

July 28, 1970

W. NICHOLS ET AL

3,521,623

BACK BRACE

Filed Feb. 12, 1965

2 Sheets-Sheet 1

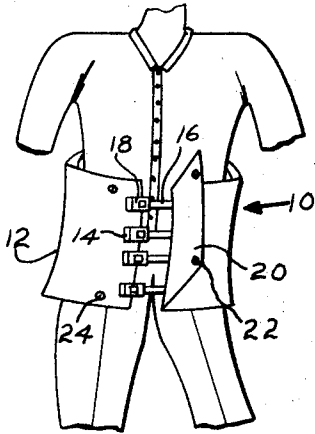


FIG-1

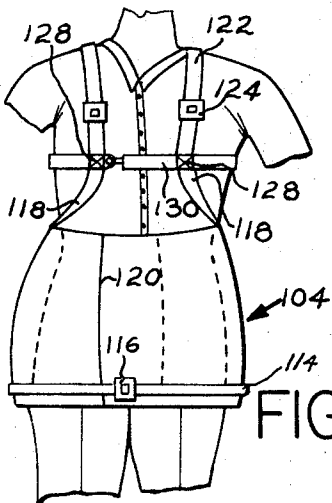


FIG-7

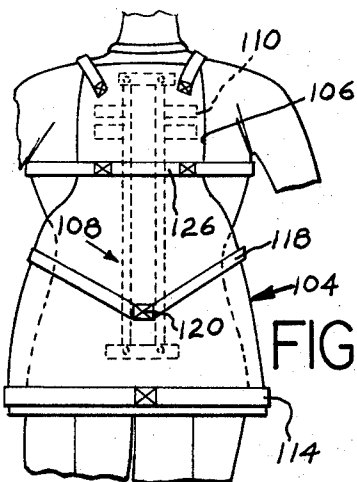
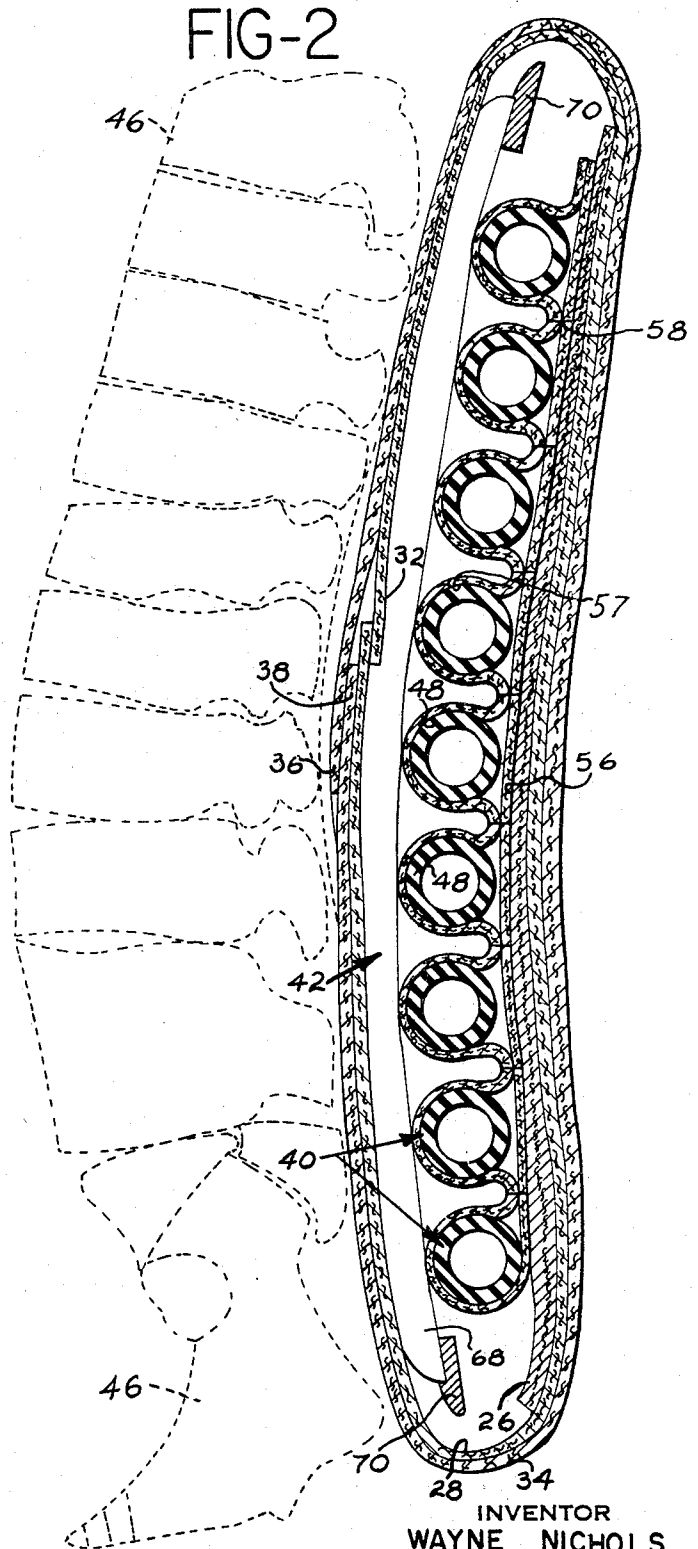


