



(72) SPITS, Marc, BE

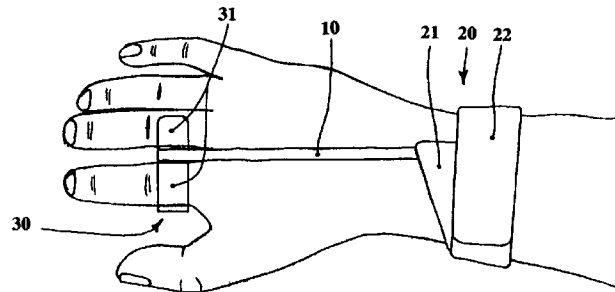
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(51) Int.Cl.⁶ A61F 5/058

(30) 1997/11/06 (1007459) NL

(54) **ORTHESE POUR LE SYNDROME DU CANAL CARPIEN**

(54) **ORTHESIS FOR THE CARPAL TUNNEL SYNDROME**



(57) L'invention porte sur une orthèse servant à prévenir et/ou à traiter le syndrome du canal carpien. Cette orthèse est composée d'une attelle de fixation de la main foncièrement rigide, se prolongeant immédiatement par-dessus la partie dorsale de la main, ladite attelle ayant deux extrémités, dont l'une est dotée d'un élément destiné à être attaché au poignet et au dessous du bras tandis que l'autre est dotée d'un élément d'attache aux doigts. L'élément d'attache aux doigts est composé d'une attelle de soutien des doigts, qui n'est de préférence fixée qu'à l'index et au majeur, tandis que le sommet de l'attelle de soutien des doigts est ouvert de façon à laisser les doigts libres de bouger de bas en haut. L'attelle de fixation de la main est courbée de façon qu'au moment de l'utilisation de l'orthèse, la partie dorsale de la main s'étire légèrement vers le haut par rapport au côté supérieur du dessous du bras.

(57) The invention relates to an orthosis for the prevention and/or treatment of carpal tunnel syndrome, comprising a substantially rigid hand fixation brace extending immediately over the dorsal part of the hand, which brace has two ends, one of which is provided with a part to be fastened to the wrist and underarm while the other is provided with a finger coupling part. The finger coupling part which is formed as a finger supporting brace, preferably only engages the index and middle finger, while the top of the finger supporting brace is open to allow finger movement in the upward direction. Further, the hand fixation brace is curved such that when the orthosis is in use, the dorsal part of the hand extends slightly upward with respect to the top side of the underarm.

ABSTRACT

5 The invention relates to an orthosis for the pre-
vention and/or treatment of carpal tunnel syndrome, compris-
ing a substantially rigid hand fixation brace extending
immediately over the dorsal part of the hand, which brace has
two ends, one of which is provided with a part to be fastened
to the wrist and underarm while the other is provided with a
10 finger coupling part. The finger coupling part which is
formed as a finger supporting brace, preferably only engages
the index and middle finger, while the top of the finger sup-
porting brace is open to allow finger movement in the upward
direction. Further, the hand fixation brace is curved such
15 that when the orthosis is in use, the dorsal part of the hand
extends slightly upward with respect to the top side of the
underarm.

Orthosis for the carpal tunnel syndrome

The present invention relates to an orthosis for the prevention and/or treatment of carpal tunnel syndrome.

Due to excessive use of the fingers and the thumb, for instance when making gripping movements or when typing, the nerve tendons and flexing tendons that control these finger movements, may become irritated. Such an injury caused by excessive use is also known as RSI (Repetitive Strain Injury). At the base of the hand palm, nerve tendons and flexing tendons of the fingers run through a tunnel, the carpal tunnel, which has a length of approximately 2 cm, and is defined at the dorsal side by bone and at the palmar side by a tendon plate. The irritation of the nerve tendons and flexing tendons may cause swelling of the tendon sheaths, thereby pinching the nerves in the carpal tunnel which in turn interferes with the functionality of the tendons. The resulting pain and unusual feeling in the hand palm and fingers caused by this irritation of the tendons at the base of the hand palm are known as the carpal tunnel syndrome.

