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C. EAMES ET AL

3,043,640

WALL MOUNTED VERTICALLY ADJUSTABLE DESK

Filed Feb. 4, 1960

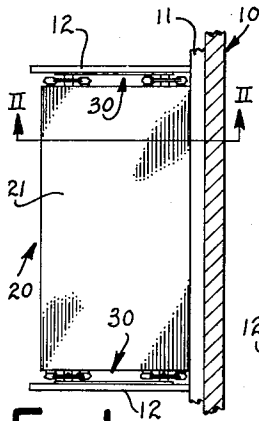


FIG. 1

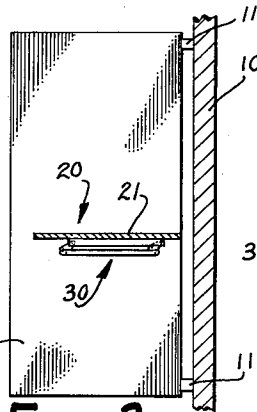


FIG. 2

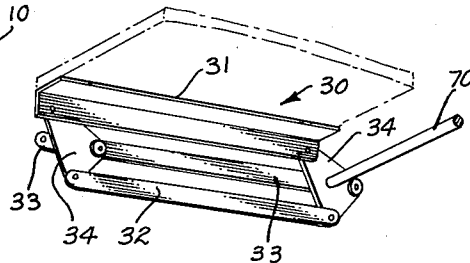


FIG. 6

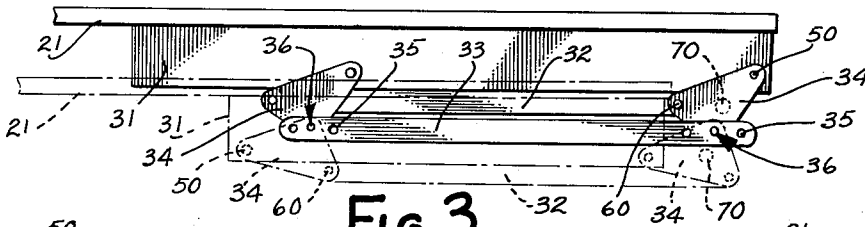


FIG. 3

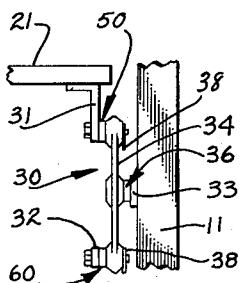


FIG. 5

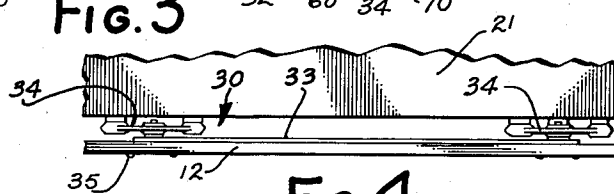


FIG. 4

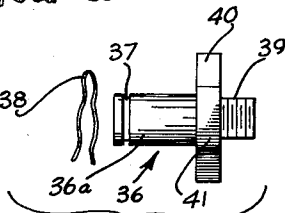


FIG. 7

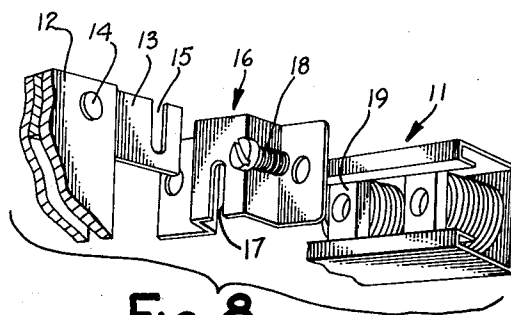


FIG. 8

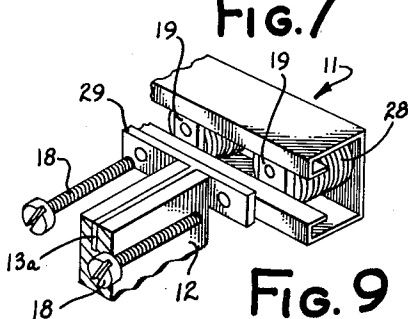


FIG. 9

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ATTORNEYS

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3,043,640

## WALL MOUNTED VERTICALLY ADJUSTABLE DESK

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Peter J. Pearce, Los Angeles, Calif., assignors to Her-  
man Miller, Inc., a corporation of Michigan  
Filed Feb. 4, 1960, Ser. No. 6,678  
5 Claims. (Cl. 311-20)

This invention relates to furniture and more particu-  
larly to a suspended desk adapted to quick adjustment be-  
tween two operating heights.

