



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 0 741 985 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.11.1996 Bulletin 1996/46

(51) Int. Cl.⁶: **A47C 7/18**, A47C 7/40

(21) Application number: **96107390.5**

(22) Date of filing: **09.05.1996**

(84) Designated Contracting States:
DE ES FR GB IT

(30) Priority: **12.05.1995 JP 149352/95**

(71) Applicant: **KABUSHIKI KAISHA KOTOBUKI**
Tokyo 03 (JP)

(72) Inventor: **Yamazaki, Ryokichi,**
c/o K.K. Kotobuki
Tokyo (JP)

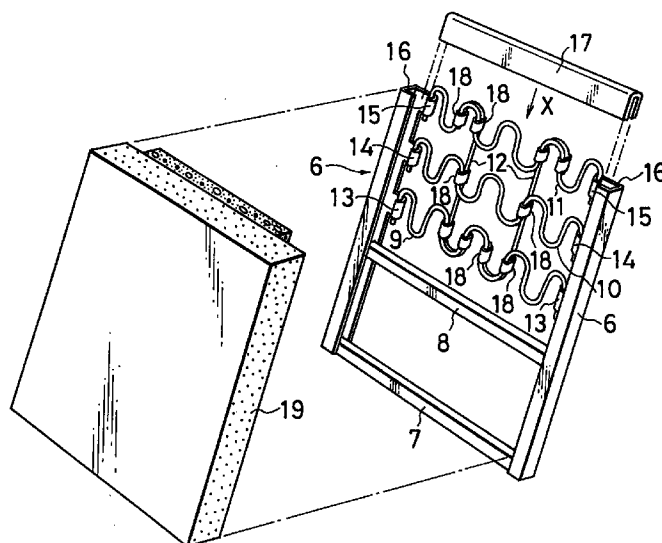
(74) Representative: **Füchsle, Klaus, Dipl.-Ing. et al**
Hoffmann, Eitle & Partner,
Patentanwälte,
Arabellastrasse 4
81925 München (DE)

(54) **Chair**

(57) Disclosed is a chair (1) including a frame (6) composed of right and left side frames (16, 20) parallel with each other fixed to a lower fixing frame (7) and a flat sheet back (4) composed of a cushion member (19) and engaged with the above frame, the chair being arranged such that a plurality of stairs of elastic members (9, 10, 11, 21, 22) are interposed between the right and left side frames above the fixing frame and a degree of deflection due to a load of the elastic members is sequentially increased from the lower portion of the sheet back toward the upper portion thereof. Coupling

members (12) may be interposed between the respective springs. With this arrangement, when a seating system is folded and accommodated, the chair of the present invention is made flat and has a smaller thickness as compared with a conventional chair including a sheet back having a curved surface, thus even if the number of stairs of the seating system is increased, a space of a storing place and an equipment cost can be reduced.

FIG.2



EP 0 741 985 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a chair, and more specifically, to the improvement of a chair of a seating system mainly installed in halls, gymnasiums, stadiums and the like.

Description of the Related Art

As a conventional chair, a chair shown in FIG. 6(a) is composed of a synthetic rubber sheet member 26 interposed between two right and left side frames 25, 25 through two coupling bars 27 at three positions on the right and left sides. A chair shown in FIG. 6(b) is composed of a hard plastic sheet member 29 interposed between right and left side frames 28, 28 through metal coil springs 30. Further, there are chairs including a flat seat back (FIG. 7(a), FIG. 8(a)) and a seat back having a curved surface so as to approximately fit to the curved line of the backbone of a sitting person (FIG. 7(b), FIG. 8(b)).

When a load is applied to the sheet member 26 of the chair shown in FIG. 6(a), since the deflection of the sheet member 26 is not changed at the upper, middle and lower portions thereof, the sheet member 26 has a drawback that it cannot be fitted to the curved backbone as a whole of a sitting person and further when a load is applied to the upper portion of the sheet back, the sheet member 26 is liable to be deformed. The deflection due to a load of the sheet member 29 of the chair shown in FIG. 6(b) is difficult to be changed at the upper, middle and lower portions of the sheet member 29 and the portion constituting the surface of the sheet member 29 is not deflected, it is difficult to fit the sheet member 29 to the curved backbone as a whole of a sitting person.

