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54 **Sofa transformable into a bed by means of an articulated parallelogram system.**

57 It is disclosed a sofa readily transformable into a bed, formed by a fixed frame and at least one mobile frame of similar conformation interconnected by a system of articulated parallelograms along the two sides of the sofa. In the

'sofa' or retracted conformation the mobile frame rests on top of the fixed frame. Elastic returning means may be provided for facilitating the extension and retraction operation.

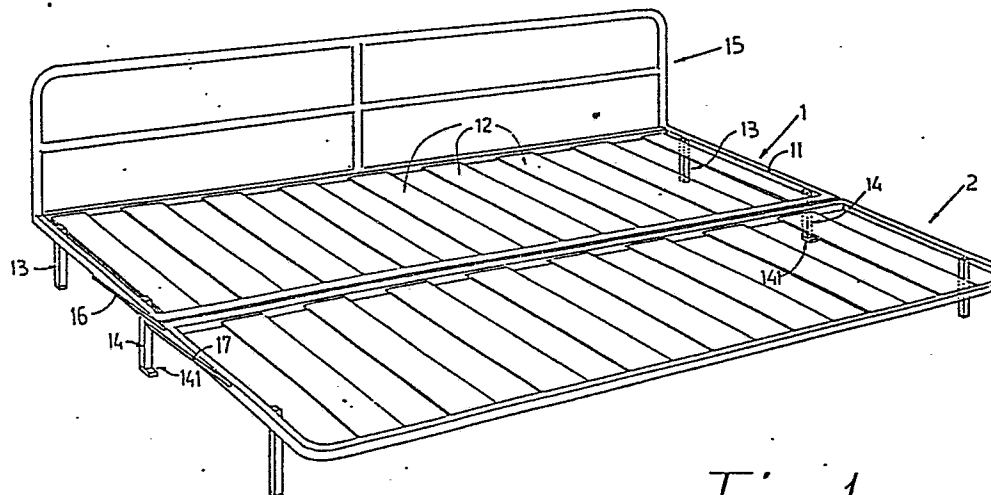


Fig. 1

"SOFA TRANSFORMABLE INTO A BED BY MEANS OF AN
ARTICULATED PARALLELOGRAM SYSTEM"

The present invention has as its object a sofa transformable into a bed by means of a system of articulated parallelograms laterally disposed between a first base frame of the sofa and a second mobile frame which may extend frontwise for producing the dimensions of a bed.

The so-called "sofa-beds" are well known and widespread and for them different transformation systems consisting of various kinematic mechanisms usually complex and of relative reliability have been studied and created.

Object of the present invention is that of accomplishing a very simple and therefore economical system which is easily operated and certainly reliable too and all that is obtained by the system in question which is characterized in that on the base fixed frame of the sofa-bed there is arranged at least a mobile frame, said frames being laterally interconnected between themselves by means of pairs of bars which create a system of articulated parallelograms to guide said mobile frame, from a first position wherein it rests upon said fixed frame, to a second position wherein it is laid out frontwise as well as adjacent to the front edge of the same, said second mobile frame being able, in

turn, to be composed by a group of at least two frames laterally interconnected among themselves too by the same system of articulated parallelograms.

In order of better understanding the characteristics and the operation of the system in question, the whole thing shall be described more in detail herebelow, in an exclusively illustrative and not limitative sense, with reference to the attached drawings wherein:

10 FIGURE 1 shows, through a perspective view, the fundamental structure of the frames forming a sofa-bed of the type in question, in the extended position constituting the "bed" configuration;

15 FIGURE 2 shows, through a schematic lateral view, the transformation system of the sofa-bed of Fig. 1;

20 FIGURE 3 shows, through a schematic lateral view equivalent to that of Fig. 2, a possible variation apt to determine a greater extension in the "bed" configuration;

25 FIGURE 4 shows, through a perspective schematic view, the particulars of a preferred type of elastic means provided for facilitating the operations of extension and/or retraction of the frames.

