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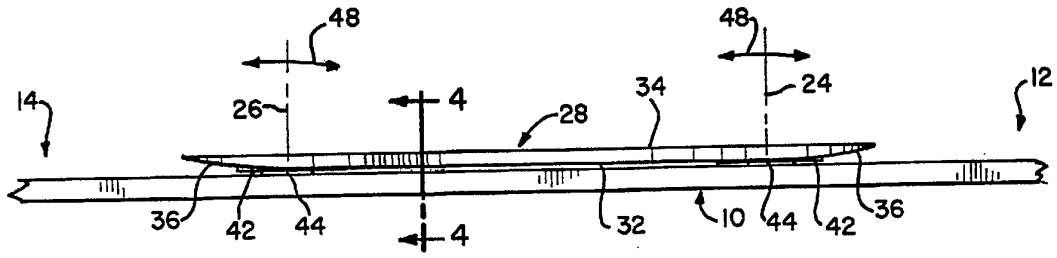
(54) Title: RIDER SUPPORTING ASSEMBLY FOR SNOWBOARDS



(57) Abstract

A rider supporting assembly for use with a snowboard prevents convex bending of the snowboard between the rider's feet. As the rider bends the snowboard, a mounting plate (28) having a controlled resilience restricts longitudinal bending of the snowboard in respone to the rider so that the rider may easily impart a force to curve the snowboard following a convex bend (with respect to the rider) yet discourages any concave bending of the snowboard, especially along the snowboard located between the rider's feet.

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RIDER SUPPORTING ASSEMBLY FOR SNOWBOARDS

Field of the Invention

The present invention relates generally to snowboards and, more particularly, concerns a supporting assembly for securing both of a rider's boots to the snowboard.

Background of the Invention

The use of foot-plates with downhill-type skis is known and is shown, for example, in U.S. 4,294,460 issued to Kirsch. The foot-plate disclosed in the 4,294,460 patent is used as a connecting interface (one per ski) between each ski binding and the upper surface of the respective ski. The foot-plate assembly of the 4,294,460 patent is intended to prevent transmission through the ski bindings and to the rider of movement stresses which are generated as the ski flexes longitudinally and laterally during its normal use. Such stresses would usually be transmitted from bindings to ski boots and, eventually, through the limbs of the rider, much to his discomfort.

The foot-plate of the 4,294,460 patent is a rectangular plate made of a material which is sufficiently rigid to support mounted ski bindings properly. The foot-plate

is about as wide as the width of the ski and slightly longer than the distance between a front and a rear binding portion of each ski. Each foot-plate of the 4,294,460 patent receives the front and rear ski bindings of the respective ski along its upper surface and is resiliently secured to the upper surf ace of the ski using a combination of rigid fasteners and flexible material. The foot-plate assembly of the 4,294,460 patent functions as a simple shock-absorber to effectively dampen the transmission of the stress movements generated by the ski, thereby eliminating any associated discomfort to the rider.

The sport of snowboarding, although similar in certain regards, is very different from conventional downhill skiing. The most obvious difference is the use of a single wide ski-like snowboard instead of two independently controllable slender downhill-type skis.

Since the rider's legs are both connected to the same ski (the snowboard), the rider will inherently impart a flexing moment to the snowboard as he performs the various maneuvers associated with the sport. Downhill skis are flexible and will bend as they are used. However, since each leg of the downhill skier is mechanically isolated from each other, downhill skiers will not impart any great twisting or bending to either ski through body and leg movement during the normal use of the ski. The movements of each leg of the downhill skier is not dependent on the movements of the other leg and is free to direct its ski, for the most part, without restriction. The lack of a fixed leverage point (about which a leg may impart bending), other than the snow surface, prevents either downhill

ski from independent bending or twisting. Conversely, in order to achieve the various maneuvers associated with the sport of snowboarding, the rider must manipulate the snowboard much like a skateboard. Certain turning maneuvers (and general snowboarding movements) either force the rider to bend the snowboard or result in the bending of the snowboard with respect to its central longitudinal axis. This bending or board distortion forces the otherwise flat-bottomed snowboard into a curved (either concave or convex) shape. Convex curving of the snowboard base surface is desirable (i.e., the top surface of the snowboard has a concave shape and the bottom surface has a convex shape). However, it is not uncommon for the rider to impart concave (curved upward towards the rider) distortion between the rider's feet. This convex curving or distortion causes the snowboard to behave unpredictably during a turning maneuver, particularly at high speeds. During a turn, if the snowboard is allowed to concave bend between the feet of the rider, the portion of the edge of the snowboard lifts from the surface of the snow, resulting in the snowboard sliding out from the turn.

