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Draughon

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(54) **ADJUSTABLE PNEUMATIC ARMREST FOR A CHAIR**

(76) Inventor: **Roman Draughon**, 1702 Alexander Ct., Sheboygan, WI (US) 53081

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(52) **U.S. Cl.** **297/411.35**; 297/411.31; 297/411.36

(58) **Field of Classification Search** 297/411.36, 297/411.37, 411.38, 411.35, 411.2, 115, 297/116, 411.31; 29/428
See application file for complete search history.

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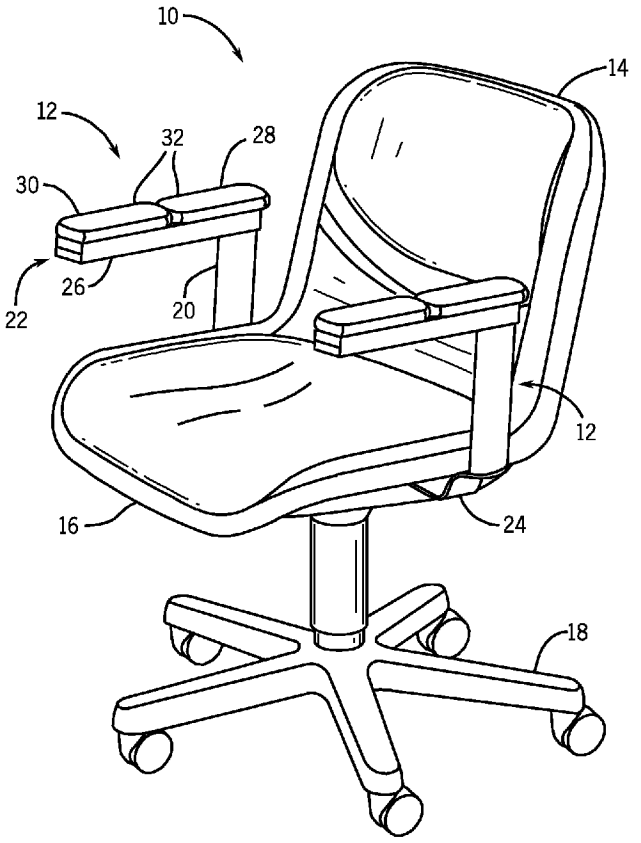
Primary Examiner—Milton Nelson, Jr.
(74) *Attorney, Agent, or Firm*—Ziolkowski Patent Solutions Group, SC

(57) **ABSTRACT**

An apparatus and method for providing an adjustable armrest. The adjustable armrest includes a horizontal armrest support, a fixed rear armpad and a slideable front armpad able to translate along the horizontal armrest support in a lengthwise direction. The adjustable armrest also includes a vertical member connected to the horizontal armrest support to bear the horizontal armrest support. The vertical member includes a gas-charged piston to vertically adjust a height of the horizontal armrest support. On the vertical member is a manually operated control used to actuate the gas-charged piston to vertically adjust a height of the horizontal armrest support. Additionally, the horizontal armrest support is configured to pivot around a connection point to the gas-charged piston.

