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(54) **STOWABLE SURFACE**

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(57) **ABSTRACT**

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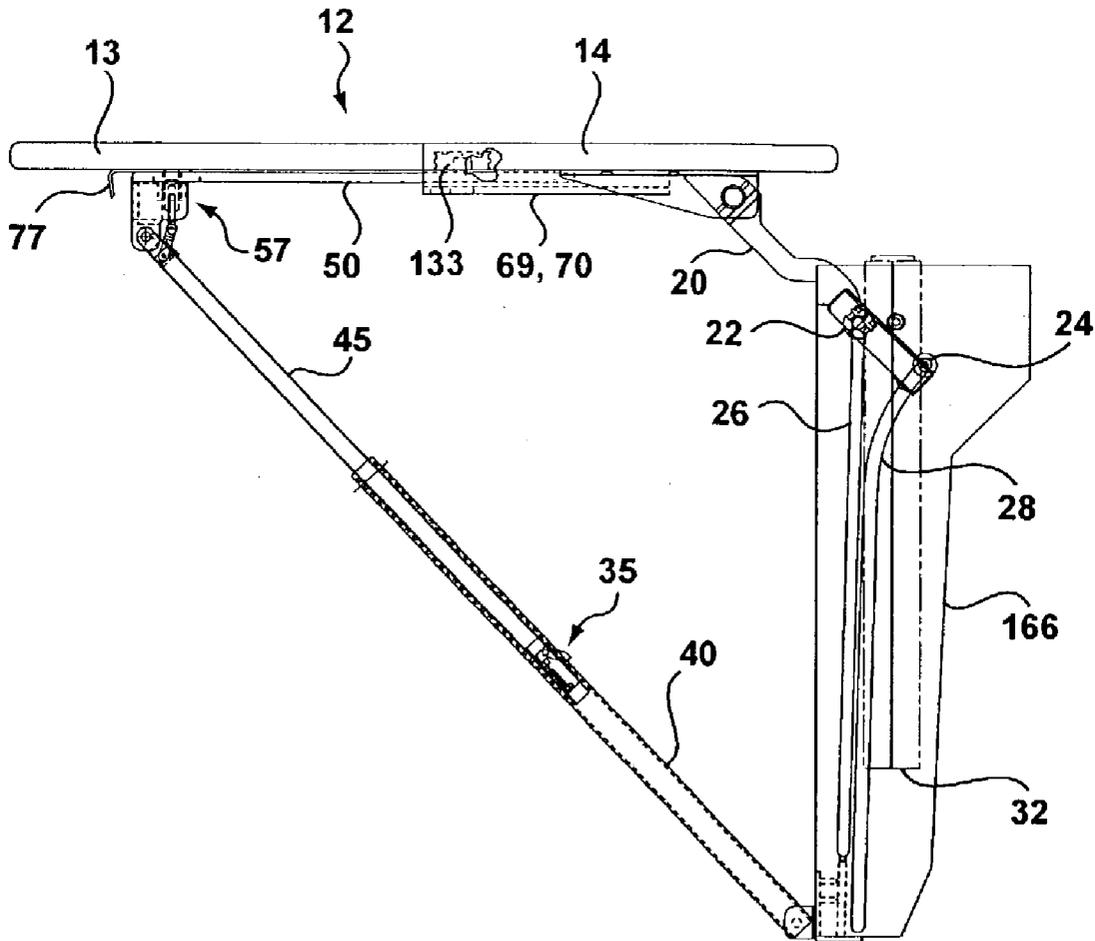
A stowable surface including an extending surface support assembly, for use as a table, bed, seat, stand, or other purpose requiring a substantially horizontal surface which folds away. The surface support assembly pivots between a deployed position and a stowed position, the surface support assembly assuming an extended position when deployed and a retracted position when stowed. A locking element is engaged to prevent extension of the surface support assembly when the surface support assembly is stowed. The locking element is moved into a disengaged position to permit extension of the surface support assembly as the surface support assembly pivots during deployment.