Ideally, the above-described rider-initiated longitudinal concave distortion of the snowboard should be minimized or eliminated without restricting desirable convex bending of the snowboard or other longitudinal flexing of the snowboard caused by the terrain of the snow. The rider should be rigidly connected to the snowboard to ensure quick maneuvering response, yet the snowboard should be isolated from unwanted movements of the rider, such as movements which cause the above-described longitudinal concave distortion.

Owing to the different movements imparted by the rider and the resulting physical demands placed on the equipment, the above discussed foot-plates of the 4,294,460 patent, although they could provide some shock absorption, would not be suitable for use with a snowboard. First of all, utilizing the foot-plates as in the 4,294,460 patent would fail to prevent the above described unwanted longitudinal bending (concave) of the snowboard. Secondly, the shock absorption provided by the foot-plates of the patent would not only dampen higher frequency vibrations and oscillations between the snowboard and its rider, but would also dampen the otherwise quick response of the rider. Thus, the rider's dynamic control of the snowboard is substantially diminished.

U.S. Patent No. 4,741,550 issued to Dennis discloses a binding system for use with snowboards wherein each of the rider's boots is connected to a respective boot binding through a resilient mount. Similar to the above-described U.S. 4,294,460, the resilient mounts of the 4,741,550 patent isolate the movements of the boots from the snowboard. This arrangement reduces the response time of each of the rider's movements and limits the degree of bending and twisting that may be imparted to the snowboard as it is used and it does not dampen or reduce the above-described unwanted longitudinal distortion.

It is, therefore, an object of the present invention to provide a rider supporting assembly for use with snowboards which reduces rider-induced unwanted longitudinal concave bending of the snowboard without adversely restricting convex bending of the snowboard to the snow or its responsiveness to

the rider.

In accordance with the present invention, a rider supporting assembly for use with a snowboard restricts concave longitudinal bending of the snowboard in response to the rider yet allows the snowboard to twist and convex bend in response to contact with the snow. The supporting assembly comprises an elongated mounting plate which has a first and a second end section, a middle section, an upper surface and a lower surface. The middle section is made narrower than the end sections to conserve weight. A first boot binding is mounted to the mounting plate along its upper surface at the first end section, and a second boot binding is mounted to the mounting plate along its upper surface at the second end section. Also, the first and second end sections of the mounting plate are connected to the snowboard so as to permit flexing in the mounting plate in response to the forces exerted thereon through the boot bindings, while permitting movement of the mounting plate relative to the snowboard, thereby minimizing concave bending of the snowboard.

Brief Description of the Drawings

The foregoing brief description, as well as further objects, features and advantages of the present invention will be understood more completely from the following detailed description of a presently preferred, but yet illustrative, embodiment of the invention, with reference to the accompanying drawings, in which:

Fig. 1 is a top plan view of the mounting assembly attached to a snowboard (partially shown), in accordance with

the preferred embodiment of the invention;

Fig. 2 is a side view of the mounting assembly shown in Fig. 1;

Fig. 3 is an enlarged side view showing details of a standoff plate and a supporting pad, in accordance with the preferred embodiment;

Fig. 4 is a sectional view of the mounting assembly taken along the lines 4-4 of Fig. 2; and

Fig. 5 is an enlarged side view showing details of a standoff plate and a supporting pad, in accordance with another embodiment of the invention.

