

July 10, 1962

L. M. PATTERSON

3,042,936

LIFT CONSTRUCTION

Filed June 25, 1959

5 Sheets-Sheet 1

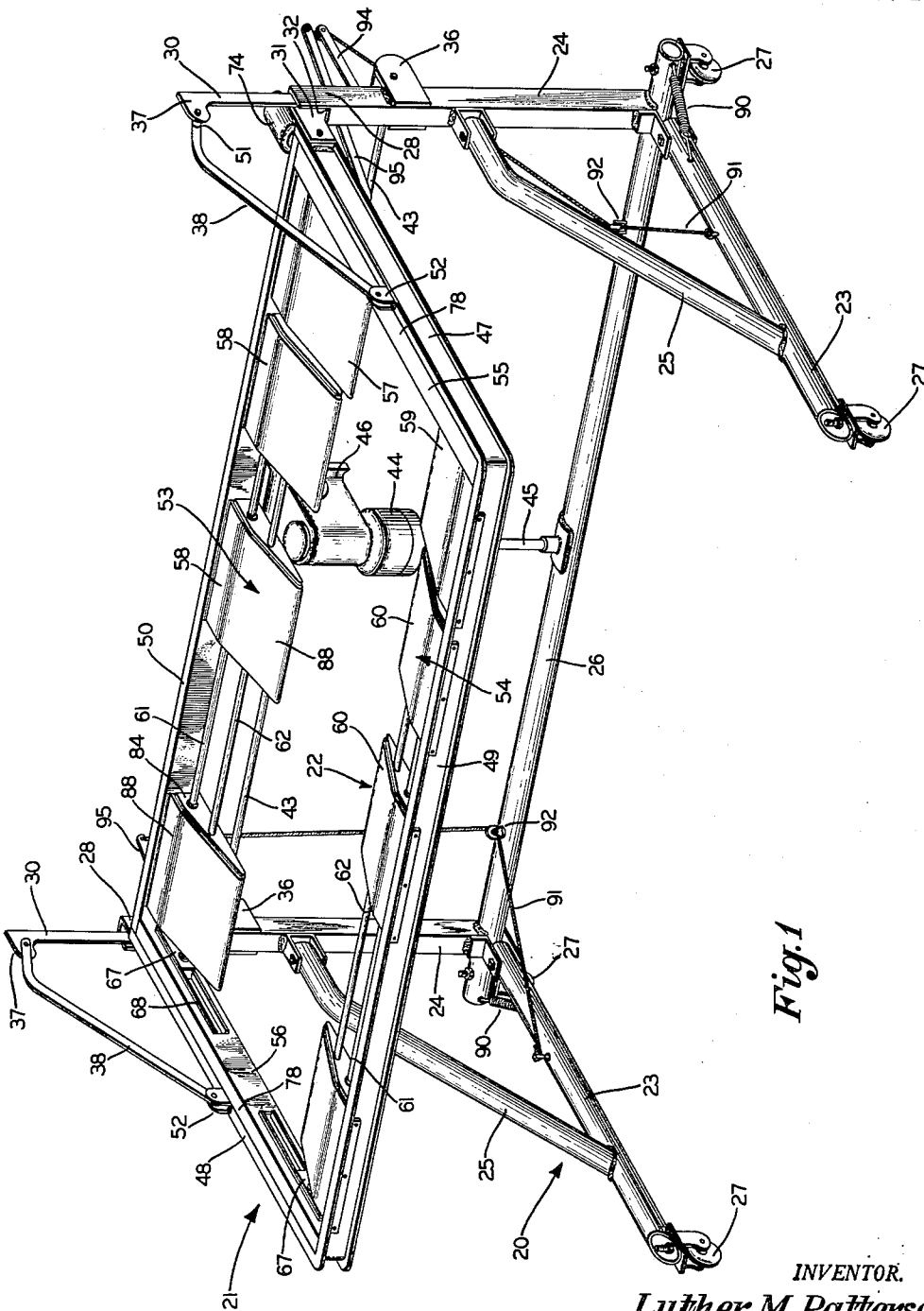


Fig. 1

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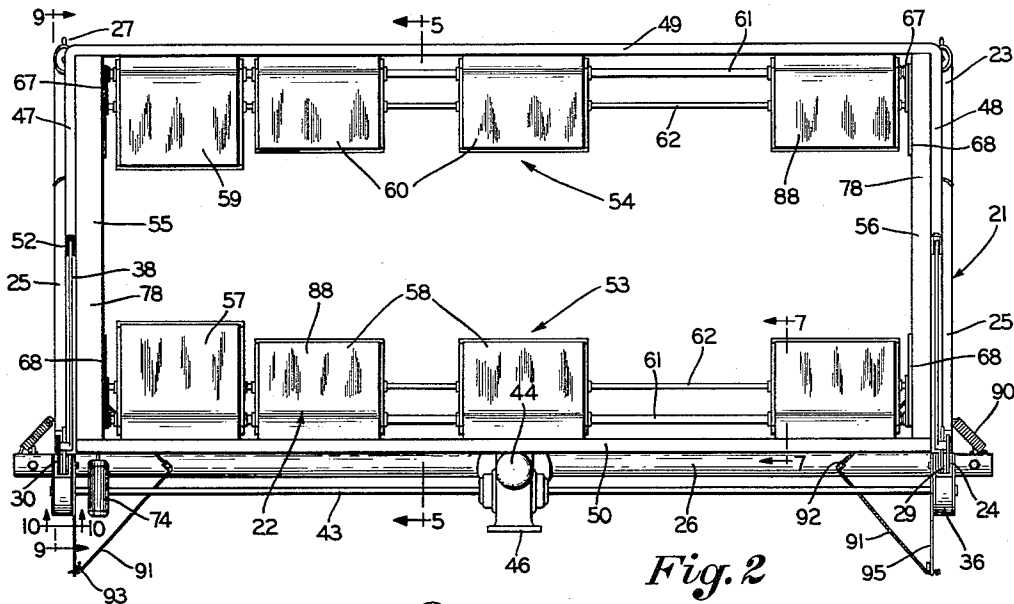


