March 14, 1967 A. A. WIEBE 3,309,137

SEATING ARRANGEMENT

Filed May 13, 1966

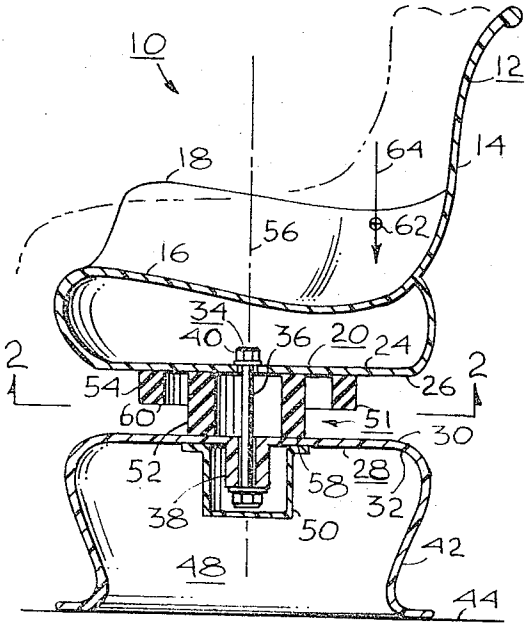


Fig. 1

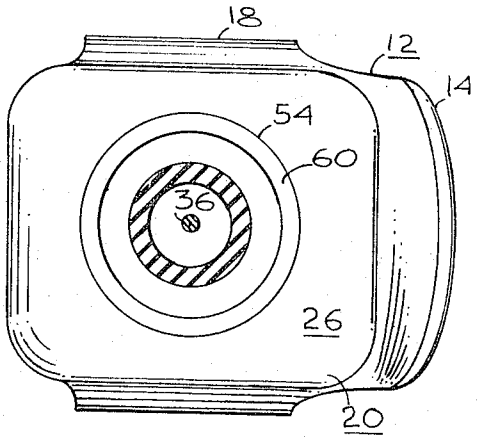


Fig. 2

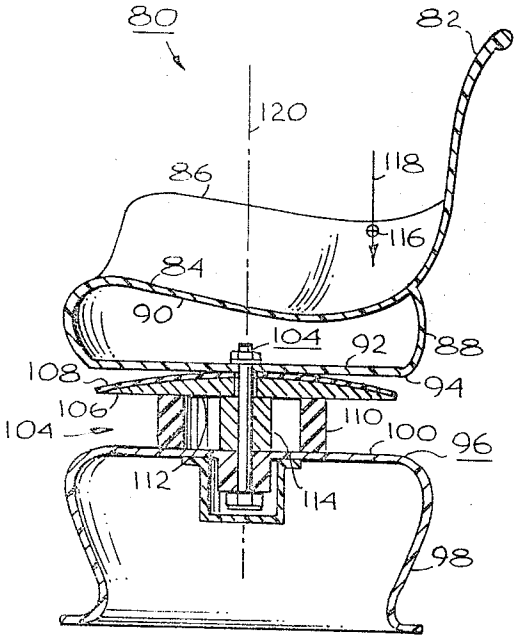


Fig. 4

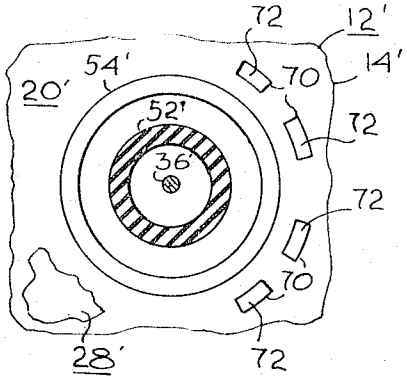


Fig. 3

INVENTOR.
AARON A. WIEBE

BY

Don B Finkelstein
ATTORNEY

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SEATING ARRANGEMENT

Aaron A. Wiebe, 10 Lassen Place, Santa Barbara, Calif. 93105

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This invention relates to the seating art and more particularly to an improved swiveling and tilting type of seating arrangement.

