# United States Patent

[11] 3,595,225


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[45] Patented **July 27, 1971**


[54] **SUPPORT MEANS APPLICABLE TO THE HANDS OF SUFFERERS FROM ARTHRITIS AND THE LIKE**
**7 Claims, 8 Drawing Figs.**


[52] **U.S. Cl.** ..... **128/77,** 128/89
[51] **Int. Cl.** ..... **A61f 5/10**
[50] **Field of Search** ..... 128/77, 87, 80, 157, 81, 153, 78, 26



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|---|---|---|---|
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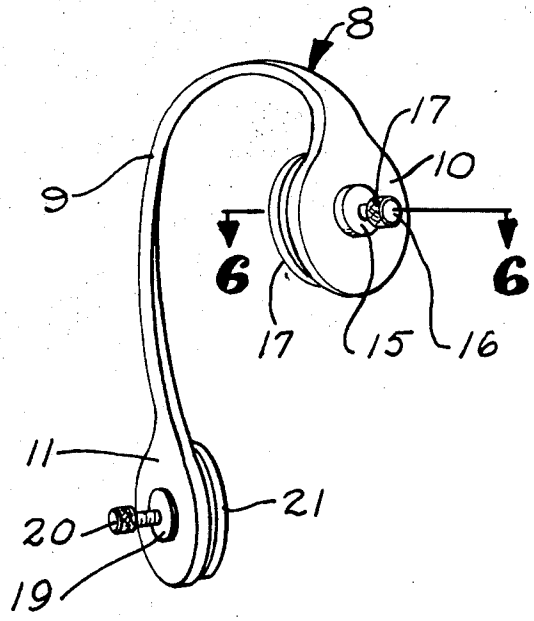
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*Attorney*—Melville, Strasser, Foster & Hoffman



**ABSTRACT:** Support or brace means applicable to portions of a human hand and comprising a twisted, substantially U-shaped, resilient body portion terminating in pressure applying end portions. The end portions apply pressure in substantially opposite directions. The supports of the present invention may be applied to the hand so as to apply substantially oppositely directed pressures to the distal and proximal metacarpal joints of the thumb or first digit, and they may be applied to any of the four remaining digits to exert opposite pressures to adjacent digital bones or phalanges to correct misalignment brought about by arthritis and the like, and to relieve the attendant pain.