The flat seat back shown in FIG. 7(a) is advantageous in that when a depth L for a seat is given, a larger width D of a passage can be secured between a front chair and a rear chair, whereas the flat seat back is defective in seating comfort. On the other hand, although the seat back having the curved surface shown in FIG. 7(b) is excellent in seating comfort, it is defective in that when the depth L for a seat is given, a width d of the passage is narrowed ($d < D$). Further, a chair installed in a telescopic seating system will be examined below. FIG. 8(a) and FIG. 8(b) show a moving floor (only a portion of it is shown) including chairs accommodated therein, wherein although the flat sheet back can reduce a height h of an accommodation space as shown in FIG. 8(a), it is defective in seating comfort. On the other hand, although the sheet back having the curved surface is excellent in seating comfort, it is defective in that it increases the height h of the accommodation space as shown in FIG. 8(b) ($H > h$).

An object of the present invention is to provide a chair having the advantage of the flat sheet back and the advantage of the sheet back having the curved surface at the same time.

SUMMARY OF THE INVENTION

To obtain the aforesaid object, the above problems are solved in claim 1 of the present invention by a chair including a frame composed of right and left side frames parallel with each other fixed to a lower fixing frame and a flat sheet back composed of a cushion material and engaged with the above frame, the chair being arranged such that a plurality of stairs of elastic members are interposed between the right and left side frames above the fixing frame and a degree of deflection due to a load of the elastic members is sequentially increased from the lower portion of the sheet back toward the upper portion thereof.

In claim 2, the chair according to claim 1 can be arranged such that the elastic members are composed of wave-shaped springs on a plane and the pitches of the springs are increased at the upper portion of the sheet back than at the lower portion thereof.

In claim 3, the chair according to claim 1 can be arranged such that the elastic members are composed of wave-shaped springs on a plane and the entire lengths of the springs are increased at the upper portion of the sheet back than at the lower portion thereof.

In claim 4, the chair according to claim 1 can be arranged such that the elastic members are composed of wave-shaped springs on a plane and the thicknesses of the springs are reduced at the upper portion of the sheet back than at the lower portion thereof.

In claim 5, the chair according to any of claims 2 to claim 4 can be arranged such that coupling members are interposed between the respective springs.

In claim 6, the chair according to claim 1 can be arranged such that the elastic members are composed of rubber sheet members.

The present invention is applicable not only to a chair fixed on a floor but also to a chair which can be risen up and fallen down in a telescopic seating system.

Although the number of a plurality of stairs of the elastic members used in the present invention are not particularly limited, a cost is increased by an increase of the number of the stairs, thus two or three stairs are usually preferable depending upon the size of the sheet back, and in particular three stairs are most preferable in balance in the size of a general-purpose sheet back.

Although the wave-shaped springs on a plane used in the present invention are made of, for example, spring steel, phosphor bronze or the like and have an approximately circular cross section, the spring steel is available at the lowest cost with large durability and convenient to use.

Although the rubber sheet members used to the present invention are made of, for example, natural rubber or synthetic rubber (SBR, NBR etc.), the synthetic

rubber is available at the lowest cost with large durability and convenient to use.

When a seating system is folded and accommodated, the chair of the present invention is made flat and has a smaller thickness as compared with a conventional chair including a sheet back having a curved surface, thus even if the number of stairs of the seating system is increased, a space of a storing place and an equipment cost can be reduced.

When the seating system is used by being extended and expanded, since the sheet back of the chair is curved so as to be fitted to the substantially curved backbone of a sitting person, the sitting person becomes less fatigued because good seating comfort is obtained and the backbone is stably supported.

Since the wave-shaped springs on a plane having various sizes and the rubber sheet members as the elastic members can be selected in accordance with the sheet back, the above effect can be achieved by a simple structure.

Further, since the vertical coupling members are interposed between the respective springs, when a vertical load is applied to the upper portion of the sheet back, there can be obtained a function that the deflection of the springs is dispersed and eased.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic side elevational view of an example of a chair of the present invention, wherein (a) shows when the chair is vacant and (b) shows when the chair is occupied;

FIG. 2 is a schematic perspective view of a main portion of a sheet back used to the chair of FIG. 1; FIG. 3 is a view schematically explaining a main portion of another example of the sheet back used to the chair of the present invention;

FIG. 4 are views schematically explaining main portions of other examples (a), (b) and (c) of the sheet back used to the chair of the present invention;

FIG. 5 is a view schematically explaining a main portion of a further example of the sheet back used to the chair of the present invention;

FIG. 6 is a view schematically explaining main portions of respective examples (a), (b) of the sheet back of a conventional chair;

FIG. 7 is a view schematically explaining the respective examples (a), (b) of the conventional chair; and

FIG. 8 is a view schematically explaining the respective examples (a), (b) of the sheet back in the state that the chairs are installed in a conventional telescopic seating system.

DESCRIPTION OF PREFERRED EMBODIMENTS

Embodiments of the present invention will be described with reference to the drawings.

