

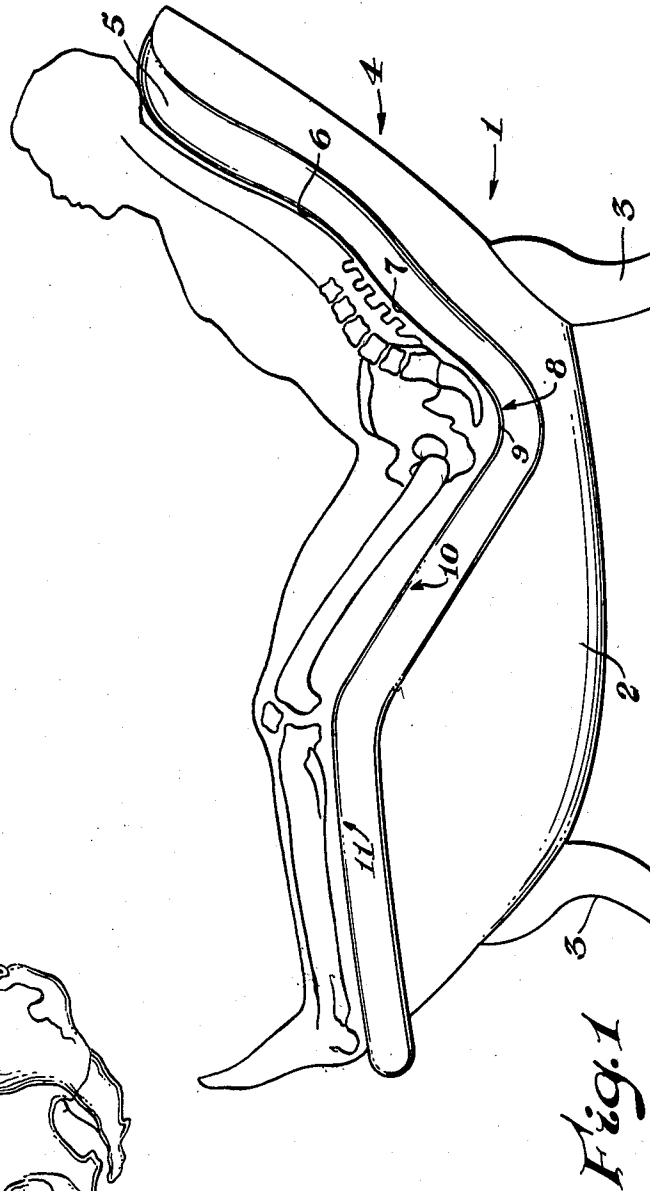
March 10, 1964

V. R. MIKAN
CHAIR CONSTRUCTION

3,124,389

Filed Sept. 7, 1961

2 Sheets-Sheet 1



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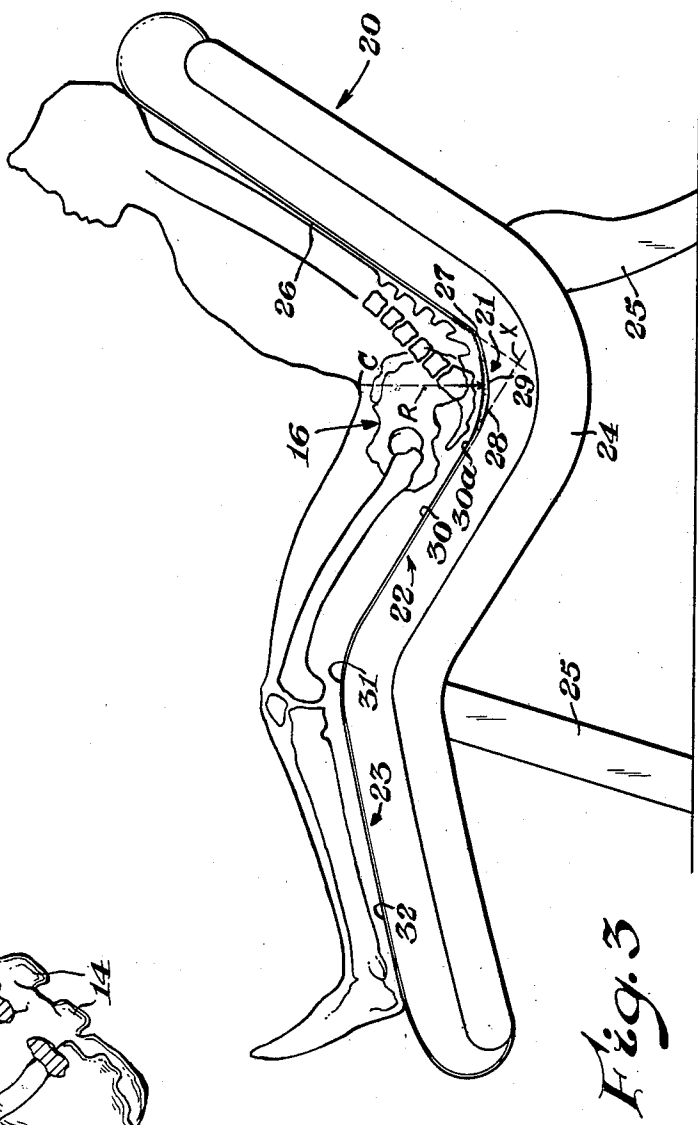
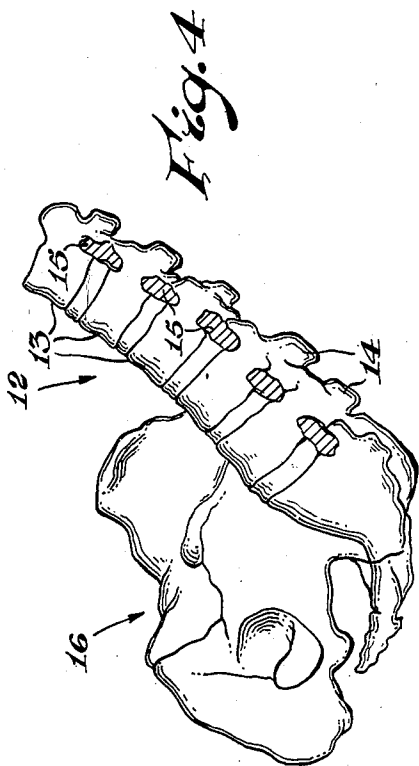
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CHAIR CONSTRUCTION

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5 Claims. (Cl. 297-454)

This application is a continuation-in-part of co-pending application Serial No. 797,767, filed March 6, 1959, now abandoned.

This invention relates to chair constructions and more particularly to a chair having its body supporting portions so constructed and related to one another as to produce a predetermined effect on the lumbar spine and associated parts of the pelvic region of a person sitting in the chair.

One of the most common maladies that physicians are called upon to treat is backache, particularly backache associated with the lumbar spine. It is estimated by reliable observers that the incidence of low backache runs as high as sixty percent of the adult population. In treating backache, it is common for physicians to advise a patient regarding his posture when working, sleeping, standing and the like. A patient also is frequently advised with respect to his sitting posture, but chairs that are available on the market frequently are of such construction that the patient may actually aggravate his condition while sitting in a chair, rather than overcoming the difficulty.

There are, of course, many causes of lumbar backache, one of the most frequently encountered being hyperextension of the lumbar spine with its accompanying compression or irritation of the lumbar or sacral nerve roots. This condition commonly causes pain in the lower back region that frequently radiates over the course of the sciatic nerve. This syndrome may be the result of any one of several pathological conditions each having in common the ability to cause compression and irritation of the lumbar or sacral nerve roots. The compression and irritation of the nerve roots are caused by the mechanism which tilts the lumbar vertebral bodies posteriorly to impinge on the neural foramina.

One of the most frequently encountered causes of pain in the lower back is the facet syndrome. This is a situation in which there is a subluxation of the articulating facets of the lumbar vertebrae. When this occurs at the lumbosacral joint it is usually associated with compression of the intervertebral disc. This will cause a posterior displacement of the fifth lumbar vertebra, with the first sacral facets being lodged in the inferior vertebral notches of the fifth lumbar vertebra. This causes encroachment on the intervertebral foramen and results in compression and irritation of the respective nerve root, resulting in sciatica.

