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McConnell

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[54] **ADJUSTABLE SUPPORT MECHANISM FOR A KEYBOARD PLATFORM**

[75] Inventor: **Dale K. McConnell**, Holland, Mich.

[73] Assignee: **Waterloo Furniture Components Ltd.**, Kitchener, Canada

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[52] **U.S. Cl.** **248/284**; 248/286; 248/918

[58] **Field of Search** 248/284, 918, 286, 291, 248/293, 298, 281.1; 108/69, 75; 312/28

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Primary Examiner—Ramon O. Ramirez

Attorney, Agent, or Firm—Allegretti & Witcoff, Ltd.

[57] **ABSTRACT**

An adjustable platform support mechanism for a keyboard includes a platform and a connecting assembly for the platform. The connecting assembly is attached to the platform by means of first and second pivotal connecting arms. The quadrilateral formed by connecting the pivots is in all instances a non-parallelogram. Thereby the platform, when moved from an extended position to a storage position, is pivoted upwardly in order to increase the space available in the kneehole underneath the desk. The shelf also features an adjustable tilt mechanism associated with keyboard platform support bracket so that the operator will be able to adjust the platform to any one of a number of tilt positions.

10 Claims, 3 Drawing Sheets

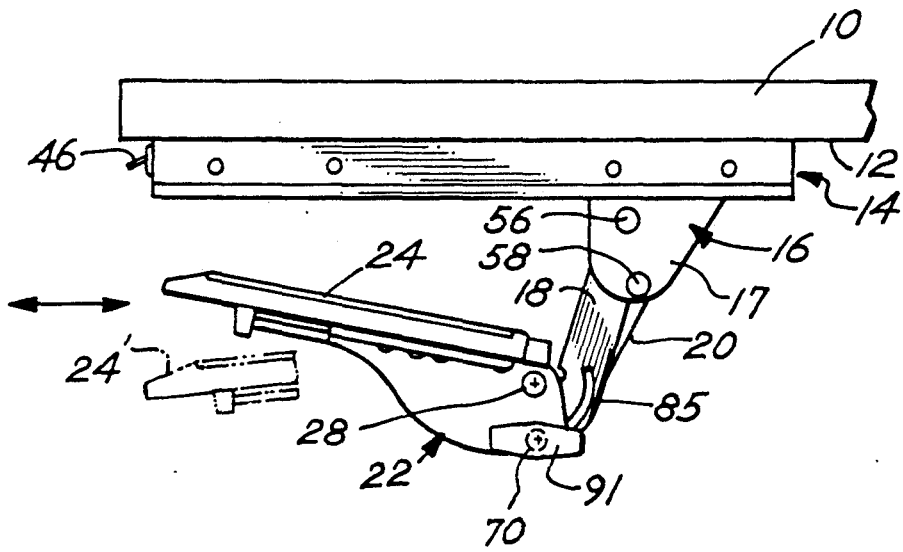

Fig. 1

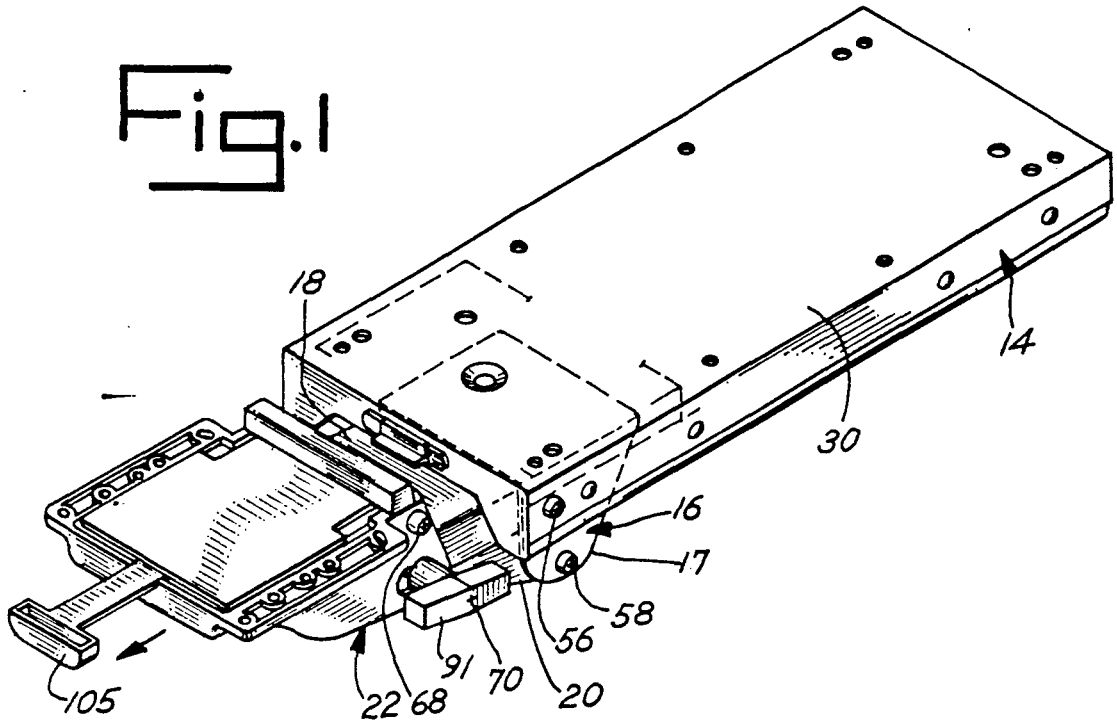
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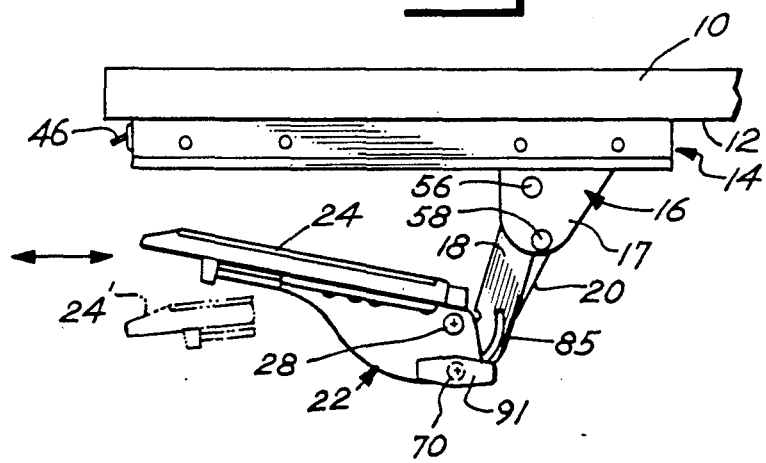
Fig. 2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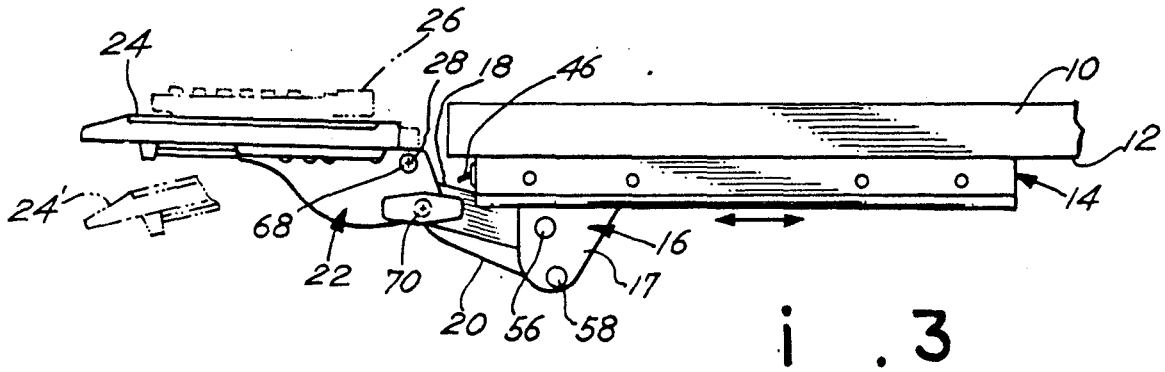
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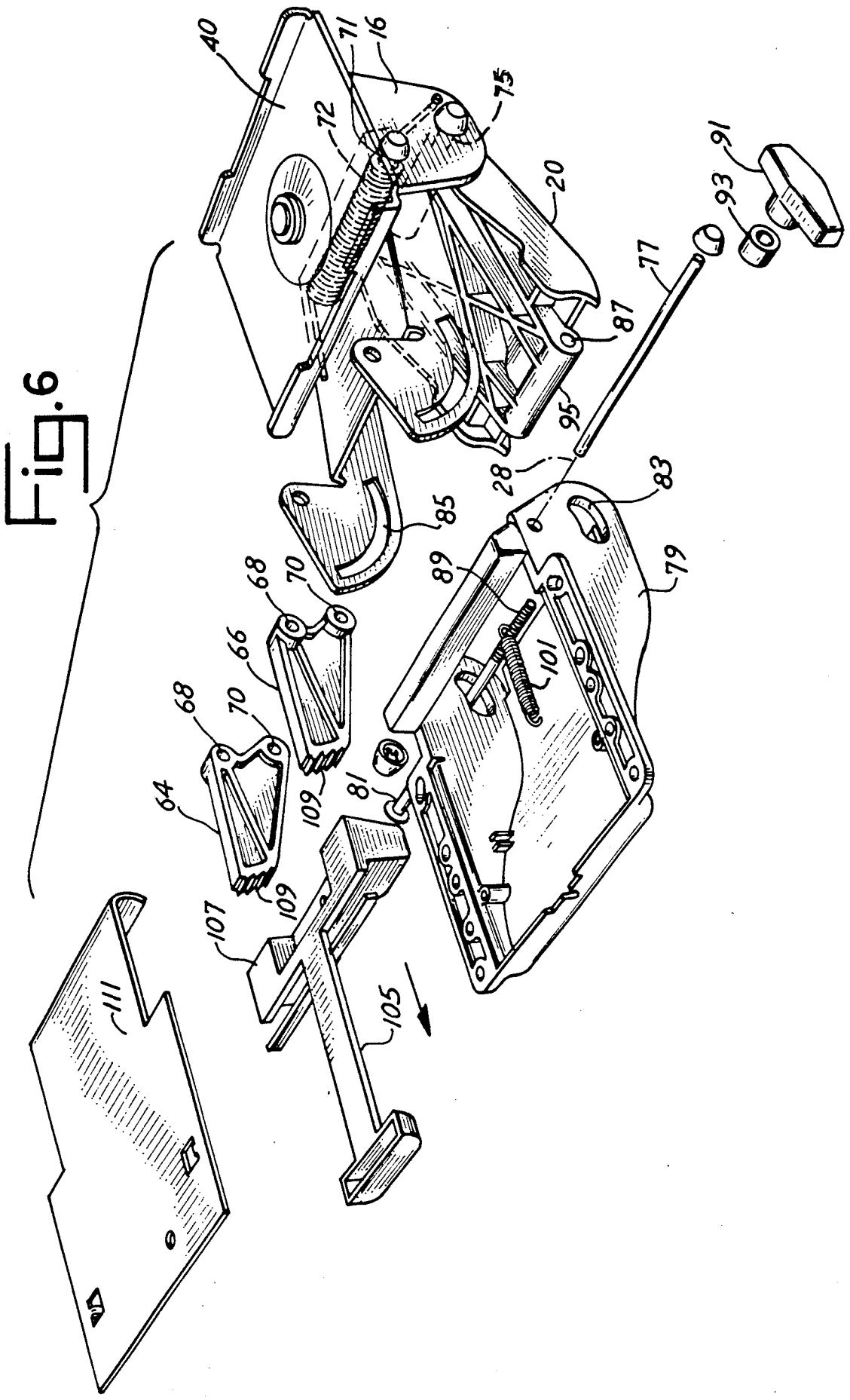
Fig. 6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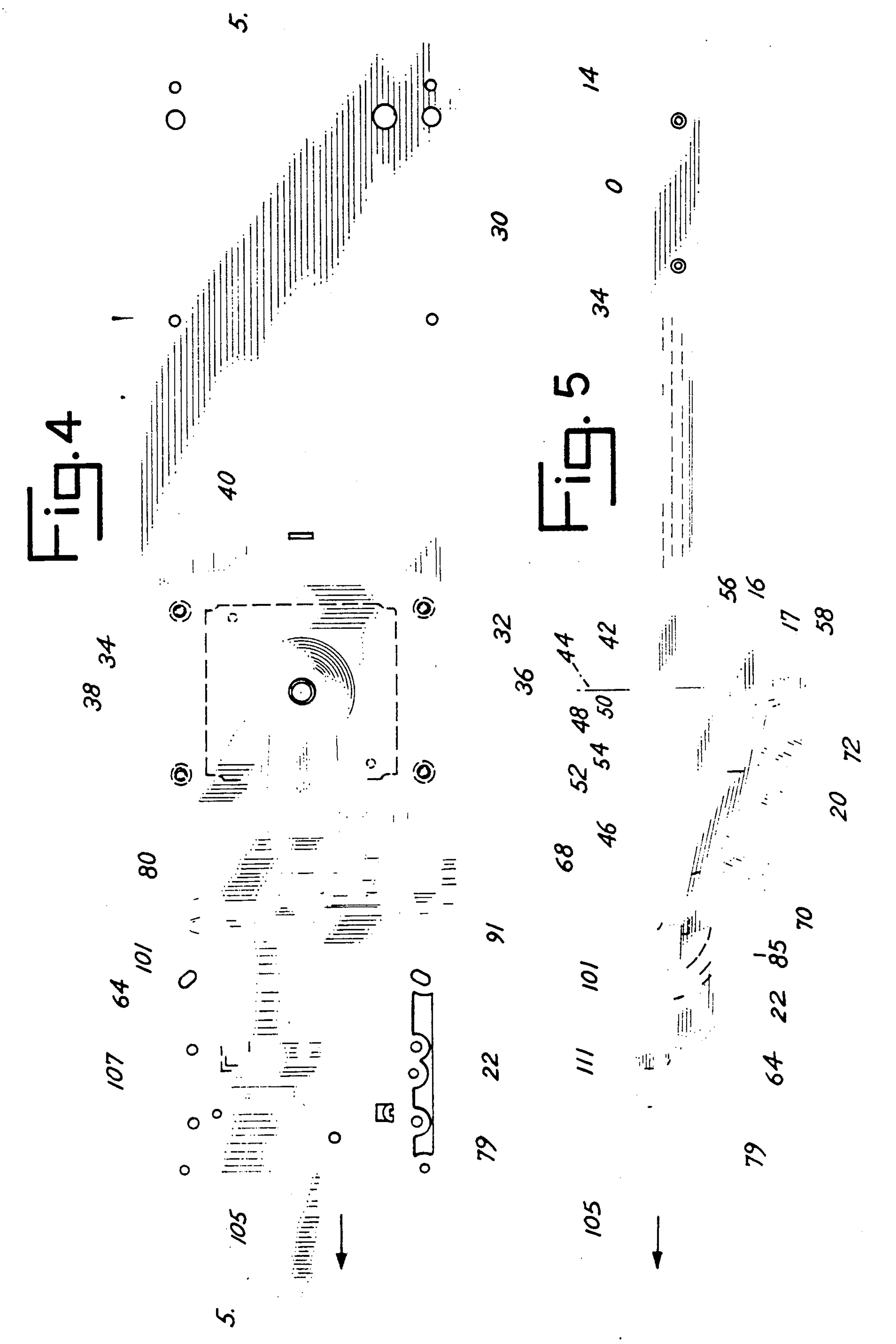
Fig. 4
Fig. 5

