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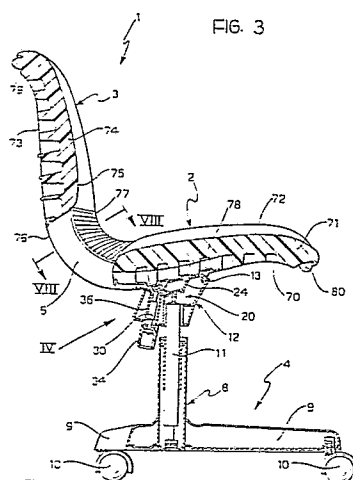
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⑤④ **A chair with a forwardly pivotable seat.**

⑤⑦ A chair including a support structure (4), a seat (2) mounted on the support structure (4) so that it can pivot between a position of normal use and a forwardly-inclined working position, and resilient means (36) which bias the seat (2) into its position of normal use. The support structure (4) of the chair includes an upper cup-shaped support (12) closed at the top by a plate (24) which is fixed to the seat (2) and is articulated to the cup-shaped support (12), the plate (24) and the cup-shaped support (12) having respective stop surfaces (24a, 20b) which are in contact with each other in the position of normal use of the seat. The resilient means are constituted by a helical compression spring (36) having its upper end in contact with a wall (18d) of the cup-shaped support (12) and its lower end in contact with a bearing ring (37) associated with a tie rod (30) which is movable with the plate (24) fixed to the seat.



Description

A chair with a forwardly pivotable seat

The present invention relates to chairs of the type comprising a support structure, a seat mounted on the support structure so that it can pivot between a position of normal use and a forwardly-inclined working position, and resilient means which bias the seat into its position of normal use.

The object of the present invention is to provide a chair of the aforementioned type with a structure which is simple and convenient in use.

The main characteristic of the chair according to the invention lies in the fact that the support structure of the chair includes an upper cup-shaped support closed at the top by a plate which is fixed to the seat and is articulated to the cup-shaped support, in that the plate and the cup-shaped support have respective stop surfaces which are in contact with each other in the position of normal use of the seat, and in that the resilient means are constituted by a helical compression spring having its upper end in contact with a wall of the cup-shaped support and its lower end in contact with a bearing ring associated with a tie rod which is movable with the plate fixed to the seat.

The tie rod passes through apertures formed in the plate and the wall of the cup-shaped support and has an upper T-shaped head housed and resting in a seat formed in the plate which is fixed to the seat.

The load of the helical spring is preferably adjustable by means of a knob incorporating a nut screwed onto a threaded portion of the tie rod. The bearing ring for the lower end of the helical spring is preferably constituted by an axial ball bearing interposed between the spring and the knob. The assembly constituted by the tie rod, the knob, the ball bearing and the helical spring can be fitted as a unit by inserting the T-shaped head of the tie rod through the aperture in the plate from below and resting it in its seat in the plate after the tie rod has been rotated through 90°.

According to a further characteristic, the chair according to the invention has a backrest which is connected to the seat by means of a double articulation constituted on each side of the chair by three mutually-articulated sheet-metal channels fixed to the seat, the backrest and an intermediate connecting element between the seat and the backrest, respectively. A pin spring is associated with each articulation and has its two opposite arms in contact with the adjacent articulation channels.

The chair according to the invention may be provided with armrests by the provision of a cross member for supporting the armrests, which is mounted between the seat and the plate. The chair also lends itself to being transformed easily into a chair with fixed legs, with or without armrests, by the replacement of the cup-shaped support and the associated plate with cross members for connecting the legs and the armrests.

Further characteristics and advantages of the present invention will become clear from the description which follows with reference to the

appended drawings, provided by way of non-limiting example, in which:

Figures 1 and 2 are a perspective view and a side elevational view of the chair according to the invention,

Figure 3 is a section of the chair of Figure 1 in the vertical plane of symmetry of the chair,

Figure 4 shows the detail IV of Figure 3, on an enlarged scale,

Figure 5 is a section taken on the line V-V of Figure 4,

Figure 6 is a section taken on the line VI-VI of Figure 5,

Figure 7 is an exploded view of a detail of the chair according to the invention,

Figure 9 is an exploded perspective view of the detail of Figure 8,

Figure 10 is a section taken on the line X-X of Figure 8,

Figure 11 is a perspective view which shows the detail of Figure 7 in the assembled condition,

Figure 12 is a variant of Figure 1,

Figure 13 is an exploded perspective view of the variant from below,

Figures 14 and 15 are perspective view of two further variants,

Figure 16 is a perspective view of the variant illustrated in Figure 15, from below, and

Figure 17 is a partially sectioned view of the chair of Figure 15, on an enlarged scale.

Figures 1 and 2 show an office chair, generally indicated 1, comprising a seat 2 and a backrest 3 carried by a support structure 4. The backrest 3 is connected to the seat 2 by means of an intermediate element 5 which is articulated to the seat 2 about a horizontal transverse axis 6 and to the backrest 3 about a horizontal transverse axis 7. In the embodiment illustrated, the support structure 4 has a single supporting column 8 whose base is provided with a plurality of spokes 9 having casters 10 at their ends.

With reference to Figure 3, the support column 8 incorporates, in known manner, a gas spring whose movable rod is indicated 11. The structure of the seat 2 is articulated to a support 12 about a horizontal transverse axis 13. The support 12 is fixed to the upper end of the rod 11, is made of sheet metal, and is essentially cup-shaped. It includes a base wall 14, a front wall 15, a rear wall 16 and two side walls 17 (see Figures 4 and 7). Moreover, the front wall 15 and the rear wall 16 are interconnected in the central region of the support by a wall 18. The wall 18 has a front portion 18a which is in contact with the corresponding part of the wall 15 and which forms a tubular seat 18b at its upper end for housing the pin of the articulation 13. The wall 18 also includes a base portion 18c which is arranged parallel to and spaced from the base wall 14, as well as a rear part 18d which has a rectangular aperture 19 formed in a recessed circular-shaped region of the wall. The base portion 18c of the wall 18 is also

connected to the side walls 17 by means of two further walls 20, each including a vertical part 20a which rises from the base wall 18 and an essentially horizontal part 20b which extends from the upper end of the wall 20a to the respective side wall 17.

A bush 21 is mounted between the base wall 14 of the cup-shaped support 12 and the wall 18c and, in its turn, is firmly fixed to the upper end of the movable rod 11 of the gas spring.

Again with reference to Figures 4 and 7, the tubular seat 18b houses the central part of an articulation pin 22 whose ends are housed in two bushes 23 forming part of a plate 24. The plate 24 has an essentially rectangular, slightly arcuate configuration with its concavity facing upwards, so as to fit the shape of the lower surface of the seat 2 (see also Figure 5). The plate 24 has four holes 25 adjacent its corners for the engagement of screws 26 (Figure 5) for fixing it to the lower wall 70 of the seat 2. As can clearly be seen in Figures 6 and 7, the plate 24 has a recessed region, indicated 24a, intermediate its front edge and its rear edge. The part 24a is in contact with the two walls 20b of the support 12 when the seat is in its position of normal use (see Figures 3 and 4). As can be seen in Figures 6 and 7, the side walls 17 of the cup-shaped support 12 have four holes 28 for the passage of the heads of the screws 26.

