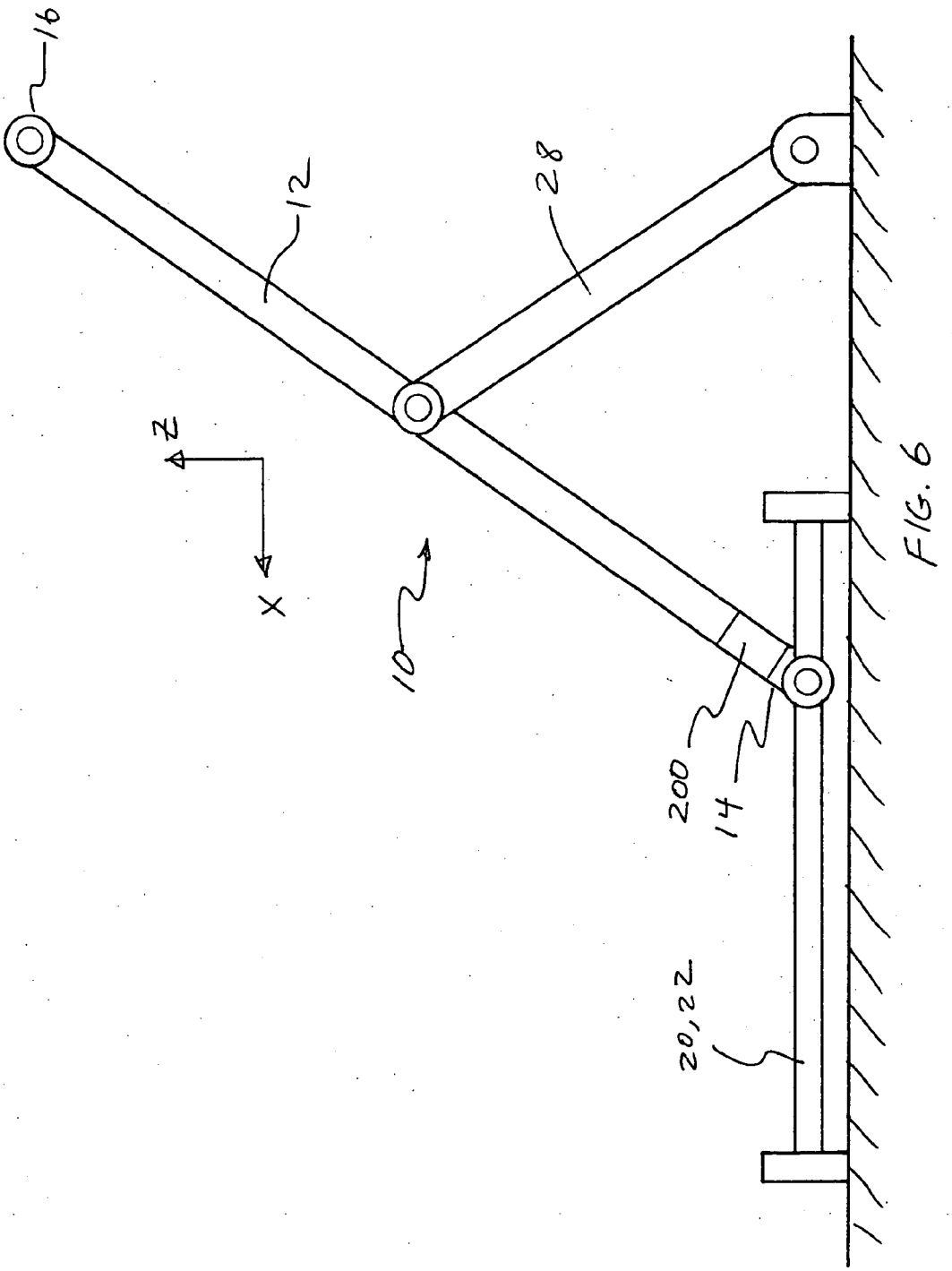


FIG. 6

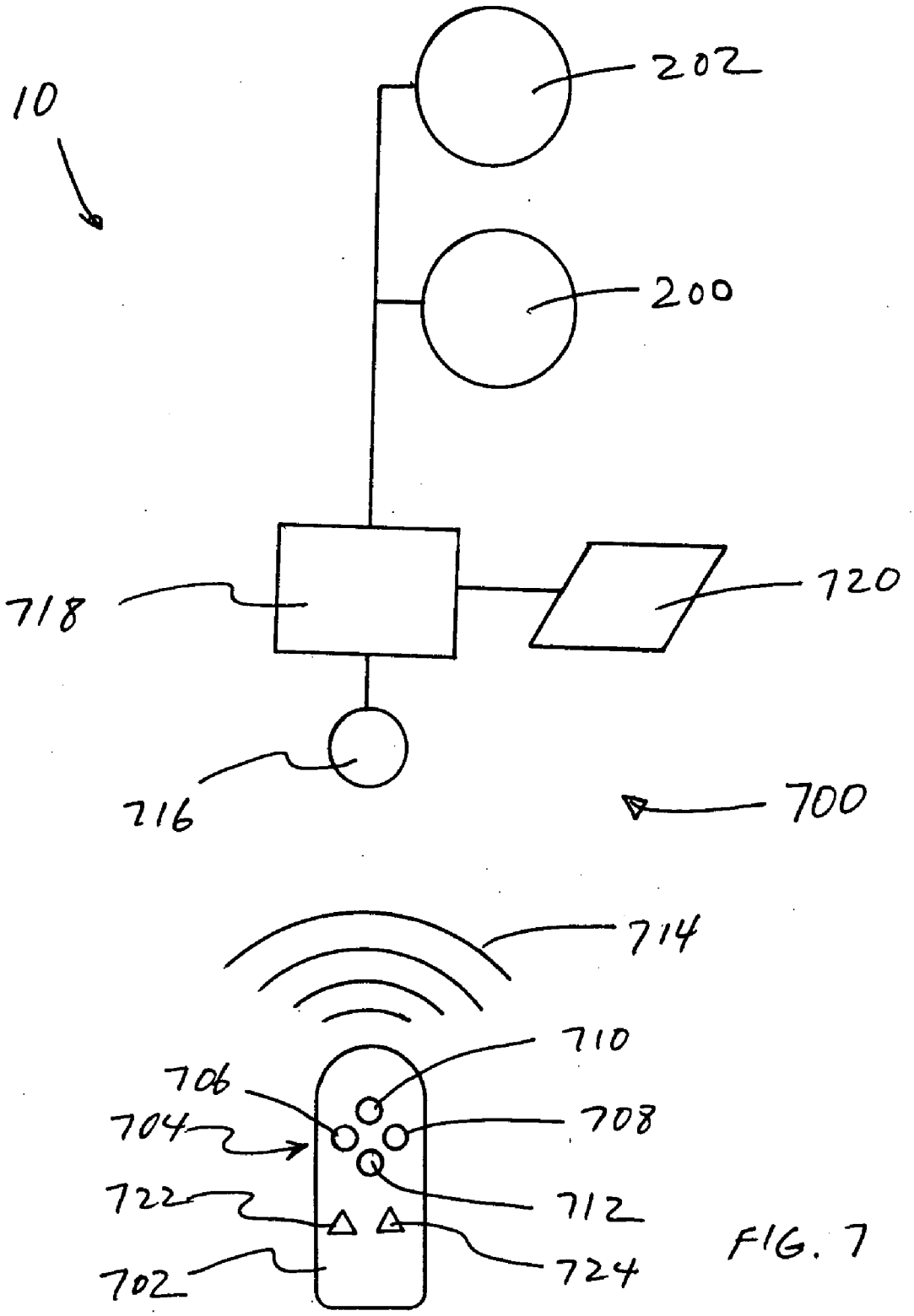


FIG. 7

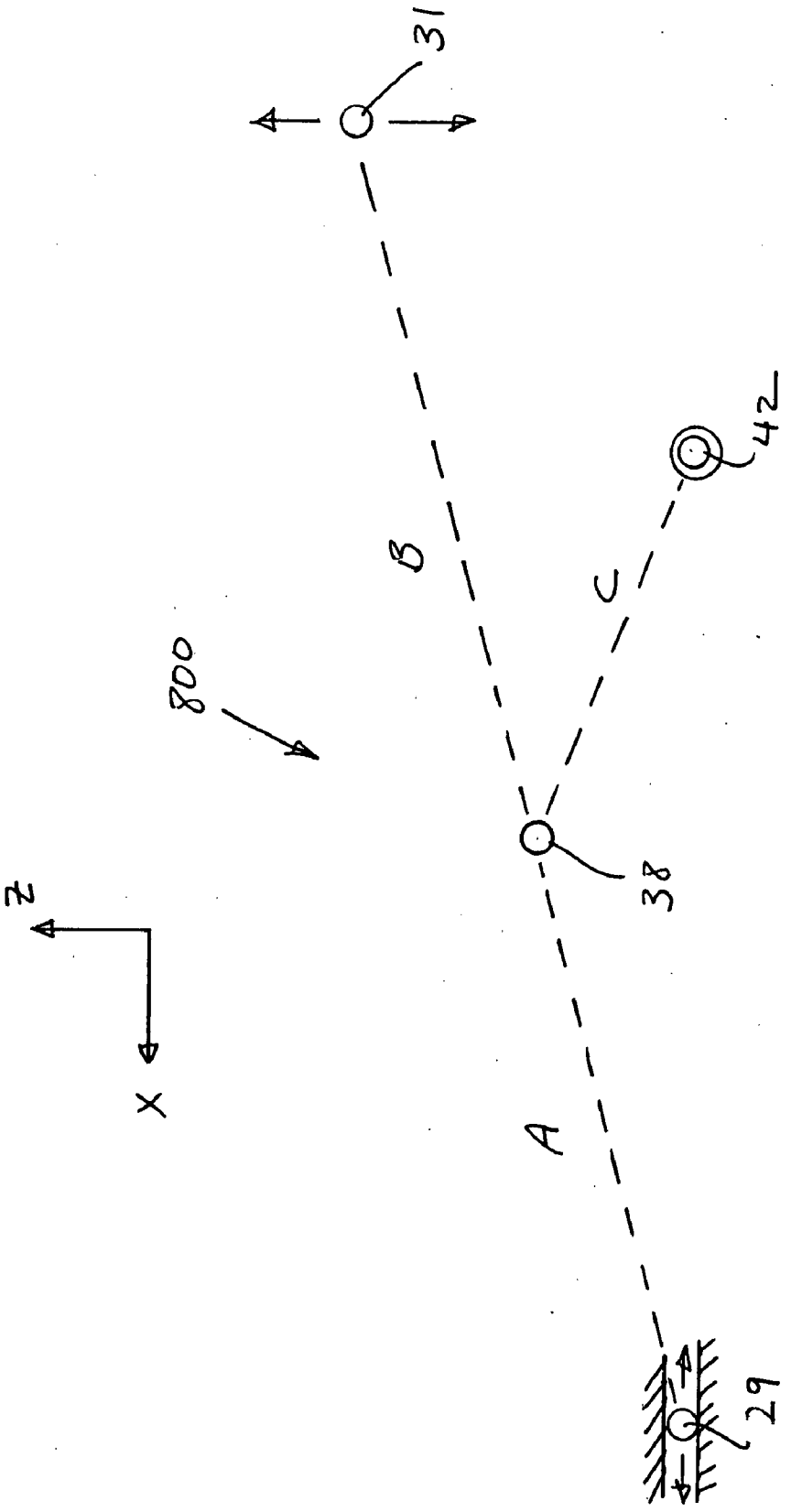


FIG. 8

MOUNTING SYSTEM ADAPTED TO EXTEND AND RETRACT IN A STRAIGHT LINE

BACKGROUND

[0001] 1. Field of the Invention

[0002] This invention is directed to a mount system that is adapted to couple to a back side of a monitor and extend the monitor in a straight line or perpendicularly from a reference plane.

