

United States Patent

[11] 3,561,436

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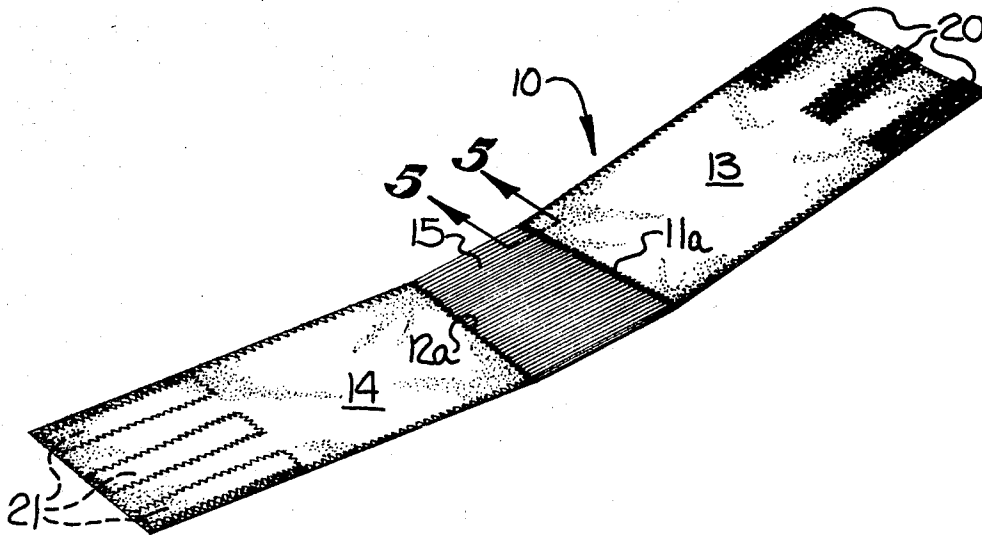
[54] **THORACIC BELT**
6 Claims, 5 Drawing Figs.