The plate 24 has a recessed portion 32 in its rear part, in which a rectangular aperture 29 is formed. A tie rod, indicated 30, is disposed through the apertures 29 and 19 and has an upper T-shaped head 31 housed and resting in the seat 32 of the plate 24. The rectangular apertures 19 and 29 enable the tie rod 30 to be inserted through the apertures from below, after which the head 31 can be made to bear on the seat 32 by rotation of the tie rod 30 through 90° about its own axis. The opposite end of the tie rod 30 has a threaded portion 32a onto which a nut 33 is screwed. The nut 33 is incorporated in the plastics body of a knob 34 having a cup-shaped end part closed by a cover 35. A helical spring 36 is associated with the tie rod 30 and has its upper end in contact with the lower surface of the wall 18d. This wall, as already indicated, has a circular recessed part in correspondence with the aperture 19, which serves to keep the upper end of the spring 36 aligned with the axis of the tie rod 30. The lower end of the spring 36 acts against the knob 34 with the interposition of an axial ball bearing 37. In practice, the assembly constituted by the tie rod 30, the spring 36, the bearing 37 and the knob 34 can be fitted as a unit into the cup-shaped support by the insertion of the head of the tie rod from below, as described above.

In the usual manner, the upper end of the movable rod 11 of the gas spring is provided with a control button 38 which, when pushed, enables the height of the chair to be adjusted. In the embodiment illustrated, the control button 38 can be operated by means of a lever 39 (Figure 5) which is pivotably mounted on one of the two side walls 17 by means of a ring 40 of elastomeric material. The lever 39 has an operative end 41 which acts on the button 38 and a handle 42 at its opposite end. A raising of the handle

42 in the direction of the arrow A shown in Figure 4 causes a corresponding lowering of its operative end 41 and the operation of the button 38.

The structure of the seat 2 includes a sheet-metal panel 70 to which is fixed a padding of expanded plastics material 71 provided with a cloth cover 72 whose peripheral edge is anchored to the panel 70. The structure of the backrest is similar and has a sheet-metal panel 73, a padding of expanded plastics material 74 and a cloth cover 75. The intermediate element 5 includes a rear sheet-metal panel 76 fixed along the periphery of a front panel 77 of plastics material. In the region to which the plate 24 is fixed, the panel 70 of the seat has a corrugated metal reinforcing plate 78 on its inner side.

The two articulations 6 and 7 between the seat and the backrest of the chair are formed, on each side of the chair, by three sheet-metal channels 43, 44 and 45 articulated to each other by pins 46 and 47. A pin spring 48 is associated with the pin 46, and its two end arms are in contact with the channel 43 and the channel 44 respectively. A pin spring 49, whose two end arms are in contact with the channel 44 and the channel 45, is associated with the pin 47. The three channels are arranged within the backrest 3, the intermediate element 5 and the seat 2, respectively. The channels 43 and 45 in the backrest 3 and the seat 2 are arranged in cavities 79 and 80 (Figures 3 and 5) defined between channel-shaped portions of the respective sheet-metal panels 73 and 70 and the padding 74 and 71. As illustrated in Figure 10, the channels 43, 44 and 45 are fixed to the respective panels by means of rivets 52.

The chair according to the invention is normally in the position of use illustrated in continuous outline in Figure 2. In this condition, the spring 36 situated in the cup-shaped support 12 pushes the tie rod 30 downwards. The upper head 31 of the tie rod therefore keeps the plate 24 in the stop position against the walls 20b of the cup-shaped support 12. From this position, a seated person can make the seat 2 pivot forwards about the axis 13 by moving his weight to the front part of the seat, so as to dispose the chair in the position indicated A in Figure 2. This position is suitable for working with typewriters, display terminals and the like. The forward pivoting of the seat 2 causes a corresponding pivoting of the plate 24 relative to the cup-shaped support 12, about the articulation axis 13. The pivoting of the plate 24 also causes the tie rod 30 to be raised, thus compressing the spring 36. When the operator stops exerting pressure with his body on the front part of the seat, the spring 36 returns the latter to the position of normal use illustrated in continuous outline in Figure 2. The load of the spring 36 can be adjusted by the operation of the knob 34, so as to change the axial position of the nut 33 and the axial bearing 37. The latter enables rotation of the knob 34 relative to the lower end of the helical spring 36. The user can thus adjust the chair so as to obtain the required degree of reaction when the seat is pivoted forwardly.

The operator may also tilt the backrest of the chair backwards from the position of normal use illustrated in continuous outline in Figure 2, by pushing

his body against it until it reaches the position indicated B in Figure 2. This position is reached by making use of the angular travel permitted by the articulations 6 and 7. When the pressure on the backrest stops, the latter returns to its position of normal use under the action of the pin springs 48 and 49.

Figures 12 and 13 show a variant of the chair according to the invention, which differs from that illustrated in Figures 1-11 in that it includes two armrests 82 which are formed by the end portions of a single tubular sheet-metal element 83. This element includes a central cross member 84 which is fixed by means of bolts 85 (Figure 13) to the sheet-metal panel 70 of the seat 2 and is situated in the recessed part of the plate 24.

Figures 15-17 show a further variant which differs from that of Figures 12 and 13 in that the cup-shaped support 12 with the plate 24 and the associated support structure 4 is replaced by two pairs of legs 86. Each pair of legs 86 is formed by a single flattened tubular element 87. This element includes a central cross member 88 which is fixed by means of bolts 89 to the panel 70 of the seat 72. The two central cross members 88 are connected by a bridge element 90 which is welded to them and, together with the cross member 84, is fixed to the panel 70 by means of bolts 91. Figure 14 shows a variant with fixed legs but without armrests.

Claims

1. A chair including a support structure (4), a seat (2) mounted on the support structure (4) so that it can pivot between a position of normal use and a forwardly-inclined working position, and resilient means (36) which bias the seat (2) into its position of normal use,

characterised in that the support structure (4) of the chair includes an upper cup-shaped support (12) closed at the top by a plate (24) which is fixed to the seat (2) and is articulated to the cup-shaped support (12), in that the plate (24) and the cup-shaped support (12) have respective stop surfaces (24a, 20b) which are in contact with each other in the position of normal use of the seat, and in that the resilient means are constituted by a helical compression spring (36) having its upper end in contact with a wall (18d) of the cup-shaped support (12) and its lower end in contact with a bearing ring (37) associated with a tie rod (30) which is movable with the plate (24) fixed to the seat.

2. A chair according to Claim 1, characterised in that the tie rod (30) is disposed through apertures (19, 29) formed in the plate (24) and the wall (18d) of the cup-shaped support (12), and has an upper head (31) housed and resting in a seat formed in the plate (24).

3. A chair according to Claim 2, characterised in that means (34) are provided for adjusting the axial position of the bearing ring (37) relative to

the tie rod (30).

4. A chair according to Claim 3, characterised in that the adjustment means comprise a knob (34) incorporating a nut (33) screwed onto a threaded portion (32) of the tie rod (30).

5. A chair according to Claim 4, characterised in that the bearing ring is constituted by an axial ball bearing (37) interposed between the lower end of the helical spring (36) and the adjustment knob (34).

