

Nov. 30, 1971

K. E. ROUCH

3,623,168

OVERHEAD BUNK LINKAGE

Filed Aug. 11, 1970

3 Sheets-Sheet 1

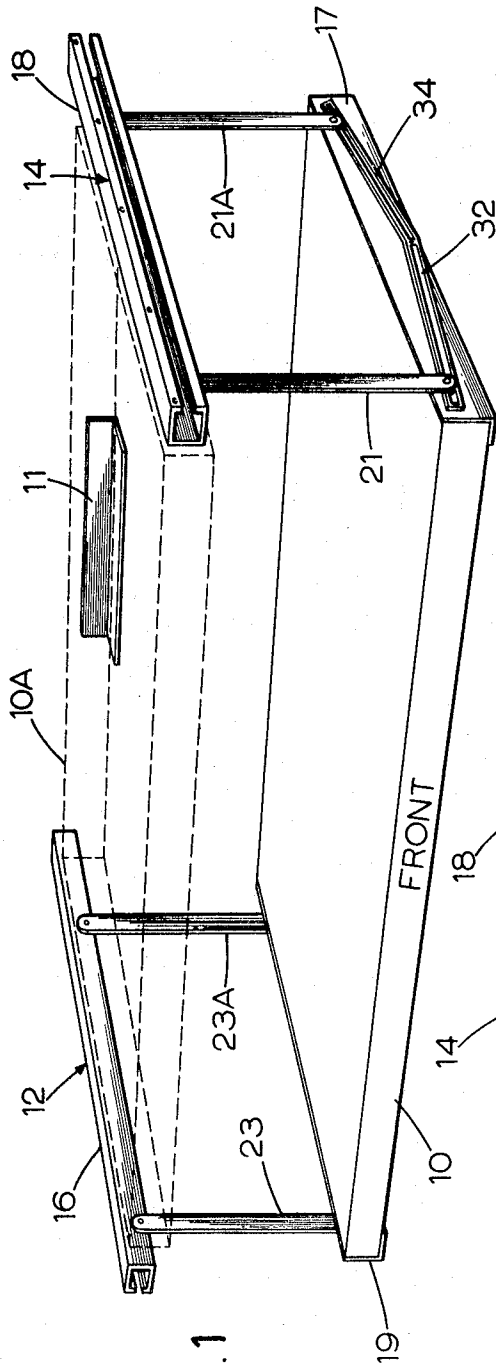


FIG. 1

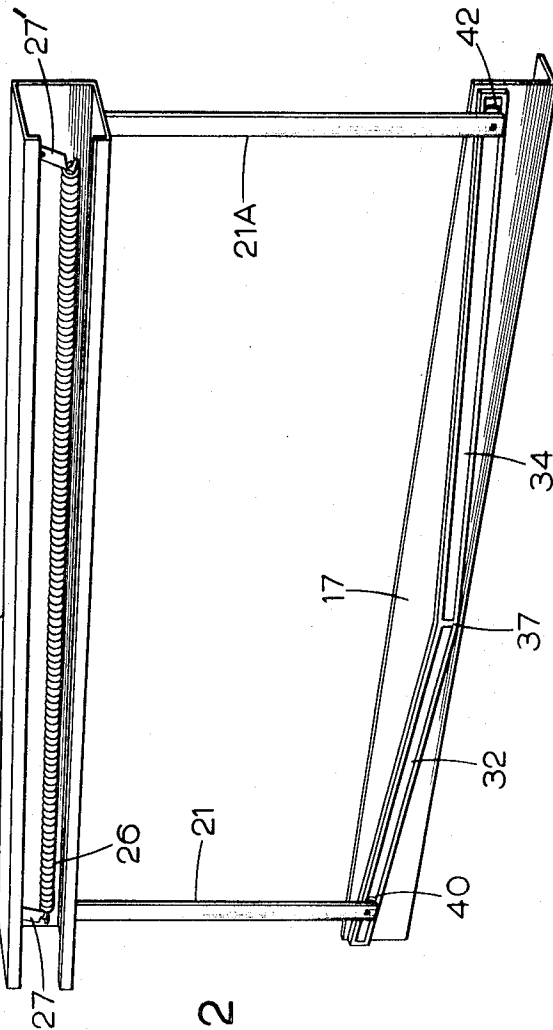


FIG. 2

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FIG. 3

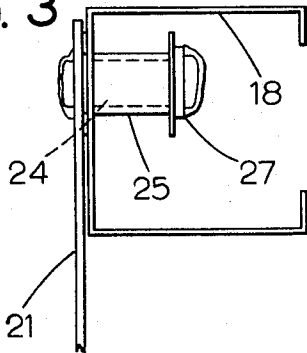


FIG. 5

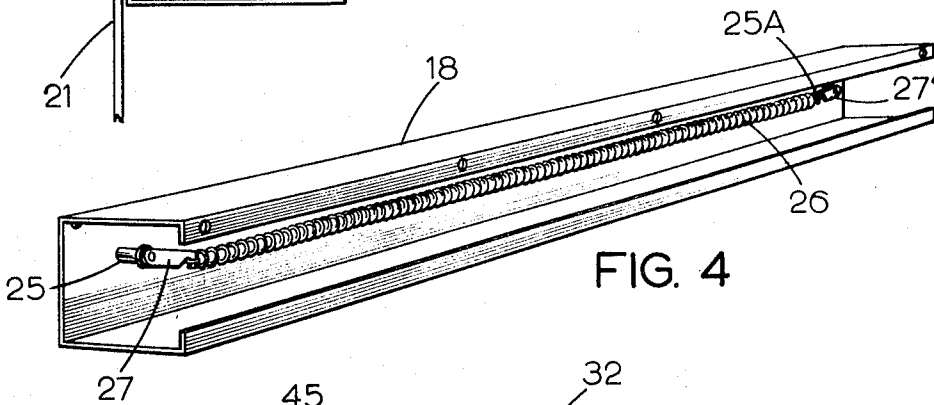
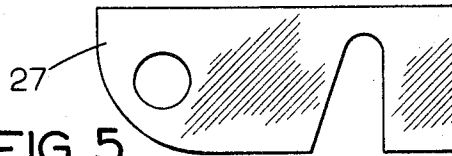