In FIG. 1 and FIG. 2, a chair 1 having a seat 3 and a sheet back 4 mounted thereto is supported on a base 2. The sheet back 4 is composed of a square metal frame 6, a foamed-urethane cushion member 19 engaged with the metal frame 6 and a thick surface covering material (covering sheet) 5 for covering the front and back surfaces of the cushion member 19.

The frame 6 is composed of C- and inverted C-shaped side frames 16, 16 symmetrically confronting with each other on the right and left sides of the frame 6, a lower end fixing frame 7 fixed to both the side frames 16, 16 at an lower end, an intermediate fixing frame 8 fixed to both the side frames 16, 16 at an intermediate portion and an upper end fixing cap 17 attached to both the side frames 16, 16 at an upper portion.

The side frames 16, 16 are made a little longer on a back surface side than a front surface side and each pair of three-stair locking pieces 13, 14, 15 are fixed at the symmetrical positions of the side frames 16, 16 on the back surface sides thereof at intervals from the upper end of the side frames, each locking piece having a vertical cylindrical shape with a cutout defined partially thereto. Both the ends of wave-shaped springs 9, 10, 11, each of which is made of spring steel, has an approximately circular cross section and is disposed on a plane, are inserted into the respective locking pieces 13, 14, 15, so that the three-stair springs 9, 10, 11 are stretched. In the embodiment, the springs 9, 10, 11 have the same pitch and the same entire length, the spring 9 has the largest thickness and the thicknesses of the springs 10 and 11 are sequentially reduced, thus the spring 11 has the smallest thickness.

Further, coupling members 12, 12 each fixed by a fixing ring 18 are disposed at symmetrical positions between the springs 9, 10, 11.

An embodiment shown in FIG. 3 is arranged such that the intermediate spring 10 among the three-stair springs 9, 10, 11 in the embodiment of FIG. 1 and FIG. 2 is abolished and the two-stair springs 9, 11 are stretched between each pair of locking pieces 13, 15 disposed on two stairs. Coupling rings 12, 12 each fixed by a fixing ring 18 are disposed at symmetrical positions between the springs 9, 11.

In the embodiment, the springs 9, 11 have the same pitch and the same entire length, the spring 9 has the largest thickness and the thickness of the spring 11 is made smaller than that of the spring 9.

An embodiment shown in FIG. 4 is the simplest example arranged such that springs 9, 11 are stretched between each pair of two-stair locking pieces 13, 15 likewise the embodiment of FIG. 3 and the coupling members 12, 12 fixed between the springs 9, 11 in the above embodiment are abolished.

In (a), the pitch of the spring 9 is made larger than that of the spring 11 and the respective springs have the same thickness and the same entire length.

In (b), the entire length of the spring 9 is made shorter than that of the spring 11, the respective springs have the same thickness and the same pitch and the

spring 9 is stretched and interposed between a pair of the locking piece 13.

In (c), the thickness of the spring 9 is made larger than that of the spring 11 and the respective springs have the same thickness and the same pitch.

An embodiment shown in FIG. 5 is arranged such that a lower-stair synthetic rubber sheet member 21 and an upper-stair synthetic rubber sheet member 22 are interposed, in place of the springs of the embodiments of FIG. 1 - FIG. 4, between right and left side frames 20, 20 to which an intermediate frame 8 is fixed through each two sets of metal coupling bars 23. The material of the upper-stair synthetic rubber sheet member 22 is selected so that the deflection due to a load of the upper-stair rubber 22 is made larger than that of the lower-stair rubber sheet member 21.

With reference to FIG. 1, operation of the example of the chair of the present invention will be described when it is vacant (a) and when it is occupied (b).

When the chair is vacant, both the front and rear surfaces of the sheet back 4 are kept flat and the three-stair springs 9, 10, 11 are disposed on substantially the same plane when no load is applied.

When the chair is occupied, the backbone of a sitting person is fixed by the lower end fixing frame 7 and the intermediate fixing frame 8 and the springs 9, 10, 11 are deflected by the load of a sitting person so as to fit to the backbone using the backbone as a fulcrum. However, since the springs 9, 10, 11 have the same pitch and the same entire length, the spring 9 has the largest thickness and the thicknesses of the springs 10 and 11 are sequentially reduced and thus the spring 11 has the smallest thickness, the spring 11 is deflected in the greatest amount and the amounts of deflection of the springs 10, 9 are sequentially reduced. Therefore, the upper portion of the sheet back 4 can be curved by the above deflection so as to be fitted to the substantially curved backbone of the sitting person.