Fig. 2

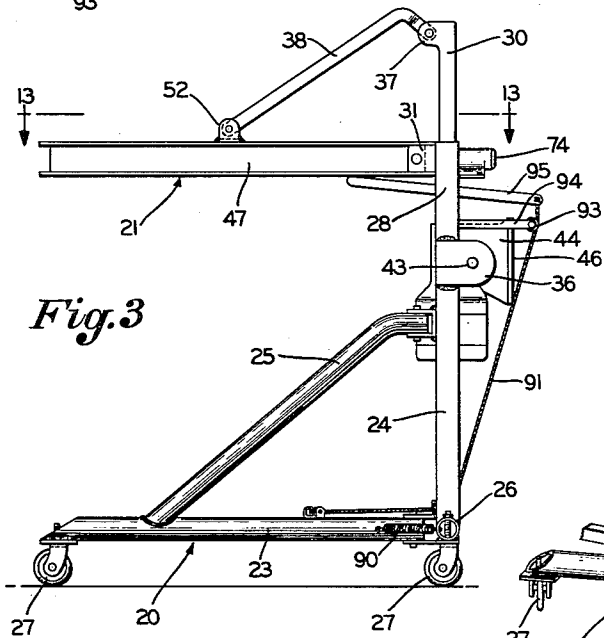


Fig. 3

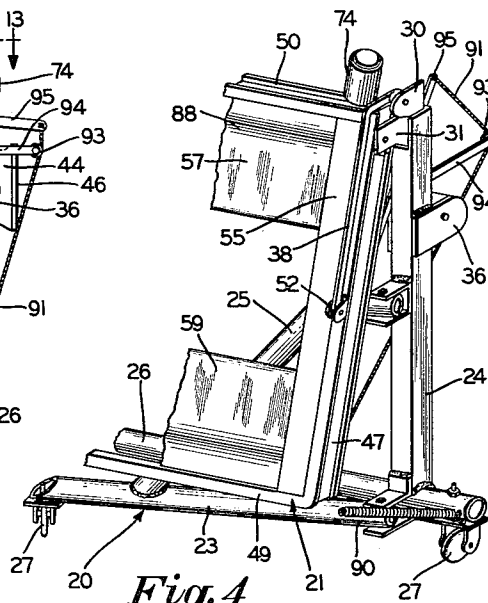


Fig. 4

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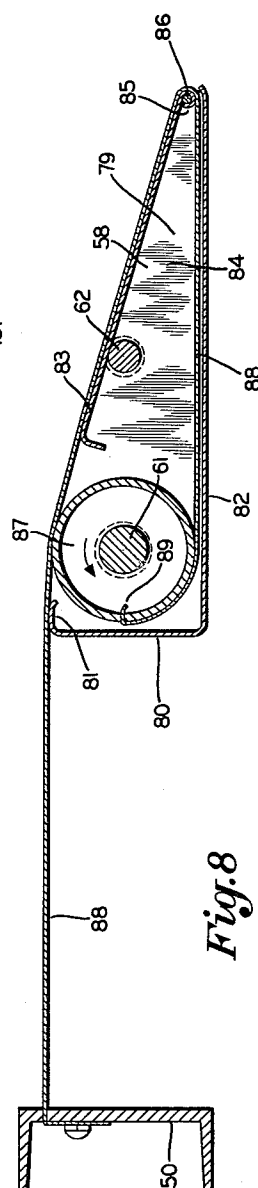
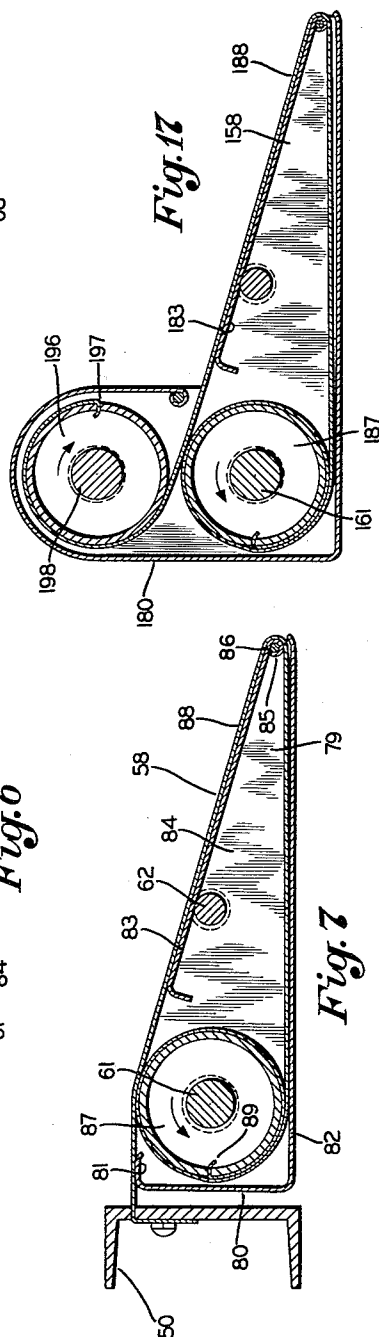
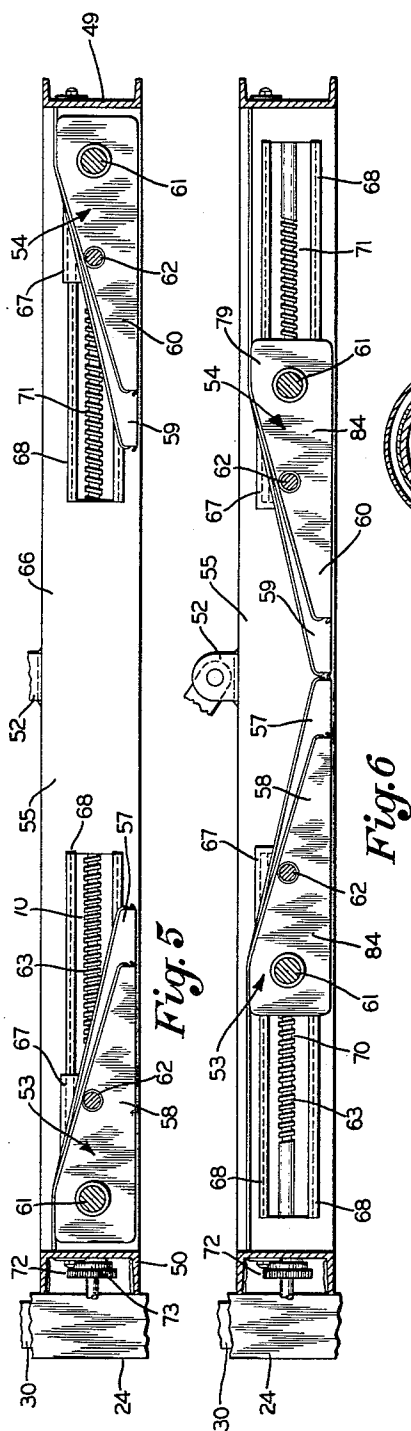
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5 Sheets-Sheet 3



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[illegible]

Fig. 9

Fig. 10

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LIFT CONSTRUCTION

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Filed June 25, 1959, Ser. No. 822,915
26 Claims. (Cl. 5—83)

My invention relates to improvements in lift construction and more specifically to a lift construction in which a lifting platform may be moved beneath a body or object to be supported while the supporting surface of the platform remains stationary relative to the body or object and during the movement of the platform.

The principles of the present invention may be applied to many different forms of lifting devices whether used merely for temporary supporting purposes, supporting and lifting purposes or supporting, lifting and transporting purposes. For instance, the broad principles of the present invention may be applied to a device used for lifting extremely fragile objects in various types of industries.

Presently, many forms of lift trucks and lifting devices are used for lifting and transporting various objects in industry, and in every such case, it is necessary to insert a lifting platform, whether in the form of a continuous platform or spaced lifting forks, beneath the object to be lifted and transported. In every such case, necessarily during the insertion of the lifting platform beneath the object to be lifted or supported, relative slidable movement must take place between the lifting platform and object; and where extremely fragile objects are involved, great damage can be caused by this sliding movement, causing abrasion between the lifting platform and object.

Another very important application of the principles of the present invention and one specifically described and illustrated in the present application is the lifting of hospital patients from a hospital bed. This becomes a considerable problem, particularly where the patient is completely helpless, or virtually so, and yet is in a condition in which any slight movement will cause considerable pain and possible injury to the patient.

Certain prior forms of lifting devices have been provided for lifting patients from a hospital bed. With all such prior constructions, however, it has again been necessary to slidably insert some lifting member beneath the patient so that relative slidable movement must take place between the lifting member and patient, resulting in an abrading of the patient's skin as well as the patient being moved around resulting in considerable pain to the patient.

It is, therefore, a general object of the present invention to provide a lift construction which eliminates the foregoing disadvantages of the prior lifting devices whether for industrial uses or for lifting patients from hospital beds.

It is a primary object of the present invention to provide a lift construction in which a lifting platform is moved beneath a body or object to be lifted or supported, and surface means is provided on the lifting platform which remains stationary relative to the body or object being lifted or supported while the lift platform moves therebeneath.

It is a further object of the present invention to provide a lift construction satisfying the foregoing objects which preferably lifts a body or object vertically upwardly

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from the surface upon which the body or object is positioned during the insertion of the lifting platform thereunder.

It is still a further object of the present invention to provide a lift construction, the principles of which may be adapted for use in a body lift device having normally spaced lifting platforms that may be positioned at either side of a patient lying prone on a hospital bed and may be moved laterally toward each other to lift the patient from the surface of the hospital bed while the surfaces of these platforms remain stationary relative to the patient during the lateral movement of the platforms.

Finally, it is an object of the present invention to provide a lift construction which may be adapted to such a body lift device for use in hospitals and which body lift device has all the necessary attributes of such equipment such as collapsibility for convenient storage and automatic efficient operability.

These and other objects are accomplished by the parts, constructions, arrangements, combinations and subcombinations comprising the present invention, the nature of which is set forth in the following general statement, preferred embodiments of which—illustrative of the best mode in which applicant has contemplated applying the principles—are set forth in the following description and illustrated in the accompanying drawings, and which are particularly and distinctly pointed out and set forth in the appended claims forming a part hereof.