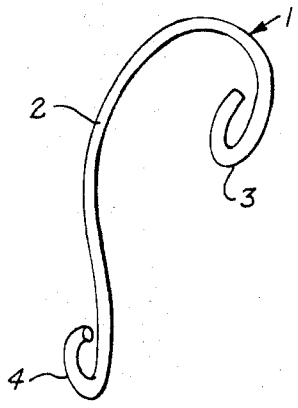



FIG. 1

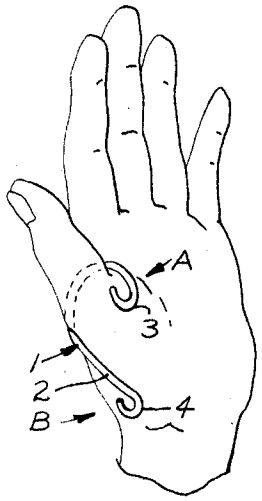



FIG. 2

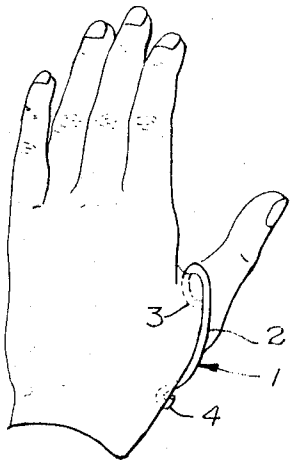



FIG. 3

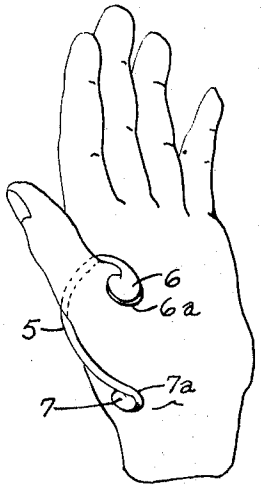



FIG. 4

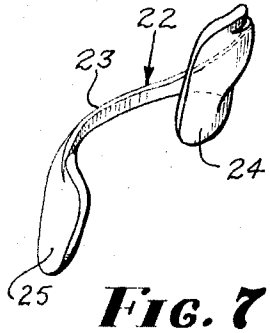



FIG. 7

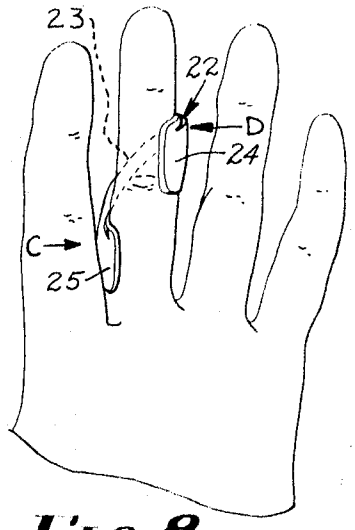



FIG. 8

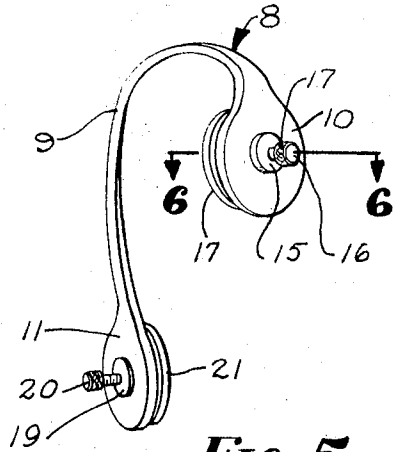



FIG. 5

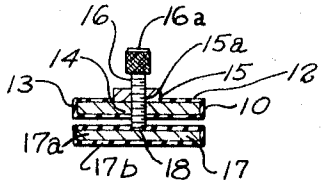



FIG. 6

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# SUPPORT MEANS APPLICABLE TO THE HANDS OF SUFFERERS FROM ARTHRITIS AND THE LIKE

## BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to support or brace means, and more particularly to support or brace means capable of applying substantially oppositely directed pressures to the distal and proximal metacarpal joints of the thumb or to adjacent phalanges of the digits so as to alleviate misalignment and pain brought about by arthritis or the like.

2. Description of the Prior Art

It has long been recognized that certain nonmalignant processes, such as arthritis and the like, cause unnatural pull on the tendons of the hand and result in painful joints, deformity and sometimes in the ultimate partial or total loss of use of the hand.

For example, in the early process of arthritis, a great deal of pain may be experienced due to the fact that a phalanx is pulled out of normal position in relation to another phalanx or the metacarpal bone causing the joint therebetween and/or the metacarpal-carpal joint to move out of normal position. In another example, the digital bones or phalanges of an individual digit may become displaced with respect to each other as a result of unnatural pull on or displacement of the tendons, resulting in a misalignment or distortion of the digit.

Heretofore, brace or support means have been used in association with the human hand to retard, for example, ulnar deviation deformity in the digital structure, characteristic of an arthritic hand. Such a device is taught, for example, in U.S. Letters Pat. No. 3,299,887. Such devices, however, involve the entire hand and depend upon the cooperation of some or all of the digits.

The present invention is directed to brace or support means which may under the direction of a physician be applied to the hand to relieve pain and retard displacement of an individual joint or joints; which do not involve the whole hand; and which do not rely for their effectiveness on the cooperation of two or more of the digits. A hand to which a support of the present invention is applied may still retain considerable mobility and usefulness. In addition, the support means of the present invention are simple in structure and are easily and inexpensively manufactured.

## SUMMARY OF THE INVENTION

The support means of the present invention comprise twisted, substantially U-shaped body portions terminating in end portions configured to apply pressure in substantially opposite directions. The support means may be made of any suitable material such as metal, plastic or the like. When desired, they may be provided with an exterior coating or covering of plastic, fabric or other material suitable for contact with the skin without irritation.