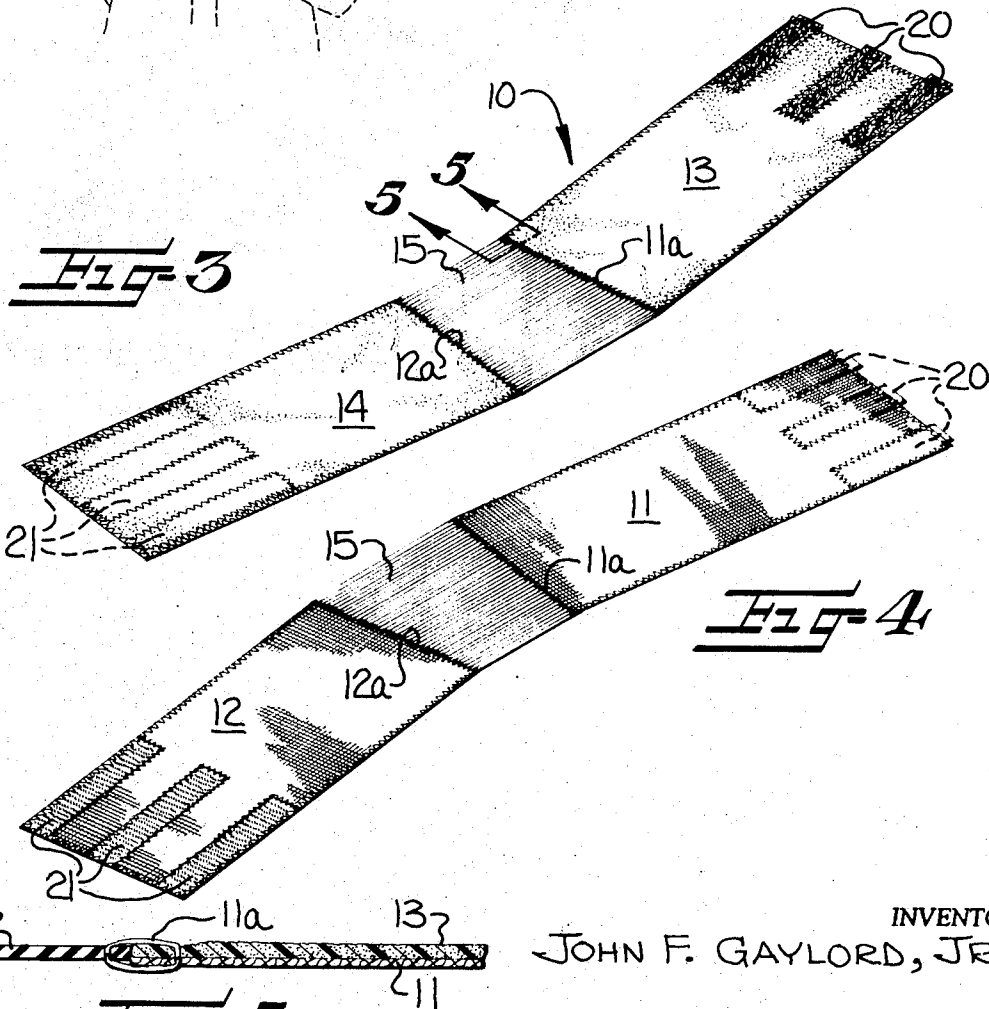
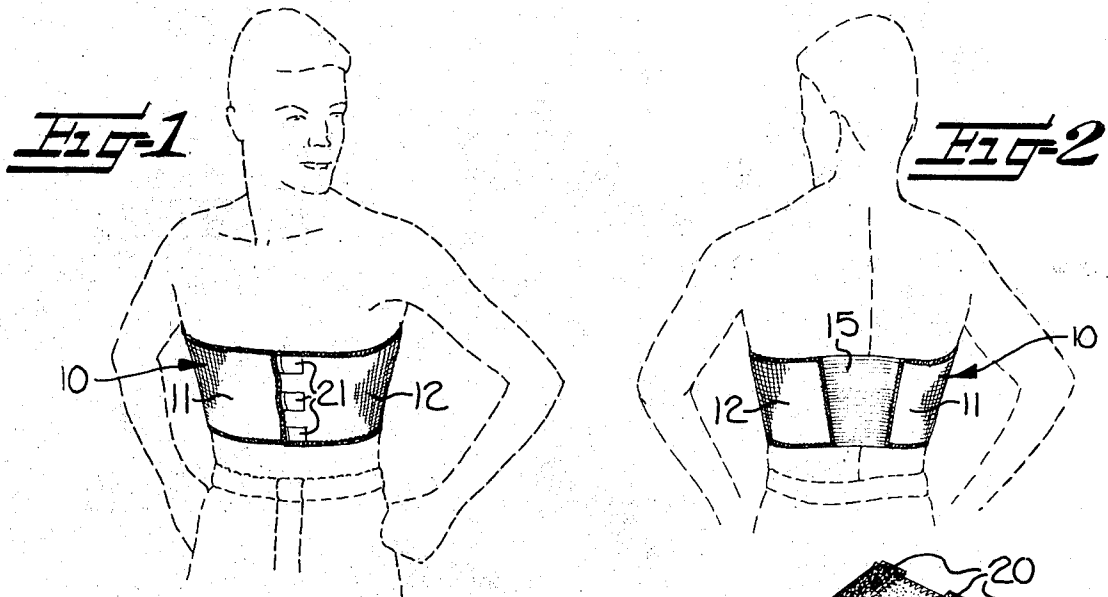
[52] U.S. Cl..... 128/87,
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157, 78, 155, 163, 78, 95

[56] **References Cited**
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ABSTRACT: A belt for reinforcing the thorax of a patient and including elongate substantially dimensionally stable pliable end panels separated by an elastic intermediate panel of trapezoidal shape secured to proximal end edges of the end panels, with fastening means for detachably securing distal end portions of the end panels in overlapping relationship, and wherein each end panel is provided with a body-engaging facing of resilient spongelike material presenting a friction surface to prevent slippage of the belt when worn by a patient.





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THORACIC BELT

Some of the objects of the invention having been stated other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which:

FIG. 1 is a front elevational view of the thoracic belt of the present invention as it is worn about a patient's thorax;

FIG. 2 is a rear elevation of the thoracic belt as it is worn about the patient's thorax;

FIG. 3 is an enlarged perspective view looking at the inside or body-engaging surface of the thoracic belt;

FIG. 4 is a perspective view looking at the outside surface of the thoracic belt; and

FIG. 5 is a fragmentary sectional view taken substantially along line 5-5 in FIG. 3 and illustrating the resilient spongelike material bonded to the inelastic fabric of the end panels to present a soft, yieldable friction surface on the inner face thereof.

