May 8, 1956 W. C. McMAHAN 2,744,805

LIFT MECHANISM FOR EXTENDING A HORIZONTAL SUPPORT

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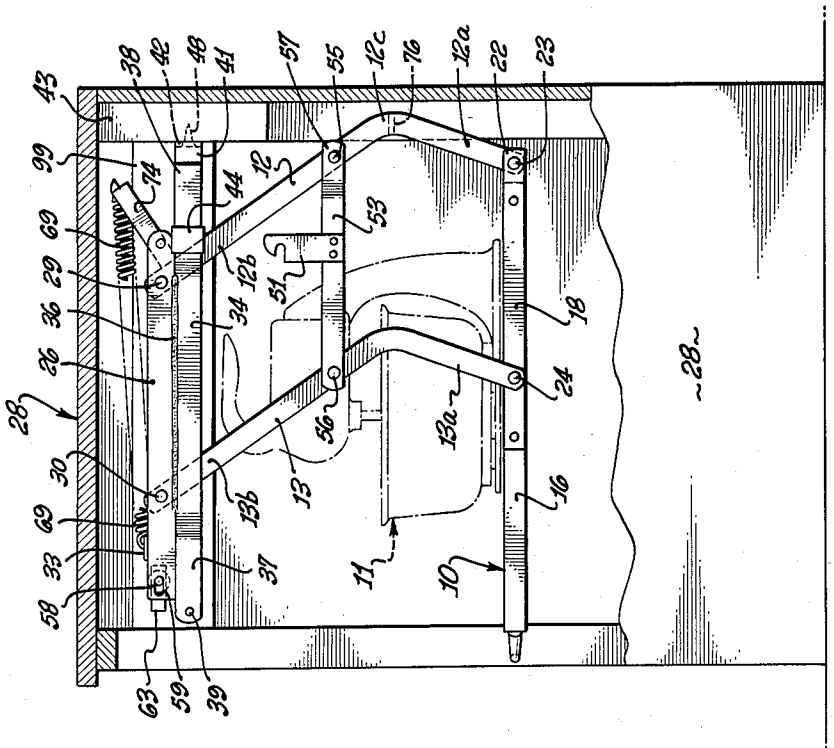


Fig. 2.

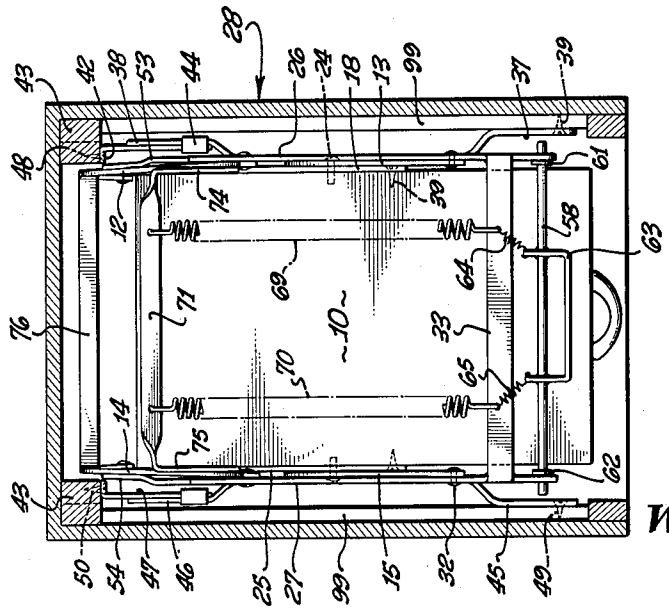


Fig. 1.

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Fig. 3.

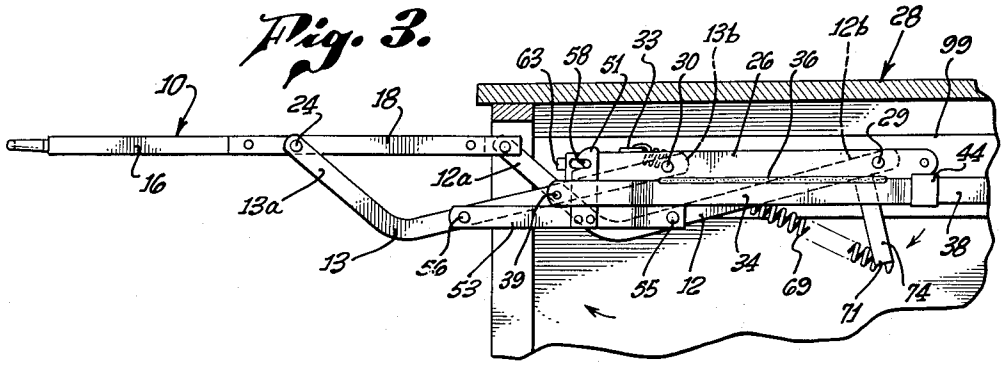


Fig. 5.

