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A. N. TAYLOR

3,070,090

NECK SUPPORT

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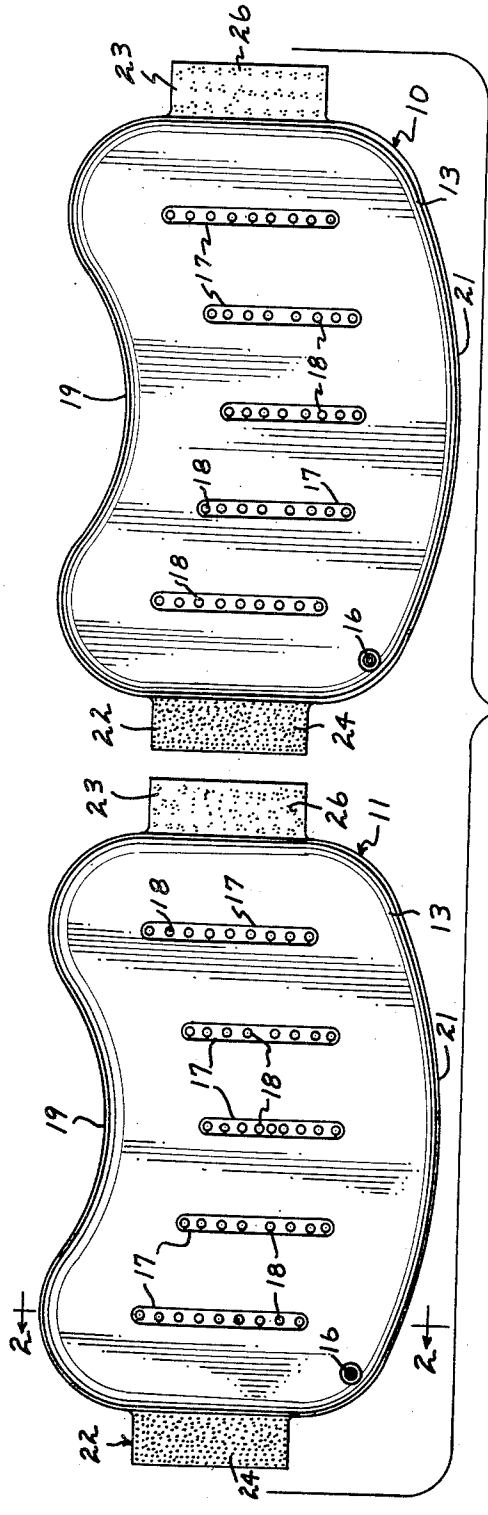

FIG. 1

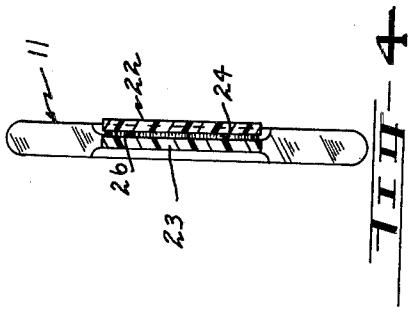

FIG. 4

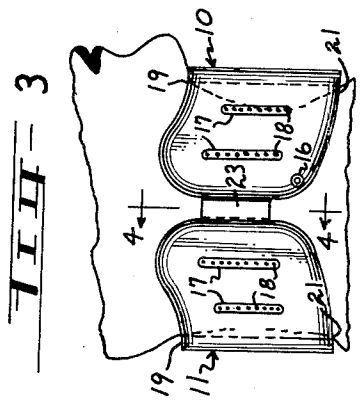

FIG. 3

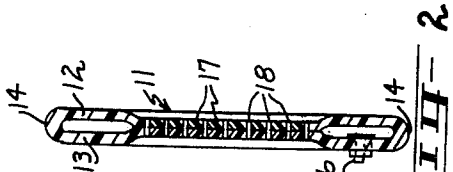

FIG. 2

INVENTOR.

BY Arabion N. Taylor

Jennings, Carter & Thompson

Attorneys

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NECK SUPPORT

Arabion N. Taylor, 429 E. 9th St., Anniston, Ala.

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This invention relates to a neck support and more particularly to an inflatable neck support which shall be adapted to limit extreme motions of the neck of a patient, thereby protecting the ligamentous structures.

Another object of my invention is to provide a neck support of the character designated which not only limits motion of the neck in various directions, but tends to return the neck to a neutral position and at the same time permits sufficient motion in the joints to aid nutrition of the cartilagenous surface of the joints and permits sufficient use of the muscles surrounding the cervical spine to maintain proper muscle tone.

Another object of my invention is to provide an inflatable support which shall provide even pressure over the entire area of contact of the support with the jaw, occiput region of the head, chest and back of the patient.

Another object of my invention is to provide a neck support which shall have separate sections which surround the front and back of the neck, said sections being adjustable independently of each other while on the patient's neck.

