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(54) Title: ERGONOMIC CHAIR

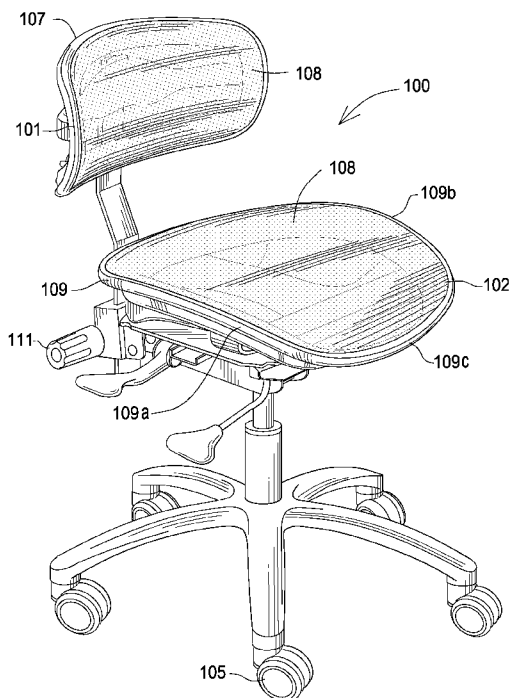


FIG.1

(57) Abstract: An ergonomic chair is disclosed. The convex shape of the seat frame, when combined with the flexible mesh fabric, allows a user's weight to roll in a clockwise manner instead of sliding forward. This rolling motion is a result of the deflection of the mesh as the user moves from an upright, resting position forward into a declined, working position. Deflecting the pressure in this manner significantly lessens the pressure on the hip bones, the tail bone and under the thighs. The mesh seat and back provide good air circulation for a user. Disposable, breathable covers are also disclosed, which can be placed over the mesh surfaces to provide protection and sanitizing between uses.



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TITLE**Ergonomic Chair****BACKGROUND**

In research and testing laboratories, medical and dental offices and other similar
5 locations, technicians and/or medical personnel have to spend long hours in the chairs.
Traditional chairs create pressure points at the hip bones, tailbone and legs of a user.
These pressure points create discomfort in the seat, legs and back of the user.
Additionally, solid surfaces become hot and uncomfortable, even more so when the
climate is controlled for the experiments, not for the technicians. However, surfaces that
10 promote air circulation around the back and seat of a person sitting in a chair are difficult,
if not impossible to sanitize according to relevant regulations.

In such laboratories, medical and dental offices, many or all of the surfaces must
be capable of being sanitized on a regular basis. In medical and dental offices, the
surfaces immediately around the patient treatment location have to be sanitized between
15 each patient. If any bodily fluids are involved in the treatment, the rules governing
sanitizing are particularly strict. Many of the chemicals used to sanitize surfaces are
harsh and can cause breakdown of many type of materials. Additionally, in order to make
sanitizing easy and fast, it is highly desirable to have smooth surfaces, to make cleaning
the surface faster and easier. Also, many laboratory situations have limitations on the
20 temperature, humidity and air circulation based on the type of experiments performed
therein, which can make the climate conditions uncomfortable for humans.

The foregoing example of the related art and limitations related therewith are
intended to be illustrative and not exclusive. Other limitations of the related art will
become apparent to those of skill in the art upon a reading of the specification and a study
25 of the drawings.

SUMMARY

The following embodiments and aspects thereof are described and illustrated in conjunction with systems, tool and methods which are meant to be exemplary and illustrative, not limiting in scope. In various embodiments, one or more of the above
5 described problems have been reduced or eliminated, while other embodiments are directed to other improvements.

One aspect of a chair according to the present disclosure is to provide a chair that allows for the comfort of the medical, dental and laboratory personnel. The convex shape of the seat frame, when combined with the flexible mesh fabric, allows the weight from
10 the user's hip bones and upper thigh bones, and corresponding seat surface deflection, to roll in a clockwise manner instead of sliding forward. This "rolling" of the weight and/or pressure is a result of the deflection of the mesh as the user moves from an upright, resting position forward into a declined, working position. Deflecting the pressure in this
15 manner significantly lessens the pressure on the hip bones, the tail bone and under the thighs. Further, a chair with a mesh seat and back provides good air circulation for a user.

Another aspect of a chair according to the present application is to provide the necessary ease of sanitation for users in a medical, dental or laboratory environment. Disposable, breathable covers are placed over the mesh surfaces in use to provide
20 sanitizing between uses.

In addition to the exemplary aspects and embodiments described above, further aspects and embodiments will become apparent by reference to the accompanying drawings forming a part of this specification wherein like reference characters designate
25 corresponding parts in the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front perspective view of an ergonomic chair according to the present disclosure.

FIG. 2 is a front elevation view FIG. 1.

FIG. 3 is a rear elevation view of FIG. 1.

FIG. 4 is a left side elevation view of FIG. 1.

FIG. 5 is a right side elevation view of FIG. 1.

FIG. 6 is a top plan view of FIG. 1.

5 FIG. 7 is a bottom plan view of FIG. 1.

FIG. 8 is a top plan view of the inner and outer frames of the seat of chair of FIG. 1 with the mesh removed.

FIG. 9 is a sectional view of FIG. 8 along line 9-9.

FIG. 10 is a sectional view of FIG. 8 along line 10-10.

10 FIG. 11 is an enlarged view of a portion of FIG. 8.

FIG. 12 is a top plan view of the outer frame of FIG. 8.

FIG. 13 is an enlarged view of a portion of FIG. 12.

FIG. 14 is a bottom plan view of a cover.

FIG. 15 is a top perspective view of the chair of FIG. 1 with the cover of FIG. 14.

15 Before explaining the disclosed embodiment of the present invention in detail, it is to be understood that the invention is not limited in its application to the details of the particular arrangement shown, since the invention is capable of other embodiments. Exemplary embodiments are illustrated in referenced figures of the drawings. It is intended that the embodiments and figures disclosed herein are to be considered
20 illustrative rather than limiting. Also, the terminology used herein is for the purpose of description and not of limitation.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring first to Figures 1-7, a chair 100 has a back 101 and a seat 102 on chair base 104. Back 101 is comprised of a rigid frame 107 and a mesh material 108. Frame
25 107 is curved. Mesh material 108 is stretched across frame 107 with enough tension to provide back support for a user. In the depicted embodiment, back 101 is convex and rests against a user's spine. Optionally, back 101 can be adjusted to pivot forward and backward as the user adjusts his or her position in the chair. In this embodiment, back

101 remains in contact with a user's back as he or she leans forward. This embodiment provides a user with continuous back support as he or she moves forward. In the depicted embodiment, lever 110 would be used to adjust the forward and backward pivoting motion of back 101. Optionally, a knob can be included to adjust the height of back 101.

