United States Patent [19]

Jacobson et al.

[11] **3,811,434**

[45] **May 21, 1974**

[54] **INFLATABLE SPLINT**

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[52] **U.S. Cl.** ..... **128/89 R**, 128/DIG. 20

[51] **Int. Cl.** **A61f 5/04**

[58] **Field of Search** ..... 128/89, 87, DIG. 20, 155, 128/165

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[57] **ABSTRACT**

An inflatable splint, and method of making same, comprising a flexible, inflatable body portion to one side of which is joined a panel of a flexible material. The panel forms an open ended sleeve with the body portion for admitting a limb, or the like, and enables the splint to be quickly and properly positioned thereon prior to inflation.

7 Claims, 8 Drawing Figures

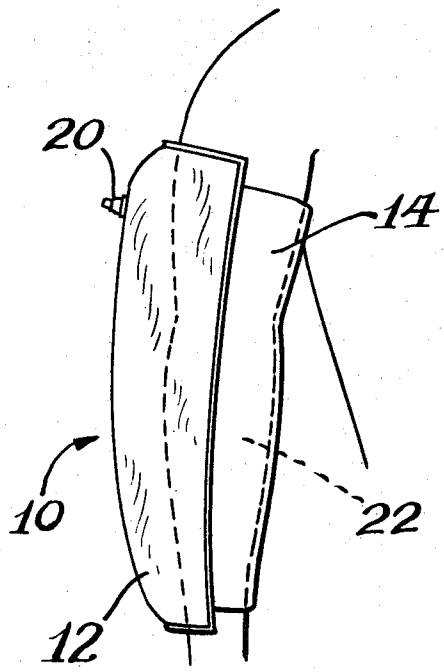


Fig. 1.

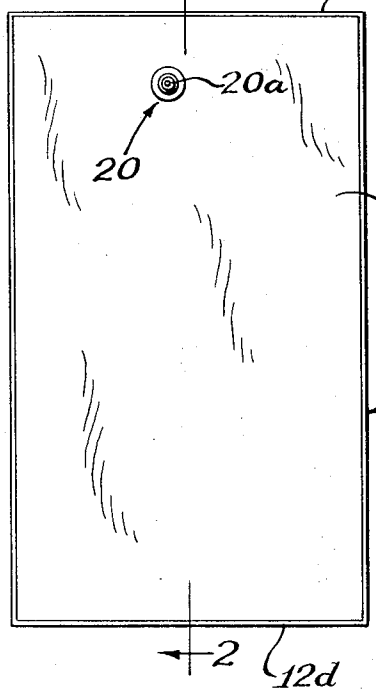


Fig. 2.

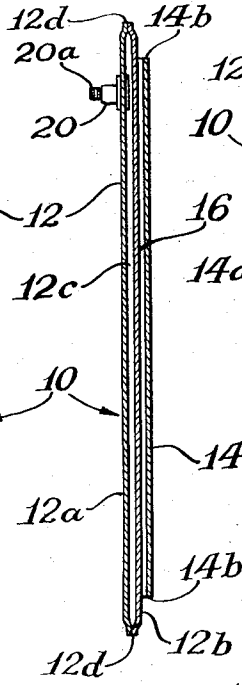


Fig. 3.

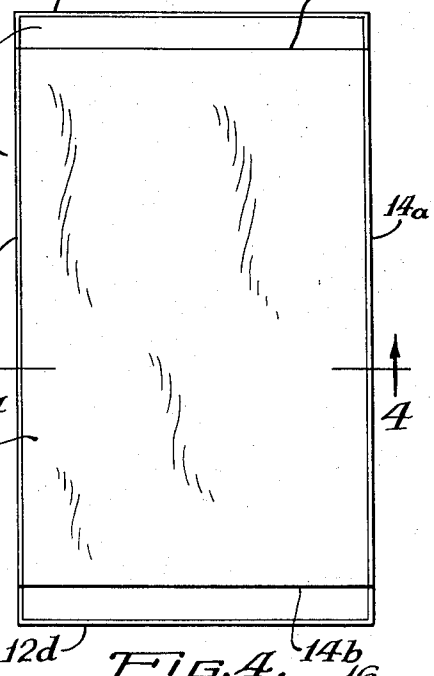


Fig. 4.

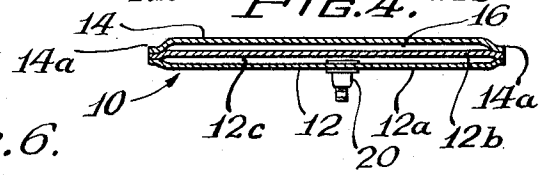


Fig. 5.

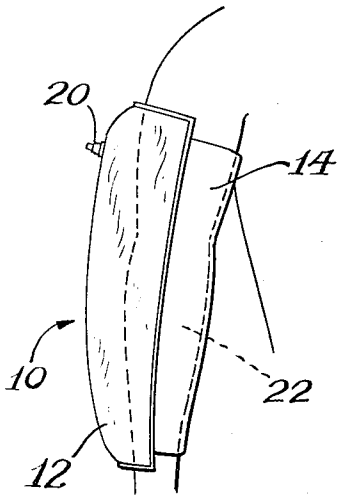


Fig. 6.

