A cabinet with a rotatable and hydraulically liftable tabletop uses a swivel means and at least one hydraulic cylinder to join a tabletop to a base cabinet. A second hydraulic cylinder additionally supports the tabletop above a caster that rolls along a circuit path about the cabinet such that the tabletop may be manipulated into a long table, tall table, or compact table configuration. The hydraulics may also be employed to lift the base cabinet off the ground such that the entire article of furniture may easily be moved like a push cart.
CABINET WITH ROTATABLE AND HYDRAULICALLY LIFTABLE TABLETOP

BACKGROUND OF THE INVENTION

[0001] The present invention relates generally to an article of furniture suitable for the storage and use of audio-visual components used for presentations, and more specifically to a cabinet having a moveably joined tabletop. Many of the rotatable tables in the prior art have a single point of support that allows the table surface to be rotated within reach of a user, such as the Lazy Susan and over-the-bed type tables shown and described in U.S. Pat. Nos. 3,963,288; 4,158,997; 4,334,482 and 6,543,369. Heavier duty prior art cabinets having a rotatable table require at least one leg support in addition to the rotational support point, such as those shown and described in U.S. Pat. Nos. 5,005,925; 5,454,636 and 5,743,603, but they are not height adjustable.

[0002] The ability to selectively position the height of a tabletop capable of supporting significant weight while maintaining the ability to rotate the tabletop into various configurations relative to a base cabinet presents some challenges. In U.S. Pat. No. 4,735,469, Liggett sidestepped the problem by placing the entire furniture assembly onto height adjustable legs having casters, but the entire assembly can accidentally be moved if someone leans against it. Burdi et al. addressed the problem by simultaneously operating two drive assemblies while counting the number of rotations of each drive assembly so the height change was consistent, as shown and described in U.S. Pat. No. 6,286,441. The best solution seems to be the use of hydraulic lifts, such as those used with some medical and industrial tables, but hydraulic lifts can be damaged when they are twisted or improperly loaded.

SUMMARY OF THE INVENTION

[0003] The present invention includes several unique combinations that provide a tabletop that may be selectively positioned upwardly or downwardly and that may be turned about an axis normal to a horizontal plane. The tabletop is joined at one end to a base cabinet using a swivel means and at least one hydraulic cylinder, and the tabletop is joined at the other end to a leg having at least another hydraulic cylinder atop a wheel such that the tabletop may be lifted and rotated relative to the base cabinet. A hydraulic pump that can force a liquid into the hydraulic cylinders is used to selectively adjust the height of the tabletop. The article of furniture can be manipulated into a long table, tall table, or compact table configuration in addition to being rotatable and liftable into numerous other positions.

[0004] The most preferred embodiment of the present invention uses paired hydraulic cylinders for extra stability and reliability. Additionally, the hydraulic lifts may be used to lift the heavy base cabinet such that the entire article of furniture may be rolled on wheels when it is in the compact table configuration. The features designed into the present invention make the article of furniture exceptionally well suited as a presentation desk that may be fully equipped with audio and visual devices.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 is a perspective view of the most preferred embodiment of the article of furniture of the present invention in a long table configuration.

[0006] FIG. 2 is a horizontal cross sectional view through line 2-2 in FIG. 1.

[0007] FIG. 3 is a plan view of the article of furniture of FIG. 1.

[0008] FIG. 4 is a vertical cross sectional view through line 4-4 in FIG. 3.

[0009] FIG. 5 is a perspective view of the article of furniture of FIG. 1 in a tall table configuration that has been partially swiveled.

[0010] FIG. 6 is a perspective view of the article of furniture of FIG. 1 in a compact table configuration.

[0011] FIG. 7 is a plan view of the compact table configuration of FIG. 5.

[0012] FIG. 8 is a perspective view of the article of furniture of FIG. 5 with the base cabinet lifted.

[0013] FIG. 9 is a cross sectional view of a first alternate swivel means.

