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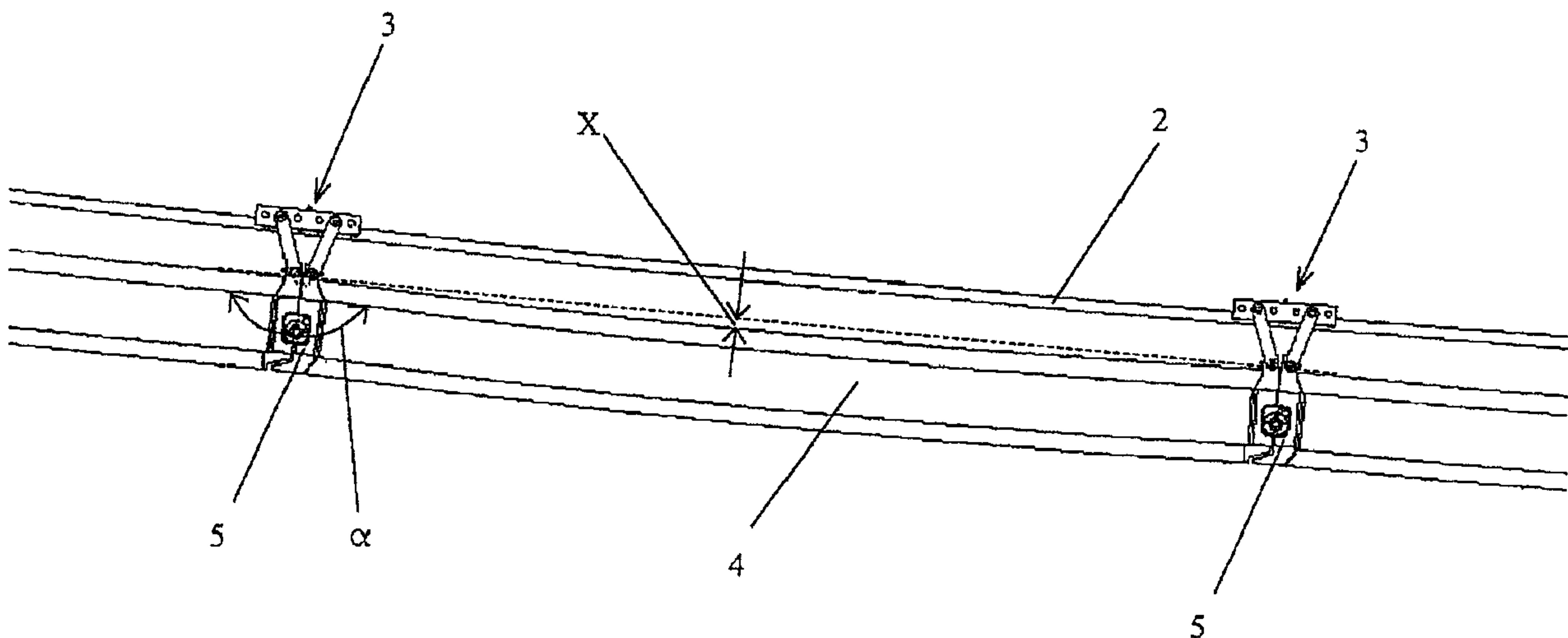
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(54) Titre : INSTALLATION POUR PASSAGERS DESCENDANT D'UNE STATION DE MONTAGNE VERS UNE
STATION DE VALLEE

(54) Title: INSTALLATION FOR TRANSPORTING PERSONS DOWNWARD FROM A MOUNTAIN STATION TO A
VALLEY STATION



(57) Abrégé/Abstract:

An installation for carrying individuals down from a mountain station into a valley station has a running rail (1) which is fastened on a supporting cable (2) at a distance from the ground, which comprises a multiplicity of sub-rails (4) connected to one another at joints (5) and along which carriages can be displaced. In the region of the joints (5), the sub-rails (4) are elevated in relation to their central region, and are preferably curved such that their curvature profile creates the elevation.



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10 rails (4) are elevated in relation to their central
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curvature profile creates the elevation.

INSTALLATION FOR TRANSPORTING PERSONS DOWNWARD FROM A
MOUNTAIN STATION TO A VALLEY STATION

The invention relates to an installation for carrying
5 individuals down from a mountain station into a valley
station, having a running rail which is fastened on a
supporting cable at a distance from the ground, which
comprises a multiplicity of sub-rails connected to one
another at joints and along which carriages can be
10 displaced.

