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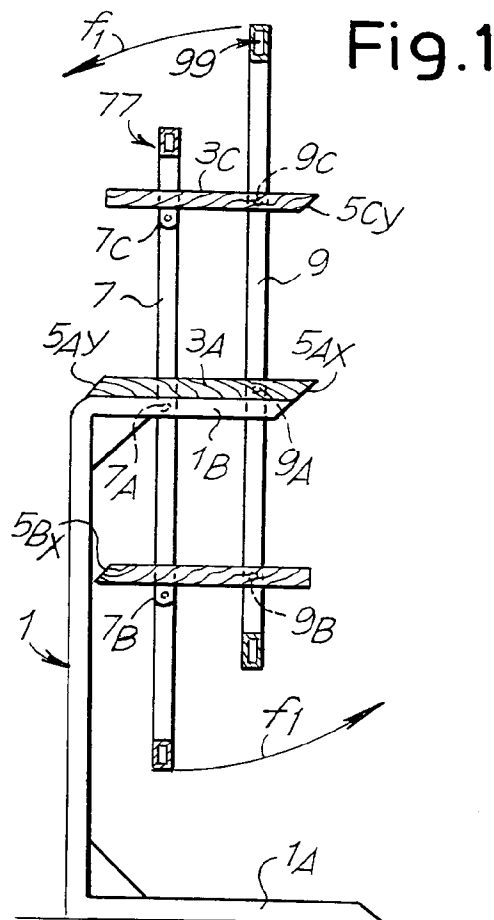
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(54) **Convertible unit for making into shelving, displays and the like.**

(57) The convertible unit comprises a series of panels (3A, 3B, 3C) connected together by hinged parallelogram systems (77, 99) by means of which the panels can adopt different positions, remaining parallel with each other at all times, and including a coplanar position.



The subject of the invention is a convertible unit for making into comparatively large horizontal supporting surfaces and/or supporting shelves. The unit's configuration can be changed at any moment by suitable means. Its great advantages are in the way it makes the most of the available space and in the varied alternative uses to which it can quickly be put. These and other objects and advantages will be clear from the following text and from the accompanying drawings.

The present convertible unit basically comprises a series of panels connected together by hinged parallelogram systems by means of which the panels can adopt different positions, remaining parallel with each other at all times, and including a coplanar position.

The hinged parallelogram systems may comprise pairs of bars that are hinged to opposite ends of the panels in such a way that they come together when the panels are in the coplanar position; the hinge pins by which they are connected to each panel are not in alignment.

In one particular embodiment of the convertible unit, the panels are kept horizontal to form shelves one above the other, or in a stepped arrangement or to make a table surface in the coplanar configuration.

However embodied, the convertible unit may comprise at least one supporting structure fixed to one of the panels. Said supporting structure may be fixed to a panel at either extremity or to an intermediate panel. The supporting structure may rest on or be fixed to a floor, and/or be fixed adjacent to a ceiling, and/or be fixed to a vertical wall.

The supporting structure may form a fixture.

Corresponding bars forming hinged parallelogram systems at a distance from each other may be constructed as parts of a single frame; a single frame may be provided which in the coplanar position runs around the periphery or at least two peripheral frames that can come together may be provided.

A clearer explanation of the invention will be provided by the description and accompanying drawing, the latter showing a practical non-restrictive embodiment of the invention. In the drawing:

Figs 1 and 2 show a vertical cross section through the line I-I of Fig. 2 and a front elevation as viewed from II-II of Fig. 1, to illustrate the position of a convertible unit in which several panels form shelves or the like;

Figs 3 and 4 show the unit illustrated in Figs 1 and 2 converted into a table surface;

Fig. 5 shows a plan viewed from the line V-V indicated in Fig. 4;

Fig. 6 shows a section similar to that in Figs 1 and 3, in which the panels are positioned in a stepped arrangement to form a display unit;

Figs 7 and 8 show perspective views of a unit in two configurations that convert easily to form a kitchen table, living room table or buffet table with

wheels to move it around, and a shelving or display unit that can be set at various angles such as that shown in Fig. 6;

Figs 9 and 10 show a display unit for a shop or the like or a wall-mounted bookcase, convertible from a shelf structure into a counter;

Figs 11 and 12 show a similar embodiment that includes fixed shelves; and

Figs 13 and 14 show two positions of a structure as a bookcase that can also be swung up to the ceiling or a false ceiling or under-ceiling storage surface that converts into shelves.

In Figs 1 to 5 the numeral 1 indicates a support which may either be the only support or be one of two supports positioned alongside each other at a distance from each other, which support or each of which supports comprises a base 1A and a bracket 1B which supports, and to which is fixed, a first panel 3A that forms one of a series of panels, for example three panels 3A, 3B and 3C forming the complex of usable surfaces; the three panels are identical, except as regards the shaping of the longitudinal edges such as 5AX and 5AY of panel 3A, 5BX of panel 3B which must be complementary to the profile of edge 5AX, and 5CY of panel 3C which must be complementary to the profile of edge 5AY. These terminal shapes will advantageously be angled to facilitate their coming together in the manner for the reasons described below. The panels of the series of panels, for example the three panels 3A, 3B and 3C, are connected together by two hinged parallelogram systems, each of which comprises two bars 7 and 9 that are hinged to the short ends of the panels 3A, 3B and 3C at their respective hinge points 7A, 7B and 7C, and 9A, 9B and 9C; the hinges 9A, 9B and 9C may lie in the thickness of the individual panels, whereas the hinges 7A, 7B and 7C will be displaced slightly below the thickness of the corresponding panels. The two bars 7 of the two opposite hinged parallelogram systems may be part of a frame 77 and similarly the two bars 9 of the two hinged parallelogram systems may be part of a single rectangular frame 99. The two frames 77 and 99 may be of essentially the same shape in order that as the two hinged parallelogram complexes are deformed, the two frames 77 and 99 come together as seen in Fig. 3.