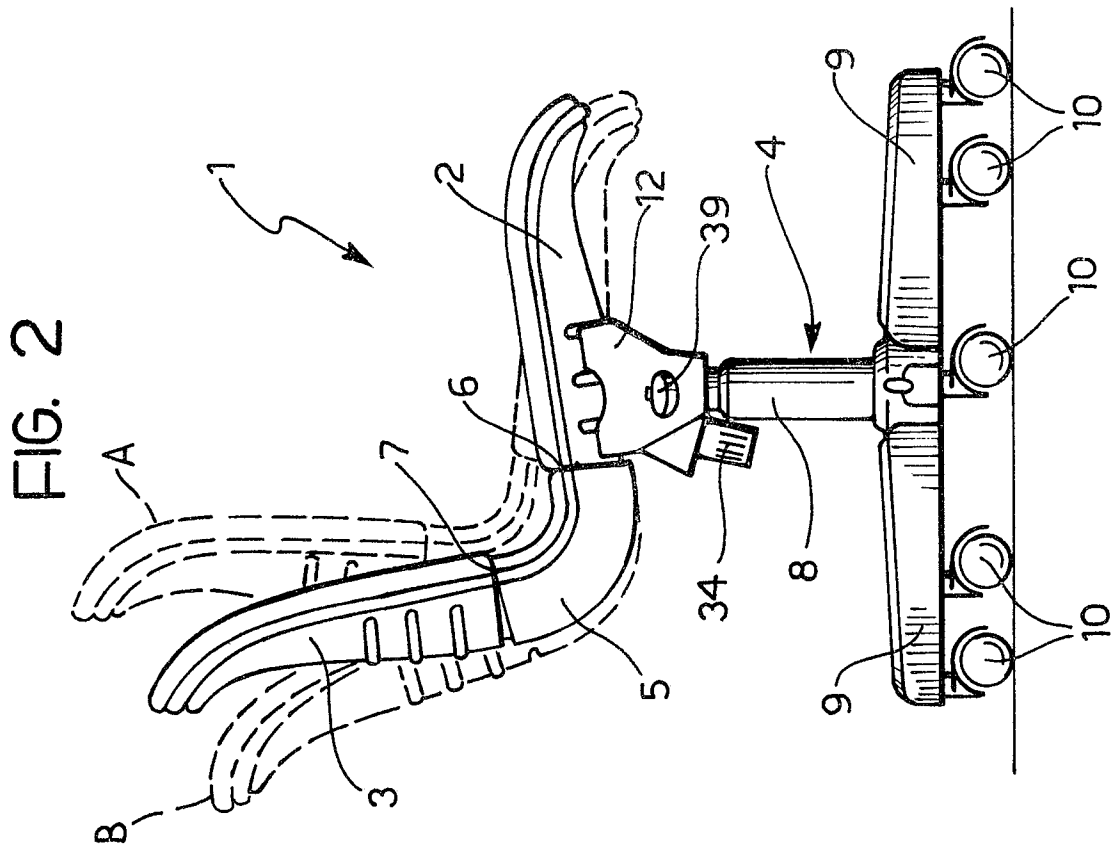
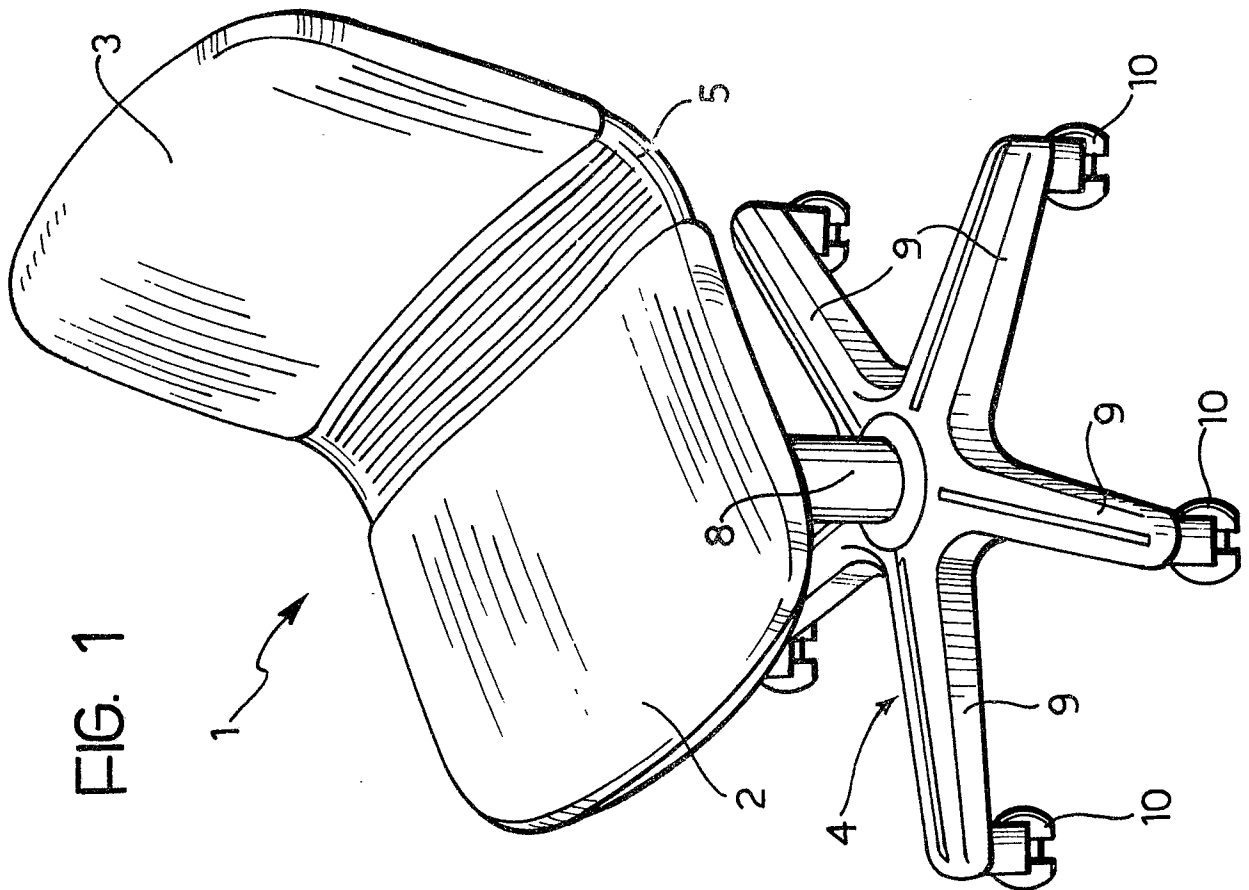
6. A chair according to Claim 4, characterised in that the upper head of the tie rod (30) is T-shaped, and in that the aperture (29) formed in the plate (24) has a rectangular shape which corresponds to that of the head, so that the latter can be inserted through the aperture from below and then rested in its seat by the rotation of the tie rod through 90°.

7. A chair according to Claim 1, characterised in that it includes a backrest (3) connected to the seat (2) by means of a double articulation (6, 7) constituted on each side of the chair by three mutually articulated sheet-metal channels (43, 44, 45) which are fixed respectively to the seat (2), the backrest (3) and an intermediate connecting element (5) between the seat and the backrest, and in that a pin spring (48, 49) is associated with each articulation, the two end arms of each spring being in contact with the two articulation channels.

8. A chair according to Claim 1, characterised in that a cross member for supporting a pair of armrests is interposed between the seat (2) and the plate (24).

9. A chair according to Claim 1, characterised in that the chair is provided with two pairs of legs connected by two parallel cross members which are in turn connected by a bridge element, and in that this unit can be fixed to the chair as an alternative to the unit constituted by the cup-shaped support and the associated plate.

10. A chair according to Claim 9, characterised in that a cross member for supporting a pair of armrests can be fixed to the bridge element.