A further object of my invention is to provide an inflatable neck support of the character designated which shall include simple means for adjusting the amount of pressure exerted by the neck support, thereby permitting the patient to adjust the support to suit his own comfort.

A further object of my invention is to provide a neck support of the character designated which continuously exerts an upward pressure on the head of the patient, thereby accomplishing a result which is essentially the same as traction on the neck without the elaborate paraphernalia usually required for traction.

A further object of my invention is to provide a neck support of the character designated in which a controlled amount of the load of the patient's head may be removed from the supporting structures therefor, such as the cervical vertebra, intervertebral disc and intervening ligaments.

A still further object of my invention is to provide a neck support of the character designated which shall be simple of construction, economical of manufacture and one which is adjustable in size so that the proper fit can be obtained for every individual.

Heretofore in the art to which my invention relates, various forms of neck supports have been devised. However, so far as I am aware, such supports hold the neck in a set position and exert substantially no upward pressure on the head of the patient. With some conventional type neck supports, movement of the neck is permitted by providing separate sections for the front and back of the neck. However, with such devices, there is no effective means for limiting the amount of movement of the neck due to the fact that the sections are pivotally connected to each other or connected to each other by relatively long flexible straps.

To overcome the above and other difficulties, I provide a neck support which comprises a pair of pneumatically inflatable sections which completely surround the neck of the patient and are connected to each other over a relatively wide area whereby a substantially rigid unit is provided at all sides of the neck. The front and rear sections of my improved neck support are adjustable relative to each other whereby they may be adjusted to selected angular positions for accommodating people having different neck shapes. To assure an even pressure at every

point of contact with the body of the patient, I provide concave upper edges for the sections and convex lower edges for the sections.

A neck support embodying features of my invention is illustrated in the accompanying drawing, forming a part of this application, in which:

FIG. 1 is a side elevational view showing a pair of the inflatable neck support sections removed from each other;

FIG. 2 is a sectional view taken generally along the line 2—2 of FIG. 1;

FIG. 3 is a side elevational view, partly broken away, showing the neck support in use; and,

FIG. 4 is a vertical sectional view taken generally along the line 4—4 of FIG. 3.

Referring now to the drawing for a better understanding of my invention, my improved neck support comprises a front section **10** and a rear section **11** which are substantially identical in construction. The sections **10** and **11** are formed of a pair of relatively thin sheets of material **12** and **13** joined to each other along the edges of the section as at **14**. The sheets **12** and **13** are preferably formed of inert plastic material which is resistant to abrasions and punctures and possesses a limited amount of elasticity, such as polyvinyl chloride. By forming the sheets **12** and **13** of an inert material, there is less danger of allergic reactions to the skin of the patient.

Suitable valve members **16** are provided in the sections **10** and **11** for introducing air or other suitable gas whereby the sections are inflated. To limit outward movement of the central portions of the sheets of material **12** and **13** as the sections are inflated, I connect adjacent portions of the sheets **12** and **13** to each other as at **17**. This may be accomplished by heat welding along the areas **17** which are spaced from each other, as shown in FIG. 1. Also, the ends of the connected areas **17** are spaced from the edges of the sections **10** and **11**, as shown. To provide ventilation for the neck of the patient, I provide a plurality of vent openings **18** in the connected areas **17**, as shown in FIGS. 1 and 2.

The upper edge of the sections **10** and **11** are curved to form a generally concave edge **19** while the lower edges of the sections **10** and **11** are curved to provide a generally convex lower edge **21**, as clearly shown in FIG. 1. By providing the concave upper edge **19**, the upper edge of the front section **10** contacts the under surface of both sides of the lower jaw of the patient while the upper concave edge **19** of the rear section **11** contacts the occiput region of the head of the patient. By providing the generally convex lower edge **21**, the lower edge of the front section **10** contacts the forward portion of the chest below the upper portion thereof and fits over the collar bones while the lower edge of the rear section **11** extends below the base of the neck and contacts the upper portion of the back of the patient. That is to say, the concave edges **19** and the convex edges **21** conform generally to the contour of the portion of the body being contacted whereby even pressure is exerted to all points of contact.

Projecting outwardly from opposite ends of each of the sections **10** and **11** are gripping tabs or sections **22** and **23**. With the sections **10** and **11** surrounding the neck of the patient, as shown in FIG. 3, the gripping section **22** of the rear section **11** is adapted to cooperate with the gripping section **23** of the front section while the gripping section **23** of the rear section is adapted to cooperate with the gripping section **22** of the front section. The gripping tabs or sections **22** and **23** are relatively wide, as shown, and each gripping tab **22** is provided with a gripping surface **24** which is in the form of a series of relatively small hook-like members which are disposed to engage a felt-like surface **26** carried by the gripping tabs **23**. That is, the hook-like members forming the surface **24** engage the felt-like surface **26**

