

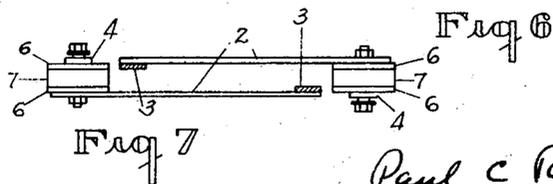
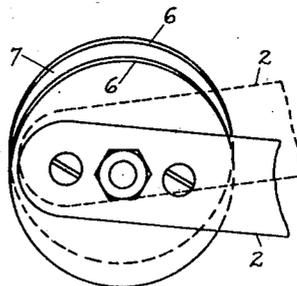
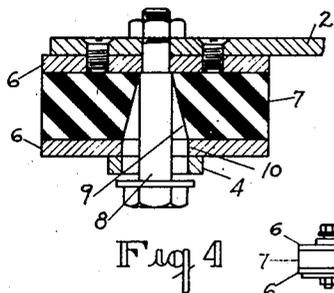
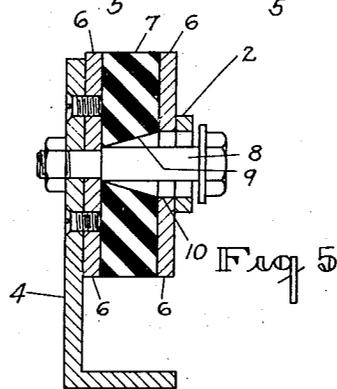
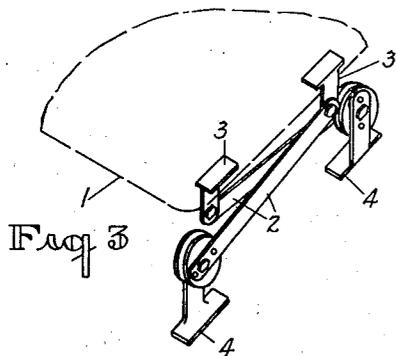
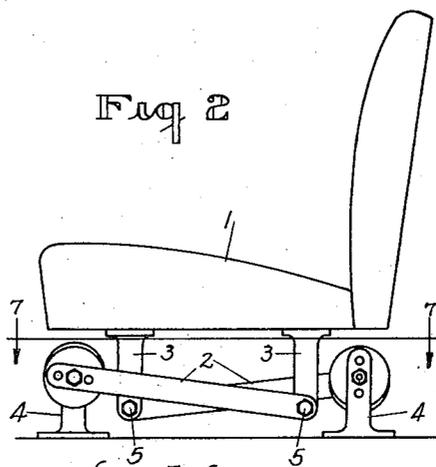
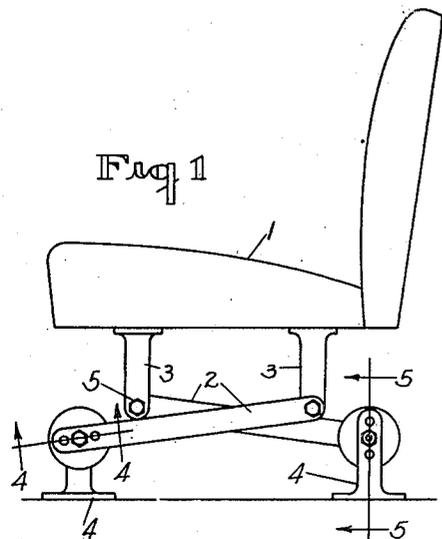
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P. C. ROCHE
CUSHION SUPPORT

