

April 2, 1946.

I. R. VERSOY ET AL  
AVIATOR'S BELT OR THE LIKE

2,397,709

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3 Sheets-Sheet 1

*Fig. 1.*

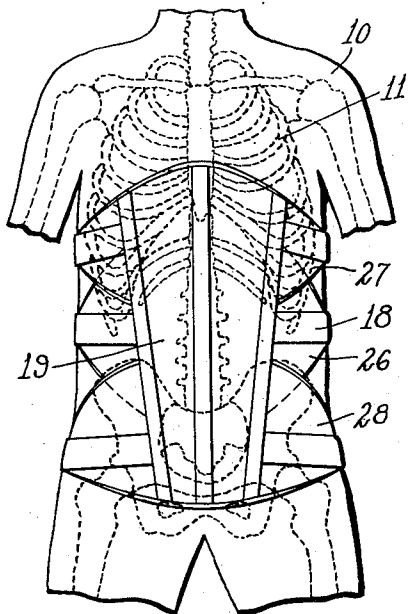


*Fig. 5.*

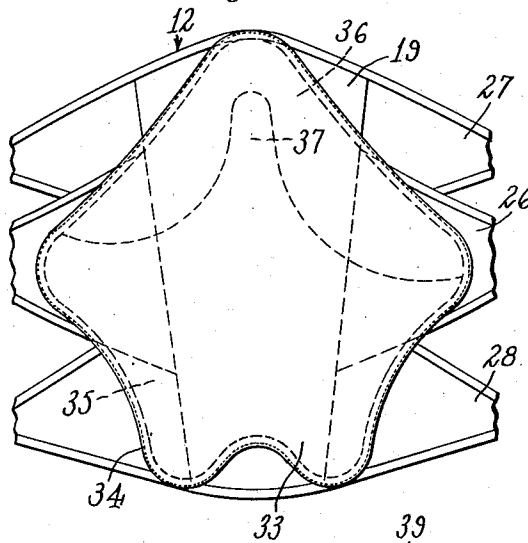


*Fig. 7.*

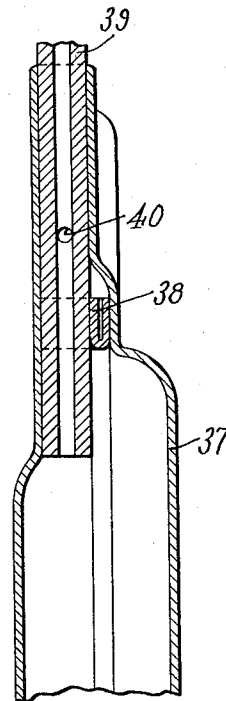
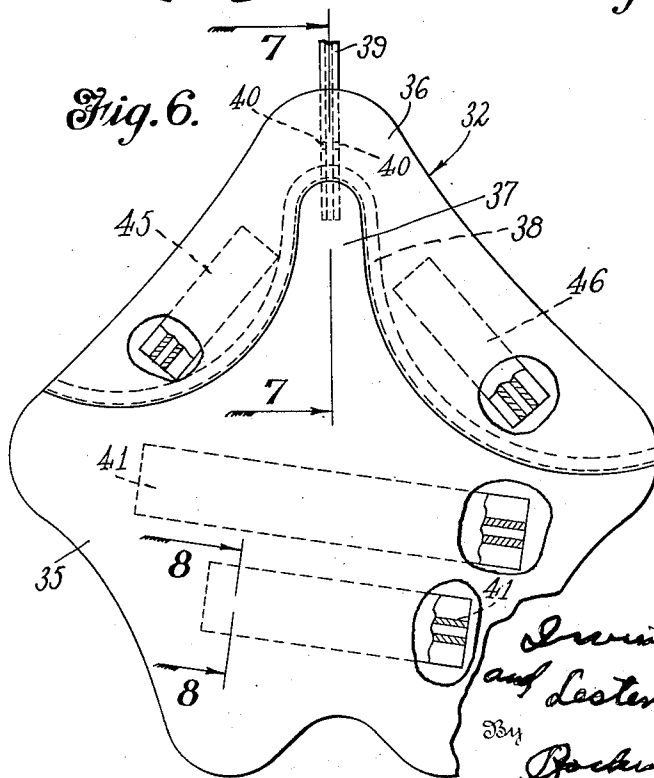