30 With reference, therefore, in particular, to Figs. 1 and 2, showing the constitution and the fundamental principle of operation of the transformation system of the subject sofa-bed, there are to be noted a first base fixed frame 1 composed by a tubular structure forming a substantially rectangular outer frame 11, which is furnished internally with

staves 12 of a kind which is per se known or with
equivalent sufficiently elastic means. Said first
base fixed frame 1 is furnished, furthermore, with
a pair of rear legs 13 and with a pair of front
5 legs 14, underneath, as well as with a contingent
back 15 in its rear part. On said first base fixed
frame 1 there is arranged a second mobile frame 2
dimensionally and structurally similar to the
10 first frame 1 and the two frames are interconnected
between themselves along their respective minor
sides by pairs of bars 16 and 17 which create a
kinematic system of articulated parallelograms.

Said second mobile frame 2, in its retracted
15 position corresponding to the "sofa" configuration,
lays over said first base fixed frame 1 protruding
with a certain portion from the front edge of the
latter in such a way as to let the above-noted
front legs 14 be discretely internal to the front
20 edge of the sofa and furthermore it is itself
provided with legs 24 arranged in a way that, in
said retracted position, they are adjacent to said
front legs 14 which are, moreover, provided with
hoofs 141 presenting frontwise protruding portions
25 of suitable thickness to allow that, again in such
retracted position, said legs 24 of said second
mobile frame 2 rest on said protruding portions
with their lower free ends.

Said bars 16 and 17 have a length equal to about
30 half of the portion of said second mobile frame 2
which, in the retracted position of the "sofa"
configuration, rests on said first base fixed

frame 1 in such a way that, in the extended position corresponding to the "bed" configuration, the rear edge of said second mobile frame 2 result adjacent to the front edge of the corresponding first base fixed frame 1, furthermore, in this position, said rear edge of the mobile frame 2 shall result supported by abutment against suitable tongues 18 fixed on the lower part of said first base fixed frame 1 and projecting from the same.

As it is clearly recognizable from Fig. 2, said bars 16 and 17 are pivoted at their ends respectively on the first base fixed frame 1 and on the second mobile frame 2 in such a way as to form an articulated parallelogram system which allows to change from a first retracted "sofa" position to a second extended "bed" position and viceversa by a simple operation.

For clarity's sake, in said Fig. 2, the retracted "sofa" position is shown with thick continuous line, while the extended "bed" position is shown with thin short-dash line, moreover an intermediate position is also shown with thin dash-single-dot line.

Said bars 16 and 17 shall be formed by suitably shaped rods provided, at their ends, with suitable pivoting means, moreover at least a pair of them, the rear two 16 and/or the front two 17, might be interconnected at one of their ends by means of a cross member, such as a pipe or the like, so as to form a "U" shaped single structure capable of preventing undesired lateral oscillations during the extraction or retraction movements.

The disclosed embodiment allows to create, in the extended position, a bed conformation with two side-by-side places arranged in a cross-wise direction, that is in the direction of the front width of the sofa, because the width of the two frames 1 and 2, determined by the base dimension of the sofa, results insufficient to allow achievement of the full length of a normal bed in the extended position.

To the end of achieving a suitable length it shall be possible to provide a composite embodiment, as clearly illustrated in Fig. 3, wherein the mobile extensible portion is formed, instead of a single mobile frame 2, as described above and shown in Figs. 1 and 2, by a pair of frames 2a and 2b interconnected between themselves by the same system of bars previously disclosed.

As it is clearly recognizable from said Fig. 3, therefore, the extensible portion shall be formed by two mobile frames 2a and 2b, the first mobile frame 2a being interconnected to the first base fixed frame 1a by pairs of bars 16a and 17a and the second mobile frame 2b being interconnected to said first mobile frame 2a by corresponding pairs of bars 26 and 27.

Also in this case, the length of the pairs of bars 16a-17a and 26-27 shall have lengths such as to determine that, in the extended position, the rear edge of the first mobile frame 2a be adjacent to the front edge of the base fixed frame 1a and the rear edge of said second mobile frame 2b be

adjacent to the front edge of said first mobile frame 2a, moreover, said rear edges, in this position, shall be supported by abutment against suitable locating tongues, respectively, tongues 18a and
5 tongues 28 projecting from the relative front edges of frames 1a and 2a.

