June 25, 1957 R. H. COWLES 2,796,920

CHAIR BACK SUPPORT

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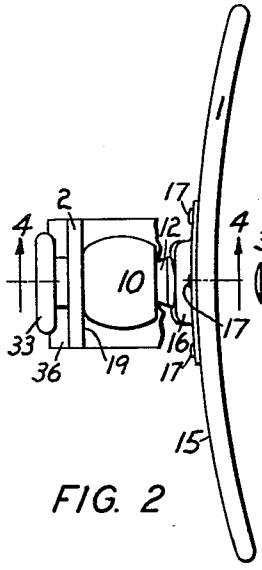


FIG. 2

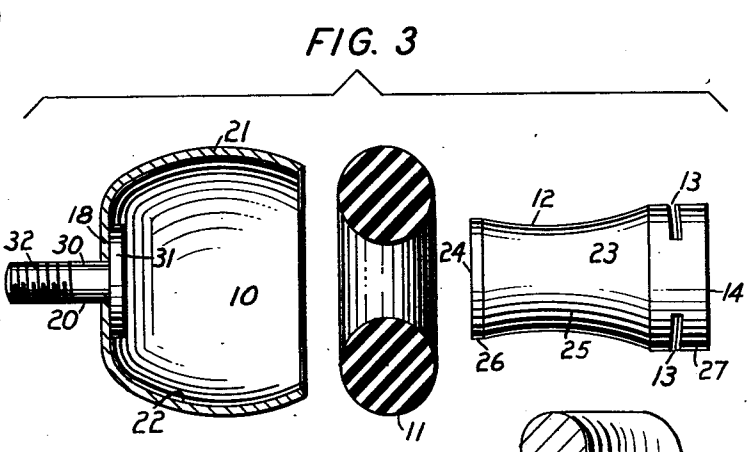


FIG. 3

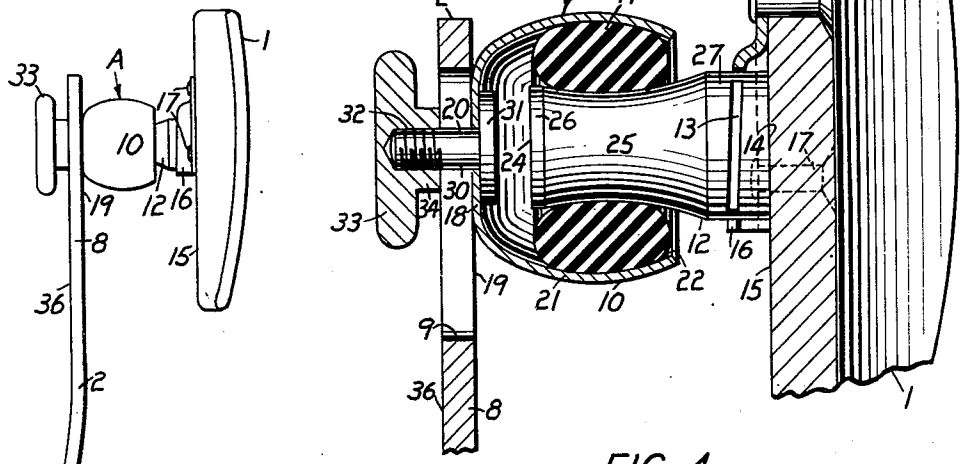


FIG. 4

FIG. 1

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CHAIR BACK SUPPORT

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3 Claims. (Cl. 155—156)

This invention relates to improvements in posture chairs and more particularly to a cushioning assembly for supporting and resiliently cushioning the back rest of a posture chair.

