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C. C. CULLEN ET AL
PNEUMATIC SPLINT

3,075,522

Filed Aug. 28, 1961

2 Sheets-Sheet 1

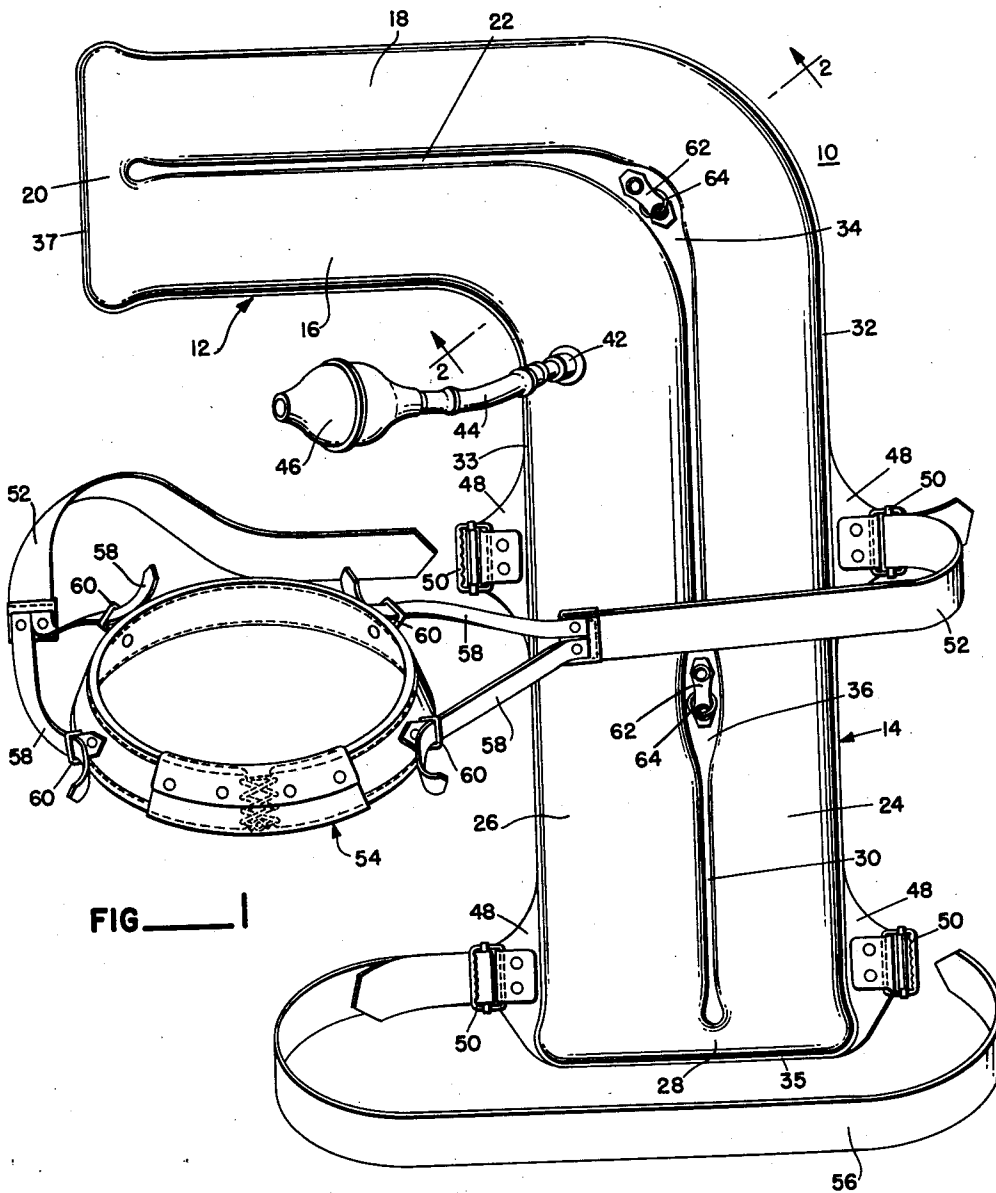


FIG. 1

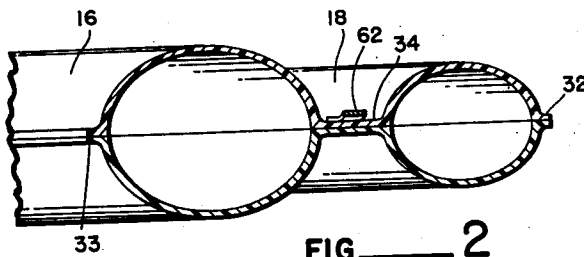


FIG. 2

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2 Sheets-Sheet 2

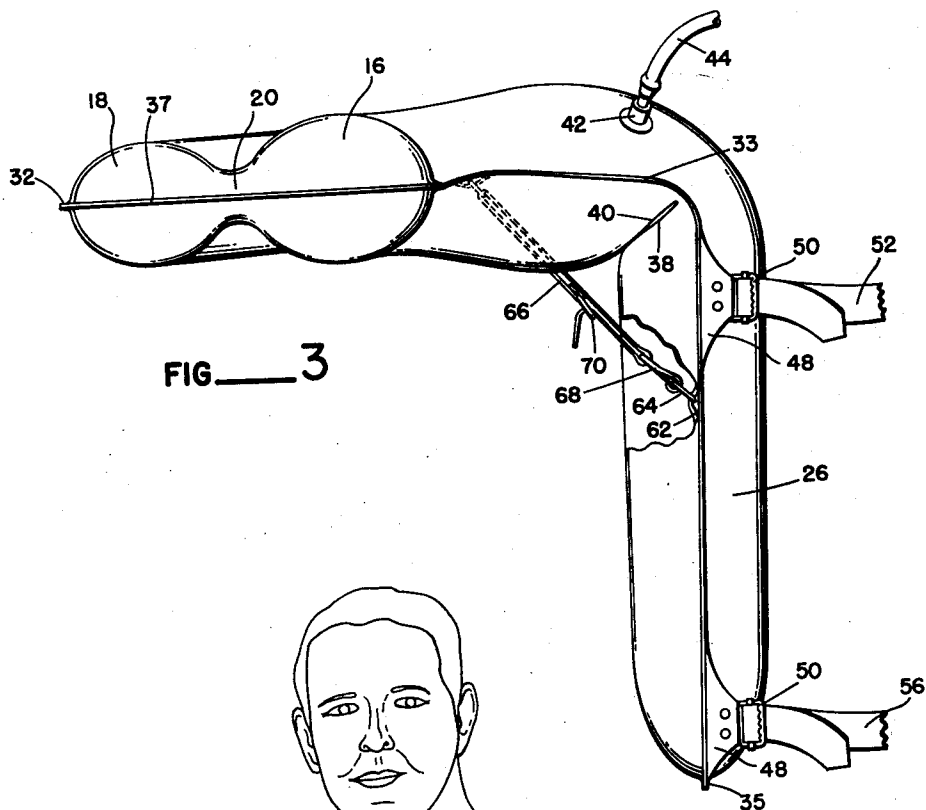


FIG. 3

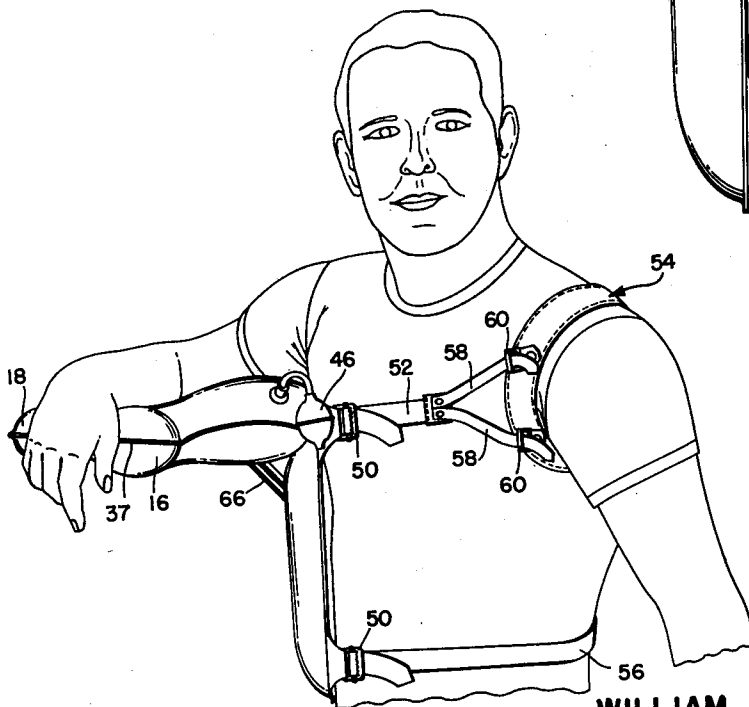


FIG. 4

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PNEUMATIC SPLINT

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This invention relates to a new and novel concept in a pneumatic surgical splint.

More particularly this invention relates to an inflatable abduction splint for immobilizing the arm of a patient in a near horizontal position.

It is necessary occasionally to maintain a patient's arm in a raised position for a period of time as treatment for nerve lesions, broken bones and other shoulder and arm ailments. Conventionally, arms are immobilized in such a manner by well-known airplane type splint or plaster casts. This type of cast encases the arm, shoulder and upper body and therefore is uncomfortable, both because of weight and bulkiness but also as a result of chafing and skin irritations under the cast. There are other mechanical abduction splints known which have not been accepted because of their complexity, cost, weight and general failure to remedy the aforementioned problems.