The said base fixed frame 1a shall be provided with rear legs 13a and front legs 14a and said
10 first mobile frame 2a with legs 24a in all respects equivalent to the corresponding legs 13-14 and 24 of the preceding embodiment, moreover, said second frame shall be provided, of course with relative legs 25.

15 In this case, legs 24a shall be provided in their respective lower ends with hoofs 241 having a frontwise projecting portion onto which will rest the lower end of legs 25 (in the retracted position) and the resulting group will finally
20 rest on the frontwise projecting portion of hoofs 141a of the corresponding front legs 14a in the totally retracted position.

For clarity's sake, in said Fig. 3, the retracted "sofa" position is shown, as in Fig. 2, with a
25 thick continuous line, a first position resulting from the extraction movement is indicated with a thin long-dash line and finally the totally extended "bed" position is shown with thin short-dash line, moreover two intermediate positions of the movements
30 of extraction and retraction are shown with thin dash-single-dot line.

Moreover it is possible to observe the movement

of the applied mattress which, in Fig. 2,
is indicated with thin continuous line in the
"sofa" position and with thin short-dash line in
the "bed" position while in Fig. 3 it is indicated
5 again with a thin continuous line in the "sofa"
position, with thin short-dash line in its first
intermediate position of extension and finally
with dot line in the "bed" position.

10 The system's operation should appear extremely
clear by the observation of Figs. 2 and 3.

To the end of facilitating the extension and/or
retraction operation, adequate elastic returning
means such as metal springs of suitable shape and
15 dimensions might be applied in a manner which is
known per se.

In Fig. 4 it is shown the preferred embodiment
of a returning device which is very simple and
economical while offering remarkable advantages in
20 manufacturing as well as in operation.

The embodiment to which reference is made consists
of the use of a well-known torsional bar which may
be applied indifferently to the pair of front bars
as well as to the pair of rear bars and fixed to
25 any of the frames, to the frame of the fixed portion
as well as to the mobile frame or frames.

With reference to Fig. 4 it is noted that the
device in question is formed by a simple rod 3 of
suitable steel forming the torsional bar.

30 One end of the rod 3 is bent back on itself to
form a ring 31 which is fixed to frame 4 by a
screw 5 with the interposition of a washer 6.

The opposite end of said rod 3 is inserted in hole 71 formed in the corresponding cylindrical member 7 coaxially to the latter wherein it is blocked by a suitable screw 72 engaging into a corresponding threaded hole which extends radially from said hole 71, said cylindrical member 7 being in turn fixed to one end of the bar 8.

Said bar 8 shall be, in practice, anyone of the bars forming the articulated parallelogram system in question and described above.

In said Fig. 4, frame 4 is illustrated as being constituted by the corresponding base fixed frame 1 of Fig. 2 or 1a of Fig. 3, moreover, for clarity's sake, it is indicated, as well as the above-noted generic bar 8, with a thin line.

Obviously said cylindrical member 7 shall be applied to said frame 4 by means of a suitable support (not shown) on which it may rotate.

It is easily understood that the torsional bar device referred to by way of an example, shall be applied symmetrically to at least two bars and precisely to the front pair or to the rear pair of a corresponding group of the system or of the systems of articulated parallelograms described above and moreover it might be applied indifferently, in correspondence of its fixed portion, to any of the frames of the system.

In conclusion, the device described herein, besides resulting of simple execution and application, clearly allows to vary, in a very simple way as well its action by varying the diameter and/or the

length of rod 3 as well as the way it is fixed into said cylindrical member 7.

5 The advantages achievable with the articulated parallelogram system herein described are evident, in fact, such a system allows a very simple and economical realization, it is easily executed and the operation of transformation from "sofa" to "bed" and viceversa results easy and docile and
10 finally the whole thing results extremely reliable.

It is well understood that changes of different kind may be introduced without ,however, departing from the basic concept of the present invention herein described and therefore from the domain of
15 protection of the invention claimed herein.