5 In the depicted embodiment, knob 111 would be used to adjust the height of back 101.

Seat 102 is mounted on a seat plate 106. Seat plate 106 pivots forward and backward. In use, seat plate 106 causes seat 102 to pivot forward and backward as a user moves his or her weight forward and backward. This pivoting motion promotes proper body alignment. A traditional seat, without seat plate 106, can rotate approximately 6°
10 forward and 6° backward. The addition of seat plate 106 allows seat 102 to rotate 19° forward and 8° backward. Seat plate 106 allows for 13° more travel, resulting in a 19° forward rotation. As a result of seat plate 106, the front edge of seat 102 is lower than a standard chair by approximately 13°.

Seat 102 is comprised of a rigid frame 109. Rigid frame 109 has left and right
15 sides 109a, 109b and front and back sides 109c, 109d. As best seen in Figures 4 and 5, the shape of the rigid frame 109 as seen from the right and left sides is a flattened arch. The arch has a front curve 113 and a back curve 114 that meet at high point 115. In the depicted embodiment, front curve 113 has a continuous slope. In the depicted embodiment, back curve 114 has a shallower slope than front curve 113.

20 Optionally, seat 102 may have adjustable height. In the depicted embodiment, lever 112 can be used to adjust the height of seat 102. Wheels 105 are optional. Chair 100 may also include armrests (not shown).

Referring next to Figures 8-13, mesh material 108 is stretched over frame 109. Mesh material 108 is tensioned such that the mesh material 108 fully supports a user as
25 he or she moves back and forth. The mesh material 108 rolls with a user as he or she moves, providing improved support without creating pressure points along the legs and/or seat of the user. Further, the mesh material 108 on seat 102 allows for air circulation

around the legs and seat of a user. This is important for keeping the user comfortable over long periods.

Rigid frame 109 is comprised of inner frame 122 and outer frame 123. Outer frame 123 includes ridge 124. Ribs 125 are located inside ridge 124. Ribs 125 contribute to the structural integrity of outer frame 123. Outer frame 123 is made of a very hard glass-reinforced plastic. Inner frame 122 is made of more flexible plastic, which allows inner frame 122 to flex to tension, or stretch, the mesh as the two matching frames are affixed to each other. During manufacture, mesh material 108 is stretched across inner frame 122 and stapled into the frame just inside recess 127 of inner frame 122. In the depicted embodiment, steel staple wire is used to attach the mesh material 108 to the inner frame 122. One having ordinary skill in the art will understand that other methods and materials having similar strength could be used to attach the mesh material to the inner frame. In the depicted embodiment, outer frame 123 and inner frame 122 are formed from of nylon reinforced with fiberglass, available from Nytex Composites Co., Ltd., No.6, Ln, 468, Sec.4, Changsui Rd., Peitouhsiang, Changhwa County, Taiwan. The material utilizes virgin resin granules, which provide stable quality assurance. The outer frame 123 and inner frame 122 are also fully recyclable. In the depicted embodiment, the flexible plastic that makes up the inner shell contains less glass fiber reinforcement which in turn allows the inner frame to be more flexible. In the depicted embodiment, outer frame 123 comprises Nylon 6 + 22.5% glass fiber. In the depicted embodiment, inner frame 122 comprises Nylon 6 + 14% glass fiber. One having ordinary skill in the art that any material having similar strength could be used.

Once mesh material 108 has been attached to inner frame 122, inner frame 122 is then bolted into outer frame 123. Jigs are used to extend the inner frame 122 by approximately twenty percent for attachment to outer frame 123. Bolts 126 secure inner frame 122 to outer frame 123. The primary purpose of the jigs is to push the outer frame 123 down onto the inner frame 122 so the frames can be affixed to one another. As outer

frame 123 is pushed down, inner frame 122 flexes outward to meet outer frame 123, and in doing so, tensions mesh material 108.

In use, most of a user's weight will be focused on the center of seat 102. Due to the curvature of rigid frame 109, the pressure on seat 102 will be concentrated on the left and right sides of rigid frame 109. Ribs 125 ensure that inner frame 122 stays securely within outer frame 123 under pressure. Recess 127 provides some additional stretching force on the mesh. Recess 127 spreads out the force from the user's weight across a wider length of mesh material 108. Without recess 127, the force of a user's weight would be borne primarily by the area around bolts 126 and the staples attaching mesh material 108 to inner frame 122. This force would make mesh material 108 more likely tear around bolts 126.

Referring next to Figure 14, a top plan view of a disposable cover 103 is shown. The cover 103 is made from non-woven material, such as polypropylene. While polypropylene is exemplary, any non-woven material having similar properties could be used. Cover 103 must be made from a breathable material to allow the user to remain comfortable. Cover 103 must be made from a material that will prevent a majority of any fluids from passing through the cover. Cover 103 must be made of material that is low cost enough to be used as a disposable cover. Alternatively, cover 103 could be made of a washable material that could be sanitized and re-used.

Figure 13 is a top perspective view of the chair 100 with cover 103 over both the seat 102 and the back 101. The covers 103 can be a generic size that can fit either the seat 102 or the back 101, or custom shaped covers can be made for each seat 102 and back 101.

While a number of exemplary aspects and embodiments have been discussed above, those of skill in the art will recognize certain modifications, permutations, additions and sub-combinations therefore. It is therefore intended that the following appended claims hereinafter introduced are interpreted to include all such modifications,

permutations, additions and sub-combinations are within their true sprit and scope. Each apparatus embodiment described herein has numerous equivalents.

The terms and expressions which have been employed are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed. Thus, it should be understood that although the present invention has been specifically disclosed by preferred embodiments and optional features, modification and variation of the concepts herein disclosed may be resorted to by those skilled in the art, and that such modifications and variations are considered to be within the scope of this invention as defined by the appended claims. In general the terms and phrases used herein have their art-recognized meaning, which can be found by reference to standard texts, journal references and contexts known to those skilled in the art. The above definitions are provided to clarify their specific use in the context of the invention.