Whatever the arrangement, it is possible to arrange the two hinged parallelogram systems in such a way as to bring the two shelves or panels 3B and 3C one beneath and one above panel 3A in the position shown in Fig. 1 to make up a set of shelves; from this position it is possible to move the two hinged parallelogram systems following the arrows f1 into the position shown in Fig. 3, in which panels 3B and 3C have been brought coplanar with panel 3A, edges 5AX and 5BX and edges 5AY and 5CY having been brought together. Frame 99 in the position shown in Fig. 3 is now above frame 77 and in a peripheral pos-

ition which surrounds the surface defined by the three coplanar panels 3A, 3B and 3C; in the position shown in Fig. 1 frames 77 and 99, and at all events bars 7 and 9, may for example be vertical, as in fact shown in Fig. 1, which also has a decorative effect.

Fig. 6 shows a stepped configuration in which the surfaces or panels 3A, 3B and 3C can be arranged: this enables the unit to be used as, for example, a display unit for a shop window or for other equivalent uses.

It is worth noting that in all cases, while the surfaces such as 3A, 3B and 3C are being moved into various possible positions, these surfaces move parallel with each other and thus are always horizontal, enabling them to carry any object still standing on the various surfaces into the different positions, provided they are compatible with the spaces required for the movements imposed by the hinged parallelogram systems described above.

The embodiment shown in Figs 1 through 5 is provided with two supports 1 which together give the unit stability.

Figs 7 and 8 depict an embodiment provided with a single support 101 similar to the support 1 but with a larger base 101A in order to give the unit stability; the base 101A may have castors. The unit again has three panels or surfaces 103A, 103B, 103C similar to the panels 3A, 3B, 3C, panel 103A being supported by the support 101 and panels 103B, 103C being hinged by means of hinged parallelogram systems with bars 107 and 109 corresponding to bars 7 and 9 from the previous example and generally constructed as frames 177 and 199. The basically symmetrical arrangement of the mobile surfaces about the fixed intermediate surface, such as 3A and 103A, gives the mobile structure a certain equilibrium in all positions; some form of locking system employing friction, pins or dual-purpose tie-strut members, may be provided in order to stabilize the positions in which the surfaces can be placed.

Figs 9 and 10 show an arrangement designed to be fixed to a vertical wall P. Attached to this wall is a supporting structure 201 which replaces the support on bases such as 1 or 101; the structure 201 is bracket-shaped with parts 201A; a surface 203B is fixed to these and hence to the wall. Bars 207 and 209 functionally equivalent to 7, 9 and 107 and 109 of the previous examples are hinged at 207A and 209A to the structure 201, 201A and with this structure can form mobile frames 277, 299 to which extra surfaces or panels 203A and 203C are hinged in a similar arrangement to the previous examples but with the fixed surface in an asymmetrical position. This embodiment allows the surfaces 203A and 203C to be moved between the position in which they are coplanar with the surface 203B, as shown in Fig. 9, and a position in which they stand above each other against the wall P as shown in Fig. 10. Once again the sur-

faces stay parallel with each other throughout their movement and objects standing on them can be left in place provided they are compatible with the spaces required for the angular movements of the surfaces, indicated by the double arrows in these Figs 9 and 10.

To avoid taking up space on surface 203C, the uppermost horizontal member of frame 277 (uppermost, that is, in the position of Fig. 10) may run beneath this surface, that is level with the hinges between the frame and the surface.

In a possible variant of the embodiment shown in Figs 9 and 10 it is possible to provide fixed shelving beneath the structure 201, 201A to supplement the arrangement of superimposed surfaces shown in Fig. 10; the surfaces beneath the structure 201, 201A are easy to get at in the position of Fig. 10 but less accessible in the position of Fig 9.

Figs 11 and 12 show a similar embodiment to that of Figs 9 and 10 in the variant referred to. In this version a structure 401 carries the surface 403B, which remains fixed, while three surfaces 403A, 403C, 403D are hinged to two frames 477, 499 similar to frames 277, 299 which are attached to the supporting structure by hinges 407A, 409A corresponding to hinges 207A, 209A from Figs 9 and 10. The frames 477 and 499 rotate about said hinges 407A and 409A to enable them to adopt a horizontal side-by-side position as shown in Fig. 11 and a vertical position as shown in Fig. 12, simultaneously moving the surfaces 403A, 403C, 403D. The horizontal member of the frame 499 that is uppermost in the position of Fig. 12 may run beneath surface 409D for the reasons already indicated in relation to frame 277.

Underneath the surface 403B, which remains fixed, are extra surfaces 403E and 403F which remain fixed. The supporting structure 401 in this case again may be fixed to a wall as was the example of Figs 9 and 10; alternatively it may consist of or be supplemented by a structure standing on the floor; if this structure 401 is not wall-mounted, special supports such as those indicated by 431 will have to be provided to act as legs hinged in some appropriate manner to the frames 477 and 499 as a support for the surface formed by these frames and by the coplanar surfaces, as shown in Fig. 11.

Figs 13 and 14 show a structure that can be used as a ceiling bookcase or a false ceiling or a partition as a ceiling storage space that is accessible by a similar operation to that made possible by the previously described structures. In this case one possible embodiment is to have a fixed structure 501 underneath a ceiling S. Hinged to the fixed structure 501 are frames such as 577 and 599 forming hinged parallelogram systems for supporting a series of surfaces such as 503B, 503C, 503D, 503E. In the position of Fig. 14 the surfaces are underneath a fixed surface 103A carried by the fixed structure 501, while in the position of Fig. 13 they can be brought coplanar with

