ABSTRACT: A portable sleeping mechanism, primarily for use atop a road vehicle, comprised of two sleeping decks, each on different levels and permanently interconnected by movable struts, which constitute the support-actuating means that collapses the unit and moves the upper deck down to a contiguous compaction on the lower deck for storage and transport; and also, expands the unit by orienting the decks on horizontal and parallel planes, one above the other transversely but offset longitudinally to provide sleeping space on both decks and adult standup dressing space at one end of the unit extending upward from the lower sleeping deck.
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FOLDABLE SLEEPING ACCOMMODATIONS FOR ATTACHMENT TO A ROAD VEHICLE

This invention relates in general to a mechanism for sleeping use and more particularly to a sleeping accommodation that is transported in a collapsed or folded configuration while mounted on a road vehicle and which is designed for expansion to provide two-level, multiple place sleeping berths without removal from the transporting vehicle.

A variety of folding devices have been invented with the object of providing sleeping facilities for use in conjunction with a road vehicle. Such inventions have not met with great favor by the using public for reasons which have become apparent. In many of the prior inventions, the task of transforming the device from a collapsed to an expanded configuration is unduly time consuming, entails substantial physical labor and requires the services or supervision of one or more adults with mechanical aptitude and manual dexterity in the assembly of the numerous detachable parts. A common objection to the prior inventions is that the devices create excessive wind drag, render the transporting vehicle topheavy and vulnerable to side wind pressures during transit and create vehicle instability on deceleration. In some instances, the installation of the sleeping device on self-propelled vehicles requires removal of the rear door or rear compartment cover or other body alteration of the transporting vehicle. Rear overhanging devices on self-propelled vehicles obstruct rear window visibility. Trailer-mounted devices subject the equipment to stricter traffic regulations and increased insurance rates. In practically every instance, previously designed folding sleeping devices do not meet popular demand for simplicity of operation and minimum standards of usefulness, in that: (a) there is inadequate interior height for adult standup space, (b) there is insufficient ventilation and (c) the only way of ingress and egress is through reduced portals, trap doors or hatches.

It is, therefore, the object of this invention to provide a mechanism:

1. That is light in weight, low in cost and can be installed, transported and used on the transporting vehicle without making structural changes in the vehicle.
2. That is collapsible to its transport configuration with all the components and accessories automatically folded and compactly stowed in a water and dusttight carrying case that is designed to reduce wind drag, creates no stability disturbances upon deceleration and only slightly raises the center of gravity of the transporting vehicle;
3. That is expandable to sleeping use configuration, comprising two levels of multiple place sleeping berths, with adult standup height inside the facility and all within the vertical confines of the transporting vehicle;
4. That is power activated so that transformation between the collapsed and expanded configurations is completed in a matter of seconds, without laborious effort and without the handling of detached parts or manual installation of stabilizing devices.
5. That installation and use of the invention will not interfere in any manner with the normal and full use of the vehicle to which it is releaseably attached; and
6. That provides in general an expandable and collapsible sleeping accommodation for transport and use on a road vehicle, which accomplishes new and improved results of utility and convenience by operational means different from prior inventions of the same class.

These, together with other objects, features and advantages, which will subsequently become apparent, reside in the combination of elements, arrangement of parts and features of construction and operation, as more fully hereinafter described and claimed, reference being made to the accompanying drawings which form a part hereof, wherein like numbers consistently refer to like parts throughout the various drawings.

FIG. 1 is a perspective view of the sleeping accommodation mounted in its collapsed configuration on the top of a four-door sedan-type automobile (shown in phantom outline) with the access ladder collapsed and laterally secured, ready for transport.

FIG. 2 is a perspective view of the embodiment of this invention in its expanded configuration, with portions cut away to show internal elements and operational parts, while carrier mounted and with access ladder extended, ready for sleeping use on top of a station wagon-type automobile (shown in phantom outline).

FIG. 3 is a longitudinal, centerline sectional view of the collapsed sleeping accommodation, taken substantially on the vertical plane indicated by section line A-A in FIG. 1, showing compact storage of bedding when collapsed to transport configuration.

FIG. 4 is a longitudinal, sectional view along the lateral margin of the collapsed accommodation, taken substantially on the vertical plane indicated by the Section line B-B of FIG. 2, showing the relative positions of one bank of actuating strut mechanisms when fully collapsed.

FIG. 5 is a similar to FIG. 4 except that the sleeping accommodation is expanded midway between the fully collapsed and the fully expanded configuration, showing the relative positions of the bedding, sleeping berths and lateral banks of actuating strut mechanism.

FIG. 6 is similar to FIG. 5 except that the sleeping accommodation is fully expanded to show the relative location of the structural elements and to demonstrate the adult standup height within the facility.

FIG. 7 is a cross-sectional view of a segment of the structural channel, the actuating travel block and the bolt connection of the push-pull rods that actuate the strut mechanism.