15

I CLAIM:

1. An ergonomic chair comprising:
a seat;
said seat comprising a rigid frame;
5 said frame having left, right, front and back portions;
said right and left portions being curved upward;
said front and back portions curved downward;
said front curve having a steeper slope than said back curve;
mesh material stretched over said rigid frame; and
10 a base.
2. The ergonomic chair of claim 1, wherein said rigid frame comprises an inner frame
and an outer frame.
3. The ergonomic chair of claim 2, wherein the outer frame comprises a substantially
rigid material.
- 15 4. The ergonomic chair of claim 2, wherein the inner frame comprises a material
having some flexibility.
5. The ergonomic chair of claim 1, further comprising a back rest, said back rest
comprising:
a rigid frame;
20 said rigid frame having a convex curve; and
mesh material stretched over said rigid frame.
6. The ergonomic chair of claim 1, further comprising a wheeled base.
7. The ergonomic chair of claim 1, further comprising a pivot plate, on which the seat
is mounted.
- 25 8. The ergonomic chair of claim 1, further comprising height adjustment means.
9. The ergonomic chair of claim 1, further comprising armrests.
10. The ergonomic chair of claim 5, further comprising means to adjust the height of
the back rest.

11. The ergonomic chair of claim 5, further comprising means to adjust the pivoting motion of the backrest.
12. The ergonomic chair of claim 1, further comprising a non-woven cover for said seat.
- 5 13. The ergonomic chair of claim 5, further comprising a non-woven cover for said back rest.
14. A method of making an ergonomic chair comprising:
forming an curved inner frame having a recess;
stretching a mesh material across said inner frame;
- 10 attaching said mesh material to said inner frame;
attaching said inner frame to a complementarily curved outer frame to form a seat; and
attaching said seat to a base.
15. The method of claim 14, wherein the curved inner frame is formed from a material which has some flexibility.
- 15 16. The method of claim 14, where in the curved outer frame is formed from a substantially rigid material.
17. The method of claim 14, further comprising the steps of:
forming a back rest having a curved frame;
stretching a mesh material across said curved frame; and
- 20 attaching said back rest to said seat.
18. The method of claim 17, further comprising the step of attaching a height adjustment means to said back rest.
19. The method of claim 17 further comprising the step of attaching a pivot adjustment means to said back rest.
- 25 20. The method of claim 14, further comprising the step of attaching wheels to said base.
21. The method of claim 14, further comprising the step of attaching armrests to said seat.

22. The method of claim 14, further comprising the step of attaching height adjustment means to said seat.
23. The method of claim 14, further comprising the step of covering said seat with a non-woven cover.
- 5 24. The method of claim 17, further comprising the step of covering said back rest with a non-woven cover.
25. A method of making an ergonomic chair comprising the steps of;
forming a curved frame;
stretching a mesh material across said frame to form a seat;
- 10 wherein sitting in said seat does not create extreme pressure points on a user's seat and thighs.
26. The method of claim 25, wherein the step of forming a curved frame includes the steps of forming an inner frame and forming an outer frame.
27. The method of claim 26 wherein the inner frame is formed of a material having
15 some flexibility.
28. The method of claim 26 wherein the outer frame is formed of a substantially rigid material.

