United States Patent

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[54] **COLLAPSIBLE TABLET ARM ASSEMBLIES**
9 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **297/162,** 16/190
[51] **Int. Cl.** **A47b 39/00**
[50] **Field of Search** 297/162; 16/1, 190

[56] **References Cited**

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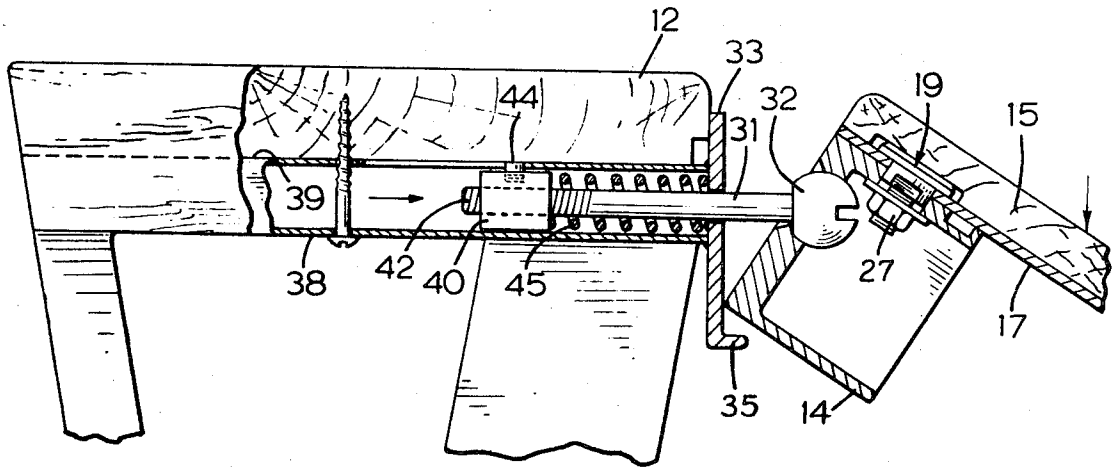
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ABSTRACT: The invention provides a collapsible writing tablet arm pivotally attached to the arm of a chair, such as those commonly found in lecture halls. The tablet arm is movable from a position alongside and below the chair, to a horizontal writing position in front of the chair. When in its horizontal position, the tablet will deflect in any direction on application of excessive force to the tablet, and restore to its horizontal position on removal of the force.



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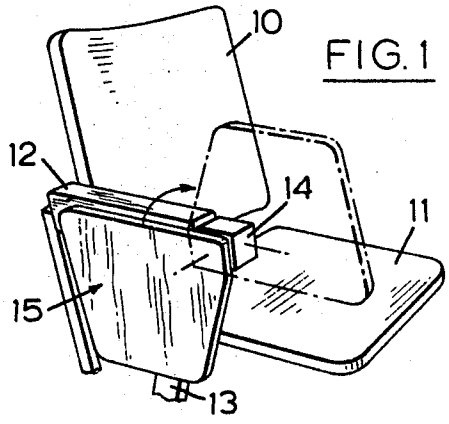