FIG. 4

FIG. 6

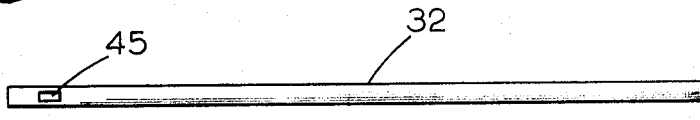


FIG. 7

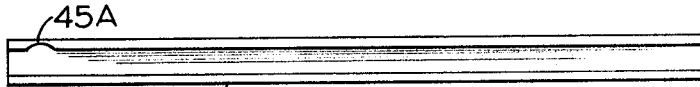


FIG. 7A

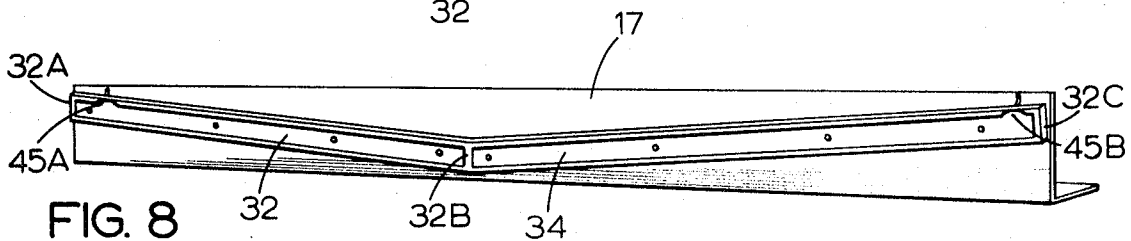


FIG. 8

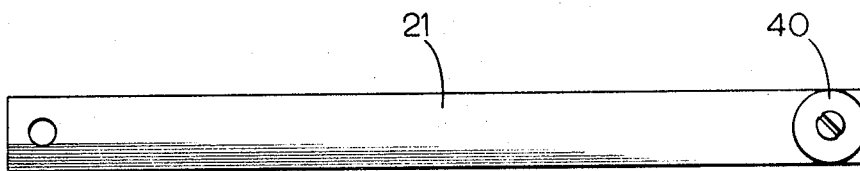


FIG. 9

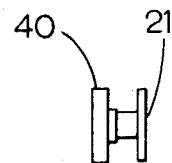


FIG. 10

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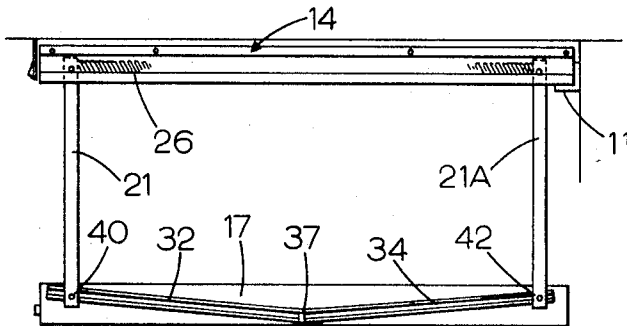