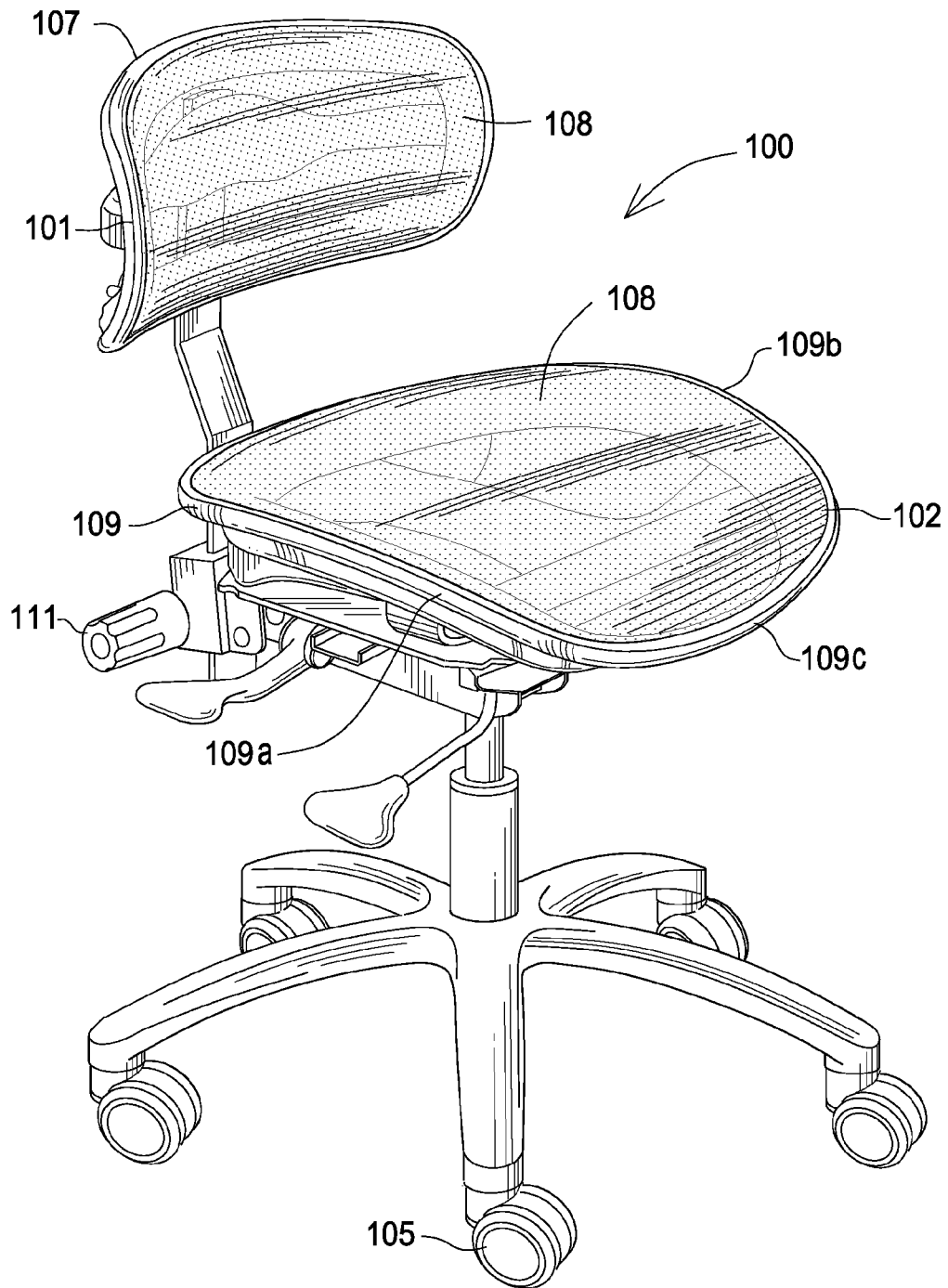


FIG.1

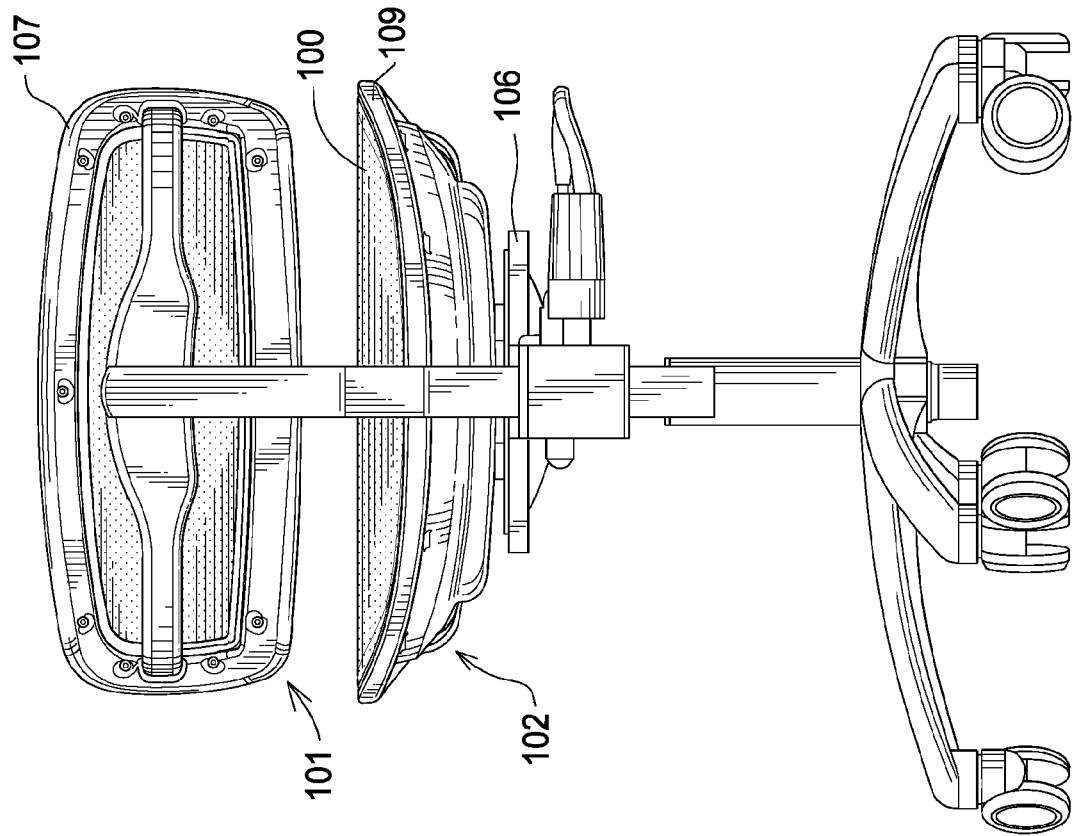


FIG.2

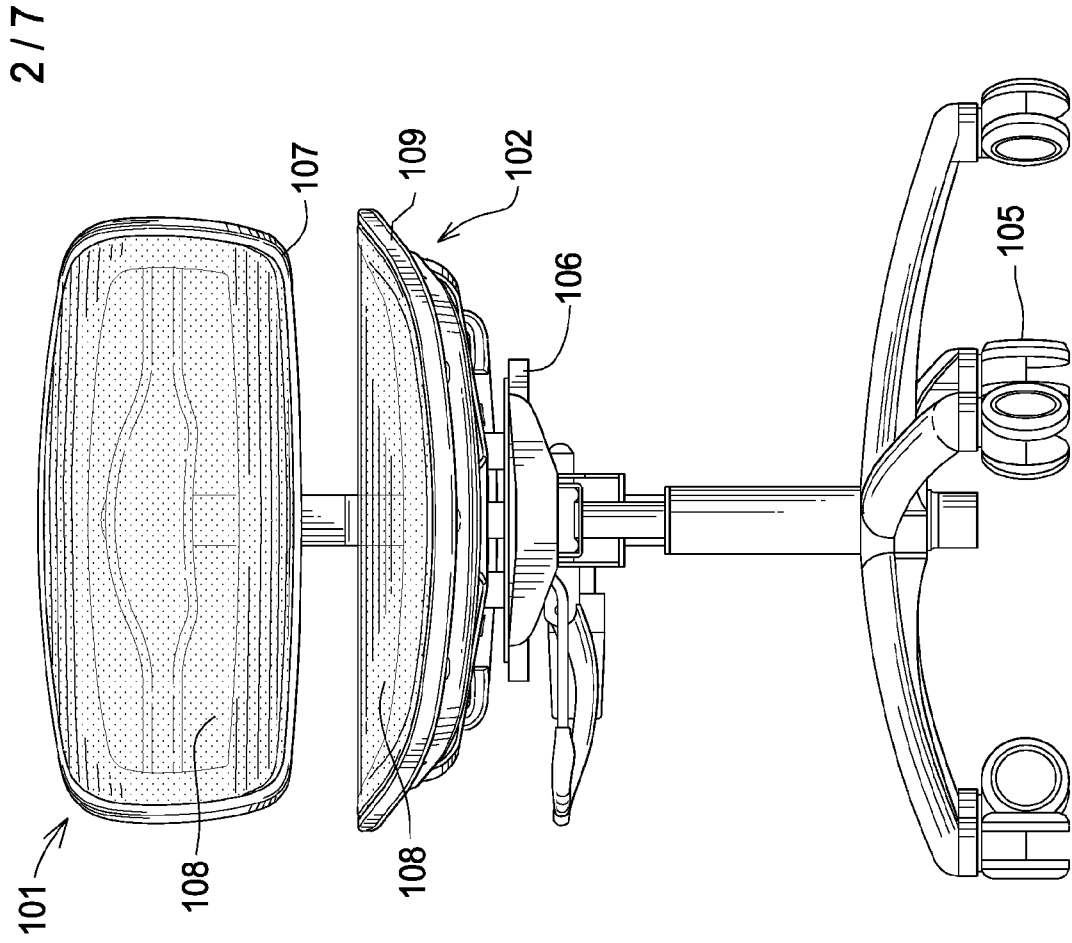