2,460,596

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2 Sheets-Sheet 1



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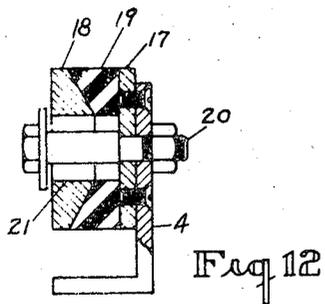
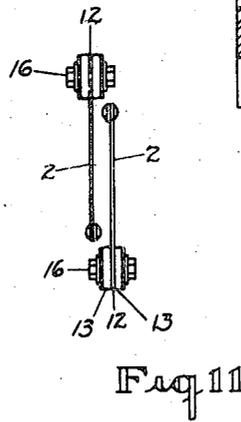
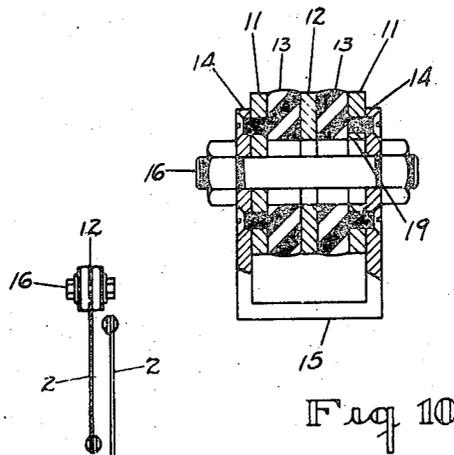
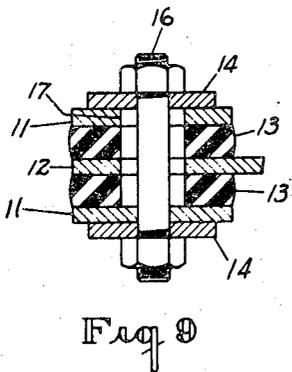
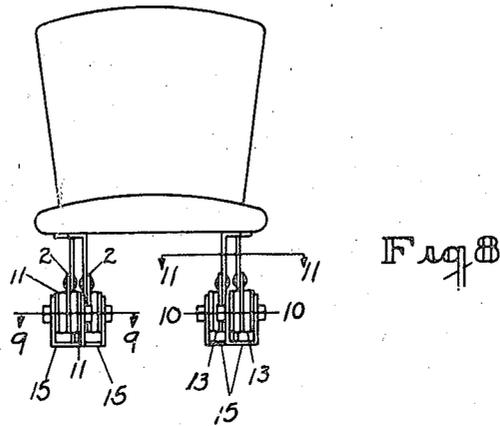
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P. C. ROCHE
CUSHION SUPPORT

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CUSHION SUPPORT

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7 Claims. (Cl. 248—358)

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The present invention is designed to provide a cushion support for devices such as chairs or seats for automobiles or airplanes which are subjected not only to the weight of the person using the chair but to shocks and vibration.

The object of my invention is to provide a simple and rugged cushion support. Further objects and advantages will appear in the specification and claims.

In the accompanying drawing, Fig. 1 is a side elevation of a chair in the unloaded position; Fig. 2 is a similar view with the chair in the loaded position; Fig. 3 is a perspective view of one side of the chair support; Figs. 4 and 5 are sectional views on line 4—4 and 5—5 of Fig. 1; Fig. 6 is a side elevation of one of the rubber joints; Fig. 7 is a sectional view on lines 7—7 of Fig. 2; Fig. 8 is a front elevation of the chair having a double rubber joint support; Figs. 9, 10 and 11 are sectional views on lines 9—9, 10—10, and 11—11 of Fig. 8; and Fig. 12 is a sectional elevation of a modification of the rubber joint construction.

Referring to the drawing, there is shown a chair 1 supported at each side by crossed arms 2 connected between brackets 3 fixed to the under side of the chair and brackets 4 fixed to the supporting surface. The connections between the arms 2 and the brackets 3 are made by pins 5. The opposite ends of the arms 2 are connected to the brackets 4 through rubber joints comprising spaced metal plates 6 connected by rubber 7 bonded to the opposed faces of the plates. The rubber joints are mounted on opposite sides of the brackets 4, one of the plates being fixed to the bracket and the other being fixed to the arm.

In the unloaded position the arms 2 are inclined upwardly from the horizontal, and in the loaded position the arms are inclined downwardly from the horizontal, the angles of inclination being substantially equal for normal load. As the arms pass the horizontal, there must necessarily be forward and backward movement of the plates 6 attached to the supporting arms, which movement is accommodated by shear of the rubber. The vertical movement of the chair is resisted by torsional shear deflection of the rubber and by the shear deflection of the rubber along the supporting arms necessary to accommodate the changes in distance between the brackets 3 and 4. The shear softness along the supporting arms makes the cushioning action of the support for vertical vibration substantially linear for a wide range of loads. The shear

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softness in the plane of the arms is also useful for cushioning horizontal vibrations.

When the chair is loaded, in addition to the torsional movement of the plates 6 attached to the supporting arms, there is also a vertical movement causing shear deflection of the rubber under the chair load. This vertical movement, indicated in Fig. 2, is insufficient to effect the torsional resistance of the mounting. Because there is not much vertical movement it is unnecessary to make the rubber mountings so that the plates attached to the supporting arms will be displaced above the other plates in the unloaded condition and will be brought into opposed relation under load.