Heretofore, it has been quite common to effect such controlled tension or expansion through the use of inelastic tape which is highly uncomfortable in that it permits virtually no expansion, or through the use of various types of elastic belt-like splints, which, although more comfortable, do not properly control expansion. Additionally, such beltlike splints normally present problems in remaining in place during use, and accordingly, it has been proposed to add shoulder straps or suspenders to the same to keep the splint from sliding down the patient's body.

It is an object of this invention to provide a thoracic splint or belt which is so constructed from a combination of elastic and inelastic panels that the inelastic panels are adapted to give maximum support to the ribs and rib muscles of a patient while the elastic panel is adapted to fit in the spinal area of the thorax, thereby permitting expansion only at that point where the ribs are connected to the spine, which is the least likely zone of injury.

A more specific object of this invention is to provide a thoracic belt having elongate opposite end panels interconnected by an intermediate elastic panel of trapezoidal configuration, and wherein the end panels are each provided with a body-engaging facing of resilient spongelike material bonded thereto and presenting a soft, yieldable friction surface which prevents slippage of the belt when it is firmly bound about the patient's thorax.

Another object is to provide a thoracic belt of the character described which includes fastening means, preferably of the "Velcro" type, for readily detachably securing opposed ends of the belt together in overlapping relationship without resorting to the use of straps and buckles, for example.

Referring more specifically to the drawings, the improved thoracic belt is broadly designated at 10 and comprises a pair of first and second elongate substantially rectangular end panels 11, 12 of substantially inelastic pliable material. Preferably, end panels 11, 12 are made of woven textile fabric, such as duck material, which has substantial inherent stability against stretch in use. The end panels 11, 12 are provided with respective body-engaging or inner facings 13, 14 (FIGS. 3 and 5) of resilient spongelike material to present a soft, yieldable friction surface to the patient's body and which prevents slippage of the belt 10 when it is firmly bound about the patient's thorax as shown in FIGS. 1 and 2. It is preferred that the body-engaging facings 13, 14 cover substantially the entire inner surfaces of the respective inelastic panels 11, 12 and that the facings are formed of closed cell polyurethane foam adhesively or otherwise suitably bonded to the inner surfaces of the inelastic panels 11, 12.

The proximal end edges of the inelastic panels 11, 12 are spaced apart from each other, but are attached to the non-parallel opposite end edges of an elastic intermediate panel 15 of substantially isosceles trapezoidal configuration. End panels 11, 12 are each of about the same width as the length of the nonparallel end edges of elastic intermediate panel 15 and are preferably of about the same width throughout their

respective lengths so that the opposite side edges of each end panel extend substantially perpendicular to the respective nonparallel end edges of the intermediate elastic panel 15 when the thoracic belt 10 is not in use, as shown in FIGS. 3 and 4.

Elastic panel 15 is made from suitable elastic woven webbing with the elastic strands thereof extending parallel to the parallel opposite side edges of the trapezoidal elastic panel 15, so that the elastic panel 15 is of substantial stretchability in a direction generally longitudinally of belt 10, but is substantially nonstretchable transversely of the belt 10.

When worn, the thoracic belt should be placed tightly about the patient's thorax. Therefore, in order that the junctures of the three panels 11, 12, 15 do not form objectionable ridges which would make uncomfortable indentations in the patient's body, it is preferred that the proximal end edges of the end panels 11, 12 abut, rather than overlap, the respective non-parallel end edges of the elastic intermediate panel 15, as shown in FIG. 5. The abutting edges at the junctures of the end panels with the intermediate panel are secured together by lines of zigzag stitching indicated at 11a, 12a in FIGS. 3 and 4.

Suitable fastening means are provided for fastening the distal end portions of end panels 11, 12 in overlapping relationship to snugly secure the belt about the patient's thorax, as shown in FIGS. 1 and 2. It is preferred that a so-called "Velcro" type of fastening means is employed in which a plurality of laterally spaced short strips of textile pile material 20 is secured to the outer or distal end portion of one of the end panels, and wherein a plurality of hook strips 21 is suitably attached to the outer or distal end portion of the other end panel.

