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(54) **ROTATING OVER-BED COMPUTER DESK**

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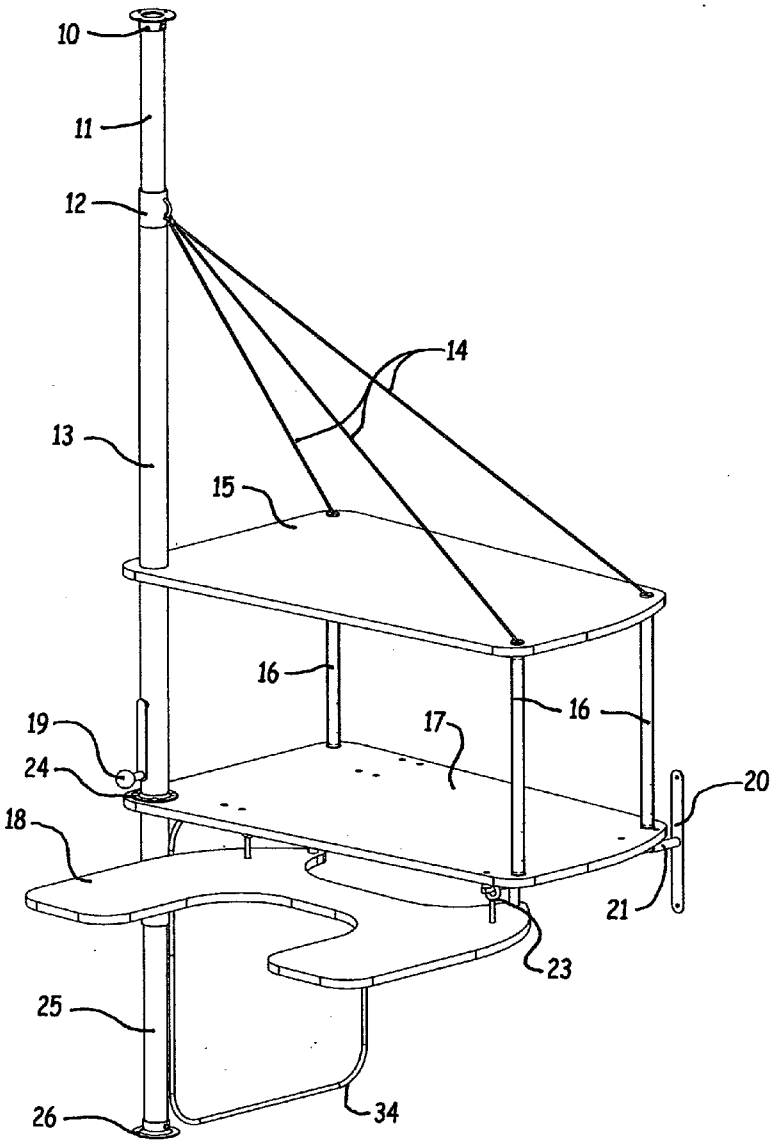
(57) **ABSTRACT**

A computer desk that uses a cantilevered work surface structure rotatably mounted to a vertical support column. The support column can be mounted so that the lower end rests upon the floor and the upper end is affixed either directly to the ceiling or by brackets to an elevated position on the wall of the structure or dwelling. The desk can be installed next to a bed and positioned to allow use while sitting up in bed or rotated to allow use while sitting in a chair. The desk can have multiple deck levels to accommodate a computer and accessories and a separate deck for control elements such as keyboard, mouse, and/or game controllers that can incorporate armrests. It can be assembled in right hand or left hand configuration from the same parts. It is designed to be as adjustable as is possible while also being inexpensive to produce.