whereby the members are firmly joined together upon pressing the cooperating tabs 22 and 23 into contact with each other. By overcoming the gripping action between the hook-like surface 24 and the felt-like surface 26, the gripping tabs may be adjusted to any angular relationship to each other whereby the neck support may be adjusted to accommodate patients having different neck shapes. Also, the size of the neck support may be readily adjusted by joining the gripping tabs 22 and 23 at selected positions relative to each other. The use of the relatively small hook-like members to form the gripping surface 24 which cooperates with the felt-like surface 26 is a well known means for connecting garment sections to each other. By providing the relatively large contact area between the gripping tabs 22 and 23 and causing the neck support to surround the entire neck of the patient, a semi-rigid unit is provided which takes the load of the head off the supporting structures, such as the neck, cervical vertebra, intervertebral disc and intervening ligaments. Also, by providing the semi-rigid neck support which surrounds the neck of the patient, a limited amount of motion of the neck is permitted while extreme motions of the neck are restrained in order to protect the ligamentous structures.

From the foregoing description, the operation of my improved neck support will be readily understood. The front section 10 and the rear section 11 of the neck support are positioned around the neck of the patient, as shown in FIG. 3, whereby the sections are in proper relationship to each other to accommodate the particular shape and size of the neck of the patient. The gripping tabs 22 and 23 are then pressed into firm engagement with each other whereby the hook-like surface 24 of the gripping tab 22 firmly engages the felt-like surface 26 of the gripping tab 23. With the sections 10 and 11 thus firmly connected to each other, there is no pivotal or hinge action between the front and rear sections after the neck support is assembled. As shown in FIG. 3, the concave edge 19 of the front section 10 contacts the under surface of both sides of the lower jaw while the concave edge 19 of the rear section 11 contacts the occiput region of the head of the patient. Also, as shown in FIG. 3, the lower concave edge 21 of the front section 10 contacts the forward portion of the chest below the upper portion thereof and fits over the collar bones while the lower convex edge 21 of the rear section 11 extends below the base of the neck and contacts the upper portion of the back of the patient. The ends of the sections 10 and 11 extend alongside the neck of the patient, as shown, whereby lateral movement of the head is limited.

After the neck support is mounted around the neck of the patient, air is introduced into the valve 16 whereby the front and rear sections are inflated separately to exert the required pressure on the areas contacted by the neck support. By providing separate means for introducing air into the front and rear sections of the neck support, the patient may readily adjust the pressure applied to his own comfort.

From the foregoing, it will be seen that I have devised an improved neck support which is very simple of construction and may be readily mounted on the neck of the patient in a minimum of time and without complicated adjustments. By providing a relatively wide contact area at the point the front and rear sections are connected to each other, a firm, semi-rigid connection is provided which prevents pivotal movement between the front and rear sections, thereby providing the required rigidity for the neck support. Also, by providing the concave and convex edges along the front and rear sections of the neck support, the support readily accommodates itself to the contour of the body of the patient whereby an even pressure is exerted to all contact areas.

Furthermore, by connecting the sheets of material 12 and 13 to each other at spaced intervals, the overall thickness of the sections is reduced to a minimum and at the same time the required rigidity is provided to exert the desired pressure at the contact areas.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. A neck support comprising a first pneumatically inflatable member adapted to surround and contact the forward and side portions of the neck of a patient with the upper edge of said first member being concave and contacting the under surface of both sides of the lower jaw and the lower edge of said first member being convex and contacting the forward portion of the chest and fitting over the collar bones, a second pneumatically inflatable member adapted to surround and contact the rear and side portions of the neck of the patient with the upper edge of said second member being concave and contacting the occiput region of the head and the lower edge of said second member being convex and extending below the base of the neck and contacting the upper portion of the back, and means connecting said first member to said second member in overlapping relationship over a wide area to provide a relatively rigid composite unit which surrounds the neck of the patient.

2. A neck support as defined in claim 1 in which means are provided for inflating said first and second members separately.

3. A neck support as defined in claim 1 in which one of said inflatable members is provided with a felt-like surface and the other inflatable member is provided with a plurality of small hook-like members disposed to engage said felt-like surface.

4. A neck support comprising a first relatively flat inflatable member adapted to surround and contact the forward and side portions of the neck of a patient with the upper edge of said first member being concave and contacting the under surface of both sides of the lower jaw and the lower edge of said first member being convex and contacting the forward portion of the chest and fitting over the collar bones, a second relatively flat inflatable member adapted to surround and contact the rear and side portions of the neck of the patient with the upper edge of said second member being convex and contacting the occiput region of the head and the lower edge of said second member being concave and extending below the base of the neck and contacting the upper portion of the back, means securing adjacent surfaces of the inflatable members to each other at spaced intervals to divide said first and second inflatable members into a plurality of separate compartments whereby the thickness of the first and second members after inflation is limited, and means connecting said first member to said second member at opposite sides of the neck of the patient in overlapping relationship over a wide area to provide a relatively rigid composite unit which surrounds the neck of the patient.

5. A neck support as defined in claim 4 in which vent openings are provided in the surfaces of the inflatable members which are secured to each other.

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