[0014] FIG. 10 is a cross sectional view of a second alternate swivel means.

[0015] The following is the list of numerical callouts used in FIGS. 1-10:

[0017] 10 base cabinet

[0018] 12 top

[0019] 14 back

[0020] 16 first side

[0021] 18 second side

[0022] 20 tabletop

[0023] 22 first half

[0024] 24 second half

[0025] 26 channel

[0026] 30 Hydraulic pump

[0027] 32 electric motor

[0028] 34 switch

[0029] 40 first hydraulic cylinder

[0030] 42 second hydraulic cylinder

[0031] 44 tube

[0032] 46 rod

[0033] 50 first leg framework

[0034] 52 first leg cylinder bracket

[0035] 54 first leg case

[0036] 56 first leg access panel

[0037] 58 turntable

[0038] 60 second leg framework

[0039] 62 second leg cylinder bracket

[0040] 64 second leg case

[0041] 66 second leg access panel
DetaiLed Description Of The Invention

The most preferred embodiment of the present invention, shown in FIGS. 1 through 8, is a cabinet with a rotatable and hydraulically liftable tabletop. This description will describe the base cabinet, tabletop, swivel means and vertical adjustment means needed to make the present invention. The preferred embodiment's structure with optional features will be described first, followed by function and alternate embodiments. Preferred materials, shapes, methods of attachment and methods of assembly will be discussed, but these preferences are not intended to exclude suitable or functionally equivalent alternatives. The term "join" has a broad meaning that is not limited to a direct connecting of parts, so there may be intermediate parts that are not specifically named but that contribute to the joining of named parts. Unnamed brackets, supports, framework and fasteners are assumed to be used whenever it should be obvious to an ordinarily skilled cabinet maker.

FIGS. 1-8, which are views of the most preferred embodiment, show a very basic base cabinet 10. The base cabinet, like the majority of the article of furniture, is preferably made from a wood product or other suitable cabinet making material. Because this article of furniture is typically used for presentations, a desk-sized structure made from a quality hardwood or veneer covered plywood having a beautiful finish is preferred. The base cabinet includes a top 12, back 14, first side 16 and second side 18. The first side serves as an at least one structure for supporting the tabletop in a horizontal plane. The base cabinet's enclosure should be combined with any necessary article supporting means, not shown, such as drawers, racks, shelves, etc., fixed or movable partly or wholly out of the enclosure to make an article supported more readily accessible. Additional components that may be added include compartments, walls, doors, shelves, partitions, racks or other article supports, or similar parts of a compartment, fixed or removable.

The tabletop 20 is a horizontally supported planar surface that is rigid, preferably a wood material. The tabletop has a first half 22 and a second half 24. The first half may be selected arbitrarily, such as would be required for a round tabletop. The first half is joined to the first side 16 of the base cabinet 10 such that the base cabinet provides the structure needed to at least partially support the tabletop in a horizontal plane. The bottom surface of the tabletop includes a channel 26, which could alternately be conduit or a cover, for concealing lines, wires or cables. The bottom surface of the tabletop may include mounting plates and brackets where extra strength is needed.

The tabletop 20 is hydraulically liftable by a vertical adjustment means that uses a hydraulic pump 30 that imparts motion to the tabletop when a means for controlling the pump is operated, such as an electric motor 32 that is actuated by a switch 34. An alternate means for controlling the pump is a simple hand crank. The hydraulic pump provides a fluid pressure that acts on a cross section of a rod or piston of one or more hydraulic cylinders. Hydraulic lines, not shown, extend from the hydraulic pump to each of the hydraulic cylinders. The hydraulic pump and electric motor may be mounted to the back 14 of the base cabinet 10. An access panel may be used to hide the pump and motor from view.