In general terms, the principles of the present invention may be stated as including one or more lifting platforms mounted for lateral movement relative to an object or body to be lifted or supported. Further, the construction includes surface means, preferably in the form of a flexible covering which preferably substantially covers at least the top surface of the lifting platform, and which surface means is laterally movable relative to the lifting platform during the lateral movement of the lifting platform and at substantially the same speed but in an opposite direction as the lifting platform, so that the portions of the surface means that contact the body or object being lifted remain stationary relative to the body or object during the lateral movement of the lifting platform.

One specific form of the lift construction of the present invention for lifting patients from beds in a hospital may be stated as including a frame member, spaced lift platform means operably mounted on the frame member movable laterally toward and away from each other and means for moving the frame member and lift platform means vertically. Each lift platform means is provided with surface means, preferably in the form of a flexible cover means, mounted laterally movable relative to the platform means and in an opposite direction and at substantially the same lateral speed as the lateral movement of the platform means, so that the portions of the cover means that contact the patient remain substantially stationary relative to the patient during the lateral movement of the platform means.

Further, this form of the lift construction may include laterally spaced sets of generally wedge-shaped lifting platforms mounted on the frame member movable laterally toward and away from each other, with cloth covers substantially covering the upper surfaces of these lifting platforms. The cloth covers are rolled up on drum means

below the angled surface of these wedge members and through gear and rack means are unrolled over the leading edge of the platforms as the platforms are moved laterally toward each other, to thereby retain the portions of the cloth cover that contact the patient stationary relative to the patient while the platform members move laterally toward each other.

Still further, this form of construction may be arranged so that the frame member supporting the lifting platforms may be collapsed preferably hingedly downwardly while at the same time the legs supporting the frame member are collapsed preferably hingedly longitudinally inwardly to thereby minimize the storage size of the construction. Finally, power means may be provided for placing the construction in either collapsed or assembled position, and also power means may be provided both for moving the lifting platforms laterally toward and away from each other and for moving the frame member vertically.

By way of example, embodiments of the lift construction of the present invention are illustrated in the accompanying drawings forming a part hereof, wherein like numerals indicate similar parts throughout the several views, and in which:

FIG. 1 is a perspective view, showing the lift construction for lifting patients from a hospital bed, with the lift construction in normal assembled position and with the lifting platforms thereof in fully retracted position;

FIG. 2, a top plan view of the lift construction of FIG. 1;

FIG. 3, an end view of the lift construction of FIG. 1;

FIG. 4, a fragmentary perspective view of the lift construction of FIG. 1 in collapsed position;

FIG. 5, a fragmentary sectional view, part in elevation, looking in the direction of the arrows 5—5 in FIG. 2;

FIG. 6, a view similar to FIG. 5, but with the lifting platforms in their extended positions;

FIG. 7, a fragmentary sectional view, part in elevation, looking in the direction of the arrows 7—7 in FIG. 2;

FIG. 8, a view similar to FIG. 7, but with the lifting platform in extended position;

FIG. 9, a fragmentary sectional view, part in elevation, looking in the direction of the arrows 9—9 in FIG. 2, but with the frame member that supports the lifting platforms in its maximum vertically raised position;

FIG. 10, a fragmentary sectional view, part in elevation, looking in the direction of the arrows 10—10 in FIG. 2, and with the frame member and lifting platforms in the same positions as FIG. 9;

FIG. 11, a view similar to FIG. 9, but with the frame member in fully collapsed position;

FIG. 12, a view similar to FIG. 10, but with the frame member in the same position as FIG. 11;

FIG. 13, a fragmentary sectional view, part in elevation, looking in the direction of the arrows 13—13 in FIG. 3;

FIG. 14, a fragmentary sectional view, part in elevation, looking in the direction of the arrows 14—14 in FIG. 13;

FIG. 15, a fragmentary sectional view, part in elevation, looking in the direction of the arrows 15—15 in FIG. 13;

FIG. 16, a fragmentary sectional view, part in elevation, similar to FIG. 13 but at the opposite end of the frame member from FIG. 13; and

FIG. 17, a view similar to FIG. 7, but showing a second embodiment of the lifting platforms.

The particular form of the lift construction comprising the present invention illustrated in the drawings is for use principally in lifting patients from a hospital bed and includes the main supporting frame, generally indicated at 20, the platform supporting frame, generally indicated at 21, and the platform means, generally indicated at 22. As shown, the main supporting frame 20 is formed from usual structural members and includes the horizontally

extending tubular foot members 23 horizontally pivotally connected to a pair of spaced upright members 24, with each foot member having an angled brace member 25 secured thereto and likewise horizontally pivotally connected to each of the upright members 24.

Further, upright members 24 are secured at their lower ends to a longitudinally extending frame member 26 spaced longitudinally inwardly from the ends of frame member 26. A castor 27 is mounted at each of the ends of the foot members 23 spaced from the longitudinal frame member 26, and also a castor 27 is mounted at each of the extreme end portions of the longitudinal frame member 26 spaced outwardly from the upright members 24, thereby making the main supporting frame 20 easily movable over a floor surface.

The upright members 24 are tubular and preferably rectangular in cross section for telescopically receiving in the upper end 28 the vertically extending main lifting members 29 and auxiliary lifting members 30. One of each of the main lifting members 29 and auxiliary lifting members 30 is received in each of the upright members 24 positioned longitudinally side by side, as shown in FIGS. 9 and 10.

As shown in FIGS. 11 and 12, when the main lifting members 29 are received fully telescoped within the upright members 24, the generally horizontal frame supporting portions 31 extend forwardly from the upright members 24 and rest in the cutouts 32 formed at the upper ends of the upright members 24. Furthermore, these frame supporting portions 31 are positioned longitudinally adjacent the platform supporting frame 21 and pivotally mount this platform supporting frame.

Still further, a cutout 33 is formed at the rear edge of each of the main lifting members 29 spaced from the upper end thereof, and the racks 34 are formed in these rear edges below the cutouts 33 and extending to the lower end of these lifting members. Also, when the main lifting members 29 are in their lowermost positions, the gears 35 are received in the cutouts 33, which gears are journaled on the rear surfaces of the upright members 24 within the gear casings 36.

The auxiliary lifting members 30 are likewise nearly fully telescoped within the upright members 24 when in their lowermost positions, as shown in FIGS. 11 and 12, and these auxiliary lifting members are provided at their upper ends with the generally horizontally forwardly extending arm supporting portions 37 which vertically pivotally mount the angled supporting arms 38. The auxiliary lifting members 30 are positioned spaced longitudinally outwardly from the main lifting members 29, and these auxiliary lifting members are likewise provided with racks 39 at the back edges thereof, which racks are at all times operably engaged with the gears 35 and extend downwardly to the lower ends of the auxiliary lifting members, as shown.

The vertical lengths of the auxiliary lifting members 30 are a predetermined amount greater than the vertical lengths of the main lifting members 29, and the auxiliary lifting members 30 are provided with longitudinally extending engagement blocks 40 at the lower ends thereof underlying the lower ends of the main lifting members 29, as shown in FIGS. 11 and 12. Furthermore, each of the main lifting members 29 and auxiliary lifting members 30 may be provided with one or more guide rollers 41 which guide these lifting members during vertical movement within the upright members 24.

Thus, when the main lifting members 29 and auxiliary lifting members 30 are in their lowermost vertical positions fully telescoped within the upright members 24, the gears 35 are received in the main lifting member cutouts 33 and are operably engaged with the auxiliary lifting member racks 39. When gears 35 are rotated in a clockwise direction, as viewed in FIG. 11, the auxiliary lifting members 30 are first moved vertically upwardly, while the main lifting members 29 remain stationary, until

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the engagement blocks 40 of the auxiliary lifting members 30 engage in the notches 42 formed at the lower ends of the main lifting members 29. At this point, continued clockwise rotation of the gears 35 causes the auxiliary lifting members 30, through the engagement blocks 40, to carry the main lifting members 29 vertically upwardly until the gears 35 also engage in the main lifting member racks 34, after which the particular positioning between the main lifting members and auxiliary lifting members is maintained constant, and the gears 35 drive all of the lifting members 29 and 30 vertically upwardly simultaneously.

