

-3 SEP 2002

Short title: Wrist pad



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This invention relates to a support for supporting an arm or a wrist in particular during the use of a keyboard or a computer mouse, at least comprising the following in the specified order:

- 5       - a top covering layer,
  - a layer of a substantially gel-free resilient material (5), containing gas, in particular air,
  - at least one reinforcement layer made of a substantially non-compressible material, and
  - 10      - a bottom layer,
- the bottom layer and the covering layer being connected to each other so that they enclose the resilient layer and the reinforcement layer.

Such a support is known from US-A-5,125,606. In said  
15 support, the reinforcement layer is made from a wooden slat on which a layer of foam padding is placed followed by a cover which is stapled and glued to the bottom of the wooden slat. A bottom layer is placed against the underside of the support. The arrangement and fixation of the different layers in the  
20 support of US-A-5,125,606 is complicated and laborious; before placing the bottom layer against the slat, the top covering layer has to be folded over the bottom surface of the wooden slat and be fixed thereto by gluing and stapling. The slat must be of such dimensions that staples can hold therein.

25       The present invention provides a support of simple manufacture and is thereto characterized in that the covering layer and the bottom layer are joined together to form a seal by means of thermal fusion and that means which prevent gas displacement out of the resilient layer in the direction of the  
30 bottom layer are accommodated in the support, said means being formed by

- a) the resilient material having a closed cell structure or
- b) a substantially airtight envelope, enclosing the resilient material, which is open cell foam material, preventing gas

35       displacement out of the resilient material in the direction of the bottom layer.



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During use of the support, an arm or a wrist rests on the support while the keyboard is being used, so that the resilient material present in the support is depressed. This causes the gas present in the support, usually air, to be partially forced out of the resilient material and to accumulate elsewhere in the support. This accumulation of air would in particular occur between the reinforcement layer and the bottom layer, with the result that the bottom layer bulges out slightly. The contact between the support and the work surface on which the support is placed, is then consequently reduced, and the support will make tilting movements in each case during use.

In order to avoid accumulation of air between the bottom layer and reinforcement layer, means which prevent gas displacement out of the resilient layer in the direction of the bottom layer, are accommodated in the support. During use, the air can no longer accumulate between the reinforcement layer and the bottom layer, with the result that the bottom layer retains its flat structure and remains fully in contact with the work surface.

It is pointed out that use of a gel-containing resilient layer in wrist supports is generally known; see, for example, WO 98/08420. The disadvantage of such materials is, however, their high cost and the difficulty of manufacturing them. Moreover, the gel material heats up during use, which promotes the growth of bacteria in the gel material.

By "resilient material containing gas, in particular air", material is meant that contains gas and that is compressible. When a load is placed on such a material, the gas will be forced out of the material. Owing to the fact that the material is resilient, the material will take up gas when the load is removed, so that it assumes its original volume. A suitable resilient material preferably comprises a foam material such as, for example, polyether, polyethylene or polyurethane, neoprene and latex rubbers, in particular polyurethane foam material.

"Means which prevent gas displacement out of the resilient material" can, for example, be embodied in the foam material itself. For instance, in an advantageous embodiment of the support according to the invention, the resilient material has

a closed-cell structure. During use, such a resilient material will be sufficiently depressed for comfortable use, but the gas enclosed in the cells of the material cannot accumulate between the reinforcement layer(s) and the bottom layer.

5 In another embodiment of the support of the present invention, open-cell foam material is used, which is enclosed in a substantially air-impermeable envelope. When such an enveloped foam material is incorporated in the support, the support will be depressed during use, and the air will be  
10 partially expelled. However, the air is trapped in the envelope and cannot move in the direction of the bottom layer, and therefore cannot accumulate between the reinforcement layer(s) and the bottom layer, with the result that tilting movements of the support are prevented.

15 A very special embodiment of the support according to the invention comprises an additional, substantially air-impermeable layer between the resilient material and the reinforcement layer(s), enclosing the resilient layer in an airtight manner between the covering layer and the additional  
20 layer. Such a support thus comprises two compartments separated from each other in an airtight manner, the resilient layer being enclosed in the first compartment, bounded by the covering layer and the additional layer. The reinforcement layer(s) is (are) accommodated in the second compartment,  
25 bounded by the additional layer and the bottom layer. Displacement of air out of the first compartment into the second compartment is not possible with this embodiment, with the result that the air accumulation between the reinforcement layer(s) and the bottom layer does not occur during use of the  
30 support.