There is a first hydraulic cylinder 40 that at least partially supports the first half 22 of the tabletop 20, and there is a second hydraulic cylinder 42 that at least partially supports the second half 24 of the tabletop. Hydraulic cylinders are often provided with a hydraulic pump such that a system is fully charged when delivered, and the hydraulic cylinders are usually all identical. Most hydraulic cylinders are constructed with a tube 44 and a rod 46. For hydraulic cylinders that do not maintain a good seal if the rod is rotated inside of the tube, we have paired the first hydraulic cylinder with another hydraulic cylinder such that the tubes of the first hydraulic cylinder and the another hydraulic cylinder are fixed relative to each other. This pairing of hydraulic cylinders provides extra stability to the tabletop. For even more stability, the second hydraulic cylinder may be paired with yet another hydraulic cylinder. The hydraulic pump and cylinders shown have a 12 inch (300 mm) height adjustment range, and were obtained through Monarch Hydraulics Inc., DynaLift® Group, located in Caledonia, Mich.

A first leg framework 50 is secured to the first side 16 of the base cabinet 10. In addition to providing a sturdy mounting surface, the first leg framework may be used to space the tabletop 20 away from the first side if there is a need for extra clearance to accommodate a particular swivel means. The first hydraulic cylinder 40 is mounted to the framework using a first leg cylinder bracket 52. A first leg case 54 is used to hide the framework, bracket and cylinder, and a first leg access panel 56 is provided for exposing the hydraulic cylinder for maintenance purposes.

The swivel means used in FIGS. 1-8 is a turntable 58 that makes the tabletop 20 rotate relative to the base cabinet 10. The term "swivel means" includes, but is not limited to, turntables, ball joint assemblies, rollers, pins, tube and rod assemblies, sleeve and pin assemblies, wheel bearings and wheel bearing assemblies. The turntable shown is of the type commonly joined to the seat of a stool, but a wheel bearing assembly of the type commonly joined to a wheel on an automobile is a very robust alternative that may easily be adapted for use with the present invention by adding an appropriate bracket that provides a mounting surface. The turntable swingably joins the tabletop to the base cabinet such that the tabletop is rotatable about an axis that is perpendicular to a horizontal plane. Some types of swivel means may benefit from the addition of one or more rollers that function to reduce the freedom of movement of the tabletop. Rollers help prevent the axis about which the tabletop rotates from being shifted by an applied torque, such as by someone sitting or leaning on an edge of the tabletop. If desired, the swivel means may be used to join the first hydraulic cylinder to the first side of the base cabinet,
thereby allowing the first hydraulic cylinder to be rotationally fixed relative to the first half of the tabletop.

[0057] A second leg framework 60 is secured to an underside of the second half 24 of the tabletop 20. The second hydraulic cylinder 42 is secured to the second leg framework using a second leg cylinder bracket 62. The second leg framework provides a sturdy mounting surface and spaces the second hydraulic cylinder away from the tabletop such that shorter hydraulic cylinders may be used without having to sacrifice any of the overall desired height of the tabletop. A second leg case 64 and a second leg access panel 66 protect the framework, bracket and cylinder from view. A rolling means, such as one or more casters 68, is fastened to that end of the second hydraulic cylinder that is closest to the floor or ground, preferably at the free end of the rod. If desired, the second leg framework may be fixed to the rolling means such that the second hydraulic cylinder separates the second leg framework from the tabletop, but the tabletop may not appear to be sturdy with increased height adjustment.

[0058] Because the hydraulic cylinders in the preferred embodiment are designed to be used as a set of four, the first hydraulic cylinder has been paired to another hydraulic cylinder, and the second hydraulic cylinder has also been paired to yet another hydraulic cylinder. The second hydraulic cylinder and its paired cylinder each have their own caster. The pair of casters is a rolling means. The casters may alternatively be mounted to a bracket to increase the distance of separation between the casters, thereby increasing stability of the tabletop, but the function remains the same and the bracket may be mounted to more than one hydraulic cylinder.