FIG. 8 is a segmentary view of the gear train and electric motor with drive shaft, supplying torque force for expanding and collapsing the accommodation.

FIG. 9 is a schematic diagram showing the electrical circuit with battery, switches and motor which provide the torque force used in FIG. 8.

FIG. 10 is a cross-sectional view of the sleeping accommodation showing relative location of the sleeping decks, actuating strut mechanism and thrust force supplied by hydraulic ram connected between the two sleeping decks.

FIG. 11 is a similar to FIG. 10 except that the hydraulic ram, supplying thrust force for expanding and collapsing the sleeping accommodation, is mounted on and moves with the upper sleeping deck.

FIG. 12 is a layout plan of the components and switching arrangement of the hydraulic pressure system which provides the thrust force used in FIGS. 10 and 11.

FIG. 13 and 14 are each segmentary cross-sectional views respectively of the mechanism fully expanded and when it is half way collapsed, showing the fold accumulator cable and spring-loaded block and tackle mechanism for automatic folding and stowing the flexible enclosing media of the sleeping accommodation.

FIG. 15 is a fragmentary cross-sectional end view of the collapsed accommodation showing the lateral enclosing media as automatically folded and stowed inside the top cover ready for transport.

FIG. 16 is a cross-sectional elevated view of the accommodation fully expanded to show the tether lines which provide the automatic tuck-in means for stowing the end sections of the flexible enclosing media.

This portable sleeping device folds into a compact package for transport and is mechanically expanded into a sleeping compartment for use in its mounted position stop the transporting vehicle.

The dual-level multiple bunk sleeping decks are positioned one above the other transversely but offset longitudinally, thus providing adult standup sleeping space within the compartment with the minimum of encroachment upon the maximum available space for sleeping bunks.
The structural support and actuating mechanism consists of two lateral banks of movable struts arranged in pivotally joined pairs, each in the configuration of an expanded toggle joint. The support-actuating mechanism, as a subassembly of this invention, provides unique and desirable results and is, therefore, separately declared and claimed as a separate invention.

The vertical horizontal rise and fall of the top cover, with reference to the base of the compartment, lends itself to the use of a mechanical means of folding and stowing of the flexible enclosing curtains which remain attached at the top and bottom while the compartment is expanded and collapsed. The automatic folding and stowing mechanism is shown in FIG. 3.

Diagonal bracing within the compartment is permanently attached between rigid stable members and movable members of the mechanism so that the bracing is automatically tightened by the expansion action of the support-actuating mechanism, thereby stabilizing the structure without external bracing or guy lines.

The lower sleeping deck, which is an integral part of the base of this invention, is supported by longitudinal spars, making it adaptable for attachment to either a towed or self-propelled vehicle. If the rigid top of the self-propelled carrier vehicle does not have sufficient length on the same plane to support both ends of the base, the unsupported end can be sustained by upright load-bearing members, downward extending from the base to a lower partially submersible. The lower supports are preferably secured to anchor legs extending through the door jamb crack of the rear compartment lid or the front hood cover, without making structural changes or conflicting blemishes to the vehicle.

Without decreasing its utility, the sleeping compartment can be fabricated one bunk width on each sleeping deck so as to more closely fit the narrower transversal span of the rigid top of compact and foreign automobiles.

The ease with which the bedding can be arranged in made-up form in readiness for transport is a novelty of this invention. Prior inventions of expandable and collapsible sleeping compartments are so low inside that the bedmaker must support himself in a prone position upon the bed he is attempting to arrange. This invention, with its dual-level sleeping decks and standup space inside, permits the bedmaker to stand firmly with both feet on the floor of the compartment while arranging the bedding of the upper bunks. The bunks on the lower sleeping deck can conveniently be reached by an adult when standing on the ground alongside the top carrier vehicle. The flexible side contours of the compartment are releasably secured at their lower edges so that the arms and shoulders of the bedmaker can be extended across the lower sleeping bunks without the bedmaker supporting himself upon the bed being arranged.

Actuation of the mechanism of this invention is entirely power operated. Except for the slight effort necessary to collapse the side rails of the access ladder and to swing it into its compact horizontal configuration for transport, there are no detached parts requiring handling, assembly or securing.

The ever increasing public use of state camp grounds and national parks for overnight stays clearly establishes a need for a portable sleeping device having the arrangement and combination of parts and achieving the improved results as hereinbefore generally outlined and as hereinafter specifically set forth.

Referring now to the drawings, the carrier vehicle may be an automobile 1 as shown in phantom outline in FIGS. 1 and 2. If the carrier vehicle is an automobile, it preferably should be one with a rigid top 2. The lower sleeping deck 3, shown in FIG. 5, is in the form of a shallow box, open on the upper sides for the retention of the lower bunk bedding 4. The lower sleeping deck is comprised of transversal members and longitudinal stringers 5, joined in a rectangular base frame, with a rigid floor 6 secured to the base frame, all of which is encompassed by a low wall 7 attached to the ends and sides, except that the wall does not cross the threshold 8, as shown in FIG. 16.