According to the present invention a back rest of a posture chair is supported from a back frame which extends above the seat of the chair. A novel resilient cushioning assembly is provided for rockably and yieldably supporting the back rest from the upper end of the back frame. Such cushioning assembly includes a rigid cup having a generally spheroidal internal peripheral surface and rigid tapered stud having an axially concave external peripheral surface which increases in diameter from an intermediate point on the stud within said cup towards opposite ends of the stud. A ring of elastic resilient rubber-like material is mounted in coaxial relationship with and under radial compression between the exterior surface of the stud and the internal surface of the cup. Such ring cushions movement of the stud with respect to the cup in any direction and yieldably resists rocking movement of the back rest. The concave surface of the stud is preferably in the form of a smoothly curved surface of revolution, and the rubber-like ring is preferably of toroidal form. Such a ring may be circular in cross section when in the normal unstressed condition and preferably has an internal diameter less than the minimum or smallest diameter of the concave surface of said stud and an external diameter greater than the maximum or largest diameter of the internal peripheral surface of said cup when in such normal condition so that the ring will be compressed and elongated axially by radial pressure in the assembled cushion.

The cup and the stud of the resilient cushioning assembly may be easily attached to the back frame and the back rest of the chair and serve as the sole means to support the back rest from said frame. The cushioning assembly serves as a universal cushion for yieldably resisting horizontal, vertical and tilting movements of the back rest and provides a comfortable chair which may be manufactured at low cost.

An object of the invention is to provide a comfortable posture chair of relatively few and simple parts which is simple in construction and operation, compact, inexpensive to manufacture, and easy to assemble and disassemble.

A further object of the invention is to provide a simple cushioning assembly for the back rest of a chair which effectively cushions movements of the back rest in all directions.

Other objects, uses and advantages of the present invention will become apparent from the following description and from the drawings in which:

Figure 1 is a side elevational view with parts broken away of the posture chair of the present invention;

Figure 2 is a fragmentary top view of the chair shown in Fig. 1;

Figure 3 is an exploded view on a large scale showing the cup, ring and stud of the cushioning assembly of the present invention;

Figure 4 is a fragmentary vertical sectional view taken substantially on the line indicated at 4—4 in Fig. 2 and on a larger scale.

Referring more particularly to the drawings in which like parts are referred to by the same numerals throughout the several views, the posture chair of the present invention includes an arcuate back rest 1, a back frame member or post 2 connected to the back rest and a seat 3 having its rear end below the back rest and spaced therefrom. The seat is carried by a generally horizontal frame member 4 which is mounted on the upper end of a vertical standard 5 which is carried by a conventional chair base or pedestal (not shown). The back post is formed from a bar of metal which extends horizontally rearwardly away from the frame member 4 and is turned upwardly rearwardly of the seat to form an upright support for the back rest. Such back post has a horizontal portion 6 at its lower end, an arcuately curved intermediate portion 7, and a substantially vertical portion 8 which is connected at its upper end to the back rest. A vertically elongated slot 9 of uniform width is provided at the upper end of said portion 8.

The back rest is detachably connected to the portion 8 of the back post 2 by means of a cushioning assembly A including a rounded cup 10, an O-ring 11 and a tapered stud 12 mounted in said cup. The cushioning assembly may be mounted between the back frame member and the back rest member of the chair by connecting the cup to one of said members and the stud to the other of said members in any suitable manner. As herein shown, the stud 12 is provided with a pair of diametrically opposed slots 13 near the forward end of the stud and has a flat front vertical face 14 which is held against the back face 15 of the back rest by a bifurcated attaching plate 16 which has portions that fit within the slots 13.

The marginal portions of the plate 16 are rigidly secured to the back rest 1 by three spaced rivets 17. The attaching plate is so shaped that it will have wedging engagement with the stud 12 to prevent movement of the stud away from the back rest while supporting the back rest on said stud. The slots 13 are of uniform width and are inclined slightly away from the vertical plane toward the upper end of the back rest so that the back rest may be readily removed from the stud by lifting the back rest upwardly with respect to the stud.