This application is a continuation-in-part of co-pending  
application entitled Storage, Serial No. 952,589, filed  
November 6, 1959, of which the inventors are Charles  
Eames and Don Albinson.

Desks having adjustable height tops have been known  
for a number of years. This invention, however, consti-  
tutes an improvement over the constructions previously  
employed for this purpose. It provides a desk having no  
supporting structure touching the floor, thus leaving the  
floor free so that it may be easily and quickly cleaned.  
It also eliminates the possibility of indentations or other  
marks being created on the floor by the presence of con-  
ventional furniture legs over a substantial period of time.  
This is particularly advantageous when floor coverings  
such as linoleum and deep carpeting are used.

This invention provides a particularly sturdy desk even  
though it is quickly adjustable from one height to another.  
The adjustability is accomplished without the use of  
special latches or fasteners. Further, the desk is stable  
in either position without the necessity of latches to  
secure it. This is important because the latches are  
often forgotten when conventional desks are adjusted  
which can result in failure of the desk and perhaps the  
dropping of expensive equipment such as a typewriter.  
Furthermore, the desk and its operating mechanism are  
designed to be a single, compact package, quickly mounted  
in a selected position in a room. Furthermore, it may  
be easily removed and relocated should such be desired.

The simplicity and compactness of the structure makes  
it relatively inexpensive. It also makes it durable and  
easy to clean. All of these factors make a desk unit of  
the type long desired for situations in which they must  
endure long and hard usage with a minimum of renova-  
tion and upkeep. Examples of such uses are dormitories,  
hotels, motels and other rental type installations.

These and other objects and purposes of this invention  
will be immediately understood by those acquainted with  
the design and construction of furniture and particularly  
of furniture for commercial installations upon reading  
the following specification in conjunction with the accom-  
panying drawings.

In the drawings:

FIG. 1 is a fragmentary, plan view of this invention  
mounted on a supporting structure;

FIG. 2 is a cross sectional view taken along the plane  
II-II of FIG. 1;

FIG. 3 is an enlarged, side elevation view of the in-  
vention showing the desk in raised position in solid lines  
and in lowered position in phantom;

FIG. 4 is a fragmentary, enlarged, plan view of one  
side of the desk mounted to its supporting panel;

FIG. 5 is a fragmentary, enlarged, front elevation view  
of one side of the desk, positioned midway between its  
two operating positions, showing the mounting structure;

FIG. 6 is a bottom perspective view of the support link-  
age utilized in this invention;

FIG. 7 is an enlarged side view of the pivot stud  
utilized in this invention;

FIG. 8 is an enlarged, exploded, perspective view

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showing one manner in which the panels supporting this  
desk unit are secured to the wall;

FIG. 9 is an exploded, perspective view showing an-  
other means for securing the desk supporting panels to  
the wall.

In executing the objects and purposes of this inven-  
tion, there has been provided a desk which is supported  
on each side by panels. The panels themselves are sup-  
ported by any suitable means such as being hung on a  
wall. On each side, the desk is hung upon a pair of  
toggles tied together by a mounting plate. The mount-  
ing plate is secured to the supporting structure. The  
toggles are so arranged that in one position the desk is  
held at an elevated or writing position and is stable since  
the toggles are then situated in an overcenter position.  
The desk has a second position in which the toggles are  
rotated approximately 180 degrees and again is stable  
because of their overcenter position. In this lowered  
position the desk is convenient for typing.

Referring specifically to the drawings, the numeral 10  
indicates a vertical rigid supporting structure such as a  
wall (FIG. 1). Mounted on the wall are a pair of rails  
11. These are vertically spaced and extend horizontally  
along the wall at a substantial distance from both the  
floor and the ceiling (FIGS. 1 and 2). The rails 11 are  
secured to the wall by any suitable means such as screws.