The rigid base frame is secured to be transporting vehicle. If mounted on the top of an automobile, as shown in FIGS. 1 and 2, the securing should be by a detachable means so that the mechanism can be removed during nonseasonal use or between trips. The device can be attached to the automobile top luggage carrier rails or supported by the use of a pressure plate 10. Because there is currently in use a variety of securing means, each of which is adequate for this invention, no particular securing means is described or claimed as a part of this invention.

A series of load-bearing struts 11, as the lower tier struts, are pivotally attached 12 at spacings along the longitudinal margins of the base frame. The upper sleeping deck 13 is comprised of a rectangular frame 14 which is attached along its longitudinal margins to the upper ends of the lower tier struts by pivotal attachments 15. Preferably, the upper sleeping deck is fabricated of lightweight metal and spanned by a load-bearing material, preferably canvas or a netting of metal or synthetic material, not actually visible in any of the drawings, for the retention and support of the upper bunk bedding 16.

Upon expansion of the assembly, the upper sleeping deck remains horizontal while its simultaneously rises and travels longitudinally to an offset position as compared to the lower sleeping deck, thus providing at one end and within the compartment a carrying space of adult standup height 17, as depicted by the adult outline in FIGS. 2 and 6.

A series of load-bearing struts 18, as the upper tier struts, are secured by pivotal attachment 15 at spacings along the longitudinal margins of the upper sleeping deck.

The top cover 19 in FIG. 1, in the form of an open inverted box, serves as the canopy over the expanded compartment and also as to the cover unit of the carrying case for the collapsed compartment with all the components stowed therein. The top cover is preferably fabricated of lightweight metal, although plastic or other synthetic material may be substituted for the metal. The surface 20 is curved down at each end 21 to reduce wind drag. The ends also serve as the securing of the depending short skirt 22 which is attached along its top edge to the longitudinal margins of surface 20. The top cover is pivotally attached 23 along its longitudinal margins to the upper ends of the upper tier struts.

The sleeping decks are completely enclosed by flexible waterproof curtains 24, 25, 26 and 27 attached to the top cover and downwarp extends to the base frame. The bottom is contour tailored to conform the upper sleeping deck extension and is secured to the base frame by reusable fasteners 28. The side and end curtains are each fitted with sizeable crescent-shaped window openings 29, with the curtain not fully severed so as to form a closure flap controllable from inside the compartment by dual slide fasteners which secure the closure flap at any desired position of closure. The window openings are each externally fitted with insect netting 30. Side curtain 24 is also fitted with an ingress and egress portal 31, which extends vertically from the lower edge of the curtain to the top cover and is located adjacent to the end of the compartment having the integral adult standup space. The portal opening is fitted with a flexible flap closure 32, which is marginally secured by a slide fastener that is controlled from either inside or outside the compartment.

As disclosed by FIGS. 8 and 9, the preferred means of power for expanding and collapsing the compartment is supplied by direct current electric motor 33, which has dual shafts and reversible direction of shaft rotation. The torque force of the motors 33 is transmitted by connection to drive shaft 34 which is connected to the power-increasing gearbox 35. The drive shaft is terminally fitted with a common-type worm gear, meshed within the gear box with a worm wheel. The worm wheel is affixed to the end an externally threaded screw member 36. The screw member is fitted with an internally threaded travel block 37. The threaded screw
member and travel block constitute a jackscrew arrangement which converts the torque force of the motor into a thrust force for expanding and collapsing the sleeping compartment. A separate jackscrew arrangement on each of the longitudinal margins of the upper sleeping deck, each receiving its torque energy from the motor 33, which is mounted midway transversely of the upper sleeping deck. The electric energy is supplied by battery 38, as shown in the circuit diagram of FIG. 5. The maximum motion of the travel block 37 is controlled by the geometrical location of limit switches 39 and the arrangement 40. The master switch has three settings “UP” “DOWN” and “OFF”.

Travel block 37 is kept in proper travel alignment by its confinement in channel 16 and by the retention of anchor bolt 41, as shown in FIG. 4. Synchronization of motion in upper and lower tier struts is accomplished by push-pull rods 42 and 43. The upper end of push-pull rod 42 is pivotally attached 44 to tier plate 18 and its lower end is pivotally attached to anchor bolt 41. The upper end of push-pull rod 43 is pivotally attached to anchor bolt 41 and its lower end is pivotally attached 45 to lower tier strut 11.