[0003] 2. Background of the Invention

[0004] Flat panel monitors such as computer monitors, LCD, plasma, slim televisions, and the like (collectively referred to as "monitor(s)") are becoming popular because they can be mounted onto a wall to save floor space and for their aesthetically pleasing appearance. In many applications, a monitor is attached to a wall with a mount bracket between the monitor and the wall. In order to reposition the monitor, an articulating mount is used to attach the monitor to the wall. The articulating mounts that are available today, however, are difficult to use because they have a tendency to move laterally left and right rather than moving straight in and out of the wall as the monitor is pushed and pulled, respectively. In situations where the monitor is recessed into a wall or a cabinet, the lateral movement of the monitor adds to the difficulty of extending and retracting the monitor from its recessed position. Moreover, with manual mounts, in order to reposition the monitor, the viewer needs to walk over to the monitor and physically move the monitor to a new position. Accordingly, there is a need to be able to extend and retract a monitor substantially straight or perpendicularly from the wall.

INVENTION SUMMARY

[0005] This invention is directed to a mount system adapted to extend and retract a monitor substantially perpendicular from the wall. The mount system includes a first guiding member having a longitudinal axis; a first arm having a first proximal end and a first distal end, the first proximal end adapted to pivot along a first pivot axis and move along the longitudinal axis of the first guiding member, the first distal end having a second pivot axis, and the first distal end adapted to couple to the back side of the monitor and pivot the monitor along the second pivot axis; and a second arm having a second proximal end and a second distal end, the second proximal end adapted to pivot about a third pivot axis, the third pivot axis being in a fixed position, and the second distal end adapted to pivotably couple to the first arm about a fourth pivot axis located about a midpoint between the first proximal end and the first distal end such that the first distal end extends and retracts relative to the second proximal end substantially along a straight line. The mount system may include one or more motors to reposition the monitor through a remote control.

[0006] Other systems, methods, features, and advantages of the invention will be, or will become, apparent to one with skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features, and advantages be included within this description, be within the scope of the invention, and be protected by the following claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The invention can be better understood with reference to the following drawings and description. The components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention. Moreover, in the figures, like referenced numerals designate corresponding parts throughout the different views.

[0008] FIG. **1** shows a perspective view of a mount system along X, Y, and Z coordinates.

[0009] FIG. **2** shows a view of the mount system of FIG. **1** along a XY plane.

[0010] FIG. **3** shows another embodiment of the mount system of FIG. **1** along a XY plane.

[0011] FIG. **4** shows a view of the mount system of FIG. **1** along a XZ plane.

[0012] FIG. **5** shows a view of the mount system of FIG. **1** along an X plane in a partially extended position.

[0013] FIG. **6** shows a view of the mount system of FIG. **1** along an X plane in an extended position.

[0014] FIG. **7** shows a control system of the mount system.

[0015] FIG. **8** shows a schematic diagram representing the pivot axes of the mount system.

DETAILED DESCRIPTION OF THE INVENTION

[0016] FIG. **1** shows a perspective view of a mount system **10** in reference to X, Y, and Z coordinates. The mount system **10** includes a first arm **12** having a proximal end **14** and a distal end **16**. The proximal end **14** may be pivotably coupled to a sleeve **18** adapted to move along one or more guiding members **20** and **22**. The two ends of the guiding members **20** and **22** may be supported by first set of anchors **24**, which are attached to a base plate **26**. This allows the distal end **14** to move along a longitudinal axis **27** of the guiding members **20** and **24** and pivot about a pivot axis **29**. The distal end **16** has a pivot axis **31** that is adapted to couple to the back side of the monitor, which will be described in more detail below.

[0017] The mount system **10** may include a second arm **28** and a third arm **30**. The second arm **28** may be a mirror image of the third arm **30** so that only the second arm **28** will be discussed in detail in this specification. The first arm **12** may be provided between the second and third arms **28** and **30**. The second arm **28** may have a proximal end **32** and a distal end **34**. The distal end **34** may be pivotably coupled to the first arm **12** along a midpoint **36** between the proximal end **14** and the distal end **16**. This allows the distal end **34** to pivot about a pivot axis **38**, which is substantially aligned with the midpoint **36**. The proximal end **32** may be pivotably coupled to the base plate **26** through second set of anchors **40**. This allows the proximal end **32** to pivot about a pivot axis **42**. A spacer **44** may be provided between the first and second arms **12** and **28** to provide a gap between the two arms.