Naturally, it is preferable to prevent the occurrence of carpal tunnel syndrome. Very often, when a person does suffer from such symptoms, a long period of absolute rest is prescribed, which in terms of working hours and loss thereof, is very costly.

A very drastic treatment is the operative splitting of the tendon plate of the carpal tunnel, to relieve the pressure on the tendons. However, this is rather a major and complicated operation without the guarantee of improvement.

Another possible treatment is the application of a splint to the wrist and hand palm. This treatment, together with a finger-less glove made of elastic material, is known from WO-94/27528, but only partly prevents the tendon's movement in the carpal tunnel.

From US-A-3,769,970 a splint is known for the restriction of movements of the underarm, the wrist, the hand and the fingers, which is substantially intended for use after an operation on the above-mentioned parts of the body. Said known splint is fitted around the underarm and the palm

of the hand and comprises a longitudinal portion, attached to which is a slidably suspended element for fixating the fingers upward. Such a splint is, however, not especially suitable for the prevention and/or treatment of carpal tunnel syndrome. For that purpose, the movements of the arm, hand and fingers are too much restricted. Moreover, such a splint is extremely bulky and heavy. This results in a great impediment for the hand's normal use, which is not necessary for the prevention and/or treatment of carpal tunnel syndrome.

The object of the invention is to maximally reduce the movements of the tendons in the carpal tunnel in order to prevent or treat carpal tunnel syndrome, while the movements of the hand, wrist and fingers are restricted as little as possible and the use of the hand is allowed to continue as normal as possible. To this end the orthosis according to the invention comprises a substantially rigid hand fixation brace extending immediately over the dorsal part of the hand, which brace has two ends, one of which is provided with a part to be fastened to the wrist and underarm while the other is provided with a finger coupling part.

The fact that the use of the hand is allowed to continue as normal as possible, will encourage quick acceptance by the intended users, which further promotes the use and the actual effectiveness of the orthosis. Moreover, the orthosis can be made to be compact and lightweight, and due to its uncomplicated construction the manufacture is simple, and due to its size, a modest amount of material is required, making the orthosis attractive from an economic point of view.

In a favourable embodiment, the finger coupling part only engages the index and middle finger. From a functional viewpoint these are the most important fingers. Restricting the movement of these fingers almost completely reduces the tendon movement. Therefore the design of the orthosis may be extremely compact. This further increases the applicability and further simplifies manufacture.

Preferably the finger coupling part is formed as a finger supporting brace, which is an effective and simple manner of forming a link with the fingers.

In a preferred embodiment the top of the finger supporting brace is open to allow finger movement in the upward direction. The finger brace now only restricts the downward movement of the fingers. This results in a substantially
5 maximal reduction of the tendon movement, without unduly restricting the use of the hand. Although this prevents gripping, it is still possible to operate the keyboard. This makes the orthosis according to the invention very user-friendly.

10 It is further preferred that the hand fixation brace be curved such that when the orthosis is in use, the dorsal part of the hand extends slightly upward with respect to the top side of the underarm. Such a position of the hand in relation to the underarm is the most relaxed position to work
15 in, so that fatigue and thus irritation of the tendons is further prevented.

Optionally the part to be fastened to the wrist/-underarm comprises a brace to be fitted around the wrist/-underarm, which in cross section is a substantially half-
20 round or half-oval brace and, attached to the brace, a band or strap for fastening. In another embodiment the part to be fastened to the wrist/underarm comprises a curved plate to be fitted on the wrist/underarm and, attached to the plate, a band or strap for fastening. These are simple and effective
25 ways of providing a fastening around the wrist and/or underarm.

The band or strap for fastening is preferably elastic, which makes the orthosis more comfortable in wear and use.

30 Furthermore, the band or strap is preferably secured by means of Velcro fastening. This provides a secure fastening which is easily adaptable to the size of the user's wrist or underarm.

In a preferred embodiment the supporting parts of
35 the orthosis are made in one piece. This simplifies manufacture and results in a smooth orthosis without any projections that could irritate the hand.