FIG. 1

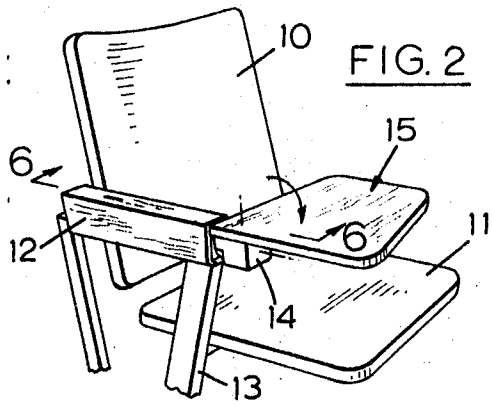


FIG. 2

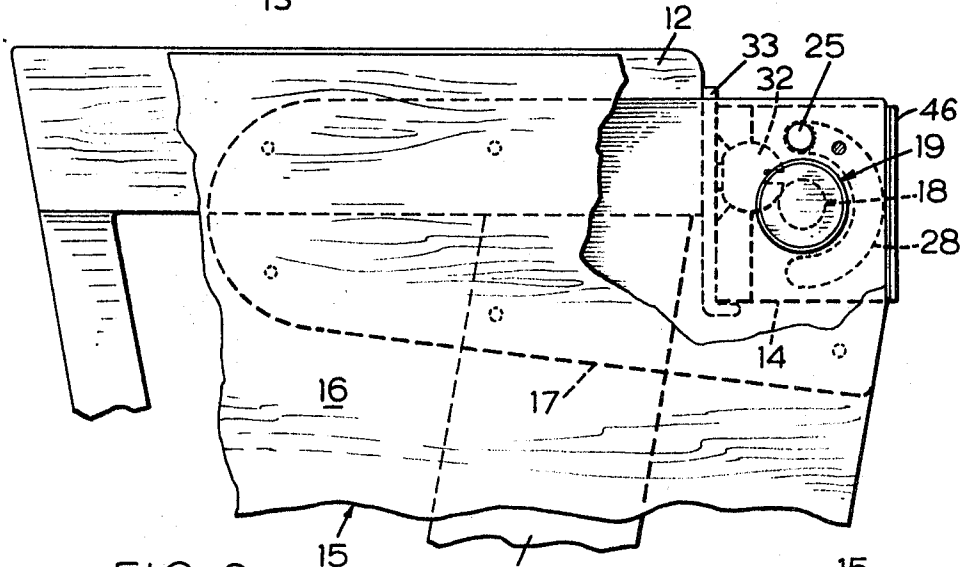


FIG. 3

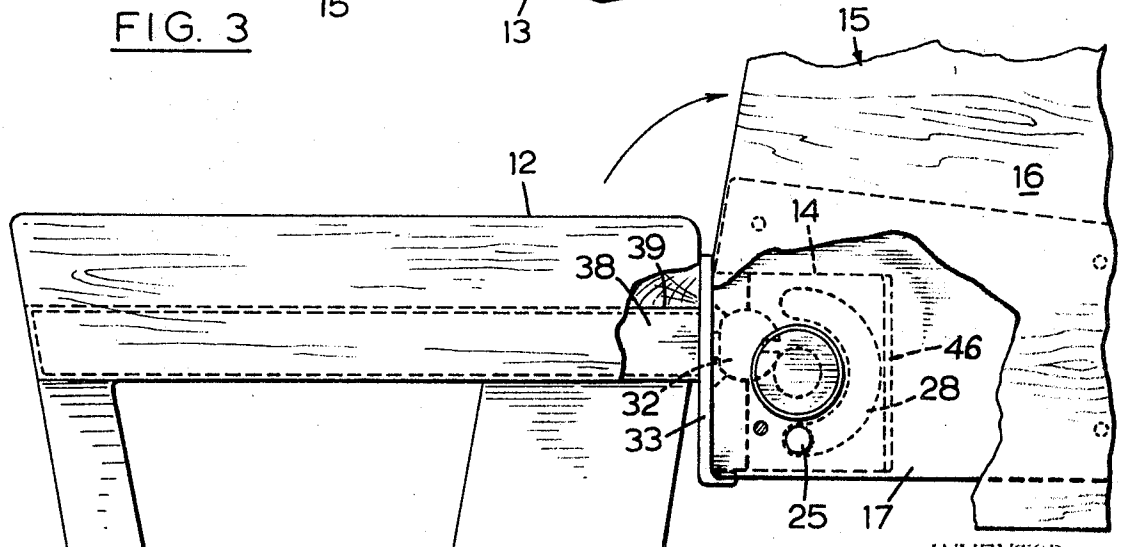


FIG. 4

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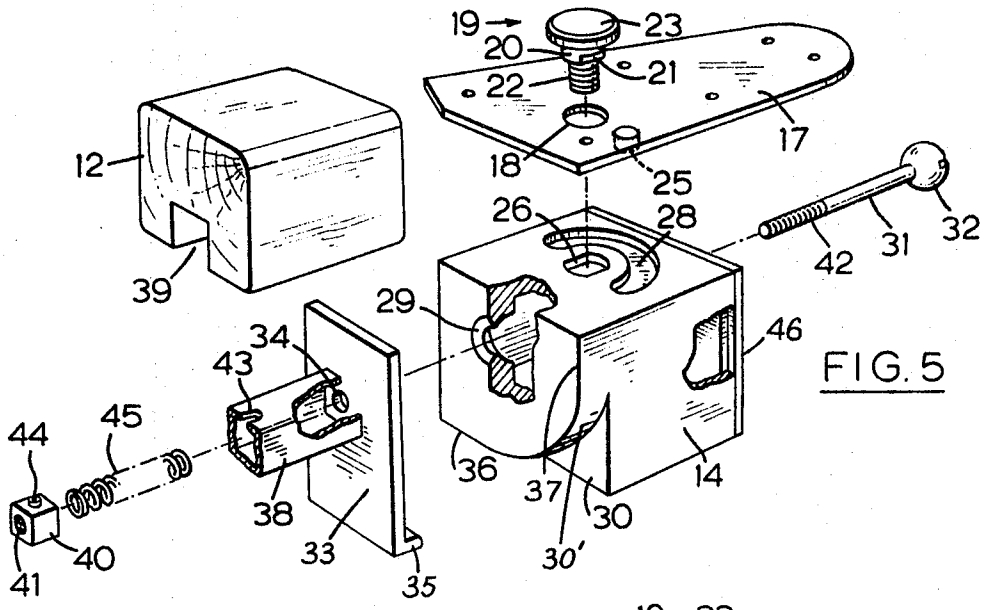


FIG. 5

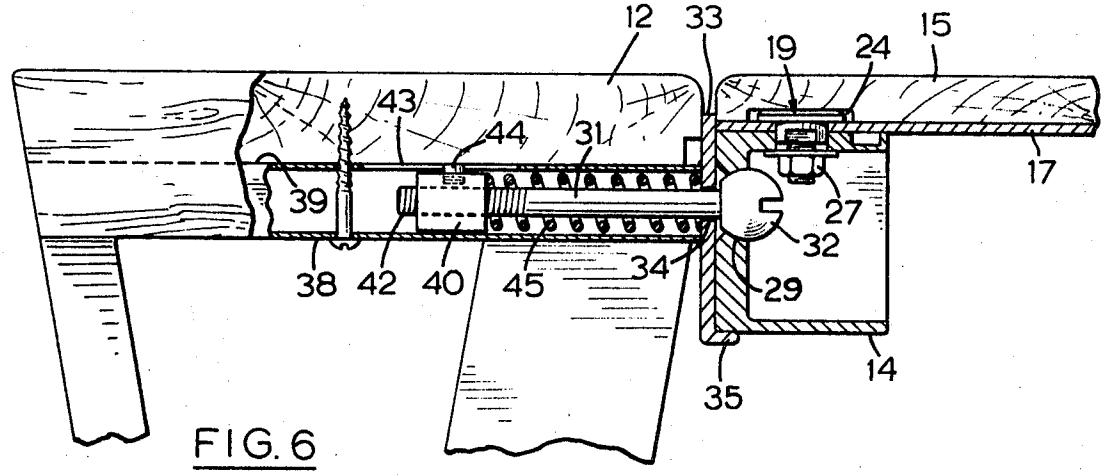


FIG. 6