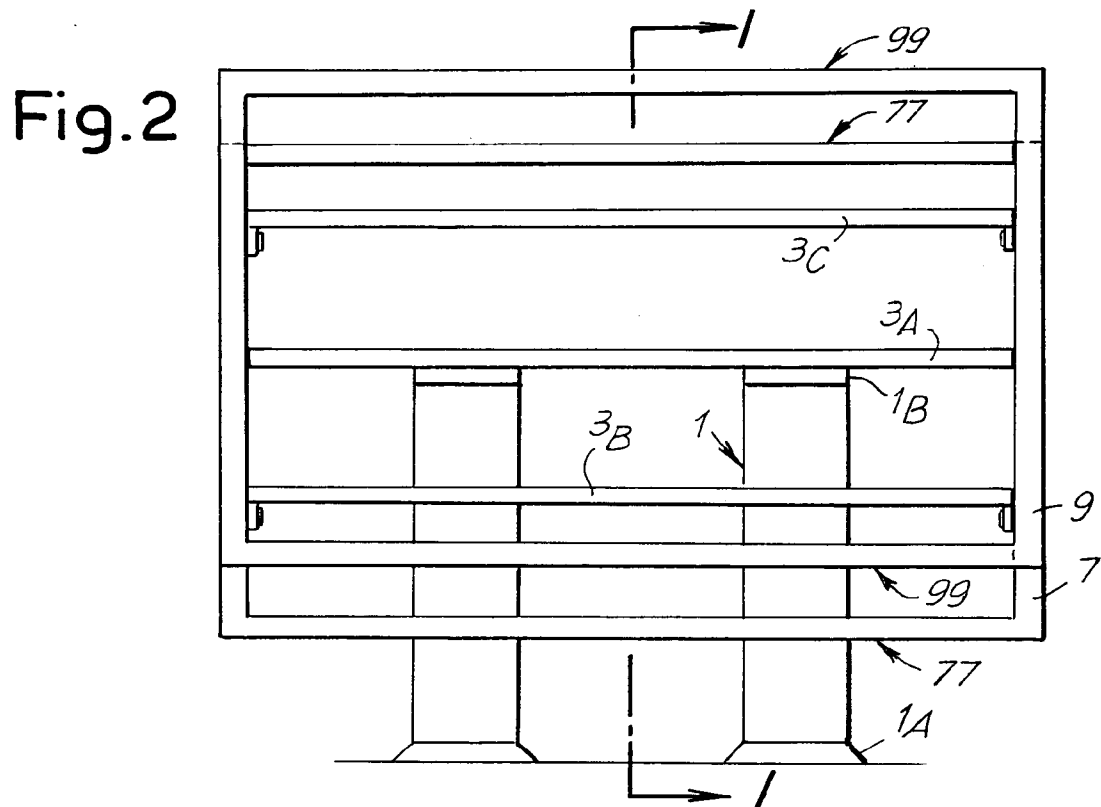
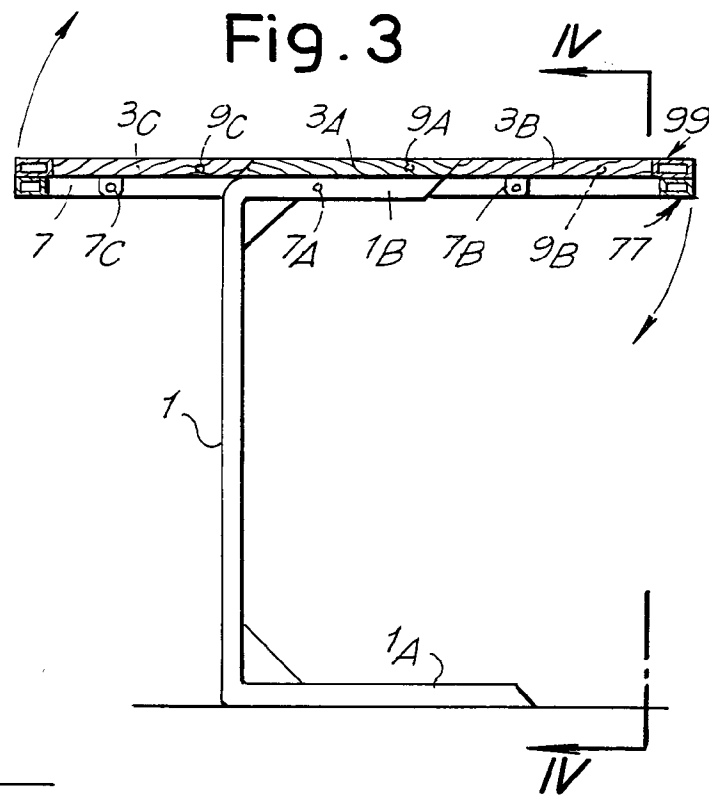
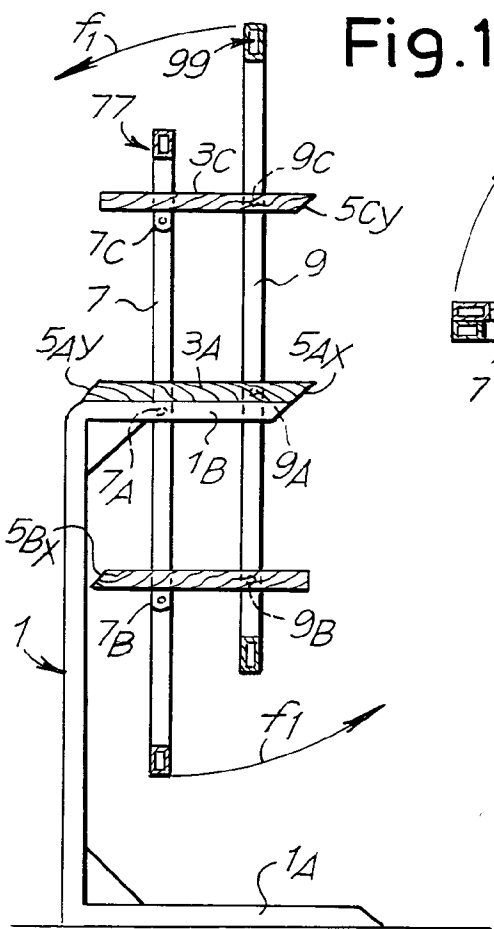
the fixed surface 503A and hence parallel with and immediately below the ceiling S, by moving the double hinge system of frames 577, 599, at least one of which must be fixed to the wall by means of snap fixings or the like, with the possibility of removing it remotely into the position shown in Fig. 13. As an alternative, it is also possible to fix the frames to a wall that is close up against the bars of the two hinged parallelogram frames 577 and 599 as they execute their angular movement; or to provide rods with shoes to support the frames in the horizontal position. These solutions for the movements and fixing in the position shown in Fig. 13 must take account of the loads on said surfaces 503B, 503C, 503D, 503E. In the position shown in Fig. 13 the loads, that is objects supported by the surfaces, fit in the space between the flat surface formed by the panels in the coplanar position and the overlying ceiling S. The size of the frames and the number of movable panels must be compatible with the height available beneath the fixed structure 501.

The above arrangements in each case provide the possibility of convenient use of space and of converting a multi-shelved supporting system into a range of positions such as those illustrated and also others which those skilled in the art will easily devise upon reading the above text.