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CLAIMS

1. Sofa transformable into a bed by means of an articulated parallelograms system comprising a fixed base portion substantially formed by a base fixed frame (1) of known kind and a mobile portion
5 formed by at least a mobile frame (2) which may be transferred from a first retracted position corresponding to the "sofa" conformation wherein it lays on said first base fixed frame (1) to a second extended
10 position corresponding to the "bed" conformation wherein it is laid out frontwise and co-planarly adjacent to said first base fixed frame (1) characterized in that said first base fixed frame (1) and second mobile frame (2) are laterally interconnected
15 between themselves by pairs of bars (16-17) forming a system of "articulated parallelograms" apt to guide said second mobile frame (2) from said first retracted ("sofa") position to said second extended ("bed") position and viceversa, returning elastic means apt to facilitate the operation of extension
20 and/or retraction being, furthermore, provided.

2. Sofa transformable into a bed according to claim 1 characterized in that said mobile portion may be constituted by a group of at least two
25 frames (2a-2b) also laterally interconnected among themselves by pairs of bars (26-27) forming further systems of "articulated parallelograms", said conformation being apt to allow a greater extension.

3. Sofa transformable into a bed according to claims 1 and 2 characterized in that said bars
30 (16-17 or 16a-17a and 26-27) forming the system or

systems of articulated parallelograms have lengths equal to about half of the portion of said mobile frame (2) or of said group of mobile frames (2a and 2b) which, in the respective retracted position, results resting on the preceding respective frame (1 or 1a or 2a) in such a way that, in the extended position, the rear edge of said mobile frame (2) or of said mobile frames (2a and 2b) be adjacent to the front edge of the corresponding preceding frame (1 or 1a or 2a), abutment means (18 or 18a and 28) apt to support the rear edges of said mobile frames (2 or 2a or 2b) in their extended position in relation to the front edges of the corresponding preceding frames in such a way that the group of frames (1 and 2 or 1a-2a-2b), in said extended position, be co-planarly fixed among themselves, being, furthermore, provided.

4. Sofa transformable into a bed according to claim 1 characterized in that said elastic returning means are preferably formed by a torsional bar device.

5. Sofa transformable into a bed according to claims 1 and 4 characterized in that said torsional bar device is formed by a rod (3) of suitable steel fixed in correspondence of one of its ends to one of said frames, the other of its ends being fixed in a cylindrical member (7) projecting from one of the ends of a corresponding bar (8) which is part of the group forming said system of articulated parallelograms, said cylindrical member (7) forming

the relative rotation pin of the same.

