

[54] ELBOW SLEEVE

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[58] Field of Search..... 128/77, 80, 165; 2/22

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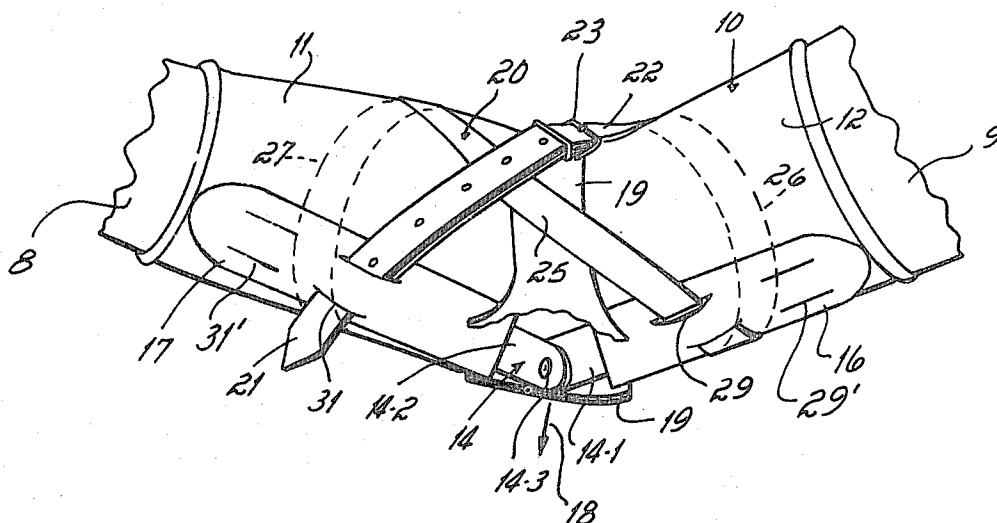
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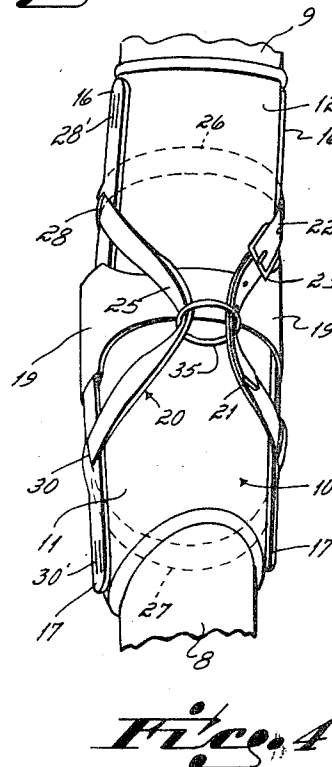
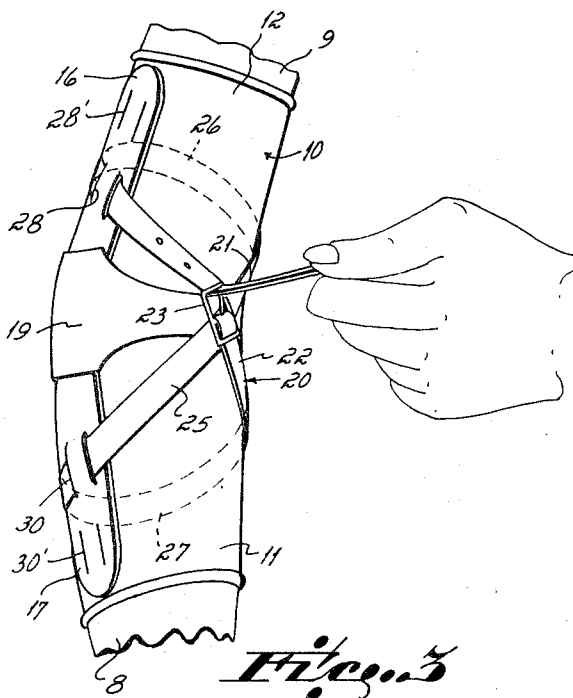
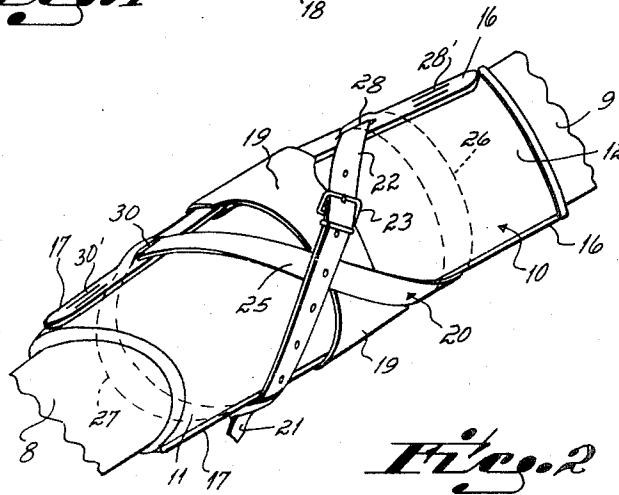
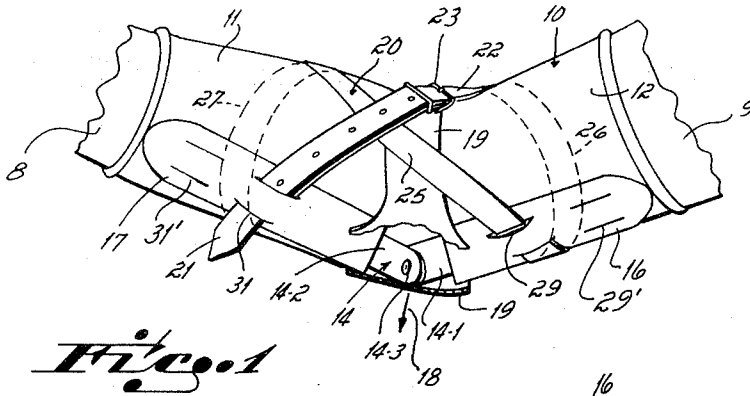
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[57] ABSTRACT