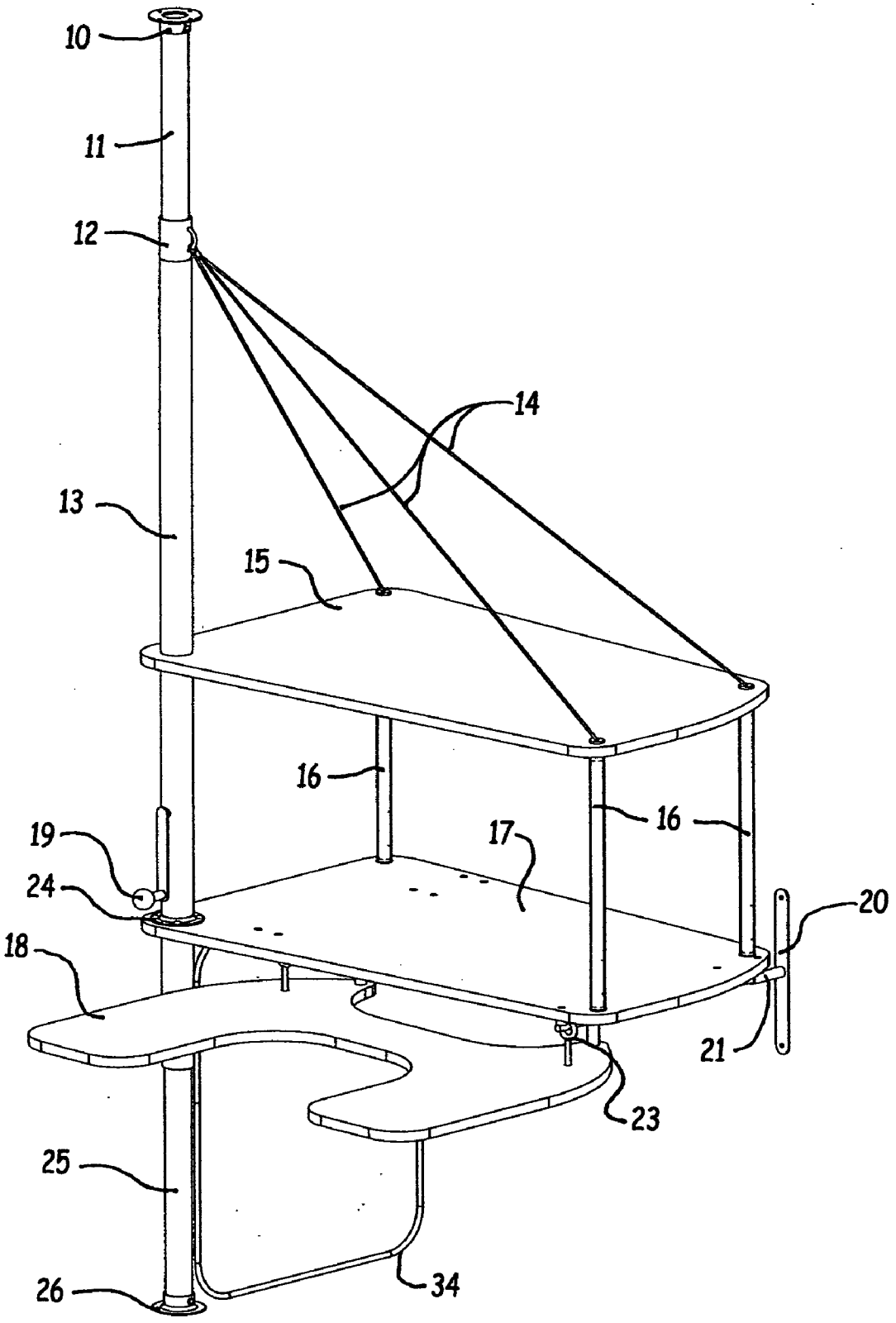


FIG. 1

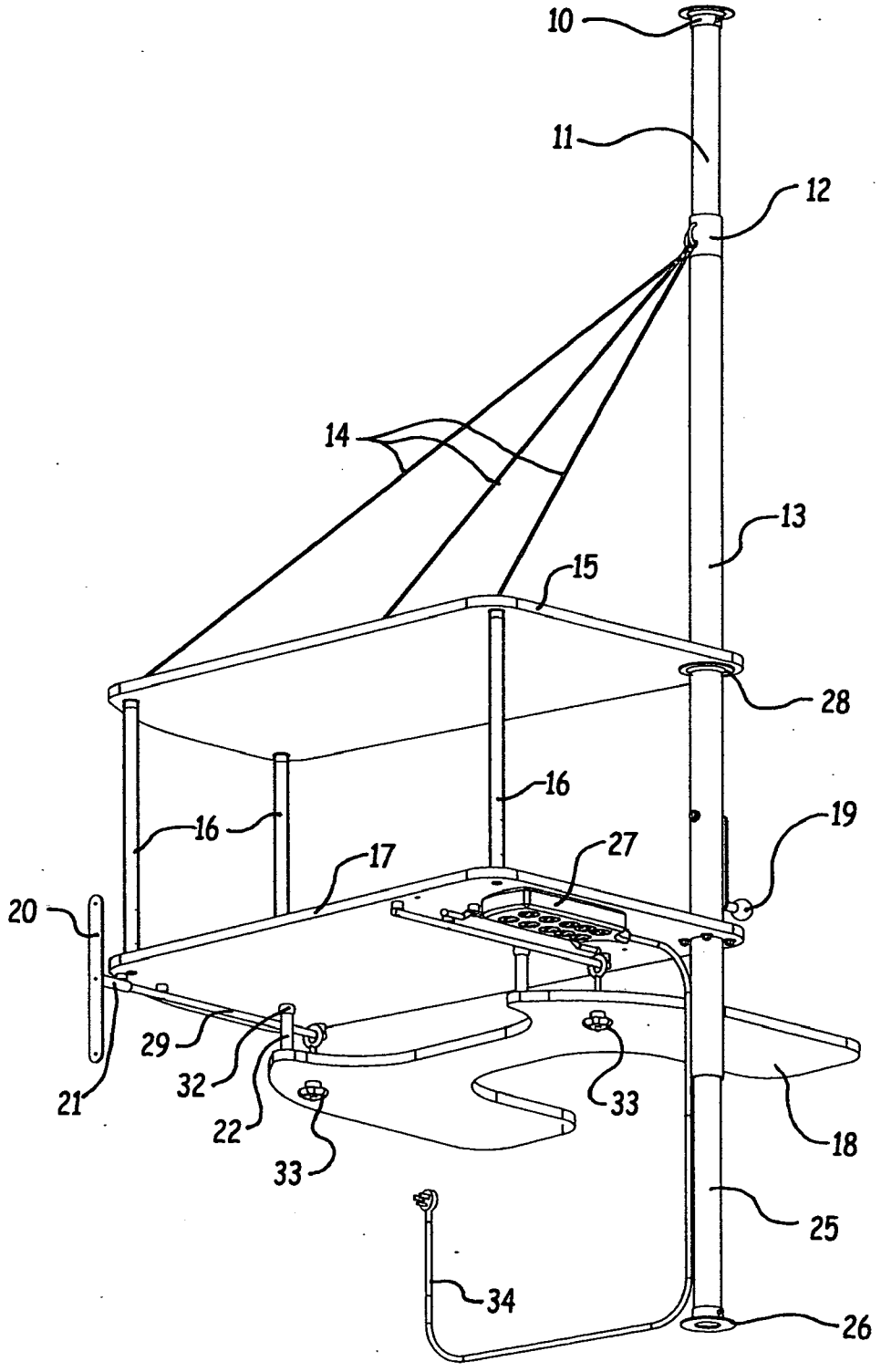


FIG. 2

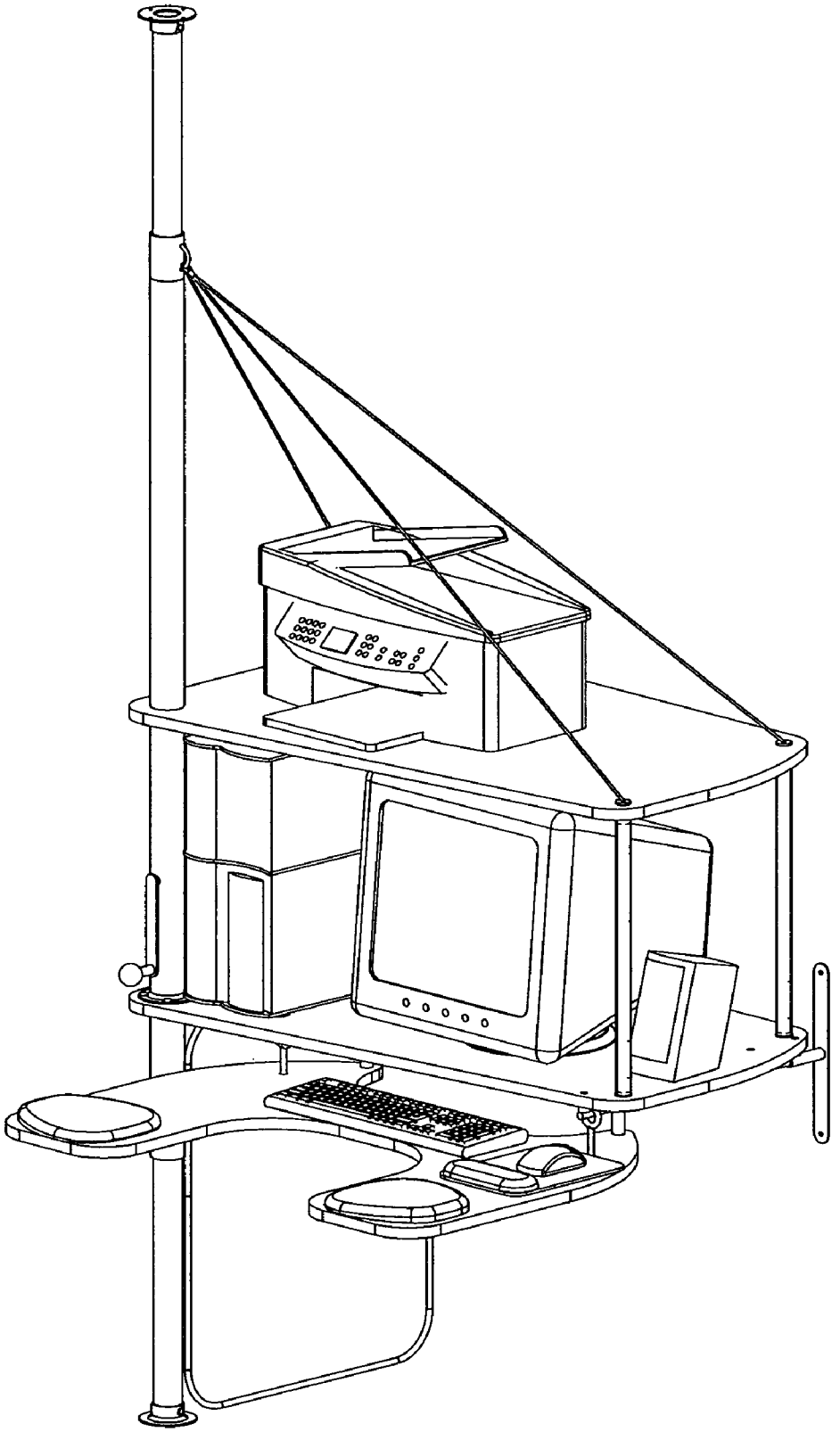


FIG. 3

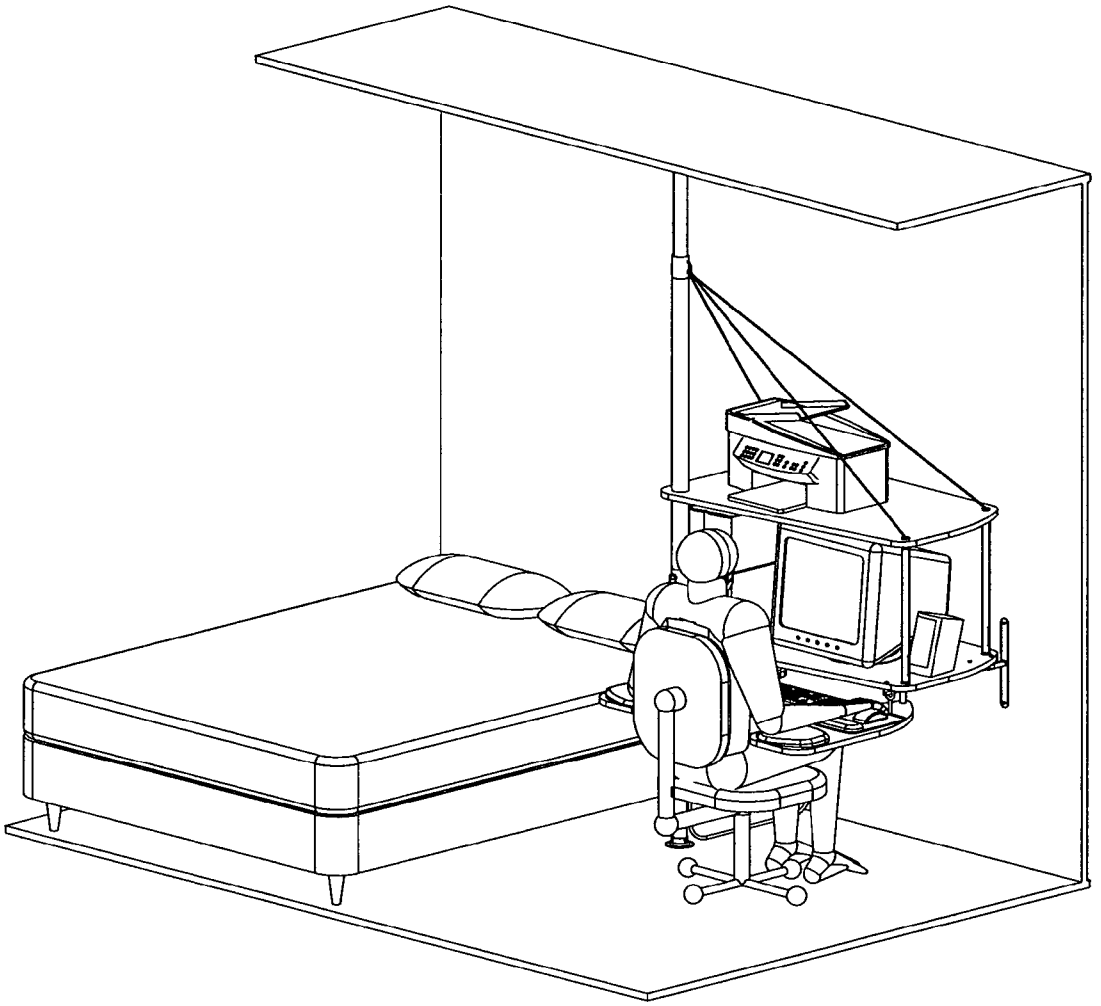


