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# EUROPEAN PATENT APPLICATION

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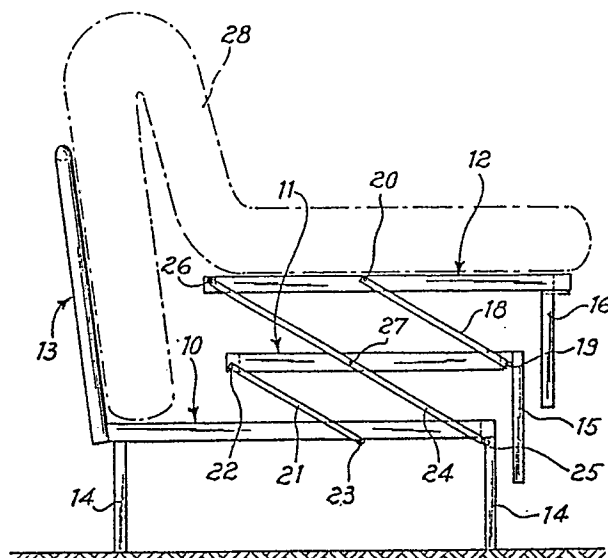
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⑤④ **Sofa-bed with facilitated opening and closing.**

⑤⑦ A sofa-bed, the seat of which is formed by three frames (10, 11, 12), two of which are shiftable, against overlapping and mutually connected at their side ends by pivoted rods (18, 21, 24), so as to allow the lifting of the two shiftable frames (11, 12) by a rotation of the lateral rods, while maintaining the parallel arrangement of the three frames, and the juxtaposition of the frames on the same plane of the stationary frame (10) at the end of the rotation of rods.



This invention relates to a sofa-bed whose structure is such as to make easier to the user the opening and closing operations thereof, corresponding respectively to the transformation of the piece of furniture from a sofa to a bed, and viceversa.

Many types of sofa-bed are known wherein mechanisms are provided, embodying different arrangements, but being in any case devised with the objective of obtaining a variable or better modifiable position structure, so that it can be used in a first position as a sofa, for sitting on, and in a second position as a bed.

The known structures, which are not recalled here in detail, since their typology is extremely broad, have the common drawback of being extremely complicated, which makes them difficult and expensive to manufacture, and often makes them uncomfortable to use since the user is required to go through a large number of operations having sometimes to be performed in a predetermined sequence, involving additional inconvenience for the user of this particular type of furniture.

Another drawback of the conventional type sofa-bed comes from the fact that the folding operation that has to be performed in order to open and close the subject piece of

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furniture extends not only to the sofa frame but also to the mattress received thereon. The latter, as it is well known, once it has been folded inside the sofa tends to react to this condition and spring back to the unfolded position, that is to say it tends in practice to cause re-opening of the frame. This drawback is made even worse in those cases where the mattress has a non disregardable resiliency, as it is for instance the case for spring mattresses.

10 Another drawback of the conventional sofa-bed structures comes from the fact that, where said structures comprise multiple movable frames practically foldable on top of each other, the operations required to obtain opening and closing of the sofa become a considerable number, which

15 makes the use of this piece of furniture inconvenient and uncomfortable. There has now been devised, and it makes the subject of this invention, a sofa-bed, in particular of the multiple movable frame type, which enables all the above mentioned drawbacks to be overcome making the usage

20 of this piece of furniture easier for the user, i.e. facilitating the user as far as the opening and closing operations of said piece of furniture are concerned.

According to one of the basic features of the sofa-bed of this invention, the particular connection arrangement

25 between the various frames, including the stationary

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one, which comprises the sofa base structure, allows opening of the sofa, and consequently closing thereof, to be performed through a single operation.

The features as well as the advantages of the sofa-bed according to this invention will become apparent from the following detailed description of a non limiting embodiment thereof, wherein reference is made to the attached drawings in which:

Figure 1 is a perspective view of the sofa in the open position thereof, for usage as a bed;

Figure 2 is a side elevational view of the sofa-bed in the closed position thereof, for usage as a sofa;

Figure 3 is a side view wherein an intermediate step of opening of the sofa is shown, to go from the sofa position to the bed usage position; and,

Figure 4 is a side view of the sofa completely opened for usage as a bed.

Referring now first to Figure 1, the sofa according to the invention is comprised of a stationary frame generally shown at 10, and of two movable frames, shown at 11 and 12 respectively, wherein first movable frame 11 is adjacent to the stationary frame 10, while second movable frame 12 comprises the sofa end frame in the bed position thereof.