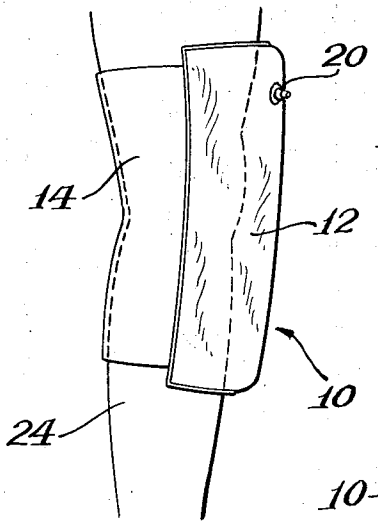
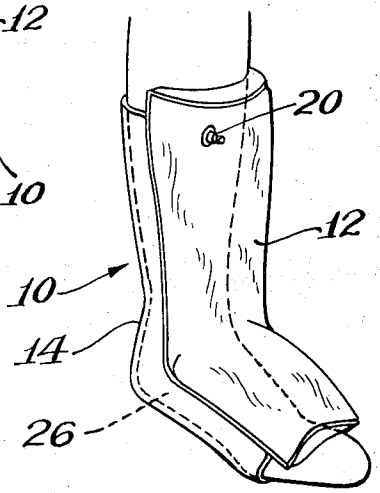


Fig. 7.



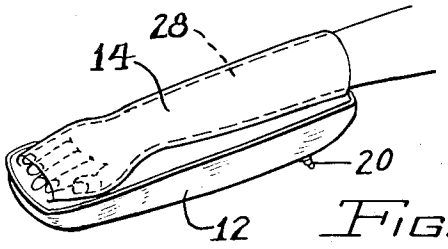


Fig. 8

INFLATABLE SPLINT

The present invention relates to an improved inflatable splint, and to a method of making such a splint.

While various inflatable splints have heretofore been developed, generally speaking, they have one, or more, disadvantages, chief among which are their use of fastening means such as slide fasteners to hold the splint in position on a limb, their cumbersomeness both when applying the splint to a limb and after it has been inflated, their overall bulkiness which makes them inconvenient to carry and to store, their inability to be used on non-extendable areas of the body such as at the curvature of the foot and ankle, and their comparatively high cost of manufacture. Exemplary of such prior splints are those disclosed in U.S. Pat. Nos. 3,338,237, 3,245,405 and 3,424,151.

In accordance with the present invention, an inflatable splint is provided which eliminates various of the aforementioned disadvantages of prior inflatable splints. The splint of this invention can be quickly and properly positioned on a limb without causing any added discomfort or pain to the wearer. The highly flexible character of the splint enables it to be readily applied in a natural, conforming position even on such angular areas of the body as the juncture of the foot and ankle. In addition, the splint, while of sufficient size for use on a leg or arm, can be easily folded into a compact package for convenient carrying and storage. The uniquely simple construction of the splint, furthermore, enables it to be manufactured at minimal cost with conventional equipment in essentially a one-step operation from readily available materials.

The splint of this invention, in brief, comprises a flexible, air-impervious, inflatable body portion to one side of which is joined a panel of a flexible sheet material. The panel forms an open ended sleeve with the body portion for admitting a limb, or the like, and enabling the splint to be quickly and properly positioned thereon prior to inflation of the body portion. The arrangement of the sleeve in relation to the body portion permits a user to freely choose the side of the injured limb, or the like, on which the inflatable body portion will lie thereby to provide optimum support for the affected area of the limb while reducing discomfort to the wearer to a minimum. This is in sharp contrast to various of the prior inflatable splints which surround, or encase, the affected area of a limb in an inflatable compartment, oftentimes resulting in excessive pressure on the affected area and requiring the wearer to hold the splint encased limb in an unnatural position thereby adding to his discomfort. Valve means are provided on the body portion of the splint of this invention to enable the body portion to be inflated by mouth or by mechanical means. The sleeve, the body portion and its associated valve means can be assembled, as indicated, into a unitary structure in essentially a single step.

The invention will be more clearly understood, and additional objects, features and advantages thereof will become apparent from the following detailed description of an embodiment of the invention illustrated in the accompanying drawings wherein:

FIG. 1 is a plan view of one side of an embodiment of the splint showing the inflatable body portion and its associated valve means;

FIG. 2 is a vertical sectional view taken substantially along line 2—2 of FIG. 1;

FIG. 3 is a plan view of the other side of said embodiment of the splint showing the panel and its relationship to the body portion;

FIG. 4 is a transverse sectional view taken substantially along line 4—4 of FIG. 3;

FIGS. 5 through 8 are perspective views showing said embodiment in position on various areas of the body.