FIG. 4

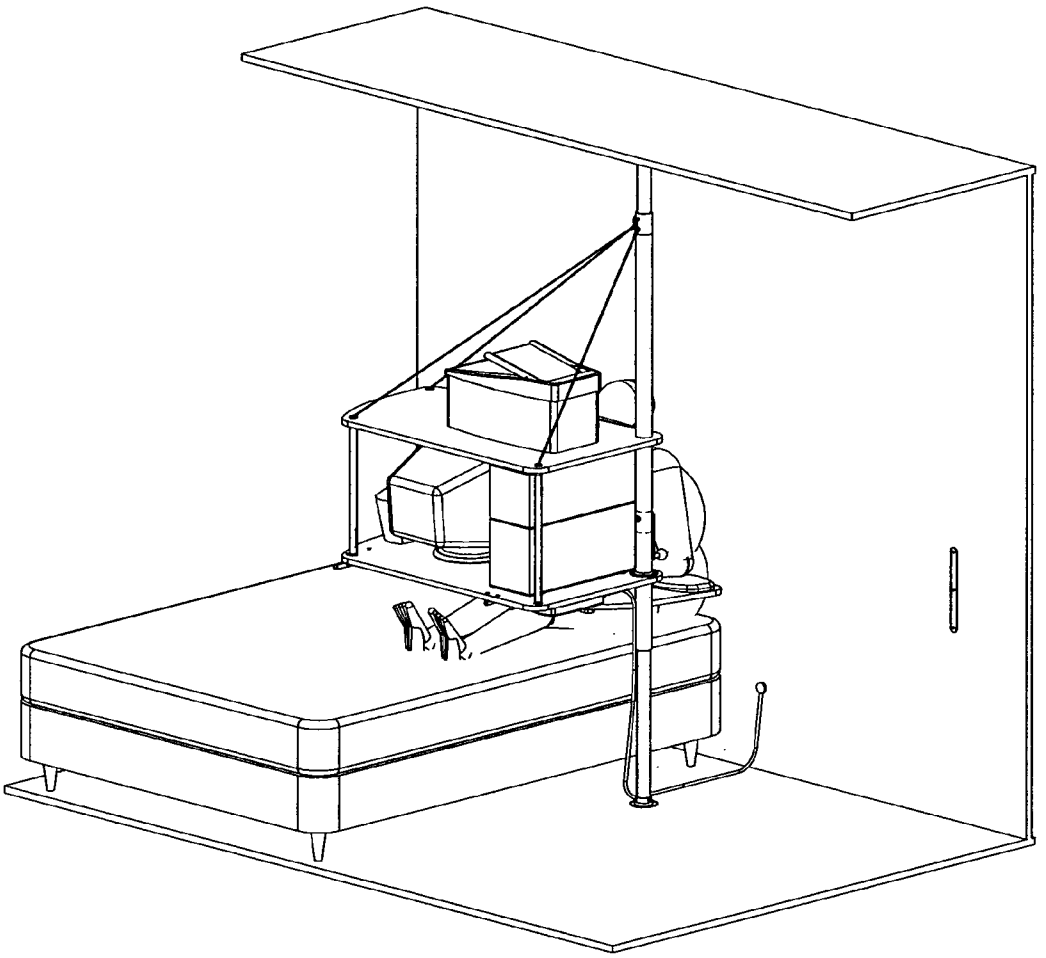


FIG. 5

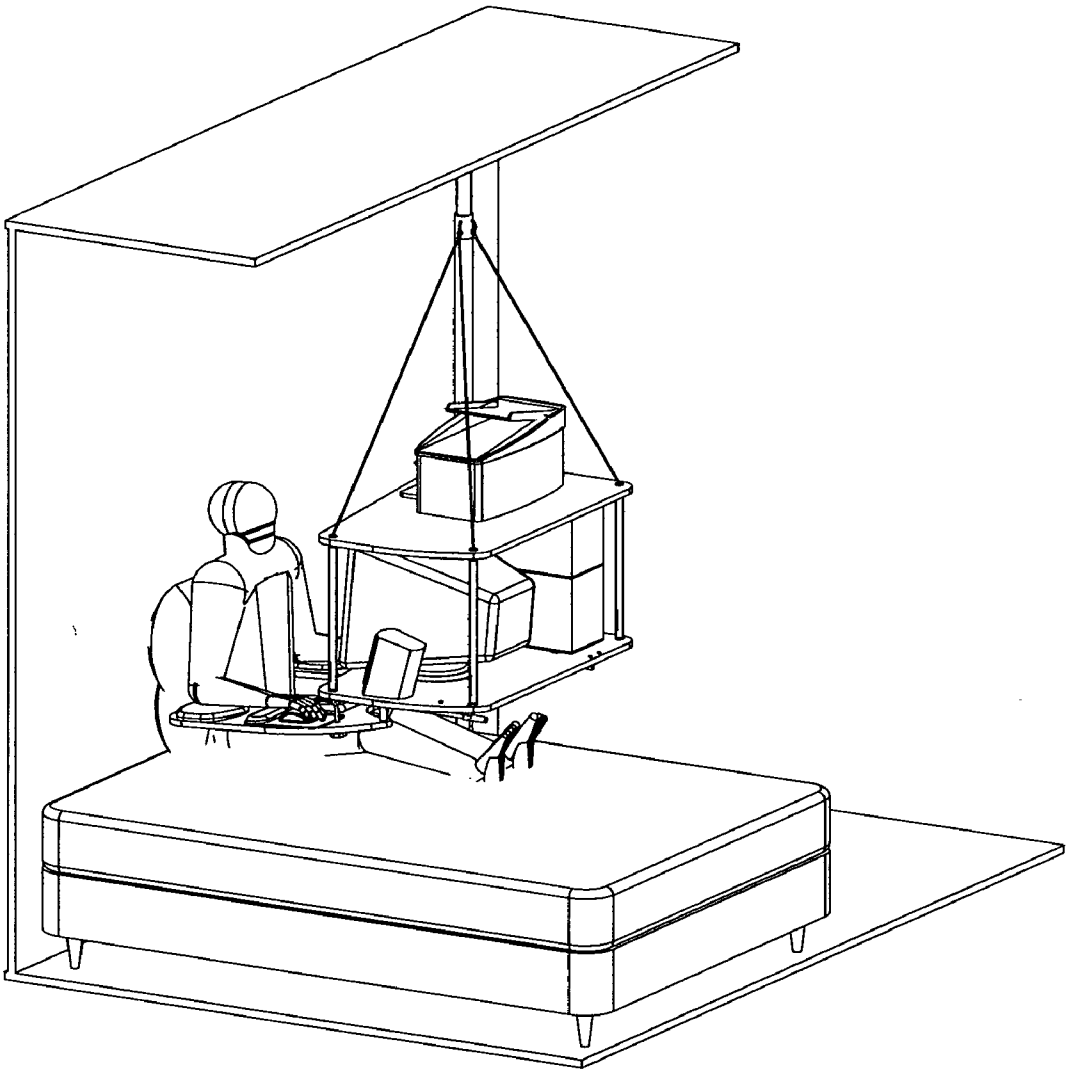


FIG. 6

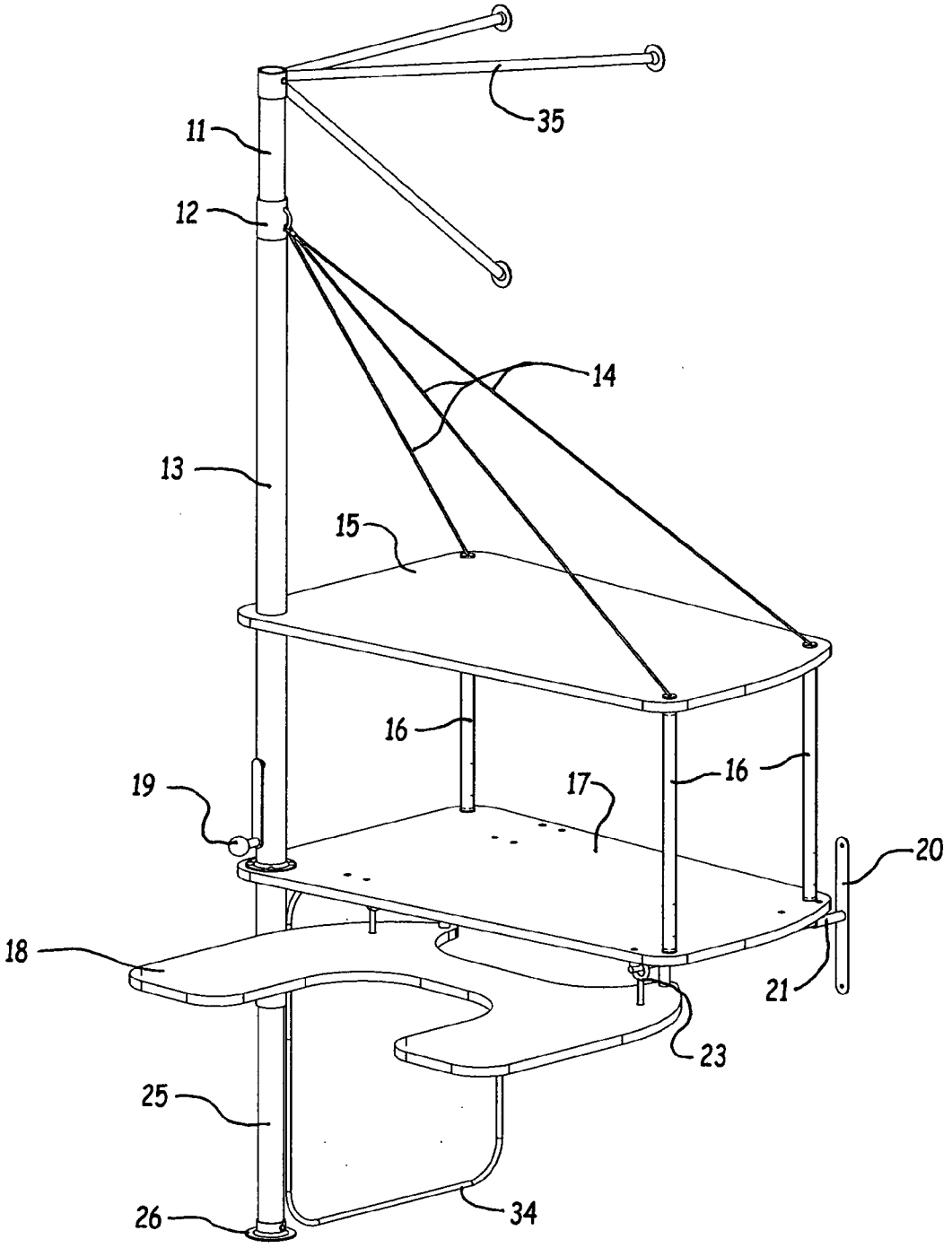


FIG. 7

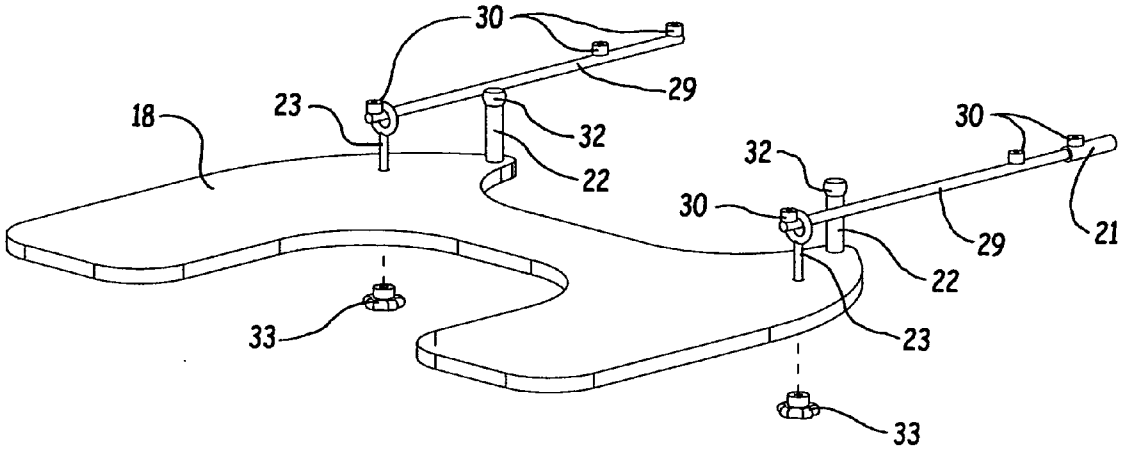


FIG. 8

ROTATING OVER-BED COMPUTER DESK

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable

DESCRIPTION OF ATTACHED APPENDIX

[0003] Not Applicable

BACKGROUND OF THE INVENTION

[0004] This invention relates generally to the field of furniture, more specifically to computer desks and work stations and most directly to over-bed computer desks and work stations.