Another common cause of pain in the lower back is osteoarthritis. This may be the sequel of hyperextension of the spine with its resulting strain and repeated trauma. A patient afflicted with this disease may have new bone formations located around the articulating facets and bodies of the vertebrae which encroach on the foramen, causing resultant low back pain and sciatica.

Still another cause of pain is spondylolisthesis, which may be characterized as the forward displacement of the fifth lumbar vertebra. This causes posterior tilting of the other lumbar vertebrae with the same result described previously.

Another cause of lumbar pain is a ruptured disc or protrusion of the disc substance into the foramen or neural canal with resulting pain and sciatica. If the difficulty can be definitely diagnosed as resulting from a ruptured disc, the patient is a candidate for surgery, but in many cases surgery is not possible and the patient must be treated more conservatively. However, if the patient

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is able to withstand laminectomy, certain structural changes following surgery still may result in an unstable back with the resulting discomfort. The discomfort may be due to nerve root irritation, rather than nerve root compression, but the effect on the patient is much the same.

In all of the conditions described above, a patient benefits from flexion of the lumbar spine. The lumbar spine normally is concave posteriorly. When the curvature is exaggerated the spine is hyperextended and the neural foramina between adjacent vertebrae through which the nerves leave the spine are somewhat restricted in size. If the lumbar spine is flexed so as to minimize the posterior concavity, the result is an enlarging of the foramina and opening of the articular facets. As a consequence, the nerve roots in the foramina are permitted more space. Thus, the patient may obtain relief of pain from compression and/or irritation of the nerve roots.

An object of this invention is to provide a chair having its body supporting parts so related one to another as to flex the lower spine of the person sitting therein to reduce its posterior concavity.

Another object of the invention is to provide a chair construction which lends itself readily to manufacture in varying sizes.

Another object of the invention is to provide a chair construction which is not limited to use by patients suffering from lumbar pain and sciatica, but which is comfortable for all persons of such size as to conform generally to the size of a particular chair.

Other objects and advantages of the invention will be pointed out specifically or will become apparent from the following description when it is considered in conjunction with the appended claims and the accompanying drawings, in which:

FIGURE 1 is a view illustrating in side elevation a conventional chair of the lounge type and illustrating the manner in which such a chair acts to maintain or exaggerate the posterior concavity of the spine of a person sitting therein;

FIGURE 2 is an enlarged view of a portion of the lumbar spine illustrating in greater detail the spinal column disclosed in FIGURE 1;

FIGURE 3 is a view similar to FIGURE 1, but illustrating a chair formed in accordance with the invention and its effect on the spine and pelvis of a person sitting therein; and

FIGURE 4 is a view similar to FIGURE 2, but illustrating in greater detail the lumbar spine region disclosed in FIGURE 3.

Chairs of the general class to which the invention pertains have been proposed heretofore and one such chair is shown at 1 in FIGURE 1. The chair 1 comprises a supporting base 2 having floor engaging legs 3 and including a back portion 4 having a pillow-like enlargement 5 at its upper end adapted to support the user's head. Immediately below the enlargement 5, the back supporting surface is indented or curved concavely as at 6 to receive the upper back portion of the person and the portion 6 merges with a built-up or padded area 7 which is convex upwardly to approximate the curvature at the small of the user's back and provide support therefor. The convex portion 7 of the back merges at its lower end with a seat portion 8 which is curved and which has its lowest point 9 located intermediate the ends of the seat portion. The seat portion merges with an upwardly inclined thigh supporting section 10, which, in turn, merges with a lower leg supporting section 11 on which the legs and feet of the person may rest.

A chair such as the chair 1 is comfortable for those persons having no difficulty with the lumbo-sacral part of their anatomy, but as is indicated in FIGURES 1 and

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2, the curvature of the back portion 4 and its relation to the seat portion and the leg supporting portion 10 is such as to permit the lumbar spine 12 of the person to maintain its posterior concavity or even exaggerate this curvature.