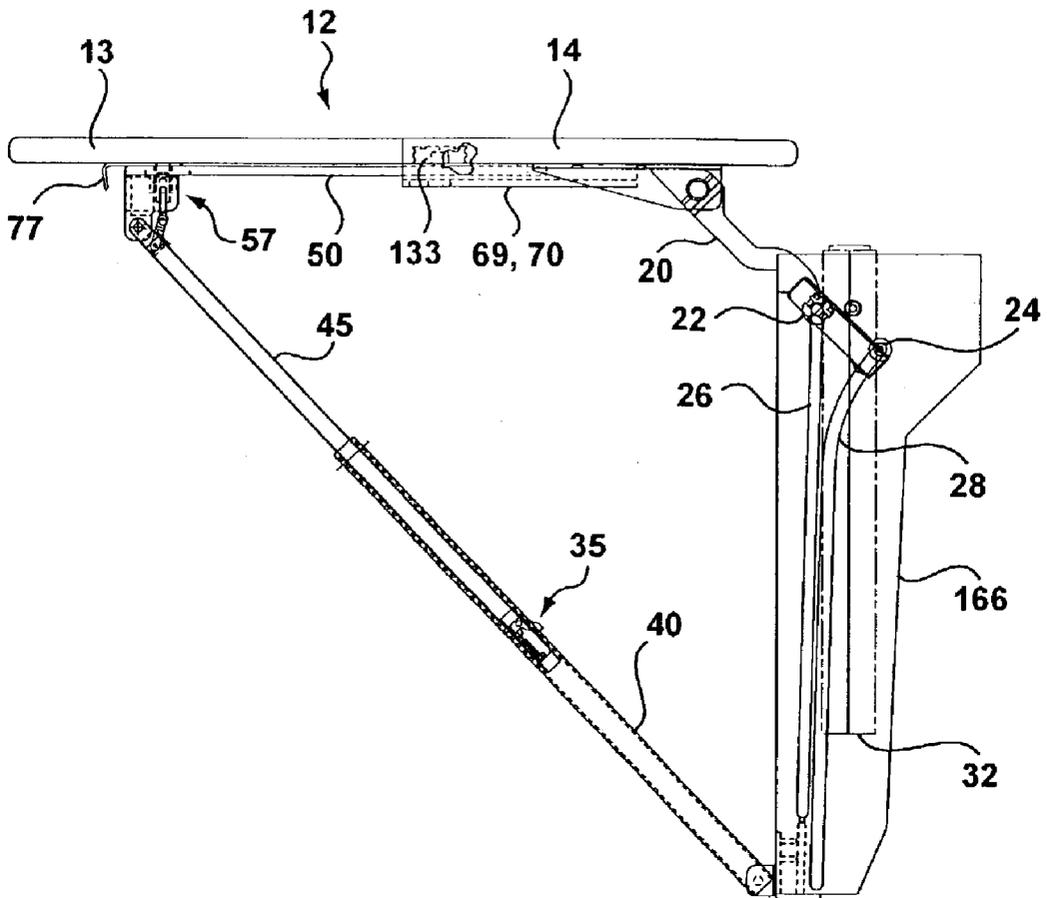
(21) Appl. No.: **10/248,648**

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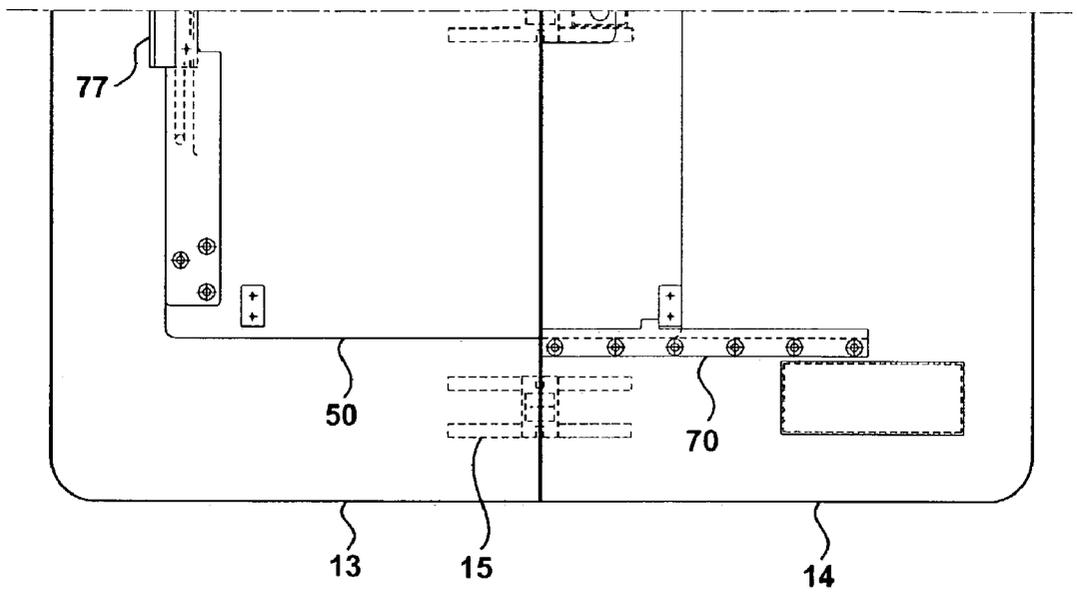
**Related U.S. Application Data**

(60) Provisional application No. 60/353,720, filed on Feb. 5, 2002.