It is to be understood that the drawing shows only an illustrative embodiment purely by way of a practical demonstration of the invention, it being possible for said invention to be altered as regards shapes and arrangements without thereby departing from the scope of the concept underlying said invention.

## Claims

1. A convertible unit comprising a series of panels connected together by hinged parallelogram systems by means of which the panels can adopt different positions, remaining parallel with each other at all times, and including a coplanar position.
2. The convertible unit as claimed in claim 1, in which the hinged parallelogram systems comprise pairs of bars that are hinged to opposite ends of the panels in such a way that they come together when the panels are in the coplanar position; the hinged pins by which they are connected to each panel not being in alignment.
3. The convertible unit as claimed in claim 1 or 2, in which the panels are kept horizontal to form shelves one above the other or like a ladder, and to make a table surface in the coplanar configuration.
4. The convertible unit as claimed in one or more of the previous claims, comprising at least one supporting structure fixed to one of the panels.
5. The unit as claimed in claim 4, in which the supporting structure is fixed to a panel at either extremity.
6. The unit as claimed in claim 4, in which the supporting structure is fixed to an intermediate panel.
7. The convertible unit as claimed in one or more of claims 1 through 4, in which the supporting structure rests on or is fixed to a floor.
8. The convertible unit as claimed in one or more of claims 1 through 4, in which the supporting structure is fixed to a vertical wall.
9. The convertible unit as claimed in one or more of claims 1 through 4, in which the supporting structure is fixed adjacent to a ceiling.
10. The unit as claimed in one or more of the previous claims, in which the supporting structure forms a fixture.
11. The convertible unit as claimed in one or more of the previous claims, in which corresponding bars forming hinged parallelogram systems at a distance from each other form part of a single frame; it being possible to provide a single frame which in the coplanar position runs around the periphery, or to provide at least two peripheral frames that can come together.
12. The unit as claimed in claim 11, in which one of the frames is completed by one side running beneath a surface at either extremity.