Referring particularly to FIGURE 2, the curvature of the lumbar spine 12 causes the individual vertebrae 13 to shift relatively to one another so that the spinus processes 14 move closer to one another, thereby decreasing the area of the foramina 15 therebetween and in which the spinal nerve roots are located. A person whose lumbar spine has a relatively high degree of curvature presents a somewhat sway-back appearance which indicates that the spine is hyperextended. A person having this kind of spinal structure is particularly susceptible to lower backache because of the encroachment of the spinal bony structure on the neural canals and, when sitting in a chair such as the chair 1, which is designed to conform to the natural spinal curvature, is not likely to have his pain relieved by such a chair, no matter how long he rests in it. This is because of the built-up structure 7 at the small of his back and because the seat portion 8 is so constructed as to tilt the pelvis 16 forwardly, thereby forcing the sacrum rearwardly and, in some cases, resulting in rather severe restriction of the foramen 15 at the lumbar sacral joint.

Referring now to FIGURES 3 and 4, a chair constructed in accordance with the invention is generally similar to the chair previously described in that the construction includes a back portion 20, a seat portion 21, a thigh supporting portion 22, and a lower leg supporting portion 23, all arranged in a manner analogous to the corresponding portions of the previously described chair and supported on a base 24 mounted on floor engaging legs 25. The supporting surface 26, however, of the back portion 20 is substantially flat or planar over substantially its entire length, and merges at its lower end with a curved portion 27 of a seat.

The curvature of the seat supporting portion 28 is an important consideration in constructing the chair and should be formed on a radius corresponding substantially to the radius of the pelvic body portion of the person for whom the chair is designed. The pelvic radii of adults varies only slightly, and hardly ever varies more than about two inches, even though the height and weight of said persons may vary considerably. For an average size adult, therefore, the radius of the seat portion 28 may be substantially one foot. The seat portion 28 curves gently upwardly from its low point 29 so as to merge with a substantially flat or planar thigh supporting surface 30.

In the preferred construction the seat portion 28 is formed on the arc of a circle having a radius of substantially twelve inches and with the center of the circle directly and vertically above the low point 29 of the seat surface. The arc on which the seat surface is formed is such that the thigh surface 30 is tangential to the curvature of the seat. The point of tangency is indicated by the reference character 30a and is located at a level substantially above the point of merger of the seat and the back portion.

The low point 29 of the seat is located slightly forwardly of the point of intersection X of the planes of the back and thigh surfaces 26 and 30 and the rise of the seat portion 28 forwardly of the point 29 toward the thigh portion is such that the rise of the forward part of the seat is first very gradual and then ever increasing to the point 30a as it follows the curvature of the arc on which it is formed. From the point 30a, the thigh supporting surface 30 is flat and rises at an angle of approximately 35° to the horizontal to a point 31 at which the surface 30 merges with a downwardly inclined lower leg supporting surface 32 which is inclined at about an angle of 15° to the horizontal. The lengths of the surfaces 30 and 32 are such that the juncture 31

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will be located at the knees of a person sitting in the chair and the entire lower leg portion of the person, including the feet, will be supported on the surface 32.

The back supporting portion 20 of the chair preferably is inclined upwardly at such an angle to the horizontal that the included angle between the seat and back does not exceed about 100°. Preferably the included angle between the seat and back portions will be 90° and such a right angular relationship can be effected if the back frame is inclined upwardly at an angle to the horizontal of about 55°.

When a patient having physical dimensions corresponding substantially to the dimensions of the chair sits in the latter, his knees will be higher than his pelvis and, because of the flatness of the back 26 and the curvature of the seat portion 28 upwardly from the low point 29, his pelvis 16 will be rocked or tilted clockwise, as viewed in FIGURE 3, so as to flex the lumbar spine in such manner as to reduce its posterior concavity. Flexion of the lumbar spine will shift the lumbar vertebrae and cause the spinus processes 14 to move away from one another so as to increase the area of the foramina 15 in the manner indicated in FIGURE 4. In this position of the spine 12, there will be sufficient room in the neural canal and foramina 15 to accommodate the nerves without compression or irritation and will relieve the pain associated with compression or irritation of the nerve roots.