The support comprises one or more reinforcement layers, made of substantially non-compressible material, in order to give the support firmness and to prevent the support from sagging when it is picked up. A suitable material for a  
35 reinforcement layer can be, for example, sheet material of wood or plastic, such as PVC or polyacrylate. Such a backing material is flat, with the result that the support will remain in good contact with a work surface or desk. It is possible to

opt to incorporate several reinforcement layers of the same or different material in the support according to the invention, for example in order to give additional firmness and body to the support. The reinforcement layer(s) is (are) preferably  
5 flexible, and at least one of the reinforcement layers is made in such a way that it is reversibly flexible. By reversibly flexible material we mean flexible material which can be bent, but which will spring back to its original state after having been placed under load. This layer serves as the restoring  
10 means; when the support is bent, it will be returned to its original state by the bendability of the abovementioned reversibly flexible reinforcement layer. Suitable material for this layer is, for example, PVC in a thickness of approximately 0.6 mm. In order to increase this restoring capacity, said  
15 reinforcement layer can be slightly pre-bent or incorporated in the support under initial tension. The support advantageously comprises at least a reinforcement layer of reversibly flexible material, of the type described above, and a flexible form-retaining material which gives the support primarily firmness  
20 and body. A very suitable material for such a reinforcement layer is cardboard in a weight of 13-18 g/cm<sup>2</sup>. A single reinforcement layer can also be selected.

Other examples of suitable materials for one or more reinforcement layers are PVC, polyester, Lexan, acrylate,  
25 polystyrene, Perspex and polypropylene.

The covering layer preferably comprises a flexible air-impermeable and moisture-impermeable material such as smooth or roughened PVC, vinyl or polypropylene, preferably soft vinyl types and roughened PVC, which give the support a comfortable  
30 surface.

The bottom layer preferably comprises anti-slip material on the side facing away from the reinforcement layer. However, it is preferable to make this bottom layer entirely of an anti-slip material. This material is likewise preferably  
35 moisture-impermeable, in order to prevent moisture from penetrating into the support. Examples of a suitable material for this layer are PVC film, neoprene rubber and latex rubber. It is also possible to provide the bottom layer locally with

anti-slip material, such as, for example, rubber or felt feet.

If suitable material is selected for the outer layers, i.e. the covering layer and the bottom layer, the edges of the support can be fused together, which makes simple manufacture possible and guarantees optimum sealing.

In a special embodiment, the support according to the invention is intended for supporting an arm or wrist in particular during use of a computer mouse, and to this end it advantageously comprises a mouse mat. Such an assembly has been found to be a useful aid during the use of a computer mouse, because the wrist need no longer be raised in order to use the mouse, but can remain resting on the support, with the result that the hand does not become tired so quickly. The presence of a mouse mat ensures that a suitable surface is provided for use of the mouse, one which does not come away from the support during use. An edge of the mouse mat is advantageously connected to an edge of the support, for example by gluing, fusing etc.

In a preferred embodiment, the abovementioned support is constructed in such a way that at least on one side the bottom layer of the support projects from the support by the same dimensions as the mouse mat, the projecting part comprising a top surface which has sufficient friction with a computer mouse to allow use of the latter. In the case of this construction, the support has a joint bottom layer, which is preferably made of an anti-slip material. The top surface of the mouse mat can be selected from the same material as the covering layer of the support, but another material is also possible; for instance a transparent PVC material is excellent as a top layer for the mouse mat part of the support. With this material as the top surface, it is possible to place a layer of a printed material, such as paper, between the bottom layer and said transparent top surface, which makes the mouse mat part suitable for accommodating and displaying, for example, an advertising message. Of course, it is also possible to place one or more additional reinforcement layers between the top surface of the mouse mat and the bottom layer, for example as described above for the support.

However, it is also possible to dispense with fixing a top layer on the projecting part of the bottom layer; in this case the top side of the bottom layer as such serves as a mouse mat. For this embodiment, the bottom layer does have to have  
5 sufficient friction with a computer mouse to make use of the mouse possible.

It is even more preferable for the support to be constructed in such a way that at least on one side both the covering layer and the bottom layer of the support project by  
10 the same dimensions as a mouse mat and are joined together, thereby forming a mouse mat. A support of this type can be very desirable from an aesthetic point of view, because the outer material of the support is made of one common covering layer and one common bottom layer.