Projecting from the wall 10 are a pair of panels 12.  
The panels are supported on the rails 11 with both their  
upper and lower ends spaced from the ceiling and floor  
respectively. Each of the panels 12 at its upper end has  
a spline 13 secured to the panel by suitable means such  
as screws 14 (FIG. 8). At the rearward end of the panel  
the spline projects beyond the panel and has a slot 15  
opening through one edge. The slotted end of the spline  
is designed to hook over and engage the anchor fitting  
16 which has an outwardly projecting central section  
slotted at 17 to receive the spline. The anchor fitting  
16 is secured to one of the rails 11 by means of screws  
18 which threadedly engage the nuts 19. The nuts 19  
are mounted within the rails and when the screws 18 are  
tightened they are pulled firmly against the inturned  
flanges of the rails. This structure is described in more  
detail in the aforementioned co-pending application en-  
titled Storage, Serial No. 852,589, filed November 6, 1959.

At the bottom of each of the panels 12 another spline  
is mounted in the identical manner to the spline at the  
top except that it is inverted so that the slot opening  
opens upwardly rather than downwardly. It also is at-  
tached to the lower rail 11 by the same means as de-  
scribed for attaching the spline at the upper end of  
the panels and as illustrated in FIG. 8.

FIG. 9 illustrates a modified means for anchoring the  
panels 12 to the rails 11. In this construction the same  
bolts 18, nuts 19 and springs 28 are used. However,  
the spline 13a is T-shaped and its head 29 seats against  
the face of the rail 11. The bolts 18 secure it to the rail  
11 through holes adjacent the ends of the head. It will  
be recognized that other forms of attachment can be used  
within the scope of this invention.

Mounted between the panels 12 is a desk assembly 20  
(FIG. 1). The desk assembly 20 has a top or platform  
21 which, while it may be of any suitable shape, is il-  
lustrated herein as rectangular and has a width consti-  
tuting a substantial portion of the distance between the  
panels 12. This desk top may be of any suitable ma-  
terial such as plywood. It may have a wooden composi-  
tion or synthetic resinous top finish, the particular finish  
applied to it being immaterial to this invention.

The desk top is supported on each side by a support  
linkage 30 (FIGS. 3 and 6). Each support linkage 30  
includes an L-shaped fastener plate 31, an anchor bar 32,  
a mounting plate 33 and a pair of toggle plates or tie

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means 34. The fastener plate 31 is secured beneath the desk top 20 with its depending flange generally aligned with the edge of the desk (FIG. 5). The mounting plate 33 is designed to be secured to the adjacent panel by suitable means such as the screws 35 (FIG. 4). The toggle plates are generally triangular in shape, having a boss at each of their base corners and one at their apex. The bosses extend from both sides of the plate as shown in FIGS. 5 and 6. Each of the toggle plates, at its apex, is pivotally secured to a mounting plate 33, the plates being so spaced therealong that these points of attachment are substantially at opposite ends thereof.

This attachment is made by means of a pivot stud 36. The detailed structure of the pivot stud is illustrated in FIG. 7. The pivot stud 36 has a pin section 36a near the free end of which is a shallow groove 37 for receiving a suitable locking fastener such as a spring wire straddle pin 38. The other end 39 of the stud is threaded. The threaded end 39 is separated from the pin section 36 by a spacer flange 40 which has a pair of flattened portions 41 on its periphery so that it may serve as a gripping point for a wrench.

The pivot stud 36 is threaded into a suitable opening in the mounting plate 33. The pin section 36a extends through an opening in the boss at the apex of a toggle plate 34. The groove 37 is exposed on the other side of the toggle plate (FIG. 5). The straddle pin 38 is then seated in the channel 37, securing the toggle plate to the mounting plate 33. It will be noted that the toggle plates are shown as not being symmetrical about their apex. This aids in positioning them in overcenter position to assure that the desk will be stable, which will be more fully explained hereinafter.