FIGS. 10 and 11 show the alternative actuating power, comprised of hydraulic rams 46. The rams in each figure have reverse thrust and are comprised of the customary hydraulic cylinder 47, fitted with piston 48 which is attached to piston rod 49. An identical ram is located along each longitudinal margin of the sleeping compartment. In FIG. 10, the external end of the piston rod is pivotally attached 50 to the upper sleeping deck frame 14 and the base end of the hydraulic cylinder is pivotally attached 51 to bracket 52 which is permanently affixed to the lower sleeping deck longitudinal stringer 5. In FIG. 11, the base end of the hydraulic cylinder is attached to the longitudinal margin of the upper sleeping deck lateral frame 14 and the external end of the piston rod is pivotally attached 51 to the common juncture of the push-pull rods 42 and 43. Maximum piston rod travel serves as the fixed stop to prevent overtravel of the strut rotation.

As shown in FIG. 12, the hydraulic rams have their terminal connections affixed respectively to hydraulic pressure lines 53 and 54. The hydraulic lines are connected to hydraulic pump 55, which is connected to and draws hydraulic fluid from reservoir 56, which is connected to hydraulic selector valve 57. The direction of piston rod thrust is controlled by the selector valve settings: “UP” “DOWN” and “NONFLOW (NF)”.

The hydraulic pump is oriented to the underside of the lower sleeping deck floor, with the pump handle extending externally so that it may be operated by a person standing alongside the transporting vehicle. The hydraulic reservoir 56 may be mounted on the base floor inside the compartment, preferably at the end opposite to the ingress and egress portal.

Side curtains 24 and 25 are automatically folded and stowed by a series of mechanism as shown in FIGS. 13, 14 and 15, one unit of which is comprised of a nonstretchable guideline 38, which is attached at 59 to anchor rail 60 secured to the underside of longitudinal base frame 5. The guideline, which may be more descriptively referred to as the fold accumulator cable, extends vertically through slide lens 61, which are attached to the inside of the enclosing side curtains. At its lower end, each guideline is fitted with a loop-stopping lug 62. The guideline extends and is threaded through fixed pulley block 63, which is fitted with sheave wheels 64 and 65. The fixed pulley block is attached to the underside near the lateral margin of the top cover surface 20, from whence the guideline extends transversely along the underside of the top cover to floating pulley block 66, which is fitted with sheave wheels 67 and 68 and is also designed with anchor ring 69. From its lower point of anchorage, the guideline is tautly threaded, having a full arch, through successively sheaves 65, 67 and thence anchored to fixed pulley block 63. Anchor ring 69 of the floating pulley block is attached to a stretched segment of tether line 70, preferably made of a coil spring which is anchored at its other end to skirt 22 of the top cover. As the top cover is lowered, the contracting tether line 70 keeps guideline 58 taut at all times. In the result that loop-stopping lug 62 accumulates the side curtain loops 61, thus draping the longitudinal flexible curtains into vertical folds that are automatically stowed inside the lateral skirt of the top cover. As the compartment is expanded from its collapsed configuration, the flexible curtains are automatically pulled from storage and the slide lenses 61 space themselves along the guideline.

As shown in FIG. 16, end curtain 26 is automatically stowed inside the compartment by nonstretchable line 71, which is attached at its upper end at 72 to the upper sleeping deck lateral frame 14 and is anchored at its lower end 73 to the lower segment of end curtain 26. End curtain 27 is automatically drawn inside the compartment by nonstretchable line 74, which is attached at 75 to end curtain 27, thence extending around sheave wheel 76 and thence terminally anchored at 77 to upper tier strut 18.

As shown in FIG. 2, transversal bracing of the lower half of the expanded compartment is provided by flexible nonstretchable stays 78, terminally affixed between movable strut 18 and part of the upper sleeping deck lateral frame 14. Similar stays 79 stabilize the upper half of the compartment by attachment between movable strut 18 and the rigid transversal portion of the top cover. Each segment of the transversal bracing is automatically tightened when the compartment is expanded and is likewise loosened for more compact storage when the compartment is collapsed.

Access from the lower level to the compartment floor level is provided by folding ladder 80, shown fully extended in FIG. 2 and as collapsed and mounted for transit in FIG. 1. The ladder consists of side rails 81 and 82, with the steps or transversal treads 83, terminally attached by hinge joint 84 to the side rails. Side rail 81 is pivotally attached 85 to longitudinal stringer 5. The pivotal attachment of the side rail serves a dual purpose in that it stabilizes the ladder when extended in place for use and also serves as the swivel point from which the ladder may be swung into a collapsed horizontal position for transport and mounting along the top cover skirt 22.

The access ladder is secured in its transport position by inserting the foot or ground end of the side rail 82 through retention loop 86. As side rail 82 is slid longitudinally away from pivotal attachment 85, the side rails are brought into a close parallel position with the steps compactly folded between. Spring-loaded latch 87 prevents longitudinal travel of the side rail 82 and thus the ladder is securely retained in its folded or collapsed configuration. Normally, before attempting to elevate the top cover, the collapsed ladder should be removed from its transport mounting. If, however, the top cover is elevated without first releasing the mounted ladder, no damages will result because the rising top cover will automatically free side rail 82 from its securement by the retention loop and the ladder will fall to its normal expanded vertical position.