When the chairs are used in airplanes or automobiles where there may be shock loading of several times the magnitude of the direct load, stop bolts 8 may be provided, fixed to one of the plates 6 of the mounting and extending through a tapered clearance hole 9 in the rubber and a clearance hole 10 in the opposite plate. In Fig. 4 the stop bolt is shown attached to the lower end of the supporting arm and in Fig. 5 the stop bolt is shown attached to the supporting bracket 4.

In the modification shown in Figs. 8 to 11, the rubber joints at the lower ends of the supporting arms 2 consist of plates 11 on opposite sides of an enlarged section 12 at the lower ends of the supporting arm with rubber disks 13 molded to the opposed faces of the plates and supporting arm. Because the supporting arm is held between the rubber disks, there is less tendency for the arm to tilt. The rubber mountings can be made of smaller diameter, which may be important in some applications to save space. The plates 11 of the mounting are fixed between the sides 14 of U-shaped brackets 15 fixed to the supporting surface. Stop bolts 16 are fixed to the sides of the bracket and extend through clearance holes 17 in the mounting. Except for the changes in the mounting construction, the operation is the same as in the previously described construction.

In Fig. 12 is shown a mounting which may be substituted for that shown in Figs. 1 and 2. This mounting consists of opposed flat and conical plates 17 and 18 with rubber 19 bonded to the opposed surfaces. The thickness of the rubber increases toward the outside so that the shear loading of the rubber under torsional stress is uniform. The flat plate 17 is shown connected to the supporting bracket 4, and the conical plate 18 is connected to the lower end of the supporting arm 2 in a manner not shown. A stop bolt 20 is

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fixed to the bracket 4 and extends through a clearance opening 21 in the plate 13 and in the rubber.

What I claim as new is:

1. In a support, crossed load supporting arms having load transmitting connections at opposite sides of the crossover for connection between a load and its support, the connections at one end of each of said arms comprising pivot joints, and the connections at the other ends of said arms comprising torsion spring joints resisting angular movement of the arms, said torsion joints comprising opposed joint members relatively movable angularly and length wise of the arms, and an element of rubber like material between and fixed to the joint members resisting the relative movements of the joint members.

2. In a support, crossed load supporting arms having load transmitting connections at opposite sides of the crossover for connection between a load and its support, the connections at one end of each of said arms comprising pivot joints, and the connections at the other ends of said arms comprising torsion joints having opposed surfaces extending along and spaced apart perpendicular to the plane of the arms with rubber therebetween and fixed to the opposed surfaces.

3. In a support, crossed load supporting arms having load transmitting connections at opposite sides of the crossover for connection between a load and its support, the connections at one end of each of said arms comprising pivot joints, and the connections at the other ends of said arms comprising torsion spring joints yieldingly resisting movement of the arms in all directions in the plane of the arms, said torsion joints comprising opposed joint members relatively movable in all directions in the plane of the arm, and an element of rubber like material between and fixed to the joint members resisting the relative movements of the joint members.

4. In a support, crossed load supporting arms having load transmitting connections at opposite sides of the crossover for connection between a load and its support, the connections at one end of each of said arms comprising pivot joints, and the connections at the other ends of said arms comprising torsion spring joints resisting angular movement of the arms, said torsion joints comprising opposed joint members relatively movable angularly and lengthwise of the arms, and an element of rubber like material between and fixed to the joint members resisting the relative movements of the joint members the joints being arranged so the joints connected to the load move from above to below one of the joints connected to the support as the load is applied,

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5. In a support, crossed load supporting arms for connection between a load and its support, pivot joints at each end of the arms and on opposite sides of the crossover forming the load transmitting connections, one of the joints comprising opposed surfaces extending along and spaced apart perpendicular to the plane of the arms with rubber therebetween and fixed to the opposed surfaces.

6. In a support, crossed load supporting arms for connection between a load and its support, pivot joints at each end of the arms and on opposite sides of the crossover forming the load transmitting connections, one of the joints comprising opposed surfaces extending along and spaced apart perpendicular to the plane of the arms with rubber therebetween and fixed to the opposed surfaces, said arms being positioned under no load conditions with the load joints above the support joints and under load with the load joints below the support joints.

7. In a support, crossed load supporting arms for connection between a load and its support, pivot joints at each end of the arms and on opposite sides of the crossover forming the load transmitting connections, one of the joints comprising opposed surfaces extending along and spaced apart perpendicular to the plane of the arms with rubber therebetween and fixed to the opposed surfaces, and a bolt fixed to one of said surfaces and extending through a clearance hole in the rubber and the other surface providing a safety limit for the joint deflection.

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