Accordingly, applicant has devised this pneumatic splint to overcome the inherent disadvantages of hitherto known splints. In effect, this invention is an L-shaped plastic body which is air tight and in which the sides are secured together approximately along a middle line taken through both legs of the L to form two chambers. Small passages are left at the end of each leg of the L to permit air to pass from one chamber to the other. Straps are provided to hold the splint to the upper body. The splint, when inflated, is bent or folded so that about half contacts the waist and rib cage and the other half extends outwardly to form a soft shelf upon which the arm may be placed, strapped and thus immobilized.

Accordingly it is an object of this invention to provide a pneumatic splint which is extremely light and soft and thus eliminates the chafing and skin irritations which are common to known splints.

Another object of this invention is to provide a pneumatic splint which is simple in design and economical to produce, and which because of its light weight eliminates the discomfort associated with bulky mechanical contrivances.

Still another object of this invention is to provide a pneumatic splint which forms a cushion-like support for an immobilized arm.

Yet another object of this invention is to supply a pneumatic abduction splint which is easily harnessed to and removed from the body and which, despite its plastic cushion construction, forms a firm, dependable support for an immobilized limb.

These together with other objects and advantages which will become subsequently apparent, reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout and in which:

FIGURE 1 is a plan view of this pneumatic splint showing its general contours and the manner in which the harness and straps are attached thereto;

FIGURE 2 is a cross-sectional view of this invention taken along the line 2-2 of FIG. 1;

FIGURE 3 is an elevational view of this device, showing it in its folded or arm supporting position; and

FIGURE 4 is a diagrammatic view showing the manner in which this pneumatic splint is worn by a patient.

Referring now to FIG. 1 it will be seen that the splint in its folded out position is L-shaped and generally desig-

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nated by the number 10. The splint comprises a main or body contacting portion 14 which is nearly twice as long as arm portion 12. The two portions of the L are joined by a curved section (not numbered).