*Fig. 6.*



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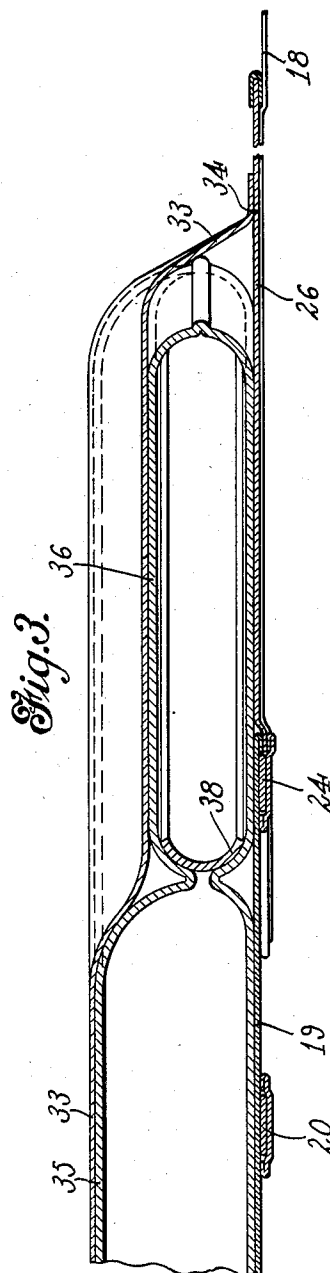
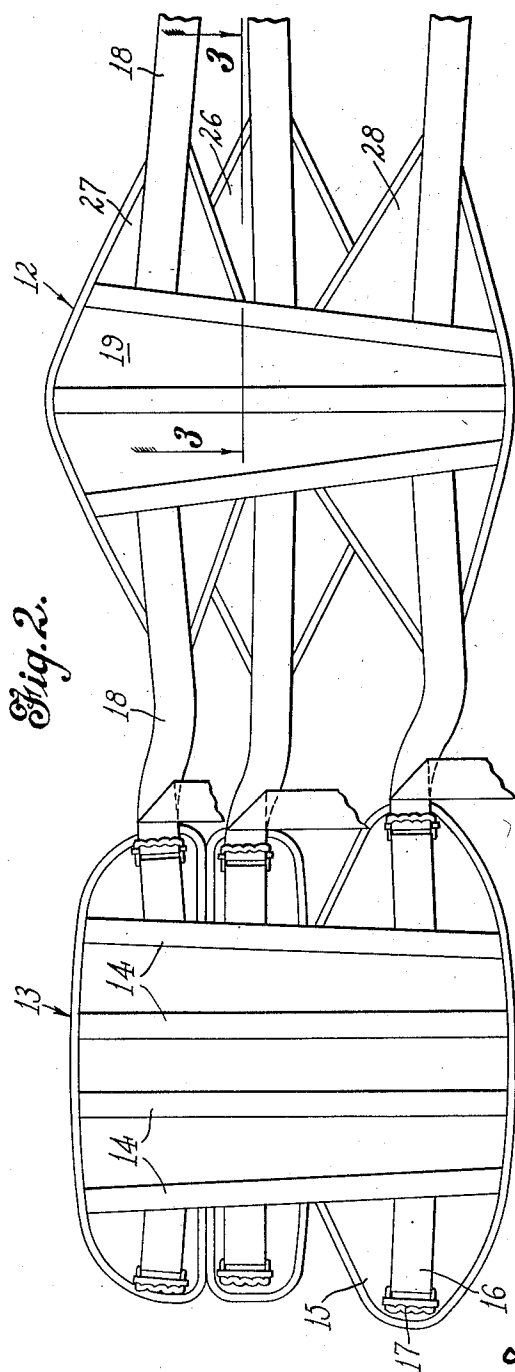
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3 Sheets-Sheet 2