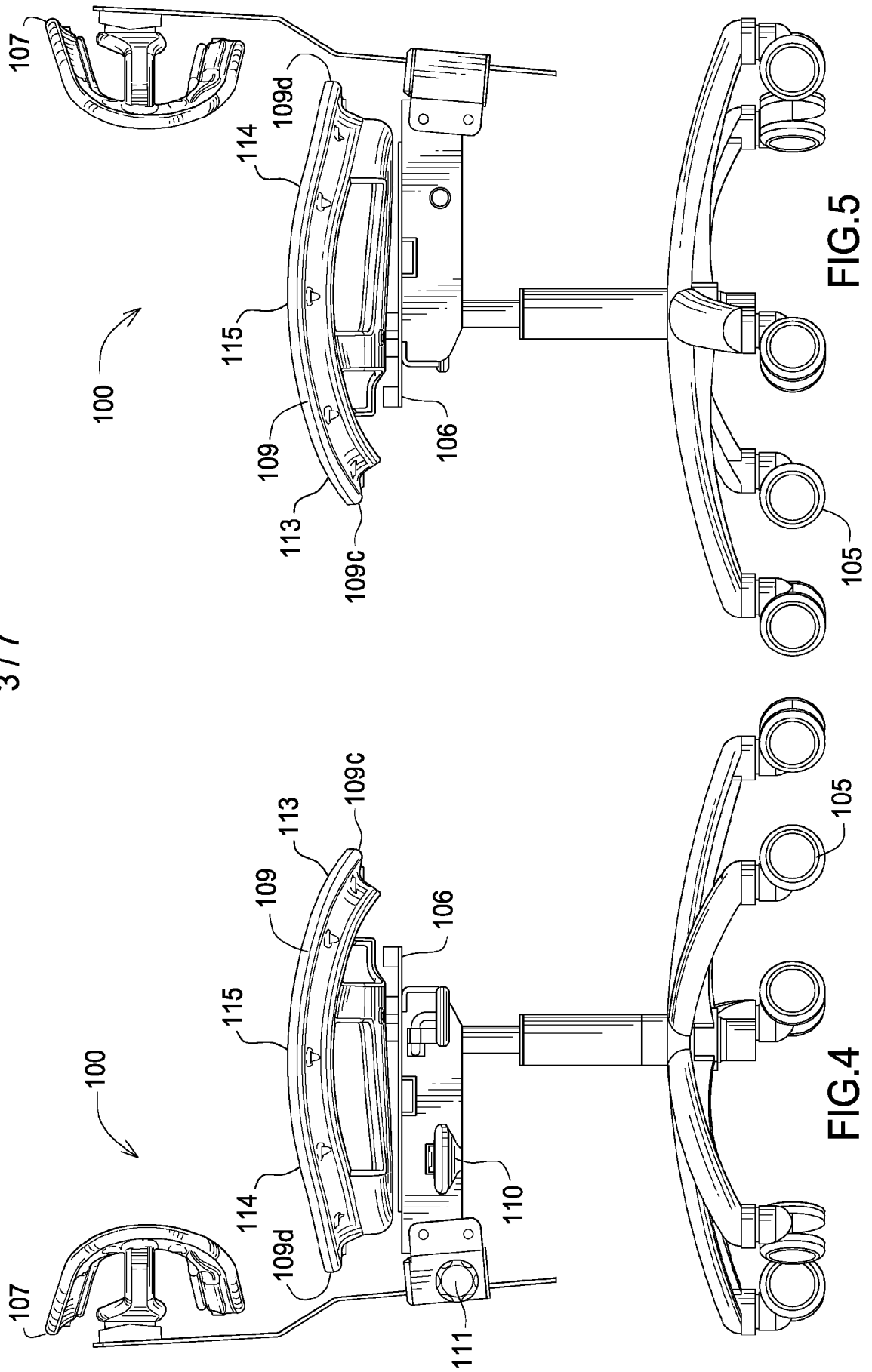


FIG.3



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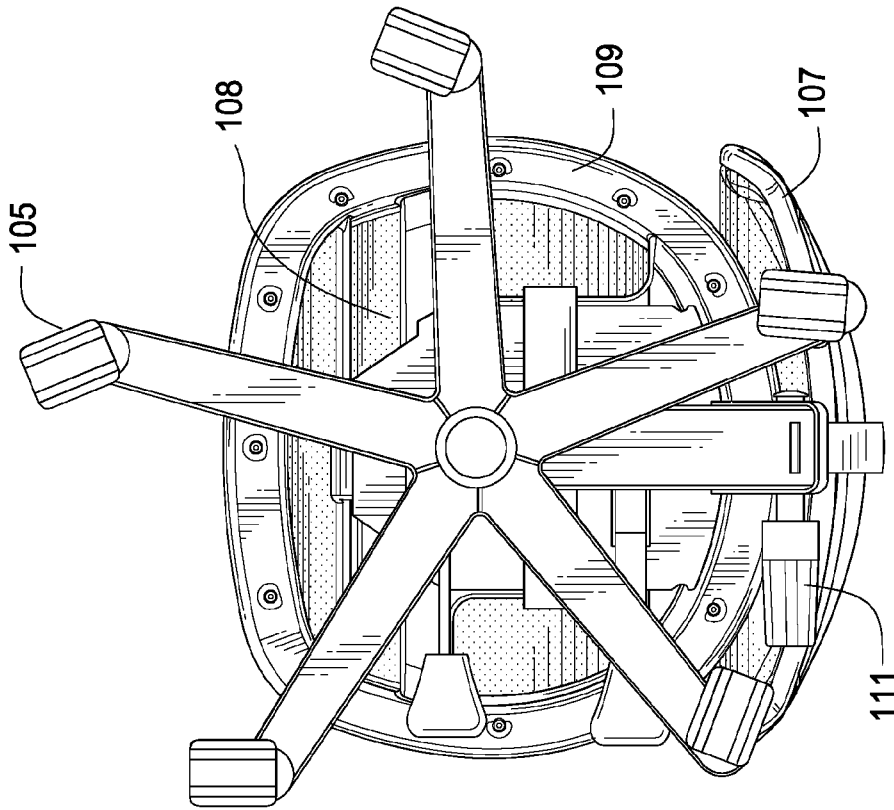