Detailed Description of the Preferred Embodiment

Referring to Figs. 1 and 2, a snowboard 10 of conventional construction is shown in part, and it has a front 12 and a rear 14, a central longitudinal axis 16 and a central lateral axis 18, a front binding axis 20, a front mounting axis 21, a rear binding axis 22 and a rear mounting axis 23. Conventional boot bindings (not shown) may be mounted to a mounting plate 28 (described in detail below) so as to be directed along the front and rear shoe axes 20, 22, respectively. The bindings are mounted so as to be adjustable pivotally about a point defined by the intersection of the longitudinal axis 16 and the respective front and rear mounting axes 20, 22. In addition, mounting plate 28 is subjected to bending as a result of torques 48, 48 produced about front and rear axis 24 and 26 as a result of the user's efforts to control the snowboard, as well as torque 46 (see Fig. 4). The front and rear upright axes 24, 26 are both located along the

central longitudinal axis 16 and the respective front and rear mounting axes 21, 23, and are perpendicular to the surface of the snowboard 10. The front and rear axes 24, 26 in part define an upright longitudinal plane 25 (see Fig. 4) through the central longitudinal axis.

Mounting plate 28 is connected to the upper surface of the snowboard 10. The mounting plate 28 includes a longitudinal axis 16, a lower surface 32 and an upper surface 34, and it is preferably elongated with rounded ends and a narrow center, similar in shape to a dog bone. The mounting plate 28 is made from a composite skinned wood or foam core laminate construction and is preferably slightly arched upward (convex surface facing upward), away from the snowboard 10, as shown in Fig. 2. Bevelled edges 36 are provided along the lower surface 32 of the mounting plate 28 to provide clearance with the snowboard in the event that the mounting plate 28 or the snowboard 10 bends about its longitudinal axis 16. The middle section of the mounting plate 28 is sufficiently rigid to limit bending movement of the front end section 12 with respect to the rear end section 14 about the central lateral axis 18.

The mounting plate 28 is preferably attached to the snowboard 10 at four points 38, using any appropriate fastener 40, such as screws or bolts as shown in Fig. 3. Two of the connecting points 38 are located along the front binding axis 20, while the remaining two connecting points 38 are located along the rear binding axis 22. The two holes 38 on the left in Fig. 1 are slightly oblong to permit bending of snowboard 10 relative to the mounting plate 28. Located between the

lower surface 32 of the mounting plate 28 and the snowboard 10, and along both respective mounting axes 21, 23, is a pad 42 and a rigid stand-off plate 44, as shown in Fig. 3. The stand-off plate is preferably a metal, such as aluminum, and is located adjacent the upper surface of the snowboard 10. The pad 42 is preferably made from a resilient shock-absorbing material, such as rubber. The resilient pad 42, which is positioned between the stand-off plate 44 and the mounting plate 28 provides some cushioning with respect to the snowboard 10 and allows the rider to easily convex bend the snowboard 10 into a tight turn without restriction. Additionally, the mounting arrangement between the mounting plate and the snowboard substantially prevents the snowboard from being subject to longitudinal concave bending between the front and rear sections in a direction toward the upper surface of the mounting plate 28.

Referring to Fig. 5, another embodiment of the fastening system used to secure the mounting plate 28 to the snowboard 10 is shown. Here, the mounting plate 28 is secured to the upper surface of the snowboard 10 using a fastener 40. The pad 42 is now positioned in an appropriate recess 50 located within the upper surface of the mounting plate 28. Located within the pad 42 is a metal washer 52 used to help distribute applied forces. This arrangement, similar to the one shown in Fig. 3 and discussed above, includes a standoff plate 44 located between the snowboard 10 and the mounting plate 28. Positioned between the standoff plate 44 and the mounting plate 28 is a mushroom-shaped spacer 54, preferably made from a strong rigid material such as a metal. The spacer

54 is positioned with its rounded side against the standoff plate 44. Appropriate openings located in the washer 52, the pad 42, the mounting plate 28, the space 54 and the standoff plate 44, align to receive the fastener 40, which again is received in a threaded bore located in the snowboard. The operation of the arrangement shown in Fig. 4 is similar to that of Fig. 3, except that here greater height is provided between the snowboard 10 and the mounting plate 28 allowing greater convex bending to the snowboard 10.