Both stationary frame 10 and the two movable frames 11 and

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12 are made up of metal tubing and have a substantially rectangular shape wherein the longer sides comprise the transverse beams of the sofa, while the shorter sides, aligned with each other, comprise the side edges of the 5 piece of furniture.

Onto the longer rear side of stationary frame 10 a back 13 is connected in any known way and can be of any desired shape.

Stationary frame 10 is provided, at the four corners 10 thereof, with support legs 14, while movable frames 11 and 12 are provided, only at the front corners thereof, with support legs shown at 15 and 16 respectively. As it is in particular apparent from Figures 2, 3 and 4, support legs 14, 15 and 16 are all the same height, for 15 obvious reasons of arranging the sofa in the bed position (Figure 4). In the sofa position (Figure 2), support legs 15 and 16 of movable frames 11 and 12 will remain slightly raised from the ground but that will not impair the stability of the piece of furniture in said position. 20 To stationary frame 10 as well as to movable frames 11 and 12 there is applied a plurality of substantially resilient members which, in the embodiment shown herein, are comprised of wooden strips also known as "slats", whose ends are inserted through the longer sides of frames 25 10, 11 and 12, whereby they extend longitudinally, i.e.

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in a direction parallel to that of sofa opening and closing. Wooden strips or slats 17 replace the conventional bed wire net, which could be used in any case for the subject sofa as well without any modification to the innovative concept.

Referring now more particularly to Figure 3, wherein the connections between the various frames 10, 11 and 12 are more clearly shown, said connections will be described and the related advantages will be emphasized. Said description will be made referring to a single one of the sofa sides, i.e. the one showing in the attached drawings, it being understood that the connections on the opposite side are identical to the ones described herein.

It can be seen from the above mentioned Figure that the three frames 10, 11 and 12 are connected to each other by means of an assembly of three substantially straight rods, whereby movable frames 11 and 12 can go from the Figure 2 position (sofa) to the Figure 4 position (bed) through an intermediate position, shown in Figure 3, by means of a traverse movement along a substantially semi-circular path.

First movable frame 11 is connected, at the ends thereof, both to second movable frame 12 and to stationary frame 10. More particularly, first movable frame 11 is connected to the second movable frame by means of a substantially

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straight rod 18 pivoted at 19 on the front end of first movable frame 11, and pivoted at the opposite end, at 20, on second movable frame 12 in a region thereof slightly set back relative to the centerline position.

5 First movable frame 11 is also connected to stationary frame 10 by means of a substantially straight rod 21 pivoted at one end thereof on the rear end of movable frame 11 and, at the opposite end, at 23, on stationary frame 10 at a region substantially set forward relative  
10 to the centerline position thereof.

The three frames 10, 11 and 12 are connected to each other by means of a substantially straight rod 24 of a larger length compared to the above rods 18 and 21, being in particular of a length which is substantially equal to  
15 the sum of the lengths of the rods mentioned above.

Connecting rod 24 has one end pivotally connected, at 25, on the front end of stationary frame 10 and the other end pivotally connected, at 26, on the rear end of second movable frame 12, while in a substantially intermediate  
20 position said rod pivots, at 27, on first movable frame 11.

The various pivot connections have been shown schematically, since said connections can be made in any known way.

To the sofa frame according to this invention there is associated a known mattress 28 and, as it is apparent in  
25 particular from Figures 2 and 3, the mattress goes to

cover the sofa back 13 with a folded portion substantially in an inverted "V" shape, in such a way as to complete the back of the sofa.

From the above description the advantages of the sofa according to this invention are readily apparent and they originate in particular from a simple design and a correspondingly low manufacturing cost.

Furthermore, according to the basic feature emphasized above, opening and closing of the sofa, i.e. the transition from the Figure 2 position to the Figure 4 position takes place through a single operation in that the three frames 10, 11 and 12 are completely connected to each other. In fact, as it is seen in particular from Figure 3, when the user moves first frame 12 forward, said motion causes a corresponding motion of first movable frame 11 connected thereto by means of rods 24 and 18, and the two frames perform the motion mentioned above relative to stationary frame 10 simultaneously, in that they are connected to stationary frame 10 through rods 24 and 21.

As it is easily understood, also the closing operation requiring an opposite motion of movable frames 11 and 12 to go from the position of Figure 4 to the position of Figure 2, will involve the same advantage mentioned above. It should eventually be noted, concerning frames 11 and 12, that the provision of support legs 15 and 16 respecti-

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vely, only at the front corner thereof, does not impair  
the stability of the sofa in the bed position, in that  
said frames, at the opposite sides thereof, will be  
supported in any known way, by means of brackets, angle  
5 iron or similar means provided at the facing edges of  
adjacent frames.