The invention will now be explained with reference to the accompanying drawings, in which identical reference numbers indicate similar parts and in which:

- Fig. 1 is a front view of an orthosis according to the invention;
- Fig. 2 is a side view of the orthosis of Fig. 1; and
- Fig. 3 is a top view of the orthosis of Fig. 1.

The orthosis shown in the drawings, for the prevention and/or treatment of carpal tunnel syndrome, comprises a hand fixation brace 10, a part 20 to be fastened to the wrist-/underarm and a finger coupling part 30. The fastening part 20 is located at one end of the hand fixation brace 10 and serves to firmly fix the orthosis to the wrist and/or underarm. The finger coupling part 30 is located at the other end of the hand fixation brace 10. Into said finger coupling part 30 a number of fingers are placed when using the orthosis.

The drawings show an orthosis to be used on the right hand. A similar orthosis can be made for the left hand and an orthosis that may be used on both hands is equally well possible.

When the orthosis is fitted, bending and rotating movements of the hand are prevented and the hand is fixed in a position determined by the form of the orthosis. To a large extent this prevents the movement of the tendons through the carpal tunnel. At the same time the hand's gripping movements are hindered, which further reduces the movements of the tendons. In Fig. 1 it can be seen that the hand fixation brace is curved such that when the orthosis is in use, the dorsal part of the hand extends slightly upward with respect to the top side of the underarm, which allows the hand to take the most relaxed position possible.

The finger coupling part 30 shown in the Figures, comprises a finger supporting brace consisting of two finger braces 31, as can be best seen in Fig. 1. This finger supporting brace accommodates the index and middle finger. From a functional viewpoint these are the most important fingers and their fixation results in a further reduction of the movements of the tendons in the carpal tunnel. The movements

of the other fingers are now also more or less automatically restricted.

At the top, the finger braces 31 are open to allow the fingers to move in the upward direction. In this way the hand retains a great deal of its functionality. For instance, it is possible to type while using the orthosis. The likelihood of sustaining the carpal tunnel syndrome with this kind of occupation is considerable. However, the use of the orthosis with these occupations is a remarkably effective means of preventing carpal tunnel syndrome of RSI.

The fastening part 20 shown in the figures comprises an in cross section substantially half-oval brace 21 for fitting around the wrist and/or underarm and a fastening band or strap 22 attached to the brace. By means of said band or strap 22 the brace 21 is fixed around the wrist and/or underarm. The band or strap 22 are fitted and fastened in a manner known as such, for instance, by means of Velcro fastening. The comfort in wear can be increased by using an elastic material for the band or strap 22.

In an alternative embodiment the fastening part 20 consists of a plate to be fitted on the wrist and/or underarm which plate is fixed into place by means of a band or strap 22 attached to the plate. This band or strap 22 is also fitted and fastened in a manner known as such.

In the embodiment shown, the hand fixation brace 10, the brace 21 and the finger coupling part 30, that is to say the supporting parts of the orthosis, are made in one piece of a metal such as, for example, aluminium or titanium, or of a plastic.

The above-described embodiments are not to be considered as a limitation to the invention. There are various possible embodiments for the orthosis for the prevention and/or treatment of carpal tunnel syndrome, all within the scope of the present invention and the appended claims.

CLAIMS

1. An orthosis for the prevention and/or treatment
5 of carpal tunnel syndrome, comprising a substantially rigid
hand fixation brace extending immediately over the dorsal
part of the hand, which brace has two ends, one of which is
provided with a part to be fastened to the wrist and underarm
while the other is provided with a finger coupling part.

10 2. An orthosis according to claim 1, **characterized**
in that the finger coupling part only engages the index and
middle finger.

3. An orthosis according to claim 1 or 2, **character-**
ized in that the finger coupling part is formed as a finger
15 supporting brace.

4. An orthosis according to claim 3, **characterized**
in that the top of the finger supporting brace is open to
allow finger movement in the upward direction.