In the embodiments shown in FIG. 3 - FIG. 4, the intermediate spring 10 among the three-stair springs 9, 10, 11 is abolished to use only the two-stair springs 9, 11 and an amount of deflection due to a load of the spring 11 is made larger than that of the spring 9, in the respective embodiments. Consequently, the upper portion of the sheet back 4 can be curved by the deflection so as to be fitted to the substantially curved backbone of the sitting person.

Further, the coupling members 12, 12 shown in FIG. 2 and FIG. 3 act to disperse and ease the deflection of the springs when a load is applied in a vertical load direction X to the upper portion of the sheet back. For example, vertical deflections Y, Y shown in FIG. 3 can be reduced approximately one half those caused when the coupling members 12, 12 are not provided.

In the embodiment shown in FIG. 5, the upper-stair rubber sheet member 22 at the upper portion of the sheet back 4 is deflected by a load in an amount greater than that of the lower-stair rubber sheet member 21 deflected by the load. Consequently, the upper portion

of the sheet back 4 can be curved so as to be fitted to the substantially curved backbone of the sitting person likewise the two-stair springs of FIG. 3 - FIG. 4.

When a seating system is folded and accommodated, the chair of the present invention is made flat and has a smaller thickness as compared with a conventional chair including a sheet back having a curved surface, thus even if the number of stairs of the seating system is increased, a space of a storing place and an equipment cost can be reduced.

When the seating system is used by being extended and expanded, since the sheet back of the chair is curved so as to be fitted the substantially curved backbone of a sitting person, a sitting person becomes less fatigued because good seating comfort is obtained and the backbone is stably supported.

Since the wave-shaped springs on a plane having various sizes and the rubber sheet members as the elastic members can be selected in accordance with the sheet back, the structure of the sheet back can be simplified.

Further, since the vertical coupling members are interposed between the respective springs, when a vertical load is applied to the upper portion of the sheet back, there can be obtained an effect that the deflection of the springs is dispersed and eased.

Claims

1. A chair (1) including a frame (6) composed of right and left side frames (16, 20) parallel with each other fixed to a lower fixing frame (7) and a flat sheet back (4) composed of a cushion member (19) and engaged with the above frame, characterized in that a plurality of stairs of elastic members (9, 10, 11, 21, 22) are interposed between said right and left side frames above said fixing frame and a degree of deflection due to a load of said elastic members is sequentially increased from the lower portion of said sheet back toward the upper portion thereof.
2. A chair according to claim 1, wherein said elastic members are composed of wave-shaped springs (9, 10, 11) on a plane and the pitches of said springs are increased at the upper portion of said sheet back than at the lower portion thereof.
3. A chair according to claim 1, wherein said elastic members are composed of wave-shaped springs (9, 10, 11) on a plane and the entire lengths of said springs are increased at the upper portion of said sheet back than at the lower portion thereof.
4. A chair according to claim 1, wherein said elastic members are composed of wave-shaped springs (9, 10, 11) on a plane and the thicknesses of said springs are reduced at the upper portion of said sheet back than at the lower portion thereof.

5. A chair according to any of claims 2 to claim 4, coupling members (12) are interposed between said respective springs (9, 10, 11).
6. A chair according to claim 1, wherein said elastic members are composed of rubber sheet members (21, 22).

10

15

20

25

30

35

40

45

50

55

FIG. 1(b)