As preferred, the strips of pile material 20 are secured, by suitable stitching, to the inside surface of end panel 11 (or to the facing 13 thereof) adjacent that end of the first end panel 11 remote from elastic intermediate panel 15. Hook strips 21 are also secured, as by suitable stitching, to the outside surface of the second end panel 12 adjacent the end thereof remote from elastic intermediate panel 15. Hook strips 21 may be of a type such as is disclosed in U.S. Pat. No. 2,717,437, issued Sept. 13, 1955, wherein the hook strip is provided with tiny fiber hook elements extending outwardly from one side of a backing material and which will become embedded in and will cling to a soft fibrous material when pressed thereagainst. Usually the material against which such hook strips are pressed to form a fastening means is a napped textile material. Since the fastening means described herein and embodied in the pile strips 20 and hook strips 21 is fully disclosed in said U.S. Pat. No. 2,717,437, a further description thereof is deemed unnecessary. In fact, it is to be understood that other fastening means, such as snap fasteners, may be employed without departing from the invention.

When the thoracic belt is placed about the thorax of a patient, as shown in FIGS. 1 and 2, the longer of the two parallel side edges of the elastic intermediate panel 15 faces upwardly and is located about the middle of the back of the patient. While the second end panel 12 is held against the chest of the patient, the first end panel 11 is pulled tightly into overlapping relationship with respect to the second panel 12, whereupon the strips of pile material 20 are pressed into surface contact with the hook strips 21 to snugly and firmly secure the thoracic belt about the thorax of the patient.

Owing to the fact that the end panels 11, 12 converge downwardly at a relatively slight angle with respect to the upper, longer, side edge of the trapezoidal elastic intermediate panel 15, the thoracic belt 10 has a natural somewhat tapered configuration when it is placed about the thorax of the patient so as to conform more readily to the shape of that portion of the patient's body. Also, since the upper portion of the elastic intermediate panel 15 is of greater length than the lower portion thereof, it can be appreciated that its upper portion is more easily stretched than the lower portion thereof. Consequently, the upper portion of the thoracic belt 10 readily

yields to the expansion of the patient's chest incident to his breathing, while the lower portion of the belt still maintains snug supporting engagement of the thoracic belt with the patient's body.

The facings 13, 14 engaging the body of the patient not only cushion the belt with respect to the patient's body so that the patient is quite comfortable while breathing, but the facings 13, 14 also present a nonslip friction surface against the body of the patient so that the thoracic belt 10 will not normally be displaced when it is being worn even though the patient may inhale and exhale very deeply, thus obviating the need for any additional supporting means or straps for maintaining the thoracic belt in the desired position at all times while it is being worn.

It is important to note that the construction of the belt 10 is such as to provide firm support about the entire critical zone of the patient's thorax with the only longitudinal expansion and contraction of the belt, attendant to the patient's breathing, occurring along a relatively short length of the belt at the spinal area of the thorax; i.e., at the elastic panel 15. As is generally known, most rib injuries generally occur forwardly of the spinal area. Thus, by restricting all expansion and contraction of the belt to the spinal area, the patient may breathe as comfortably as the injury will permit without the pain of such injury being aggravated by the thoracic belt as has been the case with prior art types of thoracic belts whose portions forwardly of the spinal area would move relative to the patient's body during expansion and contraction of the thorax.

In the drawings and specification there has been set forth a preferred embodiment of the invention and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. A thoracic belt for reinforcing the thorax of a patient and comprising first and second elongate end panels of textile fabric of substantial inherent stability against stretch in use, each end panel being substantially rectangularly shaped and having opposite side edges and opposite end edges, a body-engaging facing of resilient spongelike foam material bonded to one surface of each end panel for presenting a friction surface to obviate slippage of the belt when firmly bound about the patient's thorax, an elastic intermediate panel of substantially isosceles trapezoidal configuration having its opposite nonparallel end edges secured by means of stitching to the proximal end edges of the respective end panels along the entire length of the edges in continuous abutting nonoverlapping relationship, and fastening means for detachably interconnecting the distal end portions of said end panels opposite from said proximal edges when the thoracic belt is placed about the patient's thorax.

2. A thoracic belt according to claim 1, in which said body-engaging facing is formed of polyurethane foam material.

3. A thoracic belt according to claim 1, in which said intermediate panel is of substantial stretchability in a direction parallel to its opposite parallel side edges, and is substantially nonstretchable transversely of said direction.