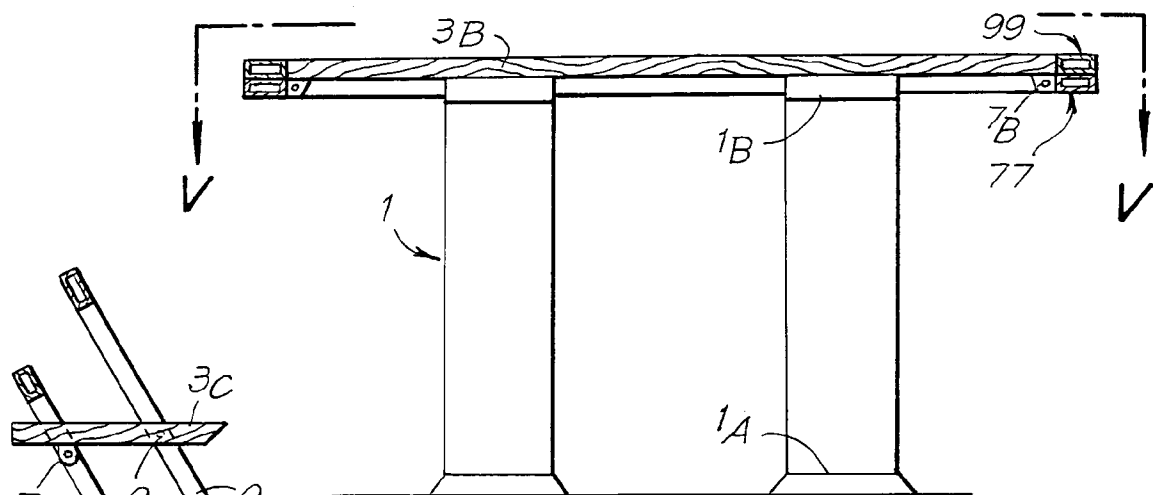


Fig. 4

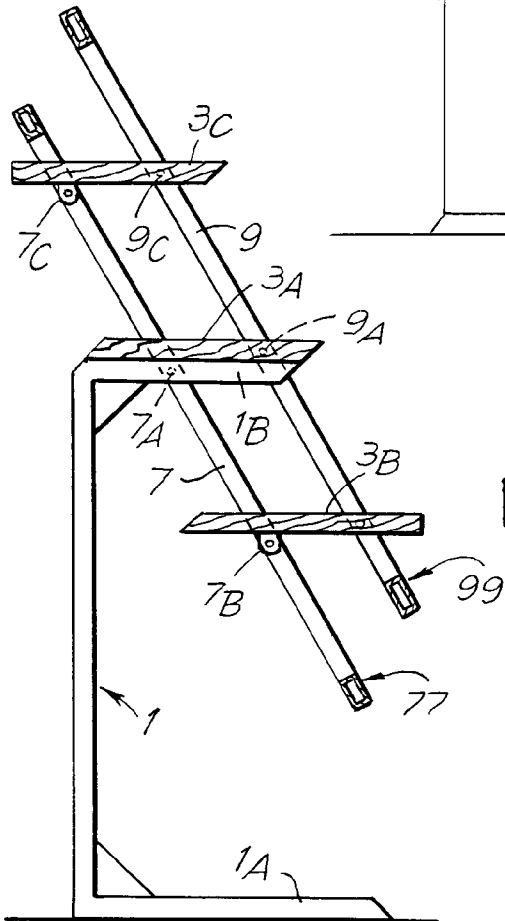


Fig. 6

Fig. 5

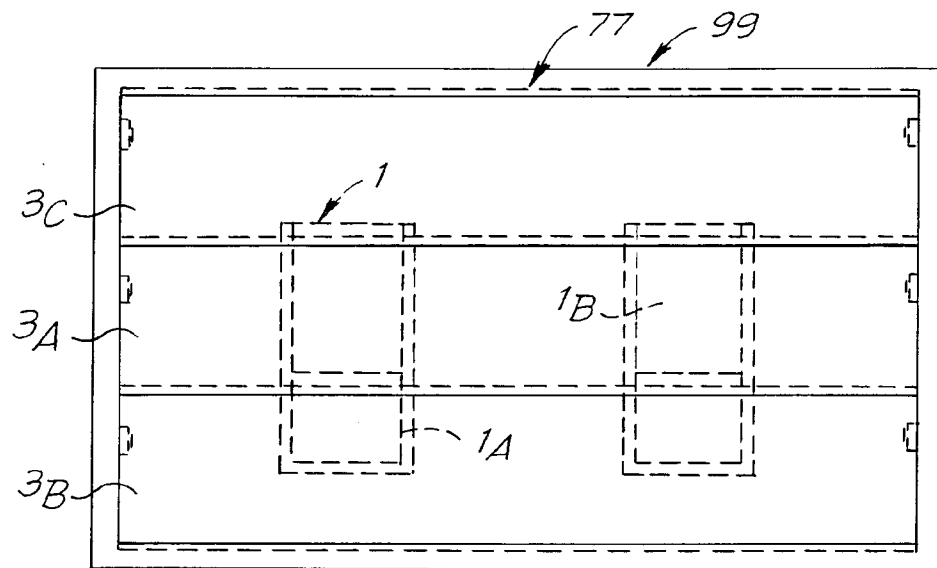