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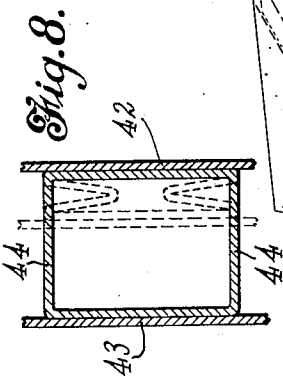
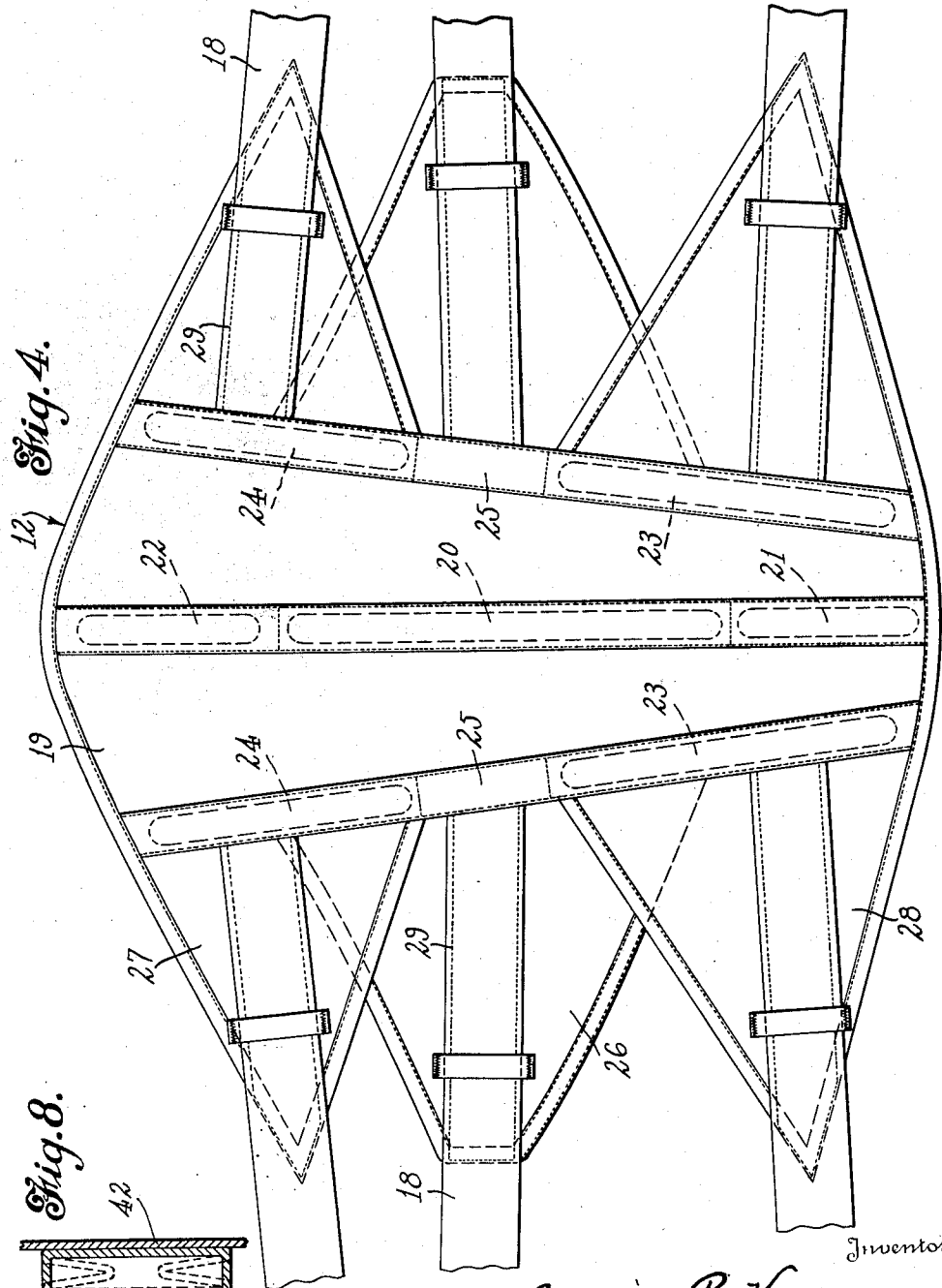
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AVIATOR'S BELT OR THE LIKE

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3 Sheets-Sheet 3



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## UNITED STATES PATENT OFFICE

2,397,709

## AVIATOR'S BELT OR THE LIKE

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Application November 1, 1940, Serial No. 363,892

2 Claims. (Cl. 128—96)

This invention relates to a belt or protective garment designed for aviators, but it is not necessarily confined to such use, as the constructional features may be advantageously employed in garments or belts suitable for other uses.