FIG-8



INVENTOR
 WAYNE NICHOLS
 BY KENNETH G. MARKLEY
Toulmin & Toulmin

ATTORNEYS

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W. NICHOLS ET AL

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2 Sheets-Sheet 2

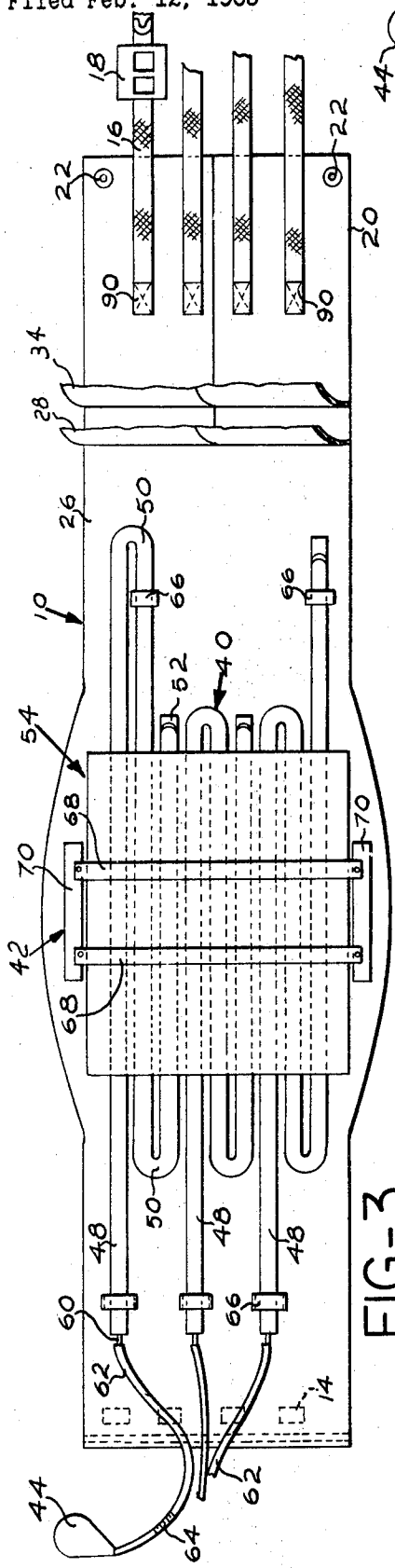


FIG-3

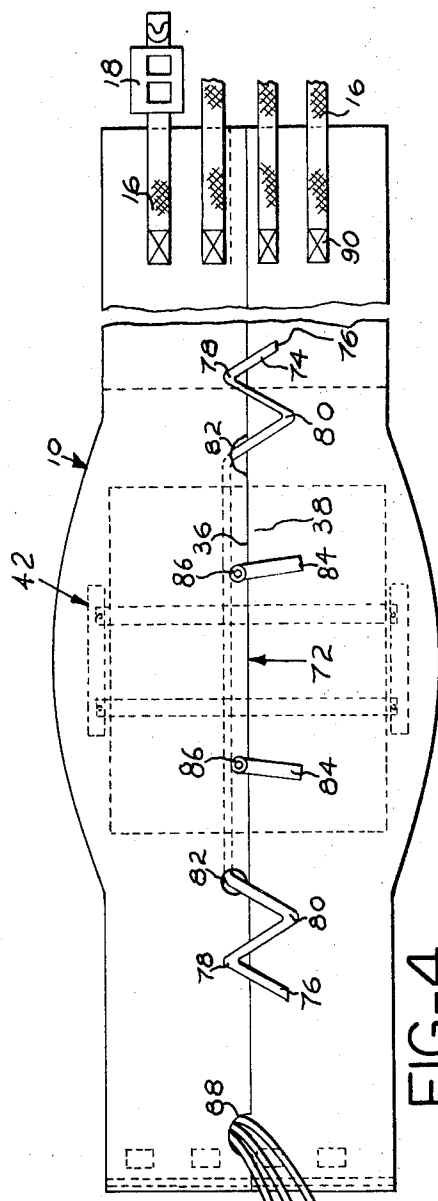


FIG-4

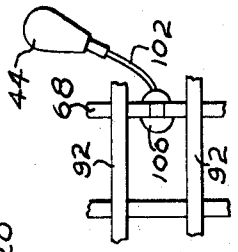


FIG-5

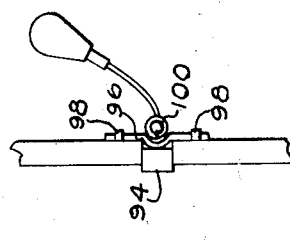


FIG-6

INVENTOR
 WAYNE NICHOLS
 BY KENNETH G. MRKLEY
Talman & Talman
 ATTORNEYS

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3,521,623
BACK BRACE

Wayne Nichols, Rte. 1, West Liberty, Ohio 44505, and
Kenneth G. Markley, 446 E. Church St., Urbana, Ohio
43078

Filed Feb. 12, 1965, Ser. No. 432,210
The portion of the term of the patent subsequent to
Oct. 7, 1985, has been disclaimed
Int. Cl. A61f 5/02

U.S. Cl. 128-78

5 Claims

ABSTRACT OF THE DISCLOSURE

A spinal brace to be worn around the torso of a human as one would wear a belt. The brace includes two rigid parallel bars which are positioned on opposite sides of the spine of the wearer and which bars are forced against the wearer's spine by a plurality of tubular air bladders which are positioned between the bars and the back portion of the brace. The air bladders are selectively inflatable and are maintained in spaced, parallel relationship along the encircling length of the brace. A modified form of the brace is also shown for those situations in which the area of the back from the base of the spine to the neck of the wearer must be supported.

