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ASSEMBLY FOR THE SUPPORT AND MOVEMENT OF OBJECTS MOUNTED ON A PLANAR SURFACE

FIELD OF INVENTION

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This invention relates to an assembly for the support and movement of heavy and/or delicate objects mounted on a planar surface. The use of the assembly is particularly relevant for, though not exclusively so, heavy and/or delicate objects such as LCD plasma television receivers, display boards and signs, information
10 boards, paintings, clocks, projectors and projector screens.

BACKGROUND

Flat panel display screen units have become common. This is due to them being
15 thin so they occupy little space, and their presence adds a touch of modernity to any room in which they are placed. The larger versions of such units are quite heavy, yet they are quite delicate and fragile. Such display screen units are also expensive.

20 Problems arise when such units need to be serviced to maintain their operatability. The circuitry of such devices is usually encased and hidden from public view. It needs to be exposed before servicing can take place. Servicing personnel usually need to work in pairs on ladders or scaffolding in order to work at a comfortable height and such that their combined strength would be able to cope with the weight
25 of each of the units. Both servicing personnel would need to coordinate their movements such that the weight distribution between them would be nearly balanced in order to avoid accidental droppage of the display screen unit because of the uneven distribution of weight.

30 The grip of each of the servicing personnel on the display screen unit is also crucial when maintenance of the display screen units is being carried out. The servicing personnel would be required to grip tightly onto the units and be able to maneuver the unit such that the internal circuitry is exposed in order to facilitate the



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maintenance of the display screen units. An excessively strong grip may actually damage the flat panel screen and/or the Liquid Crystal Diodes (LCDs). Hence, having a secure grip may actually be detrimental to the display screen unit.

- 5 Unfortunately, such incidents inadvertently happen even when extreme care is exercised. The cost of such accidents would be high as the cost would not only include the cost of replacing or repairing the display screen unit, it would include the injuries suffered by the servicing personnel should the unit fall on them.
- 10 There are currently several different designs for mounting heavy objects suitable for use on a planar surface. However, their main objective lies in securely mounting the object in place whilst reducing the risk of it falling. There has been no intention to aid in the maintenance of the heavy object.
- 15 It is thus the principal object of the present invention to provide an assembly to allow for the mounting of display screen units onto a planar surface and that aids the user by controlling the rate of exposing the internals of the display screen unit such that maintenance can be carried out.
- 20 It is the secondary object of the present invention to provide an assembly to allow for the mounting of display screen units onto a planar surface which does not require direct force to be exerted onto the region of the screen area of the display screen unit whilst preparing the display screen unit for maintenance.

25 **SUMMARY OF INVENTION**

- With the above objects in mind, there is provided an assembly for the support and movement of an object to be mounted relative to a planar surface, the assembly comprising: a backing means for supporting the assembly relative to the planar surface; at least one first link with a first end rotatably and pivotally attached to the
- 30 backing means; at least one second link with an inner end rotatably and pivotally attached to a cover; a second end of the first link rotatably and pivotally connected to the second link at an intermediate length of the second link; a biasing means

having at a first end pivotally attached to the backing means and a second end pivotally attached to the second link; wherein the biasing means provides a dampening effect on the movement of the object from a first position to a second position.

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Preferably, the cover is mounted for pivotal movement relative to the backing means and the object is mounted to the cover.

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Advantageously, the biasing means provides resistance while moving the object from the first position to the second position. Conversely, the biasing means also provides assistance while moving the object from the second position to the first position.

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It is preferable that an encasement means is securely attached to the backing means and the first end of the biasing means is releasably and pivotally attached to the encasement means. The cover is also preferably pivotally attached to the encasement means. It is advantageous when the encasement means is integrated with a mounting bracket means for the mounting of the object onto the planar surface.

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It is preferable that the biasing means is at least partially extended at the first position and at least partially retracted at the second position. The second end of the biasing means is preferably releasably and pivotally attached to a outer end of the second link.

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Advantageously, the first and second links and the biasing means are concealed when the cover and the encasement means are mutually engaged to one another.

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Preferably, there are at least two of the first links, by each side of the biasing means and the number of first links attached to the backing means is at least two. Consequently, there are preferably at least one of the second links, attached to the second end of the biasing means and the number of the second links attached to the cover is at least one.

Preferably, there is one biasing means for each combination of the first and second links.

- 5 It is preferable that the biasing means is either one of a coil spring, a hydraulic spring, a pneumatic spring, an elastomer strip, an elastic strip or a gas spring.