[0018] The first and second arms **12** and **28** may be sized so that the distance between the pivot axes **29** and **31** is about two times the distance between the pivot axes **28** and **42**. With the pivot axis **38** substantially along the midpoint between the pivot axes **29** and **31**, the pivot axis **31** may extend and retract substantially perpendicular relative to the base plate **26**. Note that the two guiding members **20** and **22** support the weight of the monitor attached to the distal end **16**. Moreover, the second and third arms **28** and **30** support the first arm **12** about its center to support the weight of the monitor to minimize the distal end **16** from sagging due to the weight of the monitor.

[0019] FIG. **2** shows the mount system **10** along the XY coordinates. In this example, negative (−) Y axis may represent the direction of the gravitational force. It is within the scope of this invention to have the gravitational force along other axis such as X or Z, in either in the positive or negative

direction. The mount system **10** may be manually operated or automated. To extend and retract mount system **10** through a motorized action, one or more motors may be provided along the pivot axes **29**, **38** and/or **42**. For example, FIG. **2** show a first motor **200** coupled to the distal end **34** of the second arm **28** to pivot the second arm **28** relative to the first arm **12** along the pivot axis **38**. This causes the proximal end **14** to slide along the guiding members **20** and **22** and the second arm **28** to pivot along the pivot axis **42**, which in turn causes the distal end **16** to extend or retract relative to the pivot axis **42** substantially along a straight line or perpendicularly relative to the base plate **26**.

[0020] FIG. **2** shows a second motor **202** coupled to the distal end **16** of the first arm **12**. The distal end may be adapted to couple to a back side of a monitor, as discussed in more detail below, and activating the second motor **202** may cause the monitor to swivel left and right. Note that the length of the two guiding members **20** and **22** may be shortened so that they are less than half (½) the distance of the first arm **12**. This allows the first arm **12** to fully retract against the base plate **26** so that the depth of the mount system **10** may be minimized.

[0021] FIG. **3** shows an alternative embodiment to extend and retract the distal end **16** of the first arm **12**. In this example, a screw **300** may be provided in place of the one of the guiding members **20** and **22**. The sleeve **302** may have a threaded opening adapted to receive the screw **300**. A motor **306** may be coupled to the screw **300** to rotate the screw **300**, which in turn causes the sleeve **302** to move along the longitudinal axis **304** of the screw **300**. This causes the proximal end **14** to slide or move along the longitudinal axis **304** of the screw **300**, which in turn causes the distal end **16** to extend and retract as discussed above. A number of openings **308** may be provided on the base plate **26** to attach the base plate **26** to a wall.

[0022] FIG. **4** shows the mount system **10** in a retracted position between a monitor **400** and a wall **402** along XZ plane. In this example, the negative (−) Y axis may represent the direction of the gravitational force. A bracket **404** may be provided to attach the back side **402** of the monitor **400** to the distal end **16** of the first arm **12**.

[0023] FIG. **5** shows the mount system **10** in a partially extended position, where the distal end **16** extends and retracts in a perpendicular manner relative to the wall **402**. In this example, the first motor **200** may be mechanically coupled to the proximal end **32** of the second arm **28** to extend and retract the first arm **12**. The second motor **202** may be provide on the distal end **16** to pivot the monitor **400** along the XZ plane.

[0024] FIG. **6** shows the mount system **10** in fully extended position. In this example, the first motor **200** may be mechanically coupled to the proximal end **14** of the first arm **12** to move the proximal end **14** along the guiding members **20** and **22**, which in turn extends and retracts the first arm **12**. Note that the second arm **28** supports the first arm **12** about its midpoint to minimize the distal end **16** from sagging along the—Y direction due to the weigh to of the monitor **400**.

[0025] FIG. **7** shows the mount system **10** including a control system **700** for adjusting the viewing angle of the monitor. The control system **700** includes a remote control **702** having one or more control buttons **704** to activate the mount system **10** to reposition the monitor. The control buttons **704** may include a left swivel button **706**, a right swivel button **708**, an extension button **710**, and a retraction button **712**. Activating one of the buttons **704** causes the remote control **702** to transmit a control signal **714**, which is received by a receiver **716**. The receiver **716** relays the control signal **714** to a processor **718** to control one or more motors **200** and **202** to extend or retract the first arm **12** and/or swivel the monitor accordingly. For example, an activation of the extension button **710** causes the processor **718** to activate the first motor **200** to extend the first arm **12**; and activation of the right swivel button **708** causes the processor **718** to activate the second motor to swivel the monitor to the right side.