[0059] The allowable movement of the article of furniture of the present invention permits the tabletop 20 to be oriented in various positions about the base cabinet 10. There is a long table configuration, shown in FIGS. 1-4, characterized by the first half 22 of the tabletop being substantially adjacent the first side 16 of the base cabinet, and characterized by the height of the tabletop being substantially in a plane defined by the top 12 of the base cabinet. If the hydraulic are operated to lift the tabletop, there is a tall table configuration, shown in FIG. 5, characterized by the tabletop being above and substantially parallel to the top of the base cabinet. With the tabletop lifted, the tabletop may be rotated into numerous positions relative to the base cabinet. At about 180 degrees of rotation, there is a compact table configuration, shown in FIGS. 6 and 7, characterized by the tabletop being in a position that is substantially over the top of the base cabinet.

[0060] FIG. 8 shows yet another configuration that allows the entire article of furniture to be rolled like it is a push cart. There are at least two cabinet wheels 84 that continuously support the first side 16 of the base cabinet. A handle 82, or a pair of handles, on the second side of the base cabinet is provided. A lifting member 80 is secured to the second leg framework and/or bracket (which is fixed relative to the tabletop), and the lifting member projects toward the base cabinet. In the compact table configuration, the lifting member is directly below the handle. As the hydraulic are operated to lift the tabletop, the lifting member catches the handle before the maximum lift capacity of the hydraulic cylinders is reached, and the second side of the base cabinet is lifted off the ground slightly before the hydraulics reach a maximum upward adjustment of the height of the tabletop. Between the cabinet wheels under the first side and the casters 68 under the second side 18 of the base cabinet, the entire article of furniture is on wheels. An alternate lifting member could be a pair of pins that pass through the second leg framework and through apertures on the second side 18 of the base cabinet to lock the unit into a compact table configuration such that the pins will lift the cabinet via the apertures as the hydraulics are operated.

[0061] FIG. 9 shows a first alternate swivel means that may be used with the present invention. There is only one first hydraulic cylinder, and it is characterized by a tube and a rod. The hydraulic cylinder is of the type that allows the rod to turn inside of the tube without damaging the seals that keep the hydraulic fluid in the system. The free end of the rod, opposite the end of the rod that interacts with the hydraulic fluid, is joined to the first half of the tabletop. The point of attachment may be very close to the end of the table. Although the axis of rotation is shown to be somewhat centrally located along the end of the table, it could be moved toward one of the corners of a rectangular tabletop, such as the front corner on the first half. Also, to maintain the compact table configuration, the axis of rotation relative to the base cabinet may be moved toward a corner, such as the back corner of the second side.

[0062] FIG. 10 shows a second alternate swivel means 76 that includes a sleeve 70 that may be used with the present invention. The term “sleeve” includes, but is not limited to, a tubular cylinder, a hollow pipe and a bushing. The sleeve is fastened to the first side of the base cabinet such that a horizontal cross section provides a substantially circular opening. The first hydraulic cylinder of the second alternate swivel means is a pair of tube and rod type hydraulic cylinders that have their tubes fixed to each other using a cylinder bracket 72, or two such brackets that are fastened to each other. The cylinder bracket extends to an attached perpendicular mounting surface 74 that is joined to a swivel means, such as a turntable or ball joint, and the swivel means is joined to the first side of the base cabinet using a platform or bracket. The rods are secured to the tabletop. Because the tubes are fixed to each other, the rods can only travel up and down in the tubes. The rods can’t spin or otherwise rotate inside of the tubes. When the pair of tubes is inside of the sleeve, the pair of tubes can rotate about the swivel means while being supported by the sleeve to maintain a vertical axis of rotation for the tabletop.

[0063] While a preferred form of the invention has been shown and described, it will be realized that alterations and modifications may be made thereunto without departing from the scope of the following claims.