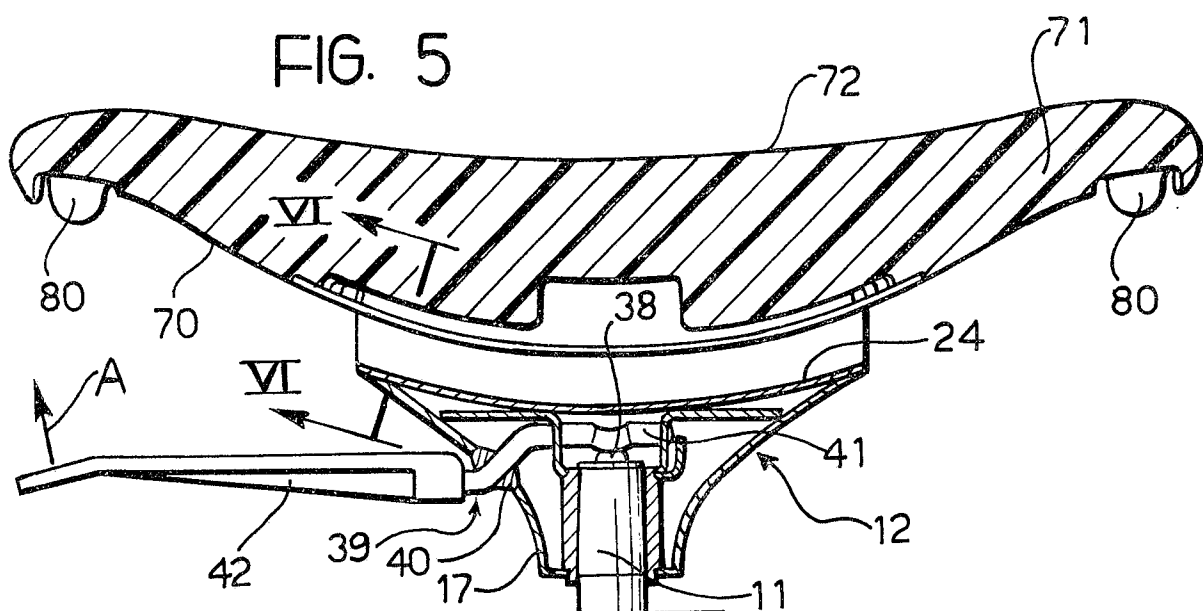
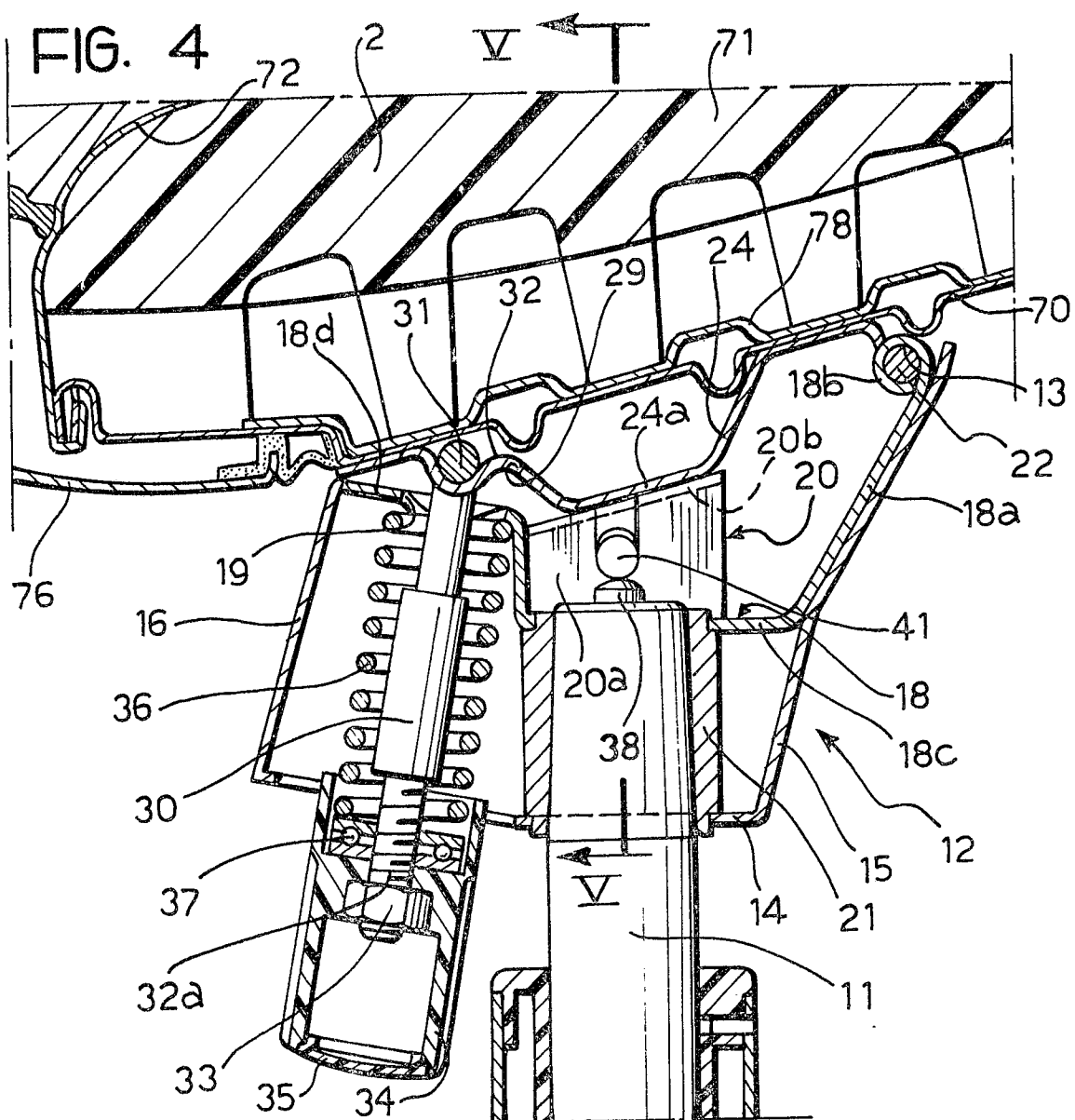


