

Jan. 5, 1965

E. D. VERE NICOLL

3,164,151

INFLATABLE SPLINT

Filed Dec. 14, 1962

Fig. 1.

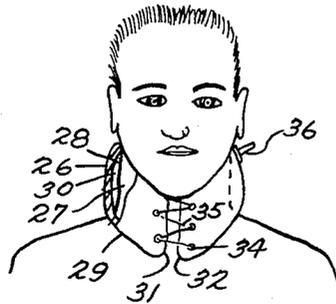


Fig. 2.

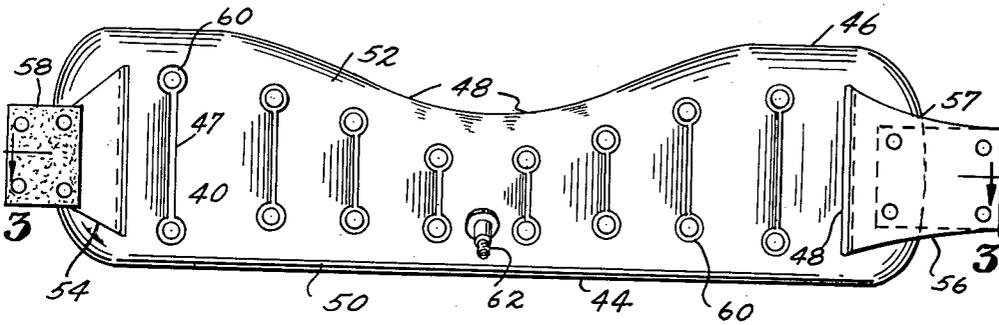


Fig. 3.

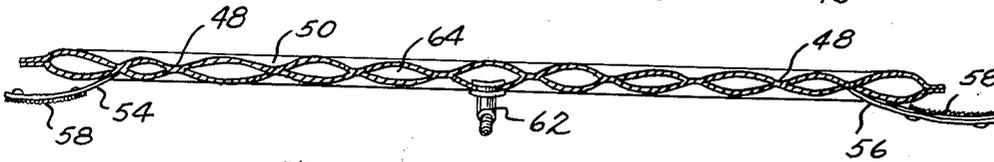
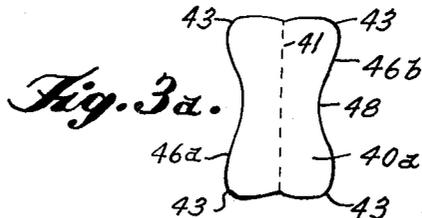
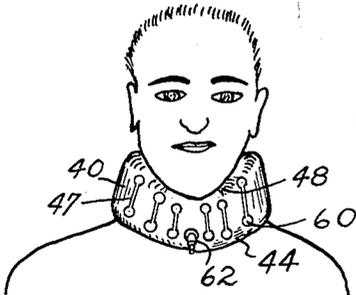


Fig. 4.



INVENTOR.

ESMOND D. VERE NICOLL

BY

Cushman, Darby & Cushman

ATTORNEYS

3,164,151

INFLATABLE SPLINT

Esmond D. Vere Nicoll, Whipperwill, R.F.D. 5,
Charlottesville, Va.

Filed Dec. 14, 1962, Ser. No. 244,678

2 Claims. (Cl. 128-75)

This invention relates to an inflatable splint and, more particularly, is directed to an inflatable surgical collar or neck brace which may be rolled into a small, compact size when not in use and which may be quickly unrolled and inflated to provide therapeutic support for a person having an injured neck.

The present application is a continuation-in-part of the copending application Serial Number 788,238, now abandoned, and entitled Inflatable Splint, which was filed on January 21, 1959.

At present the collars used in the treatment of an injured neck are generally large and bulky and are formed of metal, wood and plaster members. This makes them unsuited for packaging in small kits, and they are heavy and uncomfortable to wear and require special fitting techniques. Even the inflatable types heretofore known require some form of rigid structure to provide the required support which increases its packaged size and has other disadvantages.

An object of this invention is to provide an inflatable collar that can be rolled into a small size in its unused state and then can be readily inflated for use and which provides comfortable, light-weight, and effective neck and head support.