In many applications, particularly vehicles such as boats, it is often desirable to have a seating arrangement that will swivel or pivot to allow rotation of the seating means to any desired position as well as a tilting action. Preferably, of course, the pivotal or swivel motion should allow full 360 degree rotation and the tilting should provide for tilting in any direction. Such characteristics are particularly required in, for example, seating arrangements utilized on fishing boats by fishermen in large game fishing. For such applications, it is also often desirable that when the seating arrangement is occupied, that it be restrained from swiveling or pivotal motion and that tilting be cushioned to avoid transmission of shock loadings to the occupant thereof.

The above desiderata have not been achieved, to the best of applicant's knowledge, in any seating arrangement heretofore available.

Applicant's improved seating arrangement provides the above desiderata, in one embodiment of applicant's invention, by having a seating arrangement in which there is a chair means having a seating portion, a back portion and, if desired, side arm portions. An upper plate is spaced from the underside of the seat portion and is attached to the chair means. In the preferred embodiment of applicant's invention, the upper plate is flexible and yieldingly resilient to function in the manner of a diaphragm spring.

A lower plate is spaced from the upper plate and the lower plate also is flexible and resilient in the manner of a diaphragm type spring.

A pivot means comprising, in this embodiment of applicant's invention, a bolt passes through and pivotally couples together the upper plate and the lower plate and the axis of the pivot is approximately aligned in the center of the seat portion of the chair means.

Intermediate the upper plate and the lower plate, there is a flexible, resilient and compressible, elastically deformable means which means has at least one friction surface for frictionally engaging either the upper plate or the lower plate to resist pivotal motion between the chair means and the lower plate. The flexible, resilient, compressible, elastically deformable means acts as both a spring to absorb vertically induced shocks and loads and also, through the friction surface thereof, provides, when desired, resistance to pivotal motion.

In this embodiment of applicant's invention, the center of gravity of the chair means when occupied is offset from the axis of the pivot and at least a portion of the flexible, resilient, compressible, elastically deformable means is spaced from the axis of the pivot so that when the chair means is occupied, the friction surface induces a frictional force proportionate to the weight of the occupant and the chair means to resist a pivotal motion. Because of the offset from the axis of the pivot, the comparatively smaller amount of force is required to resist pivotal motion than for the friction surface being closer to the axis of the pivot.

In this embodiment of applicant's invention, there is also provided a slight frictional force retarding pivotal motion between the chair means and the lower plate even when the seat is unoccupied. However, this force is made comparatively small so that relatively free pivotal motion of the chair means with respect to the lower plate may be

obtained when the seat is unoccupied and the retarding force merely prevents freely pivoting and swinging motion of the chair which would be undesirable in, for example, boat applications.

The lower plate means is coupled to or a part of a seat support that is attached to the floor. In boat application, it is often desirable to have the lower plate means comprise the upper surface of a gas or fuel tank since diaphragm spring type action is available and provides a double utilization of a component on the boat. When the fuel tank is utilized, it is desired that the entire seating arrangement be fabricated of materials that is free of spark producing components. For example, the chair means and the upper plate may be fabricated from fiber, reinforced, thermosetting plastic and the flexible, resilient, compressible, elastically deformable means may be, for example, neoprene.

In utilizing this seating arrangement, it will be appreciated that the chair means may be swiveled when the chair is unoccupied or when the weight of the occupant is removed therefrom. Thus, a fisherman utilizing such a chair may reposition the chair means by rising slightly from the chair means and pivoting the chair means with respect to the lower plate by his knees, thus leaving both hands free for control of the fishing rod. However, when such a fisherman reoccupies the chair means, the frictional forces between the flexible, resilient, compressible, elastically deformable means and either the upper plate or the lower plate resists such pivotal motion and essentially locks the chair in the desired position. Further, the flexible, resilient, compressible, elastically deformable means also act as a cushion or spring to allow tilting motion in any direction.