20 Claims, 5 Drawing Sheets



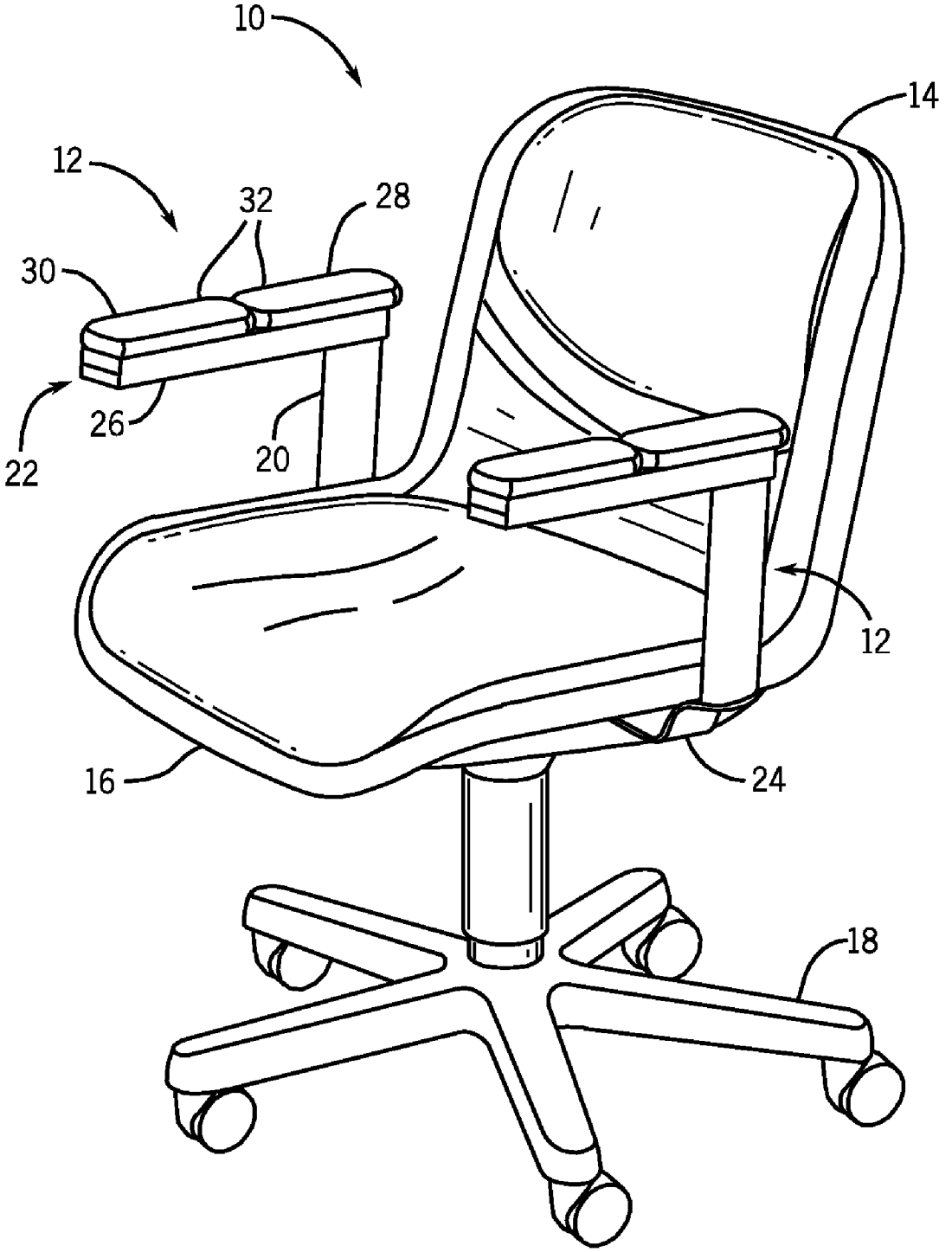


FIG. 1

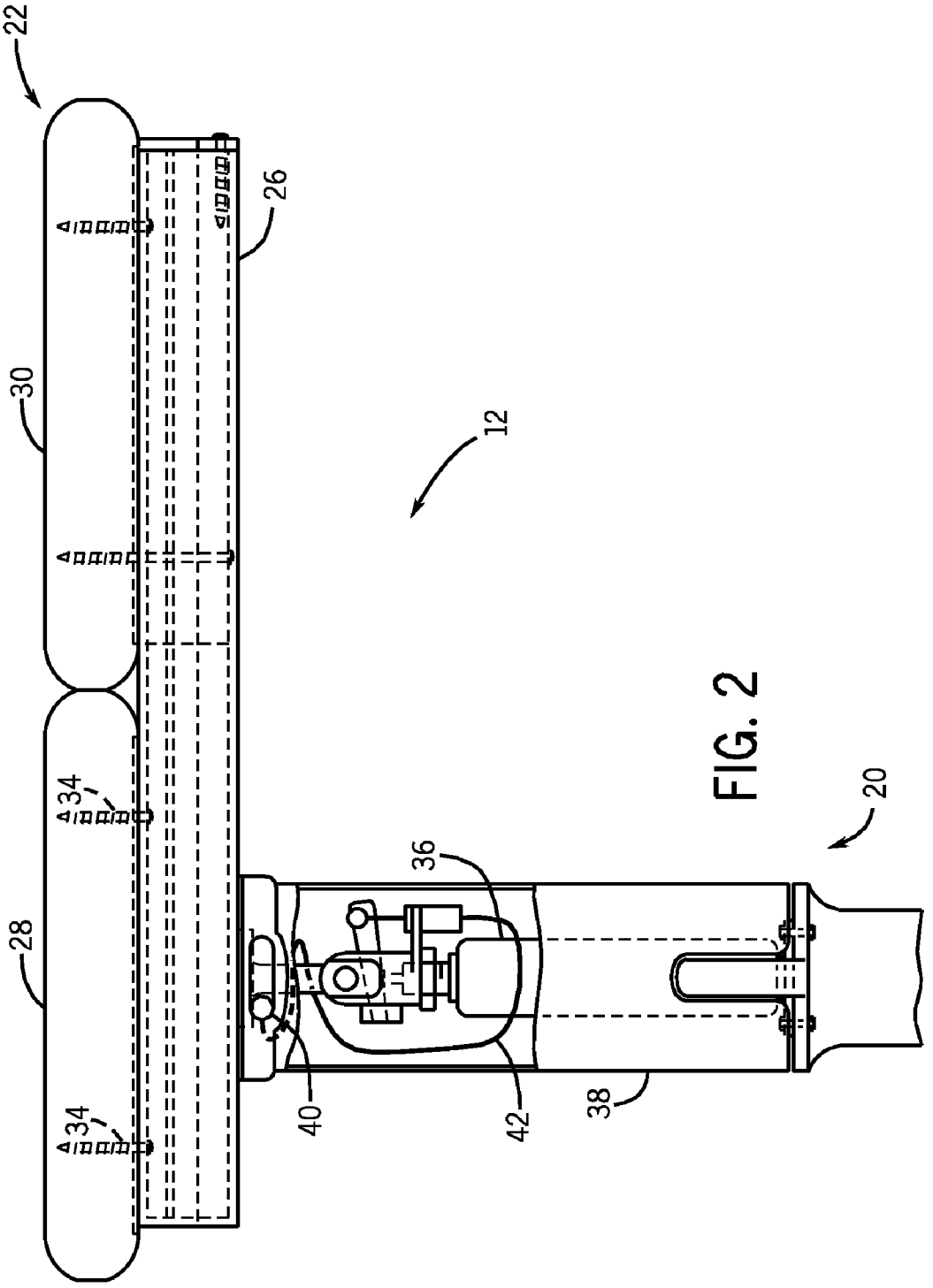


FIG. 2

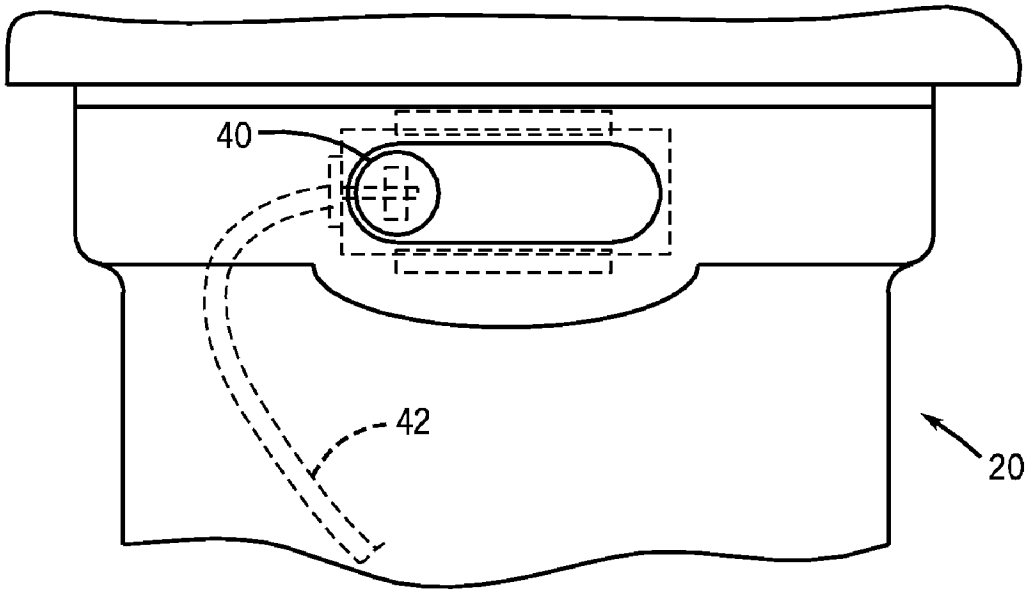


FIG. 3

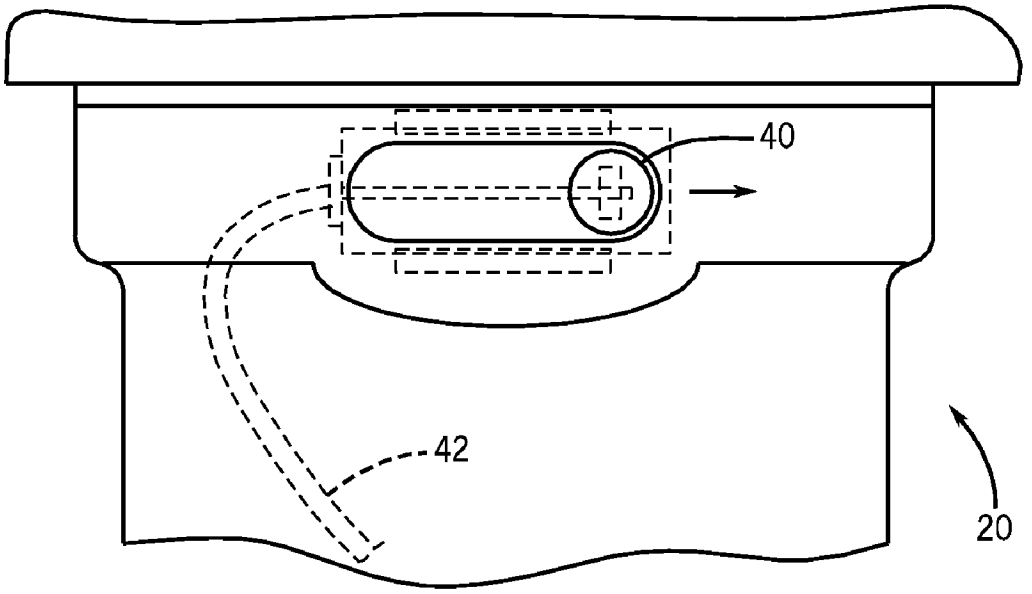


FIG. 4

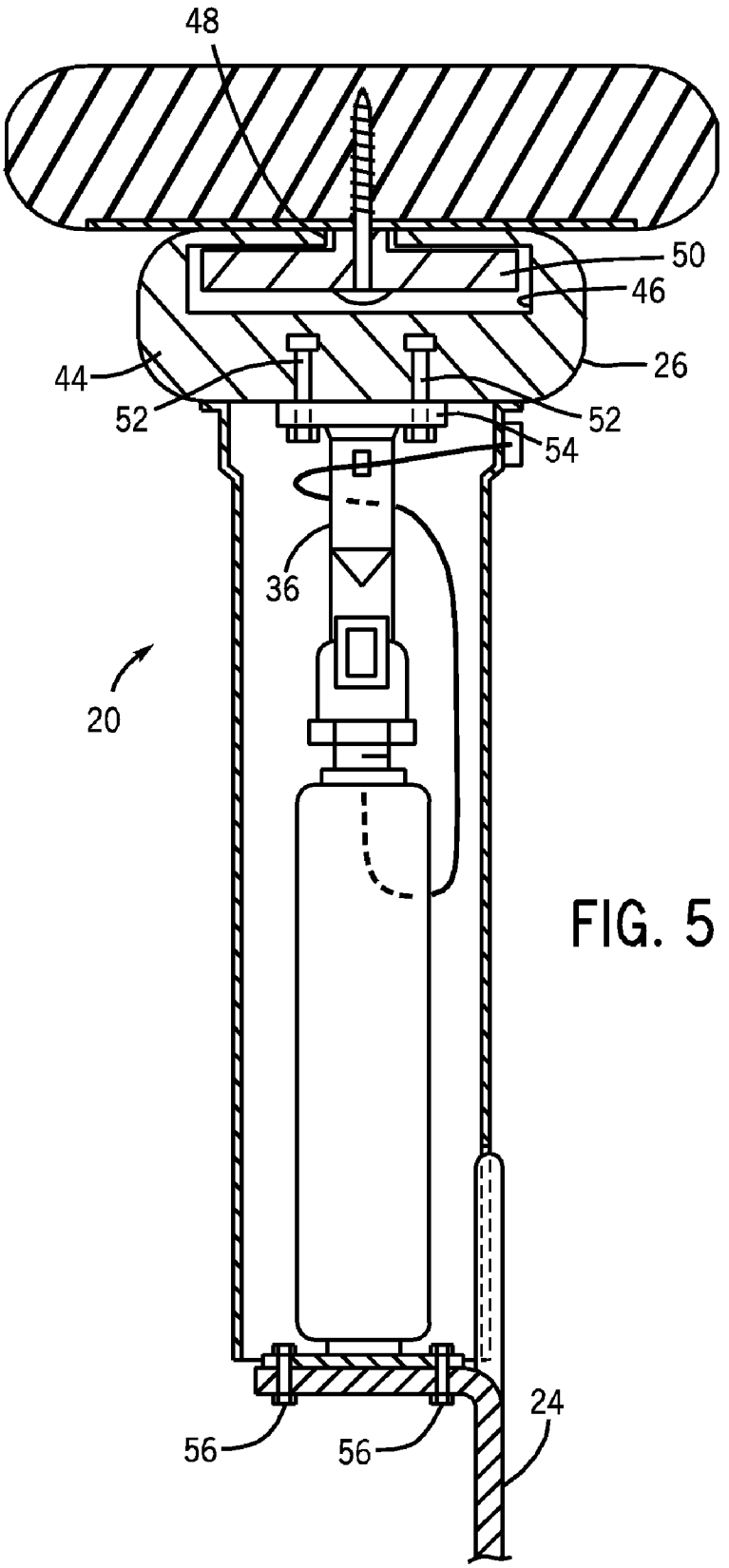


FIG. 5

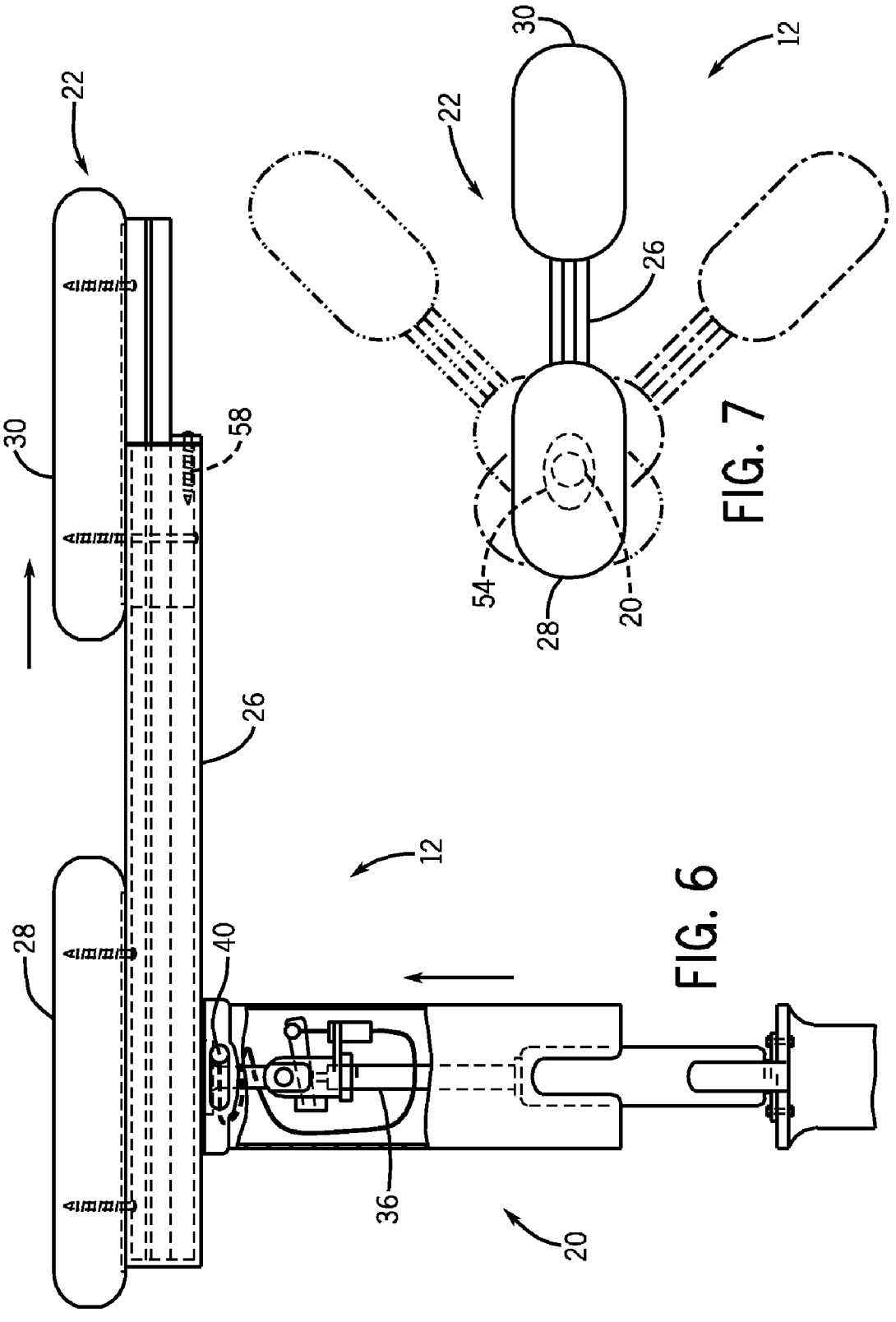


FIG. 7

FIG. 6

ADJUSTABLE PNEUMATIC ARMREST FOR A CHAIR

BACKGROUND OF THE INVENTION

The present invention relates to an improved armrest for a chair that is horizontally and vertically adjustable. More particularly, the present invention is directed to an adjustable armrest that is horizontally extendable, pivotable in a horizontal plane, and vertically adjustable via a control and pneumatic piston.

Chairs have been designed and manufactured in various ways to meet the many needs of consumers and to suit numerous different settings and situations. There are many different categories of chairs including rocking chairs, office chairs, swivel chairs, folding chairs, lawn chairs, etc. One main goal in chair design and manufacture is comfort for a user. An armrest is of utmost importance in a user's determination of the comfort level of a chair. Generally, armrests are in fixed positions relative to the seating portion of the chair, which can cause discomfort and other problems for users that do not fit the fixed position of the chair and armrest.

In an office environment, where workers often are seated at a desk and working with computers or other electronic systems for extended periods of time, a well designed office chair can maximize comfort and efficiency. More specifically, an adjustable armrest on such an office chair can be of great importance to a worker who is performing a variety of computer related functions, such as typing, scrolling and moving a mouse, sorting through paperwork, or performing other typical office tasks. A versatile arm rest can make such tasks easier and can cut down on worker fatigue and discomfort.