Another object of the invention is to provide an inflatable surgical collar or neck brace that can be easily positioned and secured on an injured person and so formed as to have, when inflated, a plurality of vertically oriented tubular columns of air in communication with each other and which when worn provides adequate support to an injured neck and the head of a person wearing the same without any additional rigid or stiffening members and with maximum of comfort to the wearer.

A further object of the invention is to provide an inflatable collar or neck brace which is inexpensive to manufacture and which may be packaged in a small, inexpensive kit.

Further objects and the entire scope of the invention will become more fully apparent when considered in light of the following detailed description of illustrative embodiments of this invention and from the appended claims.

The illustrative embodiments may be best understood by reference to the accompanying drawings, wherein:

FIGURE 1 is an illustration of one embodiment of the invention in its application as a support for the head of a person with an injured neck.

FIGURE 2 is a side elevation view of a preferred embodiment of the improved inflatable collar or neck brace.

FIGURE 3 is a sectional view along lines 3-3 of FIGURE 2.

FIGURE 3a is a view of the blank of flexible material from which the collar of FIGURE 2 is made.

FIGURE 4 is an illustration of the preferred embodiment of FIGURE 2 in its application as a collar or neck brace.

Briefly, the invention comprises an inflatable collar or neck brace fabricated with a plurality of open ended cells so as to provide, when inflated, a plurality of vertically arranged tubular air columns, the internal pressure of these columns of air supporting both laterally and vertically the neck and head of the wearer when the inflated collar is secured about said neck.

In FIGURE 1 a preliminary embodiment of the invention is shown. The outer wall 26 and the inner wall

27 of the collar are formed from a single piece of plastic material. The walls are welded together at a point at the rear of the collar (not shown). The top and bottom panels 28 and 29 are generally U-shaped and are welded to the upper and lower edges of the outer and inner walls 26 and 27 to form an air-tight space 30. The ends 31 and 32 of the collar are provided with hook fasteners 34 and the collar is fastened around the neck by the lace 35. The collar may be inflated through the valve 36. The pressure of the collar may be adjusted by varying the gas pressure or the lacing. The collar may also be provided in a fluted form by welding the outer wall 26 along spaced lateral strips. This gives additional rigidity to the collar.

The preferred form of the invention utilizes a fluted structure for the neck brace or collar.

This preferred embodiment of the invention is more fully described and illustrated in FIGURES 2-4. The collar of this embodiment is formed from a sheet of a flexible, air-impermeable material 40, preferably a flexible plastic sheet, which is cut to provide a substantially symmetrical blank 40a, as shown in FIGURE 3a. The lower edge 44 (FIGURE 2) along the axis of symmetry is straight as it is formed by folding the sheet 40a along the axis of symmetry 41 seen in FIGURE 3a. The upper edge 46 of the collar is formed by heat sealing together edges 46a and 46b of blank 40a, forming a depression at the region 43 adapted to receive and support the chin of the wearer. The blank 40a has rounded corners 43 so that when folded along its axis of symmetry 41, the said sheet 40 is free from angular points which could cause discomfort to the wearer. The dimensions of the depressions 43, as well as the width and length of the blank 40a, may be selected to provide collars to properly fit users in all sizes.

After folding, edges 46a and 46b only are first heat sealed forming seam 45. Preferably the sealed, lapped material of the seam is on the inside of the tube to avoid possible abrasive irritation to the wearer. This may be accomplished by special heat sealing techniques or by the method of first sealing on the outside and then resulting tubular structure may be turned inside-out to direct the seam interiorly of the tube.

The ends 57 of the collar are finally heat sealed to form an enclosed inflatable chamber. At spaced intervals along the collar, the symmetrical portions of sheet 40 are heat sealed together along strips 47 extending transversely of the length of the collar thereby dividing the interior of the collar into a number of sections or cells 64. The lengths of these transverse heat seals 47 may vary, each seal preferably ending at points substantially equidistant from edges 44 and 46. This allows communication between the sections or cells within the collar through channels 50 and 52. To provide means for securing the collar to the user, tabs 54 and 56 of flexible material are heat sealed to the heat sealed strips 47 at opposite ends of the collar. To tabs 54 and 56 are connected, respectively, cooperating strips 58 of woven material of the type known as "Velcro" and described in United States Patent No. 2,717,437. This material functions to securely hold the collar in place when the opposed strips 58 are pressed together.