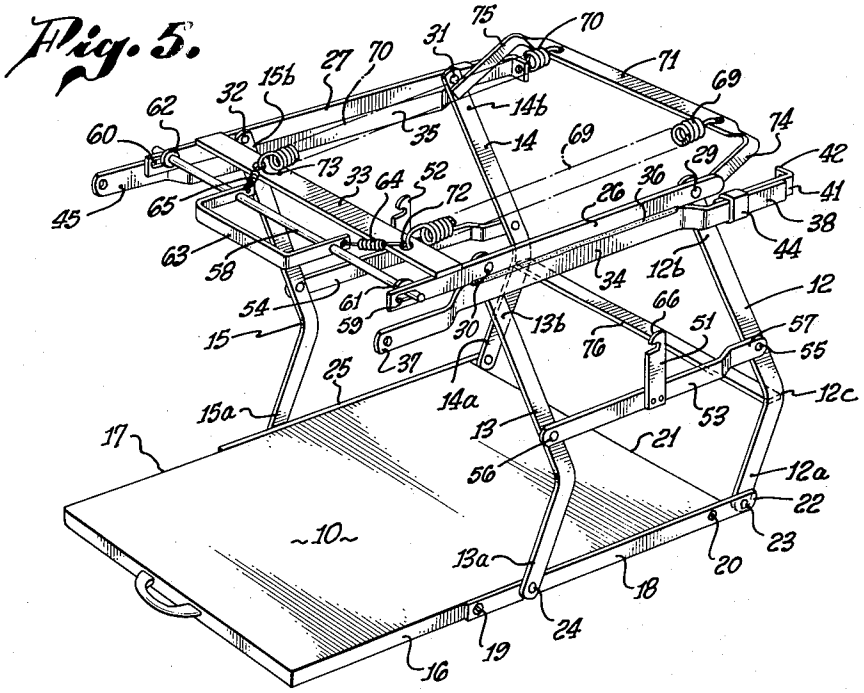
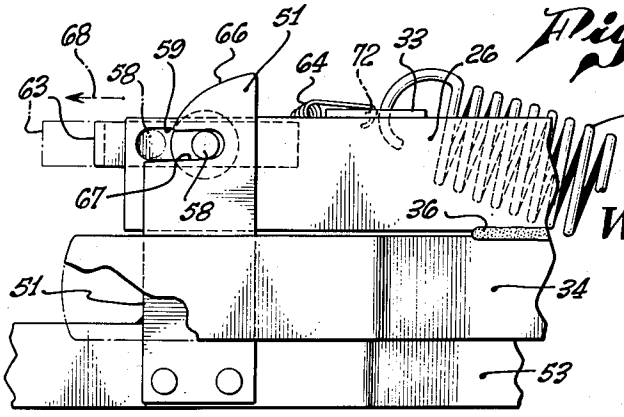


Fig. 4.



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LIFT MECHANISM FOR EXTENDING A HORIZONTAL SUPPORT

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Application November 24, 1952, Serial No. 322,221

6 Claims. (Cl. 312—27)

This invention relates to a lift mechanism, such as is adapted to be incorporated in desks for mounting typewriters, or in kitchen cabinets for mounting appliances and the like.

Such lifts commonly employ a shelf that may be manually moved from an inactive position below the top of the desk or cabinet to an active position projecting laterally of the desk or cabinet, and adjacent the top. One such mechanism is disclosed and claimed in a prior application in the name of Walter C. McMahan, Serial No. 212,535, filed February 24, 1951, now Patent No. 2,676,077, issued April 20, 1954, and entitled Typewriter Lift Mechanism, of which the present application is a continuation-in-part.

It is an object of the present invention to improve, in general, such lift mechanisms.

It is another object of this invention to provide a simple mechanism of this character whereby the platform may be elevated to a position in which it is most accessible.