The cup 10 is open at its forward end and is closed at its rearward end by substantially flat annular bottom wall 18 which is engageable with the front surface 19 of the back post in Fig. 4 and by a bolt 20 which projects rearwardly through said bottom wall and said back post. The cup has a generally spheroidal peripheral wall 21 integral with said bottom wall and projecting forwardly away from said bottom wall and the bolt 20 with its axis horizontal and substantially perpendicular to the front face 19 of the back post. Said peripheral wall has a curved axially-concave internal peripheral surface 22 which is preferably substantially spheroidal and arcuate in axial cross section. As herein shown said internal peripheral surface is generally spheroidal and elongated axially.

The stud has an axially-concave external peripheral surface 23 forwardly of the slots 13 and spaced a short distance from the rear face 24 of the stud. The surface 23 is preferably in the form of a smoothly curved surface of revolution. As herein shown, said surface defines an intermediate portion 25 which is arcuately curved in longitudinal or axial cross section. A cylindrical portion 26 extends a short distance axially from the intermediate portion to the rear face 24, and a cylindrical portion 27 of larger diameter than said portion 26 extends forwardly

from the intermediate portion to the front face **14** of the stud. In the assembly A the external peripheral surface **23** gradually increases in diameter from an intermediate point on the stud within the cup **10** towards the cylindrical portions **26** and **27** at the opposite ends of the stud.

The ring **11** is preferably formed of incompressible elastic rubber and is preferably of substantially toroidal form. As herein shown the cushioning assembly A is made from an elastic rubber ring **11** which is circular in axial cross section as shown in Fig. 3 when in the normal and unstressed condition. When in such normal condition the ring **11** has an internal diameter substantially less than the smallest or minimum diameter of the external peripheral surface **23** and has an external diameter substantially greater than the largest or maximum diameter of the internal peripheral surface **22**, whereby the ring is extended axially and compressed radially when assembled between the cup **10** and the stud **12** as shown in Fig. 4.

It will be understood that all the figures of the drawings in this application are to scale and that the cup **10**, the O-ring **11**, and the stud **12** may have the exact shape and relative dimensions shown in Figs. 3 and 4 or various other suitable dimensions. It will be noted that the radial thickness of the ring **11** is reduced about 25 or 30 percent when it is compressed from its normal unstressed condition as shown in Fig. 3 by radial pressure to its operating position as shown in Fig. 4. It will also be noted that as shown in Figs. 3 and 4 the smallest diameter of the external peripheral surface **23** is about 45 percent greater than the internal diameter of the ring **11** when such ring is in its normal unstressed condition and that as shown the diameter of the cylindrical portion **26** is about 65 percent greater than the normal internal diameter of said ring. In assembling the cushioning device of the present invention the ring **11** is stretched over the stud **12** and the stud and the ring are inserted into the cup. During such assembly the rubber ring may be compressed radially by employing a conventional frustoconical guide or the like to facilitate insertion of the ring between the stud and the cup.

Since the ring is stretched substantially when placed on the peripheral surface **23** and since the ring is compressed radially between the peripheral surfaces **22** and **23**, the ring will grip said surfaces tightly to prevent slippage of the ring on said surfaces and will serve to yieldably resist tortional thrusts caused by swinging or rotating of the stud with respect to the cup. The ring grips the stud with sufficient force to hold the back rest **1** in a substantially horizontal position at all times.

The cushioning assembly A not only resists torsional thrusts but also cushions axial thrusts. An axially-elongated annular space is provided between the axially-arcuate peripheral surfaces **22** and **23** which space gradually decreases in radial thickness from an intermediate point towards its opposite ends. Since the O-ring **11** in the cushioning assembly A is compressed radially when the stud is moved axially in either direction from its normal position shown in Fig. 4, the resistance of the ring **11** to axial movement of the stud will increase in proportion to the distance the stud is moved from said normal position. The toroidal ring **11** provides a rolling action as the stud is moved axially with respect to the cup so as to provide an effective cushion. The rear face **24** of the stud is normally parallel to and spaced from the flat front face of the bolt head **31** as shown in Fig. 4 so as to permit substantial axial movement of the stud toward the back post **2**.