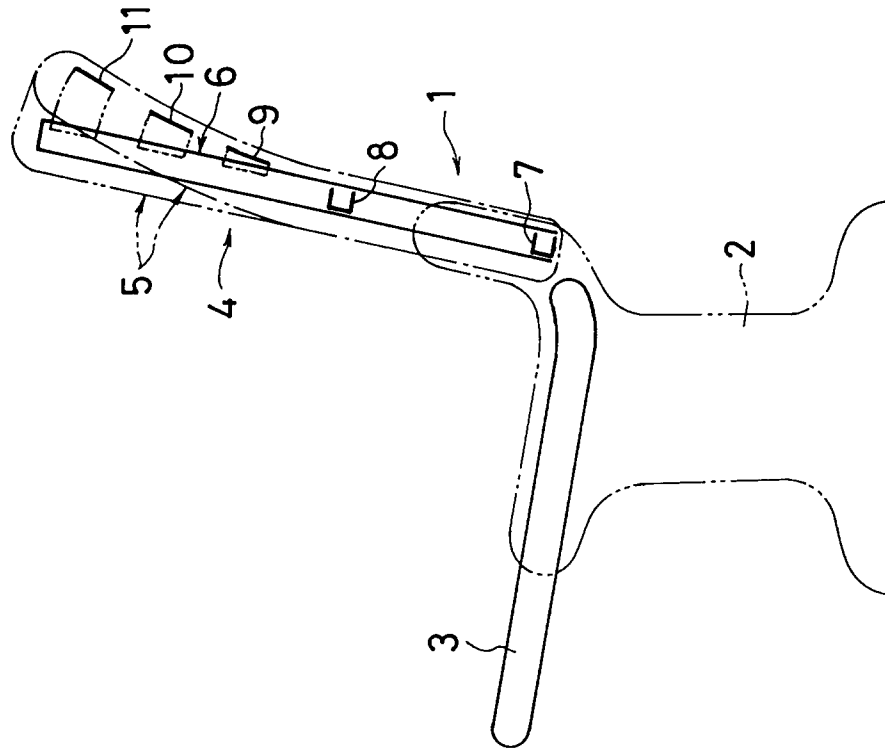


FIG. 1(a)