This invention relates to spinal braces and more particularly to spinal braces which are especially adapted for use in fractures of the vertebrae, although it can be used for other injuries to the back as well as general support for a weakened back.

Most of the prior art back braces which exist are extremely uncomfortable to wear and as a consequence, are not actually used even though purchased. Those prior braces which do provide adequate support for the back practically immobilize the wearer so that it is extremely difficult to engage in the normal activities of sitting, sleeping, driving a car, etc.

In contrast to the above, applicants' brace provides the necessary support for the back injuries enumerated above while providing comfort to the wearer. With applicants' brace, the wearer can engage in the normal activities of walking, sitting, sleeping, driving a car, etc. with little discomfort. The brace can also be worn inside or outside of the wearer's clothing.

Applicants' brace is of the corset-type variety which encircles the back and stomach. Included in the brace is a pair of spaced substantially parallel, rigid supports adapted to engage the back of the wearer on each side of the spinal column. The rigid supports are pressed into contact with the back by a plurality of air bladders which at least partially encircle the waist of the wearer. The air bladders are confined within a textile corset so that after the corset is secured around the waist of the wearer, the air bladders are inflated bringing the pair of rigid supports into contact with the back. This construction has brought about a surprising amount of rigidity and support to the back while providing the wearer with a great amount of freedom.