ADJUSTABLE SUPPORT MECHANISM FOR A KEYBOARD PLATFORM

BACKGROUND OF THE INVENTION

This invention relates to an improved adjustable support mechanism for a keyboard platform or the like.

Heretofore there have been available various mechanisms for supporting keyboards associated with computer terminals. One such device is disclosed in Smeenge, U.S. Pat. No. 4,616,798, entitled: Adjustable Support For CRT Keyboard, wherein a keyboard support mechanism comprises first and second sets of parallel, equal length arms which link first and second brackets associated respectively with a keyboard platform and a sliding plate attached beneath a desk. The parallel arms maintain the support platform in a generally horizontal position regardless of the orientation of the arms. During storage of the support platform, the platform is pivoted to a retracted position beneath the desk top. During use, the keyboard platform is pivoted forward toward an extended postion. Because of the equal length, parallel arm arrangement, the keyboard platform is always maintained in a horizontal position. The bracket supporting the inside ends of the arms beneath the desk may be slidably attached to a support plate attached to the bottom side of the desk. In this manner, the assembly may be slid beneath the desk top for storage.

Such a parallel arm mechanism has proven to be useful. However, it does limit access in the kneehole beneath the desk for an operator because the shelf is maintained in a horizontal position when in the retracted position. Thus, there has remained a need for an improved keyboard platform support mechanism which provides improved access to the kneehole opening under a desk top when the keyboard is positioned in the storage position beneath the desk top in the kneehole. The present invention provides such an improved mechanism.