Converting the accommodation from its collapsed carrying case configuration to its expanded configuration for sleeping use is accomplished with a minimum of physical effort in less time than it takes to read these operating instructions. First, release the access ladder by raising latch 87, slide side rail 82 longitudinally to free it from retention loop 86 and then swing the ladder about its pivotal attachment into its normal expanded vertical position for use. Turn the selector switch to “UP” position. (If the unit is actuated by hydraulic pressure rather than by electric motor, it will also be necessary to operate the hydraulic hand pump.) Thus, the top cover is raised, the sleeping decks are separated, the side curtains are tautly positioned and the internal diameter of the compartment is tightened, all simultaneously and without the handling of any detached parts. The worm gear drive, which will not accept torque force from the opposite direction, prevents the
compartment from collapsing from its own weight regardless of the position of expansion at which it may be intentionally stopped. Electric limit switches terminate the electric power drive when the compartment reaches its fully expanded position. If the unit is actuated by hydraulic pressure, maximum piston rod travel serves as stops when the compartment reaches its fully expanded position.

One desiring to enter the compartment ascends the access ladder, and slides the door flap fastener up and across the top of the door opening. Thereupon, the compartment may be freely entered and occupied by an adult in full standup position at the end and in a prone position on the sleeping bunks. The offset upper sleeping deck may serve as a seat for temporary use by the occupant while dressing. Ventilation is provided and can be regulated by internal operation of the slide fasteners securing the window flap closures.

Before attempting to collapse the compartment, the bedding should be spread out evenly on its respective bunk, preferably in a normal made-up form. Secure all window flaps in a closed position. Make sure that no person occupies that compartment. By operation of the external slide, completely secure the door closure flap and make sure that the side curtains are anchored at their lower edge. The compartment is now ready to collapse to its compact configuration for transport. Turn the selector switch to "DOWN" position. When the compartment has reached its minimum compact configuration, rotate the selector switch to neutral position ("OFF" or "NONFLOW"). All side and end curtains are automatically folded and stowed within the top cover. The last act in readying the equipment for transit is to raise the ground-engaging end of the access ladder, swing the ladder around horizontal and adjacent to the longitudinal side skirt of the top cover and as the side rails of the ladder are collapsed into close parallel proximity, guide the nonanchored side rails through the retention loop and make sure that the spring-loaded latch is in proper position against the end of the ladder side rail. Remove the bumper jack, if one was installed for dampening spring action of the carrier vehicle. The carrier vehicle can then be moved and used in the normal manner, with all components of the sleeping compartment compactly secured on top of the carrier vehicle.

Although this invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted without departing from the spirit and scope of the invention as herein claimed.

Claim 1. In a portable, expandable and collapsible mechanism for sleeping use, described in its expanded configuration, comprising in combination:

two dimensionally similar rigid members, as the lower and upper sleeping decks, for the support and retention of bedding, cooperatively oriented one above the other breadthwise but offset lengthwise on horizontal and parallel planes with adult sleeping space between; and

a structural-support-actuating means for interconnecting the sleeping decks, comprised of separate upstanding shafts affixed by pivotal attachment between two opposite lateral margins of the sleeping decks so that a change in shaft attitude form upstanding to nearly horizontal position will lower the upper sleeping deck to a juxtaposition above the lower sleeping deck, forming a compact configuration for transport.

2. In an expandable and collapsible device for two-level sleeping and transport on a vehicle, described in its expanded configuration, comprising in combination:

two similar quadrangular load-sustaining members, as the lower and upper sleeping decks, for the support and retention of bedding, cooperatively configured on horizontal and parallel planes with adult sleeping space between and oriented one above the other spanwise but offset lengthwise, thus providing adult standup clearance at one extremity extending upward from the lower sleeping deck member which is adapted for mounting a vehicle;

a series of vertical struts, each separately interconnecting the sleeping deck members by pivotal attachment between two comparable margins of the sleeping decks, constituting the support-actuating means for expanding and collapsing the device; and

mechanical means of power for expanding and collapsing the device, comprised of a reversible thrust force attached to and extending between the two sleeping deck members.