[0026] The processor **718** may be linked to a memory **720** to store predetermined positions. The remote control **702** may have one or more preset buttons **722** and **724** such that activation of one of these buttons cause the processor **718** to activate one or more motors **200** and **202** to reposition the monitor to one of the predetermined positions stored in the memory **720**.

[0027] FIG. **8** shows a schematic diagram **800** representing the relationship amongst the first, second, third, and fourth pivot axes of the mount system **10** along the XZ plane. The schematic diagram **800** shows the first pivot axis **29** adapted to move along the X-axis aligned with the position of the third pivot axis **42**, the second pivot axis **31** free to move substantially along the Z-axis; the third pivot axis **42** adapted to rotate in that fixed position; and the fourth pivot axis **38** between the first and second axes **29** and **31**. A variable "A" may represent the distance between the first and fourth pivot axes **29** and **38**; variable "B" may represent the distance between the fourth and second pivot axes **38** and **31**; and variable "C" may represent the distance between the third and fourth pivot axes **42** and **38**. In order for the second pivot axis **31** to move substantially along the Z-axis, as the first pivot axis moves along the X-axis, the variables A, B, and C may have the following relationship, where $C^2=A\times B$. Such a mechanism is also referred to as the Scott Russell linkage. In the example described above the distances A, B, and C are equal to each other (A=B=C), however, other variable lengths may be used in accordance with the relationship discussed above.

[0028] While various embodiments of the invention have been described, it will be apparent to those of ordinary skill in the art that many more embodiments and implementations are possible within the scope of this invention. Accordingly, the invention is not to be restricted except in light of the attached claims and their equivalents.

What is claimed is:

1. A mount system adapted to reposition a monitor, the monitor having a back side, the mount system comprising:

a first guiding member having a longitudinal axis;

a first arm having a first proximal end and a first distal end, the first proximal end adapted to pivot along a first pivot axis and move along the longitudinal axis of the first guiding member, the first distal end having a second pivot axis, and the first distal end adapted to couple to the back side of the monitor and pivot the monitor along the second pivot axis;

a second arm having a second proximal end and a second distal end, the second proximal end adapted to pivot about a third pivot axis, the third pivot axis being in a fixed position, and the second distal end adapted to pivotably couple to the first arm about a fourth pivot axis located about a midpoint between the first and second pivot axes such that the first distal end extends and retracts relative to the second proximal end substantially along a straight line.

a first motor adapted to extend and retract the first distal end of the first arm by providing motorized action along one of the first, third, and fourth pivot axes; and

a second motor adapted to pivot the monitor by providing motorized action along the second pivot axis.

2. The mount system according to claim **1**, including a second guiding member having a longitudinal axis, the first proximal end of the first arm adapted to pivot along the first pivot axis and move along the longitudinal axis of the second guiding member.

3. The mount system according to claim **1**, including a base plate, the second proximal end pivotably coupled to the base plate along the third pivot axis, and the first guiding member coupled to the base plate such that the longitudinal axis of the guiding member is substantially perpendicular to the third pivot axis.

4. The mount system according to claim **1**, including a third arm having a third proximal end and a third distal end, the first arm between the second and third arms, the third proximal end adapted to pivot about the third pivot axis, and the third distal end adapted to pivotably couple to the first arm about the fourth pivot axis.

5. The mount system according to claim **1**, where a distance between the first and second pivot axes is about two times a distance between the third and fourth pivot axes.

6. The mount system according to claim **1**, including a spacer between the second distal end and the first arm.

7. The mount system according to claim **1**, where the first motor is coupled to the second distal end to provide motorized action along the fourth pivot axis to pivot the second distal end relative to the first arm to extend or retract the first distal end of the first arm.

8. The mount system according to claim **1**, where the first, second, third, and fourth axes are parallel with a vertical axis.

9. The mount system according to claim **1**, including a remote control, a receiver, and a processor, the remote control having at least one control button to adjust the viewing angle of the monitor and activation of the at least one control button causes the remote control to send a control signal to adjust the viewing angle of the monitor, the receiver adapted to receive the control signal, the processor linked to the receiver and adapted to activate at least one of the first and second motors to based on the control signal to adjust the viewing angle of the monitor.