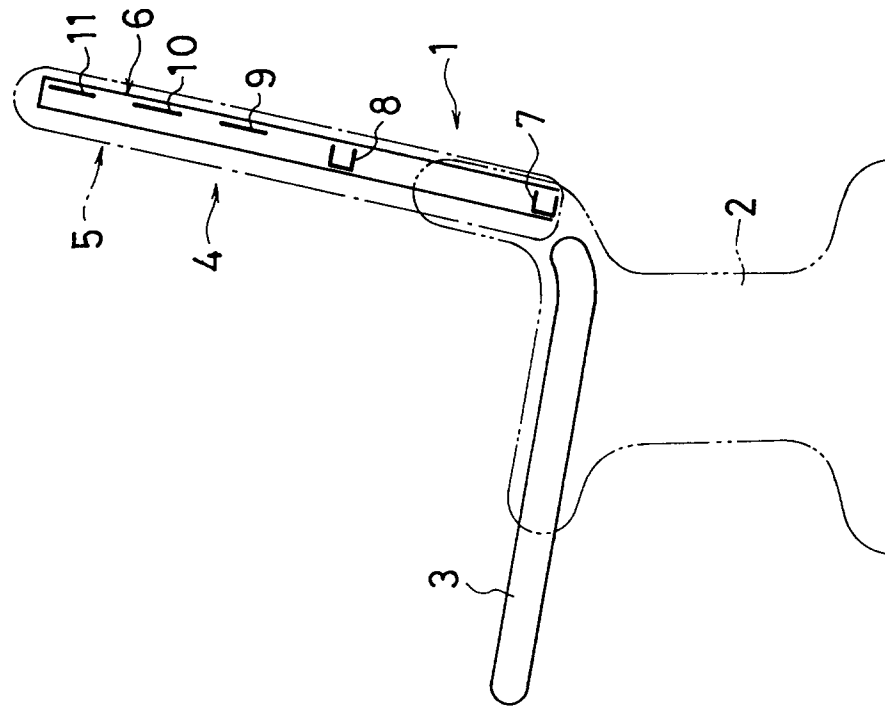


FIG.2

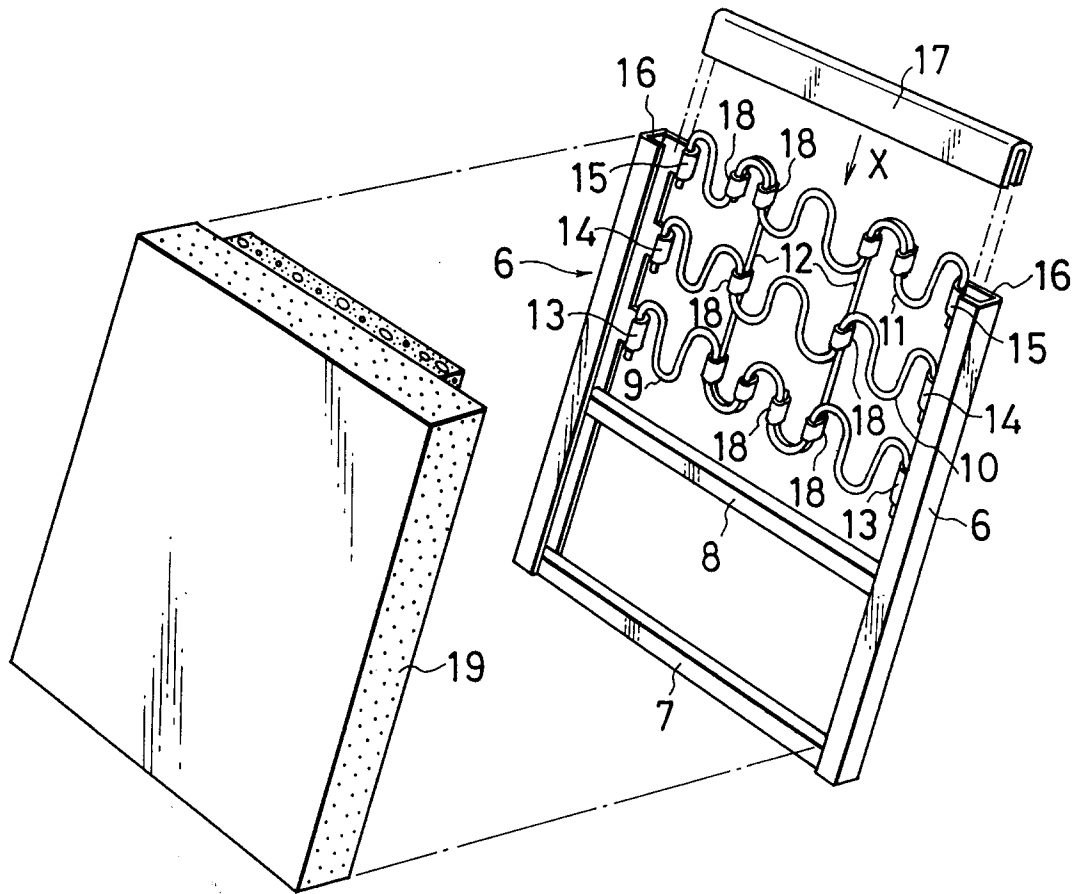


FIG.3

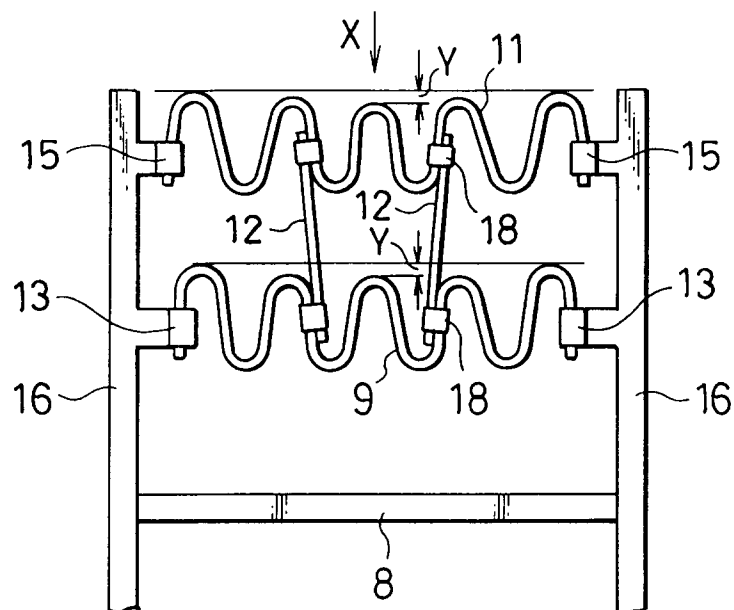


FIG. 4(a)

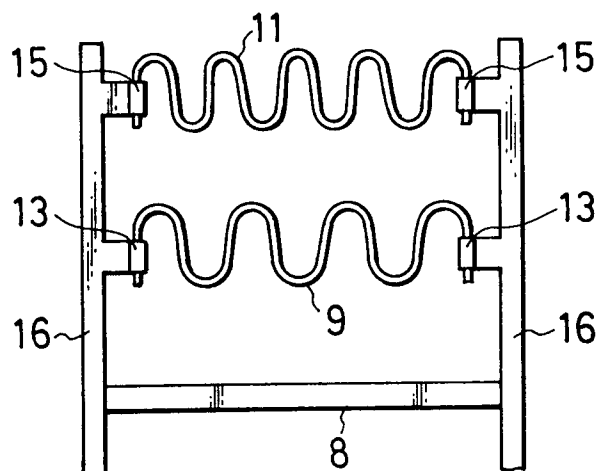


FIG. 4(b)

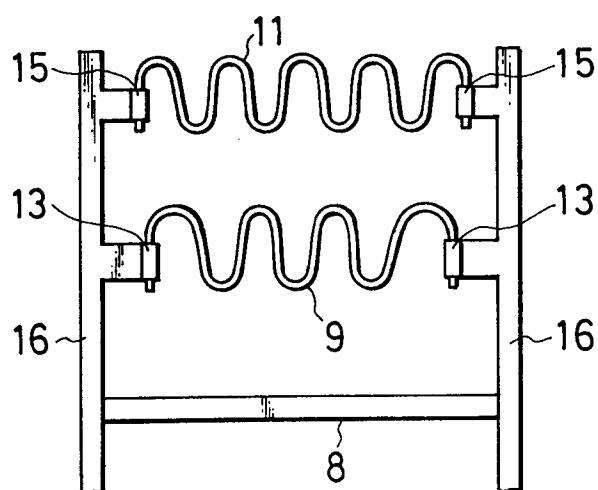


FIG. 4(c)