The gears 35 are rotatably driven simultaneously by the shafts 43, which shafts extend longitudinally of the main supporting frame 20 inwardly from each of the gears 35 to a reversible gear reduction motor unit 44. The gear reduction motor unit 44 is mounted supported on the longitudinal frame member 26 by means of the support member 45 and preferably mounts the control panel 46 thereon.

As before stated, the platform supporting frame 21 is vertically pivotally mounted on the main lifting member frame supporting portions 31, and as best shown in FIGS. 1, 2 and 3 includes the end frame members 47 and 48, front longitudinally extending frame member 49 and back longitudinally extending frame member 50. The end frame members 47 and 48 normally extend generally horizontally and laterally from the upright members 24, as shown, are preferably integrally formed with the front frame member 49, and are secured to the back frame member 50 so that frame members 47, 48, 49 and 50 normally define a generally rectangular vertical opening.

Also, as before stated, the supporting arms 38 are vertically pivotally connected to the auxiliary lifting member arm supporting portions 37 and are normally positioned angling downwardly and laterally from the auxiliary lifting members 30 to the end frame members 47 and 48, where they are vertically pivotally connected to these frame members 47 and 48. In view of the fact that the end frame members 47 and 48 are positioned longitudinally enclosed by the main lifting members 29, the supporting arms 38 are provided at their upper ends with the longitudinally extending offset portions 51 which are pivotally connected to the auxiliary lifting member frame supporting portions 31, as shown in FIGS. 10 and 12, and the lower ends of the supporting arms 38 are pivotally connected to the end frame members 47 and 48 by the generally U-shaped connecting portions 52, as shown.

The respective lengths of the main lifting members 29, auxiliary lifting members 30 and supporting arms 38 are such that when the auxiliary lifting members 30 have been moved vertically upwardly by the gears 35 to the point at which the auxiliary lifting member engagement blocks first engage in the main lifting member notches 42, the platform supporting frame 21 is maintained in a horizontally extending position, as shown in FIGS. 1 and 3. The purpose of the various pivotal connections of the various members hereinbefore described and the particular relationship between the main lifting member racks 34 and auxiliary lifting member racks 39 is not only for the purpose of providing the platform supporting frame 21 vertically movable on the main supporting frame 20, as will be hereinafter explained in detail, but also for providing the construction movable to a collapsed position in which it occupies a minimum of floor space, as will also be hereinafter explained in detail.

As best shown in FIGS. 1 and 2, the platform supporting frame, generally indicated at 21, horizontally encloses the platform means, generally indicated at 22, which platform means is preferably made up by horizontally opposed generally wedge-shaped platform member assemblies 53 and 54. Further, the platform member assemblies 53 and 54 are mounted on the platform supporting frame 21 normally spaced horizontally, as shown in FIGS. 1 and 2, but are mounted on the platform sup-

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porting frame for simultaneous horizontal movement toward and away from each other by the actuating assembly 55, shown at the left-hand side of the platform supporting frame 21 in FIG. 2, and the actuating assembly 56, shown at the right-hand side of FIG. 2.

Each of the platform member assemblies 53 and 54 is similar, with assembly 53 having the head supporting platform 57 and the longitudinally spaced body supporting platforms 58, and with the platform member assembly 54 having the head supporting platform 59 and the longitudinally spaced body supporting platforms 60. Each of the platforms 57, 58, 59 and 60 are similar in construction and mounting on the platform supporting frame 21, with the exception that the head supporting platforms 57 and 59 extend toward the front and back frame members 49 and 50 of this platform supporting frame a slightly greater distance than do the body supporting platforms 58 and 60, as shown in FIG. 2.

Also, as shown in FIG. 1, the wedge-shaped contour of the platform member assembly 53 is directed toward the platform member assembly 54, and the wedge-shaped contour of the platform member assembly 54 is directed toward the platform member assembly 53, thereby providing opposed wedge-shaped assemblies. The details of construction of the platform member assemblies 53 and 54, the supporting platforms 57 through 60 and the actuating assemblies 55 and 56 are best shown in FIGS. 5 through 8 and 13 through 15 and are hereinafter described in detail.

As shown in FIGS. 1 and 2, the platform member assemblies 53 and 54 are supported on the platform supporting frame 21 by means of the longitudinally extending rotatable supporting rods 61 and stationary supporting rods 62, the ends of which are received in the actuating assemblies 55 and 56. In view of the similarity of mounting of the platform member assemblies 53 and 54 on the supporting rods 61 and 62 as well as the mounting of the supporting rods within the actuating assemblies 55 and 56, it is only necessary for an understanding of the construction to fully describe the mounting of the supporting rods 61 and 62 in the platform member assembly 53 and the mounting of these supporting rods in the actuating assemblies 55, merely noting the minor differences between the actuating assemblies 55 and 56.

As shown in FIGS. 13, 14 and 15, the actuating assembly 55 includes a worm screw 63 extending laterally adjacent the end frame member 47, with one end journaled on the front frame member 49 and the other end journaled extending through the back frame member 50. Furthermore, the screw 63 may be supported midway by the bearing block 64 which is mounted on the bottom supporting plate 65, so that the screw 63 is rotatable with respect to the platform supporting frame 21.

A vertically extending supporting plate 66 is mounted extending between the front and back frame members 49 and 50, spaced longitudinally from the end frame member 47 and worm screw 63, and this supporting plate 66 is slotted to slidably mount the guide blocks 67. Guide blocks 67 are slidably received on the bearing tracks 68 for lateral slidable movement and, as shown in FIG. 15, are flanged at both sides of supporting plate 66 and bearing tracks 68 to prevent longitudinal displacement of these bearing blocks 64 from the bearing tracks 68 and supporting plate 66.

The ends of the stationary supporting rods 62 are received through the guide blocks 67 extending longitudinally to the worm screw 63 where they are connected by means of worm followers 69 to the worm screw 63. The worm follower 69, connected to the platform member assembly 53, is threadably engaged with the worm screw 63 through a screw portion 70 which is formed in one direction, and the worm follower 69 of the platform member assembly 54 is threadably connected to the worm screw 63 through a screw portion 71 which is formed opposite from the screw portion 70.

Thus, by rotating the worm screw 63 in one direction, the worm followers 69 of the platform member assemblies 53 and 54 will move toward each other, thereby sliding the guide blocks 67 of the two assemblies toward each other and moving the platform member assemblies 53 and 54 toward each other. Furthermore, an opposite direction of rotation of the worm screw 63 will cause a reverse movement, thereby moving the platform member assemblies 53 and 54 away from each other and toward their respective back frame member 50 and front frame member 49.

A gear 72 is mounted on the end of the worm screw 63 extending through the back frame member 50 and is operably connected to a gear 73 mounted on the drive shaft motor 74. Motor 74 is mounted on an extension 75 secured to the back frame member 50, as shown in FIGS. 13 and 14, and this motor may be wired for control from the control panel 46 on the motor unit 44, previously described and shown in FIGS. 1, 2 and 3.

The ends of the rotatable supporting rods 61 likewise extend longitudinally through the guide blocks 67 spaced laterally from the stationary supporting rods 62 and are journaled in these guide blocks 67. Further, the rotatable supporting rods 61 terminate longitudinally short of the worm screw 63 and mount the gears 76.

Gears 76 are operably engaged with the racks 77, which racks vertically overlie the gears 76 and are mounted on the supporting plate 78. Thus, when the platform member assemblies 53 and 54 are moved laterally by the worm screw 63, as before described, the guide blocks 67 will cause the rotatable supporting rods 61 to likewise move laterally, and in view of the operable connection between the gears 76 and racks 77, this lateral movement will cause rotation of the supporting rods 61.

As shown in FIG. 16, the actuating assembly 56 is similar to the actuating assembly 55, with the exception that it is not necessary to provide the worm screw 63 nor the worm follower 69 connected to the stationary supporting rods 62. Rather, in actuating assembly 56, the stationary supporting rods 62 are merely received through the guide blocks 67 and terminate at this point.