An object of this invention is to provide an improved spinal brace which is constructed to provide a rigid support for the vertebrae of the spine while providing comfort to the wearer.

A further object of this invention is to provide a back brace of the type mentioned above which provides massaging action to the back of the wearer.

Another object of this invention is to provide a back brace which can readily be made to provide support for certain portions of the back or for the entire length thereof.

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Another object of this invention is to provide a back brace of the type mentioned above which can be worn inside or outside of the wearer's clothing, is readily put on and taken off the wearer, is economical to produce and which is adaptable to be readily made into a variety of sizes to suit the specific needs of the wearer.

These objects and advantages along with others will be explained more thoroughly in the following description and drawings, in which:

FIG. 1 is a perspective view of a first modification of this invention in position on a wearer;

FIG. 2 is an enlarged cross sectional view of the brace taken along a line coinciding with the spine of the wearer and shows the brace in position against the back;

FIG. 3 is a plan view of the brace shown in FIG. 1 with some of the layers of the textile fabric of the brace peeled away to show the arrangement of the rigid support member and the positioning of the air bladders;

FIG. 4 is a plan view similar to FIG. 3 showing the side of the brace worn against the body;

FIG. 5 is a plan view of a portion of the rigid support member shown in FIG. 3 showing how this member can be adapted to provide selective pressure to specific parts of the back;

FIG. 6 is a side view of FIG. 5;

FIG. 7 is a front view of a second modification of this invention as worn; and

FIG. 8 is a back view of FIG. 7 showing a brace for the entire back also giving support near the shoulders and neck.

Referring to the drawings somewhat more in detail, FIG. 1 shows a first modification of the brace 10 which is shown in position around the torso of the wearer. The brace comprises a belt means 12 which has clips 14 of known variety secured on one end thereof. The other end of the belt means has the straps 16 with buckles 18 thereon which engage the clips 14 to secure the belt means on the wearer. The buckles are of known variety and may be adjustably secured to the straps 16 to accommodate the brace to specific individuals to hold the brace on the wearer. The brace also may be provided with a flap member 20 which has standard snap fasteners 22 thereon, which engage the mating fastener 24 to cover the buckles and straps and thereby provide a neat appearing brace.

Referring to FIGS. 2 and 3, FIG. 2 is an enlarged cross sectional view of the brace 10 as it is worn on the back of the wearer and FIG. 3 is a plan view of the brace showing the arrangement within the brace with some of the layers thereof peeled away to show the details of construction.

Included in the brace is a reinforcing belt member 26 which may be constructed of several layers of reinforced textiles such as nylon and/or heavy canvas materials. This member 26 runs for the entire length of the brace and is appropriately stitched to provide for strength and to prevent unraveling. There is an inner cover 28 having overlapping ends 30 and 32 shown in FIG. 2 which are secured together by standard snap fasteners (not shown) and an outer cover 34 having overlapping ends 36 and 38 which are also secured together. Both of these covers are suitably stitched to the belt member 26.

As shown in FIGS. 2 and 3, there is a plurality of pneumatic means or bladders generally designated 40 which are positioned between the belt member 26 and the rigid support member generally designated 42 which urge the support member 42 into engagement with the back of the wearer.

After the brace is positioned on the body as shown in FIG. 1, and the buckles 18 are secured to clips 14, the pneumatic means 40 are inflated through the use of a simple handpump 44. As the pneumatic means are inflated, they are strained against outward movement by the belt

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member 26 and consequently push the support member, generally designated 42, into engagement with the back of the wearer. The support member 42 can be made out of aluminum or steel and is shaped to the specific needs and spine curvature of the wearer. The vertebrae 46 of the wearer are shown in phantom outline in FIG. 2.

The pneumatic means comprise a plurality of tubular members which may be rubber hoses 48. In the specific embodiment shown, the hoses used were approximately one inch in diameter although other sizes depending upon specific needs may be used.