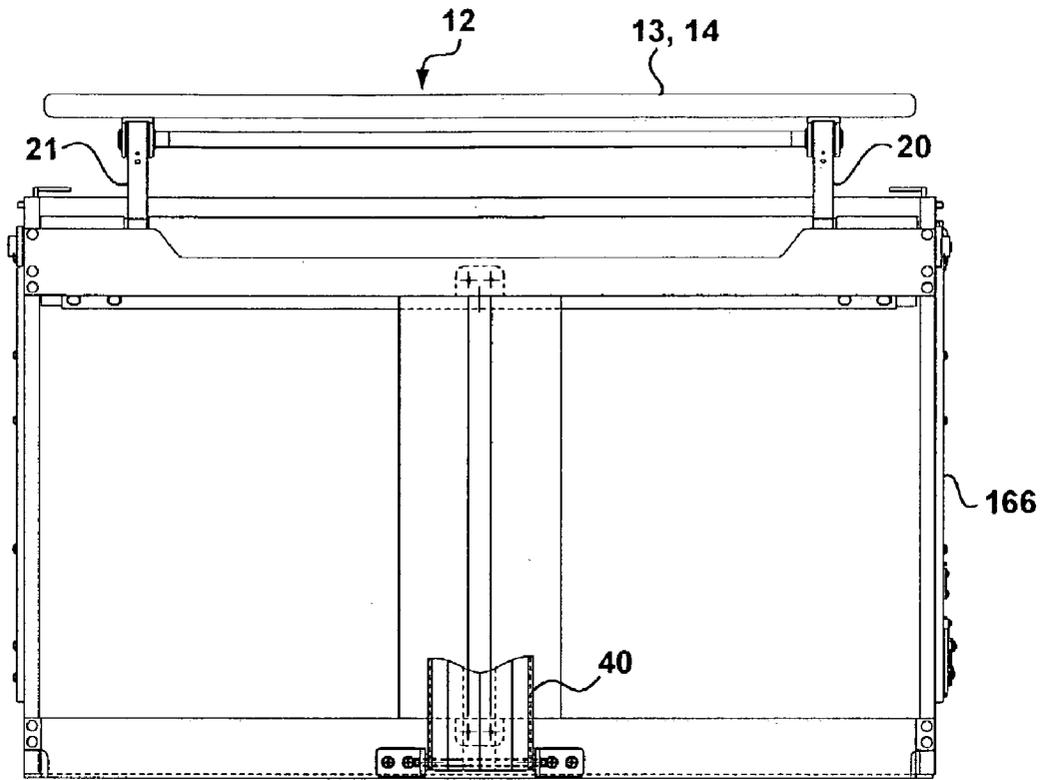




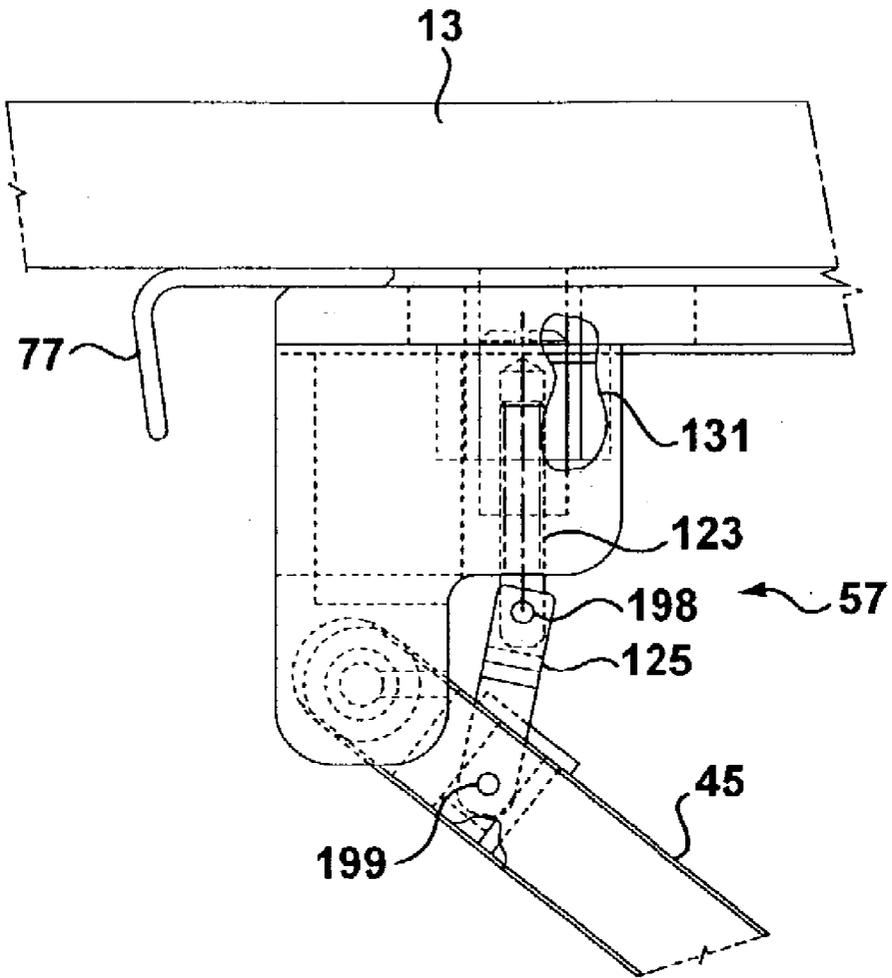
**Figure 1**



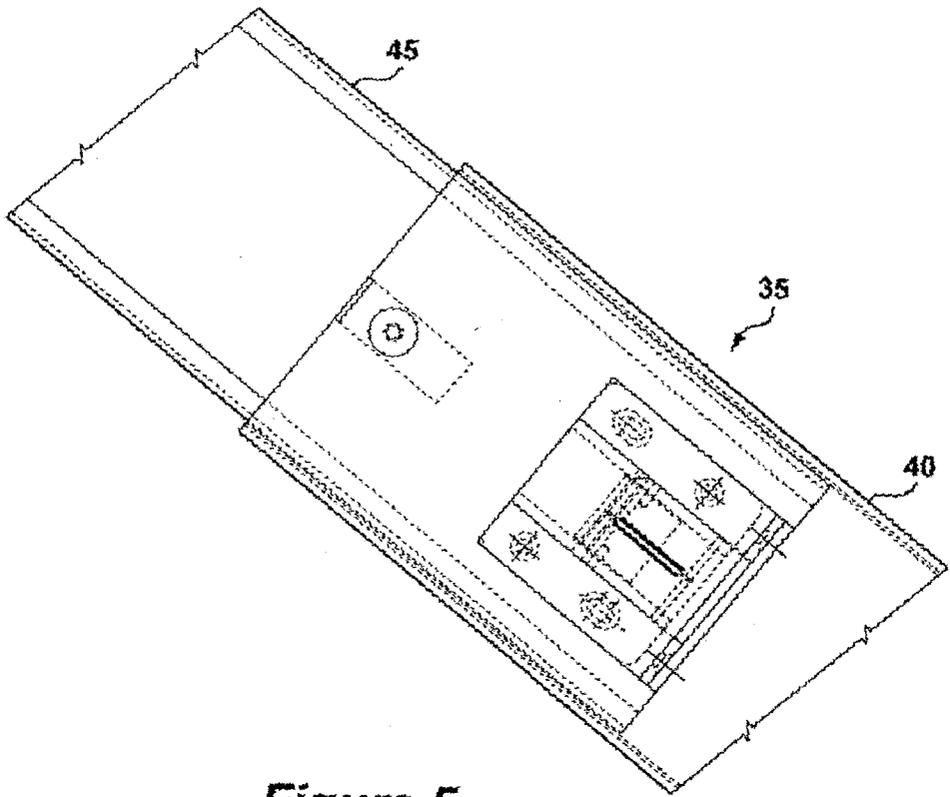
**Figure 2**



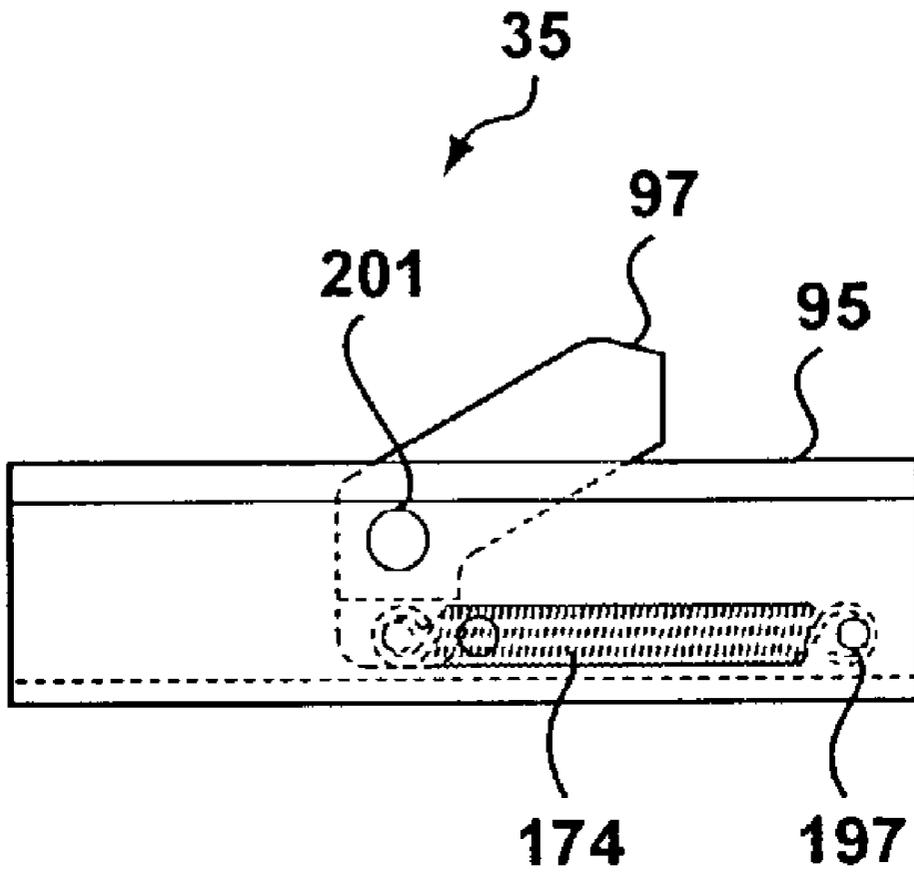
**Figure 3**



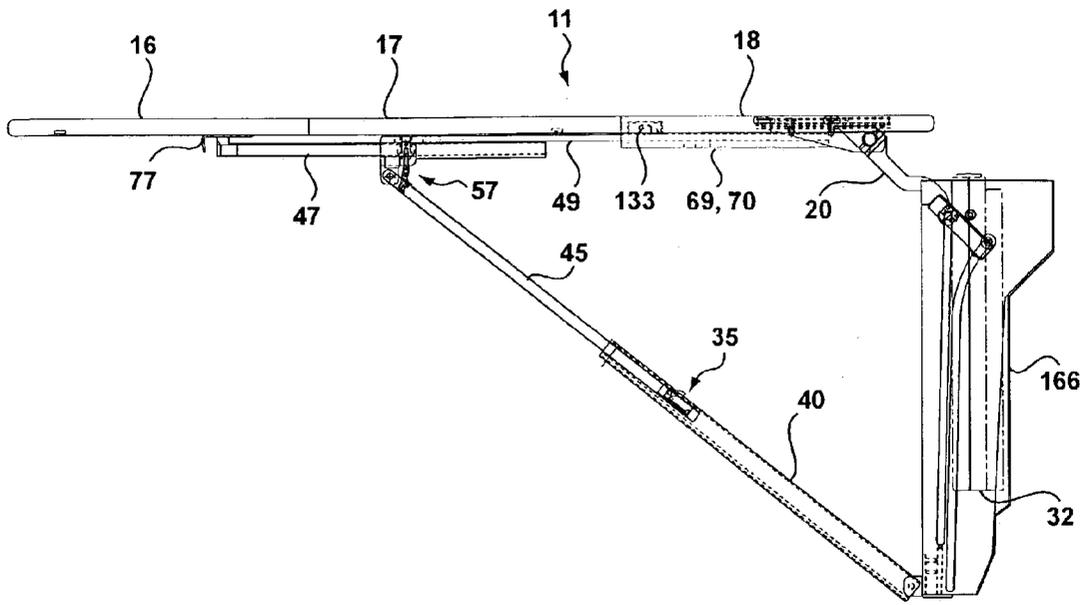
**Figure 4**



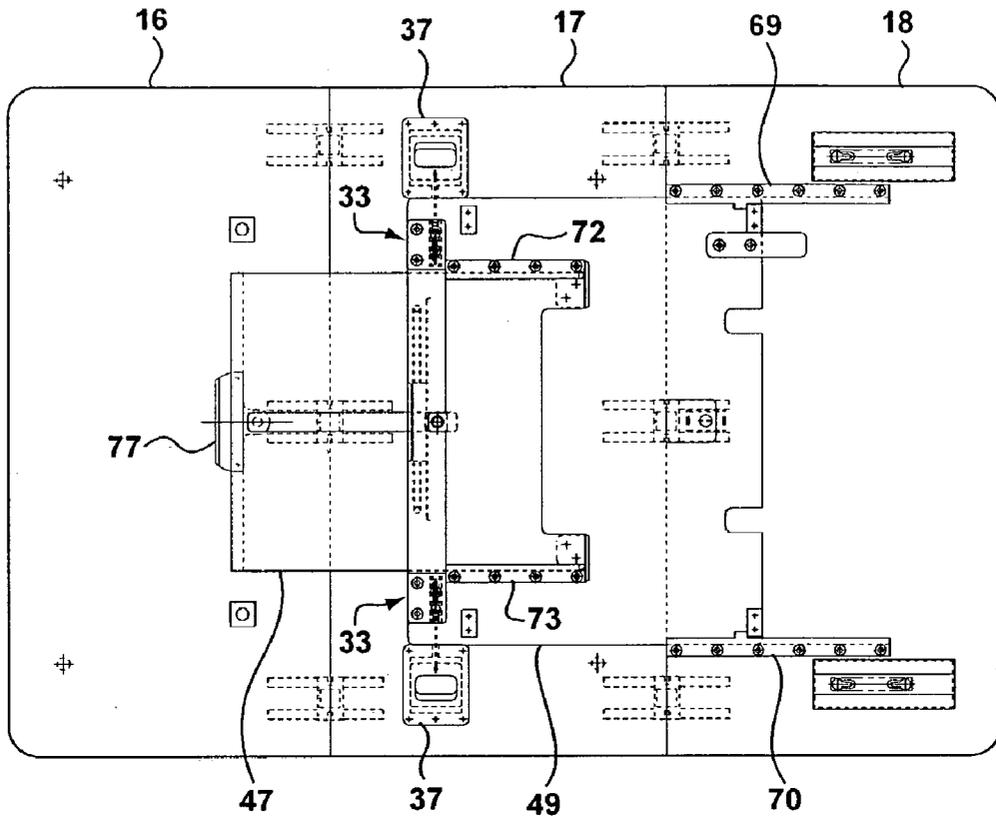
**Figure 5**



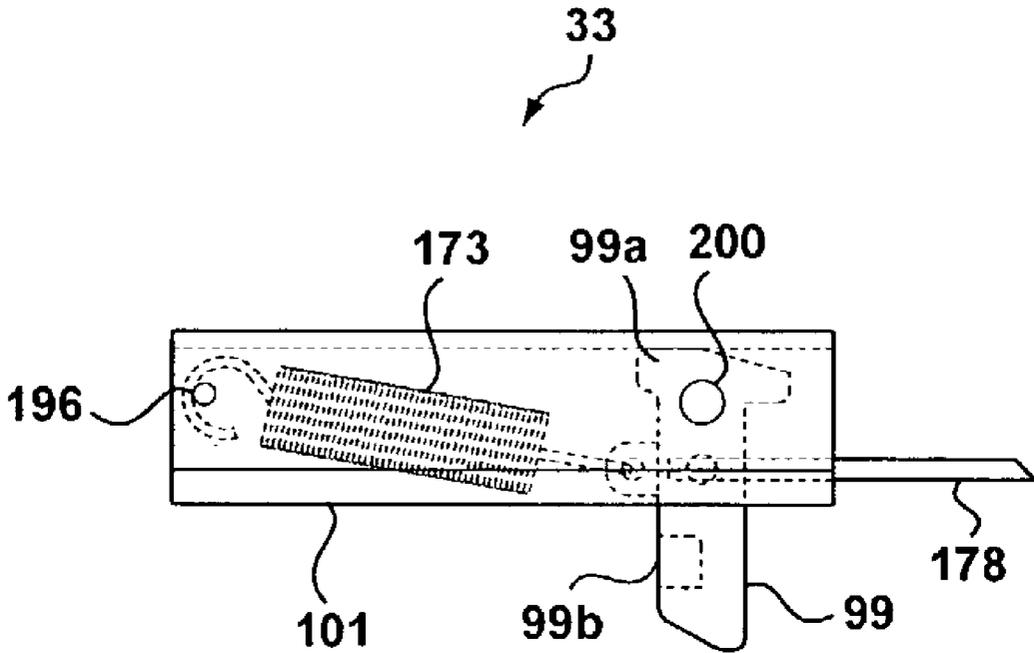
**Figure 6**



**Figure 7**



**Figure 8**



**Figure 9**

## STOWABLE SURFACE

### CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from U.S. provisional application No. 60/353,720 filed on Feb. 5, 2002, the contents of which are hereby incorporated by reference in their entirety.

### BACKGROUND OF INVENTION

[0002] 1. Field of the Invention

[0003] The invention relates generally to a stowable surface and more particularly to a stowable table suitable for aircraft, trains, boats or other applications where space is limited.

[0004] 2. Description of the Related Art

[0005] In many situations where space is limited, such as an aircraft cabin, tables are often designed to be stowed away when not in use to maximize usable space. The design of a stowable table is complicated by the need to have the table stow in a position that does not cause