In one embodiment, the twisted, substantially U-shaped body of the support is configured to partially extend about the fleshy part of the hand surrounding the metacarpal bone of the thumb, with its ends so configured and positioned as to apply appropriately directed pressure to the proximal metacarpal joint and distal metacarpal joint of the thumb. In another embodiment, the brace or support has a twisted, substantially U-shaped body portion adapted to partially extend about a digit, with its end portions positioned and configured to apply substantially oppositely directed pressures against the distal end of one phalanx and the proximal end of an adjacent phalanx so as to retard misalignment thereof and to relieve pain in the joint therebetween.

In both embodiments described above, the pressure-applying ends of the support or brace may be provided with adjustable means so that the amount of pressure applied by the ends may be individually adjusted, as desired.



## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of one embodiment of the brace or support means of the present invention.

FIGS. 2 and 3 are, respectively, front and rear perspective views of a left hand illustrating the application of the support of FIG. 1 thereto.

FIG. 4 is a perspective view, similar to FIG. 2, and illustrates a modified form of the support.

FIG. 5 is a perspective view of another embodiment of a support of the present invention illustrating adjustable means at the ends of the support.

FIG. 6 is a cross-sectional view taken along the section line 6–6 of FIG. 5.

FIG. 7 is a perspective view illustrating yet another embodiment of the support of the present invention.

FIG. 8 is a fragmentary perspective view illustrating the support of FIG. 7 as applied to a finger of a left hand.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1 through 3 illustrate an embodiment of the brace or support of the present invention in its simplest form. The support, generally indicated at 1, may be made of any suitable material including metal, plastic or the like. The material from which the support is made should be characterized by sufficient stiffness to maintain its shape and to be capable of applying pressure at its ends. In addition, while it is not necessary, it is preferred that the material from which the support is made is possessed of some resilience, not only to aid in its proper application to the hand, but also to assist it in its application of pressure to the hand (as will be described hereinafter).

For purposes of exemplary showing, the brace 1 is illustrated as made of metallic rod stock or heavy gauge wire. It comprises a body portion 2 terminating in ends 3 and 4, having a looplike configuration.

As indicated above, an arthritic condition in the hand often manifests itself first by pain in the proximal metacarpal joint of the thumb. This is often shortly thereafter accompanied by pain in the distal metacarpal joint. Unnatural pull on the tendons, caused by the disease, often results in a shifting of the distal metacarpal joint inwardly toward the palm in a medial direction. When pressure is applied to the proximal metacarpal joint inwardly and substantially toward the palm of the hand or in a medial direction, while pressure is simultaneously applied to the distal metacarpal joint in an outward or lateral direction, substantially away from the palm of the hand, these joints are returned to a more normal position and pain is greatly relieved.

The support of FIG. 1 is adapted to apply pressure to the distal and proximal metacarpal joints, in the manner described above, to shift them to their more normal position and to relieve pain. As will be understood by one skilled in the art, the pressures applied to the distal and proximal metacarpal joints are not necessarily precisely opposite in direction, but are substantially opposite and will be so described hereinafter.

As shown in FIGS. 2 and 3, the substantially U-shaped body portion of the support 1 is adapted to pass about the base of the thumb and to extend downwardly therefrom. The looplike end 3 of the support will lie flat against the hand and will apply an outward pressure against the distal metacarpal joint (in a substantially lateral direction indicated by arrow A in FIG. 2). The looplike end 4 will lie flat against the hand and will press inwardly on the proximal metacarpal joint (in a substantially medial direction indicated by arrow B in FIG. 2).

In this way, the support will maintain the aforementioned joints in their normal or near normal positions firmly but comfortably. It will be noted that the fingers of the hand are free to be used, and limited use may be made even of the thumb. The brace of the present invention has a tendency, by virtue of its configuration, to maintain its proper position on the hand without further aid. However, when a person intends to be active, it is within the scope of the invention to additionally

maintain the brace in position by adhesive tape, or other suitable means (not shown).

FIG. 4 illustrates an embodiment of the invention similar to that of FIG. 1. In this instance, however, instead of being made of rod stock or heavy gauge wire, the support is formed or molded of metal, plastic or the like. The body portion 5 is similar to the body portion 2 in FIG. 1, but may have any desired cross-sectional configuration such as rectangular or the like. The end 6 is similar to the end 3 in FIG. 1, but instead of being looped, it presents a flat continuous contact surface, indicated at 6*a*. Similarly, the end 7 is comparable to the end 4 in FIG. 1, but presents a flat bearing surface 7*a*. The function and operation of the embodiment illustrated in FIG. 4 is substantially identical to that described with respect to the embodiment of FIGS. 2 and 3.