FIG. 6

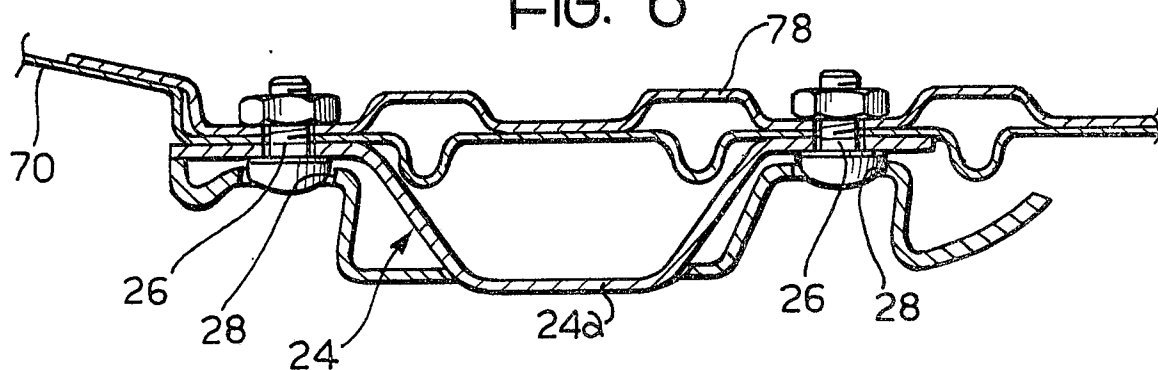


FIG. 7

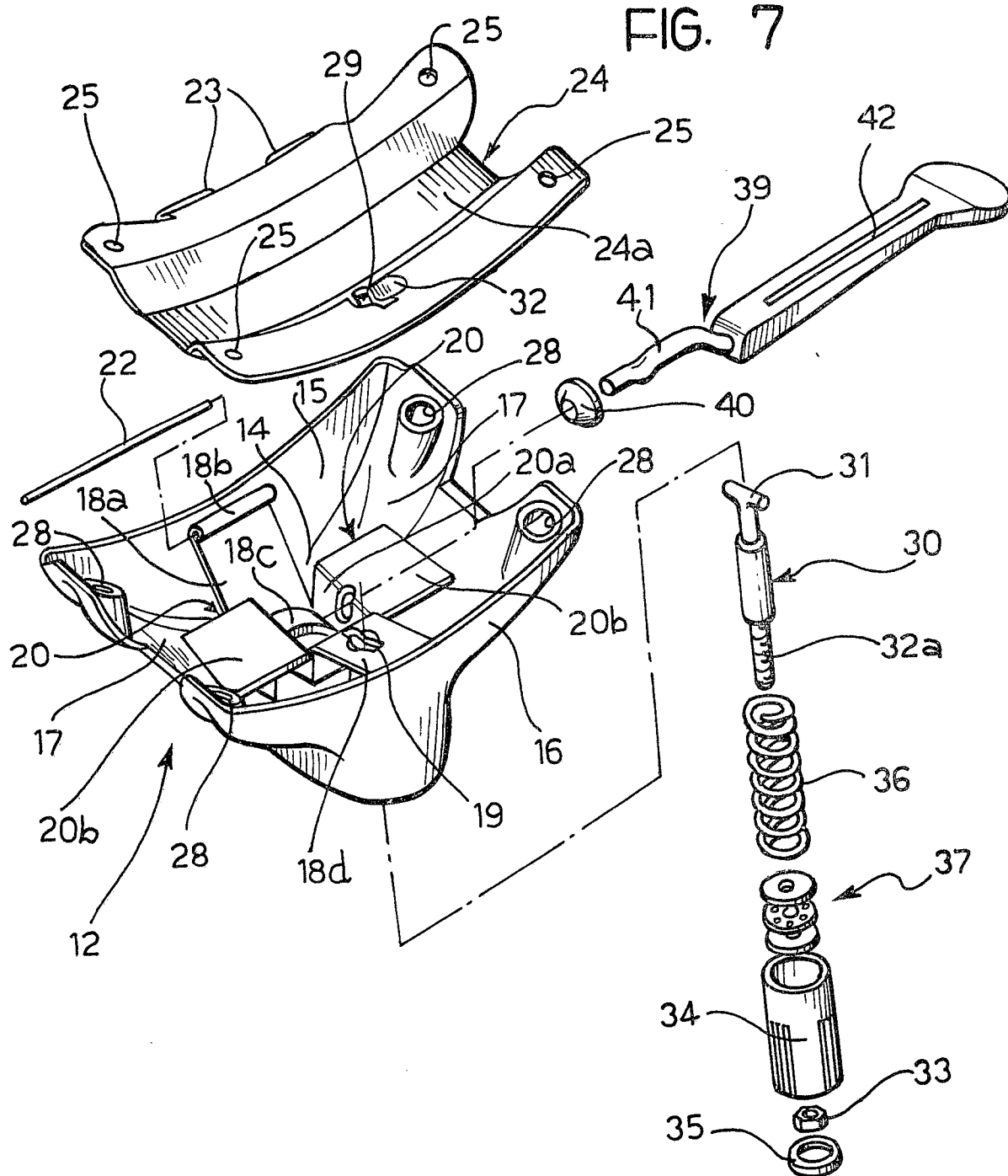


FIG. 8

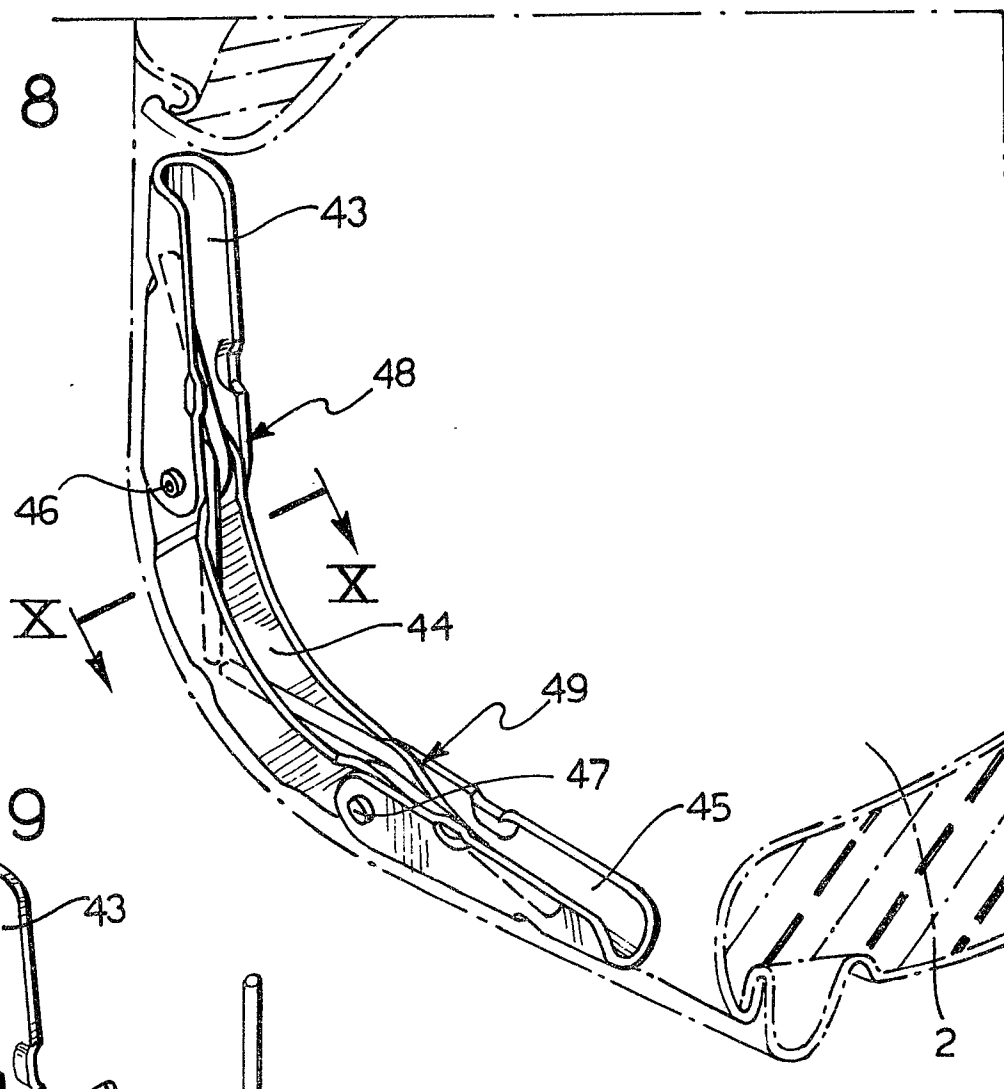