[0005] The computer desk has become a fixture in many households. Various desks and tables have been developed for the desktop computer and its peripheral accessories in efforts to improve convenience, comfort and aesthetic qualities. Conventional use of a computer would have the user sitting in a chair and the computer arranged on a desk or table in front of the seated user. There are also times when a person sitting up or reclining in bed may wish to use the computer or to perform other desk related tasks. The number of designs that accommodate use in both positions is very limited and their configurations have thus far been inadequate from the standpoints of convenience, comfort and structural strength.

[0006] There is a history of improvements to bedside tables and the like which extends back to well before the computer age. In 1888 G. Wolz received U.S. Pat. No. 383,333 for a bedside table that could be used either in bed or while sitting in a chair, by rotating the table about a pivotal axis established by the table's base. The table described has notches and a pin to establish height adjustment and suggests a heavy cast iron base to help prevent tipping of its overbalanced cantilevered top. Even today this table could be used adequately for a small, lightweight, laptop computer, but certainly not for a modern computer workstation without a very massive base, strengthened components and a great expansion of its size and increase of cost.

[0007] 1912's J. L. McPherson U.S. Pat. No. 1,046,479 shows a bedside table that clamps to the bed frame a movable shaft to onto which the work surface is attached. This certainly prevents the table from tipping over, but must be lifted to adjust height and would be inadequate to contain a full size computer. In 1962 J. Douglass Jr. et al. received U.S. Pat. No. 3,046,072 for a very similar design incorporating and refined clamp, but otherwise having the same shortcomings.

[0008] In 1933 F. Kusterle received U.S. Pat. No. 1,901,174 for a bedside hospital table that comprised a small end table with an additional upper surface that could be pivoted about an axis established by the equivalent of pillow bearings attached to the bed-ward side of the table. This table also added a crank and screw for height adjustment and telescoping upper and lower members. By attaching the pivotal axis to a heavier structure (the table) the likelihood of the table tipping over is reduced. This is further reduced with the aid of an additional support roller. One drawback of the design is that attachment of the moveable surface to the top of the pivoting axis puts great stress at that point and limits the possible loading without undo reinforcement. Once again this table could be used adequately for a small, lightweight, laptop computer, but not for a modern computer workstation, without strengthened components and a great expansion of its size.

[0009] Other early rotating over-bed tables of note include the 1967 U.S. Pat. No. 3,304,609 by N. Horowitz et al. for a dental equipment stand which employs a large heavy stationary base and appears very strong. Strength is added in this design, but only at the expense of economical manufacture and convenience. Burnett received U.S. Pat. No. 3,908,565 in 1975 for a table similar in basic structure that is also has casters mounted in its base. This design has essential the same issues regarding the trade off between weight and stability versus economy and convenience.

[0010] As we entered the home computer age of 1980 to present, a new wave of furniture innovation can be observed. Furniture is now being designed to incorporate a monitor, CPU tower, keyboard, mouse surface, and optionally a printer, modem, router, speakers, and/or additional drives and accessories. A full computer workstation with a large monitor may have well in excess of 100 lbs. of equipment.

[0011] An early example of a rotating computer workstation was patented in 1982 by Tellier et al. who received U.S. Pat. No. 4,365,561. The intent here is a single workstation that could be used by multiple users at different times by means of rotating it about a substantially central axis. It demonstrates a broad base to give stability when the loading is unbalanced, means for height adjustment, clamping the central post to prevent unwanted rotation and multiple surfaces for computer components. It was not intended for over-bed use and could not easily be adapted for such, but it demonstrates some interesting attributes. The "rotation for multiple users" theme is also used in a patent by Leymann (1986) U.S. Pat. No. 4,619,427, whose design could be positioned for over-bed use by straddling a narrow bed, but is not really portable and side by side use rather than over-bed use is the intent. Patents by Granlund (1987) U.S. Pat. No. 4,648,574 and Spence (2000) U.S. Pat. No. 6,099,093 also rotate for the purpose of passing the computer between two or more users. Neither of the latter two inventions is intended or suitable for over-bed use. These four designs all tie together keyboard and monitor so that they rotate together.

[0012] A similar approach to the earlier bed clamped tables is shown in a very novel way by Dion et al. in U.S. Pat. No. 4,779,540. The motive of the device was to add the necessary surfaces for a desktop computer to a conventional desk inexpensively and such that could easily be pushed out of the way when not needed. His design employs a vertical shaft that can be clamped to the horizontal surface of an office desk with the lower end of the shaft terminating in a small foot that sits on the floor. Swinging arms with surfaces at their ends are mounted off of the vertical shaft in a cantilever fashion This is significant because it distributes the loading of the main pivot axis between two substantially separated points, one being the floor and the other being the desk surface. It essentially creates a multi surface table using

a conventional stationary desk. Although not anticipated in the patent it could be used with a desk at bedside, and possibly set up so that the bed and desk heights were appropriate for use in both positions, but it does not provide height adjustability once assembled and the method of the cantilevered arms would require them to be expensively built to support the required loads of a full desktop computer and monitor.

[0013] Another patent worth mention that is very unique is that of Corpuz, Jr. et al. (1998) U.S. Pat. No. 5,704,298 It demonstrates a monitor stand that pivots against one of the legs of an otherwise conventional workstation. The invention describes casters under the swinging element and is an effective way of supporting a swinging rather than simply rotating element. This is also not designed or suitable for over-bed use, but demonstrates another method and type of rotating or pivoting desk.