Each of the toggle plates has its corner most remote from the apex pivotally secured to the fastener plate 31 by a pivot stud 50. The pivot studs 50 are identical to the pivot studs 36. The other corners of the toggle plates 34 are pivotally secured to opposite ends of the anchor bar 32 by suitable pivot studs 60, also identical to pivot studs 36.

As will be seen in FIG. 5, on each side of the desk the depending flange of the fastener plate 31 is vertically aligned with the anchor bar 32. Thus, when the desk is in its raised position (FIG. 3), the anchor bars 32 are situated well above the pivot pins 36 and the toggle plates 34 are rotated to a position where the bottoms of the fastener plates 31 are resting on the tops of the adjacent anchor bars 32. This provides a stable support for the desk which will have no tendency to jump or move vertically or horizontally while the desk is in use. When the desk is moved to its lowered position, the toggle plates 34 are rotated about the pivot pins 36 until the anchor bars 32 are situated well below the pivot pins 36. The desk top comes to a stable lower limit position with the bottoms of the fastener plates 31 again resting on the tops of the anchor bars 32. Again, this is a stable support, holding the desk against vertical or horizontal movement due to activities being carried out on top of the desk. The fact that the toggle plates 34 are not symmetrical about their apexes aids in assuring that the desk top cannot shift from either of its two positions.

To assure simultaneous and equal rotation of the support linkages 30 on each side of the desk, the rearward toggle plates 34 are tied together by a crossbar 70. The crossbar 70 may be of any suitable construction but preferably is tubular for economy and weight reduction. The use of this bar eliminates rocking or twisting of the desk top as it is manipulated from one position to another.

It will be seen that this structure provides a highly stable and simple support mechanism for the desk. It may be manipulated to raise or lower the desk by simply rocking the toggle plates about their pivotal attachment to the mounting plates. In both positions the desk is stable and is positively locked against accidental displacement. At the same time no latches, fasteners or other

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complex mechanism is required to assure the positive positioning of the desk. This is accomplished since in order to move the desk from either its lowered or its raised position it is necessary to lift or rotate the desk upwardly. Since such upward movement of the desk does not occur unless positive forces are applied to it, the desk cannot possibly shift from its selected position accidentally. Further, the mechanism is such that the desk panel itself is stable and is held horizontal at all times. Therefore, it may be shifted from one position to the other without removal of any items that might be resting on it, such as pencils, writing materials, books or a typewriter. Further, the positive contact, extending almost the full depth of the desk, between the fastener plate 31 and the anchor bar 32, assures a firm, steady, and stable support. Further, with this type support the desk may support extremely heavy loads.

The mechanism is compact and may be shipped to the point of installation as a practically flat assembly desk. The only steps then necessary to install the desk will be to attach the mounting plates 33 to the supporting panels 12 by means of the screws 35. The structure of the desk is particularly strong and can withstand long misuse such as being used as a seat or a means to stand on so commonly experienced by equipment provided in dormitories, motels and hotels. This assures long usage without excessive replacement or repair expenses.

It should be understood that the adjustable desk assembly described herein is especially well adapted to cooperate with the panels 12 described herein when used in conjunction therewith. Supporting this desk assembly in this manner eliminates conventional supporting legs which mar the floor and make cleaning difficult. However, this adjustable desk assembly may also be used in conjunction with conventional supporting means.

While a preferred embodiment of this invention has been described, it will be recognized that modifications to this embodiment may be made which incorporate the principles of this invention. Such of these modifications as incorporate the principles of this invention are to be considered as included in the hereinafter appended claims unless these claims by their language expressly state otherwise.

We claim:

1. Means for adjustably positioning a desk top at two operating heights comprising a support linkage operably connected between the desk top and the support therefor, the support linkage including: a pair of toggle plates, said toggle plates being generally triangular in shape with the two sides adjacent the apex being of different lengths; an anchor bar pivotally secured to and connecting corresponding first points at the corners of said toggle plates at the ends of the shorter sides; a fastener plate pivotally secured to and connecting corresponding second points at the corners of said toggle plates at the ends of the longer sides; said anchor bar and said fastener plates vertically aligned, said anchor bar lying below said fastener plate; said toggle plates pivotally secured to the desk top support at corresponding third points at the apex thereof; and said fastener plate secured to the desk top whereby rotation of said toggle plates about said third points varies the height of the desk top with respect to the desk top support and said fastener plate rests on said anchor bar at the two extremities of rotation of said toggle plates, the height of the desk top varying at said two positions of rest.