A surgical device including a tubular, elastic sleeve configured to snugly embrace the elbow region of the wearer and a portion of the forearm and upper arm extending therefrom, a pair of hinges secured to opposite sides of the sleeve with the hinge pins of each lying along an imaginary line defining the bending axis of the elbow, a first strap lying exteriorly of the sleeve along the elbow crease and secured at its opposite ends to the hinges for restricting the pinned portions of the hinges from moving rearwardly away from the elbow crease when the elbow is bent, and a second strap encircling the upper and lower portions of the sleeve above and below the elbow which is configured in the form of a "figure-8" to facilitate, with the wearer's other hand, adjustably restricting the elbow against straightening motion beyond a selectively variable bent position.

3 Claims, 4 Drawing Figures





ELBOW SLEEVE

This invention relates to elbow sleeves, and more particularly to an improved elbow sleeve of the hinged type having means to restrict the elbow against straightening motion beyond a preselected adjustably variable bent position.

Elbow sleeves have heretofore been used for alleviating a condition known as "tennis elbow" in which the elbow joint becomes sore due to inflammation occasioned by repeated impact transmitted to the elbow joint. This condition is prevalent among participants of tennis, carpenters, and the like where the elbow is subject to repeated shock. In severe cases of tennis elbow, it is desirable to positively limit bending of the elbow to movement only along the natural bending axis of the elbow joint, and for this purpose elbow sleeves are often provided with hinges secured to the elbow sleeve on the opposite sides thereof.

One of the difficulties with hinged elbow sleeves is that as the arm is bent through varying angles, the hinges tend to move relative to the sleeve such that the hinge pins no longer lie along the natural bending axis of the elbow. This not only gives rise to discomfort, but degrades the utility of the restrictive support provided by the hinges.

Under certain conditions of elbow sleeve use, it is desirable to positively restrict the elbow against straightening motion beyond a given bent position. Advantageously, the means provided to facilitate restricting the elbow should be capable of adjustment single-handedly by the wearer. Since a wearer is unable to manipulate the sleeve restricting means with the hand of the arm about which elbow the sleeve is placed, e.g., the right hand, due to the inability of reaching it with such hand, the restricting means, if to be adjusted by the wearer alone when in place on the elbow, must be such that it can be adjusted with one hand, in this case, his left hand.