Fig. 1

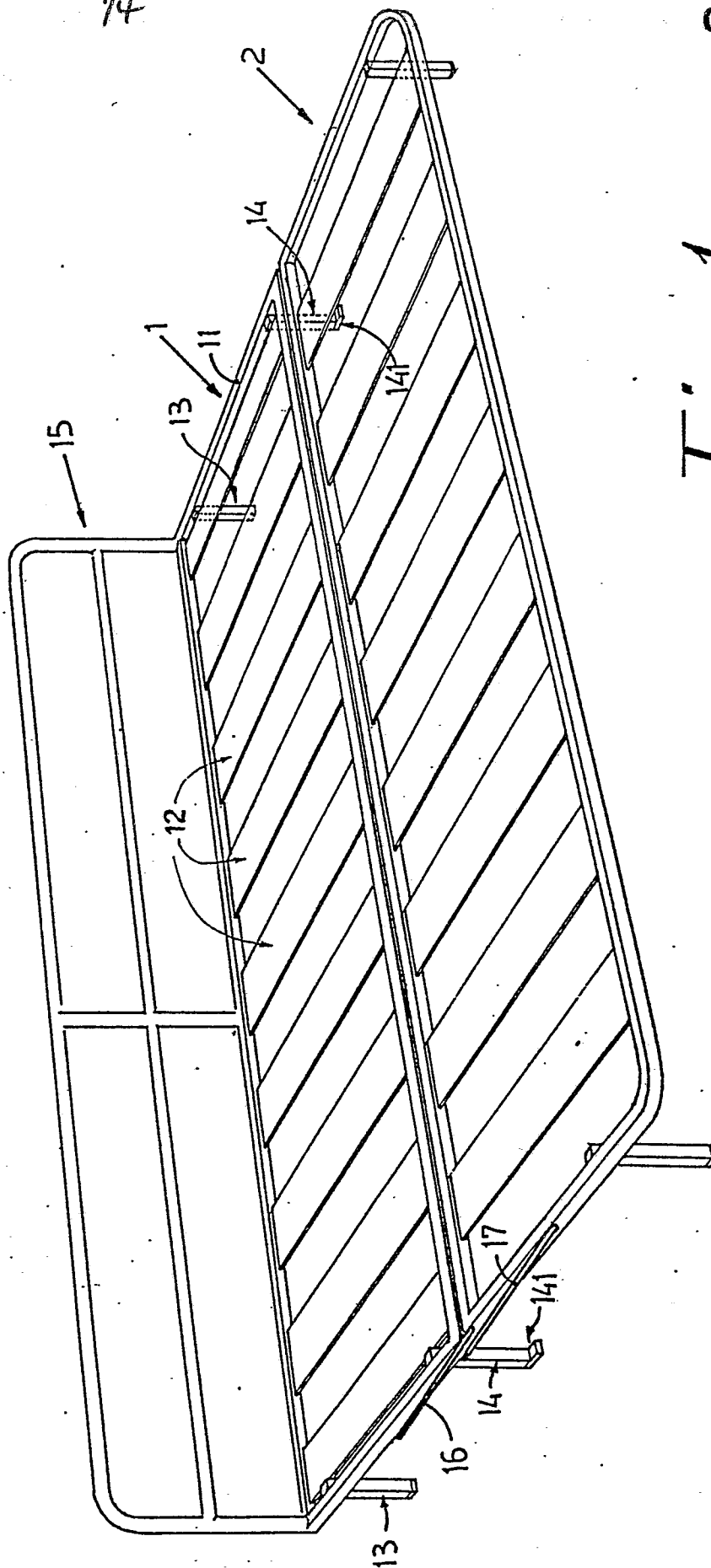