Such an installation is known from AT 410 306 B. The
travelling speed of the carriages on the running rail
is, in some cases, 70 km/h or more, as a result of
15 which problems arise in respect of the smoothness of
running of the carriages at the joints connecting the
sub-rails, or the transitions between the sub-rails,
and the jolting which occurs also gives rise to
problems relating to wear.

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The invention is therefore based on the object of
avoiding these problems as far as possible.

This object is achieved in the case of an installation
25 of the generic type in that, in the region of the
joints, sub-rails are elevated in relation to their
central region.

Since the sub-rails, in the case of the installation
30 according to the invention, are suspended from a cable,
the sub-rails dip under the weight of the carriages
occupied by one or more individuals. As a carriage
approaches the end of a sub-rail, at which the latter
is connected to a following sub-rail via a joint, the
35 sub-rail dips in its end region, and the following sub-
rail dips at its starting region, under the weight of
the carriage, in which case the prior-art sub-rails and
in particular their running surfaces, along which the
carriages roll, are no longer aligned entirely

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rectilinearly in relation to one another and a slight V-shaped dip appears in the connecting region.

The invention compensates for this dip in that the sub-rails are elevated in the region of the joints by the
5 extent of the dip which is to be expected. In a non-loaded state of the running rail or of the individual sub-rails, this means that, in the transition region from one sub-rail to the next, the sub-rails are elevated in relation to the ideal rectilinear profile
10 (or curved profile where the path is curved) and this elevation corresponds to the extent of the average dip which is to be expected as a result of the weight of the carriages and of the individual(s) therein, so that ultimately, when a carriage travels over them, the sub-
15 rails are in ideal rectilinear alignment in relation to one another (or in curved alignment where the path is curved).

Even now it would be possible, in principle, to produce
20 rectilinear sub-rails, or sub-rails which are curved in accordance with a curved profile, and to elevate these at their starting and end regions by additional integrally formed portions, it is preferred, within the context of the invention, if the sub-rails are curved
25 such that their curvature profile creates the elevation. In this case, use can be made of sub-rails which have a continuous profile and only have to be curved in accordance with the path curves which may be required and with the elevation at the starting and end
30 regions of the sub-rails.

In the case of the invention, abutting sub-rails, or the running surfaces thereof, are thus inclined in relation to one another in the non-loaded state at an
35 angle other than 180° . The extent of these angle deviations depends on a number of factors, e.g. the length of the sub-rails, the span of the cable between

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two supports, the sagging of the cable, the weight of the carriages and the number of individuals therein, etc. It is usually the case that the angle at which adjacent sub-rails, or the running surfaces thereof, are inclined in relation to one another in the region of the joints is between 175° and 179° , preferably between 176° and 178° . In some cases, however, it is, of course, also possible for this angle to be higher or lower.

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In order to make it possible for the sub-rails to dip, or in order to allow them to dip, when a carriage travels over a joint, it is preferred, in the case of the invention, if a wedge-shaped gap is arranged at a joint between two sub-rails.

15

The two sub-rails may be connected to one another via a joint axis. This joint axis may be arranged in the top region of the sub-rails, approximately halfway up the same or in the bottom region of the sub-rails.

20

Within the context of the invention it would basically be possible, for example, for the joint axis to be arranged in the top region and for the gap to be arranged beneath the joint axis in the loaded state of the joint. In the non-loaded state of the joint, it would thus be possible for no gap to be present, or for only a small gap to be present, and for the gap then to be created, or to increase, when the sub-rails dip in the region of the joint as a carriage travels over the same.

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It is preferred, within the context of the invention, however if the joint axis is arranged approximately halfway up the sub-rails and, furthermore, if the wedge-shaped gap is arranged above the joint axis in the non-loaded state of the joint. This gap closes partially or completely when a carriage travels over

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the joint.

In the case of the invention, it is further preferred if, in the region of the joints, a damping element is
5 arranged on end surfaces of the sub-rails. If the joint axis is arranged approximately halfway up the sub-rails, and the wedge-shaped gap is arranged above the joint axis in the non-loaded state of the joint, the damping element is preferably arranged above the joint
10 axis. The damping element may be arranged such that it constantly damps the pivoting movement of the sub-rails, or preferably such that it damps the movement of the sub-rails only at the end of the dipping movement, that is to say just before the gap is completely closed
15 or the sub-rails strike against one another.