While office chairs in the prior art have been designed and constructed to include adjustable armrests, such armrests are often limited in their adjustability, and the means to achieve the adjustments are not ideal. For instance, some prior art armrests have only one or two methods of adjustment, such as vertical or pivotal adjustability. These armrests lack additional modes of adjustment that can further maximize worker efficiency and comfort. Additionally, the mechanisms for adjusting the armrest can be limiting. For instance, the vertical adjustability of an armrest can be limited to only a number of pre-selected vertical positions at which the armrest locks into place. Additionally, some prior art armrests include a horizontal member that can slide horizontally; however, in existing designs, the entirety of the horizontal member is slid to another position. Such a design does not adjust the armrest in such a way as to accommodate users with different size forearms, as the length of the armrest does not change.

In light of the above limitations inherent to current armrest designs, a need exists for an armrest that covers all needed modes of adjustment that a user might desire in an office or other setting and convenient mechanisms for implementing these adjustments. It would therefore be desirable to have a system and method capable of achieving greater armrest adjustability with improved mechanisms for making adjustments to the armrest position.

BRIEF DESCRIPTION OF THE INVENTION

The present invention overcomes the aforementioned problems by providing a pneumatic armrest for a chair having a plurality of adjustment mechanisms.

According to one aspect of the present invention, an adjustable armrest for a chair includes a horizontal armrest support, a rear armpad assembly fixedly connected to the horizontal armrest support, and a front armpad assembly positioned adjacent to the rear armpad assembly and configured to translate along the horizontal armrest support in a lengthwise direction. Also, the adjustable armrest includes a vertical member connected to the horizontal armrest support to bear the horizontal armrest support. The vertical member includes a gas-charged piston to vertically adjust a height of the horizontal armrest support. On the vertical member is a manually operated control used to actuate the gas-charged piston to vertically adjust a height of the horizontal armrest support. Additionally, the horizontal armrest support is configured to pivot around a connection point to the gas-charged piston.

In accordance with another aspect of the invention, a chair includes a backrest portion, a seating portion, and an adjustable armrest. The adjustable armrest includes a pneumatic cylinder assembly affixed to the seating portion, a horizontal member, a rotation mechanism, and a push-button control. The horizontal member is mounted on the pneumatic cylinder assembly and includes a track, a fixed top surface portion, and a slideable top surface portion. The fixed top surface portion is fixedly mounted to the track and the slideable top surface portion is configured to slide along the track. The rotation mechanism is positioned between the horizontal member and the pneumatic cylinder assembly and is configured to rotate the horizontal member about the pneumatic cylinder assembly. Also, the push-button control is configured to control the pneumatic cylinder assembly to vertically adjust the horizontal member.

In accordance with another aspect of the invention, a method of manufacturing an adjustable armrest includes the step of constructing a horizontal member having a fixed member and a slideable member. The slideable member is configured to extend horizontally from the fixed member to increase the length of the horizontal member. Also, the method includes the step of constructing a vertical member having a gas-charged piston that, when activated, is configured to cause the horizontal member to be vertically adjusted. Additionally, the method includes a step of pivotably mounting the horizontal member on the vertical member so that the vertical member is supporting the horizontal member and the horizontal member can horizontally pivot about the vertical member.

Various other features and advantages of the present invention will be made apparent from the following detailed description and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings illustrate one preferred embodiment presently contemplated for carrying out the invention.

In the drawings:

FIG. **1** is a perspective view of an office-type chair with adjustable armrests according to an embodiment of the present invention.

FIG. **2** is a side cross-sectional view of the adjustable armrest of FIG. **1**.

FIG. **3** is a side cross-sectional view of a push-button control in a non-activated state according to an embodiment of the present invention.

FIG. **4** is a side cross-sectional view of the push-button control in an activated state according to an embodiment of the present invention.