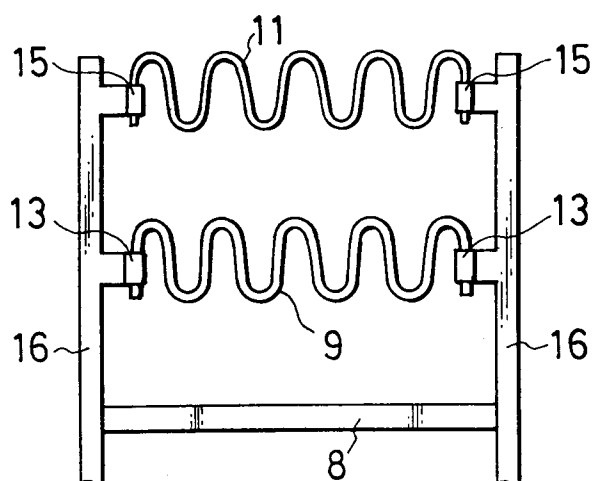


FIG.5

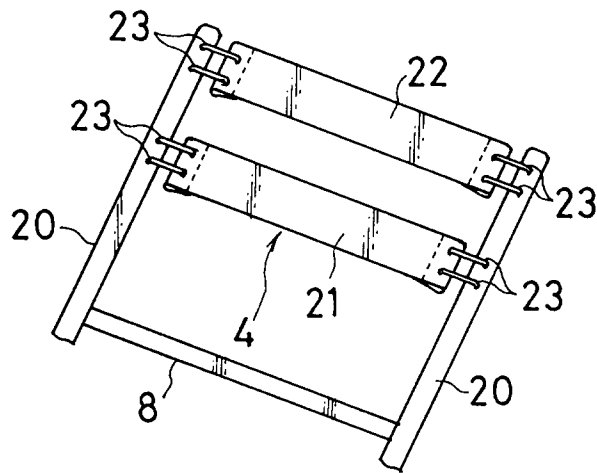


FIG.6(a)

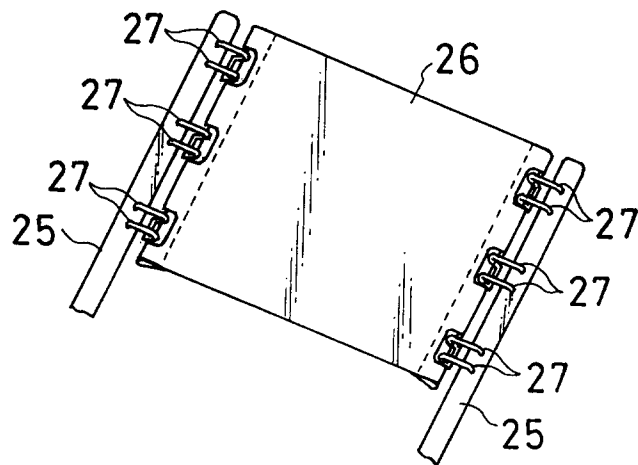


FIG.6(b)

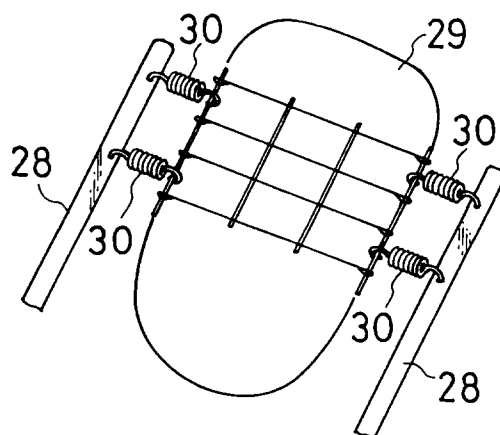


FIG. 7(a)

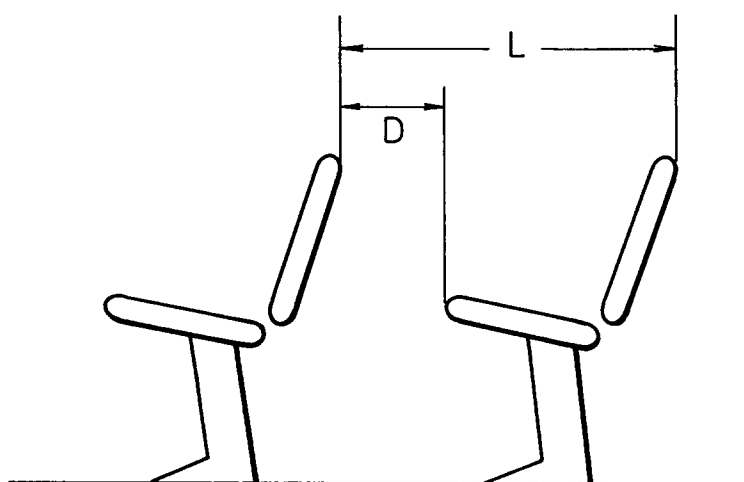


FIG. 7(b)