The above and other objects are explained in greater detail in the following description taken together with the accompanying drawings wherein similar reference characters refer to similar elements throughout and in which:

FIGURE 1 is a sectional representation of one embodiment of applicant's invention;

FIGURE 2 is a sectional view on the line 2—2 of FIGURE 1;

FIGURE 3 illustrates another embodiment of applicant's invention; and

FIGURE 4 is a sectional view of another embodiment of applicant's invention.

Referring now to FIGURE 1, there is shown a seating arrangement generally designated **10** according to one embodiment of applicant's invention. As shown on FIGURE 1, the seating arrangement **10** comprises a chair means **12** having a back portion **14** and a seat portion **16**. If desired, the chair means **12** may also be provided with side arm portions **18**.

An upper plate **20** is spaced from the underside **22** of the seat portion **16** and is coupled to the chair means **12**. As shown on FIGURE 1, the upper plate **20** and the chair means **12** may be unitarily molded from, for example, a fiber reinforced thermosetting plastic material. The upper plate **20** has an upper surface **24** and a lower surface **26**, and, in the preferred embodiment of applicant's invention, the upper plate **20** is flexible and resilient to act as a diaphragm spring such as a Belleville washer.

A lower plate means **28** having an upper surface **30** and a lower surface **32** is spaced from the upper plate **20** and is pivotally connected thereto by pivot means **34**. In this embodiment of applicant's invention shown on FIGURE 1, pivot means **34** comprises a bolt **36** passing through a hub portion **38** on the lower surface **32** of a lower plate **28** and restrained by bolt **40** against the upper surface **24** of the upper plate **20**. While the details of the pivot means **34** may be varied, it will be

appreciated that the pivot means **34** allows full rotation of the chair means **12** with respect to the lower plate **28** through a full 360 degree rotation.

The lower plate **28** is, as shown on FIGURE 1, a part of a support **42** that, for example, may be coupled to the deck surface **44**. In some embodiments of applicant's invention, it may be desired that the support **42** be a fuel tank and that the volume **48** internal of support **42** be filled with fuel. In such an embodiment, the seating arrangement **10** is preferably made of non-spark producing components and to protect against the possibility of any spark being produced by rotation of, for example, the bolt **36** a cap means **50** may be coupled to the underside **32** of the lower plate **28** to completely close the connection of the bolt **36** to the lower plate **28**. The lower plate **28** is also flexible and resilient as a diaphragm spring and may also be similar to the Belleville washer.

Intermediate the lower plate **28** and the upper plate **20**, there is provided a flexible, resilient, elastically deformable means **51** which, in this embodiment of applicant's invention, comprises a first pad **52** and a second pad **54**. Thus, the first pad **52** and the second pad **54** are, in this embodiment of applicant's invention, annular in shape and concentrically aligned with the axis **56** of the pivot means **34**. The first pad means **52** has a lower surface **58** that is a friction surface for frictionally engaging the upper surface **30** of the lower plate **28**. The frictional force produced by the engagement of the friction surface **58** of the first pad **52** with the upper surface **30** of the lower plate **28** is enough to restrain the chair means **12** from pivotal motion about the axis **56** when the chair means **12** is unoccupied since the first pad **52** and the second pad **54** are bonded or otherwise secured to the lower surface **26** of the upper plate **20**. By adjusting the amount of compression obtained in the first pad **52** through the compression applied by the bolt **36**, the unoccupied friction force may be varied, as desired.

The second pad **54** has a lower surface **60** that is adapted to frictionally engage the upper surface **30** of the lower plate **28** when the chair means **12** is occupied as, for example, by an occupant indicated on FIGURE 1 by phantom line.

It will be appreciated that when the chair means **12** is so occupied, the first pad **52** is further compressed thereby increasing the force produced by the frictional engagement of the friction surface **58** thereof against the upper surface **30** of the lower plate **28** and, depending upon the tilting of the chair means **12** in any direction.

As shown on FIGURE 2, both the first pad **52** and the second pad **54** are complete annulus pads and therefore both the tilting action and the appropriate frictional restraining action is available independently of the relative position between the lower plate **28** and the chair means **12**.