FIGS. 5 and 6 illustrate yet another embodiment of the support of the present invention.

As shown in FIG. 5, the support (generally indicated at 8) comprises a substantially U-shaped body portion 9 terminating in flat end portions 10 and 11. For purposes of an exemplary showing, and as is most clearly indicated in FIG. 6, the support is illustrated as being made of metal (as at 12) covered with a plastic coating 13. It will be understood by one skilled in the art that the coating 13 could be fabric, rubber or any other suitable material capable of prolonged contact with the skin without causing irritation.

Referring again to FIGS. 5 and 6, the end 10 of the support has a threaded perforation 14 extending therethrough. An additional element 15 may be permanently affixed to the end 10. The element 15 has a threaded perforation 15*a*, coaxial with the perforation 14. The purpose of the element 15 is to increase the number of threads present. A threaded screw 16 is engaged in the perforations 14 and 15*a*. One end of the screw 16 may have a knurled head 16*a*, or the like, so that the screw may be readily turned by hand. The other end of the screw is affixed in any suitable manner to a pressure plate 17. For purposes of an exemplary showing, the plate 17 is illustrated as being made of metal (as at 17*a*) surrounded by a plastic coating 17*b*.

The manner in which the plate 17 is affixed to the end of the screw 16 does not constitute a limitation on the present invention. The plate may be rotatively or nonrotatively affixed to the screw. Alternatively, the screw 16 may be partially threaded into the plate 17 or may be affixed thereto by gluing, welding or the like (as at 18). It will be noted, however, that rotation of the screw will move the plate 17 toward or away from the end 10, depending upon the direction in which the screw 16 is turned.

The other end of the support 8 is similarly provided with a reinforcing element 19, an adjustment screw 20 and a plate 21.

The embodiment of FIGS. 5 and 6 is adapted to be used in precisely the same way as described with respect to the embodiments of FIGS. 2, 3 and 4. In this instance, however, the amount of pressure applied to the distal metacarpal joint by the plate 17 and the amount of pressure applied to the proximal metacarpal joint by the plate 21 may be adjusted through the use of screws 16 and 20, respectively. These screws may be provided with lock washers (not shown), if desired.

FIGS. 7 and 8 illustrate another embodiment of the present invention, generally indicated at 22. As in the case of the previously described embodiments, the support of FIGS. 7 and 8 has a twisted, substantially U-shaped body 23 terminating in pressure applying ends 24 and 25. Again the support of FIGS. 7 and 8 may be formed or molded of metal, plastic, hard rubber or the like.

The body portion 23 of the support 22 is so shaped as to wrap partially around a digit, with the ends 24 and 25 lying on either side of the digit and above and below the joint between adjacent digital bones or phalanges. The purpose of the support 22 is to alleviate the condition described above wherein adjacent digital bones are shifted out of alignment by an arthritic condition. As will be evident from FIG. 8, the support will tend to return the digital bones to their proper alignment and will reduce the pain attendant to this condition. Again, while the support 22 will tend to hold itself in proper position, it may be additionally held by adhesive tape or the like (not shown).

Modifications may be made in the present invention without departing from the spirit of it. For example, any of the embodiments described may have an exterior coating of plastic, rubber fabric or the like, as described with respect to FIG. 6. In addition, the support 22 of FIGS. 7 and 8 may be provided with ends having adjustable plates similar to the plates 17 and 21 described with respect to FIGS. 5 and 6.

While all of the embodiments are illustrated as being applied to a left hand, the embodiments of FIGS. 1 through 6, for example, may be made in mirror image, so as to be applicable to a right hand. The embodiment of FIG. 8 may be similarly applied to a right hand by simply inverting it. Furthermore, it is within the scope of the invention to make any of the embodiments in various sizes.

When the support 22 is positioned as shown in FIG. 8 the lower digital bone will be urged in a medial direction (indicated by arrow C) by the end 25 while the upper digital bone will be urged in a lateral direction (indicated by the arrow D) by the end 24. These directions can be reversed simply by rotating the support 180° about the finger. In fact, the support 22 may be located in any orientation and rotative position on the finger so as to apply pressures in the proper directions.