FIG. **5** is a front cross-sectional view of the adjustable armrest of FIG. **1**.

FIG. **6** is a side cross-sectional view of the adjustable armrest of FIG. **1** with extended vertical and horizontal members.

FIG. **7** is an overhead view of the adjustable armrest of FIG. **1** being rotated clockwise and counter-clockwise.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As will be described in greater detail below, the present invention is directed to an adjustable armrest that is horizontally extendable and pivotable and is vertically adjustable via a manually operated control and pneumatic piston.

Referring to FIG. **1**, an exemplary office-type chair **10** is shown with a novel adjustable armrest **12**. In addition to the adjustable armrest **12**, office chair **10** includes a backrest portion **14**, a seating portion **16**, and a chair base **18** with wheels. The adjustable armrest **12** is made up of a vertical member **20** and a horizontal member **22**, with horizontal member **22** being mounted on, and supported by, vertical member **20**. Vertical member **20** is in turn connected to a supporting member **24**, for securing adjustable armrest **12** to seating portion **16**.

The horizontal member **22** further comprises a horizontal armrest support **26**, a fixed rear armpad assembly **28** (i.e., fixed top surface portion), and a slideable front armpad assembly **30** (i.e., slideable top surface portion). Both the fixed rear armpad assembly **28** and the slideable front armpad assembly **30** include an armpad **32**. The armpads **32** included in fixed rear armpad assembly **28** and slideable front armpad assembly **30** are identical. Thus, during construction of adjustable armrest **12**, armpads **32** can be interchangeably used in constructing either the fixed or slideable armrest assembly **28**, **30**. However, as will be described below, additional mechanisms are included in fixed rear armpad assembly **28** and slideable front armpad assembly **30** and the method of coupling each armpad assembly **28**, **30** to horizontal armrest support **26** is distinct.

Turning to FIG. **2**, a side cross-sectional view of adjustable armrest **12** is shown. Fixed rear armpad assembly **28** and slideable front armpad assembly **30** are positioned on horizontal armrest support **26** to form horizontal member **22**. As shown in FIG. **2**, horizontal armrest support **26** is configured as a track bar. Fixed rear armpad assembly **28** is fixedly connected to a back portion of track bar **26** by way of screws **34** and is positioned generally above vertical member **20**. Slideable front armpad assembly **30** is also positioned on track bar **26** and is connected thereto in a manner that allows front armpad assembly **30** to slide within track bar **26** to extend the length of horizontal member **22**. As shown in FIG. **2**, horizontal member **22** is in a non-extended position and slideable front armpad assembly **30** is positioned immediately adjacent to fixed rear armpad assembly **28**; however, as will be explained below, slideable front armpad assembly **30** can also slide in a lengthwise direction relative to the horizontal member in a direction away from fixed rear armpad assembly **28**.

Referring still to FIG. **2**, vertical member **20** includes a pneumatic cylinder assembly (i.e., gas-charged piston) **36** that is surrounded by an outer housing **38**. When activated, gas-charged piston **36** causes an upward force that can vertically extend vertical member **20** and cause the horizontal member **22** to be raised to a desired height. As pictured, gas-charged piston **36** is in a non-extended state; however, a control **40** positioned on vertical member **20** allows a user to activate and extend piston **36**. A cable/hose **42** extends from piston **36** to control **40** to transfer compressed air or gas upon activation of gas-charged piston **36** by controller **40**. The gas-charged piston **36** and cable **42** are enclosed within outer housing **38**.

As shown in FIGS. **3** and **4**, in one embodiment control **40** is a push-button control that is activated when a user manually slides the button forward. FIG. **3** shows push-button control **40** in its default, non-activated position. When desired, push-button control **40** can be pressed and slid forward by a user, as shown in FIG. **4**, to move the push-button control **40** to an activated position. Referring again to FIG. **2**, when push-button control **40** is in its non-activated position, gas-charged piston **36** remains in a fixed position and horizontal member **22** is retained at a current height. However, when push-button control **40** is in its activated position, pneumatic cylinder assembly **36** is activated to exert an upward force on horizontal member **22**. When the upward force of the pneumatic piston **36** is greater than any downward forces applied to the horizontal member **22** by a user, horizontal member **22** raises. When a downward force is applied to horizontal member **22** by a user that is greater than an upward force provided by the pneumatic piston **36**, the horizontal member **22** lowers. While push-button control **40** has been described as a push-button mechanism that is pressed and slid forward by a user, it is also envisioned that the control **40** can be a simple push-button that is activated when depressed inward.

Referring now to FIG. **5**, a front view of the adjustable armrest **12** is shown. Track bar **26** in adjustable armrest **12** can be seen as comprising an outer shell **44**, a hollow interior **46** within the outer shell **44**, and a channel **48** formed on a top surface of outer shell **44** that runs the length of the track bar **26**. Attached to an underside of the front armpad assembly **30** is an upside-down T-shaped member **50**, which mates with the hollow interior **46** of track bar **26** and slides within channel **48** and hollow interior **46**. T-shaped member **50** enables front armpad assembly **10** to be secured to track bar **26**, yet maintain the ability to slide forward and backward along the track bar to adjust the length of horizontal member **22**.

Also shown in FIG. **5**, top mounting bolts **52** join pneumatic piston **36** to a rotating connection mechanism **54** and horizontal armrest support **26**. Rotating connection mechanism **54** serves as a connection point between horizontal member **22** and vertical member **20** and allows for rotation of the horizontal member **22** about the vertical member **20**. Bottom mounting bolts **56** are also included in adjustable armrest **12** to connect vertical member **20** to supporting member **24**, which is mounted on seating portion **16** (see FIG. **1**). Although bolts **52**, **56** are used to mount components of the adjustable armrest **12**, it is envisioned that any similarly functioning mounting devices known to those of ordinary skill in the art, such as screws, can be used in their place.