Within the context of the invention, it is possible, in the region of the joints, for the sub-rails to be suspended from the cable by rail shoes, via links. It
20 is preferred in this context if, in the region of a joint, two sub-rails connected to one another at a joint are suspended from a common rail shoe, via a respective link. This embodiment gives the advantage of straightforward and statically reliable installation.

25 In a development of the invention, it may also be provided that a rail shoe has two or more optional bearing locations for a link. This embodiment gives the further advantage that the different angles which the
30 links can thus assume make it possible to set different loading ratios for the force transmission between the rail shoe and the sub-rails connected to one another at a joint.

35 Further features and advantages of the invention can be gathered from the following description of preferred exemplary embodiments of the invention with reference to the drawings, in which:

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figure 1 shows part of an installation according to the invention,
figure 2 shows an enlarged detail of the part of the installation from figure 1,
5 figure 3 shows a joint connecting two sub-rails, in the non-loaded state,
figure 4 shows the joint from figure 3 in the loaded state,
10 figure 5 shows, on an enlarged scale, part of the joint with a damping element,
figure 6 shows, in section, the joint from figure 5 in the non-loaded state, and
figure 7 shows, in section, the joint from figure 5 in
15 the loaded state.

Figure 1 illustrates part of an installation which is intended for carrying individuals down from a mountain station into a valley station and in which a running
20 rail 1 is suspended from a supporting cable 2 via suspension means 3. The installation can be configured generally as is known per se from the prior art, for example from AT 410 306 B. This means that the supporting cable 2 is tensioned between supports,
25 stationary points of the landscape or the like, it being possible to use a single supporting cable 2 or a plurality of supporting cables 2 arranged one behind the other in the direction of travel. Traveling along the running rail 1 are carriages (not illustrated)
30 which may be in the form of cars, chairs, gondolas or the like and in which individuals or passengers sit, lie or stand in order to be carried down from a mountain station to a valley station, preferably driven by gravitational force. Since the configuration of the
35 mountain station and valley station, of the supports or the like and of the carriages have no particular bearing on the invention, they have not been illustrated in the drawings and, in addition, will not

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be described in any more detail hereinbelow in the description.

The running rail 1 comprises sub-rails 4 which are
5 connected to one another at joints 5. The sub-rails 4,
as can best be seen in figure 2, are curved such that
they sag to some extent in their central region and, in
the region of the joints, are elevated in relation to
the central region. The extent of this elevation is
10 designated by X in figure 2. If a carriage travels over
a sub-rail 4 and is located precisely in the central
region thereof, its weight is distributed approximately
equally to the supporting cable 2 via the two
suspension means 3 at the start and at the end of the
15 sub-rail 4. If, however, the carriage is located in the
region of a joint 5, its weight is transmitted to the
supporting cable 2 only via a single suspension means
3, in which case the ends of the two sub-rails 4
connected to one another at the joint 5 dip to a lower
20 level than in the case described above, in which the
carriage is located in the central region of a sub-
rail 4.

The bending of the sub-rails 4 causes two adjacent sub-
25 rails 4 to strike against one another at a joint 5 at
an angle α of less than 180° , 177° in the exemplary
embodiment illustrated. This angle α is selected such
that, in the case of the given static and dynamic
boundary conditions, e.g. the load-bearing capacity
30 and/or elasticity of the supporting cable 2, the
distance between two supports and the weight of a
carriage, it tends toward 180° when the carriage
travels over the joint 5. A following sub-rail 4 is
then in precise alignment with a preceding sub-rail 4,
35 and this therefore allows a carriage to travel over a
joint 5 without any jolting. At relatively high
traveling speeds, this not only increases the comfort
of the passengers to a considerable extent, but also

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significantly reduces the wear to the sub-rails 4 and to the joints 5 and the carriages.

In the exemplary embodiment illustrated, the sub-rails 4 are curved continuously over their entire length. However, the curvature may also be discontinuous, that is to say the radius of curvature is greater in the central region and decreases, continuously or discontinuously, in the direction of the ends of the sub-rails 4. It is likewise possible for the sub-rails 4 to be rectilinear in the central region and to be curved in the direction of the ends. The curvature which has just been mentioned is the curvature which creates the elevation of the sub-rails 4 according to the invention, this elevation compensating for the dip which occurs when a carriage travels over the joints. Independently of this, it is, of course, possible for the sub-rails 4 to be curved in addition, in order for curves to be created along the path of the running rail 1.