[0014] There is also a method use in several designs that are similar in method to that presented in the Cauffiel U.S. Pat. No. 5,479,865, where the base is made so that a chair leg or legs sits on it and anchors it to the ground. These tend to be used with relatively small tables not intended for computers but may also be used over a bed in a limited manner such as a small laptop computer. Stress inherent in the unsupported cantilever design would require very careful manufacture of components throughout the system to be strong enough to support a full size computer. Then it would also require a very large base and/or heavy chair in order to be stable. An extension of this idea is presented by Brown et al. in U.S. Pat. No. 6,298,794 where there chair and workstation are integrated together. Their design was not intended for over bed use, but presents various swinging, limited capacity cantilevered elements together with crank and screw height adjustment and could potentially be used in an over-bed capacity.

[0015] In U.S. Pat. No. 5,630,566 by Laura Case, a portable vertical pole is used with a plurality of articulated adjustable arms to position monitor, keyboard, etc. for comfortable use by a standing, bed bound or wheelchair bound person. In order for the work station to be stable it would require a large base radius and very tight clamping on the arm joints. It could be used in both bed position and conventional chair position. This computer stand provides a very limited amount of work surface and would be expensive to scale up. The work station rolls on casters and could be moved easily by a standing and walking person who is careful to avoid tipping it, but not so easily by a person confined to bed.

[0016] Another portable workstation is described by Newman in U.S. Pat. No. 4,848,710. The frame of the workstation is designed to straddle a bed bound person and solves some of the structural issues of the cantilevered designs. This patent also describes a version which is cantilevered from the side and has a wheeled carriage that extends under the bed to counteract the weight of the cantilevered portion. Unfortunately, it also requires a standing ambulatory person to move the table while being careful not to tip it over and it also does not provide easy height adjustment when loaded with a computer. These are designed primarily for use in hospitals or rest homes with standard hospital beds. A more adjustable version of the cantilevered design is taught by Roddan in U.S. Pat. No. 6,269,753, but has the same drawback of needing a walking person to carefully wheel it into position. His patent also presents the use of armrests attached to the desk, which become advantageous when a desk is used in bed mode, unfortunately the method of mounting that is taught gives very little adjustability and moving the desk to an appropriate position for the armrest severely limits leg room when used in bed mode.

[0017] The method of the preferred embodiment of the present inventions is to use a vertical floor to ceiling column similar to that used in a rotating bunk bed invented by Keller in U.S. Pat. No. 4,360,936. While Keller's design still uses a cantilevered arm method that is likely prone to high stresses, lacks a method for height adjustment and is not designed for use as a computer desk, it does show that both the ceiling and floor can be used as stressed elements of a cantilevered, loaded system.

[0018] With the exception of the bed straddling workstation described in Newman U.S. Pat. No. 4,848,710 which is unruly to move around or adjust, all of the configurations that could be used to present a computer in bed mode lack inherent structural rigidity and strength to easily support a computer system with a large, heavy monitor. Most of them do not provide space for all of the components of a computer and still offer ample space for writing and other activities. None of them offer and easy way to move the entire system from bed mode to conventional mode. The only armrest system offered is inadequate to truly provide a comfortable arrangement.

SUMMARY OF THE INVENTION

[0019] It is accordingly the object of the present invention to provide a robust yet inexpensive, easily adjustable computer desk or workstation that can be used in bed and that can easily be rotated into position or rotated out of the way by the bed-bound person. The alternate position is appropriate for use in a chair. The invention also provides a surface that can be easily positioned and adjusted which incorporates keyboard, mouse pad and armrests. This enhances comfort and mouse control in either bed of chair. The new workstation can also be assembled as right or left hand from the same parts.

[0020] Other objects and advantages of the present invention will become apparent from the following descriptions, taken in connection with the accompanying drawings, wherein, by way of illustration and example, an embodiment of the present invention is disclosed.

[0021] In accordance with a preferred embodiment of the invention, there is disclosed a desk that uses a floor to ceiling column as its main support structure. The column has a height adjustable and rotatable larger diameter main section with smaller diameter telescoping ends at top and bottom. For height adjustment, the lower telescoping end has a means for adjustment relative to the main section such as a crank and screw, pneumatic cylinder or electrical actuator. The upper telescoping end slides engaged within the main section and provides horizontal stability to the upper end of the column by secure attachment to a ceiling mounted flange or to a bracket secured at an elevated position to the wall. By mounting both ends of the support column to elements of the structure or dwelling in which it is being used, stresses are managed very efficiently and it becomes impossible to tip over. The horizontal load at the ceiling is typically less than

one fifth of the weight of the entire system. Another objective that is achieved is the ability to easily rotate the entire work station into the over-bed position and back to chair position.

[0022] In the preferred embodiment of the invention two similar, vertically separated parallel work surfaces are attached to the main section of the column so that the column is positioned relatively near a forward corner of the work surfaces. The column provides means of attachment with bolts or screws for the lower work surface and by gravity against a flange on the column for the upper work surface. Support at the corners of the work surfaces that are distant from the support column is provided by means of cables attached to loops on a short piece at the upper end of the main section of the column. Each of the three support cables run through holes near each corner in the upper work surface where they are directed downward through a support strut to an adjustable means of attachment at the lower work surface. The support struts establish the height and parallelism of the upper work surface relative to the lower surface and provide vertical support. In this way the vertical load caused by the weight of the computer system and work surfaces is shared more or less equally by the three support cables and the column's main section. The upper work surface experiences horizontal compressive loads that are of little consequence. The adjustments where the cables attach to the lower work surface provide a method for leveling the lower (and therefore also upper) work surface. By using this method support for the work surfaces is provided at all four corners and minimizes the large bending moment usually associated with cantilevered desks. It also allows a clean bottom side of the lower work surface so that there is nothing to interfere with a person's legs when using the desk while in bed. In the same spirit of the invention the work surfaces could be braced from underneath instead of supported from above with cables. This would be a less efficient method requiring substantial and well designed braces, but may have some appeal where less capacity is required.

[0023] The upper and lower work surfaces are made in such a way that the same pieces can be assembled either side up or to create either a left hand or right hand desk. To make this possible the cables are attached to a short column section sitting atop the column's main section that can also be turned upside down to orient the cables properly for either direction.