10. A mount system adapted to reposition a monitor, the monitor having a back side, the mount system comprising:

a screw having a longitudinal axis;

a sleeve adapted to receive the screw and move along the longitudinal axis of the screw;

a first arm having a first proximal end and a first distal end, the first proximal end adapted to pivotably couple to the sleeve along a first pivot axis and move along the longitudinal axis of the screw, the first distal end having a second pivot axis, and the first distal end adapted to couple to the back side of the monitor and pivot the monitor along the second pivot axis;

a second arm having a second proximal end and a second distal end, the second proximal end adapted to pivot about a third pivot axis, the third pivot axis being in a fixed position, and the second distal end adapted to pivotably couple to the first arm about a fourth pivot axis located about a midpoint between the first and second pivot axes such that the first distal end extends and retracts relative to the second proximal end substantially along a straight line;

a first motor adapted to rotate the screw to move the first proximal end along the longitudinal axis of the screw to extend and retract the first distal end of the first arm; and

a second motor adapted to pivot the monitor by providing motorized action along the second pivot axis.

11. The mount system according to claim **1**, including a first guiding member having a longitudinal axis substantially parallel with the longitudinal axis of the screw, the first proximal end of the first arm adapted to pivot along the first pivot axis and move along the longitudinal axis of the second guiding member.

12. The mount system according to claim **11**, including a base plate, the second proximal end pivotably coupled to the base plate along the third pivot axis, and the screw and first guiding member coupled to the base plate such that the longitudinal axis of the guiding member is substantially perpendicular to the third pivot axis.

13. The mount system according to claim **10**, including a third arm having a third proximal end and a third distal end, the first arm between the second and third arms, the third proximal end adapted to pivot about the third pivot axis, and the third distal end adapted to pivotably couple to the first arm about the fourth pivot axis.

14. The mount system according to claim **10**, where a distance between the first and second pivot axes is about two times a distance between the third and fourth pivot axes.

15. The mount system according to claim **10**, where the first, second, third, and fourth axes are parallel with a vertical axis.

16. The mount system according to claim **10**, including a remote control, a receiver, and a processor, the remote control having at least one control button to adjust the viewing angle of the monitor and activation of the at least one control button causes the remote control to send a control signal to adjust the viewing angle of the monitor, the receiver adapted to receive the control signal, the processor linked to the receiver and adapted to activate at least one of the first and second motors to based on the control signal to adjust the viewing angle of the monitor.

17. A mount system adapted to reposition a monitor, the monitor having a back side, the motorized mounting system comprising:

a first guiding member having a longitudinal axis;

a sleeve adapted to receive the first guiding member and move along the longitudinal axis of the first guiding member;

a first arm having a first proximal end and a first distal end, the first proximal end adapted to pivotably couple to the sleeve and pivot along a first pivot axis, the first distal end having a second pivot axis, and the first distal end adapted to couple to the back side of the monitor and swivel the monitor along the second pivot axis that is aligned with a vertical axis; and

a second arm having a second proximal end and a second distal end, the second proximal end adapted to pivot about a third pivot axis, the third pivot axis being in a fixed position, and the second distal end adapted to pivotably couple to the first arm about a fourth pivot axis located about a midpoint between the first and second

pivot axes such that the first distal end extends and retracts relative to the second proximal end substantially along a straight line.

18. The mount system according to claim **17**, including a first motor adapted to extend and retract the first distal end of the first arm by providing motorized action along one of the first, third, and fourth pivot axes; and a second motor adapted to pivot the monitor by providing motorized action along the second pivot axis.

19. The mount system according to claim **17**, where the first guiding member is a screw such that rotation of the screw causes the sleeve to move along the longitudinal axis of the first guiding member, and including a first motor adapted to rotate the screw to extend and retract the first distal end, and a second motor adapted to pivot the monitor by providing motorized action along the second pivot axis.

20. The mount system according to claim **17**, including a second guiding member having a longitudinal axis substantially parallel with the longitudinal axis of the first guiding member, the first proximal end of the first arm adapted to pivot along the first pivot axis and move along the longitudinal axis of the second guiding member.

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