Figure 3 illustrates, on an enlarged scale, a joint location in the non-loaded state, two sub-rails 4 here being connected to one another at a joint 5 and being suspended from the supporting cable 2 via a suspension means 3. The joint 5, which is illustrated in section, on an enlarged scale, in figure 5, has a hollow bolt 6, which defines a joint axis 7. The hollow bolt 6 connects two joint parts 8 and 9, which are each connected to a sub-rail 4. The hollow bolt 6 is secured against displacement with the aid of a securing bolt 10 and against rotation with the aid of a rotation-prevention means 11. The joint parts 8 and 9 are accommodated in circular-cylindrical end caps 12, 13 which close the tubes which form the sub-rails 4, these tubes, in the exemplary embodiment illustrated, being circular-cylindrical.

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The outer circumference of the tubes which form the sub-rails 4 forms the running surface for the carriages (not illustrated in the drawings), which roll along these running surfaces via running rollers. The external diameter of the end caps 12, 13 is equal to the external diameter of the tubes which form the sub-rails 4, and this therefore makes it possible for a carriage to travel over the joint 5 without any jolting.

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On their top side, the two joint parts 8, 9 have extensions 14, 15, on which links 16, 17 are mounted in a pivotable manner in bearings 18, 19. At the opposite ends, the links 16, 17 are mounted on a rail shoe 22 via joint pins 20, 21. In the exemplary embodiment illustrated, the rail shoe 22 has, for each link 16, 17, in each case three holes 23a, 23b, 23c and 24a, 24b, 24c, in which the joint pins 20, 21 can optionally be inserted. An appropriate selection of the holes makes it possible to vary the angle at which the links 16, 17 are oriented, as a result of which it is also possible for the dissipation of forces to be better adapted to the respective conditions.

As can best be seen in figures 3 and 6, the two joint parts 8 and 9 and the extensions 14, 15 thereof are separated from one another by a wedge-shaped gap 25 above the joint axis 7 in the non-loaded state. The wedge angle β of this gap 25 is approximately equal to the angle $180^\circ - \alpha$, at which the orientation of the ends of the sub-rails 4, or of the running surfaces thereof, deviates from the straight position.

If a carriage travels over a joint 5, the sagging of the cable 2 increases in this region, and therefore the ends of the sub-rails 4 dip at the joint 5, as a result of which the wedge-shaped gap 25 is closed. This position of the joint is illustrated in figures 4 and

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7. In this position, those ends of the sub-rails 4 which are connected by the joint 5 are in precise alignment in relation to one another, and the carriage can therefore travel over the joint 5 without any jolting.

Since the two joint parts 8, 9 and/or the extensions 14, 15 thereof strike against one another as the carriage travels over the joint, it is advantageous for this striking action to be damped, for which reason the invention provides damping elements 26 in the extensions 14, 15.

In the exemplary embodiment illustrated, the damping elements 26 comprise pins 27 with widened heads 28, which are accommodated in holes 29 in the extensions 15 and are supported on the base of the holes 29 via cup springs 30. The heads 28 project only to a slight extent beyond the end surfaces 31, 32 of the extensions 14, 15, and the damping elements 26 therefore take effect just shortly before the extensions 14, 15 strike against one another.

The joint parts 8, 9 are also separated beneath the joint axis 7 by a gap 35, and the latter also allows the joints 5 to move freely in the upward direction. This is advantageous since, as carriages descend along the running rail 1, the entire running rail 1 can thus swing freely upward and downward without subjecting the joint 5 to mechanical loading as a result.

Additional rails 33, 34 are arranged on the top side and underside of the tubes of the sub-rails 4, these tubes forming the running surfaces, and the additional rails, on the one hand increase the flexural rigidity of the sub-rails 4 and, on the other hand, serve as guides for the running-gear mechanisms of the carriages in order to limit movement of the carriages to and fro

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about the longitudinal axis of the sub-rails 4, or to prevent this movement altogether.