What is claimed is:
1. An article of furniture comprising:
a base cabinet having a back, a first side and a second side;
a tabletop having a first half and a second half;
a first hydraulic cylinder that at least partially supports the first half of the tabletop at least partially above the first side of the base cabinet;
a swivel means that joins the tabletop to the base cabinet;
at least one wheel;
a second hydraulic cylinder that at least partially supports the second half of the tabletop substantially above the at least one wheel;
a hydraulic pump that can force a liquid into the hydraulic cylinders; and
a means for controlling the hydraulic pump such that a user can adjust the height of the tabletop relative to the base cabinet.

2. The article of furniture of claim 1 wherein the first hydraulic cylinder is characterized by a tube and a rod; and wherein the swivel means is characterized by an ability of the rod to turn inside of the tube.

3. The article of furniture of claim 1 wherein at least part of the first hydraulic cylinder is fixed relative to the first side of the base cabinet; and wherein the swivel means is a turntable that substantially joins the first half of the tabletop to the first hydraulic cylinder.

4. The article of furniture of claim 1 wherein at least part of the first hydraulic cylinder is fixed relative to the first half of the tabletop; and wherein the swivel means is a turntable that substantially joins the first hydraulic cylinder to the first side of the base cabinet.

5. The article of furniture of claim 1 further comprising at least one roller that functions to reduce the freedom of movement of the swivel means.

6. The article of furniture of claim 1 wherein the at least one wheel is a pair of casters.

7. The article of furniture of claim 1 further comprising at least one additional hydraulic cylinder that at least partially supports the tabletop.

8. An article of furniture comprising:
a base cabinet having a back, a first side, a second side and a top;
a tabletop having a first half and a second half;
a first pair of hydraulic cylinders that at least partially supports the first half of the tabletop;
a swivel means that joins the tabletop to the base cabinet; at least one rolling means;
a second pair of hydraulic cylinders that at least partially supports the second half of the tabletop substantially above the at least one rolling means;
a hydraulic pump that can force a liquid into the hydraulic cylinders; and
a means for controlling the hydraulic pump such that a user can adjust the height of the tabletop relative to the base cabinet.

9. The article of furniture of claim 8 further comprising a long table configuration characterized by the first half of the tabletop being substantially adjacent the first side of the cabinet base, and by the height of the tabletop being substantially in a plane defined by the top of the base cabinet.

10. The article of furniture of claim 8 further comprising a tall table configuration characterized by the tabletop being at least one hundred millimeters above and substantially parallel to the top of the base cabinet.

11. The article of furniture of claim 8 further comprising a compact table configuration characterized by the tabletop being in a position that is substantially over the top of the base cabinet.

12. The article of furniture of claim 11 further comprising at least two wheels that support the first side of the base cabinet.

13. The article of furniture of claim 11 further comprising a handle on the second side of the base cabinet; a lifting member for joining the handle to the second half of the tabletop; and wherein an upward adjustment of the height of the tabletop causes the second side of the base cabinet to be lifted by the lifting member when it is joined to the handle.

14. The article of furniture of claim 13 further comprising at least two wheels that support the first side of the base cabinet.

15. The article of furniture of claim 8 wherein the at least one rolling means is a pair of casters.

16. An article of furniture comprising:
a base cabinet;
a tabletop;
at least one hydraulic cylinder, characterized by a tube and a rod, that at least partially supports the tabletop;
a sleeve, fastened to the base cabinet, that fits around at least part of the tube such that movement of the tube is substantially limited to rotational movement that causes the tabletop to swivel relative to the base cabinet;
a hydraulic pump that can force a liquid into the at least one hydraulic cylinder; and
a means for controlling the hydraulic pump such that a user can adjust the height of the tabletop relative to the base cabinet.

17. The article of furniture of claim 16 further comprising a swivel means that is fastened to the base cabinet and that supports weight distributed to the tube of the at least one hydraulic cylinder.

18. The article of furniture of claim 16 wherein the sleeve is a hollow pipe.

19. The article of furniture of claim 16 wherein the at least one hydraulic cylinder is a pair of hydraulic cylinders having their tubes joined by a bracket.

20. The article of furniture of claim 19 further comprising a swivel means that is fastened to the base cabinet and to the bracket.