It is still another object of this invention to make it possible to fit the mechanism into cabinets of slightly different size. For this purpose, the supporting structure incorporates an adjustable element.

It is still another object of this invention to provide a support of this character, which, when elevated, is positively and automatically restrained against inadvertent movement, all in an improved and simplified manner, and in which the restraint is easily manually released.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of one embodiment of the invention. For this purpose, there is shown a form in the drawings accompanying and forming part of the present specification. The form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of this invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a top view of a device incorporating the present invention, the cabinet in which the device is accommodated being shown in section;

Fig. 2 is a vertical elevation of the apparatus in the lowered position as illustrated in Fig. 1, the cabinet also being shown in section;

Fig. 3 is a view similar to Fig. 2, the apparatus being shown in raised position, the cabinet in which the device is accommodated being illustrated as a fragmentary section;

Fig. 4 is an enlarged fragmentary view of the locking mechanism in the position of Fig. 3, the dot and dash lines illustrating the manner in which the mechanism is released; and

Fig. 5 is a pictorial view of the complete apparatus, illustrated in lowered position.

A platform **10**, of any suitable form, forms the base upon which an appliance, or the like, may rest. An appliance, such as an electric mixer **11**, is illustrated in dot and dash lines in Fig. 2. The platform may serve to support any other device as, for example, a typewriter or the like beneath a desk top.

The platform **10** is suspended by the aid of parallelogram linkage comprising four similar arms or links **12**, **13**, **14**, and **15**. The lower ends of each of the links are mounted at opposite sides **16** and **17** of the platform **10**. For this purpose, a metal strip **18** is secured to the side **16** by the aid of wood or other appropriate screws **19** and **20**. The strip **18** projects rearwardly beyond the rear surface **21** of the platform **10**. The end of the link **12** is pivotally connected to the inside of the rearwardly projecting end **22** of the strip **18**, as by the aid of a suitable pin **23**. The end of the link **13** is similarly pivotally mounted to the outside of the strip **18** by the aid of a pin **24**. The links **14** and **15** are similarly pivotally connected to the platform **10** at the other side **17** thereof. For this purpose, a strip or plate **25** is provided.

The upper ends of the links **12**, **13**, **14**, and **15** are mounted on a rigid stationary frame structure comprising bars **26** and **27** that are, in turn, secured to the cabinet **28** in a manner to be hereinafter more fully described.

For pivotally mounting the upper ends of the links **12** and **13** to the bar **26**, pins **29** and **30** are provided. Similarly, pins **31** and **32** pivotally mount the upper ends of links **14** and **15** to the bar **27**. A brace **33** joins the parallel bars **26** and **27** and cooperates therewith to form a rigid construction. The ends of the brace are secured, as by welding, to the forward portion of the bars **26** and **27**.

The spacing between the pins **23** and **24**, mounting the lower ends of the links **12** and **13**, substantially precisely corresponds to the spacing between the pins **29** and **30** mounting the upper ends of the links **12** and **13** to the bar **26**. Similarly, the spacing between the pins mounting the lower ends of the links **14** and **15** corresponds to the spacing between the pins **31** and **32** mounting the upper ends of the links **14** and **15** to the frame member **27**. The axes of the pins **29**, **30**, **31**, and **32** mounting the links **12**, **13**, **14**, and **15** to the frame **26**, **27**, and platform **10** respectively extend parallel to each other end. By virtue of these arrangements, a swinging parallelogram suspension for the platform **10** is provided, in which the platform **10** is optionally positionable in spaced parallel planes. The platform **10** remains horizontal for all positions thereof upon proper initial orientation of the device.

For mounting the frame members **26** and **27** within the cabinet **28**, supporting members **34** and **35** are provided. The supporting members **34** and **35** are respectively disposed immediately below the frame members **26** and **27**. The frame members **26** and **27** and the supporting members **34** and **35** are respectively secured together, as by the aid of appropriate welds **36** (Figs. 4 and 5).

The ends **37** and **38** of the member **34** are offset in a direction outwardly of the frame member **26** (see, also, Fig. 1). An appropriate screw **39** passes through an appropriate aperture in the offset end **37** to secure that end of the supporting member to a cleat **99** immediately below the cabinet top. The other offset portion **38** of the supporting member **36** adjustably mounts a reversible bracket **41** (Figs. 1 and 5). The bracket **41** has a flange **42** that may extend inwardly or outwardly, depending upon the manner in which the structure is best adapted to be secured to the cabinet. In the present instance, the flange **42** abuts a vertical stud or brace **43** in the rear corner of the cabinet **28**.