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What is claimed is:

1. An installation for carrying individuals down from a mountain station into a valley station, having a running rail which is fastened on a supporting cable at a distance from the ground, which comprises a multiplicity of sub-rails connected to one another at joints and along which carriages can be displaced wherein, in the region of the joints, the sub-rails are elevated in relation to their central region.
2. The installation as claimed in claim 1, wherein the sub-rails are curved such that their curvature profile creates the elevation.
3. The installation as claimed in claim 2, wherein adjacent sub-rails are inclined in relation to one another in the region of the joints at an angle α which is between 175° and 179° .
4. The installation as claimed in claim 3, wherein the angle α is between 176° and 178° .
5. The installation as claimed in any one of claims 1 to 4, wherein a gap is arranged at a joint between two sub-rails.
6. The installation as claimed in claim 5, wherein the gap is a wedge-shaped gap.
7. The installation as claimed in claim 6, wherein the wedge-shaped gap is arranged above a joint axis in a non-loaded state of the joint.
8. The installation as claimed in claim 7, wherein the gap between the sub-rails is arranged beneath the joint axis.

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9. The installation as claimed in claim 7 or 8, wherein the joint axis is arranged halfway up the sub-rails.

10. The installation as claimed in claim 8, wherein the gap is arranged beneath the joint axis in the loaded state of the joint.

11. The installation as claimed in any one of claims 1 to 10, wherein, in a region of the joints, damping elements are arranged on end surfaces of the sub-rails.

12. The installation as claimed in any one of claims 7 to 10, wherein, in a region of the joints, damping elements are arranged on end surfaces of the sub-rails, and wherein the damping elements are arranged above the joint axis.

13. The installation as claimed in any one of claims 1 to 12, wherein, in the region of the joints, the sub-rails are suspended from the supporting cable by rail shoes, via links.

14. The installation as claimed in claim 13, wherein, in the region of one of the joints, two sub-rails connected to one another at said joint are suspended from a common one of the rail shoes, via a respective one of the links.

15. The installation as claimed in claim 14, wherein said rail shoe has two or more optional bearing locations for the link.