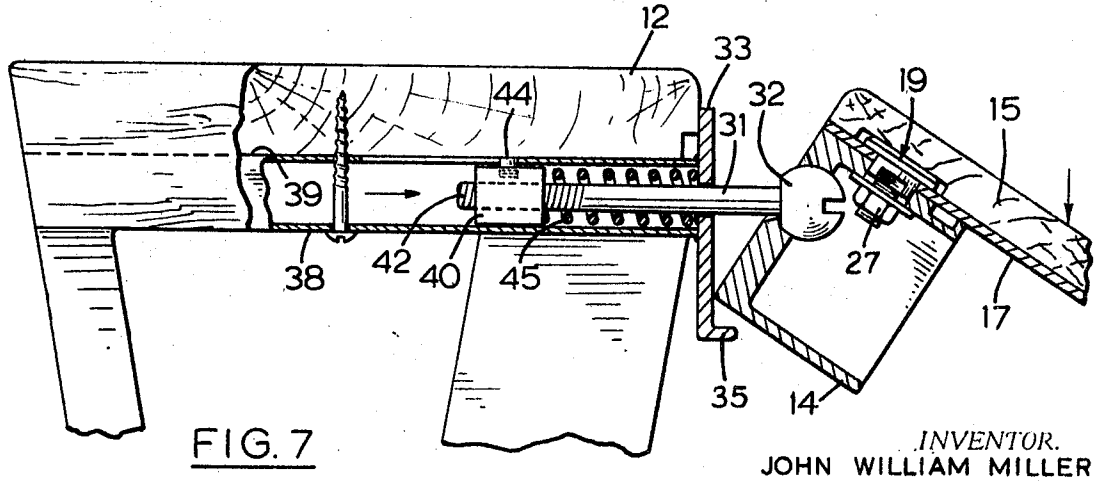


FIG. 7

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COLLAPSIBLE TABLET ARM ASSEMBLIES

This invention relates to collapsible writing tablet assemblies attached to chairs, of the type commonly installed in lecture theatres, classrooms, auditoriums and the like.