The construction of this invention is in effect that of two sheets of flexible, nonstretchable material such as translucent plastic cut to the pattern shown in FIG. 1 and joined completely around the edges thereof to form a narrow flat margin. Such margin is comprised of inside edge margin 33, outside edge margin 32, body end margin 35, and arm end margin 37.

Along the length of each portion of the L and slightly off center towards the outer margin 32 extend divider margin 30 along the body portion 14 and divider margin 22 along the arm portion. It will be noted that divider margin 22 in arm portion 12 extends to within a short distance of end margin 37 thus leaving a restricted air passage 20. In the same way divider margin 30 in body portion 14 extends to within a short distance of end margin 35 defining a reduced air passage 28. The divider margins widen to present two enlarged divider areas 34 and 36. Divider area 34 is located at the junction of divider margins 22 and 30 approximately half way around the curved section of the L. Enlarged divider area 36 is located roughly one-half the distance from the curved section to the end of the body portion 14.

As thus generally described this pneumatic splint has two main chambers, one slightly larger than the other, made up of smaller body chamber portion 24 and arm chamber portion 26 and arm chamber portion 16. In this manner the two chambers form a generally V-shaped cavity in which the entire arm rests. Said main chambers, as mentioned above, are interconnected by the end air passages 20 and 28. The inside main chamber, i.e., the chamber on the inside angle of the L, is larger for a specific purpose. Reference here is being made to a transverse cross section as shown in FIG. 2.

It has been found that the inside chamber is the primary support chamber and for that reason its supporting ability is strengthened by being larger in overall dimensions. For instance, FIG. 3 shows that the main inner chamber is thicker through that area through which the bend or fold is made in the splint than in any other area. It seems apparent when the splint is folded that the crease or fold will present a surface or line 38 bearing against surface or line 40, both of which would be in the body portion 14 of the splint since the fold is made in said body portion just below the curved section.

The pneumatic splint may be inflated by any means available. However, in the preferred embodiment a small hand bulb 46 with a short length of hose 44 may be attached to the air inlet 42 which is located on the body portion near the curved section. The bulb, of course, is appropriately constructed to permit air to be pumped into the chambers by rapid squeezing. The bulb is also provided with means to allow air escape if it is desired to deflate the splint.

The body portion 14 of the splint is provided with four buckle tabs 48 which protrude as ears from the edge margins. Two are located at the corners and two are positioned higher up and just below where the fold is made. Each tab 48 is provided with a buckle 50. The two lower splint buckles clasp the waist belt 56 to the patient. The two upper splint buckles receive the shoulder belts 52. A ring shaped shoulder harness 54, which is generally frusto-conical in shape, has located thereon four small harness buckles 60. Said harness buckles 60 are spaced apart so that when the harness 54 is put on two of said harness buckles will be located in front and two in back. A separate shoulder belt 52 is provided for each of the upper splint buckles 50, with each of said

shoulder belts being too short to extend around the body. Each shoulder belt has attached thereto at one end thereof two smaller harness belts 58 which in turn are connected to the harness buckles 60. The arrangement of belts allows for distribution of force around the entire shoulder contacting area of the harness 54.

Each side of this pneumatic splint is provided in the divider areas 34 and 36 with a small clip 62, made of leather or other strong material, which holds a small metal ring 64. The clips are located so that two rivets extending through the divider areas will secure two clips, one to each side. The clips 62 and rings 64 permit a retaining belt 66 to be attached to said rings. When the splint is in its ready to wear position, as shown in FIGS. 3 and 4, it has a tendency to straighten itself out. In other words, the arm supporting portion tends to lift. Belt 66 by being attached to the clips underneath prevents the lift. The belt may be adjusted for length by buckle 70. Hooks 68 may be used at one or both ends to attach the belt to the rings 62. The clips 62 and rings 64 are provided on both sides to allow the splint to be used on either right or left arms.

It will be understood from the foregoing description that when the splint is inflated it gives the effect of two cushions lying side by side. When the splint is strapped on the patient the limb to be immobilized rests between the two chambers or cushions. There are no sharp edges or points or heavy elements connected with this splint which cause discomfort to any part of the body or limb which said splint contacts.