Actuating assembly 57 does, however, include the guide blocks 67 receiving the ends of the stationary supporting rods 62 therethrough and journalling the rotatable supporting rods 61 therethrough, with the rotatable supporting rod 61 being connected through gears 76 to the racks 77. Thus, when the worm screw 63 of actuating assembly 55 moves the stationary supporting rods 62 laterally causing the gears 76 and racks 77 to rotate the rotatable supporting rods 61, this rotatable motion will be carried through the rotatable supporting rods 61 to the actuating assembly 56, thereby causing the guide blocks 67 of actuating assembly 56 to move laterally and force the ends of the supporting rods 61 and 62 in actuating assembly 56 to travel in perfect lateral synchronization with the ends of these rods in the actuating assembly 55.

As shown in FIGS. 5 and 6, the limits of horizontal movement of the platform member assemblies 53 and 54 toward each other are determined by the ends of the head supporting platforms 57 and 59 coming nearly into abutting relationship, as shown in FIG. 6, in view of the greater lateral lengths of these head supporting platforms 57 and 59 over the body supporting platforms 58 and 60. Except for these differences in lateral length, however, each of the supporting platforms 57, 58, 59 and 60 is similar in construction so that a description of one of the body supporting platforms 58 of the platform member assembly 53 will serve to describe all of these supporting platforms for the purposes of the present invention.

As shown in FIG. 7, the body supporting platforms 58 include a rigid preferably metal frame 79 formed preferably triangular in cross section and receiving the ro-

tatable supporting rods 61 journaled therethrough and the stationary supporting rods 62 secured therethrough. Frames 79 are preferably made up of the side vertically and longitudinally extending cover members 80 having the laterally extending guide flanges 81, the bottom generally horizontally extending cover members 82, the upper angled support cover members 83 and the end generally vertically and laterally extending cover members 84.

The stationary supporting rod 62 is received through the supporting platforms 58 supported by the end cover members 84 directly underlying the upper support cover members 83 and providing a support for these cover members 83. The upper support cover members 83 angle downwardly over the stationary supporting rod 62 from left to right, as shown in FIG. 7, terminating at the edge of the supporting platforms 58 where these platforms are a minimum vertical thickness in a curled portion 85 spaced upwardly from the end of the bottom cover members 82. The curled portions 85 may receive the stiffening rods 86, as shown, merely for the purpose of adding longitudinal stiffness to the upper support cover members 83 at this leading side location.

The rotatable supporting rod 61 is journaled extending through the end cover members 84 approximately midway of the height of the side cover members 80 and spaced laterally therefrom. Further, the rotatable supporting rod 61 receives a cylindrical drum 87 within each of these supporting platforms, which drums are secured to the supporting rods 61 and rotatable therewith.

The drums 87 are spaced slightly vertically above the bottom cover members 82 and slightly laterally of the side cover members 80 having one of the ends of the flexible coverings 88 secured thereto as at 89. The flexible coverings 88 are preferably formed of a cloth material such as nylon or some form of canvas, and are wrapped around the drums 87, after which they extend to and around the curled end portions 85 of the upper support cover members 83, over the upper surface of the upper support cover members 83, again over the drums 87, over the guide flanges 81 on the side cover members 80, and ultimately through and secured to the back frame member 50.

The flexible coverings 88 are of a predetermined proper length so that when the body supporting platforms 58 are closely adjacent the back frame member 50, as shown in FIG. 7, these flexible coverings 88 are stretched slightly around the drum 87 over the curled end portions 85 of the upper support cover members 83, over these upper support cover members 83 and to the back frame member 50, as above described. Furthermore, the rotation of the rotatable supporting rods 61 and, therefore, the rotation of the drums 87, as well as the size of the drums 87, are predetermined so that as the supporting platforms 58 are moved laterally away from the back frame member 50, the flexible coverings 88 will be played out at exactly the proper speed for maintaining these flexible coverings taut over the upper support cover members 83 and to the back frame member 50.

Thus, as the supporting platforms 58 move laterally away from the back frame member 50, the flexible coverings 88 from surface means which will remain relatively laterally stationary with respect to the platform supporting frame 21, as far as any given point on these flexible coverings above the upper support cover members 83 is concerned, except for a vertically upward movement as caused by the angled position of these upper support cover members 83. This is true despite the lateral movement of the supporting platforms 58. Also, during the movement of these platforms toward the back frame member 50, the flexible coverings will be rerolled around the drums 87.

As before stated, all of the supporting platforms 57, 58, 59 and 60 are similar in construction and, therefore, operate in the identical manner described above with regard to the supporting platforms 58. Furthermore,

since the supporting platforms are arranged in oppositely laterally movable platform member assemblies 53 and 54, as shown in FIGS. 1, 2, 5 and 6, if a body or object is positioned laterally between the platform member assemblies 53 and 54 and these assemblies are moved laterally toward each other, the portions of the flexible coverings 88 that contact the body or object will remain stationary relative to the body or object after they have contacted the same and despite the continued lateral movement of the upper support cover members 83, so that there is no slidable movement between the body or object and the flexible coverings 88 but only a slight vertical lifting of the body or object by the angling of the upper support cover members 83 being moved laterally under the body or object.

It has been previously described that the horizontally extending foot members 23 and brace members 25 of the main supporting frame 20 are horizontally pivotally attached to the upright members 24, and also that the platform supporting frame 21 and its supporting arms 38 are vertically pivotally attached to each other as well as to the main lifting members 29 and auxiliary lifting members 30 telescoped within the upright members 24. The purpose of these pivotal connections is for providing the particular lift construction described semi-collapsible so as to occupy a minimum of floor space when in this semi-collapsed position.

In order to facilitate this semi-collapsing movement and return to the usable assembled position, the springs 90 are operably connected between the foot members 23 and the extreme end portions of the longitudinal frame member 26, with these springs normally maintaining the foot members 23 at their fully extended positions, as shown in FIG. 1, but permitting the inward pivotal movement of these foot members 23 from the positions of FIG. 1 to the positions of FIG. 4. Also, the cables 91 are secured to the foot members 23 spaced from the upright members 24 and extend around the pulleys 92 mounted on the longitudinal frame member 26 spaced longitudinally from the upright members 24.

Further, cables 91 then extend upwardly around the pulleys 93 mounted on the arms 94 spaced rearwardly from the upright members 24 and are connected to the ends of the vertically pivotal arms 95. As shown in FIGS. 1 and 2, arms 95 are pivotally mounted to the upright members 24 underlying the end frame members 47 and 48 of the platform supporting frame 21.

Thus, a vertically downward pivotal movement of the platform supporting frame 21 forces the pivotal arms 95 to pivot with respect to the upright members 24, thereby pulling the cables 91 upwardly and forcing the foot members 23 to pivot horizontally inwardly with respect to the upright members 24 and assume a semi-collapsed position, as shown in FIG. 4. When the platform supporting frame 21 is pivoted vertically upwardly from its position shown in FIG. 4 to its position shown in FIG. 3, the pivotal arms 95 are forced to pivot with respect to the upright members 24 by the springs 90 resiliently urging the foot members 23 horizontally to their open or extended positions, which forces the cables 91 downwardly and repositions the pivotal arms 95 in their substantially horizontal positions as shown in FIG. 3.

In use of the lift construction described and shown in the drawings for lifting a patient from a hospital bed and assuming the construction is in its collapsed storing position, as shown in FIGS. 4, 11 and 12, the gear reduction motor unit 44 is actuated preferably from the control panel 46 to begin clockwise rotation of the gears 35, as viewed in FIG. 11. This rotation of the gears 35 causes the auxiliary lifting members 30 through the racks 39 to move vertically upwardly, and since the gears 35 at this point are received in the cutouts 33 of the main lifting members 29, these main lifting members will not move despite the rotation of the gears 35.