As seen in FIG. 3, the hoses 48 may be of a single length which have reverse bends 50 therein to provide a plurality of tubes in parallel relationship with one another. The end of the tubes 48 may be crimped over and sealed as at 52. The tubes or hoses 48 are maintained in parallel relationship by the fabric means generally designated 54 which has one side 56 stitched to the belt member 26 as shown in FIG. 2. The other side of the fabric 54 is formed into a plurality of fabric tunnels 57 which are secured to the belt member 26 by stitching 58 as shown. These fabric tunnels are loose enough to permit the hoses to expand enabling the hoses to push the rigid support means into engagement with the back of the wearer and to push the hoses laterally into contact with the adjacent hoses.

Each of the hoses 48 is provided with a stem 60 at the open end which is inserted into a smaller tube 62. The other end of tube 62 has a known air valve 64 therein to which the bulb type hand pump 44 can be secured. After pumping up the hoses to the required pressure, the pump 44 can be removed and the valve 64 will prevent the outward flow of air.

To prevent the wearer from building up too much pressure in the hoses, the hose 62 will slip off stem 60 when the pressure approaches about 3 p.s.i. Generally about one pound per square inch is sufficient to inflate the hoses and provide the necessary pressure therein. At such a low pressure, the folding over of the hoses forming reverse bends 50 therein does not seal off the supply of air to remaining lengths of the hoses.

The fabric means 54 used to maintain the hoses in spaced parallel relationship need be positioned only at the back portion of the brace as shown in FIG. 3. Certain portions of the hoses 48 extend beyond the confines of fabric 54 and extend towards the sides and the stomach of the wearer when the brace is in position. Suitable fabric staples 66 may be stitched to the belt member 26 to maintain these portions of the hoses in position.

The rigid support member designated 42 consists of two rigid parallel members 68 which are secured to cross members 70 to maintain the members 68 in spaced relation. The members 68 are spaced to engage the back of the wearer on each side of the spine. The ends thereof are suitably chamfered to prevent sharp edges. When the brace is on the wearer and inflated, air hoses 48 are also flexible enough to contact the back on both sides of the members 68 and therebetween to provide comfort in wearing the brace so that the wearer hardly notices the pressure exerted by the support member 42. This makes the brace extremely comfortable to wear. Since there is a plurality of air hoses, the hoses themselves provide some massaging action for the muscles in the back as the wearer moves about.

The support member 42 is positioned on the fabric means 54 and is inserted under the inner cover 28. The member 42 is inserted through both outer and inner covers 34 and 38 respectively through an opening in the back portion as shown at 72 in FIG. 4. The opening 72 is generally closed and the edges 36 and 38 are resiliently secured together to provide for expansion when the pneumatic means is inflated. The resilient joining may take the form of an elastic fabric 74 which is secured to the sides as at 76, 78, 80 and 82. A length of the elastic joins the junctions 82 and pulls the cover 34 together along the length of brace. Another elastic member 84 has

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one end secured to side 38 and the other detachably secured to the underside of side 36 by snap fasteners 86. The inner cover 28 may have a similar arrangement (not shown) at 84 to provide an opening similar to 72 through which the support member 42 can be inserted. By having the openings in the covers, a standard brace can be made for a variety of needs and the specific support member 42 for a particular wearer can be inserted therein. The member 42 is loosely held within the inner cover; however, when the brace is positioned on the wearer, and inflated, the member 42 is firmly held in position by the pressure of the pneumatic means 40.

FIG. 4 also shows an opening 88 in the cover through which the hoses 62 are inserted. The straps 16 are suitably stitched to the belt member 26 at 90. If found desirable, the straps 16 may be placed on the outside of flap 20 which may be shortened.

FIGS. 5 and 6 show details as to how the support member 42 may be adapted to provide specific pressure to certain vertebrae if desired. In addition to cross members 70 there are additional cross members 92 which are positioned on both sides of a section 94 which is cut from one of the members 68. A flexible steel or nylon strip 96 is secured to the side of the section 94 which is worn away from the body and the ends of the strip are slidably secured to suitable staples 98 which permit section 94 to be moved out of the plane of its pertaining member 68 by a bladder 100. The bladder is connected via a hose 102 with a valve in the line to a hand pump 44. Hose 102 would normally be led out of hole 88 in FIG. 4 which would make all the tubes accessible for pumping and deflating operations.