2. Means for adjustably positioning a desk top at two operating heights comprising a support linkage operably connected between the desk top and the support therefor, the support linkage including: a pair of toggle plates, said toggle plates being generally triangular in shape with the two sides adjacent the apex being of different lengths; an anchor bar pivotally secured to and connecting corresponding first points at the corners of said toggle plates at the ends of the shorter sides; a fastener plate

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pivotally secured to and connecting corresponding second points at the corners of said toggle plates at the ends of the longer sides; said anchor bar and said fastener plates vertically aligned on one side of said toggle plates, said anchor bar lying below said fastener plate; a mounting plate pivotally secured to and connecting corresponding third points on one other side of the toggle plates at their apexes; said mounting plate fixedly secured to the desk top support; said fastener plate secured to the desk top whereby rotation of said toggle plates about said third points varies the height of the desk top with respect to the desk top support and said fastener plate rests on said anchor bar at the two extremities of rotation of said toggle plates, the height of the desk top varying at said two positions of rest.

3. Means for adjustably positioning a desk top at two operating heights, comprising: a support linkage operably connected between the side edges of the desk top and a pair of support panels mounted on a wall; each support linkage including a pair of toggle plates, said toggle plates being generally triangular in shape with the two sides adjacent the apex being of different lengths; an anchor bar pivotally secured to and connecting corresponding first points at the corners of said toggle plates at the ends of the shorter sides; a fastener plate pivotally secured to and connecting corresponding second points at the corners of said toggle plates at the ends of the longer sides; said anchor bar and said fastener plates vertically aligned on one side of said toggle plates, said anchor bar lying below said fastener plate; a mounting plate pivotally secured to and connecting corresponding third points on one other side of the toggle plates at their apexes; said mounting plate fixedly secured to the said panels; said fastener plate secured to the desk top whereby rotation of said toggle plates about said third points varies the height of the desk top with respect to said panels and said fastener plate rests on said anchor bar at the two extremities of rotation of said toggle plates, the height of the desk top varying at said two positions of rest; and a crossbar joining the apexes of the toggle plates nearest the back of the desk top.

4. Means for adjustably positioning a desk top at two operating heights, comprising: two panels secured to a wall, said panels being spaced one from the other; a support linkage operably connected between the desk top and said panels; said support linkage including a pair of toggle plates; an anchor bar pivotally secured to and connecting corresponding first points on said toggle

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plates; a fastener plate pivotally secured to and connecting corresponding second points on said toggle plates; said anchor bar and said fastener plates vertically aligned, said anchor bar lying below said fastener plate; said toggle plates pivotally secured to the desk top support at corresponding third points; and said fastener plate secured to the desk top whereby rotation of said toggle plates about said third points varies the height of the desk top with respect to the desk top support and said fastener plate rests on said anchor bar at the two extremities of rotation of said toggle plates, the height of the desk top varying at said two positions of rest.

5. Means for adjustably positioning a desk top at two operating heights, comprising: two panels secured to a wall, said panels being spaced one from the other; a support linkage operably connected between the desk top and said panels; said support linkage including a pair of toggle plates; an anchor bar pivotally secured to and connecting corresponding first points on said toggle plates; a fastener plate pivotally secured to and connecting corresponding second points on said toggle plates; said anchor bar and said fastener plate vertically aligned on one side of said toggle plates, said anchor bar lying below said fastener plate; a mounting plate pivotally secured to and connecting corresponding third points on the other side of said toggle plates; said mounting plate fixedly secured to the desk top support; and said fastener plate secured to the desk top whereby rotation of said toggle plates about said third points varies the height of the desk top with respect to the fixed mounting plate and said fastener plate rests on said anchor bar at the two extremities of rotation of said toggle plates, the height of the desk top varying at said two positions of rest.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,043,640

July 10, 1962

Charles Eames et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 14, for "952,589" read -- 852,589 --.

Signed and sealed this 11th day of December 1962.

(SEAL)

Attest:

ERNEST W. SWIDER  
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