In the operation of an airplane it often occurs that the movements of the plane place an abnormal strain on the joints and muscles attached to the spine. This is particularly true when a plane is going at high speed and its direction of motion is suddenly changed, such as occurs in dive-bombing, for example, in which operation the aviator plunges almost vertically downward at a high rate of speed and then rights his plane at the bottom of the dive, or even turns it upwardly to start another climb. The centrifugal force caused by high speed with sudden changes in direction affects the balance of bodily functions, due to the inability of the vascular system to maintain the proper distribution of blood to the various organs. A sudden change of direction while going at high speed tends to displace the internal organs with their large supply of blood, producing ill effects of various kinds.

One object of the invention is the provision of a belt or protective garment for aviators, which will serve to support and confine various portions of the body of the aviator to prevent the ill effects attendant upon airplane operation.

Another object of the invention is the provision of a protective garment or belt for aviators which is constructed particularly to protect and support the abdomen and adjacent portions of the body of the aviator which are not protected by the bony structure of the skeleton.

Another object of the invention is the provision of a protective garment or belt for aviators which is constructed to support the spine over a broad area above and below the top of the hip bone.

A still further object of the invention is the provision of a garment of the character described which will have provision for adjusting the various parts of the garment about the body of the aviator independently of each other. For this purpose the garment is in the form of a belt having a plurality of tabs or the like, certain ones of which may be placed under tension independently of the others, so that the desired tension can be given the belt at one part of the body independently of that given the belt at an adjacent part of the body.

A still further object of the invention is the

provision of a belt or protective garment for aviators provided with a bladder or air cushion so constructed as to give controlled pressure over predetermined areas of the body, and so arranged that the thickness of the bladder may be greater at one portion than another, so that one portion of the body is protected by a greater amount of air, or, in other words, by a thicker air cushion, than another.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed. In the accompanying drawings:

Fig. 1 is a front elevational view of a belt or garment embodying our invention, the belt being shown in the position in which it is designed to be worn;

Fig. 2 is a front or outside view of the belt showing both front and back portions or panels thereof;

Fig. 3 is a sectional view on line 3—3 of Fig. 2;

Fig. 4 is an enlarged front or outside elevational view of the front panel or section of the garment;

Fig. 5 is a rear or inside view of the front panel of the garment on a reduced scale;

Fig. 6 is an elevational view of the bladder detached from the garment;

Fig. 7 is a sectional view on line 7—7 of Fig. 6; and

Fig. 8 is a sectional view on line 8—8 of Fig. 6.

To illustrate a preferred embodiment of our invention we have shown a portion of the human body at 10, to which is applied the improved protective garment. A portion of the bony structure or skeleton of the body is shown at 11 in order to illustrate the approximate position of the garment or belt upon the body with relation to the bones of the skeleton.

As shown in Fig. 2, the garment consists of a front section 12 and a rear panel or section 13, (both preferably being of inelastic material) the latter being provided with vertically disposed substantially parallel stiffening stays 14 extending substantially from top to bottom thereof and also provided with a series of tabs 15 connected to the outer stays 14 and projecting outwardly from the panel 13 to pass partially around the sides of the wearer. On the outside of the tabs 15, straps 16 may be secured at the outer stay sections 14, which straps carry, upon their ends, buckles 17 to receive the ends of cooperating straps 18 secured to the front section 12.

The front section, as shown more particularly in Fig. 4, comprises a central panel 19, which,

as will be noted from Fig. 1, is adapted to extend over the abdominal portion of the body from a point adjacent the pubic bone to the lower end of the sternum, and will preferably overlap slightly upon the sternum. This panel 19 has a central stay or stiffened section in which are mounted the stiffening members 20, 21 and 22. It will be noted that the central bone or stiffening member 20 is substantially longer than the rest to reach over the principal portion of the abdomen, and the sections 21 and 22, being discontinuous with the section 20, will permit the upper and lower portions of this section of the garment to accommodate itself to changes in the body from standing to sitting positions; that is, the panel may bend slightly at the upper and lower ends of the central stay or bone 20 if occasion requires it. The upper stay 22 may in this manner accommodate itself to various conditions of sternum shapes.