In lecture theatres it is common to provide rows of permanently installed chairs, each chair having a writing tablet associated with an arm rest of the chair. To allow easy access to the chair, however, the tablet should be movable between a writing position, in which the tablet is located generally horizontally, and in front of the chair, and an out of the way position in which the tablet is located vertically, and alongside the chair. The tablet thus needs to be rotatable relative to the chair about two different axes, one to move the tablet from the horizontal to the vertical plane, and the other to move the vertically disposed tablet downwardly to its out of the way position alongside the chair.

Such tablet and chair assemblies are however frequently subject to misuse, by application of excessive loads to the tablets in the writing position. Students may sit on the tablets, drop heavy loads onto them, or deflect them by collision, thereby straining and eventually breaking the pivotal attachment means securing the tablet to the arm rest of the chair.

An object of the present invention is to provide a collapsible writing tablet and chair assembly which will withstand such misuse without breaking.

Other objects and advantages of the invention will become apparent from the following description.

Briefly, the invention provides in combination a collapsible writing tablet assembly and a chair to which the tablet is pivotally attached, the tablet being capable of deflection in any direction from its horizontal, writing position on application of excessive force to the tablet in this position, and restoration to its writing position on removal of this excessive force. The writing tablet is able to withstand without downward deflection the application of small downward forces, such as those applied during the course of normal writing operations on the tablet in its horizontal position, but will yield under the application of excessive force, such as the weight of a person sitting on the horizontal tablet.

The means for pivotal attachment of the tablet to the arm rest of the chair suitably comprises an apertured housing in the apertures of which are pivotally received cooperating pivot formations secured to the arm rest and the tablet assembly. A first pivot assembly allows the tablet to be pivoted relative to the housing and the arm rest in a substantially vertical plane between its out of the way position alongside the chair and a second position in which the tablet is located generally vertically and in front of the chair. This first pivot assembly may comprise a bolt passing through an aperture in the tablet structure and received in an aperture in the housing.

In the preferred embodiment of the invention, a second pivot assembly allows the tablet and housing to be pivoted relative to the arm rest through about 90°, to move the tablet from its second position to its horizontal writing position. This pivot assembly also allows the deflection of the tablet previously referred to. Suitably, this second pivot assembly comprises an elongated bolt, the shank of which is slidably secured within the arm rest of the chair, and having a spherical head retained within the housing by means of cooperation with the periphery of an aperture in the housing. The bolt is slidable axially to a limited extent within the housing, and the arrangement is such that deflection of the tablet from its horizontal writing position moves the bolt outwardly with respect to the arm rest. This outward movement is resisted by a spring located within the arm rest. This spring acts to restore the bolt to its initial position on removal of force, so that the tablet then returns to its horizontal position. The minimum force required to cause downward deflection of the tablet can be predetermined by the initial setting of the tension in the spring. The housing and tablet in such an arrangement can also rotate relative to the arm rest about an axis substantially parallel to the axis of the arm rest, the bolt acting as the pivot pin for such rotation.

A specific embodiment of the invention is illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of a collapsible writing tablet and part of its associated chair, with the tablet disposed in a vertical plane;

FIG. 2 is a view similar to FIG. 1 with the tablet disposed in the writing position;

FIG. 3 is a detailed side view of part of the tablet and associated chair structure, with the tablet in the position shown in full lines in FIG. 1, and with parts cut away to show the attachment of the tablet to the chair;

FIG. 4 is a detailed side view similar to FIG. 3, but with the tablet in the position shown in broken lines in FIG. 1;

FIG. 5 is an exploded view with parts cut away, of the tablet and chair pivotal attachment means;

FIG. 6 is a vertical cross section on the line 6–6 of FIG. 2;

FIG. 7 is a view similar to FIG. 6, but with the tablet in a downwardly deflected position.

In the drawings, like reference numerals indicate like parts.