The bracket **41** is also adjustable longitudinally of the supporting member **34** so that the supporting member **34** can conform within limits to the size requirements of the cabinet in which it is installed. For this purpose, and

to provide for a reversal of the bracket **41**, a strap **44** (see, also, Fig. 5) is carried by the bracket **41** and defines therewith a space receiving the offset end **38** and the bracket **41**. The strap **44** may have its ends extending over the edges of the bracket **41** and welded thereto. Accordingly, the mounting bracket **41** is slidably movable longitudinally of the offset end **38** and confined for such movement by the aid of the member **44**. Furthermore, the bracket can be reversed in order to reorient the flange **42**.

The left-hand supporting member **35** cooperates with the frame member **27** in a precisely symmetrical manner. This supporting member **35** has offset ends **45** and **46**, the rearward offset portion **46** adjustably mounting a bracket **47** similar to bracket **41**. Appropriate screws **48**, **49**, and **50**, together with the screw **39**, properly mount the structure in the cabinet recess.

The platform **10** is swingable from the lowered position illustrated in Fig. 2 to the raised position illustrated in Fig. 3, the links **12**, **13**, **14**, and **15** rotating about their upper pivotal mountings provided by pins **29**, **30**, **31**, and **32**.

The configuration of each of the links **12**, **13**, **14**, **15** is such that in the elevated position of Fig. 3, maximum height of the platform **10** can be achieved. Thus, in this position, those ends **12***a*, **13***a*, **14***a*, **15***a* of the links attached to platform **10** all extend slightly above the level of those ends **12***b*, **13***b*, **14***b*, **15***b* of the links attached to the frame members **26** and **27**. The platform **10** thus lies close to the top surface of the cabinet **28**.

To permit this function, the links **12**, **13**, **14**, **15** are of a particular configuration, wherein they extend generally on one side of a straight line joining the pivotal mountings **23**—**29**, **24**—**30**, etc. of each link. In the present instance, the links are of angled configuration, the ends **12***a*, **12***b* of link **12**, for instance, forming an obtuse angle at an apex **12***c*. Optionally, the links **12**, **13**, **14**, **15** could be in the form of an arc. By virtue of this configuration, there is clearance between the links and the mechanism supported by the frame members **26** and **27** to permit the platform **10** to reach the elevated position of Fig. 3.

Provisions are made to permit the ends **12***a*, **14***a* of rear links **12** and **14** to pass the forward links **13** and **15** respectively as these links move from the position of Fig. 2 to the position of Fig. 3. For this purpose, the distance between the outer surfaces of ends **12***a* and **14***a* is substantially less than the distance between the inner surfaces of the links **13** and **15**, so that the inner links **12** and **14** can extend between the outer links **13** and **15** (see Fig. 3).

These relative spacings are obtained because the ends **12***a* and **14***a* are mounted inwardly of the strips **18** and **25**, while the ends **13***a* and **15***a* are mounted exteriorly thereof.

A brace **76** connects the rear links **12** and **14** together and also serve to maintain a rigid and slightly converging configuration between links **12** and **14**. This brace **76** is joined as by welding to the respective apices of the bends of the rear links.

In order to maintain the platform **10** in an elevated position, hook or catch members **51** and **52** are provided. These catch members extend vertically from braces **53** and **54**. Brace **53** extends substantially parallel to the frame member **26** and the strip **18** and joins the links **12** and **13** midway of their lengths and above the bends respectively. The brace **53** is pivoted to the link **12** by the aid of a pin **55**, and is pivoted to the link **13** by the aid of a pin **56**. The brace **54** is similarly secured.

As illustrated in Figs. 3 and 5, and by a comparison between them, the lower portion of the rear link **12** must also cross the brace **53** in reaching the elevated position. In order to permit this, the end **57** of the brace that is secured to the rear link **12** is inwardly offset.

The hook or catch **51** is rigidly secured to the brace **53** in a suitable manner. Upon the platform **10** being moved to the elevated position, the catch **51** is moved into latching relationship with the lock bar **58**. This lock bar **58** is carried by the frame members **26** and **27**. The ends of the bar **58** are mounted in parallel elongate slots **59** and **60** in the ends of the frame members **26** and **27** respectively. Collars **61** and **62** prevent the bar **58** from moving longitudinally. The bar **58** is thus movable in a direction transverse to its axis and in a plane extending longitudinally of both of frame members **26** and **27**.