At its side edges, this front panel may also be provided with stay sections in which are disposed the stiffening or bone members 23 and 24. It will be noted that the lower bone sections 23 are separated or spaced from the upper sections 24 over substantial areas, as shown at 25, which areas are in line with the central straps 18, as will be referred to hereinafter.

Secured to each of the side stay sections of the front panel are central tabs 26 and upper and lower tabs 27 and 28, respectively, the three straps 18 being drawn substantially across the central portions of these tabs and stitched thereto, as shown at 29. The upper tab 27 is of a width, adjacent the edge of the panel, substantially equal to that of the stiffening member 24, and likewise the width of the lower tab is similarly related to the length of the stiffening member 23, these tabs tapering outwardly away from the panel. It will be noted that the upper and lower straps 18 are secured to the edge stay sections of the panel 19 so that the pull upon these straps is borne by the stay sections adjacent the intermediate parts of the stiffening members 23 and 24.

The central tab 26 is positioned substantially at the central portion of the panel 19 as respects its upper and lower edges, and is of sufficient width adjacent the side edges of the panel to overlap the adjacent edges of the tabs 27 and 28, as illustrated. The center straps 18, which are associated with the tabs 26, are stitched to these tabs in line with the space between the stiffening members 23 and 24, so that the strain upon these straps is borne by the central stay section which carries the stiffening member 20.

It will be noted that the central tabs 26 extend over the area between the ribs at the upper side and the hip bones at the lower side, so as to distribute the pull upon these tabs over the area between the ribs and the hip bones at the side and front. Thus it will be seen that the front panel, together with the central tabs, will protect and support substantially all of the part of the body unprotected by the bony structure at the front and sides of the wearer of the garment.

The lower tabs on the front and back sections of the garment pass about the hip portion of the wearer, and the adjustment permitted in the effective length of the straps 18 by the buckles will permit adjustment to various types of hip development or prominence of hip bones, and will also give support at the front of the garment to the lower abdominal area from the pubic bone

upward, or to that part of the abdominal area which is not reached by the tabs 26.

The upper tabs at the front and back of the garment give control to the upper central part of the abdomen, with adjustment, as shown, for varying developments and conditions of the rib basket portion of the body. It will, of course, be understood that each of the tabs 15 on the rear panel 13 cooperates with the corresponding tabs on the front panel to confine these corresponding portions of the body at the back thereof, the central back tab, for example, covering the area between the ribs and hip bones at the back.

In connection with the above explanation, it will be understood that, as the straps 18 are stitched to the tabs 26, 27 and 28, and as likewise the straps 16 at the back of the garment are stitched to the corresponding tabs, the pull upon these straps will likewise place tension upon the tabs to properly confine and place pressure upon the parts of the body where this pressure is essential, particularly where the bony structure of the skeleton is absent, as illustrated. It may also be noted that the joints between the stiffening members in the central stay section of the front panel are staggered with respect to the joints between the stiffening members in the side sections. This permits the central straps 18 to pull upon the central section of the garment, and permits greater freedom of adjustment of the central tabs 26 with respect to the upper and lower tabs 27 and 28. The staggered or jointed bone construction of the front panel likewise permits this panel to adjust itself adjacent its upper and lower portions to the standing and seated positions of the wearer without interfering essentially with the confining action of the garment.

While it is necessary to give relatively firm support to the portions of the body, it is also desirable that this support be cushioned or given a certain amount of resilience. For this purpose I have placed upon the inside of the front panel 19 a cushioning device which in the present instance is in the form of an inflatable bladder 32. This bladder may be placed on the back of the front panel and held in position by being confined in a pocket between the latter and a piece of fabric 33 stitched at its edges 34 to the rear face of the front panel, the pocket being of substantially the same shape as the bladder. The member 33 may be of inelastic or elastic fabric, and if the latter, may be of two-way stretch material, so that it will stretch over its entire surface in both directions to permit the inflation of the bladder, but at the same time will exercise a limiting action upon this inflation and also serve as a protection against rupture of the bladder due to sudden strains. The bladder may be formed of any suitable material, such as rubber.