The linear dimensions given herein are for persons of average height and build, so it will be necessary, of course, to provide chairs of differing sizes for patients having differing linear physical dimensions. It is believed that chairs constructed in five sizes will accommodate most of the patients suffering from lumbar backache due to the hyperextension syndrome and the dimensions for each size chair will be proportioned to those referred to herein.

A chair constructed in accordance with the invention has been used under physicians' supervision in several instances for the treatment of patients suffering from lumbar backache. In each instance the patient experienced relief from pain at least during the time he occupied the chair. In most cases the patients' relief from pain continued for at least several hours after leaving the chair, thereby demonstrating conclusively that a chair formed in accordance with the disclosure has therapeutic properties.

The disclosed embodiment is representative of a presently preferred form of the invention, but is intended to be illustrative rather than definitive thereof. The invention is defined in the claims.

I claim:

1. A chair construction comprising a back portion; a seat portion having a low point forwardly of said back portion; a thigh supporting portion; and support means for each of said portions, said back portion being inclined to the vertical and having a substantially planar body supporting section merging at its lower end with said seat portion, said seat portion being curved upwardly from said low point and merging with one end of said thigh supporting portion, the juncture of said seat portion and said thigh supporting portion being located at a zone which is elevated relatively to the low point of said seat portion and to said lower end of said back portion, said thigh supporting portion being substantially planar from its juncture with said seat portion.

2. A chair construction comprising a back portion having a substantially planar body supporting surface inclined to the vertical; a seat portion merging with the lower end of said back portion and being concave upwardly; a thigh supporting portion merging at one end with said seat portion and being inclined upwardly to the horizontal, said seat portion having its lowest point between said back portion and said thigh portion and extending upwardly from said point toward said thigh por-

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tion along the arc of a circle having a radius of substantially one foot; and means supporting each of said portions, the arrangement of said portions being such that a person seated in said chair will have his knees at a level higher than his pelvis and the lumbar vertebrae of his spine will be flexed from their normal curved condition.

3. A chair construction for relieving pressure on the spinal nerve roots of a person, said construction comprising a back portion inclined upwardly at substantially 55° to the horizontal and having a substantially planar body supporting section; a seat portion merging at one of its ends with the lower end of said back portion and being formed on a radius corresponding substantially to the diameter of the pelvic body portion of said person; a thigh supporting portion inclined upwardly at substantially 35° to the horizontal and merging at its lower end with the other end of said seat portion at a point which is substantially tangential to the arc of said seat portion, said seat portion having its lowest point adjacent the zone of its merger with said back portion and curving upwardly from said lowest point to its point of merger with said thigh supporting portion, said thigh supporting portion corresponding in length substantially to the length of the thighs of said person; and means supporting each of said portions, the arrangement of said portions being such that when said person is seated in said chair his knees will be at a level higher than his pelvis and the lumbar portion of his spine will be flexed from its normal curvature so as to prevent encroachment of the vertebrae of said lumbar portion of his spine or the foramina therebetween.

4. A chair composition for relieving pressure on the spinal nerve roots of a person, said construction comprising a main back portion having a substantially planar

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body supporting surface; a thigh supporting portion, said main back portion and said thigh supporting portion diverging upwardly and having an included angle therebetween of substantially 90°; a curved seat portion merging with said planar back surface and said thigh supporting portion along a smoothly rounded arc having a radius of substantially one foot, the arc of said seat portion being tangential to said thigh supporting portion; and base means supporting each of said portions in relative positions such that a person seated in said chair construction will have his knees at a level higher than his pelvis and will have his pelvis tilted to flex his lumbar spine.

5. A chair construction comprising a substantially flat, planar back supporting portion; a substantially flat, planar thigh supporting portion, said portions having an included angle therebetween of substantially 90°; a seat portion interposed between said back supporting portion and said thigh supporting portion, said seat portion being curved along the arc of a circle having a radius of substantially one foot with the arc of said seat portion being tangential to said thigh supporting portion, said seat portion having its lowest point between said back and thigh portions and being inclined upwardly toward said thigh portion along the arc of said circle so that a person seated in said chair will have his pelvis tilted to flex his lumbar spine; and base means supporting each of said portions.

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