It should be understood that variations and modifications  
can be made to the sofa according to this invention,  
without exceeding the scope of protection thereof.

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CLAIMS

1. A sofa-bed including at least a stationary frame and at least a pair of movable frames adapted to be moved from a first position wherein they lie substantially on top of each other and on top of the stationary frame, this position corresponding to the use as a sofa, to a second position, corresponding to the use as a bed, wherein they lie substantially aside from each other and from the stationary frame, said movable frames being adapted to be brought back from said second position to said first position through a movement opposite to the former one, said movements being allowed by an assembly of connection rods which connect said movable frames to each other and to the stationary frame, characterized in that said rod assembly includes at least a connection rod (24) simultaneously connecting said movable frames (11, 12) to each other and to the stationary frame (10) and cooperating with at least a pair of connecting rods (18, 21) wherein the first connects second movable frame (12) to first movable frame (11), while second rod (21) connects first movable frame (11) and second movable frame (10) to each other.
2. The sofa-bed of Claim 1, characterized in that connecting rod (24) has one end thereof pivoted at (26) on the rear end of second movable frame (12) and has the other

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end pivoted at (25) on the front end of stationary frame (10) and, eventually, it pivots in a substantially central position thereof, at (27), on first movable frame (11).

5 3. The sofa-bed of Claim 2, characterized in that the pivot point (27) of rod (24) relative to first movable frame (11) is removed from the central area of said first movable frame (11) in the direction of pivot point (22) of rod (21) relative to said first movable plane (11).

10 4. The sofa-bed according to Claim 1, characterized in that the length of rod (24) simultaneously connecting movable frames (11, 12) to stationary frame (10) has a length which is substantially equal to the sum of the lengths of the two remaining rods (18, 21) of the  
15 connecting rod assembly.

5. The sofa-bed according to Claim 1, characterized in that it includes a rod assembly (24, 18, 21) at each of the sides thereof.