an obstruction within the cabin while still being adequately supported when deployed for use. This problem becomes more acute when the table is large and is required to extend a long way from its stowed position, and particularly when the table must be folded or collapsed into a small space for stowing.

[0006] These considerations have resulted in table designs which include support pieces that must be moved into position prior to deploying the table or during deployment of the table. Such designs typically require several actions by the user in order to properly deploy the table and a corresponding number of actions to stow the table. This results in a lengthy procedure to deploy and stow the table as each action is performed sequentially, or requires the user to use both hands. Furthermore, where actions must be performed in a certain order or separate pieces must be assembled or positioned prior to deployment or stowing of the table, users unfamiliar with the operation of the table (such as passengers riding in the aircraft) will often have difficulty correctly with the table.

[0007] This problem occurs in many other situations where space is limited, such as on trains, boats, recreational vehicles, small rooms, etc. and not only with tables, but also beds, seats, work surfaces and other objects with horizontal surfaces that occupy a lot of space.

[0008] Thus, there is a particular need for a table that can be stowed, where the table can be withdrawn from the stowed position and substantially deployed in one motion by the user using one hand. There is also a need for a table comprising a single unit, with substantially all parts of the table being attached and deploying together.

### SUMMARY OF INVENTION

[0009] The present invention addresses these problems by providing a stowable surface including an extending surface support assembly which pivots between a deployed position and a stowed position, the surface support assembly assuming an extended position when deployed and a retracted position when stowed. A first locking element for preventing extension of the surface support assembly is included,

where the first locking element is engaged to prevent extension of the surface support assembly when the table top assembly is stowed, the first locking element being movable into a disengaged position to permit extension of the surface support assembly as the surface support assembly pivots during deployment.