FIGS. 7 and 8 show a second modification of the spinal brace of this invention which is used in situations in which the full length of the back or regions near the shoulders and neck need support. The brace generally designated 104 is constructed in the same manner as was brace 10 except the brace 104 has a back portion 106 which extends toward the neck. A rigid support member generally designated 108 extends from the lower back portion up to the neck as shown in phantom outline in FIG. 8. The pneumatic means construction is the same in this modification and only a few tubular hoses 110 are shown in FIG. 8.

To secure adequate firmness for the brace, an extra belt 114 is secured to the back of the brace and is buckled in front by known buckle and clip means 116. A second strap means 118 is secured to the back of the brace at 120 and extends around the front as shown to adjustably connect with shoulder strap 122 by adjustment buckles 124.

Another strap means 126 is secured to the back of the brace at about chest height and may be secured at 128 to the shoulder strap 122.

A heavy elastic member 130 may have one end secured to the junction 128 and have a suitable clip means to detachably secure the other end to the other junction 128. This elastic member provides some flexibility when moving, sitting, driving a car, etc.

What is claimed is:

1. A spinal brace comprising; belt means adapted to encircle the torso of a human and having ends adapted to be secured together, and also having a back portion, said belt means comprising a flexible reinforcing member and cover means secured thereto, on the side of the reinforcing member which is worn away from the torso, fabric means secured to said reinforcing member at said back portion on the side thereof worn towards said torso and said fabric means being formed into a plurality of tunnels which are arranged in spaced parallel relationship along at least a portion of the length of said belt means which is worn against the back of a human, expandable tubes positioned in said tunnels and adapted to be selectively inflated, and rigid support means positioned at said back portion on said fabric means on the side thereof to be worn against said back and comprising a pair of spaced substantially parallel rigid supports adapted to engage the back of the wearer

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on each side of the spinal column, rigid cross supports secured to said pair of supports to maintain them in said spaced relationship, said cover means extending over said rigid support means and detachably secured at said back portion to provide an opening through which said rigid support means may removably be positioned on said fabric means.

2. The brace as claimed in claim 1 in which at least some of said expandable tubes extend beyond said tunnels along the length of said brace and have at least one reverse bend therein and are returned through an adjacent tunnel with one end of said tube being sealed.

3. The brace as claimed in claim 2 in which at least one of said pair of substantially parallel rigid supports has a segment adapted to be moved out of the plane thereof towards the back of the wearer and further comprising an inflatable expandable tube positioned on one side of said segment to urge said segment out of said plane towards the said back of the wearer.

4. A spinal brace comprising; belt means adapted to encircle the torso of a human and having ends adapted to be secured together, and also having a back portion, said belt means comprising a flexible reinforcing member and cover means secured thereto on the side of the reinforcing member which is worn away from the torso, fabric means secured to said reinforcing member at said back portion of the side thereof worn towards said torso and said fabric means being formed into a plurality of tunnels which are arranged in spaced parallel relationship along at least a portion of the length of said belt means which is worn against the back of a human, expandable tubes positioned in said tunnels and means for selectively inflating said tubes, said back portion extending along a direction to cover substantially the entire spinal column of the wearer from the base thereof to the neck of the wearer, rigid support means positioned at said back portion on said fabric means on the side thereof to be worn against said back and comprising a pair of spaced substantially parallel rigid supports adapted to engage the back of the

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wearer on each side of the spinal column, rigid cross supports secured to said pair of supports to maintain them in said spaced relationship, said cover means extending over said rigid support means and detachably secured at said back portion to provide an opening through which said rigid support means may removably be positioned on said fabric means, and strap means adapted to secure said brace to the wearer.

5. The brace as claimed in claim 4 in which said strap means comprise a first strap means secured to said brace and adapted to encircle the torso near the base of the spine of the wearer, second strap means secured to said brace and adapted to encircle the said torso near the chest of the wearer, third strap means having one end secured to said brace between said first and second strap means and adapted to extend toward the chest and over the shoulders of the wearer with the remaining ends being secured to the back of said brace near the neck of the wearer.

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RICHARD A. GAUDET, Primary Examiner

K. L. HOWELL, Assistant Examiner

U. S. Cl. X.R.

128—87, 95