FIG. 11

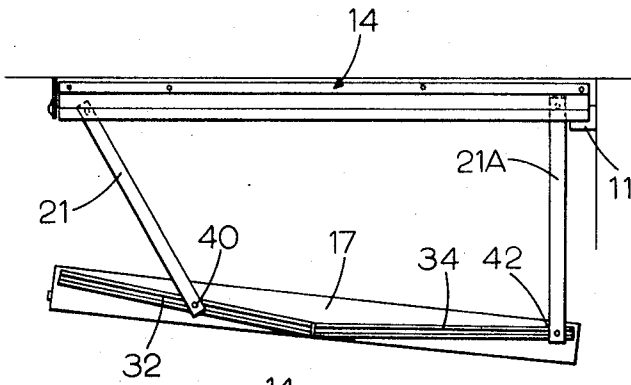


FIG. 12

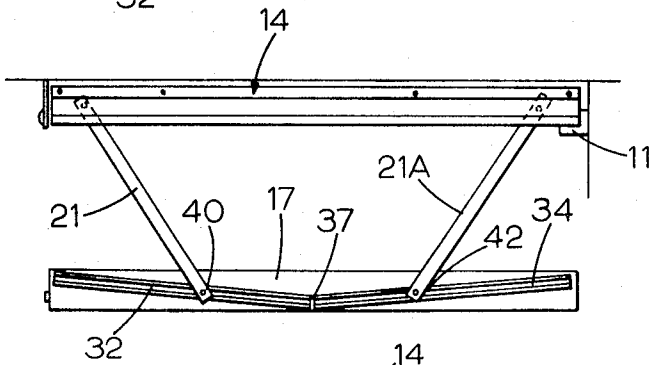


FIG. 13

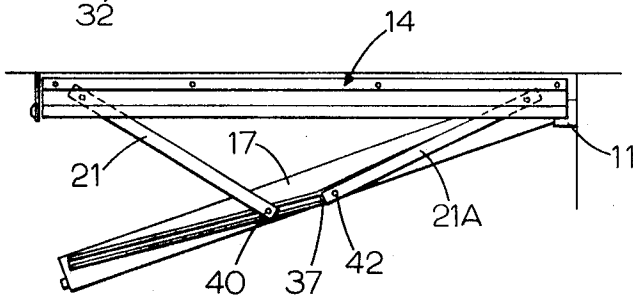


FIG. 14

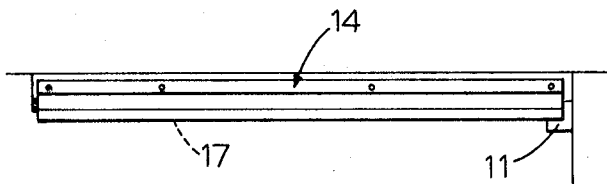


FIG. 15

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U.S. Cl. 5-10

6 Claims

ABSTRACT OF THE DISCLOSURE

The overhead bunk linkage for positioning and supporting assists in manipulating a load such as a bunk bed between storage and use positions. Spaced linkage assemblies are located one adjacent each end of the bunk designed to operate in spaced planar regions perpendicular to the bunk. Each linkage assembly has front and rear downwardly extending support links, each link mounted for swinging movement from an upper support region where spring means are provided to urge the lower ends of the front and rear links toward each other. Adjacent the lower ends of the links, tracks are provided on the ends of the bunk extending adjacent the plane of the swing of the links with a sliding connection between the links and the tracks. The tracks extend front and rear from the central region of the bunk and preferably are inclined upward in their path toward front and rear. With this sliding connection and a substantial swinging force on the links, the direction of movement of the links relative to the inclined tracks exerts components of lifting force upward on the bunk, thus to assist manual manipulation of the bunk toward and away from a storage position.

BACKGROUND OF THE INVENTION

The use of bunk type beds capable of satisfactory support in an in use position with additional capability of satisfactory transfer to an overhead storage position has been recognized as a need in mobile homes as well as in other related applications. However, it seems a fair summary to state that ease of manipulation in the transfer between in use and storage as well as compactness and simplicity of such mechanism are improvements to be desired over prior structures. The use of a resilient force generating mechanism beyond the use of a simple return spring as a supplement to manually applied force to assist in manipulation of stowing linkages seems a proper field in which to effect advance over prior devices.