[0010] Another aspect of the invention comprises a stowable surface including a surface support assembly which pivots between a deployed position and a stowed position, and an extending support member connected to the table top assembly, the support member assuming an extended position when the surface support assembly is deployed and a retracted position when the surface support assembly is stowed. A support member locking element is disposed in a portion of the extending support member for preventing retraction of the support member during stowing of the surface support assembly, where the support member locking element is engaged to prevent retraction of the support member when the surface support assembly is deployed, the support member locking element movable into a disengaged position to permit retraction of the support member as the surface support assembly pivots during stowing.

[0011] The stowable surface is preferably deployable by exerting a force at only one point, and is preferably also stowable by exerting a force at only one point. Preferably all parts of the stowable surface are attached together and deploy together.

### BRIEF DESCRIPTION OF DRAWINGS

[0012] The features and advantages of the invention will be appreciated upon reference to the following drawings, in which:

[0013] **FIG. 1** is side view of a stowable table;

[0014] **FIG. 2** is bottom plan view of the stowable table of **FIG. 1**;

[0015] **FIG. 3** is end view of the stowable table of **FIG. 1**;

[0016] **FIG. 4** is a detail view of a locking pin assembly for the stowable table of **FIG. 1**;

[0017] **FIG. 5** is a detail view of a portion of a support leg for the stowable table of **FIG. 1**;

[0018] **FIG. 6** is a detail view of a striker assembly for the stowable table of **FIG. 1**;

[0019] **FIG. 7** is side view of a second embodiment of a stowable table;

[0020] **FIG. 8** is bottom plan view of the stowable table of **FIG. 7**; and

[0021] **FIG. 9** is a detail view of a latch assembly for the stowable table of **FIG. 7**.

### DETAILED DESCRIPTION

[0022] The following is a description of certain embodiments of the invention, given by way of example only and with reference to the drawings. The embodiments shown are stowable tables, although one of skill in the art will recognize that the structures and techniques described are equally applicable to other stowable surfaces such as beds, seats, work surfaces etc. Referring now to **FIG. 1**, a side view of a stowable table is shown in the deployed position. The

“inboard” side of the table is shown on the left side of FIG. 1 and the “outboard” side of the table is shown on the right side of FIG. 1. For example, when the table is used in a typical installation in an aircraft where the table stows in a wall cavity, the inboard side of the table will be towards the center of the aircraft body while the outboard side will be towards the exterior wall of the aircraft.

[0023] The table comprises a table top assembly 12 comprising an inboard leaf 13 and outboard leaf 14, outboard tracks 69 and 70, and outboard leaf support assembly 50. Outboard leaf support assembly 50 slides on outboard tracks 69 and 70 mounted on the underside of table top assembly 12, and includes a handle 77 at its inboard end. Table top assembly 12 folds so that inboard leaf 13 folds on top of outboard leaf 14 aided by hinge 15 (shown in FIG. 2).

[0024] The inboard side of the table top assembly is attached to a telescoping cantilever support member comprising upper leg assembly 45 and lower leg assembly 40. Upper leg assembly 45 is rotatably attached to outboard leaf support assembly 50 at one end and lower leg assembly 40 is rotatably attached to housing assembly 166 or directly to a wall structure at the other end. A locking pin assembly 57 is located near the connection between upper leg assembly 45 and outboard leaf support assembly 50, and a striker pin assembly 35 is located in the overlapping portion of upper leg assembly 45 and lower leg assembly 40.

[0025] Table top assembly 12 has a bracket attached to its underside near its outboard end, the bracket rotatably attached to a connecting member 20. Connecting member 20 includes guide pins 22 and 24 which run within sliding tracks 26 and 28 respectively in housing assembly 166 for stowing the table. Housing assembly 166 may be mounted in a cavity in a wall (not shown). When stowed, the table top is folded and positioned vertically completely within the housing, as indicated by the dashed outline 32 in FIG. 1. A hinged or sliding cover (not shown) may be provided to cover the top opening of the housing 166 or wall cavity when the table is stowed or deployed.

[0026] FIG. 2 shows a bottom plan view of a portion of the table top assembly 12, showing the arrangement of inboard track 70 and outboard leaf support assembly 50. FIG. 3 is end view of the stowable table of FIG. 1 in the deployed position looking from the outboard side.

[0027] FIG. 4 shows details of the locking pin assembly 57. A link 125 is connected at one end via pin 199 to the upper end of upper leg assembly 45 near its connection to outboard leaf support assembly 50. The other end of link 125 is connected via pin 198 to shaft 123. Shaft 123 moves within a cavity alongside bushing 131. When the table is stowed, and during the initial part of the deployment and the last part of the stowing of the table, the shaft 123 is pushed into the cavity alongside bushing 131 and engages into a hole in block 133 located on the underside of table top assembly 12. This prevents outboard leaf support assembly 50 from extending prematurely during deployment of the table, and from retracting prematurely during stowing of the table.

[0028] FIG. 5 shows striker assembly 35 located at the overlap of upper leg assembly 45 and lower leg assembly 40, and FIG. 6 shows details of striker assembly 35. Striker assembly 35 comprises striker 97 rotatably mounted on pin

201 to striker base 95. Spring 174 is stretched between striker 97 and pin 197, urging striker 97 into a position protruding from the striker base 95. A cutout portion is made in the surface of lower leg assembly 40. This cutout portion is positioned near the top end of the lower leg assembly 40 in the portion which overlaps with upper leg assembly 45. When in the protruding position, striker 97 is moved into the cutout portion of lower leg assembly 40. In this position, striker 97 prevents upper leg assembly 45 and lower leg assembly 40 from telescoping into a collapsed position.