3. In a two-level assembly that is collapsible for transport and expandable for sleeping use on a vehicle, described in its expanded configuration, comprising in combination:

two rectangular fram.elike members of approximately equal width, as the lower and upper sleeping decks for the support and retention of bedding, spaced in horizontal and parallel relation one above the other transversally with adult sleeping space between the decks and longitudinally offset, thus affording adult standup height at one end extending upward from the lower sleeping deck which is adapted for mounting on a vehicle;

a structural-support-actuating means, comprised of multiple equal-length struts terminally joined by pivotal attachment into straight line vertical pairs (strut pairs) spaced in bank along the longitudinal margins of the sleeping decks, with the lower extremity of each strut pair pivotally attached to the longitudinal margins of the lower sleeping deck and with the interconnecting common juncture of each strut pair pivotally attached to the longitudinal margins of the upper sleeping deck, and a motion-synchronizing means attached to each strut bank;

a protective cover member, coextensive with an parallel spaced at adult standup height above the lower sleeping deck, as the top cover with its longitudinal margins rotatably attached to the upper extremity of each strut pair of the support-actuating means; and

an actuating means of power for expanding and collapsing the assembly, comprised of a reversible thrust force mounted on the upper sleeping deck and attached to the actuating mechanism.

4. In a two-level structure that is collapsible for transport and expandable for sleeping use on a vehicle, described in its expanded configuration, comprising in combination:

two load-bearing rectangular flat plates of approximately equal width, as the lower and upper sleeping decks for the support and retention of bedding, arranged in horizontal and parallel relation and cooperatively spaced for sleeping purposes one above the other transversally but longitudinally offset to permit adult standup space at one end extending upward from the lower sleeping deck which is adapted for mounting on a vehicle;

an interconnecting-actuating means, comprised of multiple struts arranged in separate banks along the longitudinal margins of the sleeping decks, with each bank consisting of two terminally contiguous tiers of equal-length vertical struts, one tier above the other, aligned and pivotally interconnected by strut and attachment into separate vertical pairs (strut pairs), thus providing a series of expanded toggle joint configurations with the lower extremity of each strut pair connected by pivotal attachment at spacings along the longitudinal margins of the lower sleeping deck and the interconnecting common juncture of each strut pair pivotally attached and extending along the longitudinal margins of the upper sleeping deck;

a motion-synchronizing means in each bank of struts, comprised of two push-pull rods arranged in a V-configuration rotated 90° with the contiguous rod ends adapted for pivotal attachment to a source of thrust power, and with the diverging rod ends rotatably attached respectively, one to an upper tier strut and one to a lower
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tier strut so that during all stages of expansion or collapse the V-point of the push-pull rods traverse a line adjacent to and parallel with the longitudinal margin of the upper sleeping deck;
an enclosing means, having a horizontally disposed rigid top member and a laterally depending flexible media, as the top, ends and sides enclosing the assembly, with the rigid top pivotally attached along its longitudinal margins to the upper extremity of each strut pair and with the depending flexible media extending to the lower sleeping deck;
two reversible thrust hydraulic rams, each with piston rod, separately installed between the sleeping decks, with the heel or base end of the ram pivotally attached to a longitudinal margin of the lower sleeping deck and the piston rod pivotally attached to the comparable cooperative longitudinal margin of the upper sleeping deck, and a hydraulic pressure pump connected to the hydraulic rams with an intervening reversible flow shutoff valve.

5. In a two-level expandable and collapsible sleeping facility for transport and use on an automobile, described in its expanded configuration, comprising in combination:
a rectangular floorlike member, as the lower sleeping deck, horizontally disposed for the support and retention of bedding, said member being adapted for attachment to an automobile;
a rectangular rigid frame with overlaid load-sustaining media, as the upper sleeping deck, positioned parallel to and transversely above the lower sleeping deck, with the decks longitudinally offset and sleeping space between;
a rooflike member, with integral short skirt downward extending from its lateral margins, disposed parallel to and at adult standup height above the lower sleeping deck;
two lateral banks of interconnecting-actuating linkage, with each bank comprised of two terminally contiguous tiers of vertical struts, one tier above the other, aligned and pivotally interconnected by strut end attachment into separate vertical pairs (strut pairs), thus forming along the longitudinal margins of the facility a series of expanded toggle joint configurations, with the lower extremity of each strut pair pivotally attached at sparcings along the longitudinal margins of the lower sleeping deck, with the interconnecting juncture of each strut pair pivotally attached at cooperative spacings along the longitudinal margins of the upper sleeping deck and with the upper extremity of each strut pair pivotally attached to the longitudinal margins of the rooflike member;
motion-synchronizing push-pull rods in each lateral bank of struts, in the configuration of a V rotated 90° with the contiguous rod ends adapted for pivotal attachment of thrust power and with the diverging rod ends rotateably attached respectively one to an upper tier strut and one to a lower tier strut;
a means of encasing the facility by flexible side and end curtains, designed with incised window openings and an ingress and egress portal, with the upper and lower extremity of the curtains attached respectively to the skirt of the rooflike member and to the external margins of the lower sleeping deck; and
two jackscrew assemblies, for expanding and collapsing the facility, mounted one each on the longitudinal margins of the upper sleeping deck, separately connected through a gearbox to a common source of torque force, with its drivescrew fitted with an internally threaded travel block that is pivotally attached to the common juncture of the push-pull rods.