Turning now to FIG. **6**, adjustable arm **12** is shown in an extended state in both a vertical direction and a horizontal direction. That is, vertical member **20** is extended vertically by way of gas-charged cylinder **36** having been activated by push-button control **40**. Additionally, slideable front armpad assembly **30** has been moved forward along track bar **26**, thus extending the length of horizontal member **22**. Furthermore, being able to vertically adjust horizontal member **22** allows a user to choose a desired height at which to rest the user's arm for maximum comfort. Extending the overall length of horizontal member **22** by moving slideable front armpad assembly **30** forward, while the rear armpad assembly **28** remains fixed, advantageously enables adjustable armrest **12** to accommodate various forearm sizes. In other words, users may have different elbow-to-wrist lengths that ordinarily could not be accommodated by a fixed armrest or by an armrest that slides in its entirety; however, the ability to slide front armpad assembly **30** ensures that users with a longer distance between elbow and wrist can still rest both elbow and wrist on adjustable armrest **12**. To set a maximum distance at

which front armpad assembly **30** can be translated from rear armpad assembly **28**, a stop plug **58** is positioned at the end of track bar **26**. Stop plug **58** prevents T-shaped member **50** from sliding past an end point of track bar **26**. Stop plug **58** can take the form of a bolt, pin, screw, or any other device that can easily be secured to track bar **26** and extend into hollow interior **46** to abut t-shaped member **50** when slid forward.

Referring now to FIG. **7**, the angular range of motion of horizontal member **22** in pivoting about vertical member **20** in the horizontal plane is shown. Horizontal member **22** is connected to vertical member **20** so that it can be pivoted about the connection point therebetween, in either a clockwise or counter-clockwise direction. That is, to allow for pivoting at the connection point, rotating connection mechanism **54** is positioned to secure horizontal member **22** with vertical member **20**. Rotation of horizontal member **22** in both a clockwise and counter-clockwise direction allows a user to choose a desired position for comfort and allows the user to easily move from, for example, a keyboard to a mouse, without having to lift their arm from adjustable armrest **12**. As such, rotating connection mechanism **54** is configured to allow for rotation of the horizontal member **22** over an angular range of at least 45 degrees to maximize user comfort.

While the adjustable armrest **12** set forth above has been described for use with an office-type chair **10** as shown in FIG. **1**, it is envisioned that adjustable armrest **12** can be mounted to any suitable chair.

Therefore, according to one embodiment of the present invention, an adjustable armrest for a chair includes a horizontal armrest support, a rear armpad assembly fixedly connected to the horizontal armrest support, and a front armpad assembly positioned adjacent to the rear armpad assembly and configured to translate along the horizontal armrest support in a lengthwise direction. Also, the adjustable armrest includes a vertical member connected to the horizontal armrest support to bear the horizontal armrest support. The vertical member includes a gas-charged piston to vertically adjust a height of the horizontal armrest support. On the vertical member is a manually operated control used to actuate the gas-charged piston to vertically adjust a height of the horizontal armrest support. Additionally, the horizontal armrest support is configured to pivot around a connection point to the gas-charged piston.

In accordance with another embodiment of the invention, a chair includes a backrest portion, a seating portion, and an adjustable armrest. The adjustable armrest includes a pneumatic cylinder assembly affixed to the seating portion, a horizontal member, a rotation mechanism, and a push-button control. The horizontal member is mounted on the pneumatic cylinder assembly and includes a track, a fixed top surface portion, and a slideable top surface portion. The fixed top surface portion is fixedly mounted to the track and the slideable top surface portion is configured to slide along the track. The rotation mechanism is positioned between the horizontal member and the pneumatic cylinder assembly and is configured to rotate the horizontal member about the pneumatic cylinder assembly. Also, the push-button control configured to control the pneumatic cylinder assembly to vertically adjust the horizontal member.

In accordance with another embodiment of the invention, a method of manufacturing an adjustable armrest includes the step of constructing a horizontal member having a fixed member and a slideable member. The slideable member is configured to extend horizontally from the fixed member to increase the length of the horizontal member. Also, the method includes a step of constructing a vertical member having a gas-charged piston that, when activated, is configured to cause the horizontal member to be vertically adjusted. Additionally, the method includes a step of pivotably mounting the horizontal member on the vertical member so that the vertical member is supporting the horizontal member and the horizontal member can horizontally pivot about the vertical member.

The present invention has been described in terms of the preferred embodiment, and it is recognized that equivalents, alternatives, and modifications, aside from those expressly stated, are possible and within the scope of the appending claims.

What is claimed is:

1. An adjustable armrest for a chair comprising:

a horizontal armrest support;

a rear armpad assembly fixedly connected to the horizontal armrest support;

a front armpad assembly positioned adjacent to the rear armpad assembly and configured to translate along the horizontal armrest support in a lengthwise direction;

a vertical member connected to the horizontal armrest support to bear the horizontal armrest support, the vertical member including a gas-charged piston to vertically adjust a height of the horizontal armrest support;

a manually operated control positioned on the vertical member to actuate the gas-charged piston to vertically adjust a height of the horizontal armrest support; and

wherein the horizontal armrest support is configured to pivot around a connection point to the gas-charged piston.