[0029] To deploy the table, the user stands facing the wall and pulls the handle 77 up, lifting the folded table out of the housing 166 into a substantially vertical position. At this point, upper leg assembly 45 is also substantially vertical and the gap between upper leg assembly 45 and outboard leaf support assembly 50 is relatively small, causing link 125 to press against shaft 123 so that shaft 123 is held engaged into the hole in block 133. This prevents outboard leaf support assembly 50 from sliding on outboard tracks 69 and 70 and extending prematurely during deployment of the table.

[0030] As the folded table is withdrawn from the wall cavity, the user pulls the handle 77 in an inboard direction away from the housing 166 and the folded table top assembly 12 begins to assume a partly horizontal attitude as the table rotates on the hinged bracket mounted on the underside of the table top assembly 12. As the table becomes more horizontal, the gap between the upper leg assembly 45 and outboard leaf support assembly 50 increases, causing link 125 to pull against shaft 123 so that shaft 123 becomes disengaged from the hole in block 133. This now permits outboard leaf support assembly 50 to slide on outboard tracks 69 and 70 and extend as the folded table assumes a horizontal position.

[0031] As the folded table is withdrawn from the wall cavity, the telescoping support member comprising upper leg assembly 45 and lower leg assembly 40 extends. When the telescoping support member is sufficiently extended, the cutout portion in the lower leg assembly 40 aligns with the striker assembly 35 to permit the striker 97 to assume a protruding position due to the action of spring 174. In this position, striker 97 prevents upper leg assembly 45 and lower leg assembly 40 from sliding with respect to each other, preventing the telescoping support member (comprising upper leg assembly 45 and lower leg assembly 40) from collapsing. Thus, the striker assembly 35 acts as a locking mechanism to lock the telescoping support member into an extended position and prevent it from retracting during deployment of the table.

[0032] Once the table has assumed a horizontal position, the user unfolds the inboard leaf 13 of the table top assembly 12 so that it rests on the extended outboard leaf support assembly 50.

[0033] To stow the table, the reverse process is performed. The user first folds the inboard leaf 13 of the table top assembly 12 onto the outboard leaf 14. The user then pushes handle 77 in the outboard direction and pushes the folded table towards the housing 166. The outboard leaf support assembly 50 begins to slide on outboard tracks 69 and 70, retracting under the folded table top assembly 12.

[0034] The folded table rotates into a partly vertical position on the hinged bracket mounted on the underside of the

table top assembly 12. As the table becomes more vertical, the gap between the upper leg assembly 45 and outboard leaf support assembly 50 decreases, causing link 125 to push against shaft 123 so that shaft 123 engages with the hole in block 133. The striker 97 remains in the protruding position, preventing the telescoping support member from collapsing and thus preventing the folded table from prematurely dropping into the housing assembly 166.

[0035] When the folded table is in a substantially vertical position, the telescoping support member is also substantially vertical and the striker 97 now engages the surface of the housing assembly 166 or wall, or a plate mounted on the housing or wall for this purpose. Striker 97 is pushed back into the striker base so that the telescoping support member can collapse. This permits the folded table, now in a substantially vertical position, to slide down into the housing 166 (or wall cavity) to assume the stowed position.

[0036] A second embodiment of the stowable table is shown in FIGS. 7 and 8. FIG. 7 shows a side view of the table in the deployed position. This embodiment operates similarly to the embodiment of FIG. 1, but the folding table top assembly 11 comprises three leafs 16, 17, 18 instead of two (i.e. the table top folds in three instead of folding in two). Leaf 17 folds on top of leaf 18, and leaf 16 folds on top of leaf 17 in a "Z" arrangement when stowed. There are also two leaf support assemblies under the table top assembly 11; outboard leaf support assembly 49 and an inboard leaf support assembly 47. Outboard leaf support assembly 49 slides on outboard tracks 69 and 70, and inboard leaf support assembly 47 slides on inboard tracks 72 and 73, mounted on the underside of table top assembly 11. FIG. 8 shows a bottom plan view of the table top assembly 11, showing the arrangement of outboard tracks 69 and 70, inboard tracks 72 and 73, inboard leaf support assembly 49, and outboard leaf support assembly 47.

[0037] The three leaf embodiment includes locking pin assembly 57 and striker assembly 35 as described for the two leaf embodiment above. In addition, a latch assembly 33 and latch handle 37 are included mounted on each side of the underside of table top assembly 11. FIG. 9 shows details of the latch assembly 33.

[0038] Latch assembly 33 is attached to the bottom of leaf 17 and comprises latch 99 rotatably mounted on pin 200 to latch channel 101. Latch 99 includes a heel portion 99a and cutout portion 99b. Spring 173 is stretched between latch 99 and pin 196, urging latch 99 into an upright position protruding from the latch channel 101 with heel portion 99a pressed against the base of latch channel 101. Latch assembly 33 is mounted so that the cutout portion 99b of latch 99 engages with outboard leaf support assembly 49 to prevent leaf 17 from lifting away from outboard leaf support assembly 49. Because leaf 16 is connected by hinges to leaf 17, this prevents leaf 16 from tilting and keeps the table top in place if pressure is applied on the top surface at the inboard edge of leaf 16 (for example as a result on someone leaning on the inboard edge of the table top).

[0039] A cable 178 is connected to latch 99 at one end and to latch handle 37 at the other end. When latch handle 37 is pulled outwards from the table top assembly 11, latch 99 is moved in opposition to spring 173 so that latch portion 99b disengages from outboard leaf support assembly 49 to permit leaf 17 to be folded on top of leaf 18 during stowing of the table.

[0040] Thus, two embodiments of a stowable surface have been described. The tables described are stowable in a housing or wall cavity and are preferably withdrawn from the stowage cavity and substantially deployed in one motion by the user, requiring only the table top to be unfolded and optionally a cover to be replaced over the top opening of the wall cavity. The tables preferably comprise a single unit, with all parts of the tables being attached and deploying together (with the exception of unfolding the table leafs). The stowing and deployment of the tables may be accomplished using only one hand and applying force at only one point in one continuous motion.