FIG. 9

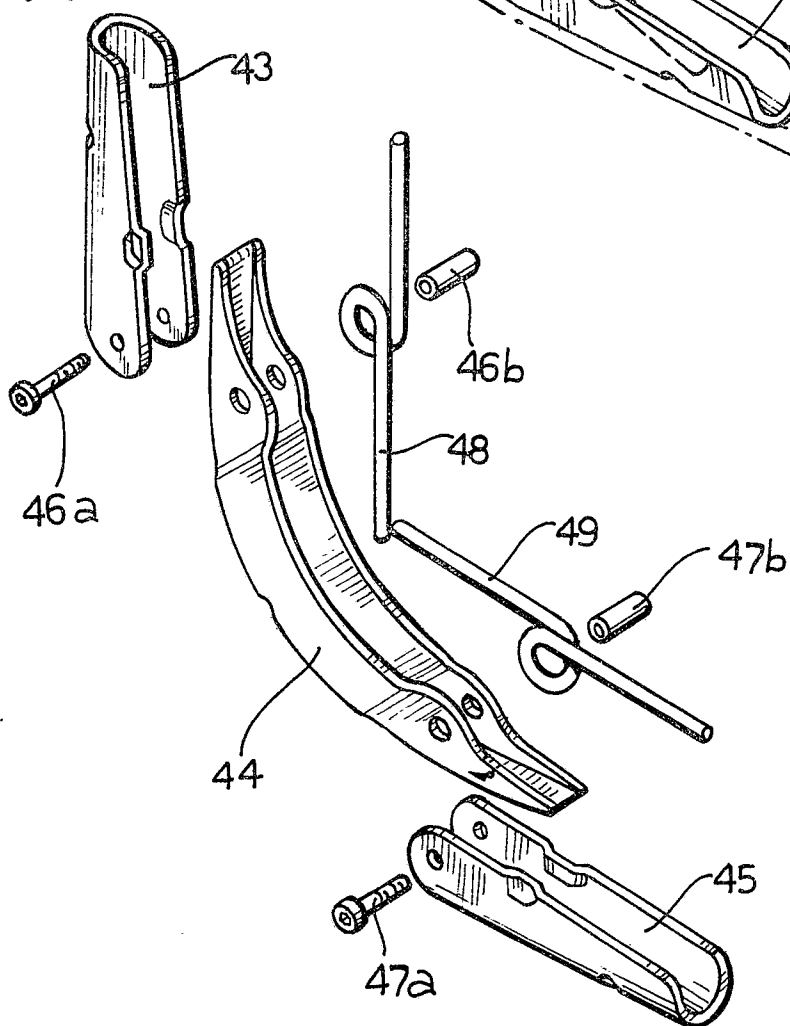


FIG. 10

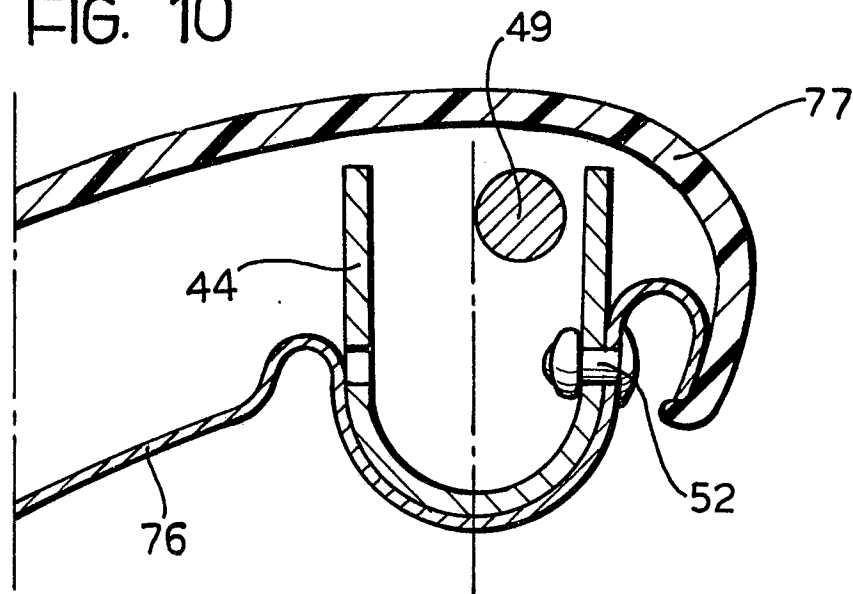


FIG. 11

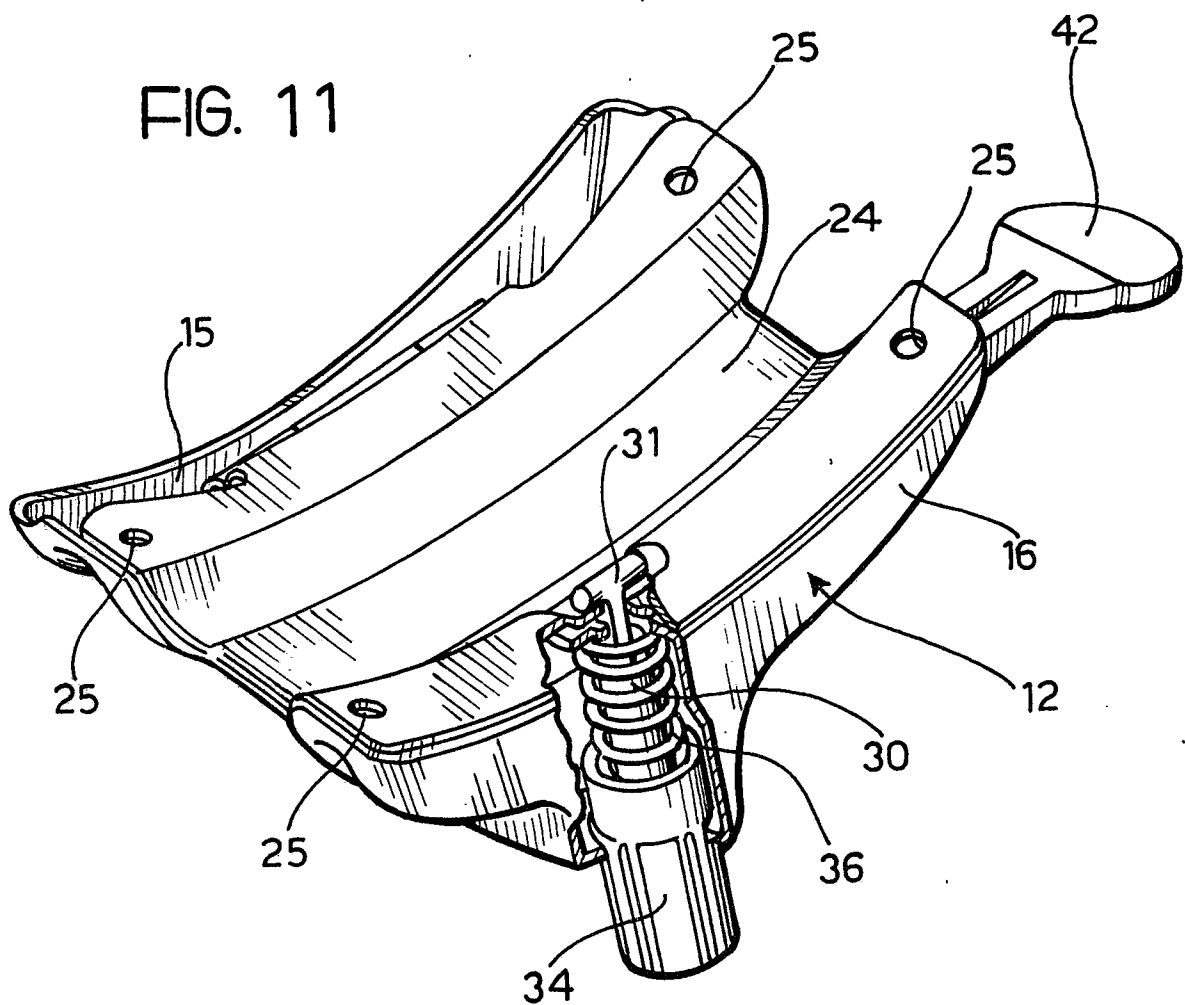