With reference to FIGS. 1 and 2, the chair to which the writing tablet is attached is one of a row of chairs secured together, such as those commonly used in lecture theatres and classrooms, each of which individual chairs has certain structural features in common with its immediate neighbor, such as legs, arm rests, etc. As illustrated, the chair has a back **10**, a seta **11**, a fixed arm rest **12**, and a fixed upright arm supporting member **13**. A pivot housing **14** is pivotally attached to the forward end of the arm rest **12**. A writing tablet **15** is pivotally attached to the pivot housing **14**. The tablet **15** may be turned relatively to the pivot housing **14** in a vertical plane, from an out of the way position by the side of the chair, as shown in full lines on FIG. 1, to an upwardly and forwardly extending position, as shown in broken lines on FIG. 1.

The pivot housing **14** is pivotally attached to the forward end of the arm rest **12**, and can turn relatively thereto about an axis substantially parallel to the axis of the arm rest **12**. When the tablet **15** is pivoted relative to the housing **14** to its upstanding position shown in broken lines in FIG. 1, it is clear of the arm rest **12**. Then the housing **14** and tablet **15** can pivot relative to the arm rest **12**, about the aforementioned axis, to bring the tablet **15** into the horizontal, i.e. writing, position in front of the chair shown in FIG. 2. Pivoting of the tablet **15** and housing **14** in this manner beyond the substantially horizontal position of the tablet is prevented by cooperating formations on the arm rest **12** and the housing **14**, to be more fully described later.

The means by which the tablet **15** may pivot in a vertical plane relatively to the housing **14** will be understood from FIGS. 3, 4 and 5.

As shown in FIGS. 3 and 4, the tablet **15** comprises a surface portion **16**, having a suitably smooth outer surface for writing, and a base plate **17** underlying part of the surface portion **16**, and to which the surface portion is screwed or otherwise secured. The base plate **17** is apertured at **18**, and a large-headed bolt **19** is provided, to extend through the aperture **18**. The shank of the bolt **19** has a smooth circular collar portion **20**, a flat-sided portion **21** and a screw-threaded portion **22**. The head **23** of the bolt **19** is dimensioned so that it will not pass through aperture **18** in the plate **17**. The circular collar portion **20** has an axial length substantially the same as the thickness of the plate **17**, and a cross section to be a smooth fit in the aperture **18** and to allow smooth pivotal movement therebetween. When the bolt **19** is in position through the aperture **18**, the head **23** of the bolt is received in a recess **24** in the surface portion **16** of the tablet (see FIG. 6) to allow convenient interfit of the assembled parts. The base plate **17** is also provided with a depending stop formation **25** adjacent the aperture **18**.

As best seen in FIG. 5, the pivot housing **14** is generally cubic in shape. The surface to which the base plate **17** is pivotally secured is provided with a central aperture **26** to

receive the bolt 19. The central aperture 26 is provided with opposed straight sides to cooperate with the flat-sided portion 21 of the shank of bolt 19. The screw-threaded portion 22, after assembly, extends into the interior of the pivot housing 14, where it is secured by means of a nut 27 (see FIGS. 6 and 7). Thus, the bolt 19 is nonrotatable with respect to the pivot housing 14, but the tablet 15 is rotatable with respect to the pivot housing 14 about the axis of the shank of the bolt 19.

The pivot housing 14 is also provided with an arcuate aperture 28, in which the stop formation 25 on the base plate 17 is received. This arrangement serves to limit the arc of rotation of the tablet 15 with respect to the pivot housing 14.

When the tablet 15 is in the out of the way position shown in full lines in FIG. 1, it is maintained substantially in the position shown by engagement of the stop formation 25 with the upper end of the arcuate aperture 28 as shown in detail in FIG. 3. The tablet 15 may be rotated from this position about the bolt 19, through about 180°, to the position shown in broken lines in FIG. 1, and in detail in FIG. 4, in which the stop formation 25 engages the lower end of the arcuate aperture 28. In this position the tablet is clear of the arm rest 12 and fixed arm-supporting member 13 of the chair, and so it can be moved to the horizontal position shown in FIG. 2.