The mounting plate 28 is preferably constructed to encourage slight controlled and uniform convex bending of the snowboard 10 about its longitudinal axis 16 with respect to the rider, yet discourages any undesirable concave bending of the snowboard 10 about the central lateral axis 18 and especially adjacent to the mounting plate 28 and under the rider's weight (between the rider's feet). This allows the snowboard to maintain a desired convex shape which helps apply the rider's weight to the edges of the snowboard 10, especially the inside edges of a turn. The mounting plate 28 effectively allows the rider to only convex bend the snowboard, and prevents any concave bending (somewhat rippled or wavy) along the longitudinal axis and between the rider's feet.

As will be appreciated from Fig. 2, the torques 48 applied simultaneously at each end of the mounting plate 28 will cause desirable convex bending of the snowboard 10. The torques 48, 48 applied simultaneously at each end of the mounting plate 28 would, if not prevented by the mounting plate 28, create an undesirable concave curve to the snowboard 10.

The lateral torques 46 in Fig. 4 will be transmitted to the snowboard causing it to tilt so as to apply the rider's weight to the edges. Thus, the mounting plate 28 not only prevents undesirable concave bending movement along the central lateral axis 18, as discussed above, but also allows even distribution of the rider's weight and force along the edge of the snowboard 10 regardless of the rider's stance. The distribution of the weight and force may therefore be controlled easily by the relative position and orientation of the standoff plates 44 on the snowboard 10.

Although a preferred embodiment of the invention has been disclosed for illustrative purposes, those skilled in the art will appreciate that many additions, modifications, and substitutions, in addition to those specifically discussed, are possible, without departing from the scope and spirit of the invention as defined by the accompanying claims. For example, the mounting plate need not be dog bone shaped, but could have another shape that would make it more flexible or stiffer in the middle. This could be achieved by controlling the thickness of the middle portion or the relative rigidity of the material used to make the middle portions and the two end portions. Also, it is contemplated that the snowboard itself could be manufactured to incorporate (perhaps as a laminate) the mounting plate 28 so that the snowboard functions as described above, without the need of the separate mounting plate 28.

What is claimed is:

1. A rider supporting assembly for use with a snowboard for receiving boots worn on the feet of the rider, said mounting assembly comprising:

an elongated mounting plate having a first end section, a second end section, a middle section, an upper surface and a lower surface, said mounting plate having a central longitudinal axis and a central lateral axis, said middle section being sufficiently rigid to limit bending movement of said first end section with respect to said second end section about said central lateral axis;

means for mounting said boot to said mounting plate at said first and second end sections, respectively; and

means for mounting said mounting plate to said snowboard so that the rider is oriented in his normal riding position and so that said mounting plate may bend longitudinally in response to forces applied to it by the rider, without the snowboard being subjected to longitudinal concave bending between said first and second sections in a direction toward said upper surface.

2. The supporting assembly of claim 1, wherein said mounting plate is generally dog bone shaped.

3. The supporting assembly of claim 1, wherein said mounting plate mounting means is constructed so as to permit limited longitudinal movement of one of said first and second end sections relative to the snowboard, while substantially restraining the mounting plate against lateral movement

relative to the snowboard.

4. The supporting assembly of claim 3, wherein said mounting plate mounting means includes an oblong hole extending in said longitudinal axial direction, in said mounting plate.

5. The supporting assembly of claim 4, wherein said mounting plate mounting means includes a resilient pad and a rigid standoff plate disposed between said mounting plate and said snowboard.

6. The supporting assembly of claim 5, wherein said resilient pad is disposed adjacent to said mounting plate and said stand-off plate is disposed adjacent to said snowboard.

7. The supporting assembly of claim 6, wherein said resilient pad is received in a recess of said mounting plate.

8. The supporting assembly of claim 7, wherein said resilient pad includes a metal washer.

9. The supporting assembly of claim 7, further including a mushroom-shaped spacer disposed between said stand-off plate and said mounting plate.