FIG. 13

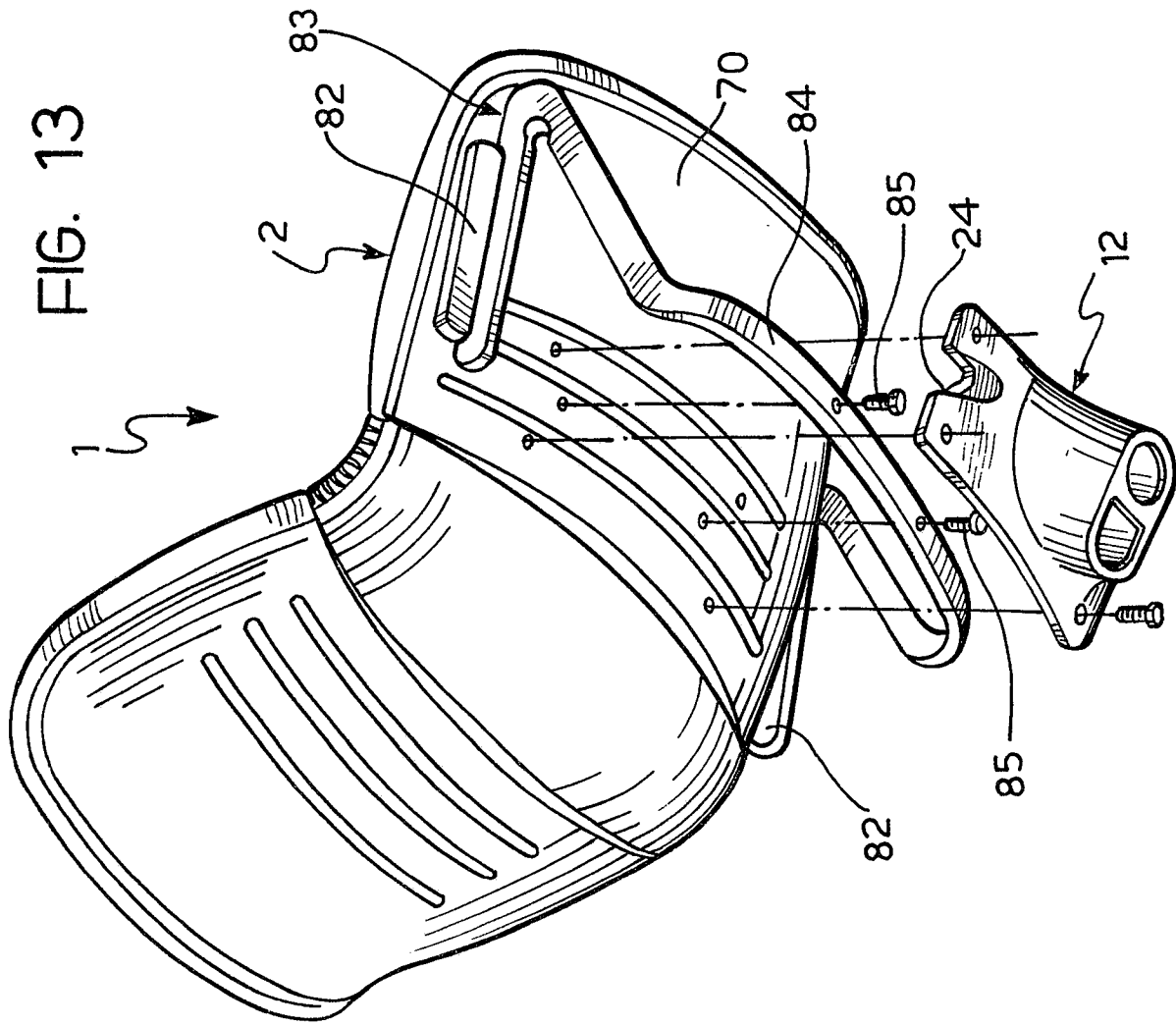


FIG. 12

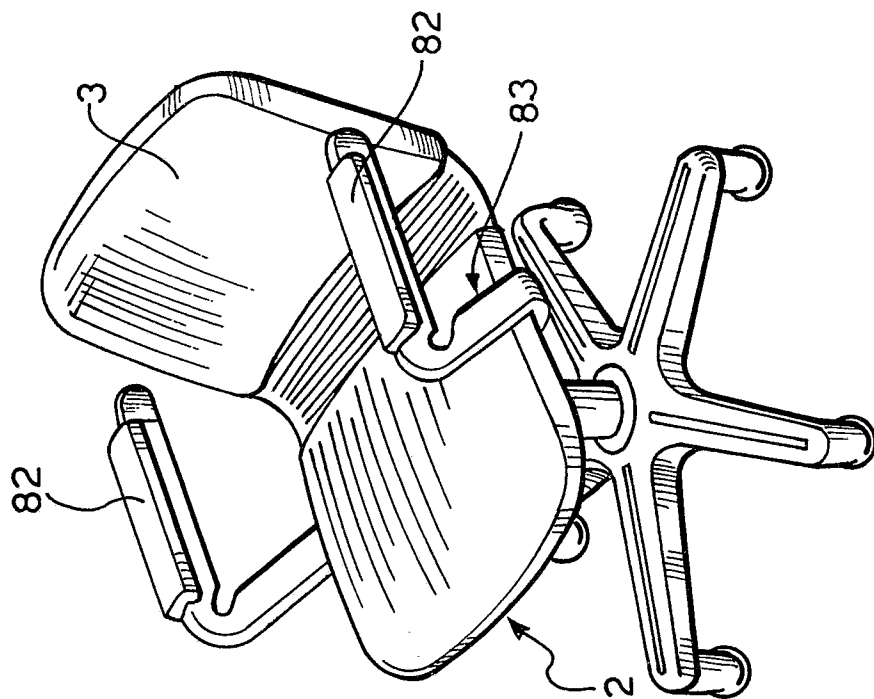


FIG. 15