15 The invention also provides a method for manufacturing a support according to the invention, in which a bottom layer, at least one reinforcement layer, an additional, substantially air-impermeable layer, a resilient layer and a covering layer are placed in succession on top of one another, in the above or  
20 in the reverse order, the dimensions of these layers being selected in such a way that the bottom layer, the additional layer and the covering layer project on all sides beyond the reinforcement layer(s) and the resilient layer, after which the projecting parts of the covering layer, the additional layer  
25 and the bottom layer are joined together and thereby enclose the resilient layer between the covering layer and the additional layer, and the reinforcement layer(s) between the additional layer and the bottom layer. In this way, two separate compartments are formed within the support, without  
30 air exchange between the compartments being possible. The projecting parts can be joined together in a simple manner, and the other layers are enclosed in the process. The projecting parts of the layers are preferably joined together to form a seal by means of thermal fusion. In order to obtain a  
35 decoratively attractive support, it is also possible to fix the covering layer to the bottom layer with a decorative lace, combined with fusion of the two layers, in which case the lace may be threaded through one or both supporting layers if

desired.

An attractive stable support is obtainable if the dimensions of the covering layer are selected in such a way that they are slightly larger than those of the bottom layer.

5 This produces a flat bottom surface on the support, the connection between the covering layer and the bottom layer defining the edges of the bottom surface. The bottom surface formed in this way is flat and lies in a very stable manner on the work surface.

10 For the manufacture of a support comprising a mouse-mat, the covering layer and the bottom layer are selected in the dimensions suitable for the purpose, after which the layers are joined together along the edges of the support and of the mouse mat, as described above for the manufacture of the  
15 support. If desired, one or more additional reinforcement layers can be placed between the parts of the layers intended for the mouse mat part.

Many embodiments are possible within the scope of the invention. For instance, the covering layer can have a second  
20 covering layer placed on it, said second covering layer being, for example, transparent. Said second covering layer can be joined together with the first covering layer and the bottom layer, and possibly with the additional layer, in such a way that a space is produced between the second covering layer and  
25 the original first covering layer, for the accommodation of, for example, a picture. If desired, this second covering layer may cover the entire top surface of the support and contain an opening for inserting or removing a picture. The second covering layer may also be fixed only at some points on the  
30 original covering layer. It is therefore also possible for the second covering layer to cover only part of the first covering layer. Moreover, the second covering layer does not necessarily have to be fixed together with the first covering layer and the anti-slip layer at the position of the edge of the support, but  
35 said second covering layer may also be fixed at some points on the first covering layer.

It is also possible to print the covering layer for, for example, advertising purposes.

This invention will be discussed below with reference to the drawing, in which:

Figs 1 and 2 show perspective views of two embodiments of a support according to the invention,

5 Fig. 3 shows a cross-section along line X-X in Figure 1, and

Figs 4 and 5 show cross-sections of supports comprising a mouse-mat according to the invention.

Fig. 1 shows a support 1, the top surface of which is  
10 formed substantially by a first covering layer 2, which at the edges is fused with an anti-slip bottom layer, which is not visible here. The support comprises a second covering layer 9, which for fixing to the support is likewise fused with covering layer 2 and the bottom layer at fused edge 3. The second  
15 covering layer 9 covers only part of the top surface of the support and is preferably made of a transparent material, so that pictures such as photographs or business cards and the like can be placed between said second covering layer and covering layer 2.

20 In Fig. 2 support 1A comprises a second covering layer 10A, which is fixed on covering layer 2 at the position of the edges 10 of covering layer 10A. The short sides of the second covering layer 10A are open, allowing space for a picture.

Fig. 3 shows a covering layer 2, resilient foam  
25 material 5, an anti-slip bottom layer 4, a first reinforcement layer 6 made of, for example, cardboard, and a second reinforcement layer 7 made of, for example, PVC. The bottom layer can be made of an anti-slip material.

An additional air-impermeable layer 8 is incorporated  
30 between the foam material 5 and the reinforcement layer 6, the foam material 5 being enclosed between the covering layer 2 and the additional layer 8, by the fact that the covering layer 2 is fused with the additional layer 8 at the position of 3. The two layers 2 and 8 are likewise fused with the anti-slip bottom  
35 layer 4. The foam material 5 can be, for example, open-cell polyether foam. In this case, edge 3 of the support is formed by the fusing of covering layer 2, additional layer 8 and bottom layer 4, which last layer is in the form of an anti-slip

layer. The dimensions of the covering layer 2 are likewise slightly greater than those of bottom layer 4.

During the manufacture, the layers concerned are placed in a suitable manner on top of one another, covering layer 2, bottom layer 4 and the additional layer 8 projecting around the other layers. With slight compression of the edges of the resilient layer, the projecting parts of the covering layer, the bottom layer and the additional layer can be joined together, and any excess projecting material can be cut off.

Owing to the presence of the additional air-impermeable layer, when the resilient layer is compressed, no air will be displaced between the supporting layer and the bottom layer, so that the bottom layer, and consequently the bottom face of the support, remains substantially flat.