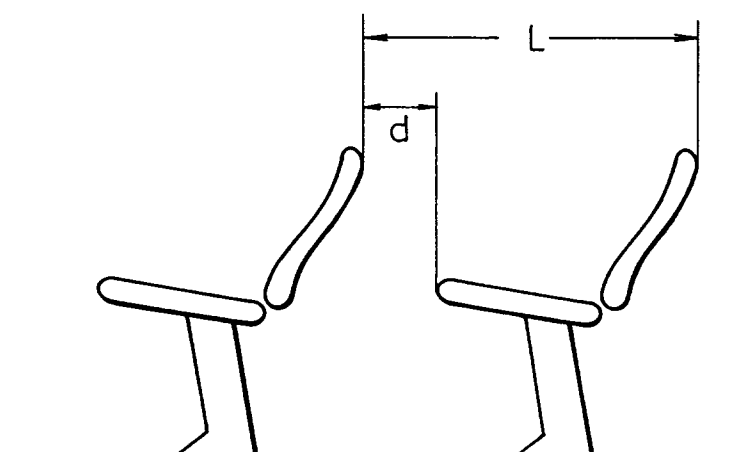


FIG. 8(a)

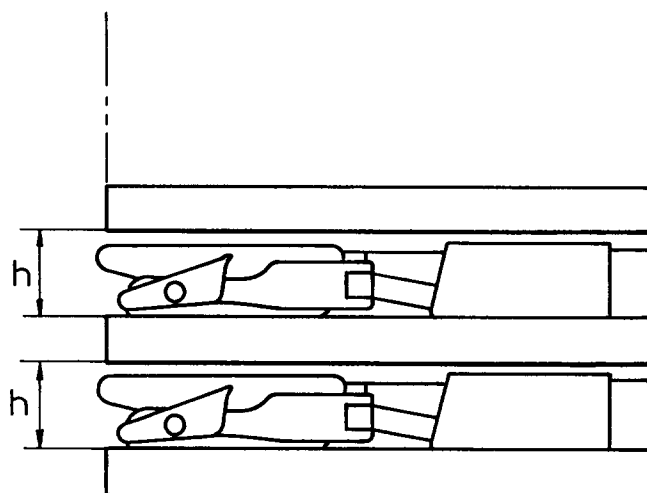
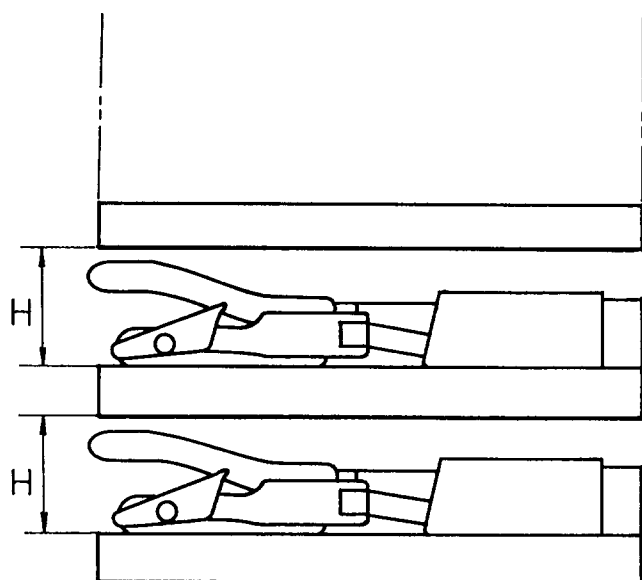


FIG. 8(b)





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 10 7390

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.6)
A	GB-A-1 078 735 (FLINT) * page 2, line 94 - page 3, line 47; figure 1 *	1,2	A47C7/18 A47C7/40
A	GB-A-720 696 (STEVENSON) * page 1, line 60 - page 2, line 4; figures 1,4 *	1,6	
A	FR-A-1 393 334 (QUINETTE & CIE.) * page 2, column 1, line 25 - line 57; figures 3,4 *	1,6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A47C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 August 1996	Examiner Mysliwetz, W
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)