For this movement to the horizontal or writing position, the tablet 15 and the pivot housing 14 both pivot about an axis substantially parallel to the axis of the arm rest 12. For this purpose, pivot housing 14 is pivotally secured to the end of the arm rest 12, by means shown best in FIGS. 5 and 6. The pivot housing 14 at its rearward face, i.e. the face nearest the end of the arm rest 12, is provided with a substantially centrally disposed circular aperture 29, and an approximately crescent shaped cutaway portion 30 bounded by an arcuate surface 30' the center of curvature of which is the main axis of the arm rest 12, this main axis passing through the center of the aperture 29. An elongated bolt 31 with a generally spherical head 32 is anchored in the arm rest 12 and projects forwardly therefrom, with the head 32 outermost. The head 32 is received within the pivot housing 14. The rear wall of the pivot housing is thickened, and the aperture 29 therein has peripheral walls shaped to cooperate with the spherical head 32 of the bolt. The aperture 29 is dimensioned so that the head 32 cannot be withdrawn therethrough, the peripheral walls of aperture 29 engaging the rearward portion of the spherical head 32 of the bolt 31. The pivot housing 14 is secured to the arm rest 12 by engagement of the bolt head 32 in this manner with the periphery of the aperture 29.

A plate 33 is secured to the forward end of the arm rest 12. The plate 33 is apertured at 34 to allow passage of the shank of bolt 31, and is provided with an integral forwardly extending horizontal lip 35 at the bottom thereof. The lip 35 extends forward a distance less than the forward extent of the cutaway portion 30 of the pivot housing 14.

When the tablet 15 is in the horizontal writing position, as shown in FIG. 6, the bottom edge 36 of the rear face of the housing 14 abuts the lip 35, and thus rotation of the housing 14 and tablet 15 about the bolt 31 to the right of its position shown in FIG. 2 is prevented. However, due to the provision of the cutaway portion 30 in the rear face of the housing 14, rotation of the housing 14 and tablet 15 about the bolt 31 in the opposite direction is permitted, until the tablet 15 assumes the vertical position shown in broken lines in FIG. 1. Further rotation in this direction is prevented by engagement of the side edge 37 with the lip 35. Thus the housing 14 and tablet 15 are allowed to pivot through approximately 90°, between the position illustrated in FIG. 2 and the position shown in dotted outline in FIG. 1. The pivot housing 14 is preferably made of nylon, so that the pivoting action in which it takes part is substantially silent.

By virtue of the manner of attachment of the bolt 31 to the arm rest 12, the pivot housing 14 and tablet 15 can deflect to a limited extent on application of excess force to the horizontal tablet. The downward deflection caused by such application of excess downward force is illustrated in FIGS. 6 and 7.

A metal tube 38 of rectangular cross section is fixedly secured in a recess 39 in the arm rest 12. The tube 38 extends along the axis of the arm rest 12, and its forward end is partially closed by the plate 33. The aperture 34 of the plate 33 is located substantially centrally of the end of the tube 38. Within the tube 38 is located a nylon nut 40, of a shape and size to be a sliding fit but nonrotatable within the tube. The nylon nut 40 has an axially extending screw-threaded aperture 41 for reception of the screw-threaded portion 42 of the shank of the bolt 31, and is provided with a setscrew 44 by means of which the nut 40 may be firmly clamped at the desired position to the shank of bolt 31. The tube 38 is provided along a portion of its upper surface with cutaway portion 43. This allows access to the setscrew 44 and associated parts on assembly of the structure, so that they may be set in their correct initial position.

A coil spring 45 is located within the tube 38, and surrounds the shank of the bolt 31. The rearward end of the spring 45 bears against the nylon nut 40. The forward end of the spring 45 bears against the plate 33. The spring 45 urges the nylon nut 40 towards the rear of the tube 38. On assembly, the initial position of the nylon nut 40 and the tension in the spring 45 is set by means of rotation of the elongated bolt 31 and consequent axial movement of the nut 40 relative to the bolt 31 by screw engagement therebetween. The said screw 44 is then tightened, access to the said screw 44 being provided by the cutaway portion 43 in the tube 38.

When force is applied to the tablet 15, with the tablet in its horizontal, writing position as shown in FIG. 6, this force tends to cause pivotal movement of the housing 14, about the line of contact of the edge 36 of the rear face of the housing 14 with the plate 33. Such rotation causes an outward, pulling force to be exerted by the walls of the aperture 29 in the pivot housing 14 on the spherical head 32 of the bolt 31. This outward force in turn tends to compress the coil spring 45 and slide the nylon nut 40 in the tube 38 to the right as shown in FIG. 6. Such movement is resisted by the coil spring 45.