SUMMARY OF THE INVENTION

In a principal aspect, the improved shelf or platform support mechanism for a keyboard of the present invention comprises a bracket which is slidably mounted on a plate for attachment beneath a desk top. The slide bracket includes first and second pivots. A keyboard platform likewise includes a platform bracket with first and second pivots. A first linkage arm connects the first pivots. A second linkage arm connects the second pivots. A second linkage arm is positioned vertically below the first arm and is generally not parallel to the first arm. The non-parallel arrangement is affected by either (1) having the upper and lower pivots of each bracket spaced a different distance or (2) the lower arm having a greater length than the upper arm or (3) a combination thereof. In any event, the linkage provides that the key board platform will vary in orientation whenever the link arms are pivoted. Thus, when the platform is moved to a retracted or storage position by pivoting of the arms, the movement the second arm relative to the first will cause the platform to tilt upwardly from horizontal, thus providing more room in the kneehole beneath desk top. To accommodate the fact that the platform will tilt upwardly, the platform itself is pivotally attached to its bracket and may be pivoted about its first pivot to adjust its orientation to any of a number of detent positions. Thus, a spring biased detent mechanism permits orientation of the keyboard support platform in a number of non-horizontal as well as a horizontal position as desired by the keyboard operator. In the preferred embodiment the support plate is slidably mounted for storage of the entire mechanism and platform beneath the desk top. The plate may also be pivoted about a vertical axis. A locking mechanism is also included for locking the plate and the support mechanism in the extended position. Finally, a hand operated locking member is available to lock the linkage arms in any desired orientation.

Thus, it is an object of the invention to provide an improved adjustable support mechanism for a keyboard platform.

A further object of the invention is to provide an improved platform support mechanism for a keyboard which includes generally non-parallel linkage arms connecting the keyboard assembly with the assembly which attaches to the lower side of a desk top.

Yet another object of the invention is to provide an improved keyboard support assembly wherein the support mechanism for the keyboard includes a first linkage arm connecting upper pivot points associated with respective brackets of a keyboard platform and a slide plate and lower pivot points associated with the same brackets wherein the lower pivot points are differently spaced from the upper pivot points.

Another object of the invention is to provide a support mechanism which provides for improved ease of storage of the keyboard support platform relative to the known prior art, yet which is highly adjustable when positioned in an orientation for use.

Another object of the invention is to provide an improved keyboard platform support mechanism which includes an easily adjustable mechanism for altering the angle or tilt of the platform, and which also includes an easily adjustable and accessible mechanism for locking or holding the support linkage in a fixed position.

Yet another object of the invention is to provide an improved keyboard platform support mechanism of simplified and rugged construction which is easily assembled, easily manufactured, durable, and useful.

These and other object, advantages and features of the invention will be set forth in a detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

In the detailed description which follows, reference will be made to the drawing comprised of the following FIGURES:

FIG. **1** is a perspective view of the mechanism of the invention;

FIG. **2** is a side elevation of the support mechanism of the invention attached to the underside of a desk and in the retracted position;

FIG. **3** is a side elevation of the support mechanism of the invention attached to the underside of a desk and in the extended position with the keyboard support mechanism illustrated in alternative positions in phantom;

FIG. **4** is a top plan view of the support mechanism of the invention;

FIG. **5** is a side elevation, cross sectional view taken along the line **5—5** in FIG. **4** depicting the improved mechanism of the invention; and

FIG. **6** is an exploded perspective view illustrating the component parts and there interconnection.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Before describing the component parts of mechanism of the invention, a brief description of the manner in which the mechanism operates will be beneficial in illustrating the construction of the invention. Reference is thus directed to FIGS. 1, 2 and 3. As shown in FIG. 2 there is illustrated a desk top 10. Attached to the underside 12 of the desk top 10 is a plate assembly 14. The plate assembly 14 supports a sliding bracket mechanism 16. The sliding bracket mechanism 16 supports the remainder of the support mechanism for the keyboard platform and is slidable between a retracted position as depicted in FIG. 2 and an extended position as depicted in FIG. 3. In the preferred embodiment, the sliding bracket mechanism 16 is also pivotable about a vertical axis as will be described in more detail below.