Thus, the second pad **54** has the friction surface **60** thereof spaced from the upper surface **30** of the lower plate for the condition of the chair being unoccupied but, when the chair means **12** is occupied, at least a portion of the friction surface **60** engages the upper surface **30** of the lower plate **20** to resist pivotal motion about the axis **56**. Since the second pad **54** is spaced at a greater distance from the axis **56** than the first pad **52**, the frictional force produced by the friction surface **60** provides a greater torque when the chair is occupied for resisting such pivotal rotation of the chair means **12**.

In general, the weight of the chair means **12** is comparatively small compared to the weight of an occupant thereof and consequently applicant has found that the combined center of gravity of an occupant of the chair means **12** and the chair means **12**, such as indicated by the mark **60**, is towards the back portion **14** of the chair means **12** and consequently the axis of operation of the center of gravity **64** is spaced from the axis **56** of the pivot means **34** in the preferred embodiment of applicant's invention. Thus, the flection of the upper plate **20** and/or the lower plate **28** which is of a yieldingly resistant nature as is provided by the diaphragm spring-type action thereof, allows contact between the friction surface **60** and the upper surface **30** of the lower plate **28** to provide a friction force therebetween that essentially locks the chair means **12** with respect to the lower plate **28** in the position selected by the occupant.

In boat applications, applicant has found that the resilient flexibility of the upper plate **20** and lower plate **28**, as well as the compressible, elastically deformable nature of the pads **52** and **54** absorb both vertical, fore and aft and lateral shocks that may be transmitted to the chair means **12** and thus provides a much more comfortable ride in vehicles than has heretofore been obtainable.

It will be appreciated that the further the separation between the axis **64** of the center of gravity **62** and the axis **56** of the pivot **34**, there will be greater deflection of the upper plate **20** and/or the lower plate **28** and consequently a greater torque can be obtained to resist pivotal motion of the chair means **12** when occupied.

When the chain means **12** is utilized on fishing boats in game fishing, applicant has found that it is often desirable to provide additional compressible, elastically deformable pads to provide a greater locking torque for the prevention of rotation of the chair means **12** with respect to the lower plate **20**. Such an arrangement is illustrated in FIGURE 3 wherein there is shown a chair means **12'** similar to the chair means **12**. The view of FIGURE 3 is similar to the view taken of FIGURE 2 to illustrate the variation in the flexible, compressible, elastically deformable pads. An upper plate **20'** has coupled thereto the first pad means **52'** and a second pad means **54'**, which components are similar to the upper plate **20**, first pad **52** and second pad **54** illustrated in FIGURES 1 and 2. In addition, there is also provided a plurality of third pads **70** which are also compressible and elastically deformable and fabricated of materials similar to that utilized for fabricating the first pad **52'**, second pad **54'** which, as noted above, may be neoprene. In the operation of the embodiment of the invention shown in FIGURE 3, the third pad means **70**, for the condition of the chair means **12'** being unoccupied, is spaced from the lower plate **20'**. However, when the chair means **12'** was occupied and, in particular, when it was tilted rearwardly towards the back portion **14'** thereof, the friction surfaces **72** of the third pad **70** would engage the lower plate **28'** and, since there is a greater distance from the pivot **36'**, than either the first pad **52'** or second pad **54'**, a greater locking torque would be provided.

It will be appreciated that variations in the exact shape and configuration of the first pad **52**, second pad **54** or third pad **70** as illustrated variously in FIGURES 1, 2 and 3 may be made. That is, first pad **52** and second pad **54** could be made in segmented portions as illustrated for third pad **70**, and third pad **70** could be made in a form of the arc of a cylinder. Thus, many variations of the shape of the pads may be made within the scope of applicant's invention herein.

FIGURE 4 illustrates another embodiment of applicant's invention. As shown thereon, there is a chair means **80** which may be similar to the chair means **12** illustrated in FIGURES 1 and 2 and is provided with a back portion **82**, a seat portion **84**, and if desired, side arm portions **86**. An upper plate **88** is coupled to the chair means **80** and is spaced from the lower surface **90** of the seat portion **84**. The upper plate **88** has an upper surface **92** and a lower surface **94**.