A U-shaped handle **63** is mounted upon the lock bar **58** for manipulation thereof. For this purpose, the bar **58** extends through apertures in the arms of the handle respectively. Tension springs **64** and **65** are secured to the ends of the handle and the brace **33** as by suitable apertures receiving end turns of the springs. These springs **64**, **65**, as viewed in Fig. 4, normally urge the handle and lock bar **58** toward the right in their guiding slots **59** and **60**. As the platform **10** reaches the elevated position illustrated in Fig. 3, the latch or catch **51** engages the lock bar **58** near its end to move the lock bar against the force of the springs **64** and **65** and toward the left, as viewed in Fig. 4. For this purpose, the catch **51** has an upper cam surface **66**. A slot **67** in the catch **51** receives the lock bar **58** upon further movement of the catch **51** in an upward direction. This latching recess **67** adjoins the cam surface **66**. The lock bar **58** is urged into the recess **67** by the operation of the tension springs **64** and **65** after the cam surface **66** is no longer effective.

Downward movement of the platform **10** is then prevented by engagement of the lock bar **58** with the hook **51**. Further upward movement from the elevated position is similarly limited. The latch **52** operates in an entirely symmetrical manner and simultaneously with the catch **51**. The catches **51** and **52** pass inwardly of the offset ends **37** and **45** of the supporting members **34** and **35** respectively upon the platform reaching the elevated position.

In order to release the mechanism so that it may be moved to the lowered position, the handle **63** is moved outwardly. This handle is conveniently located, as shown most clearly in Fig. 1, and is readily available for manipulation by the user. To release the mechanism, the handle **63** is moved outwardly in the direction of the arrow **68**, illustrated in Fig. 4, to the dotted line position therein illustrated. The lock bar **58**, mounting the handle **63**, is similarly moved outwardly to the dotted line position, where it is freed from engagement with the upper wall of the slot **67**. Accordingly, the catches **51** and **52** can pass downwardly with respect to the latch member **58**, and the entire mechanism can be retracted.

In order to maintain stable positioning of the mechanism and to assist in lowering and raising the platform **10**, an eccentric spring construction is provided. For this purpose, heavy tension springs **69** and **70** are provided. These springs **69**, **70** have ends secured to a U-shaped bracket **71** of twisted configuration. This bracket **71** also cooperates with the brace **33** to maintain a rigid configuration with the frame members **26** and **27**. The other ends of the springs **69** and **70** are secured to the brace **33**. Conveniently, the springs **69** and **70** may pass through those apertures **72** and **73** of the brace **33** that also mount the tension springs **64** and **65** respectively.

The arms **74** and **75** of the U-shaped bracket are secured to the rear links **12** and **14** respectively at a place spaced from, but close to, the pivoted pins **29** and **31**. Accordingly, the bracket **71** is arcuately movable along with the links **12** and **14**.

In the position illustrated in Fig. 2, the spring **69**, for instance, extends on one side of the pivot pin **29** about which one end of the spring **69** is arcuately movable. In this position, the spring **69** urges the construction in a counterclockwise direction. The spring **70** operates similarly. This corresponds to maintaining the apparatus in the lowered position. As the device is rotated, however,

the place of attachment of the ends of the springs 69 and 70 moves with respect to the pivot pin 29 and the place of attachment of the other ends of the springs 69 and 70. After an initial movement corresponding to further tensioning of the springs 69 and 70, the springs 69 and 70 pass the pivot pins 29 and 31 respectively and then extend on the opposite side of the pins 29 and 31 about which the ends of the springs 69 and 70 are arcuately movable. Accordingly, the springs 69 and 70 now urge the mechanism in a clockwise direction corresponding to elevated position of the mechanism. The tension springs 69 and 70 thus assist in moving the mechanism and also to maintain it in stable position.

The inventor claims:

1. In a lift mechanism: a pair of frame members; a pair of rear links pivoted on a common axis by said frame members respectively; a pair of forward links pivoted on a common axis spaced from said first axis and by said frame members respectively; a support; means pivotally connecting the links to the support; those ends of the links attached to the support being forwardly inclined so that when said support is elevated to the level approximating that of said frame members, clearance is provided between said rear links and the forward ends of said frame members; said frame members having longitudinally extending slots at their forward ends; a latch bar extending between said frame members and guidingly received in said slots; a handle carried by the bar substantially centrally thereof; resilient means urging said bar rearwardly of said frame members; and a hook member engaging said bar upon movement of said support to an elevated position, said hook member being carried by said links.