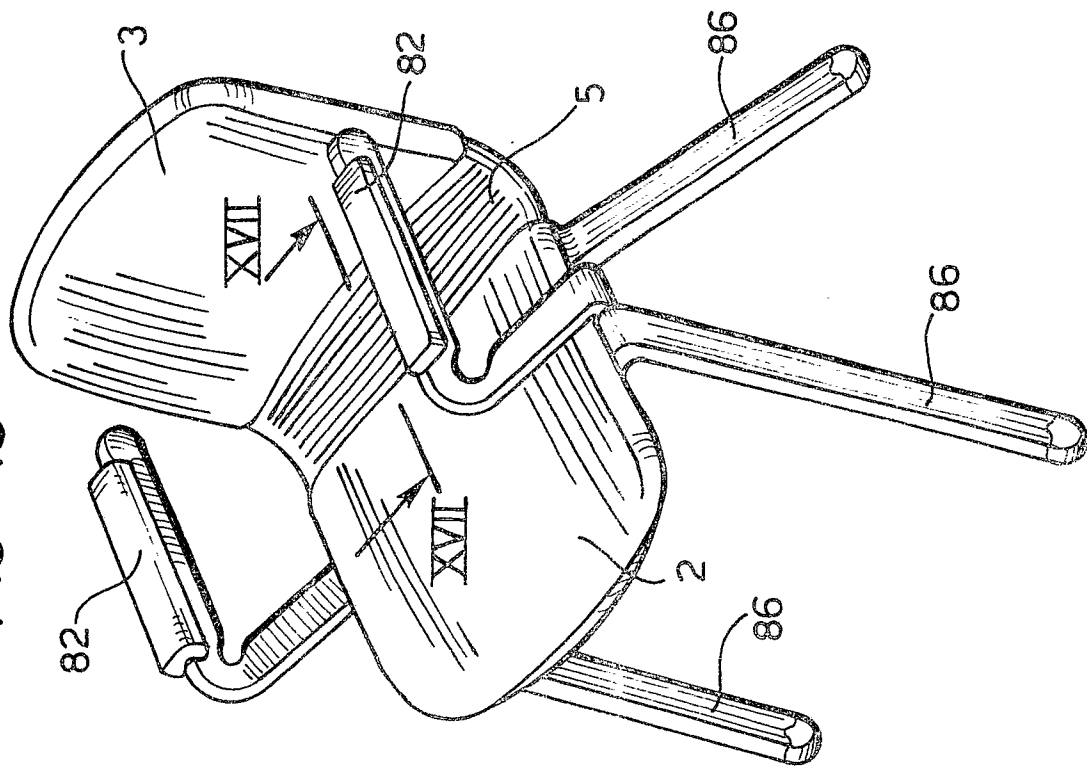


FIG. 14

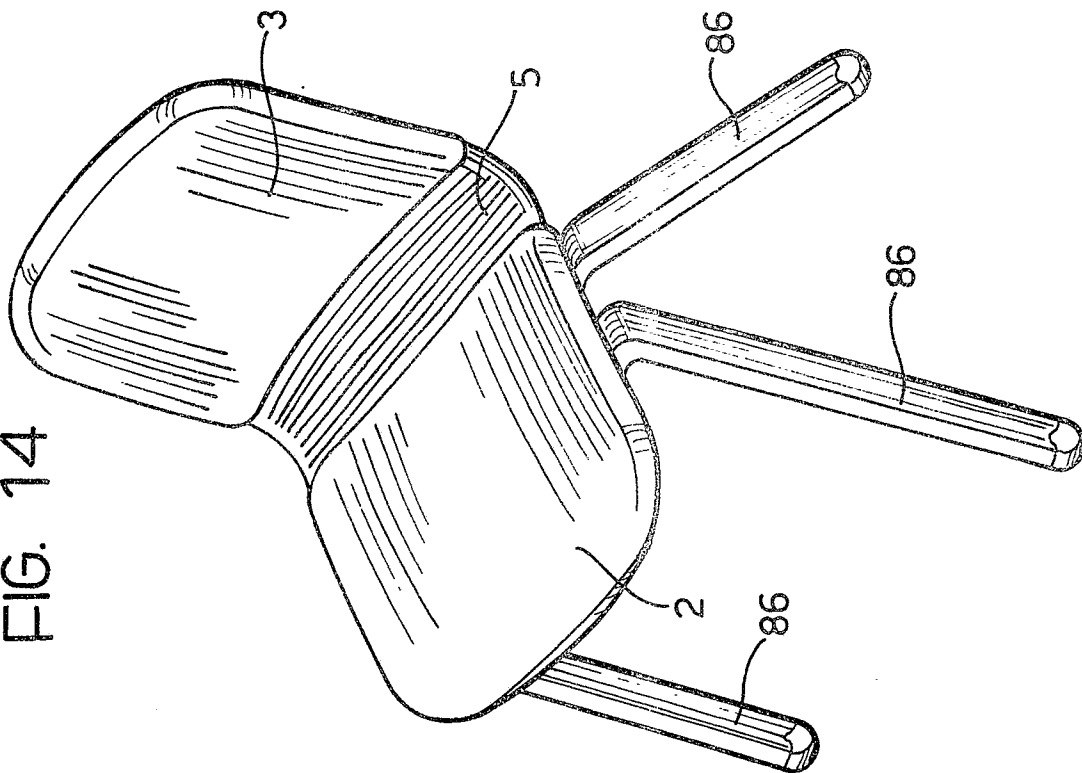


FIG. 17

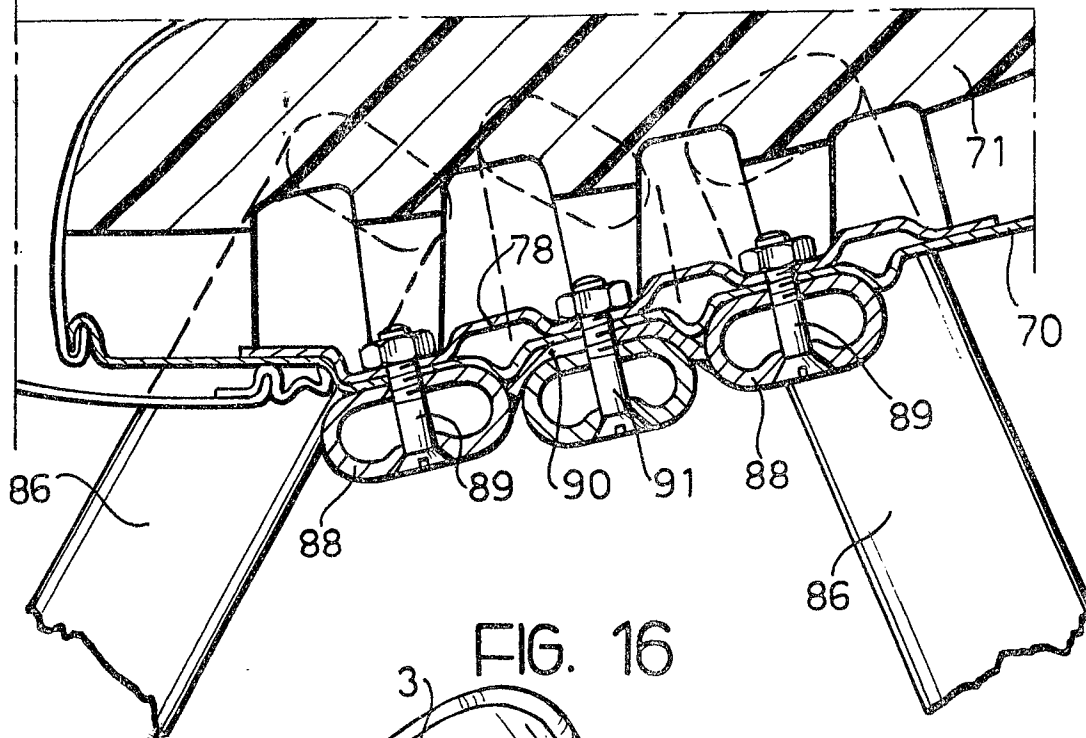


FIG. 16