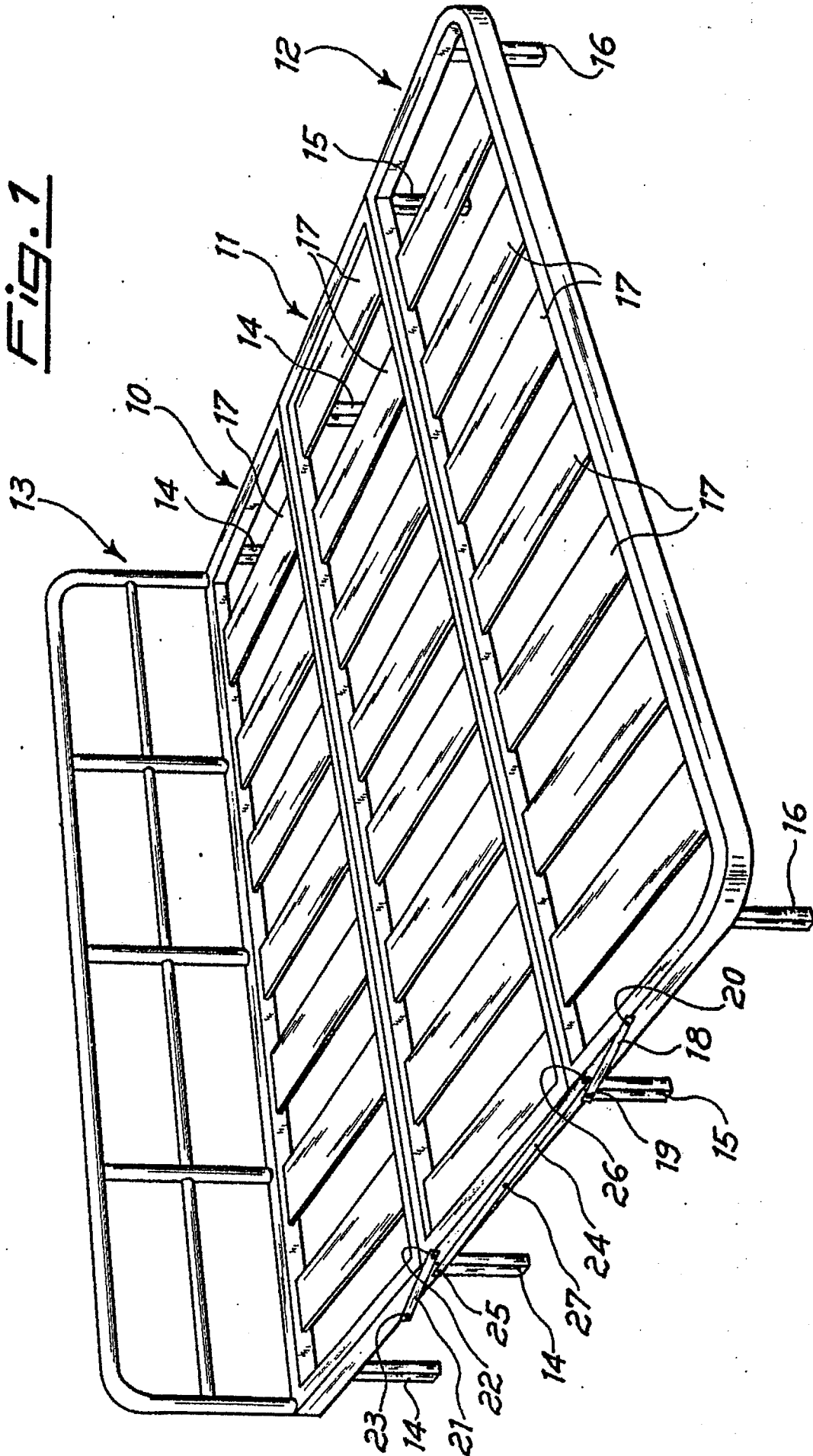
Fig. 1

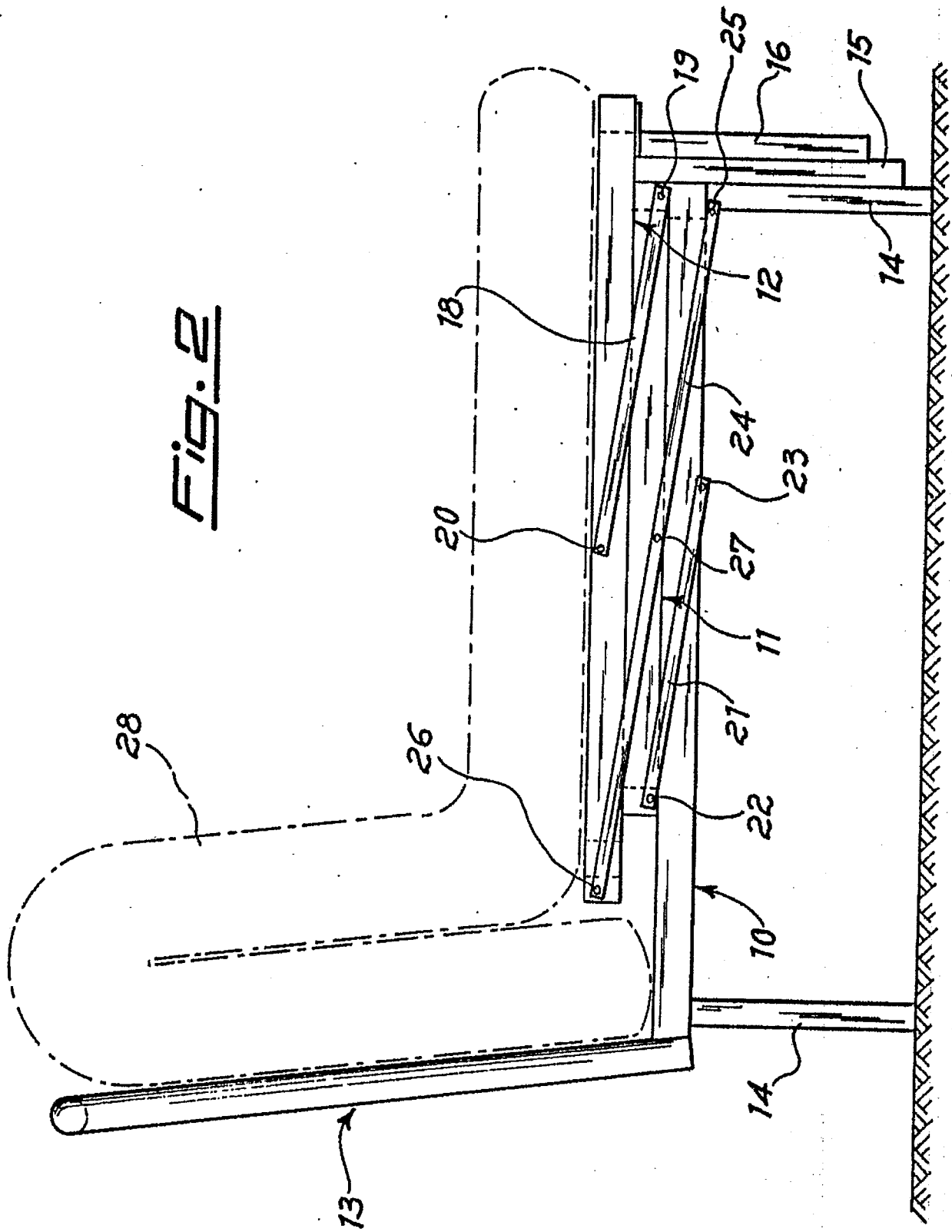