2. In a lift mechanism: a pair of frame members; a pair of rear links pivoted on a common axis by said frame members respectively; a pair of forward links pivoted on a common axis spaced from said first axis and by said frame members respectively; a support; means pivotally connecting the links to the support; those ends of the links attached to the support being forwardly inclined so that when said support is elevated to the level approximating that of said frame members, clearance is provided between said rear links and the forward ends of said frame members; said frame members having longitudinally extending slots at their forward ends; a latch bar extending between said frame members and guidingly received in said slots; a handle having an aperture through which said bar extends; resilient means engaging an end of the handle for urging said bar rearwardly of said frame members and for angularly orienting said handle; and a hook member engaging said bar upon movement of said support to an elevated position, said hook member being carried by said links.

3. In a lift mechanism a: support; a pair of strips adapted to be secured to opposite sides of the support; said strips being adapted to project rearwardly beyond said support; a first pair of arms pivotally secured at one end to the rearwardly projecting portions of said strips respectively; a second pair of arms pivotally secured at one end to said strips respectively and forward of said rearwardly projecting portions; said arms all being of similar angled configuration between their ends; a pair of frame members pivotally securing the other ends of said arms; said arms providing a parallelogram suspension for said support for movement of said support from a lowered position to an elevated position with respect to said frame members; a bar extending between said frame members, said frame members having slots guidingly receiving the ends of said bar for translation of said bar in a direction longitudinally of said frame members; and at pair of hook members carried by said arms and engageable with the ends of said bar upon movement of said arms to elevate said support; the angled configuration of said first pair of arms providing clearance between said arms and said bar.

4. In a lift mechanism: a support; a pair of parallel strips adapted to be secured to opposite sides of the support; said strips being adapted to project rearwardy beyond said support; a first pair of arms, each arm being pivotally secured at one end to the rearwardly projecting portions of said strips respectively, said pivotally secured ends of said first pair of arms being disposed on the inner sides of said strips; a second pair of arms, each arm being pivotally secured at one end to said strips respectively and forward of said rearwardly projecting portions, said pivotally secured ends of said second pair of arms being disposed on the outside of said strips; a pair of substantially parallel frame members, one of said frame members pivotally securing the other end of one of said first pair of arms and the other end of one of said second pair of arms on one side of said one frame member, the other of said frame members pivotally securing the other end of the other of said first pair of arms and the other end of the other of said second pair of arms on one side of said other frame member; said first pair of arms having an angled configuration; said arms providing a parallelogram suspension for said support for movement of said support from a lowered position to an elevated position with respect to said frame members; and a releasable latch for holding said support in an elevated position, and carried by said frame members, the configuration of said first pair of arms providing clearance between said first pair of arms and said releasable latch, and the mounting of said pairs of arms on said strips providing clearance between the first pair of arms and the second pair of arms.

5. In a lift mechanism: a pair of parallel spaced frame elements; a plurality of arms having one end pivotally secured to said frame elements for providing a parallelogram suspension for a platform or the like; a pair of supporting members extending in juxtaposed relationship with respect to said frame elements respectively, each of said pair of supporting members having an offset end; a pair of bracket members for said ends respectively having a flange for attachment to a cabinet or the like; and a pair of loops for removably and slidably mounting said brackets with respect to said offset ends respectively, said brackets being reversible on said ends for reorienting said flanges.

6. In a lift mechanism a: pair of substantially parallel frame members, each of said frame members having a slot at one end thereof for receiving a latch bar; a latch bar having ends accommodated in said slots and guided for translation in a direction substantially longitudinally thereof by said slots; resilient means urging said bar in one direction in said slots; a first pair of arms pivotally mounted at one end on said frame members respectively, said first pair of arms being of angled configuration; a second pair of arms pivotally mounted at one end on said frame members respectively and spaced from said first pair of arms; a platform pivotally mounting the other ends of said arms, said arms providing a parallelogram suspension for said platform; the distance between the other ends of said first pair of arms being less than the distance between the other ends of said other pair of arms; and a catch carried by said arms for engagement with said bar upon movement of said platform to an elevated position.

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