However, when a sufficiently large force is applied to the tablet 15 to overcome the resistance of the coil spring 45, the tablet 15 and housing 14 will deflect in the appropriate direction, for example as illustrated downwardly to the position shown in FIG. 7. This movement is effectively pivotal movement about the line of contact between an edge, as illustrated the bottom edge 36, of the rear face of the housing 14 and the plate 33. The aperture 29 in the thickened rear wall of the housing 14, as previously mentioned, has peripheral walls shaped to cooperate with the spherical head 32 on the bolt 31, and thus during this movement exerts cam action on the bolt head 32 to move the bolt outwards. Such outward movement slides the nylon nut 40 within the tube 38, compressing the spring 45. On release of the applied downward force, the spring 45 acts to restore the tablet 15 and housing 14 to the horizontal position shown in FIG. 6.

The extent of permitted deflection of the tablet 15 is limited substantially to that shown in FIG. 7. Further movement, instead of exerting an outward force on the bolt 31, would exert a bending force thereon, and this of course is prevented by the strong, rigid nature of the bolt 31.

Thus on assembly of the structure, the tension in the spring 45 is set so that it will withstand the application of downward force to the tablet 15 consistent with its use for normal writing operations. The tablet will, however, deflect on application of excessive force thereto.

It will be understood that the form of the invention herewith shown and described is a preferred example, and that various modifications can be carried out without departing from the spirit of the invention or the scope of the appended claims.

What I claim as my invention is:

1. In combination, a collapsible writing tablet, a chair having an arm rest, and a pivot assembly pivotally connecting the tablet to the arm rest of the chair, said pivot assembly including:

a first pivotal connection means allowing pivotal movement of the tablet in a substantially vertical plane between a first position in which the tablet is generally vertically disposed alongside the chair, and a second position in which the tablet is disposed generally vertically and in front of the chair;

and a second pivotal connection means allowing pivotal movement of the tablet about an axis generally parallel to the axis of the arm rest, from the said second position to a third position in which the tablet is disposed generally horizontally and in front of the chair;

said second pivotal connection means comprising means to allow deflection of the tablet relative to the arm rest from the third position on application to the tablet of a greater than predetermined force, and restoration to the third position on removal of said force.

2. The combination of claim 1, wherein said predetermined force is slightly greater than the force applied during normal writing use.

3. The combination of claim 1, wherein the pivot assembly comprises an apertured housing and pivotal formations associated with the tablet and the arm rest respectively, which pivotal formation cooperate with the apertures of said housing.

4. The combination of claim 3 wherein the second pivotal connection means comprises an elongated bolt with a spherical head, the shank of the bolt being secured to the arm rest and projecting through an aperture in the rearward face of said housing, the periphery of said aperture having a configuration pivotally to cooperate with the spherical head of said bolt, and a size to retain the head of said bolt within the housing.

5. The combination of claim 4 wherein the elongated bolt is slidably secured within the arm rest and is urged by a spring towards its rearmost position within the arm rest.

6. The combination of claim 5 wherein the housing is adapted to pivot about the line of contact between the bottom edge of the housing and the arm rest structure on downward deflection of the tablet, and the periphery of the aperture is adapted to cooperate with the spherical head of said bolt to urge the bolt forwardly relative to the arm rest against the resistance of said spring on downward deflection of the tablet.

7. The combination of claim 4 wherein the arm rest includes a lipped plate secured to the forward end thereof and the housing is of generally cubic shape and has a cutaway portion on its rearward face at one corner thereof, rotation of the housing and tablet relative to the arm rest about the axis generally parallel to the axis of the arm rest being limited to about 90° by abutment of edges of the housing adjacent said cutaway portion against the lip of said plate at the extremities of said rotation.

8. The combination of claim 3 wherein the first pivotal connection means comprises a bolt passing through an aperture in the tablet structure and received in an aperture in the housing, the housing being of generally cubic shape and said first pivotal connection means being located on a face of said housing adjacent to the face of said housing on which said second pivotal connection means is located.

9. The combination of claim 8 wherein the face of said housing on which said first pivotal connection means is located is provided with an arcuate aperture, and the tablet structure is provided with a stop formation received in said arcuate aperture, thereby limiting pivotal movement of the tablet relative to the housing to about 180°.