The foregoing is considered as illustrative only of the principle of this invention. Since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed is:

1. An inflatable surgical splint comprising: an L-shaped body substantially divided into a pair of generally L-shaped air-tight inflatable flexible nonstretchable chambers secured together and defining a generally V-shaped cavity therebetween; means for permitting air to pass between said chambers; means for inflating said chambers; and means for holding one portion of said splint and said V-shaped cavity at an angle with respect to the remaining portion of said splint and said V-shaped cavity. 40
2. An inflatable surgical splint for immobilizing the arm of a patient, comprising: an L-shaped body substantially divided into a pair of generally L-shaped air-tight inflatable flexible nonstretchable chambers joined together to form a cavity therebetween for receiving the patient's arm; means for permitting air to pass between said chambers; means for inflating said chambers; and means for holding one portion of said splint and said cavity at an angle with respect to the remaining portion of said splint and said cavity to form a shelf on which the patient's arm is supported. 50
3. An inflatable surgical splint for supporting a patient's arm, comprising: a generally L-shaped air-tight inflatable flexible nonstretchable body; divider means located between the side edges of said body to form two chambers within said body and defining a V-shaped cavity along the length of said body; means at each end of said body permitting the passage of air between said chambers; means for inflating said chambers; and means 65

for holding one portion of said splint and said V-shaped cavity at an angle with respect to the remaining portion of said splint and said V-shaped cavity to form a shelf on which the patient's arm is supported.

4. An inflatable surgical splint for supporting a patient's arm, comprising: a generally L-shaped air-tight inflatable body made of flexible, nonstretchable material; divider means located between the side edges of said body forming two chambers within said body, said chambers defining a generally V-shaped cavity along the length of said body, said divider means being spaced from the ends of said body to define air passages between said chambers; means for inflating said chambers; and means for holding one portion of said splint and said V-shaped cavity at an angle with respect to the remaining portion of said splint and said V-shaped cavity to form a shelf on which the patient's arm is supported. 10 15

5. An inflatable surgical splint for supporting a patient's arm, comprising: a generally L-shaped air-tight inflatable flexible nonstretchable body; divider means located between the side edges of said body to form two L-shaped chambers within said body and defining a V-shaped cavity between said chambers and along the length of said body, said divider means being spaced from the ends of said body to define air passages between said chambers; means for inflating said chambers; and means for holding one portion of said splint and said V-shaped cavity at an angle with respect to the remaining portion of said splint and said V-shaped cavity to form a shelf on which the patient's arm is supported. 20 25 30

6. An inflatable surgical splint for supporting a patient's arm, comprising: a generally L-shaped air-tight inflatable flexible nonstretchable body; divider means located between the side edges of said body to form two L-shaped chambers within said body and defining a V-shaped cavity between said chambers and along the length of said body, one of said chambers being larger in transverse cross section than the other of said chambers, said divider means being spaced from the ends of said body to define air passages between said chambers; means for inflating said chambers; and means for holding one portion of said splint and said V-shaped cavity at an angle with respect to the remaining portion of said splint and said V-shaped cavity to form a shelf on which the patient's arm is supported. 35 40 45

7. An inflatable surgical splint for supporting a patient's arm, comprising: a generally L-shaped air-tight inflatable flexible nonstretchable body; divider means located between the side edges of said body to form two L-shaped chambers within said body and also defining a V-shaped cavity between said chambers and along the length of said body, said divider means being closer to the outside edge of said body so that the inside chamber is of larger size in transverse cross section than the outside chamber, said divider means being spaced from the ends of said body to define air passages between said chambers; means for inflating said chambers; and means for holding one portion of said splint and said V-shaped cavity at an angle with respect to the remaining portion of said splint and said V-shaped cavity to form a shelf on which the patient's arm is supported. 50 55 60

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