Fig. 4 shows a support comprising a mouse-mat according to the invention, in which the support part is constructed in a corresponding way to that of the support of Fig. 3. Covering layer 1 and bottom layer 4 are dimensioned in such a way that they project beyond the support at the same side of the support. The support 1 is heat-sealed at the position of 3A and 3B, with a fusion seam all the way round. Said fusion seam also bounds the mouse mat part 12 on one side of the support, at the position of 3A. At the position of 3A, the fusion seam forms part of a fusion edge, which encloses the mouse mat part. Fusion edge 3C is part of said surrounding fusion edge. The top side of the mouse mat in this case is formed by a part of the covering layer 2.

However, instead of covering layer 2 and/or bottom layer 4 for the mouse mat part, a separate piece of an identical or different material can be used, and this material is joined to the edge of the support, for example by fusion, at the position of the fusion seam 3A, this being shown in Fig. 5. For this purpose, at the position of 3A the fusion seam of the support is preferably made slightly wider than it is at the position of 3B and of the short sides of the support, in order to form a good adhesion surface for the mouse mat part. In this case, a reinforcement layer 13 is incorporated between bottom layer 4A and top surface 2A, which is in the form of a covering

layer. It is also possible to dispense with a fusion seam or provide only a partial fusion seam at the position of, for example, 3C, so that exchangeable pictures can be placed between the covering layer and the bottom layer of the mouse  
5 mat part.

Although it is not shown, the support comprising a mouse-mat illustrated in Fig. 5 is considered to comprise an additional layer 8 corresponding to that of Fig. 4.

Claims

1. Support for supporting an arm or a wrist in particular during the use of a keyboard or a computer mouse, at least comprising the following in the specified order:
- a top covering layer (2),
  - a layer of a substantially gel-free resilient material (5), containing gas, in particular air,
  - at least one reinforcement layer (6, 7) made of a substantially non-compressible material, and
  - a bottom layer (4),
- the bottom layer (4) and the covering layer (2) being connected to each other so that they enclose the resilient layer and the reinforcement layer, characterized in that the covering layer and the bottom layer are joined together to form a seal by means of thermal fusion and that means which prevent gas displacement out of the resilient layer in the direction of the bottom layer are accommodated in the support, said means being formed by
- c) the resilient material having a closed cell structure or
  - d) a substantially airtight envelope, enclosing the resilient material, which is open cell foam material, preventing gas displacement out of the resilient material in the direction of the bottom layer.
2. Support according to claim 1, characterized in that the support comprises an additional, substantially air-impermeable layer (8) defining two compartments separated from each other in an airtight manner, the first compartment having the resilient layer enclosed therein, the first compartment being bounded by the covering layer and the additional layer, the second compartment being bounded by the additional layer and the bottom layer.
3. Support according to claim 2, wherein the additional, substantial air-impermeable layer is between the resilient material and the reinforcement layer(s).

4. Support according to one of the preceding claims, characterized in that at least one of the reinforcement layers is made in such a way that it is reversibly flexible.
5. Support according to one of the preceding claims, characterized in that the bottom layer (4) comprises anti-slip material.
6. Support according to one of the claims 2-5, characterized in that the covering layer, the bottom layer and the additional layer are fused together at the position of the edges (3) of the support.
7. Support according to one of the preceding claims, for supporting an arm or a wrist in particular during use of a computer mouse, characterized in that it comprises a mouse mat (12).
8. Support according to claim 7, characterized in that at least on one side the bottom layer (4) of the support (1) projects from the support by the same dimensions as a mouse mat, the projecting part comprising a top surface which has sufficient friction with a computer mouse to allow use of the mouse.
9. Support according to claim 7 or 8, characterized in that at least on one side both the covering layer (2) and the bottom layer (4) of the support project by the same dimensions as a mouse mat and are joined together, thereby forming the mouse mat.
10. Method for manufacturing a support according to any of the claims 2-9, characterized in that a bottom layer (4), at least one reinforcement layer (6, 7), an additional, substantially air-impermeable layer (8), a resilient layer (5) and a covering layer (2) are placed in succession on top of one another, in the above or in the reverse order, the dimensions of these layers being selected in such a way that the bottom layer, the

additional layer and the covering layer project on all sides beyond the reinforcement layer(s) and the resilient layer, after which the projecting parts of the covering layer, the additional layer and the bottom layer are joined together and  
5 enclose the resilient layer in a substantially airtight manner between the covering layer and the additional layer, and the reinforcement layer(s) between the additional layer and the bottom layer.