As the auxiliary lifting members 30 move vertically up-

wardly, the supporting arms 38 are forced to pivot vertically, thereby pivoting the platform supporting frame 21 vertically to its horizontally extending position, as shown in FIGS. 1 and 3. As before described, during this vertical pivoting of the platform supporting frame 21, permitting the arms 95 to pivot toward their normal generally horizontally extending positions, the springs 90 force the horizontal foot members 23 and their brace members 25 to pivot horizontally outwardly to their extended positions, as shown in FIGS. 1, 2 and 3.

As the platform supporting frame 21 reaches its normal horizontally extending position, the engagement blocks 40 at the lower ends of the auxiliary lifting members 30 engage in the notches 42 at the lower ends of the main lifting members 29, thereby providing a fixed relative vertical positioning between the main lifting members 29 and the auxiliary lifting members 30. Further, a vertical upward movement of the auxiliary lifting members 30 forces the main lifting members 29 to likewise move vertically upwardly with members 30 so that the gears 35 begin to engage in the racks 34 on the main lifting members 29. This commences the vertical lifting movement of the platform supporting frame 21. Further, continued vertical movement of the main and auxiliary lifting members 29 and 30 causes the platform supporting frame 21 to continue to move vertically upwardly while remaining in its horizontally extending position and perfectly supported in such position by the supporting arms 38 in view of the fixed relative vertical positioning between the main and auxiliary lifting members 29 and 30.

After the platform supporting frame 21 has been raised to a desired vertical height in order that it may be moved over a hospital bed upon which a patient is positioned, the gear reduction motor unit 44 is reversed to lower the platform supporting frame 21 onto the bed, with the platform member assemblies 53 and 54 in their maximum laterally spread positions, as shown in FIG. 2. At this point, the head of the patient is laterally adjacent the head supporting platforms 57 and 59 while the body of the patient is laterally adjacent the body supporting platforms 58 and 60.

After the platform supporting frame 21 is positioned, as described in the foregoing, the gear reduction motor unit is stopped, and preferably from the same control panel 46, the motor 74 is actuated to rotate the worm screw 63. Rotation of screw 63 causes the worm followers 62 to move laterally, thereby moving the platform member assemblies 53 and 54 laterally toward each other and beneath the patient lying on the hospital bed.

This lateral movement of the platform member assemblies 53 and 54 also causes the rotation of the drums 87 through the gear 76, rack 77 and rotatable supporting rods 61. Thus, as the platform member assemblies 53 and 54 move laterally toward each other, the flexible coverings 88 thereof will be played out from the drums 87.

This will cause the portions of the flexible coverings 88 which contact the patient and ultimately support the patient to remain laterally stationary once such contact takes place, and even though the remaining portions of the platform member assemblies 53 and 54 continue to move laterally inwardly until the head supporting platforms 57 and 59 are nearly abutting in the position shown in FIG. 6 and the patient is fully supported on the platform member assemblies 53 and 54. Furthermore, although no relative lateral movement will take place between the patient and the flexible coverings 88, in view of the upper support cover members 83 being angled in wedge shape, as the remaining portions of the platform member assemblies 53 and 54 move under to fully support the patient, the patient will be moved slightly vertically upwardly.

After the patient is fully supported by the platform member assemblies 53 and 54, the motor 74 is stopped and the patient may be further lifted and transported on the lift construction merely by again actuating the gear re-

duction motor unit causing the platform supporting frame 21 to move vertically upwardly clear of the hospital bed. Also, the patient may be deposited on another bed or any other desired horizontal surface merely by lowering the platform supporting frame 21 and reversing the foregoing movement of the platform member assemblies 53 and 54.

The most important principle of the present invention, whether used in a lift construction for lifting patients from a hospital bed or for any other desired form of lift construction, is the fact that one or more lifting platforms are provided which are laterally movable but have upper surface means thereon relatively laterally movable in the opposite lateral direction and at the same lateral speed, so that any portion on the surface means contacting a body or object remains substantially stationary with respect to the body or object while the lifting platforms move laterally. Furthermore, by providing the upper portions of the lifting platforms which directly support the surface means angled laterally upwardly away from the body or object under which the platform members are being laterally moved, the body or object is moved vertically upwardly.

In this manner, the lifting platforms can be moved under a body or object to be supported or lifted and absolutely no slidable movement takes place between the surface means and the body or object. This is extremely important when severely injured patients are being lifted from a hospital bed and where any slight slidable movement between the surface means contacting the patient and the patient might cause severe pain or injury. Also, this same principle may be applied for lifting fragile objects which might be damaged from such slidable movement.

In the second embodiment form of the lift construction of the present invention for lifting patients from hospital beds, the only change in construction concerns the supporting platforms of the platform member assemblies. Shown in FIG. 17 is a view of one of the body supporting platforms 158 similar to FIG. 7.

In this second embodiment construction, the flexible coverings 188 are still wrapped around the drums 187 and extend over the upper support cover members 183. In this case, however, rather than securing the other ends of the flexible coverings 188 to any frame members, the drums 196 are positioned spaced vertically above the drums 187 having the other ends of the flexible coverings 188 wrapped around and secured thereto as at 197.

The drums 196 are mounted on the rotatable supporting rods 198 and the rotatable supporting rods 198 are preferably geared to the rotatable supporting rods 161 which rotatably mount the drums 187, but rods 198 and drums 196 are rotatable in an opposite direction. Thus, as the flexible coverings 188 are played outwardly from the drums 187, they are taken up on the drums 196 so that they will remain at all times taut over the upper support cover members 183.

Finally, in this second embodiment, the side cover members 180 extend upwardly over and spaced from the drums 196 in order to enclose these moving drums. Again, all of the supporting platforms are substantially identical except possibly for lateral lengths, and these supporting platforms are mounted similar to the first embodiment on the platform supporting frame for the same use as in the first embodiment.

Thus, in this second embodiment construction of the supporting platforms, the only difference is that rather than having the end of the flexible coverings secured to a stationary frame member as these flexible coverings are played out from one drum, the opposite ends are taken up by a second drum. The relative movements of the flexible coverings with respect to a particular patient being lifted and supported on a lift construction is, however, identically the same, and in this embodiment as in the first embodiment, there is no slidable movement be-

tween the flexible coverings and the patient being lifted and supported even though the supporting platforms are moving laterally beneath the patient.

Although in the foregoing, the embodiments of the lift construction of the present invention have been described and shown as using various gear and rack assemblies, electric motors and worm screw and worm follower assemblies for the movement of the platform supporting frame 21 on the main supporting frame 20 and the movement of the platform means 22 on the platform supporting frame 21, it should be understood that the broad principles of the present invention can be carried out by various other means, such as hydraulic mechanisms. It is not intended, therefore, to limit the broader principles of the present invention to the particular mechanical mechanisms shown nor to limit the broad principles of the present invention to the particular form of lift construction shown.

In the foregoing description, certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom, because such words are used for descriptive purposes herein, and are intended to be broadly construed.

Moreover, the embodiments of the improved construction illustrated and described herein is by way of example, and the scope of the present invention is not limited to the exact details of the construction shown.

Having now described the invention, the construction, operation and use of preferred embodiments thereof, and the advantageous new and useful results obtained thereby; the new and useful construction and reasonable mechanical equivalents thereof obvious to those skilled in the art are set forth in the appended claims.

I claim:

1. Lift construction including a stationary frame member having generally horizontally extending supporting legs, the supporting legs being pivotally connected to the stationary frame for horizontal pivotal movement between extended and collapsed positions, a normally generally horizontal frame member, support means mounting the horizontal frame member selectively vertically movable on the stationary frame member, pivot means mounting the horizontal frame member on the stationary frame member pivotally vertically between an extended generally horizontally extending position and a collapsed downwardly angled position, selectively operable control means operably connected to the stationary frame supporting legs and horizontal frame member for simultaneously selectively moving said legs and frame member between extended and collapsed positions, laterally spaced platform members mounted on the horizontal frame member laterally movable toward and away from each other at a given lateral speed, the platform members having opposed longitudinally extending leading edges, flexible cover means extending laterally over each of the platform member leading edges and over at least a portion of each of the platform members, the flexible cover means having lateral lengths substantially greater than the respective platform member portions, storage means operably connected to each of the cover means and synchronized with the lateral movement of the platform members for moving the cover means relatively laterally over the respective platform member leading edges and said portions in directions opposite to the lateral movement of the respective platform members and at substantially the same lateral speed as the lateral movement of the respective platform members, and the cover means remaining laterally over the respective platform member leading edges and said portions during the lateral movement of the platform members; whereby the portions of the cover means on each of the platform members contacting an object to be supported remain stationary laterally relative to the object while the platform members move laterally together beneath the object.