6. In a two-level sleeping compartment, expandable for sleeping use and collapsible for transport on an automobile, described in its expanded configuration, comprising in combination:
a rectangular frame with integral rigid floor, as the lower sleeping deck, horizontally disposed for the support and retention of bedding, said frame being adapted for releasable attachment to an automobile;
a plurality of vertical equal-length staffs, as the lower tier staffs of the support-actuating mechanism, with the lower end of each staff pivotally attached at selected spacings along the longitudinal margins of the lower sleeping deck;
a second rectangular frame having transversal load-sustaining media, as the upper sleeping deck, with its longitudinal margins pivotally attached to the upper ends of the lower tier staffs and parallel oriented transversely above but longitudinally offset as compared to the lower sleeping deck so as to provide sleeping space between the decks and adult standup space at one end extending upward from the lower sleeping deck;
a premier tier of support-actuating staffs, each of approximately equal length and vertically disposed with the lower ends of each staff pivotally attached at selected spacings along the longitudinal margins of the upper sleeping deck;
a canopy, comprised of a rigid member with integral short depending skirt, as the top cover with its longitudinal margins pivotally attached to the upper tier of support-actuating staffs so that it is oriented parallel to and at adult standup height above the lower sleeping deck;
a motion-synchronizing means in each lateral bank of the support-actuating mechanism, comprised of two push-pull rods arranged in a V-configuration rotated 90° with the contiguous rod ends adapted for pivotal attachment to a source of thrust force, and with the diverging rod ends rotateably attached respectively, one to an upper tier staff and one to a lower tier staff so that during all stages of expansion or collapse the V-point of the push-pull rods traverse a line adjacent and parallel to the longitudinal margin of the upper sleeping deck;
means of actuating force for expanding and collapsing the compartment, comprised in each bank of actuating mechanism of a movable thrust rod, mounted on the longitudinal margins of the upper sleeping deck with the movable thrust rod pivotally attached to the contiguous rod ends of the V-push-pull rods in the adjacent bank of staffs, and a source of power simultaneously supplied to the thrust mechanism;
flexible enclosing curtain, attached to the lateral margins of the canopy, contour tailored and laterally encompassing the compartment by downward extending to its releasable attachment to the lower sleeping deck;
means of passageway, strategically cut through the enclosing curtain, to provide a closable ingress and egress portal and controllable apertures for the transmission of light and air; and
curtain folding and stowing means, for the automatic folding and stowing of the enclosing curtain, that is actuated by the expansion and collapse of the compartment.

7. In a two-level, expandable and collapsible tentlike compartment, adapted for collapsed transport and sleeping use when expanded atop an automobile, described in its expanded configuration,
a lower sleeping deck, comprised of a horizontally disposed rectangular base frame with attached overlaid rigid floor and integral upward extending low sidewalls, for the support and retention of bedding and in support of superstructure, said deck being adapted for detachable mounting atop an automobile;
a lower tier of support-actuating struts, comprises of multiple equal-length shafts, each vertically disposed with its lower end pivotally attached at a selected location along the longitudinal margins of the lower sleeping deck;
an upper sleeping deck, comprised of a rectangular rigid frame spanned by a load-sustaining flexible media, with
its longitudinal margins pivotally attached to the upper extremity of the lower tier struts, said sleeping deck being similar in size and configuration and parallel oriented transversally above but longitudinally offset as compared to the lower sleeping deck so as to provide adult sleeping space between the decks and standup height at one end extending upward from the floor of the lower sleeping deck;

an upper tier of support-actuating struts, comprised of multiple equal-length rigid shafts, each vertically disposed with its lower end pivotally attached at a selected location among the longitudinal margins of the upper sleeping deck;

a rigid top cover, comprised of a horizontal rectangular member, comparable in configuration and size to the base frame and having integral short depending marginal skirt, which top cover is super imposed parallel to and at adult standup height above the floor and pivotally attached, at spaced positions along the longitudinal margins, to the struts extending of the upper tier struts, thus providing an overhead canopy when the compartment is expanded and which also serves as an enclosing cover for the entire mechanism when collapsed into its carrying case configuration;

motion-synchronizing linkage, comprised of two push-pull rods in each lateral bank of struts arranged in the configuration of a V rotated 90° with the contiguous rod ends pivotally interconnected and adapted for attachment to a source of thrust power, and with the diverging rod ends rotatably attached respectively, one to an upper tier strut and the other to the companion lower tier strut so that during all stages of expansion and collapse of the compartment, the V-point of the push-pull rods will traverse a line adjacent and parallel to the longitudinal margin of the upper sleeping deck;