SUMMARY

It is a primary object of the invention to provide a linkage with built in resilient force generating elements to effectively assist manual manipulation of a linkage effecting transfer of a load such as a bunk bed between in use and overhead storage.

It is a further object to provide a linkage wherein tracks are provided on the ends of the bunks extending adjacent spring urged links with sliding connection between such spring urged links and the tracks whereby components of lifting force are exerted on the bunk to assist manual manipulation of the bunk in movements both toward and away from a storage positions.

It is another object to provide a spring urged linkage powered by a spring capable of generating of sufficient force thru a connecting linkage which will generate components of lifting force sufficient to materially assist manual manipulation of a load such as a bunk upward from a down in use position to a storage position; such lifting force being present as well in operation of the linkage from storage toward the down in use position will prevent uncontrolled downward movement but in an amount easily overcome by manually applied force when desired.

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The above and other objects of the invention will appear more fully by reference to the following description of a specific structure successful in actual use, and by reference to the accompanying drawings forming a part hereof.

DRAWINGS

FIG. 1 is a perspective view showing a bunk in down in use position supported by spaced linkage assemblies, secured to the upper side wall or ceiling of a trailer or other location.

FIG. 2 is a perspective view of one of the spaced linkage assemblies showing the mounting of the links for swinging movement and the use of a spring to urge downwardly extending links toward each other from an upper support with the lower ends operating in tracks upwardly inclined in a lower end support for the bunk.

FIG. 3 is an end view of the upper support showing bearing mounting for downwardly extending links.

FIG. 4 is a perspective view of the support channel for the links showing the connection between the links and the spring mounting therefor.

FIG. 5 shows the spring arm connecting the link crank arm with the spring.

FIG. 6 is the top view of one of the tracks.

FIG. 7 is a side view of one of the tracks and FIG. 7A is an end view of the track.

FIG. 8 is a sub-assembly of the lower end support with the tracks mounted thereon and shows an extending ledge for supporting the bunk.

FIG. 9 is a plan view of one of the downwardly extending links with a plastic roller secured at the lower end thereon.

FIG. 10 is an end view of the link with plastic roller in position thereon.

FIGS. 11 through 15 are in part diagrammatic and show a series of positions of the linkage assembly which occur during an operating procedure of manual manipulation of the bunk from a down in use to an upper storage position.

DESCRIPTION OF ILLUSTRATIVE STRUCTURE

Referring to the drawings and particularly to FIG. 1 which is a perspective view showing an assembly of the bunk support in down, in use, position and the upper storage position of the bunk being indicated by dotted lines 10A, with a wall support 11 provided for the upper storage position as will later appear. The bunk 10 in use is supported on lower supports 17, 19 of spaced vertical linkage assemblies 12 and 14, one of the assemblies secured in spaced relationship to the other at each end of the bunk 10. Lower support members 17, 19 are formed with projecting portions each constructed to form a support for the end of the bunk 10. Each of the vertical assemblies 12, 14 shown in FIG. 1 are alike in structure and the assembly 14 shown also in FIG. 2 has a front downwardly extending forward link 21 and rearward link 21A for the assembly 14 and there is a like forward link 23 and rearward link 23A for the assembly 12.

Each sidewall or ceiling support channel 16 and 18 are alike in structure, more detail structure of channel 18 being shown in FIGS. 2, 3 and 4 where it appears that there is provided a bearing 25 at the front end and a bearing 25 at the rear secured to the channel with a projecting bearing shaft 24 which is rigidly secured to the upper end of the corresponding link 21 as shown in FIG. 3, which link, bearing shaft portions are reproduced as to all four of the support links 21, 21A, 23, 23A thus to provide swinging upper supports for each of the downwardly extending links 21, 21A, 23, 23A. Each of the bearing shafts 24, 24A, etc., is connected rigidly to a spring arm 27, there being four of these arms each of which connect with an end of a spring 26 with a rigidly

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connected arm 27 and as shown in FIG. 4 the result is a spring connection providing a resilient assembly urging the downwardly extending links to swing toward each other, i.e., the front links 21 and 23 spring urged in such relation that their lower ends are urged to swing rearward and the rear links 21A, 23A are spring urged to swing forward.