Fig. 7

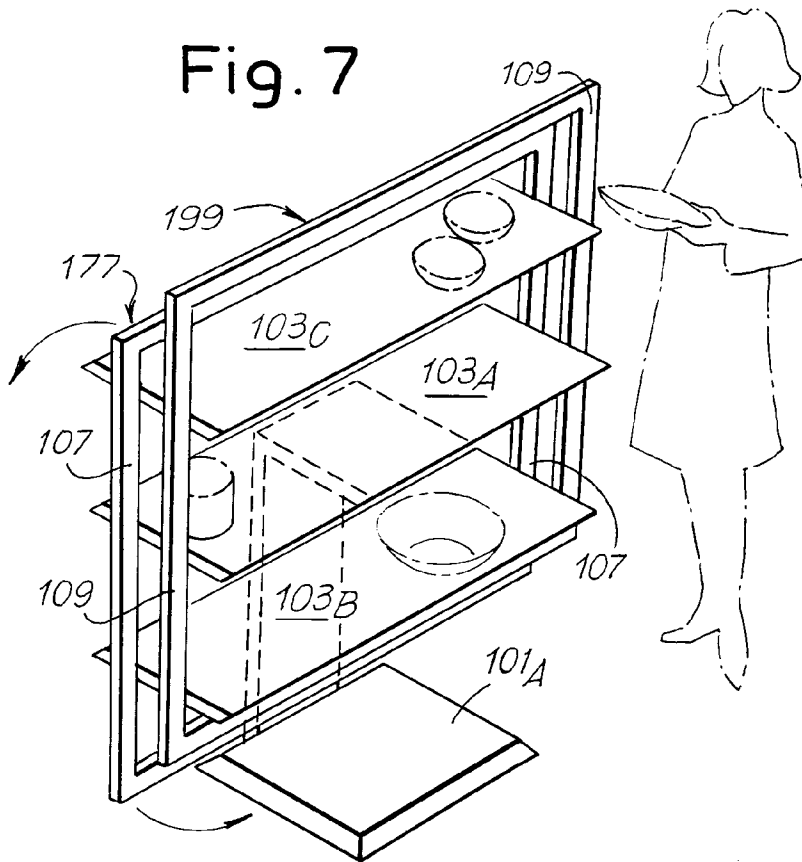


Fig. 8

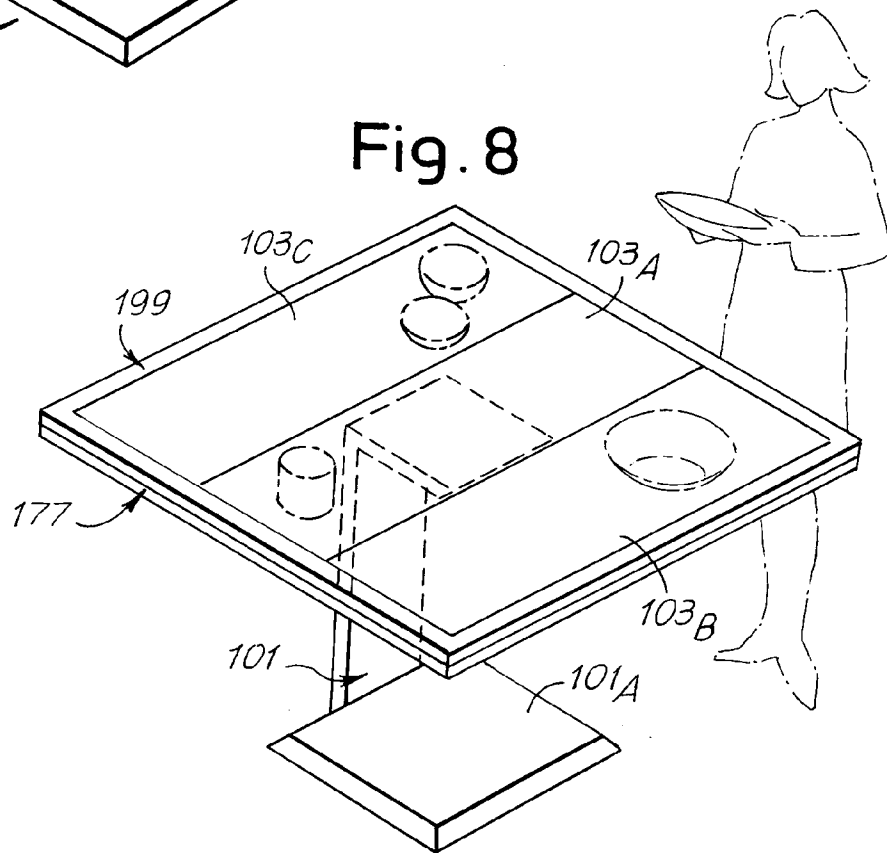


Fig. 9

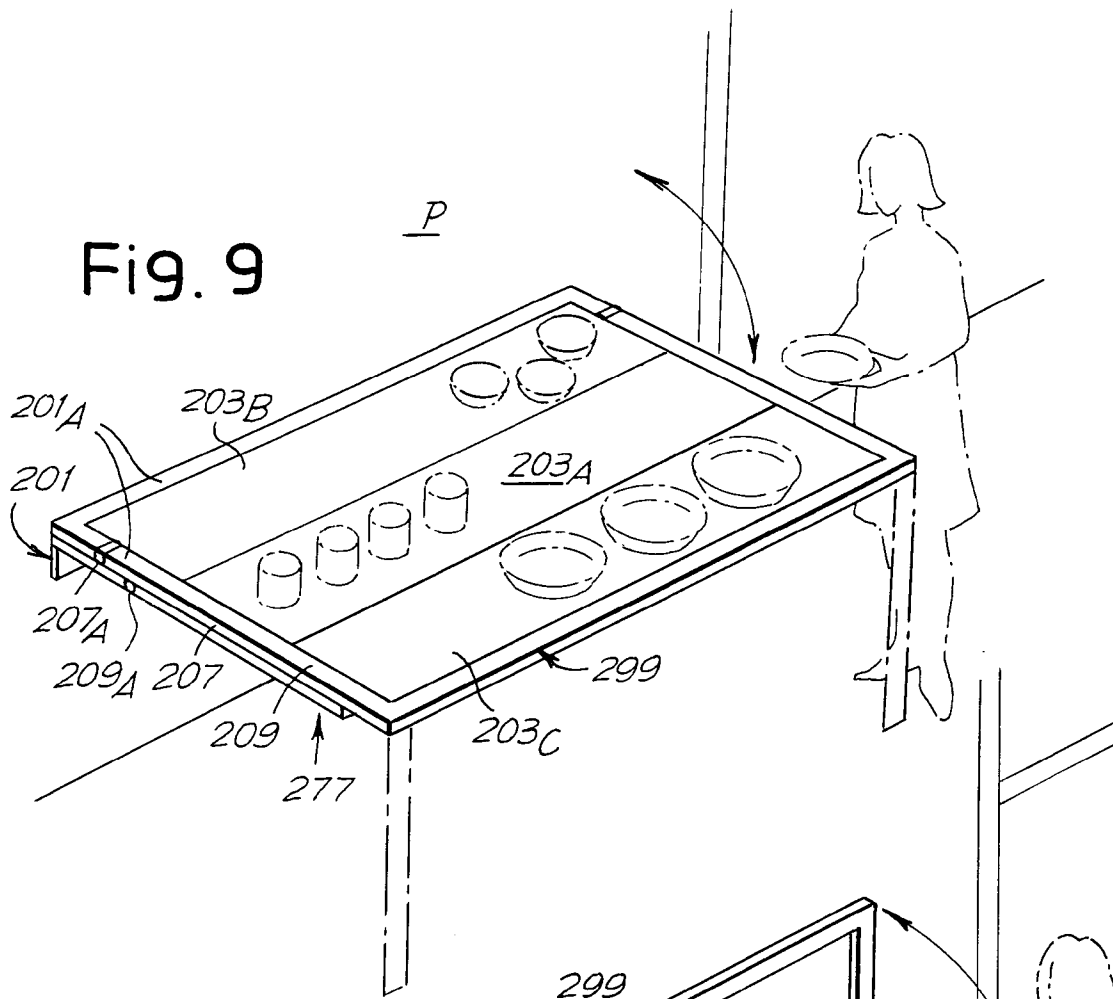