2. Lift construction including a frame member, lat-

erally spaced platform members mounted on the frame member laterally movable toward and away from each other at given lateral speeds, the platform members having opposed longitudinally extending leading edges, first and second storage members for each platform member, flexible cover means each having first and second ends mounted on each of the storage members and extending laterally over each of the platform member leading edges and over at least a portion of each of the platform members, the flexible cover means having lateral lengths substantially greater than the respective platform member portions, the cover means first ends being connected to the respective first storage members extending over the respective platform member leading edges and said portions, the cover means second ends being connected to the respective second storage members, means mounting the storage members for moving the cover means laterally over the respective platform member leading edges and said portions in a direction opposite to the lateral movement of the respective platform members and at substantially the same lateral speed as the lateral movement of the respective platform members, the cover means remaining on the respective storage members and over the respective platform member leading edges and said portions during the lateral movement of the platform members, and means operably connected to the first and second storage members for maintaining the cover means taut over the respective platform member leading edges and said portions during the lateral movement of the platform members; whereby the portions of the cover means on each of the platform members contacting an object to be supported remain stationary laterally relative to the object while the platform members move laterally together beneath the object.

3. Lift construction including a frame member, laterally spaced platform members mounted on the frame member laterally movable toward and away from each other at given lateral speeds, the platform members having opposed longitudinally extending leading edges, flexible cover means having first and second ends extending laterally over each of the platform member leading edges and over at least a portion of each of the platform members, the flexible cover means having lateral lengths substantially greater than the respective platform member portions, first and second storage drums mounted rotatable on each of the platform members and movable laterally with the platform members, the cover means first ends being connected to the respective first storage drums extending over the respective platform member leading edges and said portions, the cover means second ends being connected to the respective second storage drums, means operably connected to the first and second storage drums rotating the drums during every lateral movement of the respective platform members and in synchronization with said platform member lateral movement for moving the cover means relatively laterally over the respective platform member leading edges and said portions in directions opposite to the lateral movement of the respective platform members and at substantially the same lateral speed as the lateral movement of the respective platform members, and the cover means remaining laterally over the respective platform member leading edges and said portions during the lateral movement of the platform members; whereby the portions of the cover means on each of the platform members contacting an object to be supported remain stationary laterally relative to the object while the platform members move laterally together beneath the object.

4. Lift construction including a stationary frame member, a generally horizontal frame member, means mounting the horizontal frame member selectively vertically movable on the stationary frame member, laterally spaced platform members mounted on the horizontal frame member laterally movable toward and away from each other at given lateral speeds, the platform members having op-

posed longitudinally extending leading edges, flexible cover means extending laterally over each of the platform member leading edges and over at least a portion of each of the platform members, the flexible cover means having lateral lengths substantially greater than the respective platform member portions, storage means including a drum mounted rotatable on each of the platform members and movable laterally with the platform members, the rotatable drums being mounted on longitudinally extending shafts, gears mounted on the shafts, racks mounted on the stationary frame member extending laterally and being operably engaged with the gears rotating the drums in synchronization with the lateral movement of the platform members, the operable connection of the racks and gears rotating the drums and moving the cover means relatively laterally over the respective platform member leading edges and said portions in directions opposite to the lateral movement of the respective platform members and at substantially the same lateral speed as the lateral movement of the respective platform members, and the cover means remaining laterally over the respective platform member leading edges and said portions during the lateral movement of the platform members; whereby the portions of the cover means on each of the platform members contacting an object to be supported remain stationary laterally relative to the object while the platform members move laterally together beneath the object.

5. Lift construction including a platform member, frame means mounting the platform member for lateral movement relative to the frame means at given lateral speeds, surface means operably connected to the frame means and extending over at least a portion of the platform member, and means mounting the surface means on the frame means relatively laterally movable over the platform member portion in a direction opposite to the lateral movement of the platform member for every lateral movement of the platform member relative to the frame means and at substantially the same lateral speed as the lateral movement of the platform member; whereby the portions of the surface means contacting an object to be supported remain stationary laterally relative to the object while the platform member moves laterally beneath the object.

6. Lift construction including a platform member, frame means mounting the platform member for lateral movement relative to the frame means at given lateral speeds, flexible cover means operably connected to the frame means and extending over at least a portion of the platform member and having a lateral length substantially greater than said platform member portion, means mounting the cover means on the frame means relatively laterally movable over the platform member portion in a direction opposite to the lateral movement of the platform member for every lateral movement of the platform member relative to the frame means and at substantially the same lateral speed as the lateral movement of the platform member, and the cover means remaining laterally over the platform member portion during every lateral movement of the platform member relative to the frame means; whereby the portions of the cover means contacting an object to be supported remain stationary laterally relative to the object while the platform member moves laterally beneath the object.

7. Lift construction including a platform member, frame means mounting the platform member for lateral movement relative to the frame means at given lateral speeds, the platform member having a longitudinally extending leading edge, flexible cover means operably connected to the frame means and extending laterally over the platform member leading edge and over at least a portion of the platform member, the cover means having a lateral length substantially greater than the platform member portion, means mounting the cover means on the frame means relatively laterally movable over the plat-

form member leading edge and said portion in a direction opposite to the lateral movement of the platform member for every lateral movement of the platform member relative to the frame means and at substantially the same lateral speed as the lateral movement of the platform member, and the cover means remaining laterally over the platform member leading edge and said portion during every lateral movement of the platform member relative to the frame means; whereby the portions of the cover means contacting an object to be supported remain stationary laterally relative to the object while the platform member moves laterally beneath the object.

8. Lift construction including a platform member, frame means mounting the platform member for lateral movement relative to the frame means at given lateral speeds, the platform member having a longitudinally extending leading edge and an angled upper surface extending laterally and upwardly from said leading edge, flexible cover means operably connected to the frame means and extending laterally over at least the platform member leading edge and angled upper surface, the cover means having a lateral length substantially greater than the platform member upper surface, means mounting the cover means on the frame means relatively laterally movable over the platform member leading edge and upper surface in a direction opposite to the lateral movement of the platform member for every lateral movement of the platform member relative to the frame means and at substantially the same lateral speed as the lateral movement of the platform member, and the cover means remaining over the platform member leading edge and upper surface during every lateral movement of the platform member relative to the frame means; whereby the portions of the cover means contacting an object to be supported remain stationary laterally relative to the object while the platform member moves laterally beneath the object.

9. Lift construction including a platform member, frame means mounting the platform member for lateral movement relative to the frame means at given lateral speeds, the platform member having a longitudinally extending leading edge, a storage member on the frame means, flexible cover means mounted on the storage member and extending laterally over the platform member leading edge and over at least a portion of the platform member, the cover means having a lateral length substantially greater than the platform member portion, means mounting the storage member on the frame means for moving the cover means laterally over the platform member leading edge and said portion in a direction opposite to the lateral movement of the platform member for every lateral movement of the platform member relative to the frame means and at substantially the same lateral speed as the lateral movement of the platform member, and the cover means remaining on the storage member and over the platform member leading edge and said portion during every lateral movement of the platform member relative to the frame means; whereby the portions of the cover means contacting an object to be supported remain stationary laterally relative to the object while the platform member moves laterally beneath the object.

10. Lift construction as defined in claim 9 in which the cover means has a first and second end; in which the cover means first end is connected to the storage member on the frame means with the cover means extending over the platform member leading edge and said portion; and in which the cover means second end is mounted stationary on the frame means and the platform member moves laterally relative to said second end and the frame means.