The sliding bracket mechanism 16 which depends from the plate assembly 14 has a first linkage arm 18 pivotally attached thereto. Arm 18 is also referred to as an upper linkage arm 18. A second linkage arm 20 is also pivotally attached to bracket mechanism 16 and may be referred to as a lower linkage arm 20. The first and second linkage arms 18, 20 are also pivotally attached to a keyboard platform assembly 22 at upper and lower pivot connections respectively. The keyboard platform assembly 22, as will be described in greater detail below, is comprised of brckets which are attached to the remainder of the mechanism forming the assembly 22. The keyboard platform assembly 22 supports a keyboard platform 24. The keyboard platform 24 is designed to support a computer keyboard 26 as shown in phantom in FIG. 3. A keyboard 26 thus is typically positioned on the platform 24.

Movement of the platform assembly between the positions of FIG. 2 and FIG. 3 is effected by pivoting of the upper and lower arms 18, 20 forming a linkage when in combination with brackets 17 and assembly 22. When in the retracted position as shown in FIG. 2, the assembly 22 and thus the platform 24 are tilted in a clockwise direction relative to the position depicted to FIG. 3. This provides for increased access and space in the kneehole area beneath the desk top 10 or work surface. To position the mechanism in the extended position as depicted in FIG. 3, the sliding bracket mechanism 16 is slid forward on the plate assembly 14. The upper and lower linkage arms 18 and 20 respectively are pivoted about their respective connecting pivot points. This causes the platform 24 to rise toward the level of the top of the desk top 10 and move in a counterclockwise manner relative to the position shown in FIG. 2. Importantly, the pivots on the bracket assembly 16 are spaced a greater distance than those pivots on the assembly 22. Aternatively, the length of the lower linkage arm 20 may be greater than the length of the upper linkage arm 18 or a combination of such construction features may be utilized to provide the described non-parallel linkage. This non-parallel linkage results in the relative movement of the platform 24 from the orientation depicted in FIG. 2 to the generally horizontal orientation as depicted in FIG. 3. Again, by using a non-parallel linkage of arms and pivots the orientation of platform 24 is changed from the position of FIG. 2 to the position of FIG. 3.

Thus, the keyboard platform assembly 22 is positioned in a horizontal work position when in the extended orientation of FIG. 3. By contrast when in the retracted position of FIG. 2 the platform assembly 22 is moved in a clockwise orientation which permits improved access and room in the kneehole beneath the work surface or desk top 10. Because of the described construction, the platform 24 does not and cannont maintain a fixed generally horizontal orientation upon pivoting of the linkage arms 18 and 20. Rather, the orientation is constantly changed depending upon the position of the linkage arms 18 and 20.

As an additional feature of the invention, the platform assembly 22 includes a mechanism, to be described below in greater detail, which permits the platform 24 to be independently rotated about an axis 28 independent of the movement of the linkage arms 18 and 20. Thus, there is depicted in FIGS. 2 and 3 a phantom position 24 for the platform assembly 22 due to utilization of the detent reorientation mechanism utilized to pivot the assembly 22 about axis 28. This provides flexibility for the user to custom position the platform 24.

The specific construction for the various component parts is illustrated in greater detail and in FIGS. 1 and 4 through 6. Referring to those FIGURES, therefore, and initially referring to FIGS. 4 and 5 there is depicted in greater detail the plate assembly 14 which is designed for attachment to the lower side or underside 12 of a desk top 10. The plate assembly 14 includes a U-shaped cross section mounting plate 30 which fastens to the underside of 12 of the desk top 10. The mounting plate 30 includes parallel side, slide channels 32 and 34 as shown in FIG. 4. The parallel slide channels 32 and 34 include ball bearing tracks which slidably receive brackets 36 and 38 respectively. The brackets 36, 38 are riveted to a planar mounting plate 40 which is also depicted in FIG. 6. Thus, the mounting plate 40 is slidable in channels 32, 34 between a retracted and an extended position as the slide brackets 36 and 38 cooperate with the ball bearing channels 32 and 34. FIG. 2 depicts the retracted position. FIG. 3 depicts the extended position. Other slide mechanisms may be adopted.

The bracket 17 of bracket mechanism 16 is pivotally attached to the plate 40 by means of a vertical pivot pin or shaft 42 as depicted in FIG. 5. Thus, the depending brackets 17 may pivot about a vertical axis 44 in FIG. 5 thereby permitting the attached mechanism 16 to pivoot about that axis 44.