There is also provided a lower plate **96** which, for example, may be similar to the lower plate **28** shown on FIGURES 1 and 2 and be part of a support structure **98** which also may be similar to the support structure **42**.

Both the lower plate **96** and the upper plates **88** are flexible, resilient and of a diaphragm spring-type construction for yieldingly resisting deformation. A lower plate **96** has an upper surface **100** and a lower surface

102 and is spaced from the upper plate 88. A pivot means 104 which may be similar to the pivot means 34 shown on FIGURE 2, is provided to pivotally couple the chair means 80 to the lower plate 96 to allow full 360 degree pivotal rotation therebetween. Since the support 98 is generally secured to other structure, the chair means 80 is thus free to pivot about the pivot means 104 in any direction relative to the support means 98. As noted above, the support means 98 may be a part of a fuel tank structure, if desired.

Intermediate the upper surface 100 of the lower plate 96 and lower surface 94 of the upper plate 88, there is provided a flexible, resilient, substantially deformable means 104. As shown on FIGURE 4, the flexible resilient, compressible, elastically deformable means 104 is comprised of a rigid plate means 106 having an upper surface 108 that is a friction surface for frictionally engaging the lower surface 94 of the upper plate 88. Thus, the surface 108 may comprise, for example, a neoprene coating applied to the rigid plate 106. As shown on FIGURE 4, the friction surface 108, for the condition of the chair means 80 being unoccupied, frictionally engages a portion of the lower surface 94 of the upper plate 88 in regions adjacent the pivot 104.

A compressible, elastically deformable means such as pad means 110 is coupled to the lower surface 112 of the rigid plate 106 and the upper surface 100 of the lower plate 96 and provides the shock mounting and shock isolation provision for minimizing the transmission of shock from the support 98 to the chair means 80 and for allowing tilting motion of the chair means 80 with respect to the lower plate 96 in any direction.

In this embodiment of applicant's invention, a rigid support means 114 may be coupled to the upper surface 100 of the lower plate 96 and bear against the lower surface 112 of the rigid plate 106 to provide spacing therebetween.

The center of gravity 116 of an occupant and the chair means 80 act along the axis 118, which, in this embodiment of applicant's invention, is also preferably spaced from the axis of rotation 120 of the pivot means 104.

When the chair means 80 is occupied, there is deflection of the upper plate 88 and/or the lower plate 96 and additional surface areas of the lower surface 94 of the upper plate 88 come in contact with the friction surface 108 of the rigid plate 106 in regions spaced from the pivot means 104. The frictional force thus produced provides a greater torque and essentially locks the chair means 80 in any desired position relative to the lower plate 96 when the chair means 80 is occupied.

The frictional force that is exerted between the lower surface 94 of the upper plate 88 and the upper surface or friction surface 108 of the rigid plate 106 when the chair means 80 is not occupied is adjusted by adjusting the compression therebetween provided by the pivot means 104 and by the shape of the relative components. Thus, the friction force produced by the condition of the chair means 80 being unoccupied is sufficient to hold the chair and prevent it from freely pivoting about the pivot means 104 but yielding to forces to rotate the chair means 80 when it is so desired.

This concludes the description of applicant's invention of an improved seating arrangement. From the above, it can be seen that applicant has provided an improved seating arrangement in which the chair means may be comparatively easily swiveled or pivoted when unoccupied, but automatically locked in any desired position when occupied. Further, such locking effect is automatically achieved when the chair is occupied and no special operations are required to lock the chair. It will be appreciated that those skilled in the art may find many variations and adaptations of applicant's invention herein. Therefore, the following claims are intended to cover all variations and adaptations falling within the true scope and spirit of applicant's invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. An improved seating arrangement comprising, in combination:
- a chair means having a back portion and a seat portion;
- an upper plate having an upper surface spaced from seat portion of said chair means and coupled thereto, and a lower surface;
- a lower plate having an upper surface spaced from said lower surface of said upper plate, and a lower surface;
- pivot means for pivotally coupling said upper plate to said lower plate to allow pivotal motion of said chair means about the axis of said pivot means relative to said lower plate;
- a flexible, resilient, compressible, elastic deformable means intermediate said lower surface of said upper plate and said upper surface of said lower plate and having at least one friction surface for frictionally engaging one of said upper plate and said lower plate to resist said relative pivotal motion.