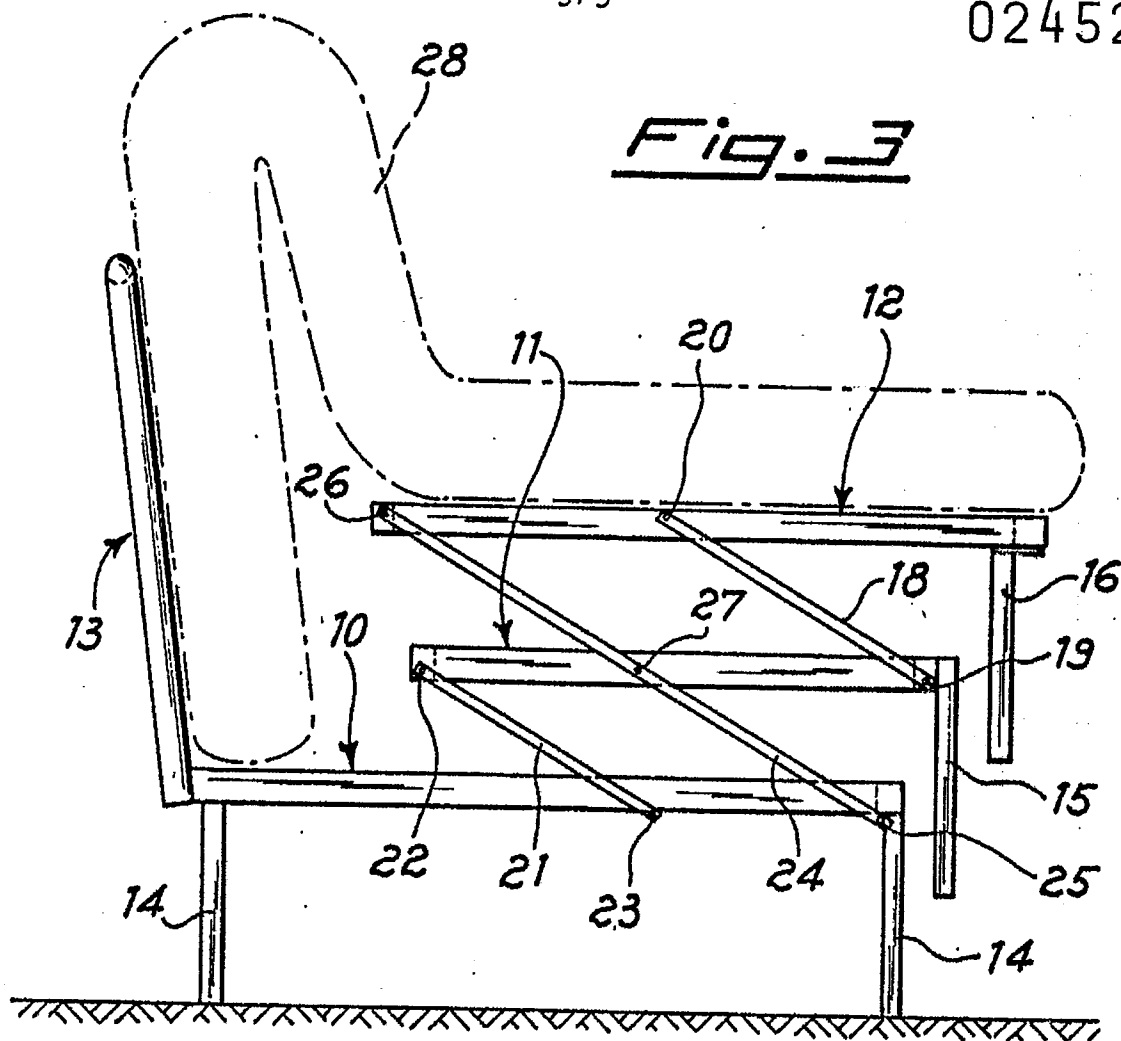
Fig. 2

Fig. 3Fig. 4