FIG.7

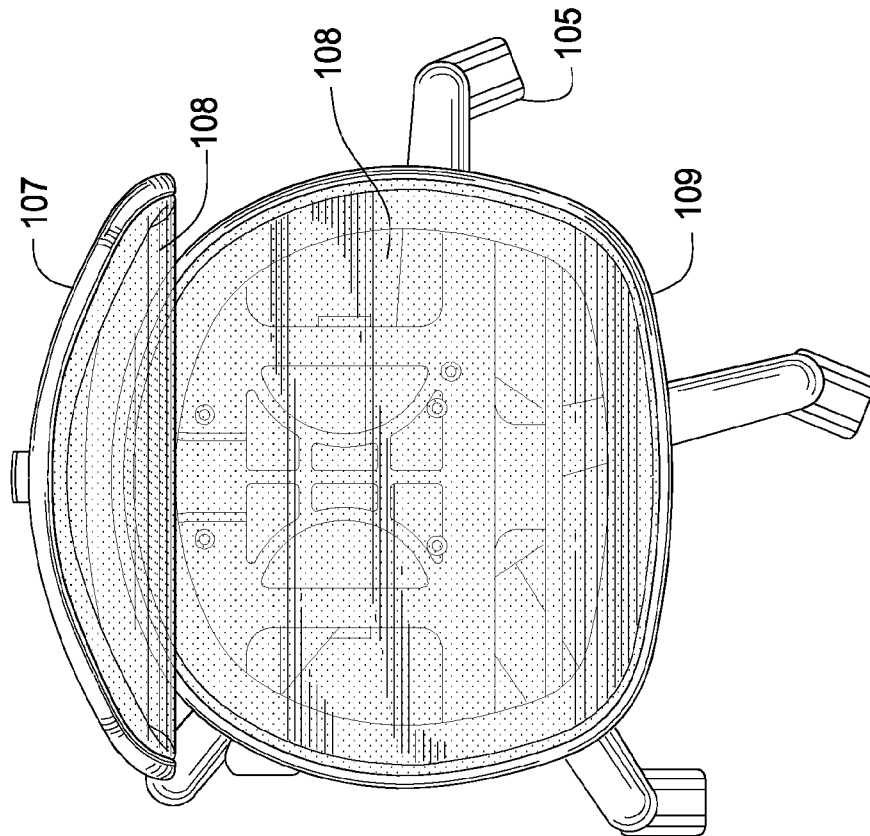


FIG.6

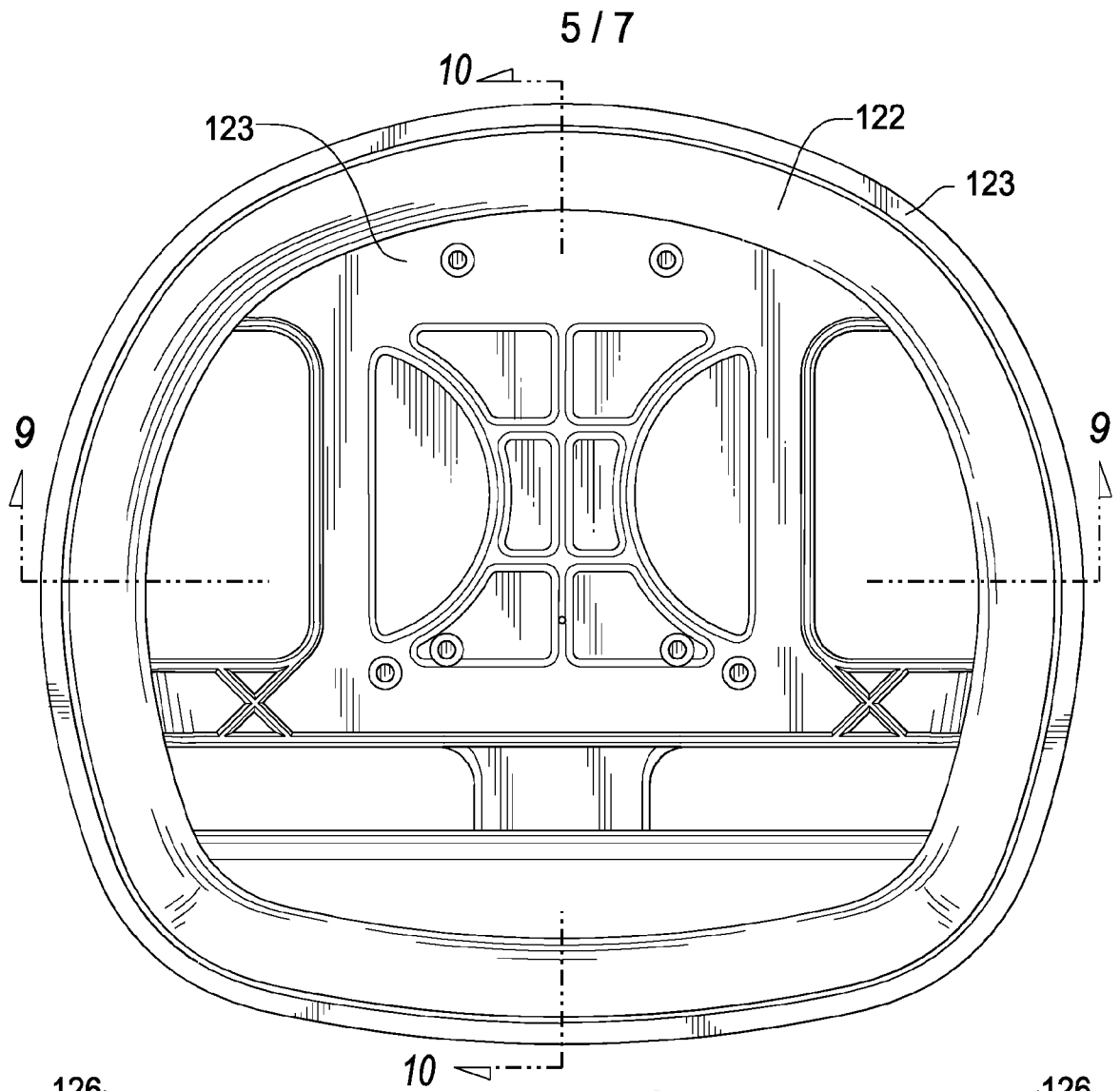


FIG. 8

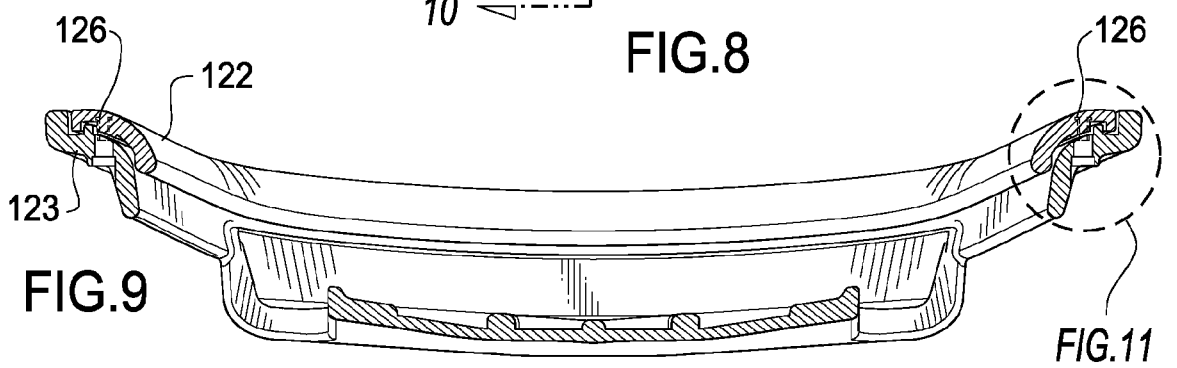


FIG. 9