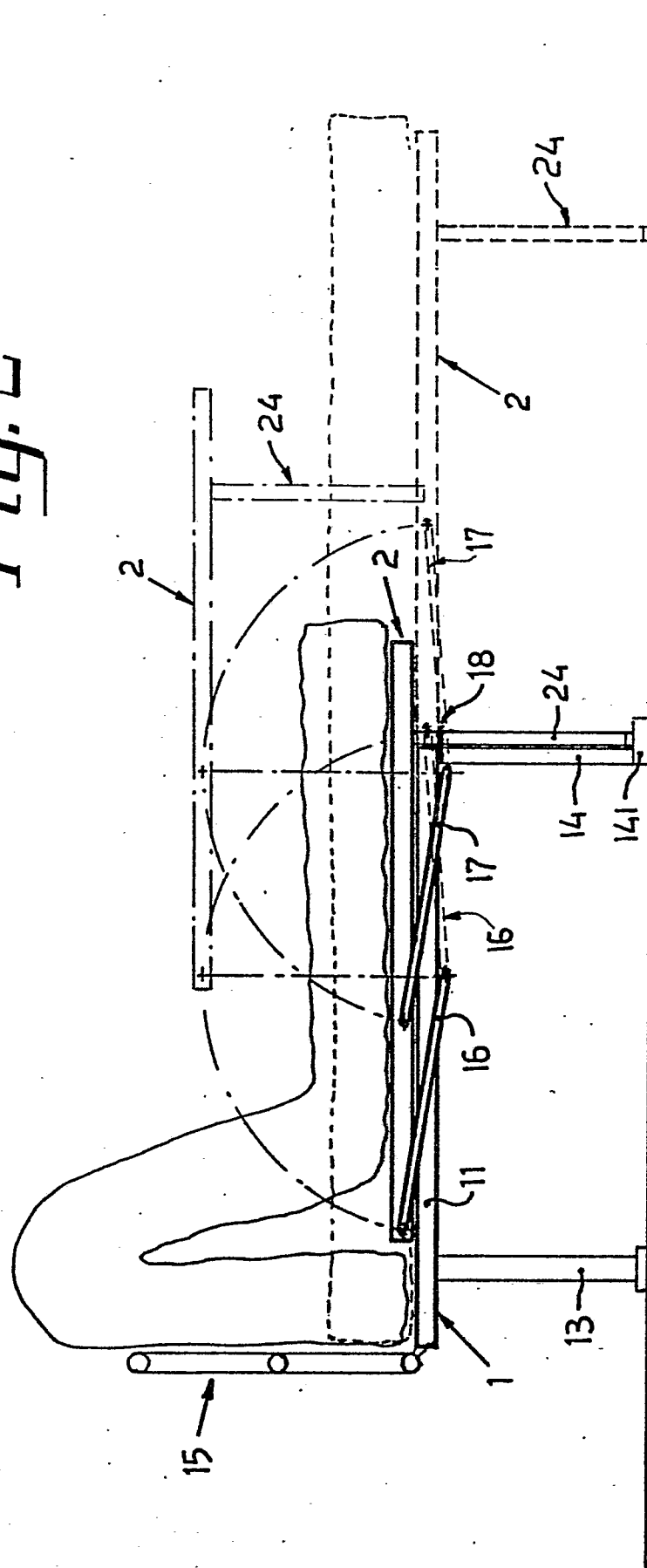
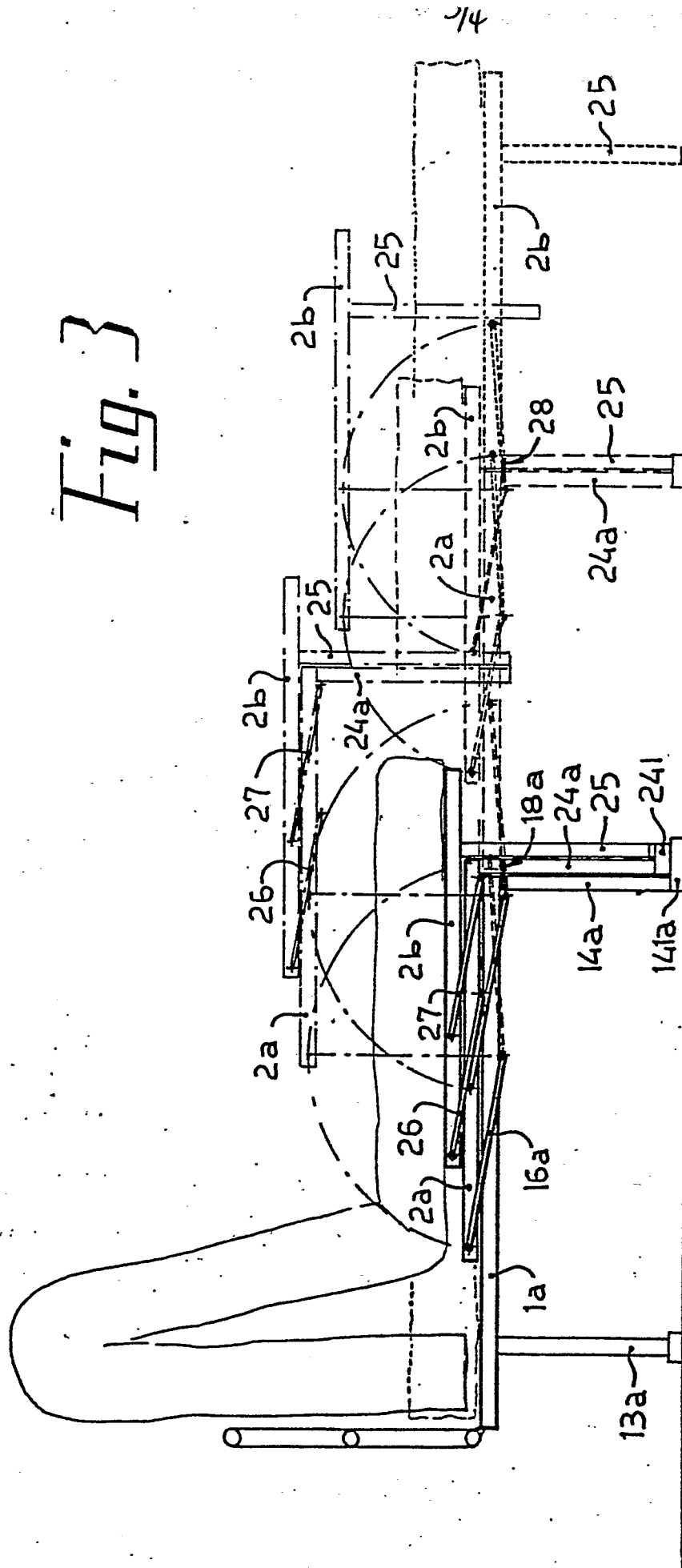