2. The arrangement defined in claim 1 wherein said upper plates and said lower plates are flexible and resilient.

3. The arrangement defined in claim 2 wherein:
- said at least one frictional surface resists said pivotal motion with a first force for the condition of said chair means unoccupied, and resists said pivotal motion with a second force greater than said first force for the condition of said chair means occupied.

4. The arrangement defined in claim 3 wherein said pivot means engages said upper plate in a spaced apart relationship to the axis of the center of gravity of said chair means and an occupant thereof for the condition of said chair means occupied.

5. The arrangement defined in claim 2 wherein:
- said chair means, said upper plate, said lower plate and said compressible, elastic deformable means are fabricated of materials free of spark producing structure.

6. The arrangement defined in claim 2 wherein said compressible, elastically deformable means comprises:
- a rigid pleat means intermediate said lower surface of said upper plate and said upper surface of said lower plate and having an upper surface engaging said lower surface of said upper plate at a lower surface spaced from said upper surface of said lower plate, and said upper surface of said rigid plate means comprises said at least one friction surface;
- and a flexible, resilient, compressible, elastically deformable pad coupled to said lower surface of said rigid plate means and to said upper surface of said lower plate for yieldingly resisting through compression loads imposed on said chair means.

7. The arrangement defined in claim 6 wherein said compressible, elastically deformable means further comprises:
- a rigid spacer means coupled to said upper surface of said lower plate and frictionally engaging said lower surface of said rigid plate means;
- said pad comprises:
  - an annulus coupled to said rigid plate means and to said upper surface of said lower plate means in spaced apart relationship to said pivot means;
- and said upper plate elastically deforms for the condition of said chair means occcupied to provide said frictional engagement between said lower surface of said upper plate and said friction surface of said rigid plate means in regions spaced from said pivot means;
- and said pivot means engages said upper plate in a spaced apart relationship to the axis of the center of gravity of said chair means and the occupant thereof for the condition of said chair means occupied.

8. The arrangement defined in claim 2 wherein said compressible, elastically deformable means comprises:
- a first compressible, elastically deformable pad having an upper surface coupled to said bottom surface of

said upper plate and a lower surface frictionally engaging said upper surface of said lower plate for the condition of said chair means unoccupied;

a second compressible, elastically deformable pad having an upper surface coupled to said lower surface of said upper plate and having a lower surface spaced from said upper surface of said lower plate for the condition of said chair means unoccupied and said lower surface of said second compressible, elastically deformable pad frictionally engaging said upper surface of said lower plate for the condition of said chair means occupied, and said lower surfaces of said first and said second pads comprising said friction surface for resisting said pivotal motion.

9. The arrangement defined in claim 8 wherein:

said first and said second pads each comprises an annulus, and said first pad is spaced a first distance from said pivot means and said second pad is spaced a second distance greater than said first distance from said pivot means;

and said pivot means engages said upper plate in a spaced apart relationship to the axis of the center of gravity of said chair means and the occupant thereof for the condition of said chair means occupied.

10. The arrangement defined in claim 9 and further comprising:

at least one third compressible, elastically deformable pad having an upper surface coupled to said lower surface of said upper plate in regions adjacent said back portion of said chair means, and a lower surface spaced from said upper surface of said lower plate for a condition of said chair unoccupied, and said lower surface of said third pad means frictionally engaging said upper surface of said lower plate for the condition of said chair means occupied and tilted rearwardly towards said back portion of said chair means to resist said relative pivotal motion.

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FRANK B. SHERRY, *Primary Examiner.*

G. O. FINCH, *Assistant Examiner.*