In FIGS. 1 through 4, the embodiment of the splint 10 illustrated comprises a generally rectangularly shaped, flexible body portion 12, and a correspondingly shaped flexible panel 14 joined along two of its opposite margins 14*a*—14*a* to one side of the body portion 12. The portion 12 and the panel 14 advantageously are fabricated of a flexible, air-impervious material such a polyvinyl chloride, polyethylene, polypropylene, natural and synthetic rubbers, or the like. As shown, the body portion 12 is formed of two sheets or panels 12*a* and 12*b* of a flexible, air-impervious plastic material such a polyvinyl chloride, the opposed margins of which have been joined, as by electronic or heat sealing, in air-tight engagement to provide an inflatable compartment or chamber 12*c* therebetween. It should be understood, of course, that the body portion 12 can be formed of a tube of a flexible, air-impervious material, the ends of the tube being sealed to provide an inflatable compartment or chamber.

The panel 14 advantageously is formed of a sheet of plastic material of the same type as that used to form the body portion 12. The panel 14 forms an open ended sleeve 16 with the body portion 12 for admitting a limb, or the like. As shown, the panel 14 desirably is shorter in length than the body portion 12, thus positioning the free end margins 14*b*—14*b* thereof inwardly in spaced relation with respect to joined end margins 12*d*—12*d* of the body portion. This arrangement facilitates separation of an end 14*b* of the panel 14 from the body portion 12 when it is desired to use the splint 10.

The body portion 12 is provided with a valve 20 for introducing air into the compartment or chamber 12*c*. As illustrated, the valve 20 advantageously has a threaded stem 20*a* to enable the body portion 12 to be inflated by mouth, or by means of a pump. Any of various valve constructions known to the art can, of course, be used, the valve 20 being a preferred example of one such construction.

In FIGS. 5, 6, 7 and 8 of the drawing, the splint 10 is shown in use on an arm 22, a leg 24, an ankle 26 and the hand, wrist and lower portion of an arm 28, respectively, of the body. The inflatable body portion 12, in each instance, is positioned on the affected area to provide optimum support with minimal discomfort to the wearer. The highly flexible character of the splint enables it to be easily, comfortably and properly mounted on an ankle as shown in FIG. 7. Apart from its flexibility, the rugged construction of the splint of the present invention enables it to withstand rough handling and to resist damage from contact with foreign objects.

As indicated hereinabove, the splint can be assembled in essentially a one-step operation. Thus, by way of illustration, two sheets or panels 12*a* and 12*b*, of essentially the same size, of a flexible plastic material, such a polyvinyl chloride, are placed in overlying relation with respect to one another on a suitable supporting surface (not shown). A third sheet or panel 14 of the plastic material, shorter in length than the first mentioned sheets, is superimposed on the first two sheets so that its end margins 14*b*—14*b* lie between the

opposed end margins 12*d*—12*d* of the two sheets. The opposed margins of the three sheets are then simultaneously joined with suitable electronic or heat sealing equipment. The valve **20** may be affixed to the outermost one of the two sheets which form the inflatable body portion of the splint either before, during or after the sealing operation. As stated previously hereinabove, the body portion of the splint may be formed of a tube of a flexible plastic material instead of separate sheets as described above.

While for purposes of illustration a preferred embodiment of this invention has been shown and described, other forms thereof will become apparent to those skilled in the art upon reference to this disclosure and, therefore, it should be understood that any such departures from the specific embodiment shown and described are intended to fall within the spirit and scope of this invention.

What is claimed is:

1. An inflatable splint comprising a body portion formed of a flexible, air-impervious material, said body portion consisting of opposed walls which are closed around their periphery to provide an uninterrupted, air-tight inflatable compartment therebetween, a panel of a flexible sheet material positioned in substantially overlying relation with respect to one wall of the body portion and integrally joined along two of its opposite side margins to two opposed opposite side margins of the body portion to form an open ended sleeve with said one wall of the body portion for admitting a limb, or the like, and to enable the splint to be quickly and properly positioned thereon prior to inflation of the body portion, said panel in cooperation with the body portion in its inflated condition serving as the sole means for maintaining the splint in proper position on a limb, or the like, and means on the body portion for introducing air into the inflatable compartment thereof.

2. A splint according to claim **1** wherein the opposed walls which form the inflatable compartment of the body portion of the splint comprise two panels of a flexible air-impervious material, the opposed margins of which are sealed in air-tight engagement.

3. A splint according to claim **1** wherein the opposed walls which form the inflatable compartment of the body portion of the splint comprise a tube of a flexible, air-impervious material, the margins of the open ends of which have been sealed in air-tight engagement.

4. A splint according to claim **1** wherein the panel joined to the body portion of the splint is shorter in length than the length of the body portion to facilitate separation of the free end margins of the panel from the body portion when the splint is readied for use.

5. A splint according to claim **1** wherein the body portion and its associated panel is formed of a flexible plastic, rubber, or rubber-like material.

6. A splint according to claim **5** wherein the flexible material is a plastic material selected from the group consisting of polyvinyl chloride, polyethylene and polypropylene.

7. A splint according to claim **1** wherein the body portion is provided with a valve stem which enables the body portion to be inflated by mouth or by mechanical means.

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