Fig. 2





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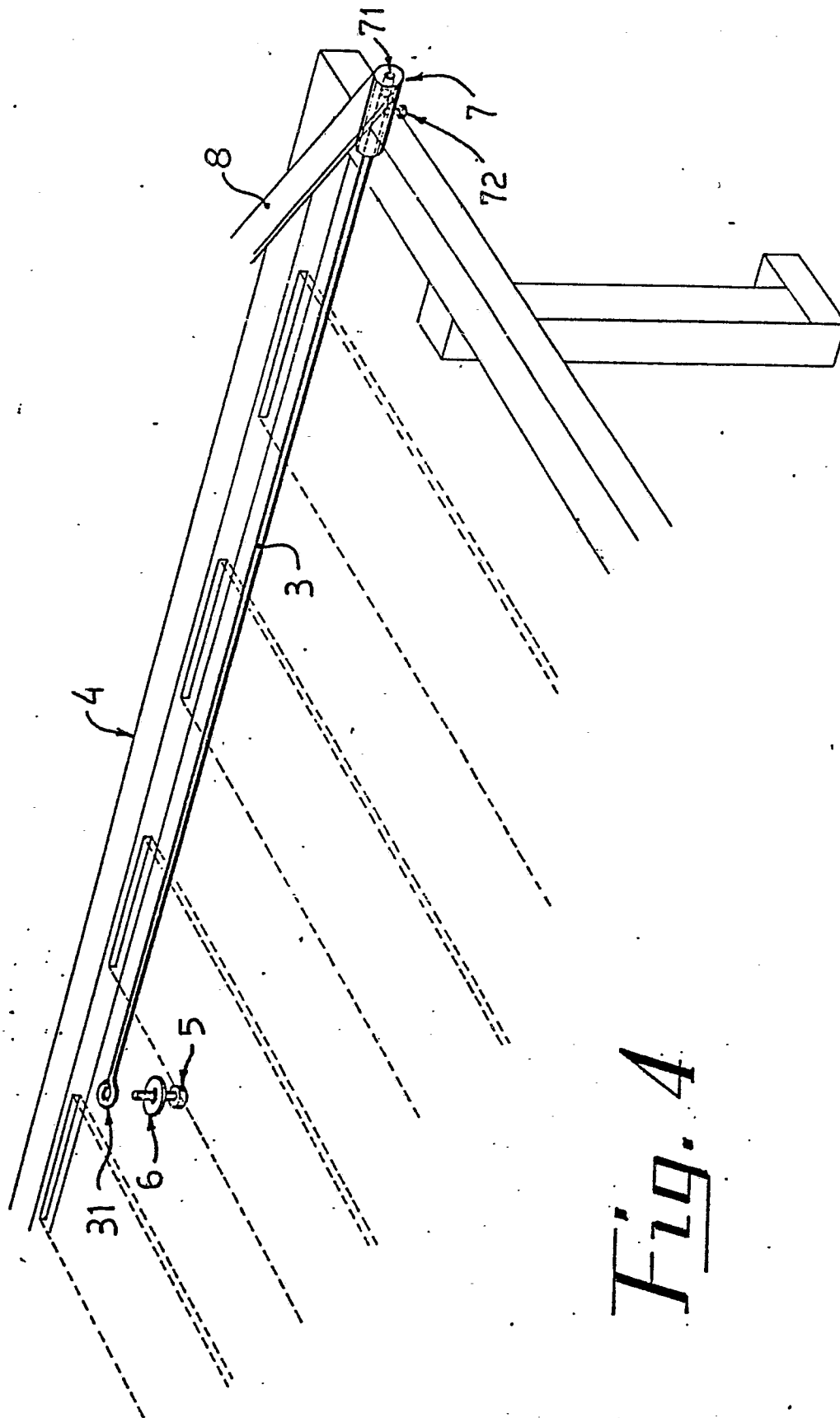


Fig. 4