In all instances, the braces or supports of the present invention should be used at the direction and under the supervision of a physician.

I claim:

1. A support means applicable to a portion of the human hand to alleviate misalignment and pain brought about by arthritis and the like, said support means comprising a twisted, substantially U-shaped body, one leg of said U-shaped body being short and terminating in an upper end, the other leg of said U-shaped body being elongated and terminating in a lower end below said upper end, a pressure-applying bearing surface at each of said ends, said body of said support being adapted to extend partially about and engage the fleshy part of the hand surrounding the metacarpal bone of the thumb, said short leg being of such length as to position said bearing surface at said upper end of said support means at the distal metacarpal joint of the thumb, said elongated leg being of such length as to position said bearing surface at said lower end of said support means at the proximal metacarpal joint of the thumb, the axis of said bearing surface at said upper end of said support means lying in a plane substantially normal to the axis of said bearing surface at said lower end of said support means, whereby said upper bearing surface will apply pressure to the distal metacarpal joint of the thumb in a substantially lateral direction and said lower bearing surface will apply pressure to the proximal metacarpal joint of the thumb in a substantially medial direction when the device is placed on the human hand.

2. The structure claimed in claim 1 wherein said upper and lower ends are of looplike configuration, said bearing surfaces comprising integral portions of said ends.

3. The structure claimed in claim 1 wherein said body of said support means is made of resilient material.

4. The structure claimed in claim 1 wherein said bearing surfaces comprise integral surface portions of said upper and lower ends.

5. A support means applicable to a portion of the human hand to alleviate misalignment and pain brought about by arthritis and the like, said support means comprising a twisted, substantially U-shaped body terminating in an upper end and lower end, a pressure-applying bearing surface in association with each of said ends, said body being configured to extend partially about and engage said portion of said hand, said end portions being located on substantially opposite sides of said portion of said hand, said bearing surfaces being oriented to apply pressure in substantially parallel, substantially opposite

directions, each of said bearing surfaces comprising a surface portion of an element operatively connected to one of said ends of said support means, means for moving said element toward and away from its respective end of said support means along an axis substantially parallel to the direction of said pressure to be applied by its respective bearing surface and means for maintaining said element in adjusted position along said axis whereby to adjust the pressure applied by said bearing surfaces.

6. A support means applicable to a portion of the human hand to alleviate misalignment and pain brought about by arthritis and the like, said support means comprising a twisted, substantially U-shaped body terminating in an upper end and a lower end, a pressure-applying bearing surface in association with each of said ends, said body being configured to extend partially about and engage the fleshy part of the hand surrounding the metacarpal bone of the thumb, said bearing surface associated with said upper end of said support being so located and oriented as to apply pressure to the distal metacarpal joint of the thumb in a substantially lateral direction, said bearing surface associated with said lower end of said support being so located and oriented as to apply pressure to the proximal metacarpal joint of the thumb in a substantially medial direction whereby to return said joints to a more normal position and to relieve pain therein, each of said bearing surfaces comprising a surface portion of an element operatively connected to one of said ends of said support means, means for moving said element toward and away from its respective end of said support means along an axis substantially parallel to the direction of said pressure to be applied by its respective bearing surface and means for maintaining said element in adjusted position along said axis whereby to adjust the pressure applied by said bearing surfaces.

7. A support means applicable to a portion of the human hand to alleviate misalignment and pain brought about by arthritis and the like, said support means comprising a twisted, substantially U-shaped body terminating in an upper end and a lower end, a pressure-applying bearing surface in association with each of said ends, said body being configured to extend partially about and engage a digit, said end portions being located on substantially opposite sides of said digit, said bearing surfaces being so located and oriented as to apply substantially oppositely directed pressures to the distal end of one phalanx of said digit and the proximal end of an adjacent phalanx of said digit, each of said bearing surfaces comprising a surface portion of an element operatively connected to one of said ends of said support means, means for moving said element toward and away from its respective end of said support means along an axis substantially parallel to the direction of said pressure to be applied by its respective bearing surface and means for maintaining said element in adjusted position along said axis whereby to adjust the pressure applied by said bearing surfaces.