As previously described the plate 40 and thus the entire mechanism attached to the plate 40 is slidable between the retracted position as depicted in FIG. 2 and the extended position as depicted in FIG. 3. A flexible plastic locking arm 46 is carried by the plate 40. The locking arm 46 includes an inward, upwardly extending tab 48 which cooperates with a depending projection 50 in the mounting plate 30 when ever the sliding plate 40 is in the extended or forward position. The locking arm 46 is flexible and is biased by cooperation of tab 48 and projection 50 so that a forward lip 52 associated with the locking arm 46 will be flexibly biased into engagement with edge 54 of the sliding plate 40 when that plate is in the forward position illustrated in FIGS. 3 and 5. This will retain the sliding plate 40 and thus the entire assembly in the extended or forward position shown in FIG. 3 preventing sliding movement to the retracted position. To release the plate 40, the locking arm 46 is manually moved or flexed upwardly in FIG. 5 against the flexible biasing force associated with the arm 46 to thereby release from the edge 54 and thus permit release of the platform or the mounting plate 40.

The sliding bracket **17** depends from the plate **40** and includes an upper first pivot **56** and a second, lower pivot **58**. The pivots **56** and **58** each generally define an axis which are parallel to one another. The axes are generally spaced from one another with one above the other.

The first or upper linkage arm **18** is comprised of a pair of spaced generally parallel links **60, 61** connected by a cross member **62**. Upper linkage arm **18** is pivotally connected to upper pivot **56**. Nested between the links **60** and **61**, but in a relatively lower position is the lower or second linkage arm **20**. In the embodiment shown the second linkage arm **20** is a single linkage arm which connects from the lower pivot **58**.

The linkage arms **18** and **20** both connect to spaced ratchet brackets **64** and **66** associated with the keyboard platform assembly. Each bracket **64** and **66** includes an upper pivot **68** and a lower pivot **70**. Thus, the upper linkage arm **18** via the links **60** and **61** connects with and fits and the outside of the upper pivots **68**. The lower linkage arm **20** fits in between the brackets **64** and **66** thereby spacing those brackets and also connects with the lower pivot **70**. Again, note the links **60** and **61** also fit on the outside of the lower linkage arm **20**. Thus, the lower linkage arm **20** is between the ratchet brackets **64** and **66** and on the outside of racket brackets **64, 66** are the links **60** and **61**.

Importantly, the distance between the upper and lower pivots **56** and **58** is greater than the distance between the upper and lower pivots **68** and **70** to provide a non-parallel linkage. Alternatively, the distance between the lower pivots **58** and **70** may be greater than that between the upper pivots **56** and **68** or some combination thereof to provide a non-parallelogram in all orientations of a quadrilateral which connects the pivots **56, 58 70** and **68**. The upper linkage arm **18** is attached to the bracket **17** by means of a rod **71** which is capped or headed at both ends and which extends through appropriate openings in the bracket **17** and arm **18**. A spiral spring **72** fits around the rod **71**. One end of the spiral spring **72** is attached to the bracket **17**. The opposite end fits against the cross plate **62** to bias the cross plate **64** and links **60, 61** (arm **18**) in the clockwise direction as viewed in FIGS. **2, 3** and **5**, for example. The lower arm **20** is likewise attached and cooperative with the bracket **17** by means of a rod **75** which is also capped at both ends.

The opposite end of each linkage arm **18, 20** is likewise fixed or retained in engagement with the appropriate ratchet brackets **64, 66** by means of rods. Thus, a rod **77** which is capped at both ends fits through a keyboard platform support member **79** and then through the links **60** and **61** as well as the upper pivot openings **68** in the ratchet brackets **64, 66**. A second rod **81** fits through arcuate slots **83** in the member **79** and then passes through second arcuate slots **85** in the links **60** and **61**. The rod **81** thus passes through the pivot openings **70** and an opening **87** associated with the end of lower arm **20**.

The rod **81** has a slightly different construction. That is the rod **81** includes a headed end **80** and a threaded end **89** cooperative with a rotable handle **91**. A spacer **93** fits against the handle **91**. Spacer **93** fits through the slot **83** and is slidable in the slot **83**. The handle **91** may be tightened on the threaded end **89** to draw the headed **80** and spacer **93** tightly against the links **60, 61** tightening that links **60, 61** against the end **95** of the lower arm **20** through which the passage **87** is defined and against the ratchet brackets **64, 66**. In this manner, the linkage arms **18** and **20** may be held in a fixed or locked position.