2. The adjustable armrest of claim **1** wherein the horizontal armrest support further comprises a track bar having an outer shell, a hollow interior within the outer shell, and a channel formed in a top surface of the outer shell running the length of the track bar.

3. The adjustable armrest of claim **2** wherein the gas-charged piston is attached to a bottom surface of the track bar.

4. The adjustable armrest of claim **2** wherein the front armpad assembly further comprises a t-shaped member configured to mate with the hollow interior of the track bar and slide within the channel and hollow interior of the track bar.

5. The adjustable armrest of claim **2** wherein the front armpad assembly is further configured to slide along the track bar relative to the rear armpad assembly to increase the length of the horizontal armrest support to a length at least sufficient to support a forearm of a user from elbow to wrist.

6. The adjustable armrest of claim **2** wherein the track bar further comprises a stop plug to prevent the front armpad assembly from sliding past an endpoint of the track bar.

7. The adjustable armrest of claim **1** wherein the connection point further comprises a rotation mechanism positioned between the horizontal armrest support and the vertical member and configured to allow for rotation of the horizontal armrest support about the vertical member.

8. The adjustable armrest of claim **1** wherein the manually operated control further comprises a push-button control, the push-button control configured to actuate the gas-charged piston and vertically translate the horizontal armrest support when pressed and prevent actuation of the gas-charged piston when released.

9. The adjustable armrest of claim **8** wherein the gas-charged piston is configured so that when the push-button control is pressed and a downward force is applied to the horizontal armrest support that is greater than an upward force provided by the gas-charged piston, the horizontal armrest support lowers.

10. A chair comprising:
a backrest portion;
a seating portion; and
an adjustable armrest, wherein the adjustable armrest comprises:
a pneumatic cylinder assembly affixed to the seating portion;
a horizontal member mounted on the pneumatic cylinder assembly and including a track, a fixed top surface portion, and a slideable top surface portion, wherein the fixed top surface portion is fixedly mounted to the track and the slideable top surface portion is configured to slide along the track;
a rotation mechanism positioned between the horizontal member and the pneumatic cylinder assembly and configured to rotate the horizontal member about the pneumatic cylinder assembly; and
a push-button control configured to control the pneumatic cylinder assembly to vertically adjust the horizontal member;
wherein the slideable top surface portion and the fixed top surface portion comprise a slideable armpad assembly and a fixed armpad assembly respectively, and wherein the slideable armpad assembly is configured to slide within the track to modify a distance between the slideable armpad assembly and the fixed armpad assembly and modify a length of the horizontal member.

11. The chair of claim 10 wherein the push-button control is configured to activate the pneumatic cylinder assembly to raise or lower the horizontal member when depressed and fix a position of the pneumatic cylinder assembly to maintain the horizontal member at a current height when not depressed.

12. The chair of claim 10 wherein the rotation mechanism is configured to allow the horizontal member to rotate about the pneumatic cylinder assembly in a clockwise and a counter-clockwise direction.

13. The chair of claim 10 wherein the horizontal member has a range of rotation about the pneumatic cylinder assembly of at least 45 degrees.

14. The chair of claim 10 wherein the track includes a stop plug to prevent the slideable top surface portion from sliding past an endpoint of the track.

15. The chair of claim 10 wherein the slideable top surface portion is at a greater distance from the rotation mechanism than the fixed top surface portion.

16. A method of manufacturing an adjustable armrest comprising the steps of:
constructing a horizontal member having a fixed member and a slideable member, wherein the slideable member is configured to extend horizontally from the fixed member to increase the length of the horizontal member;
constructing a vertical member having a gas-charged piston that, when activated, is configured to cause the horizontal member to be vertically adjusted; and
pivotably mounting the horizontal member on the vertical member so that the vertical member is supporting the horizontal member and the horizontal member can horizontally pivot about the vertical member;
wherein the step of constructing the horizontal member further comprises:
forming a track bar having an outer shell, a hollow interior within the outer shell, and a channel formed in a top surface of the outer shell running the length of the track bar;
screwing the fixed member to the track bar;
mounting a t-shaped member on the slideable member;
positioning the t-shaped member within the hollow interior and channel of the track bar to slidingly engage the slideable member with the track bar.

17. A method of manufacturing an adjustable armrest comprising the steps of:
constructing a horizontal member having a fixed member and a slideable member, wherein the slideable member is configured to extend horizontally from the fixed member to increase the length of the horizontal member;
constructing a vertical member having a gas-charged piston that, when activated, is configured to cause the horizontal member to be vertically adjusted; and
pivotably mounting the horizontal member on the vertical member so that the vertical member is supporting the horizontal member and the horizontal member can horizontally pivot about the vertical member;
wherein constructing the horizontal member further comprises constructing a pair of armpads, wherein each of the pair of armpads is configured to at least partially form one of the fixed member and the slideable member.

18. The method of claim 17 wherein the step of constructing the horizontal member further comprises:
forming a track bar having an outer shell, a hollow interior within the outer shell, and a channel formed in a top surface of the outer shell running the length of the track bar;
screwing the fixed member to the track bar;
mounting a t-shaped member on the slideable member;
positioning the t-shaped member within the hollow interior and channel of the track bar to slidingly engage the slideable member with the track bar.

19. The method of claim 17 further comprising the step of mounting a push-button control on the vertical member, the push-button control configured to actuate the gas-charged piston and vertically translate the horizontal member when pressed and prevent actuation of the gas-charged piston when released.

20. The method of claim 17 wherein the step of pivotably mounting further comprises positioning a rotation mechanism between the horizontal member and the vertical member to rotate the horizontal member about the vertical member.

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