Fig. 10

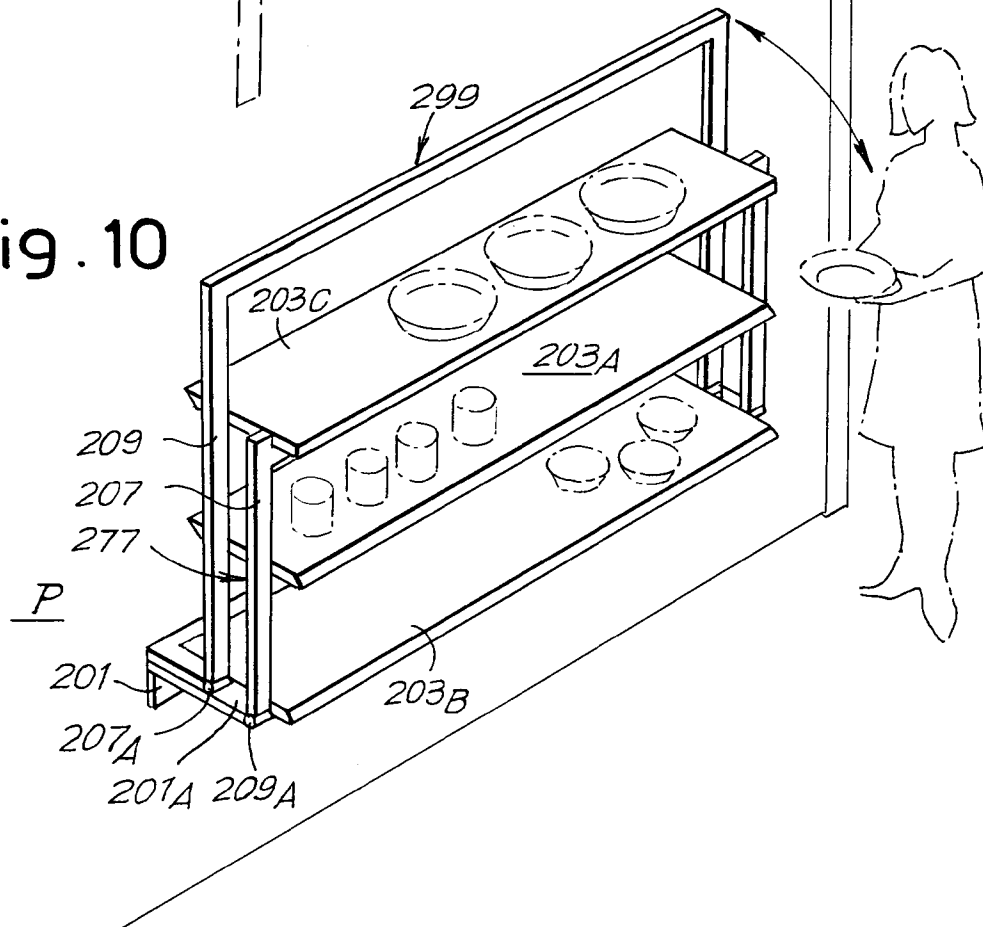


Fig.11

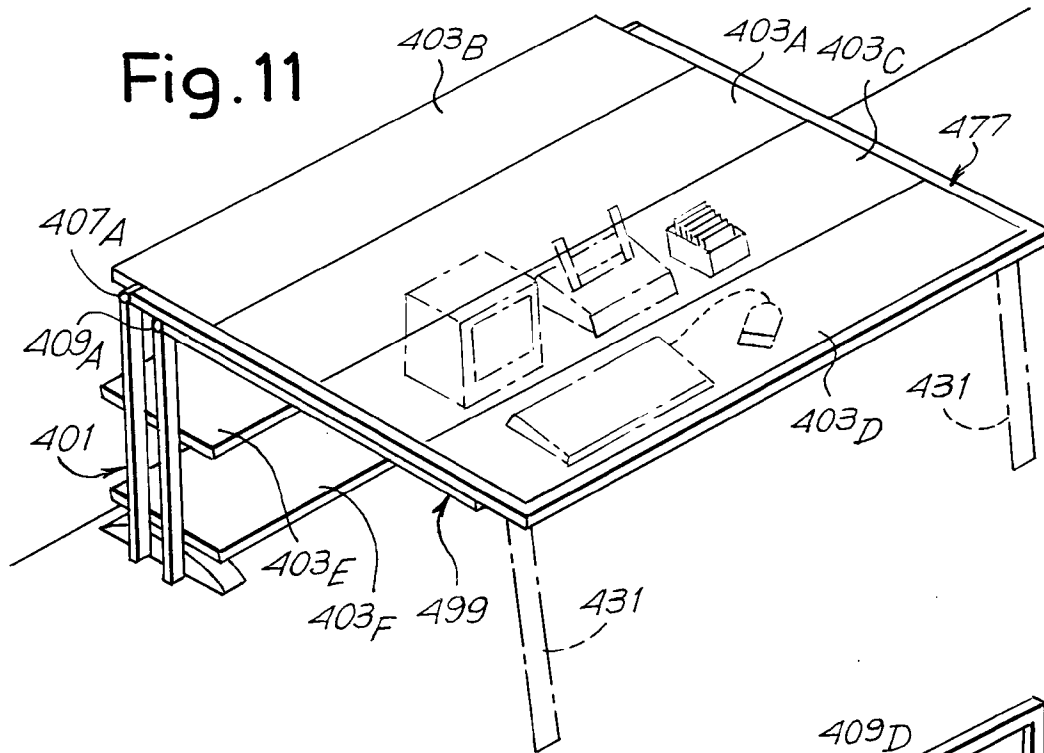
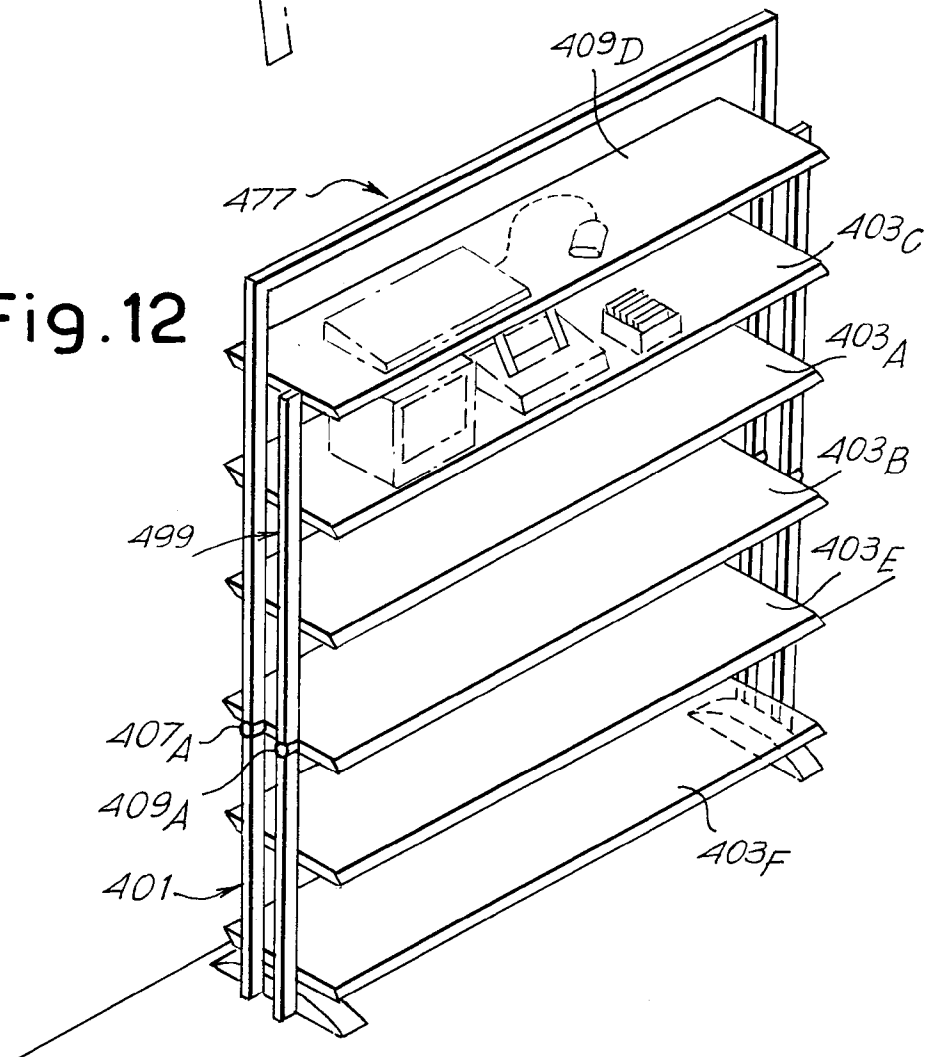