Each of the lower support members 17 and 19 of the linkage assemblies as shown in FIG. 2 has track members 32, 34 extending from a central region 37, the track 32 extending forward and inclined upward and track 34 extending rearward and also upwardly inclined. Like tracks are provided for member 19. Each of the tracks is formed to receive plastic rollers 40, 42 which roll in the tracks and which are secured adjacent the lower ends of the links 21, 21A, 23, 23A as shown. Adjacent the outer end of each track as shown in FIG. 6 there is a slot 45 in which the roller 40 will fall when it reaches the outward end of its travel and such slot with curved cut-out 45, FIGS. 7 and 8, as clearance for the bearing of the roller 40 will afford a stop and positive securing of the roller in position to be manually moved from this end position when desired. Stop bars 32A, 32B and 32C are also secured at the outer and inner ends of the tracks.

The operation of the device is illustrated in FIGS. 11 to 15 inclusive, where FIG. 11 shows the bunk in down in use position with the downward extending links at both ends of the bunk in a substantial vertical position with their lower ends in the outermost front and rear ends of the inclined tracks. It is understood that the linkage at both ends of the bunk as viewed looking at that end are the same in construction and arrangement. The tracks and links with support therefor with resilient connection being like the structure shown in FIGS. 2 to 10 inclusive.

Continuing with the description of the operation the procedure in operating the bunk from a position of standing at the left hand end of FIG. 11 and facing the front of the bunk, which is the left hand end as shown in FIG. 11, the first step to release is to lift the front of the bunk (left in the FIG. 11) which will cause the front links in both vertical assemblies to move to the position shown in FIG. 12, that is the lower end of the front links will slide on the tracks toward the central portion of the bunk as shown. This movement follows when it is considered that the links are spring urged by the construction as it has been described, so that the lower end of the front links will be swung in a counterclockwise direction about their top support bearings and in such movement the spring action will cause the roller at the lower ends of the links to exert a force which will have a lifting action in the tracks and this lifting action supplied by the spring will be in addition to the manual lift at the front of the bunk and will assist the operator in lifting the bunk. In other words, it will not require as much of a lifting force to lift the front of the bunk as otherwise would be required if there were no resilient connection to swing the links.

The next step referring to FIG. 13 is to push down on the front of the bunk to release the rear downward projecting links and this will likewise cause the rear links during this movement to exert a lifting force resulting from the inclined position of the track and the spring urged swinging movement in a clockwise direction of the links. In this condition, the bunk is moved part way in an upward direction toward the upper storage position but the next step is illustrated by FIG. 14 when a manual push downward on the front of the bunk will then lift the rear edge of the bunk into a position such that it can be rested on the angle support 11 on the wall at the rear of the bunk. This movement is again assisted by the spring action which in both front and rear links is exerting an upward force on the bunk between the tracks and the rollers connected to the ends of the links with the rear links swinging forward. With the rear of the bunk thus in position on the angle support 11 the next step which is illustrated in FIGS. 14 and 15 is to manually push up on the front of the bunk to lift the bunk to a storage position such as shown in FIG. 15

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with the top of the bunk adjacent to the ceiling. It is again to be emphasized that during this movement there is an assist toward the movement by the action of the link in the tracks and will not require as much manual lift as would be the case if there were no such spring action and connections.

It is understood that when the bunk is in the top storage position the latches are secured to hold the outer end of the bunk in storage position.

In order to bring the bunk down from the storage position to the in use position, the reverse procedure is carried out by manually first pushing down on the front to bring the bunk to FIG. 14 then manually moving it to FIG. 13, FIG. 12 and last to FIG. 11. In this case, the effect of the resilient connection is to provide an upward holding force which is not enough to lift the bunk by itself but which is overcome by downward push to the manual manipulation. This upward holding force of the resilient mechanism makes it possible to bring the bunk down in a controlled manner. For if the resilient spring generated force were not available the bunk would move down of its own accord which would be an undesired result. So the spring action in effect holds the bunk in a position such that it can be manually moved more easily by a downward push by the operator.

As a general comment on the structure the spring 26 and the connecting linkage from 24, 25, 27 to the downwardly extending supporting links 21, 21A, 23, 23A with their connection to the upward inclined tracks 32, 34 by rollers 40 spring urges the links to swing toward each other to generate the components of upward lifting force on the bunk supporting member 17. This mechanism is a force generating means in part separate from, but assisting, the manually applied force to manipulate the bunk relative to the links to move it between down in use position to upper storage position as shown in FIG. 11 to 15. Such a separate force is more positive and of greater amount than is generally found in linkage mechanisms.