11. Lift construction as defined in claim 9 in which the cover means has a first and second end; in which the storage member is a first storage member on the frame means and there is a second storage member on the frame means; in which the cover means first end is connected to the

first storage member extending over the platform member leading edge and said portion; in which the cover means second end is connected to the second storage member; and in which the first and second storage members have means operably connected thereto for maintaining the cover means taut over the platform member leading edge and said portion during the lateral movement of the platform member relative to the frame means.

12. Lift construction as defined in claim 9 in which the platform member portion has a laterally extending upward angled upper surface extending from the platform member leading edge laterally and upwardly.

13. Lift construction including a frame member, a platform member laterally movable on the frame member at given lateral speeds, surface means extending laterally over at least a portion of the platform member, and rotatable storage means on the frame member operably connected to the surface means and synchronized rotatable with the lateral movement of the platform member on the frame member for moving the surface means relatively laterally over the platform member portion in a direction opposite to the lateral movement of the platform member for every lateral movement of the platform member on the frame member and at substantially the same lateral speed as the lateral movement of the platform member; whereby the portions of the surface means contacting an object to be supported remain stationary laterally relative to the object while the platform member moves laterally beneath the object.

14. Lift construction as defined in claim 13 in which the storage means is a drum mounted rotatable on the platform member and movable laterally with the platform member on the frame member; in which the surface means has a first and second end; in which the surface means first end is connected to the rotatable drum and extends over the platform member portion; and in which the surface means second end is secured stationary on the frame member.

15. Lift construction as defined in claim 13 in which the storage means is a rotatable drum mounted on the platform member and movable laterally with the platform member on the frame member; in which the surface means has a first and second end; in which the surface means first end is connected to the rotatable drum with the surface means extending over the platform member portion; in which a second rotatable drum is mounted on the platform member movable laterally with the platform member on the frame member; in which the surface means second end is connected to the second rotatable drum; and in which the storage means rotatable drum and second rotatable drum have means operably connected thereto for rotating said drums and maintaining the surface means relatively laterally movable over the platform member portion during every lateral movement of the platform member relative to the frame member.

16. Lift construction as defined in claim 13 in which the platform member portion has a longitudinally extending leading edge; in which the platform member portion has a laterally extending upward angled upper surface extending from the leading edge laterally and upwardly; and in which the surface means extends laterally from the rotatable storage means over the platform member portion leading edge and over the platform member portion angled surface.

17. Lift construction including a frame member, laterally spaced platform members mounted on the frame member laterally movable toward and away from each other at given lateral speeds, surface means extending laterally over at least a portion of each of the platform members and remaining over said platform member portions at all times, and means mounting the surface means relatively laterally movable over said each platform member portion in a direction opposite to the lateral movement of said each platform member during every lateral movement of said each platform member relative to the

frame member and at substantially the same lateral speed as the lateral movement of said each platform member; whereby the portions of the surface means on each of the platform members contacting an object to be supported remain stationary laterally relative to the object while the platform members move laterally together beneath the object.

18. Lift construction including a frame member, laterally spaced platform members mounted on the frame member laterally movable toward and away from each other at given lateral speeds, the platform members having opposed longitudinally extending leading edges, flexible cover means extending laterally over each of the platform member leading edges and over at least a portion of each of the platform members, the flexible cover means having lateral lengths substantially greater than the respective platform member portions, means mounting the cover means relatively laterally movable over said each platform member leading edge and said portion in a direction opposite to the lateral movement of said each platform member during every lateral movement of said each platform member relative to the frame member and at substantially the same lateral speed as the lateral movement of said each platform member, and the cover means remaining laterally over said each platform member leading edge and said portion at all times and during the lateral movement of the platform members; whereby the portions of the cover means on each of the platform members contacting an object to be supported remain stationary laterally relative to the object while the platform members move laterally together beneath the object.

19. Lift construction as defined in claim 18 in which each of the platform member portions has a laterally extending upward angled upper surface extending from the platform member leading edge laterally and upwardly.

20. Lift construction including a frame member, laterally spaced platform members mounted on the frame member laterally movable relative to the frame member toward and away from each other at given lateral speeds, the platform members having opposed longitudinally extending leading edges, a storage member for each platform member, flexible cover means mounted on each of the storage members and extending laterally over each of the platform member leading edges and over at least a portion of each of the platform members, the flexible cover means having lateral lengths substantially greater than the respective platform member portions, means mounting the storage members for moving the cover means laterally over the respective platform member leading edges and said portions in a direction opposite to the lateral movement of the respective platform members during every lateral movement of the respective platform member relative to the frame member and at substantially the same lateral speed as the lateral movement of the respective platform members, and the cover means remaining on the respective storage members and over the respective platform member leading edges and said portions at all times and during the lateral movement of the platform members; whereby the portions of the cover means on each of the platform members contacting an object to be supported remain stationary laterally relative to the object while the platform members move laterally together beneath the object.

21. Lift construction as defined in claim 20 in which the cover means have first and second ends; in which the cover means first ends are connected to the respective storage members on the frame member with the cover means extending over the respective platform member leading edges and said portions; and in which the cover means second ends are mounted stationary on the frame member and the platform members move laterally relative to said second ends and the frame member.

22. Lift construction including a frame member, laterally spaced platform members mounted on the frame

member laterally movable relative to the frame member toward and away from each other at given lateral speeds, the platform members having opposed longitudinally extending leading edges, flexible cover means extending laterally over each of the platform member leading edges and over at least a portion of each of the platform members, the flexible cover means having lateral lengths substantially greater than the respective platform member portions, storage means operably connected to each of the cover means and synchronized with the lateral movement of the platform members for moving the cover means relatively laterally over the respective platform member leading edges and said portions in directions opposite to the lateral movement of the respective platform members during every lateral movement of the respective platform members relative to the frame member and at substantially the same lateral speed as the lateral movement of the respective platform members, and the cover means remaining laterally over the respective platform member leading edges and said portions at all times and during the lateral movement of the platform members; whereby the portions of the cover means on each of the platform members contacting an object to be supported remain stationary laterally relative to the object while the platform members move laterally together beneath the object.

23. Lift construction as defined in claim 22 in which the storage means include a drum mounted rotatable on each of the platform members and movable laterally with the platform members relative to the frame member; in which the cover means are connected to the respective rotatable drums extending over the respective platform member leading edges and said portions at all times; in which the rotatable drums rotate during every lateral movement of the respective platform members relative to the frame member and move the cover means over the respective platform member leading edges and said portions; and in which the rotation of the rotatable drums is synchronized with the lateral movement of the platform members.

24. Lift construction as defined in claim 23 in which the cover means have first and second ends; in which the cover means first ends are connected to the respective rotatable drums; and in which the cover means second ends are secured stationary on the frame member.

25. Lift construction including a stationary frame member, a generally horizontal frame member, means mounting the horizontal frame member selectively vertically movable on the stationary frame member, laterally spaced platform members mounted on the horizontal frame member laterally movable relative to the horizontal frame member toward and away from each other at given lateral speeds, the platform members having opposed longitudinally extending leading edges, flexible cover means extending laterally over each of the platform member leading edges and over at least a portion of each of the platform members, the flexible cover means having lateral lengths substantially greater than the respective platform member portions, storage means operably connected to each of the cover means and synchronized with the lateral movement of the platform members relative to the horizontal frame member for moving the cover means relatively laterally over the respective platform member leading edges and said portions in directions opposite to the lateral movement of the respective platform members during every lateral movement of the respective platform members relative to the horizontal frame member and at substantially the same lateral speed as the lateral movement of the respective platform members, and the cover means remaining laterally over the respective platform member leading edges and said portions at all times and during the lateral movement of the platform members; whereby the portions of the cover means on each of the platform members contacting an object to be supported remain

stationary laterally relative to the object while the platform members move laterally together beneath the object.

26. Lift construction as defined in claim 25 in which the storage means include a drum mounted rotatable on each of the platform members and movable laterally with the platform members relative to the horizontal frame member; in which the cover means are connected to the respective rotatable drums extending over the respective platform member leading edges and said portions at all times; in which the rotatable drums rotate during every lateral movement of the respective platform members relative the horizontal frame member and move the cover means over the respective platform member leading

edges and said portions; and in which the rotation of the rotatable drums is synchronized with the lateral movement of the platform members.

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