4. A thoracic belt according to claim 3, in which said end panels are each of about the same width as the length of the nonparallel end edges of said intermediate panel substantially throughout the length of said end panels, and wherein opposite side edges of each end panel extend substantially perpendicular to the respective nonparallel end edges of said intermediate panel when the thoracic belt is not in use.

5. A thoracic belt according to claim 1, wherein said fastening means comprises means forming a napped surface on one face of said first end panel adjacent the distal end thereof, and a plurality of hook-shaped fiber members secured to and projecting from the opposite face of said second end panel adjacent the distal end thereof for grippingly engaging said napped surface on said first panel to fasten the distal ends of said first and second end panels in overlapping relationship.

6. A thoracic belt for encircling a patient's body beneath the arms to provide tension around and controlled expansion of the thoracic cavity, said belt comprising a pair of elongate, substantially rectangularly shaped, end panels of textile fabric of substantial stability against stretch in use, each end panel having bonded thereto a body-engaging facing of polyurethane foam material presenting a resilient friction surface to obviate slippage of the belt when firmly bound about the patient's thorax, an isosceles trapezoidally shaped elastic intermediate panel situated between said end panels and having its entire opposite nonparallel end edges in continuous abutting and nonoverlapping relationship the respective proximal end edges of said end panels, stitching means securing opposite end portions of said intermediate panel to proximal end portions of said end panels to maintain said abutting nonoverlapping relationship and with opposite substantially parallel side edges of said end panels extending substantially perpendicular to the respective nonparallel end edges of said intermediate panel, said intermediate panel being formed of elastic webbing including elastic strands extending substantially longitudinally only of said belt, one of said end panels having means forming a napped surface on one face thereof adjacent the distal end thereof remote from said intermediate panel, and a plurality of hook-shaped fiber members secured to and projecting from the opposite face of the other of said end panels adjacent the distal end thereof remote from said intermediate panel, for grippingly engaging said napped surface of said one end panel to fasten the distal ends of said end panels together in overlapping relationship.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,561,436

Dated February 9, 1971

Inventor(s) John F. Gaylord, Jr.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 1, above line 3, insert the following paragraph:

--This invention relates to an improved thoracic belt or splint for encircling a patient's body beneath the arms to provide tension around, and controlled expansion of , the thoracic cavity. Controlled tension or expansion around the thoracic cavity is generally prescribed for a wide range of ailments; particularly rib fracture or separation, since if uncontrolled expansion is permitted, there is a greater opportunity for the ribs to grate against one another at the zone of the injury, thereby causing pain and possibly deterring healing. --

Col. 1, lines 3-19 should be deleted, and the following inserted follow line 50:

--Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which:

Figure 1 is a front elevational view of the thoracic belt of the present invention as it is worn about a patient's thorax;

Figure 2 is a rear elevation of the thoracic belt as it is worn about the patient's thorax;

Figure 3 is an enlarged perspective view looking at the inside or body-engaging surface of the thoracic belt;

Figure 4 is a perspective view looking at the outside surface of the thoracic belt; and

Figure 5 is a fragmentary sectional view taken substantially along line 5-5 in Figure 3 and illustrating the resilient sponge-like material bonded to the inelastic fabric of the end part to present a soft, yieldable friction surface on the inner face thereof. --

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Dated February 9, 1971

Inventor(s) John F. Gaylord, Jr.

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It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 1, line 25, "beltlike" should read -- belt-like --; line 42, "spongelike" should read -- sponge-like --; line 59, "spongelik" should read -- sponge-like --; line 73, "nonparallel" should read -- non-parallel --

Col. 2, line 3, "nonparallel" should read -- non-parallel --; line 11, "nonstretchable" should read -- non-stretchable --

Col. 3, line 8, "nonslip" should read -- non-slip --; line 40, "spongelike" should read -- sponge-like --; line 47, "nonoverlapping" should read -- non-overlapping --

Col. 4, line 9, "nonparallel" should read -- non-parallel --; line 12 "nonparallel" should read -- non-parallel --; line 25, "rectangularly shaped" should read -- rectangularly-shaped --; line 30, "trapezoidally shaped" should read -- trapezoidally-shaped --; line 32, "nonparallel" should read -- non-parallel --; line 33, "nonoverlapping" should read -- non-overlapping --; line 36 and 37, "nonover-lapping" should read -- non-overlappi; line 39, "nonparallel" should read -- non-parallel --

Signed and sealed this 19th day of October 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patents