A further provision of this embodiment is a plurality of vents 60 to allow air to reach the neck of the injured party. These vents are provided by heat sealing the symmetrical portions of sheet 40 together over circular areas at each end of sealed strips 47 intermediate the strips to which tabs 54 and 56 are attached to the collar. Portions of these circular areas are cut away to provide vents 60 while maintaining the collar air tight.

At any convenient time during the manufacture of the collar, a suitable slip valve 62 may be attached to

the sheet 40 intermediate centrally located sealed strips 47. This valve may be used to inflate and deflate the collar.

When the collar is inflated, it assumes a configuration which can most clearly be seen with reference to FIGURES 3 and 4. By means of channels 50 and 52, the air is evenly and balancedly distributed to the sections or cells 64 defined by sealed strips 47. The inflation of the chamber produces a plurality of parallel spaced air columns within the cells 64. When the collar is attached about the neck of the injured party, as shown in FIGURE 4, these air columns provide a cushioned, but firm vertical support for the head and a lateral support for the neck. The depression 48, receiving the chin of the wearer, further tends to prevent and restrain rotational movement of the head.

It is thus seen from the foregoing description that a supporting neck brace or collar may be formed that is easily rolled or folded into a small, compact package for storage. As a collar or neck brace it provides the necessary support for the head and neck, and the inflated walls with air columns therein provide the necessary padding for the comfort of the injured person. The pneumatic pressure provides sufficient rigidity with additional support being provided by the fluted form of the collar which establishes air columns when the collar is inflated.

The collar designs disclosed herein are examples of arrangements in which the inventive features of the disclosure may be utilized, and it will become apparent to one skilled in the art that certain modifications, such as a textile cloth covering for the collar, adding to its comfort, may be made within the spirit of the invention as defined by the appended claims.

What is claimed is:

1. An inflatable collar or brace for supporting the neck and head of the wearer, comprising a sheet of flexible air-impermeable plastic material, said sheet being generally symmetrical about an axis of symmetry extending longitudinally of its length and having curved side edges with a width in its middle region less than the width of its end regions, and folded along said axis of symmetry to form a folded straight side edge; means sealing together adjacent edges of said folded sheet along the ends the curved side thereof so as to form an elongated enclosed chamber having a folded straight side edge, a curved sealed side edge, two sealed end edges and two opposing side walls having a central region narrower than the end regions; means further sealing together the said opposing side walls of said chamber at a plurality of spaced strips, said strips extending generally

transversely to the length of said chamber and intermediate the ends thereof and of a length less than the width of said chamber at the location of said strip; adjacent pairs of said strips forming with the portions of the opposing said side walls located therebetween an inflatable cell; said strips further providing means for curving said chamber when inflated; generally enclosed tubular channels being also formed extending interiorly longitudinally of said chamber, from one of said end edges to the other of said end edges, one of said tubular channels extending along said folded side edge, and the other of said tubular channels extending along said sealed side edge, each of said channels being in open communication with each of said cells; means permitting inflation of said chamber to inflate said cells and said channels whereby a plurality of substantially parallel generally vertical air columns extending transversely of the length of said chamber are formed, said air columns terminating at their ends in the inflated channels extending along the edges of said chamber, resistance to compression of said inflated air columns providing vertical support to the head of the wearer and at the same time providing gentle lateral support to the neck of the wearer, through the resting of said inflated channels against the shoulder and head of the wearer, and said central narrower region of said chamber supporting and partially surrounding the chin of the wearer to restrict rotational movement of the same; and fastening means for connecting and disconnecting the ends of said chamber to each other and to secure said collar about the neck of the wearer.

2. The inflatable collar or brace of claim 1 wherein the needs of said spaced strips are substantially equidistant from the side edges of said chamber, and terminate in a centrally apertured sealed area of said side walls, where by ventilation is provided to the neck of the wearer when the neck brace is worn.

References Cited in the file of this patent

UNITED STATES PATENTS

1,964,962	Rosenblum	July 3, 1934
2,651,392	Berry	Sept. 8, 1953
2,802,630	Moore	Aug. 6, 1957
2,806,471	Breese	Sept. 17, 1957
3,070,090	Taylor	Dec. 25, 1962

OTHER REFERENCES

Braces Today, Sept. 1956.

"Variety of Therapeutic Applications Characterize Slip-on Cervical Collar," by Otto Eisert and Dominic Marinello, copyright 1956, 1 page.