It has been an object of this invention to provide a hinged elbow sleeve of the positional restricting type which maintains the hinge pins in position along the natural bending axis of the elbow as the elbow is bent through different angular positions, and which permits the wearer to adjustably restrict the elbow against motion beyond a preselected limit without assistance when the sleeve is in place on his elbow.

This objective has been accomplished in accordance with the principles of this invention by providing an elbow sleeve of the type having hinges on opposite sides thereof with the combination of a first strap located along the elbow crease which is secured at its opposite ends to the pinned sections of the hinges to effectively maintain the hinge pins along the desired natural bending axis of the elbow irrespective of the degree to which the elbow is bent, and a second strap encircling the upper and lower portions of the sleeve above and below the elbow which is configured in the form of a "figure-8" and which, when a buckle is provided in the general area of the elbow crease, permits the wearer to single-handedly adjust and restrict the elbow against straightening beyond a desired angular position.

These and other advantages and objectives of the invention will become more readily apparent from a detailed description of the invention in which:

FIG. 1 is a side perspective view of the sleeve of this invention;

FIG. 2 is a front perspective view of the sleeve of this invention;

FIG. 3 is a side perspective view of the sleeve of this invention showing the manner in which the angular position is adjusted with one hand, and

FIG. 4 is a front perspective view of a modified form of this invention showing an alternate form of "figure-8" adjusting strap.

With reference to FIGS. 1, 2, and 3, the preferred embodiment of this invention is seen to include an elongated, tubular elastic sleeve 10. The length of the sleeve 10 is selected such that the lower and upper portions 11 and 12 thereof cover portions of the forearm 8 and the upper arm 9 extending from the wearer's elbow. The diameter of the sleeve 10 is selected such that the sleeve snugly embraces the wearer's elbow and adjacent portions of the forearm 8 and upper arm 9 when positioned in place about the user's elbow. Preferably, the elastic sleeve 10 is fabricated of one-way stretch material, namely, stretchable in a circumferential direction, although it may be fabricated of two-way stretch material if desired so as to also stretch in a longitudinal direction.

The sleeve 10 is provided with a pair of identical hinges located on opposite sides of the sleeve, only one hinge 14 of which is shown. The hinge 14 includes upper and lower elongated bars 14-1 and 14-2, preferably fabricated of rigid material such as metal, which are connected for pivotal motion by a pin 14-3. Elongated hinge members 14-1 and 14-2 are secured in place by upper and lower sheaths 16 and 17 sewn to the exterior of the sleeve 10 at positions surrounding the upper arm 9 and forearm 8, and are disposed in a direction generally parallel to the longitudinal axis of the sleeve.

To insure that the pivot pins 14-3 of the hinges, which are located on opposite sides of the sleeve 10, remain disposed along an imaginary line coincident with the normal bending axis of the elbow as the elbow is bent through varying angular position, a hinge-retaining strap 19 is provided. The strap 19, which preferably is inelastic, is located exteriorly of the sleeve 10 overlying the elbow crease. The retaining strap 19 terminates at its opposite ends in loops which surround their respectively associated elongated hinge members 14-1 and 14-2 in a region of the pin 14-3. The length of the retaining strap 19 measured in a direction parallel to the elbow crease is selected such that the hinge pins 14-3 of the hinges 14 located on opposite sides of the elbow sleeve 10 are restrained against movement off the imaginary line defining the bending axis of the elbow. As the elbow bends, there is a tendency for the pivot pins 14-3 of the hinges 14 to move rearwardly, that is, away from the elbow crease in the direction of arrow 18. The restraining strap 19, the ends of which encircle the pinned portion of the hinges 14, restrains the pinned portion of the hinges against such undesirable rearward motion off the elbow bending axis. Stated differently, the restraining strap 19 insures that, as the elbow bends, the pivot pins 14-3 of the hinges remain coincident with the imaginary line defining the normal bending axis of the elbow.