The bracket mechanism **79** is designed to be pivotable about the axis defined by the rod **77**. It is also designed to be rigidly connected and disconnected from the brackets **64** and **66**. That is, a coil spring **101** connects from the rod **81** at one end to a locking bar **105** which is slidably mounted in the bracket mechanism **79**. The locking bar **105** includes a locking rib **107** which engages in appropriate detent teeth **109** associated with the brackets **64** and **66**. Thus, by pulling in the direction of the arrow in FIG. **6** on the locking bar **105** against the force of the spring **101** which is attached to the bar **105**, the rib **107** is disengaged from the teeth **109**. The mechanism **79** may then be pivoted about the axis of rod **77** to reorient the mechanism **70** and the attached planer plate **111** which fits on the mechanism **79**. The plate **111** supports the platform **24** as previously described. In review, it is possible to adjust the tilt of the platform **24** by pulling on the locking bar mechanism **105** and pivoting the assembly **79**.

It is to be noted once again that the guadralateral defined by connecting the pivots **56, 58, 68, 70** is not a parallelogram and in the preferred embodiment is arranged to provide for effective clockwise movement of the platform **24** as the linkage is moved to the position which the the storage position.

It is possible to vary the construction of the invention by providing additional elements or by eliminating certain elements without departing from the spirit or scope of the invention. For example, the pivot shaft or pin **42** may be eliminated to eliminate the pivoting operation associated therewith. Further, it is possible to eliminate the mechanism associated with the locking bar **105**. Thus, the platform would be in a horizontal position when extended and in the space saving position depicted in FIG. **2** when retracted. Of course, by varying the relative length of the upper and lower links it is possible to accommodate or vary the improved access or knee room in the region beneath the desk. Thus, while there has been set forth the preferred embodiment of the invention, it is understood that the invention is to be limited only by the following claims and their equivalents.

What is claimed is:

1. An improved adjustable support mechanism for a keyboard platform assembly of the type including a platform supported by said support mechanism, said platform associated with a desk, said support mechanism comprising in combination:

a mounting plate for attachment to the underside of a desk platform;

a slide assembly cooperative with the mounting plate and slidable between an extended position and a retracted position;

first bracket means projecting downwardly from the slide assembly, said first bracket means including an upper pivot and a lower pivot;

a forward platform for support of the keyboard;

second bracket means projecting downwardly from the forward platform, said second bracket means including an upper pivot and a lower pivot;

a first connecting arm between the upper pivots; and

a second connecting arm between the lower pivots whereby the arms and pivots provide a non-parallel, unequal connecting linkages between the pivots, said arms defining means for tilting the plat-

form to a non-horizontal position in the kneehole under a desk top as the platform is moved by pivoting of the arms to the retracted position.

2. The improved mechanism of claim 1 including platform orientation adjustment means connecting the platform with the platform bracket.

3. The improved support mechanism of claim 2 wherein the platform adjustment means comprise a pivot mechanism connecting the platform bracket to the platform for pivoting said platform about the upper pivot of said bracket.

4. The improved platform support mechanism of claim 1 wherein the first connecting arm comprises a pair of spaced parallel arms and said second connecting arm comprises a single arm intermediate the parallel arms.

5. The support mechanism of claim 1 including a vertical pivot axis connecting between the mounting plate bracket and the mounting plate.

6. The improved support mechanism of claim 1 wherein the forward platform is pivotable about the upper pivot of the platform support bracket and further including detent means for locking the platform into anyone of a series of detent positions whereby the platform may be maintained in said position for support of a keyboard or the like.

7. The improved support mechanism of claim 1 including spring means for biasing the arms toward the extended position.

8. The improved support mechanism of claim 1 wherein the first connecting arms comprised a pair of parallel arms spaced one from the other by a connecting planer plate and further including the spiral spring means having one end biased against the plate and other end biased against the support bracket for the plate to bias the first connecting arms toward the extended position.

9. The improved support mechanism of claim 1 including means for locking the connecting arms in a fixed pivot position.

10. The improved support mechanism of claim 1 including means for locking the connecting arms in a fixed pivot position comprising means for frictionally locking the first connecting arm and the second connecting arm one against the other.

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