Fig.12



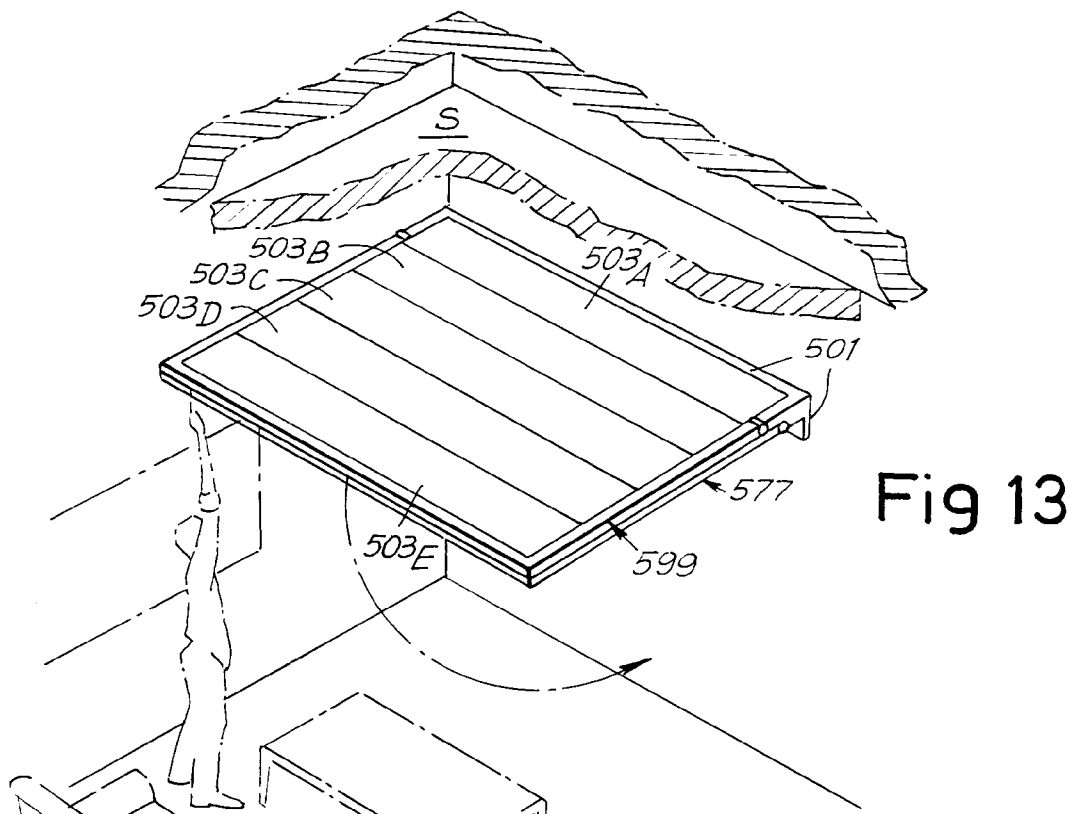
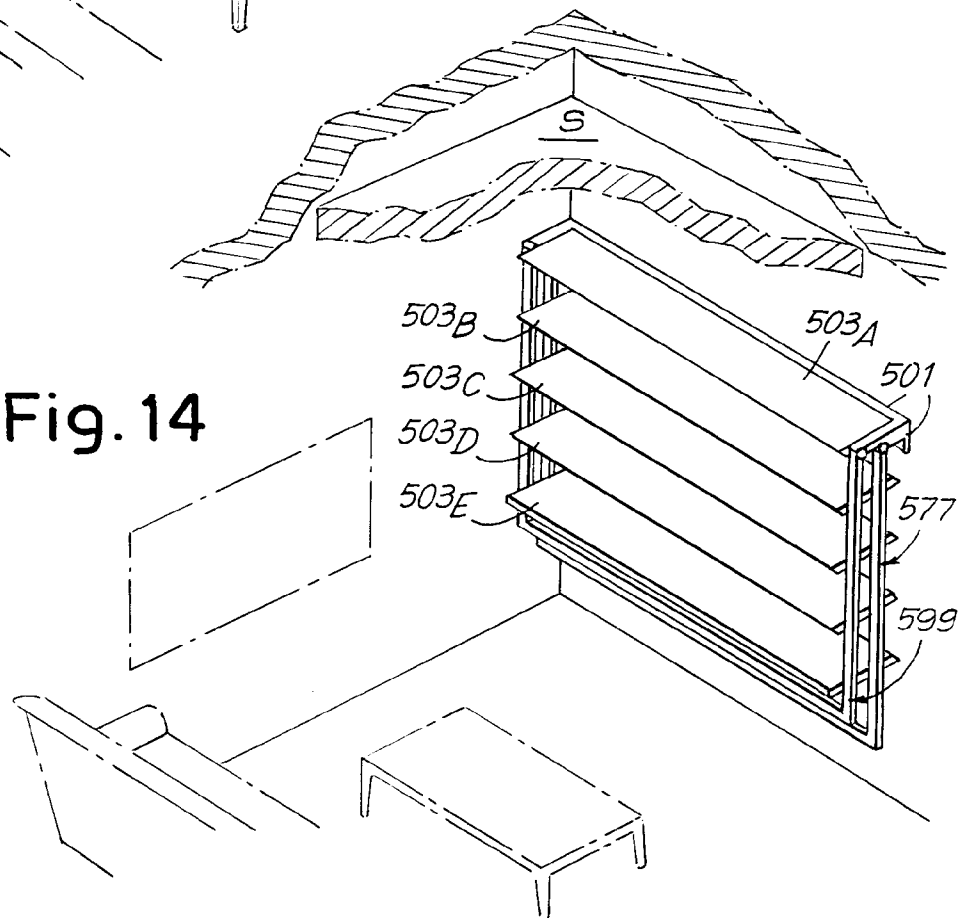


Fig. 14





European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 93 83 0313

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                               |                                                     |                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim                                   | CLASSIFICATION OF THE APPLICATION (Int.Cl.5) |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | DE-U-90 10 709 (TESCH)<br>* the whole document *                              | 1-7                                                 | A47B85/06                                    |
| X<br>A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | US-A-1 889 901 (MILLARD)<br>* the whole document *                            | 1<br>11                                             |                                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                               |                                                     | TECHNICAL FIELDS<br>SEARCHED (Int.Cl.5)      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                               |                                                     | A47B                                         |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                               |                                                     |                                              |
| Place of search<br>THE HAGUE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                               | Date of completion of the search<br>5 November 1993 | Examiner<br>NOESEN, R                        |
| <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone<br/> Y : particularly relevant if combined with another document of the same category<br/> A : technological background<br/> O : non-written disclosure<br/> P : intermediate document</p> <p>T : theory or principle underlying the invention<br/> E : earlier patent document, but published on, or after the filing date<br/> D : document cited in the application<br/> L : document cited for other reasons<br/> &amp; : member of the same patent family, corresponding document</p> |                                                                               |                                                     |                                              |

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