[0041] One of skill in the art will recognize that the embodiments described are susceptible to various modifications and alternative forms. For example, the table top assembly could comprise two, three, or more leafs that are hinged together, that slide with respect to each other, or that are stowed in separate pieces and are placed together when the table is deployed. Alternatively, the table top assembly could comprise a single piece. The telescoping support member could be designed to hinge or bend instead of telescope, or to extend and compress in some other manner.

[0042] The locking pin assembly could utilize a latch, catch, bolt, friction element, or other suitable element in place of the locking pin to prevent premature extension or retraction of the table top assembly during deployment or stowing. The striker assembly could utilize a latch, catch, bolt, pin, friction element, or other suitable element in place of the striker to prevent collapsing of the support member. Similarly, the latching assembly could utilize a catch, bolt, pin, friction element, or other suitable element in place of the latch to prevent extension or retraction of the leaf support assembly. The springs used in striker assembly and latching assembly could be omitted and a leaf spring, rubber element, or other suitable element used instead, or the striker or latch could be arranged to move under the force of gravity.

[0043] The folding table could be stowed in a housing, directly in a wall cavity, against a wall, or into a vertical position away from a wall. The folding table could include the locking pin arrangement to prevent the leaf support assembly from extending prematurely during deployment of the table but not the striker assembly to prevent the folded table from prematurely dropping into the wall cavity during stowing of the table. Vice versa, the folding table could include the striker assembly but not the locking pin arrangement.

[0044] The structure disclosed could be employed as a stowable table, or could be used for any other purpose requiring a substantially horizontal surface which folds away, such as a bed, seat, stand, control panel, or work surface. The structure could be used where a stowable horizontal surface or object is required, or where the surface or object is only partly horizontal.

[0045] The table could be designed for manual use or could be designed to be deployed and/or stowed using electrical, hydraulic, pneumatic, or spring loaded mechanisms. The table could be designed for use in aircraft, trains, buses, or any situation in which it would be beneficial to be able to stow the table.

[0046] Many modifications in addition to those described above may be made to the structures and techniques

described herein without departing from the spirit and scope of the invention. Accordingly, although specific embodiments have been described, these are examples only and are not limiting upon the scope of the invention.

**1.** A stowable surface comprising:

an extending surface support assembly, the surface support assembly pivoting between a deployed position and a stowed position, the surface support assembly assuming an extended position when deployed and a retracted position when stowed; and

a first locking element for preventing extension of the surface support assembly, wherein the first locking element is engaged to prevent extension of the surface support assembly when the surface support assembly is stowed, the first locking element movable into a disengaged position to permit extension of the surface support assembly as the surface support assembly pivots during deployment.

**2.** The stowable surface of claim 1, further comprising a support member connected to the surface support assembly, the support member moving the first locking element into the disengaged position during deployment of the surface support assembly.

**3.** The stowable surface of claim 1, further comprising a first member connected to the surface support assembly and the first locking element, wherein an angle between the first member and the surface support assembly increases as the surface support assembly pivots during deployment, the first locking element being disengaged by the relative movement of the first member and the surface support assembly during deployment of the surface support assembly.

**4.** The stowable surface of claim 3, wherein the first member comprises a support member at least partly supporting the surface support assembly when in a deployed position.

**5.** The stowable surface of claim 1, further comprising a housing assembly, the surface support assembly pivoting to slide into the housing assembly to assume the stowed position.

**6.** The stowable surface of claim 1, further comprising an extending support member connected to the surface support assembly, the support member assuming an extended position when the surface support assembly is deployed and a retracted position when the surface support assembly is stowed.

**7.** The stowable surface of claim 6, further comprising a second locking element for preventing retraction of the support member during stowing of the surface support assembly.

**8.** The stowable surface of claim 7, wherein the support member pivots as the surface support assembly is stowed, the second locking element being disengaged as a result of the pivoting movement of the support member to permit retraction of the support member.

**9.** The stowable surface of claim 7, wherein the second locking element is disengaged to permit retraction of the

support member when the surface support assembly pivots into a substantially vertical position.

**10.** The stowable surface of claim 1, further comprising a third locking element for preventing extension or retraction of at least a portion of the surface support assembly, the third locking element being disengaged manually.

**11.** The stowable surface of claim 1, wherein the stowable surface is deployable by exerting a force at only one point.

**12.** The stowable surface of claim 1, wherein the stowable surface is stowable by exerting a force at only one point.

**13.** The stowable surface of claim 1, wherein the stowable surface is deployable and stowable by exerting a force at only one point.

**14.** The stowable surface of claim 1, wherein all parts of the stowable surface are attached together and deploy together.

**15.** The stowable surface of claim 1, wherein the stowable surface comprises a table, the table further comprising at least one leaf.

**16.** A stowable table comprising:

a surface support assembly, the surface support assembly pivoting between a deployed position and a stowed position;

an extending support member connected to the surface support assembly, the support member assuming an extended position when the surface support assembly is deployed and a retracted position when the surface support assembly is stowed; and

a support member locking element disposed in a portion of the extending support member for preventing retraction of the support member during stowing of the surface support assembly,

wherein the support member locking element is engaged to prevent retraction of the support member when the surface support assembly is deployed, the support member locking element movable into a disengaged position to permit retraction of the support member as the surface support assembly pivots during stowing.

**17.** The stowable surface of claim 16, wherein the support member pivots as the surface support assembly is stowed, the support member locking element being disengaged as a result of the pivoting movement of the support member to permit retraction of the support member.

**18.** The stowable surface of claim 16, wherein the support member locking element is disengaged to permit retraction of the support member when the surface support assembly pivots into a substantially vertical position.

**19.** The stowable surface of claim 16, wherein the stowable surface is deployable and stowable by exerting a force at only one point.

**20.** The stowable surface of claim 16, wherein all parts of the stowable surface are attached together and deploy together.

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