5. An orthosis according to one of the claims 1-4,
20 **characterized** in that the hand fixation brace be curved such
that when the orthosis is in use, the dorsal part of the hand
extends slightly upward with respect to the top side of the
underarm.

6. An orthosis according to one of the claims 1-5,
25 **characterized** in that the part to be fastened to the wrist/-
underarm comprises a brace to be fitted around the wrist/-
underarm, which in cross section is a substantially half-
round or half-oval brace and, attached to the brace, a band
or strap for fastening.

30 7. An orthosis according to one of the claims 1-5,
characterized in that the part to be fastened to the wrist/-
underarm comprises a curved plate to be fitted on the wrist/-
underarm and, attached to the plate, a band or strap for fas-
tening.

35 8. An orthosis according to claim 6 or 7, **character-**
ized in that the band or strap for fastening is elastic.

9. An orthosis according to one of the claims 6-8,
characterized in that the band or strap is secured by means
of Velcro fastening.

10. An orthosis according to one of the preceding claims, characterized in that the supporting parts are made in one piece.

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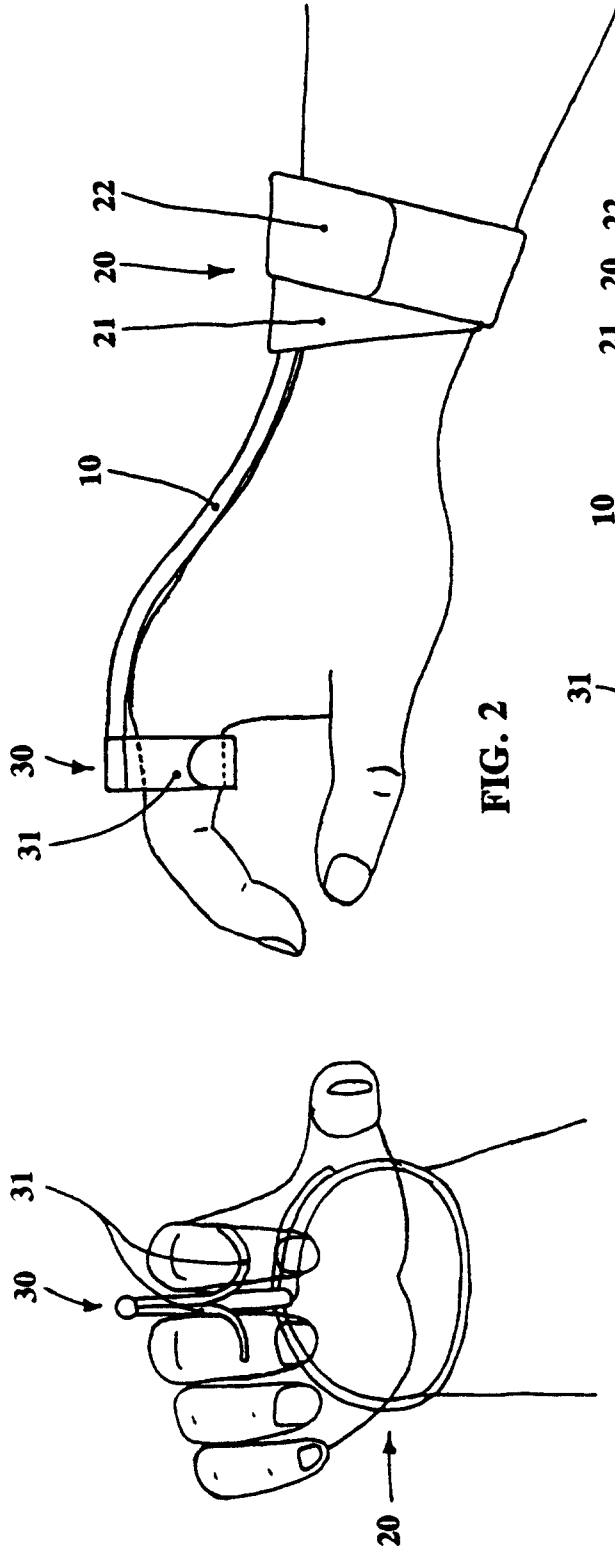