The surgical device of this invention also includes a restricting strap 20 in the form of a single, elongated, inelastic strap having opposite ends 21 and 22 which are adapted to be adjustably secured to each other by

a suitable buckle fastener 23. The strap 20 has an intermediate section 25 which overlies the elbow crease in an angled disposition with respect to engaged strap ends 21 and 22. The strap 20 also includes an upper rear section 26 disposed to slidably engage the rear of the upper arm 9. Rear strap section 26 connects to strap end 21 and to the upper end of intermediate strap section 25. Strap 20 also includes a lower rear section 27 which slidably encircles the rear of the forearm 8, connecting the strap end 22 and the lower end of the intermediate strap section 25. The upper portions of strap sections 21 and 25 slidably engage slotted loops 28 and 29 formed in opposite sides of the upper sheaths 16, while the lower ends of strap sections 25 and 22 slidably engage slotted loops 30 and 31 formed in opposite sides of lower sheaths 17. Loops 28, 29, 30 and 31 maintain the various sections of the strap 20 with which they are engaged in the desired longitudinal position with respect to the longitudinal sleeve axis. Alternatively, and to enhance the restricting action of strap 20, the strap may be threaded through the set of loops 28', 29', 30' and 31'. Strap section 26, the upper portion of strap 25, and the inner portion of strap 21 effectively form a first, upper loop encircling the upper arm 9 while strap sections 27 and 22 and the lower portion of strap 25 effectively form a second, lower loop encircling the forearm 8. Between these two loops, the strap 20 is criss-crossed to form a necked region.

In operation, the sleeve 10 is positioned to encircle the wearer's elbow with the hinges 14 adjacent the inner and outer portion thereof and the retaining strap 19 overlying the elbow crease such that the hinge pivot pins 14-3 are disposed along an imaginary line coincident with the normal bending axis of the elbow. The elbow is then bent to the desired angle and the strap ends 21 and 22 secured with respect to each other by the buckle 23 such that the strap 20 is maintained in a taut position. With the strap so secured, the elbow is effectively restricted against straightening motion beyond the angular position it occupies when the strap 20 is secured. The degree of angulation, beyond which the elbow cannot bend in a direction to straighten it, when the strap 20 is secured is correlated to the effective length of the strap 20, i.e., the strap length between buckle 23 and the point on section 21 wherein it engages the buckle, with the angulation decreasing as this effective length decreases and vice versa.

In accordance with an alternative form of the invention depicted in FIG. 4, the figure-8 configuration for

the strap 20, and in particular the necked portion between the upper and lower loop sections 26 and 27, is obtained without criss-crossing the intermediate strap section 25 and the buckled strap end sections 21 and 22. Instead, intermediate strap section 25 and buckled strap end sections 21 and 22 are passed through a ring 35 with respect to which they slidably engage. The ring 35 permits the strap 20 to be effectively necked to form a "figure-8" without actually criss-crossing the intermediate strap section 25 and the buckled strap end sections 21 and 22.

What is claimed is:

1. A surgical device comprising:

a tubular elastic sleeve configured to snugly embrace the joint region of a wearer's limb and adjacent sections of the upper limb and lower limb extending therefrom, said sleeve having a region thereof adapted to be creased when the limb is bent at the joint,

a pair of hinges secured to opposite sides of said sleeve, each hinge pivoting at a point along an imaginary line coincident with the bending axis of the joint,

A first strap disposed exteriorly of said sleeve overlying said crease, said first strap being connected at spaced points to said hinges adjacent said hinge pivoting points to restrict said hinge pivoting points from moving away from said crease to a position off said imaginary line, and

a second unitary strap configured in the general form of a figure-8 and having upper and lower loop-shaped sections slidably encircling said sleeve upper limb and lower limb sections adjacent said joint, respectively, and a single necked section between said upper and lower loop-shaped sections and overlying said crease outwardly of said first strap and unrestrained by said sleeve at said crease, to facilitate adjustably restricting the limb against further straightening in selectively variable angular positions with the degree of angulation correlated to the effective length of said second strap.

2. The device of claim 1 wherein said strap in the region of said joint crease is criss-crossed to form said necked section.

3. The device of claim 1 further including a ring slidably engaging two adjacent, non-crossing sections of said strap overlying said joint crease to effectively form said necked section without criss-crossing said strap.

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