10. The supporting assembly of claim 4, wherein said mounting plate mounting means includes at least two spaced apart mounting positions, said resilient pad being mounted between said snowboard and said mounting plate approximately

midway between said two spaced apart mounting positions.

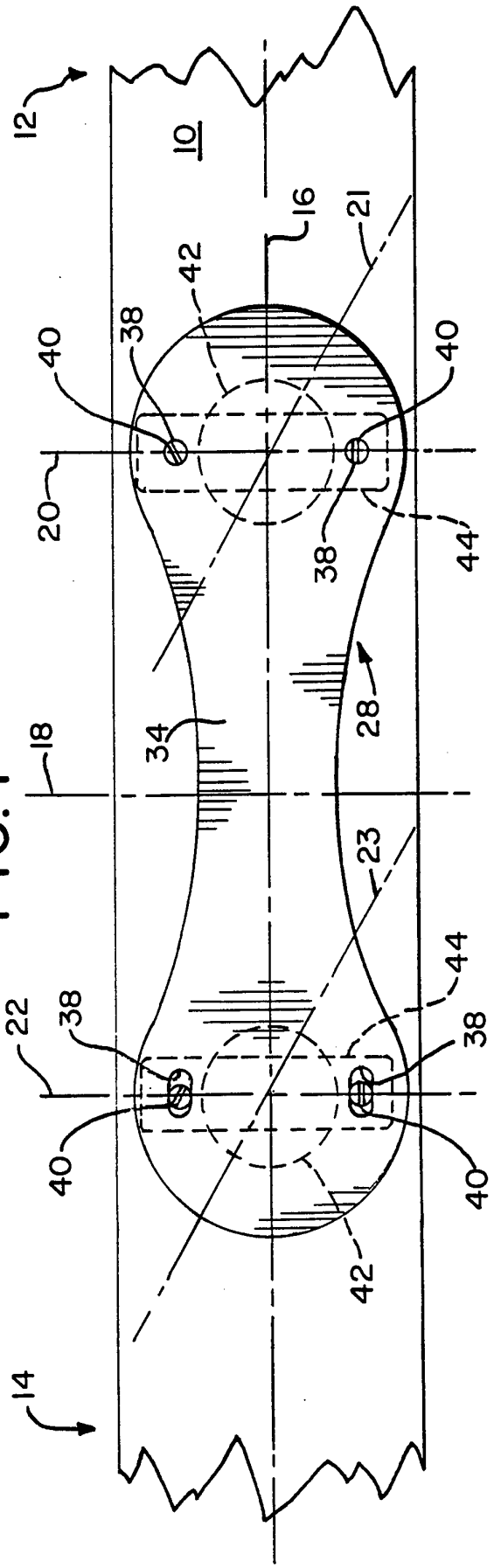
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FIG. 1

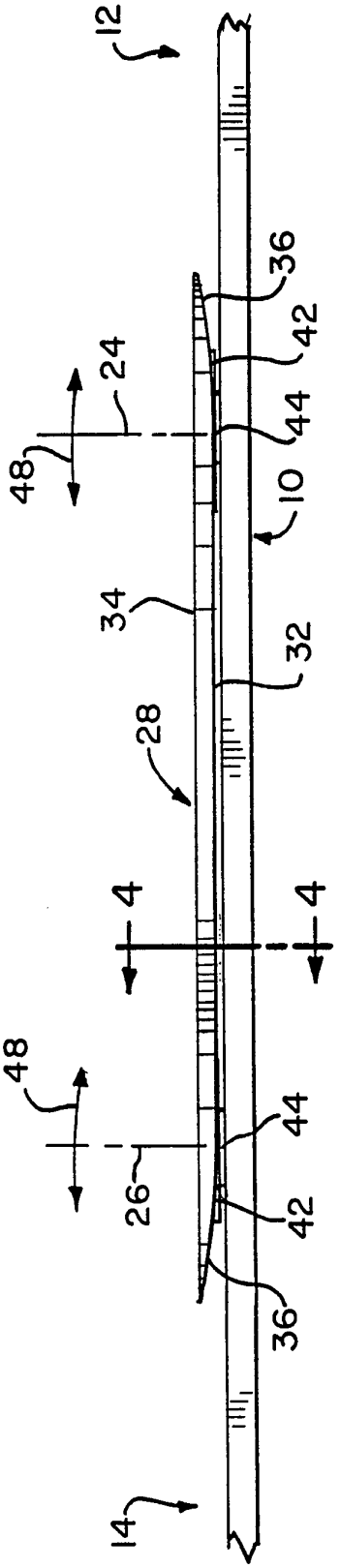
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FIG. 2