The cup **21** may be attached to the back rest or other back frame of the chair by means of the bolt **20** or any other suitable attaching means. As herein shown the bolt **20** is provided with a cylindrical intermediate portion **30** of a diameter to fit tightly in the circular hole formed by the bottom wall **18** and a radially enlarged head **31** which is welded to said bottom wall. The bolt also has a rearwardly projecting externally threaded portion **32** coaxial with said portions **30** and **31** which is adapted to receive an internally threaded manually rotatable clamping nut **33**. The clamping nut has a hub portion **34** with a flat front face engageable with the rear face **36** of the back post **2** at the margin of the slot and may be screwed on the bolt to clamp the cup **10** against the back post **2** as shown in Fig. 4.

It will be understood that in accordance with the patent statutes, variations and modifications of the specific device disclosed herein may be made without departing from the spirit of the present invention.

Having described my invention, I claim:

1. A posture chair having a back frame provided with a vertically elongated slot, a back rest supported solely by said frame, a rigid metal cup having a generally spheroidal internal peripheral surface and an externally threaded attaching bolt extending through said slot, an internally threaded clamping member mounted on the end of said bolt and engaging said frame along the margin of said slot for detachably clamping said cup to said frame, a rigid metal stud detachably and rigidly connected to said back rest and projecting into said cup, said stud having an axially concave external peripheral surface of arcuately curved axial cross section that increases in diameter from an intermediate point toward its opposite ends, and an elastic O-ring of resilient rubber-like material compressed and axially elongated between said stud and said cup by radial pressure, said ring in the normal unstressed condition being generally circular in axial cross section and having a radial thickness at least about 20 percent greater than its radial thickness when compressed between said cup and said stud whereby the ring grips the stud with sufficient force to hold said stud in a substantially horizontal position.

2. A posture chair having a generally horizontal seat, an upright back post extending upwardly from said seat, a back rest above the back end of said seat, and a resilient cushioning assembly connected between said post and said back rest for supporting said back rest, said assembly comprising a rigid metal cup rigidly connected to said back post and having a generally spheroidal internal surface, a rigid horizontal metal stud mounted on said back rest and having an axially concave external peripheral surface of revolution with an arcuately curved axial cross section that increases in diameter from an intermediate point toward its opposite ends, and an elastic O-ring of resilient rubber-like material compressed and axially elongated between said stud and said cup by radial pressure, said O-ring in the normal unstressed condition having a radial thickness about 20 to 30 percent greater than its radial thickness when compressed between said cup and said stud, the normal radial thickness of said O-ring being materially less than the radii of axial curvature of the internal spheroidal surface of said cup and the external peripheral surface of said stud so that the ring grips the stud throughout the major portion of said axially concave surface and holds the stud in a generally horizontal position while yieldably resisting thrusts caused by swinging or rotating movements of the back rest, said spheroidal surface extending axially a distance materially greater than the axial length of the compressed O-ring, and said stud normally being spaced from the base of said cup so that the O-ring cushions axial movements of the stud.

3. In a posture chair having a seat, a back frame member extending above said seat and a back rest member above the back end of said seat, an improved resilient cushioning assembly connected between said members for supporting said back rest member comprising: a rigid metal cup having an axially concave internal peripheral surface extending substantially the full axial length of the cup, a rigid stud spaced from and substantially concentric to said cup and projecting into said cup, said stud having an axially concave external pe-

ripheral surface along the major portion of its length providing an annular space between said stud and said cup that decreases in radial thickness from an intermediate point toward its opposite ends, and a toroidal elastic rubber ring in said annular space compressed radially and elongated axially between said peripheral surfaces, said ring when compressed between said stud and said cup having an axial length materially greater than its radial thickness and having inner and outer surfaces extending the major portion of the length of the ring gripping the stud and the cup to hold the stud in a horizontal position substantially in axial alignment with the cup and to resist rotating or swinging movements of

the stud, said inner and outer ring surfaces having an axial length materially less than the axial length of said axially concave surfaces so that axial movements of the back rest are effectively cushioned.

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