FIG. 11

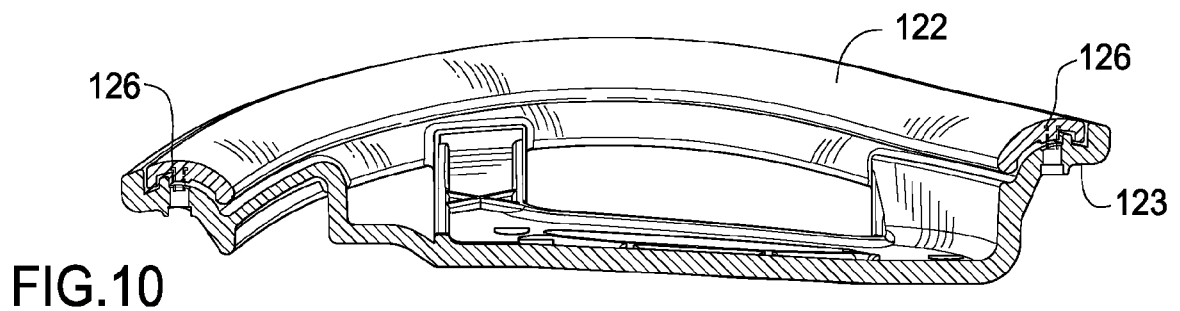


FIG. 10

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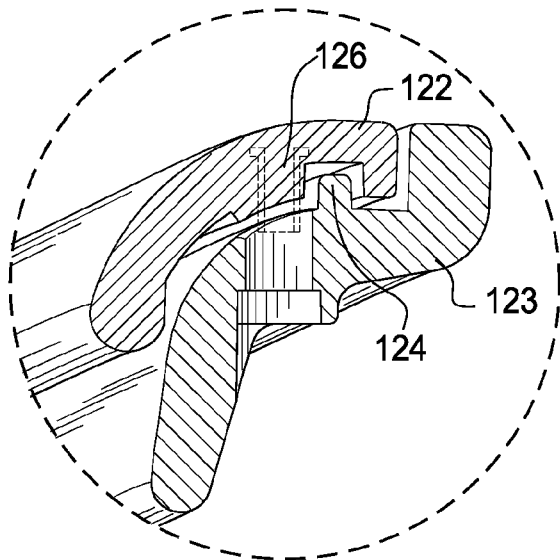