FIG. 1

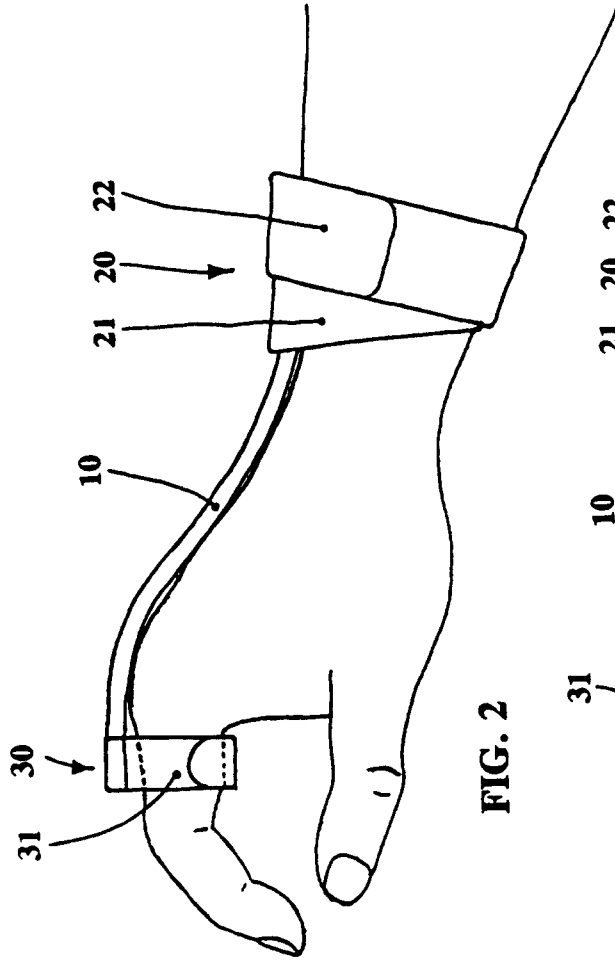


FIG. 2

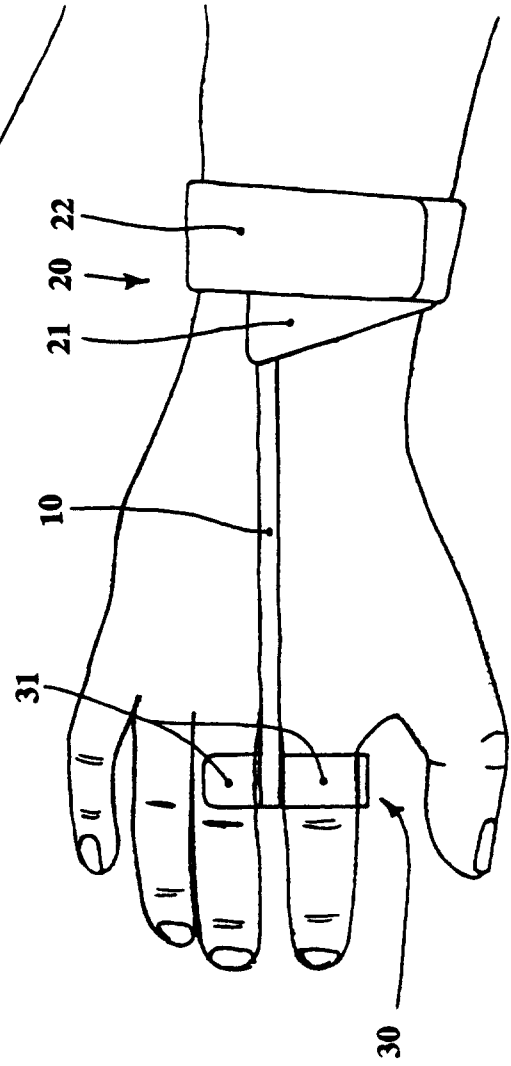


FIG. 3