Referring to FIGS. 11 to 15 and FIGS. 1 and 2, with the tracks 32, 34 extending front and rear in an upward incline from a central region of support 17 and therefore from a central region of the load, it appears that the operation of links 21, 21A and 23, 23A with their connection thru rollers 40 will generate components of vertical lift force during the manipulation described with reference to FIGS. 11 to 15. Although some vertical lift action would result if the tracks were not upwardly inclined in members 17, the result is improved and greater forces generated in the direction desired by this incline. Such will be demonstrated on inspection of the relative positions of the tracks and links in FIGS. 11 to 15. The direction of contact with the tracks corresponds more closely to the desired vertical lift direction with the tracks inclined and therefore there is a greater lift component when it is remembered that the spring urged force of the links toward each other is more nearly normal to the path of the tracks and closer to the vertical direction desired in the region of operation used.

The invention has been described by reference to a specific structure found practical in actual operation but it is understood that modifications thereof are intended within the scope of the following claims.

I claim:

1. In a device for positioning and supporting a load between upper storage and down in use positions; front and rear downwardly extending links supported for swinging movement near the top of said links, a pair of front and rear links adjacent each end of the load;
- a track secured on the load adjacent the lower ends of downwardly extending links extending front and rear from a central region of the load;
- connections allowing relative sliding movement between the track and the lower ends of the downwardly extending links;

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resilient means connected with said front and rear links urging said links to swing the lower ends thereof toward each other;

whereby the swinging of said lower ends of said links toward each other in said track produces components of force to assist upward movement of said load and thereby assist in manual manipulating movement of the load between the upper storage and down in use positions.

2. A device as in claim 1 wherein the track extending front and rear from the central region of the load is inclined upward in its front and rear path.

3. A device as in claim 1 wherein the resilient means is provided by;

an upper bearing for each of said links;

means mounting the front and rear downwardly extending links one on each of said bearings for swinging movements;

levers rigidly connected one lever to each of the links for swinging therewith;

tension spring means having an end thereof located adjacent to the lever of each of said links and connected therewith to tension such spring to effect swinging movement of the levers and links in direction to swing the lower end of each link toward the other downwardly extending link of each front and rear pair of links.

4. A device as in claim 3 wherein the resilient connection is provided by a longitudinally extending spring, the corresponding lever of one link connected at each end of said spring constructed and arranged to tension the spring in the direction to urge the lower ends of a front and rear pair of links toward each other.

5. A positioning and supporting device for handling a load between storage and in use positions, the load being such as is found in generally rectangular and horizontally disposed bunk bed;

the device comprising:

a pair of linkage assemblies constructed for mounting, one assembly adjacent each end of such bunk, in spaced generally vertical planar regions;

forward and rear support links extending downward in the general planar region of each linkage assembly, one link forward and one rearward in the planar region of each of the linkage assemblies;

means to support each of said links for swinging movement from an upper support region;

resilient means connected with said links biasing said links to swing inward toward each other, the lower end of each forward link biased to swing in a rearward direction and the lower end of each rearward link biased to swing in a forward direction;

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track members secured relative to the ends of the bunk with such tracks inclined from an inner end upward from the central region of the bunk ends, respectively toward the front and rear of the planar region to outward stop positions;

means connecting the links near their lower ends in sliding connected movement relative to the tracks;

whereby the aforesaid resilient means urging said links to swing inward toward each other while in position for sliding connecting operation in the inclined tracks will produce components of force to assist satisfactory manual manipulating movement of the bunk toward and from an upper storage position.

6. In a linkage assembly for positioning and supporting a load between a down in use position and an upper storage position:

front and rear links mounted for swinging movement from an upper storage position and extending downward therefrom to support the load with a front and a rear link adjacent each end of the load;

resilient means connected with said front and rear links biasing the lower ends of said links to swing inward toward each other in the plane of each pair of front and rear links;

tracks extending, toward front and rear from a central region of the load and positioned adjacent the plane of the links;

connections from the front and rear tracks adjacent to the extending lower ends of the front and rear links, respectively, allowing sliding movement between the front and rear links and the respective front and rear extending tracks,

thereby to assist satisfactory manual manipulating movement of the load, thus supported on the links during positioning toward an upper storage position from a lower in use position and toward a lower in use position from an upper storage position.

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U.S. Cl. X.R.

108—145; 312—247, 306