DESCRIPTION OF DRAWINGS

- 10 In order that the invention may be better understood and readily put into practical effect, there shall now be described by way of non-limitative example only preferred embodiments of the present invention, the description being in reference to the accompanying illustrative drawings in which:

- 15 Figure 1 is a side view of the assembly in a first position;
Figure 2 is a side view of the assembly in an intermediate position during the movement of the assembly;
Figure 3 is a side view of the assembly in a second position;
Figure 4 is a front view of the backing means with the links, biasing and pivoting
20 means attached;
Figure 5 is a side view of the backing means with the links, biasing and pivoting means attached; and
Figure 6 is a front view of two backing means with the connecting, biasing and pivoting means attached while secured to the encasement and with cover in place.

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DESCRIPTION OF PREFERRED EMBODIMENTS

- In one embodiment of the present invention, there is provided an assembly 32 for the mounting, support and movement of objects on a planar surface such as a wall
30 or ceiling. The assembly 32 can be used for particularly, but not exclusively, for the encasement and support of an LCD plasma television.

A backing means 20 supports the assembly 32 on the wall, ceiling and the like and is securely attached to an encasement means 28. The backing means 20 is relatively stiff and rigid in order to handle the torsion and tensile stresses caused by the mounting of the LCD plasma television-laden assembly 32 on a planar surface.

The backing means 20 includes a hinge 30. The hinge 30 could be one or more butt hinges or a piano hinge along a first edge 36 of the backing means 20. The hinge 30 is also secured to a cover 26 to ensure that the LCD plasma television can be moved about, exposing its internal circuitry, for maintenance and replacement.

The backing means 20 has an L-shaped cross section and is preferably secured along the inner edge 40 of the encasement 28.

A first link 22 is rotatably and pivotally attached to the backing means 20. Preferably, the first link 22 is rigid and stiff with identical cross sectional areas and shapes at both ends. An inner end 38 of the first link 22 is rotatably and pivotally attached to the backing means 20.

A second link 34 that is rigid and stiff is rotatably and pivotally attached at an inner end 44 to the cover 26. An outer end 46 of the biasing means 24 is rotatably and pivotally attached to an outer end 48 of the second link 34 to ensure that relative movement between the biasing means 24 and the second link 34 is allowable. An outer end 50 of the plurality of first links 22 is rotatably and pivotally attached at an intermediary length along the second link 34. The exact position of a joint 52 along the main axis of the second link 34 would be approximately 5 – 40% of the length of the second link as measured from the outer end 48 of the second link 34. Preferably, the distance of the joint 52 from the outer end 48 of the second link 34 is 8 – 30% of the length of the second link 34. Most preferably, the distance of the joint 52 from the outer end 48 of the second link 34 is 15% of the length of the second link 34. The assembly 32 is effectively a linkage arrangement that has a cam effect.

The first links 22 structurally support a biasing means 24 rotatably and pivotally attached to the backing means 20 at an inner end 38 and a second link 34 with an inner end 44 rotatably and pivotally attached to a cover 26. The biasing means 24 is releasably and securely attached at an inner end 42 to the backing means 20 at a point of attachment to allow for maintenance of the biasing means 24.

The encasement 28 and cover 26 are both sized and shaped according to the size and shape of the LCD plasma television. The encasement 28 is integrated with a mount for securing the whole assembly 32 onto a planar surface such as a ceiling or wall. The encasement 28 and cover 26 fit either engageably or interlockably with one another, securely encasing the television set within. At least two of the backing means 20 is employed in the assembly 32 regardless of the size of the television. This is because of the loading rating of the biasing means 22. Any excessive loading on the biasing means 22 will result in the failure in the workings of the assembly 32. The backing means 20 are attached in a parallel manner either horizontally or vertically to the ground.

The encasement 28 and cover 26 are joined at the hinge 30 at the base of the cover 26, allowing the LCD plasma television set to be rotated outwards revealing the internal circuitry, with the top edge of the television set being closest to the ground at a second position (Fig. 3). Alternatively, the hinge 30 could be positioned at a perpendicular edge along a first end 54 and a second end 56 of the encasement 28, allowing the LCD plasma television to be rotated outwards revealing the internal circuitry, with the top edge of the television still being furthest to the ground at that position.

The biasing means 24 has been primarily implemented into the assembly to aid the user in moving the television set and exposing its internal circuitry. The arrangement of the first link 22, second link 34 and the biasing means 24 with regard to their positioning and relative angular relationship is of importance to the functionality of the assembly. The arrangement of the assembly is similar to that of a four-bar linkage.

In the operation of the assembly, the biasing means 24 will be extended at the first position (Fig. 1) wherein the encasement 28 and the cover 26 are engaged/interlocked. When the encasement 28 and the cover 26 are separated, the biasing means 24 undergoes compression. In the initial stage when the encasement 28 and the cover 26 are just separated, the biasing means 24 initially allows the television set to be flipped, such that not much resistance is felt from the biasing means 24. The only force acting on the television set would seem to be that of gravity only. The dampening effect of the biasing means 24 is negligible until the biasing means 24 is parallel with the ground. However, after separating the encasement 28 and the cover 26 beyond the point such that a first surface 58 of the cover 26 is parallel to the ground (Fig. 2), the biasing means 24 would begin to act to resist the motion of the television set. This is to prevent the user from letting the heavy television swing around should the cover 26 slip from the user's hands. Hence, some force will be required from that position to push the television in the cover 26 to the second position (Fig. 3).