[0024] The invention also includes a means of incorporating armrests, keyboard and mouse pad area in an additional work surface suspended beneath the main lower work surface described above. The new armrest method creates a platform that can easily be slid in and out, rotated from side to side and adjusted for height and angle. This design essentially consists of eyebolts sliding on steel rods that are affixed with spacers to the underside of the main work surface. The armrest platform is held up by threaded knobs on the eyebolts. The platform is stabilized with rubber bumpers affixed to the ends of two posts mounted rearward such that the weight of the platform levers the bumpers up into the underside of the main work surface. The platform can be moved easily by lifting its forward end and sliding it along the rails. Movement of the adjusting knobs alters the pitch angle of the platform and changes the height of its forward end.

DESCRIPTION OF THE DRAWINGS

[0025] FIG. **1** and FIG. **2** are perspective views of the preferred embodiment from above front right and below left rear respectively. FIG. **3** is an perspective view of the preferred embodiment with a computer system. FIG. **4** illustrates the invention being used by a person in a chair. FIG. **5** and FIG. **6** illustrate the invention being used by a person in a bed. FIG. **7** is a perspective view of the invention with an optional wall bracket instead of a ceiling mount. FIG. **8** is an isometric view of the control deck system elements with other parts removed for clarity.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] Detailed descriptions of the preferred embodiment are provided herein. It is to be understood, however, that the present invention may be embodied in various forms. Therefore, specific details disclosed herein are not to be interpreted as limiting, but rather as a basis for the claims and as a representative basis for teaching one skilled in the art to employ the present invention in virtually any appropriately detailed system, structure or manner.

[0027] FIG. **1** and FIG. **2** are perspective views of the preferred embodiment from above front right and below left rear respectively. FIG. **3** is an perspective view of the preferred embodiment with a computer system. FIG. **4** illustrates the invention being used by a person in a chair. FIG. **5** and FIG. **6** illustrate the invention being used by a person in a bed. FIG. **7** is a perspective view of the invention with an optional wall bracket instead of a ceiling mount. FIG. **8** is an isometric view of the control deck system elements with other parts removed for clarity.

[0028] Referring to elements as numbered in the drawing figures, A floor to ceiling support column consists of a height adjustable and rotatable larger main section (**13**) with smaller telescoping ends at top (**11**) and bottom (**25**). For height adjustment, a crank (**19**) and lift screw mounted to the main section (**13**) act on the lower section (**25**) to raise or lower the main section. The upper telescoping end (**11**) slides unrestrained within the main section (**13**) and provides horizontal stability to the upper end of the column by secure attachment to the ceiling through flange (**10**). The lower section (**25**) terminates at flange (**26**) which has rubber bumpers underneath that contact the floor.

[0029] Two work surfaces are attached to the main section of the column so that the column is positioned relatively near a forward corner of the work surfaces. The upper surface (**15**) will be referred to as the "upper deck" and the lower surface (**17**) will be referred to as the "main deck". The column provides means of attachment for the main deck with bolts or screws through a flange (**24**) that is welded to the main section (**13**). The upper deck (**15**) is held by gravity against another welded flange (**28**). Support at the distal corners is provided by means of cables (**14**) attached at their upper end to a hanger (**12**) resting upon the upper end of the main section (**13**). Each of the three support cables (**14**) run through holes near each corner in the upper deck where they are directed downward through support struts (**16**) and terminate in threaded members that receive screws from under the main deck (**17**).

[0030] A third work surface (**18**) to be referred to as the "control deck" incorporates armrests and surfaces to receive

a keyboard and mouse pad. The control deck is suspended from two eye bolts (**23**) with adjusting knobs (**33**) hanging from two rods (**29**) mounted on spacers (**30**) to the underside of the main deck (**17**). At the rear of the control deck are two posts (**22**) with rubber tips (**32**) or the like that are levered by the weight of the armrests into the main deck (**17**) when at rest or when the control deck is positively loaded, thus securing the position of the control deck (**18**). Lifting the front of the control deck (**18**) releases the rubber tips and allows free movement in and out and several degrees side to side. Adjustment of knobs (**33**) changes the pitch angle of the control deck (**18**) and thereby the height as well.

[**0031**] A magnetic latch (**21**) attached to the end of one of the rods (**29**) strikes a steel plate (**20**) attached to the wall to prevent unwanted movement. A surge suppressor (**27**) with power cord (**34**) is attached to the underside of the main deck (**17**).

[**0032**] While the invention has been described in connection with a preferred embodiment, it is not intended to limit the scope of the invention to the particular form set forth, but on the contrary, it is intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

1) A desk or computer work station consisting of a telescoping support column with a major central outer section and minor upper and lower inner sections which have lower and upper ends terminating at floor and attached to the ceiling of the structure or dwelling. The central outer section provides means for height adjustment by mechanical extension or retraction of the lower inner section and free sliding movement of the upper inner section. The central outer section also provides means of attachment for substantially horizontal work surfaces. The assembly of central outer column section and work surfaces is able to be rotated about the upper and lower inner column sections which remain stationary.

2) A desk or computer workstation as described in claim 1 where the upper inner section of the support column terminates at an elevated fixture that is attached to a wall of the structure or dwelling rather than attached to the ceiling.

3) A desk or computer workstation as described in claim 1 or 2 that allows the adjustment of height by means of a mechanical crank and screw assembly.

4) A desk or computer workstation as described in claim 1 or 2 that allows the adjustment of height by means of a pneumatic or hydraulic cylinder.

5) A desk or computer workstation as described in claim 1 or 2 that allows the adjustment of height by means of an electrical actuator.

6) A desk or computer workstation as described in any of claims **3-5** that has one or more cantilevered, off-center work surfaces capable of extending over a bed, chair or sofa.

7) A desk or computer workstation as described in any of claims **3-5** that uses a braced under surface structure to support the work surfaces.

8) A desk or computer workstation as described in any of claims **3-5** that uses a suspension structure to support the work surface(s).

9) A desk or computer workstation as described in claim 6 that is constructed so that the same cantilevered work surface components can be assembled in either a right or left hand configuration.

10) A desk or computer workstation as described in claim 7 or 8 that has a sliding and/or adjustable keyboard surface or tray.

11) A desk or computer workstation as described in claim 10 that has armrests and mouse pad incorporated into the keyboard surface.

12) A desk or computer workstation as described in claim 5 or 6 that uses a magnetic wall latch to prevent unwanted rotational movement.

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