FIG. 3

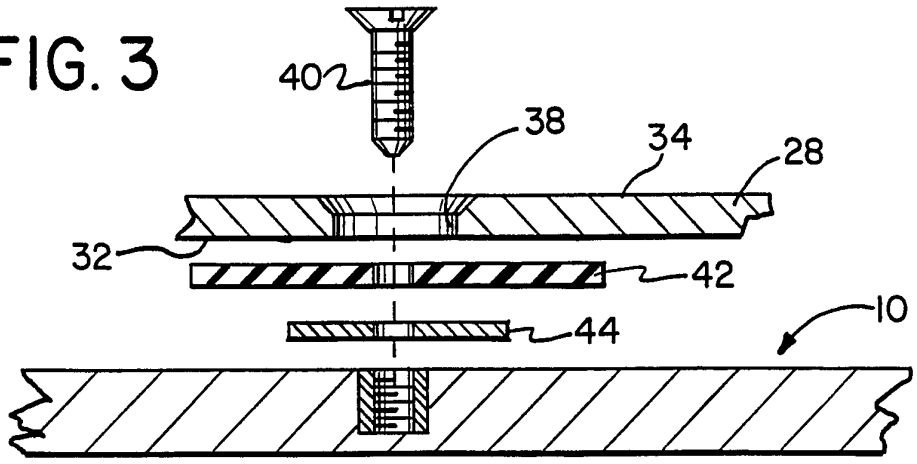


FIG. 4

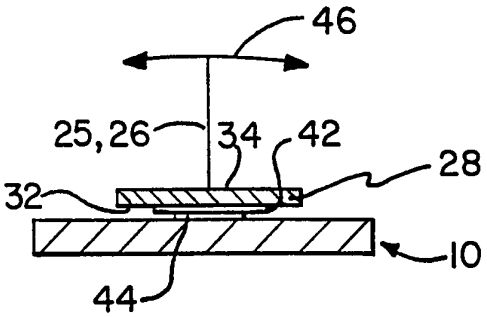
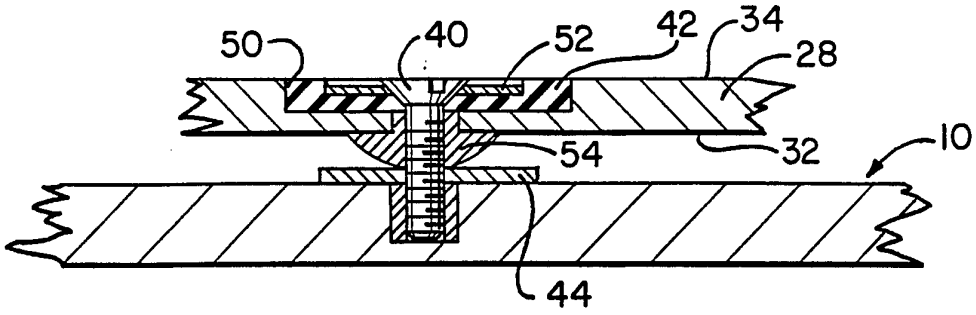


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/06318

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A63C 17/18
US CL : 280/607,14.2

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 280/607,14.2
280/602,607,14.2

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4,784,233 (Favors) November 15, 1988 See Figure 2	1
X	DT, A, 3,702,094 (Hergeth) August 4, 1988 See Figure 1	1 and 2
X	US, A, 4,221,394 (Campbell) September 9, 1980 See Entire Document	1
X	FR, A, 2,659,246 (Gilodi) September 9, 1991 See Figures 1-4	1-10

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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