FIG. 11

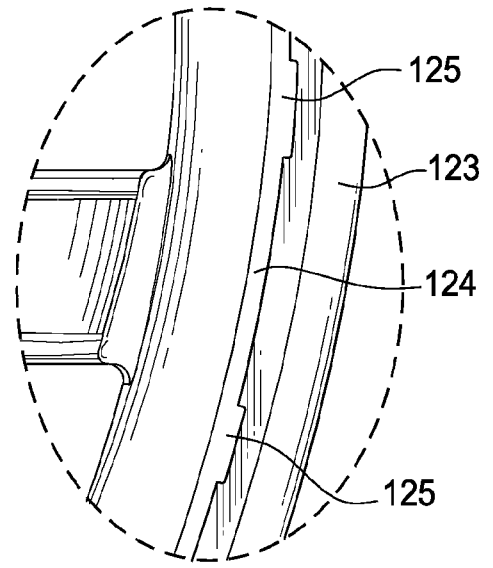


FIG. 13

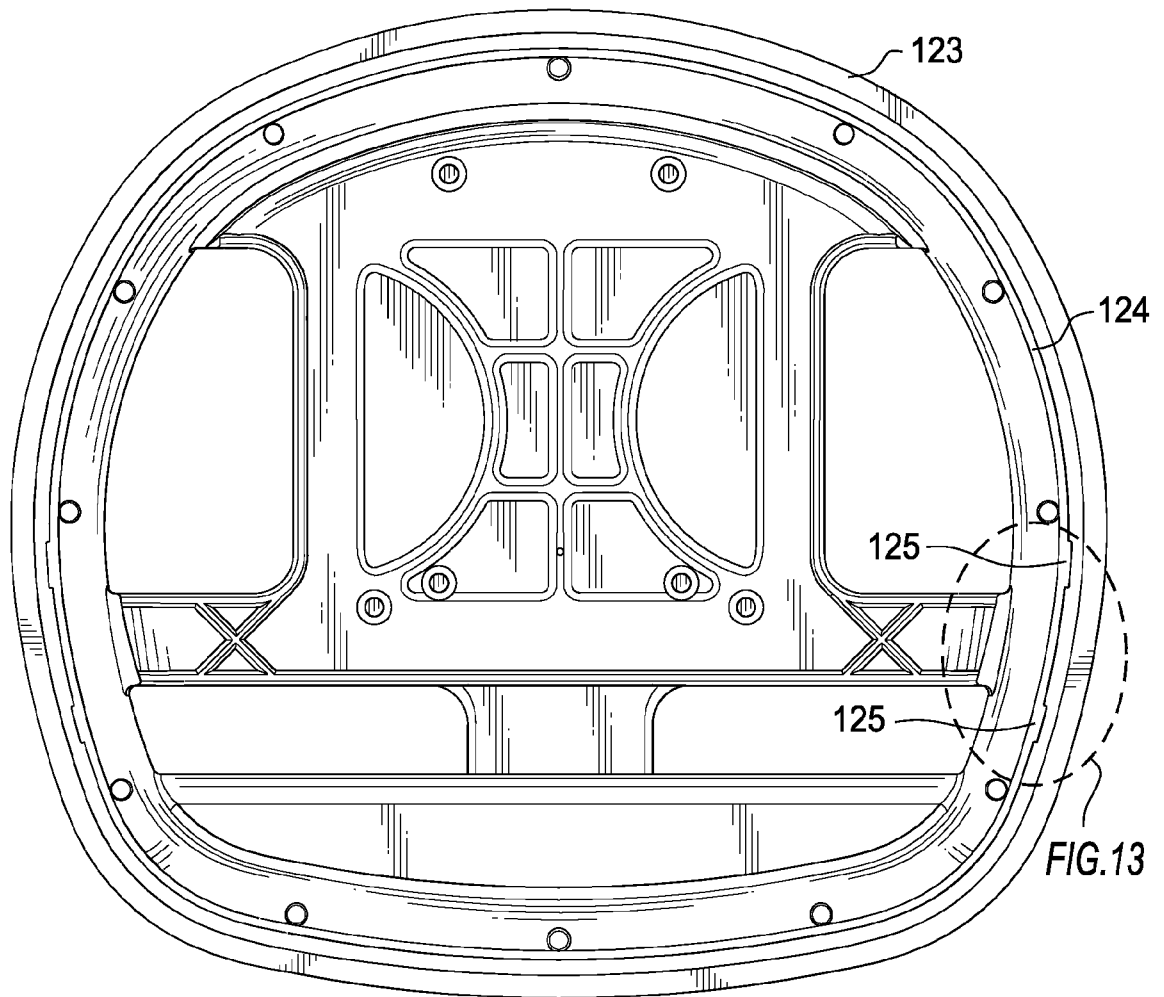


FIG. 12

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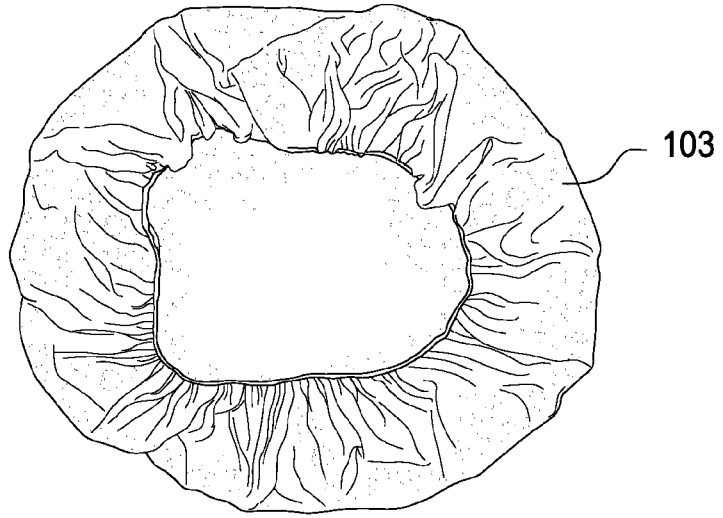


FIG. 14

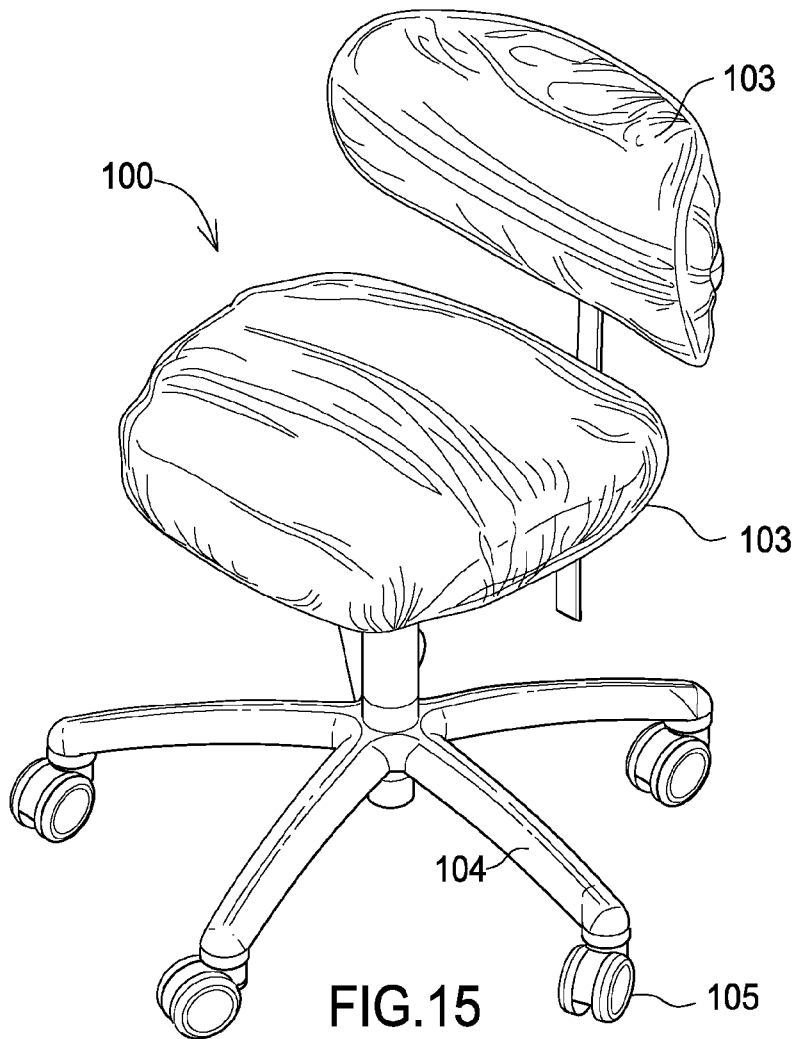


FIG. 15