a reversible electric motor mounted on the upper sleeping deck and dually connected, each to a lateral bank of support-actuating struts by a drive shaft, in train with a worm gear drive and threaded jack-screw fitted with an internally threaded travel block which is pivotally connected to the common juncture of the V push-pull rods, as the power means for expanding and collapsing the compartment; and

transversal stabilizers, comprised of separate units of flexible nonstretchable stays, diagonally affixed by attachment between a stable transversal member of the compartment and a movable strut;

a flexible waterproof curtain, attached to the top-cover marginal skirt, contour tailored and laterally encompassing the compartment by downward extending to its releasable attachment to the four margins of the base frame;

an ingress and egress portal cut through the lateral encompassing curtain adjacent to the standup space within the compartment, in a configuration that leaves an unsecured portion of the curtain as a closure flap;

multiple windows cut through the encompassing curtain to provide flow of light and air, each fitted externally with insect barrier netting, and in a configuration having an unsevered portion of the curtain as an adjustable closure flap;

an automatic curtain folding and stowing device, actuated by the rise and fall of the top cover, comprised of a series of nonstretchable guide lines, each fitted with a loop-stopping lug near the point where the line is permanently anchored to the base frame, from whence the line extends upward inside the curtain through attached curtain loops and thence through a block and tackle arrangement, first through a fixed pulley block and thence through a floating pulley block, each block having two pulleys, with the guideline kept taut by a springlike anchor line attached between the floating pulley block and the anchor line secured to the underside of the top cover; and

an access ladder with steps hingedly attached to the side rails and with the upper end of one side rail pivotally attached to the base frame so that the ladder can be swung to a horizontal position for mounting along the longitudinal skirt of the top cover when the compartment is collapsed for transport.

8. In a horizontal elevating and lowering mechanism, as a subassembly, for use with a vertical expanding and collapsing sleeping assembly which has a horizontal base, a movable top cover and a movable upper sleeping deck interengaged parallel between the base and the top cover, which subassembly is now declared and separately claimed as a patentable subcombination, herein described in its expanded configuration, comprising in combination:

multiple movable struts of approximately equal length, vertically arranged in two tiers, one tier superimposed above the other and spaced in comparable numbers, as opposite lateral banks of struts, along the longitudinal margins of the sleeping assembly, with a strut of the lower tier aligned with a strut of the upper tier by pivotal interconnection at their adjacent terminals, forming a series of strut pairs, each in an expanded toggle joint configuration with the lower and upper extremity of each strut pair fashioned for pivotal attachment respectively to comparable lateral margins of the base and the movable top cover, and having the common juncture of each strut pair designed for pivotal attachment to the cooperating lateral margin of the movable upper sleeping deck; and

a motion-synchronizing means in each strut bank, comprised of two push-pull rods arranged in the configuration of a V rotated 90° with the contiguous rod ends pivotally interconnected and with the diverging rod ends rotatably attached respectively, one to an upper tier strut and the other to a lower tier strut so that during all stages of expansion and collapse of the sleeping assembly the V-point of the push-pull rods will traverse a line adjacent and parallel to the longitudinal margin of the upper sleeping deck;

all of which, when so assembled, united and actuated in conjunction with an expandable and collapsible sleeping assembly, raises and lowers the movable sleeping deck and movable top cover, while each movable member remains horizontal and parallel to the base at all stages of elevation, with the movable sleeping deck traveling longitudinally to an offset position above the base, thereby providing adult standup height at one end within the expanded sleeping assembly.

9. In a curtain folding and stowing assembly for use with an expandable and collapsible sleeping compartment which has a horizontal base, a movable top cover, interconnecting expanding and collapsing mechanism and lateral enclosing flexible curtain, which curtain folding and stowing assembly is now declared and separately claimed as a subcombination, consisting of a series of identical units, one of which is herein described in its expanded configuration, comprising in combination:

a two-sheave fixed pulley block attached to the underside and near the lateral margin of the top cover; and

a two-sheave floating pulley block, statically described as being located near the underside and approximately midway transversalwise of the top cover and which floating pulley block moves transversal and parallel to the top cover;

a nonstretchable guideline with its adjustable loop-stopping lug, anchored at its lower end to the sleeping compartment base, thence extending upward through a series of slidable loops affixed in vertical alignment to the inside of the flexible enclosing curtain, with said guideline further extending, in block and tackle threading fashion, first through the fixed pulley block and thence through the floating pulley block, with the extended end of the guideline affixed to the fixed pulley block; and

a stretched segment of springlike tether attached to the floating pulley block and thence extending transversal the
top cover to its point of anchorage to the underside and lateral margin of the top cover opposite from the fixed pulley block; each of which units, when so singly arranged and multiply assembled, keeps the guidelines taut at all stages of expansion and collapse of the compartment and the lowering of the top cover, from which the enclosing curtains are suspended, causes the loop-stopping lug to accumulate the curtain loops, thus stowing the flexible enclosing curtain in vertical folds within the sleeping compartment.