It is desirable to have the pressure placed upon the body controlled to some extent, and also to have the bladder so constructed that a sudden pressure upon one area thereof will not quickly force the air into another area and thus create a bulbous shape or condition. It is also desirable that the bladder be of greater depth or thickness between its walls at one area than another in order to provide a greater cushion of air over the body at some points. For example, the abdominal section will require a greater bladder depth and larger air cushion than the upper portion which overlies the ribs and sternum.

In order to effect this result we have illustrated a bladder of the shape shown more espe-

cially in Figs. 3, 6 and 7, which is divided into a lower abdominal portion 35 and an upper portion 36. The lower portion 35 has a neck 37 extending upwardly between the right and left lobes of the upper portion 36, as shown more especially in Fig. 6. The two parts of the bladder are separated by a partition 38 substantially of U-shaped form in cross section, as shown more especially in Fig. 7, this partition limiting the separation between the upper and lower walls of the bladder at that point, as shown more especially in Fig. 3, and prevents communication between the parts 35 and 36 of the bladder except that permitted by the filler tube 39, which passes across the partition 38 and communicates with the lower bladder section 35, and which tube is provided with an opening 40 to admit air to the upper bladder portion 36. It will be seen, therefore, that when air is blown into the filler tube 39 it will enter both upper and lower portions of the bladder and place both portions normally under equal pressure. When, however, pressure is applied locally to one portion or the other of the bladder, the small communicating port 40 will not permit the air to pass rapidly from one portion to another.

It is also desirable to control the local distention of the bladder due to sudden pressure at one point to prevent the latter bulging out at another point. For example, the portion 35 of the bladder covers a substantial area, and pressure upon one part might force the air suddenly into another part, thus abnormally extending the latter. We have, therefore, placed limiting members in each section of the bladder to serve to prevent undue separation of the walls thereof. As shown in Figs. 6 and 8, two of these limiting members 41 are placed in the lower portion 35 of the bladder, although the number thereof may be varied as desired. These members are of open-ended rectangular shape in cross section, as shown in Fig. 8, having upper and lower walls 42 and 43 secured flatly against the upper and lower walls of the bladder, respectively, and side walls 44 connecting the upper and lower walls. When the bladder is collapsed, the side walls are adapted to fold inwardly, as shown in Fig. 8, so that the bladder will lie flat. When the bladder is inflated, however, these walls will be distended but will serve to limit the distention of the bladder, particularly in any one place. As these members are open at their ends, they will, of course, communicate with the interior of the bladder and be filled with air.

A similar limiting member 45 is placed in the left-hand upper portion 36 of the bladder, while

another member 46 is placed in the right-hand portion. From Fig. 3 it will be observed that the upper portion of the bladder is not permitted to expand to the same extent as the lower portion 35, this portion of the bladder being held by the limiting members 45 and 46 to a lesser depth or thickness, thus creating a shelf between the two bladder portions. The upper left-hand edge of the lower bladder portion 35 is designed to lie below and under the heart section of the body, substantially following the line of the ribs, while the upper right-hand edge of the lower bladder portion may be slightly lower than the left-hand section, so as to provide a shelf-like support for the liver.

The lower portion 35 of the bladder is designed to cushion the strains upon the principal portion of the abdominal section. It may be inflated to the desired point so that the necessary pressure will be exerted upon the body to prevent dislocation of the internal organs by exerting pressure over the principal portion of the abdominal section and forming a shelf-like area at the lower border of the ribs.

While we have shown and described a preferred embodiment of our invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the appended claims.

What we claim is:

1. A protective belt or a garment designed to encircle the body and having a front section, a bladder disposed at the inner surface of the front section to lie between it and the body of the wearer, means to limit the separation of the walls of the bladder, said means providing for a greater separation of said walls at the lower portion of the bladder than at the upper portion thereof and thus providing for an abrupt shelf-like area between the upper and lower portions of the bladder.

2. A protective belt or garment designed to encircle the body and having a front section adapted to cover the abdomen of the wearer, cushioning means carried at the inner surface of the front section and extending over a substantial portion of said surface, said means comprising upper lobe portions and a lower inflatable bladder portion, and there being an abrupt shelf-like area between said portions when the bladder is inflated, said bladder having an upwardly extending inflatable neck portion disposed between said lobe portions.

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