The first link 22, second link 34 and the biasing means 24 can be designed to be concealed when the encasement 28 and the cover 26 are engaged together. This may be by the first link 22, second link 34 and biasing means 24 being so arranged as to be in a side-by-side relationship (ie. flush). When the encasement 28 and the cover 26 are engaged together, the first and second links 22, 34 may be bifurcated, with biasing means 24 locating within first link 22 and first link 22 locating within second link 34 to achieve a flush appearance.

The cover 26 may include a transparent screen. The transparent screen may be tinted, coated with an anti-glare coating, treated to be smash-proof, or treated in other ways.

The cover 26 and the encasement 28 may be secured with locks to prevent theft of the LCD plasma television set. When the locks are released, the cover 26 will not drop towards the ground.

The assembly 32 also prolongs the longevity of the LCD plasma television set by not requiring the maintenance personnel to grip tightly to the screen of the television set and inadvertently damaging individual LCDs or the screen panel itself.

- 5 The biasing means 24 can be selected from a group consisting of a coil spring, a hydraulic spring, a pneumatic spring, an elastomer strip, an elastic strip or a gas spring (as illustrated).

10 Whilst there has been described in the foregoing description preferred embodiments of the present invention, it will be understood by those skilled in the technology concerned that many variations or modifications may be made to details of design or construction without departing from the present invention.

15 The present invention extends to all features disclosed either individually, or in all possible permutations and combinations.

CLAIMS

1. An assembly for the support and movement of an object to be mounted relative to a planar surface, the assembly comprising:
 - 5 a backing means for supporting the assembly relative to the planar surface;
at least one first link with a first end rotatably and pivotally attached to said backing means;
at least one second link with an inner end rotatably and pivotally attached to a cover;
 - 10 a second end of said first link rotatably and pivotally connected to said second link at an intermediate length of said second link;
a biasing means having at a first end pivotally attached to said backing means and a second end pivotally attached to said second link;
wherein,
 - 15 said biasing means provides a dampening effect on the movement of said object from a first position to a second position.
2. An assembly as claimed in claim 1, wherein said object is mounted to said cover.
- 20 3. An assembly as claimed in claim 1 or 2, wherein said cover is mounted for pivotal movement relative to said backing means.
4. An assembly as claimed in claim 1, wherein said biasing means provides
25 resistance while moving said object from said first position to said second position.
5. An assembly as claimed in any one of claims 1 – 5, wherein said biasing means provides assistance while moving said object from said second position to said first position.
- 30 6. An assembly as claimed in any of claims 1 – 5, wherein an encasement means is securely attached to said backing means.

7. An assembly as claimed in claim 6, wherein said first end of said biasing means is releasably and pivotally attached to said encasement means.
8. An assembly as claimed in any of claims 1 – 7, wherein a second end of said biasing means is releasably and pivotally attached to an outer end of said second link.
9. An assembly as claimed in any of claims 1 – 8, wherein said cover is pivotally attached to said encasement means.
10. An assembly as claimed in any of claims 7 – 9, wherein said encasement means is integrated with a mounting bracket means for the mounting of the object onto the planar surface.
11. An assembly as claimed in any of claims 1 – 10, wherein said biasing means is at least partially extended at the first position.
12. An assembly as claimed in any of claims 1 – 11, wherein said biasing means is at least partially retracted at the second position.
13. An assembly as claimed in any of claims 1 – 12, wherein said cover and said encasement means can are mutually engageable.
14. An assembly as claimed in claim 13, wherein said first and second links and said biasing means are concealed when said cover and said encasement means are mutually engaged to one another.
15. An assembly as claimed in any of claims 1 – 14, wherein there are at least two of said first links, by each side of said biasing means and the number of said first links attached to said backing means is at least two.

16. An assembly as claimed in any of claims 1 – 15, wherein there are at least one of said second links, attached to said second end of said biasing means and the number of said second links attached to said cover is at least one.

5 17. An assembly as claimed in claim 16, wherein for each combination of said first and said second links, there is one biasing means.

18. An assembly as claimed in claims 1 – 17, wherein said biasing means is a coil spring.

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19. An assembly as claimed in claims 1 – 17, wherein said biasing means is a hydraulic spring.

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20. An assembly as claimed in claims 1 – 17, wherein said biasing means is a pneumatic spring.

21. An assembly as claimed in claims 1 – 17, wherein said biasing means is an elastomer strip.

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22. An assembly as claimed in claims 1 – 17, wherein said biasing means is an elastic strip.

23. An assembly as claimed in claims 1 – 17, wherein said biasing means is a gas spring.