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Fig. 1

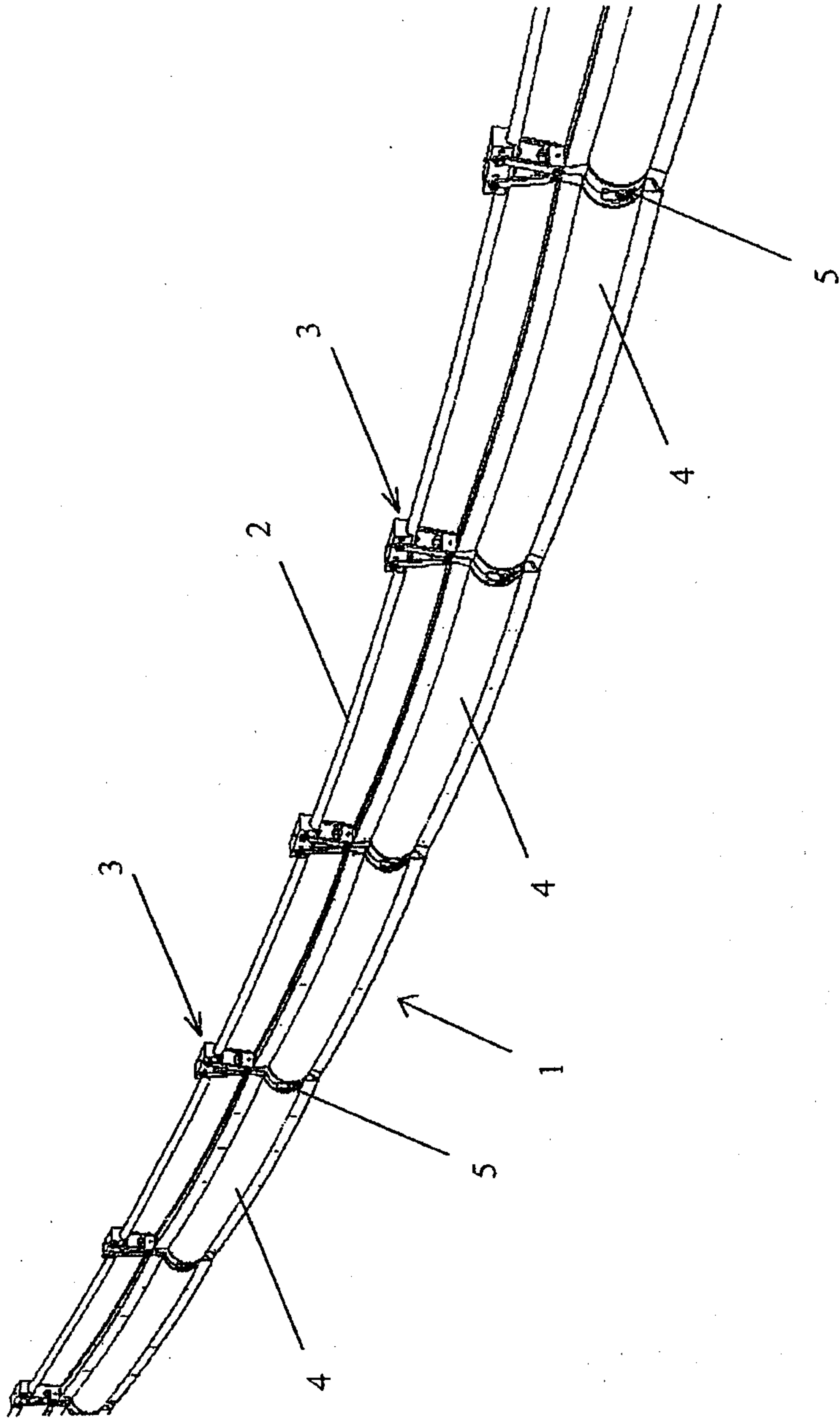
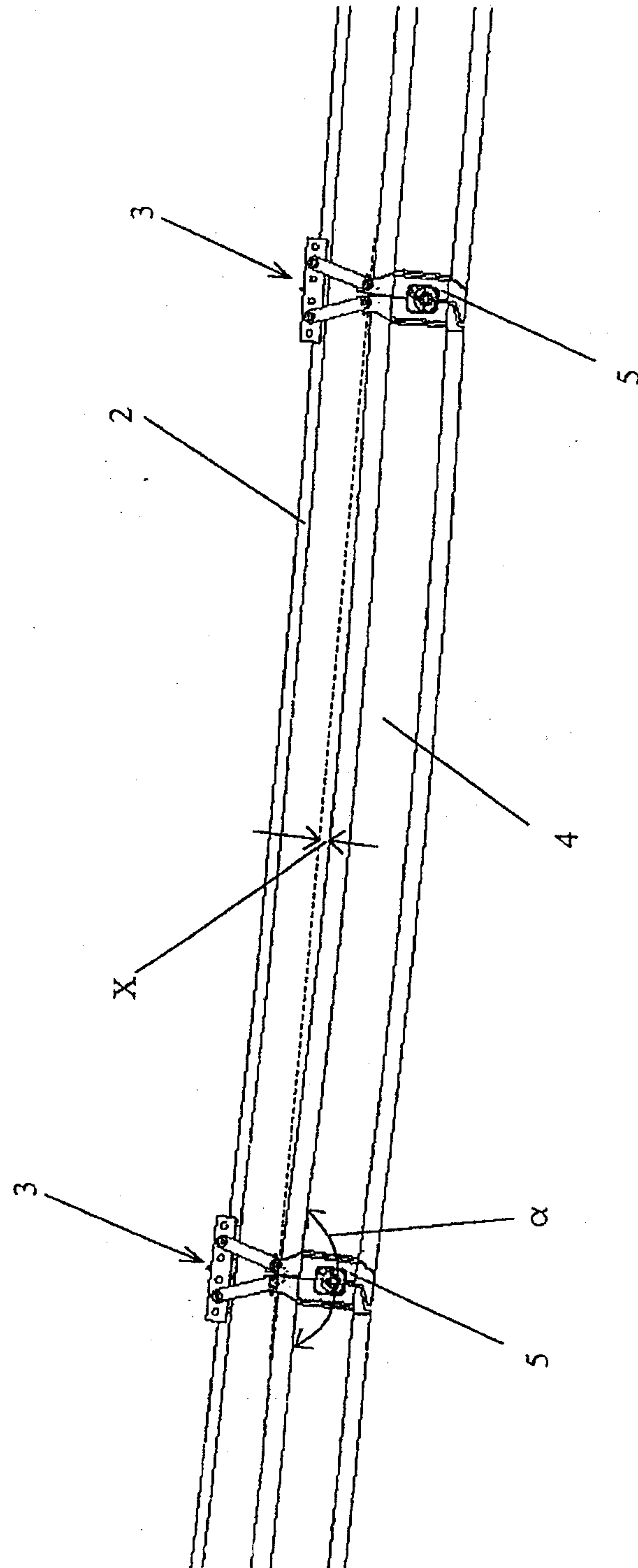


Fig. 2



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Fig. 3

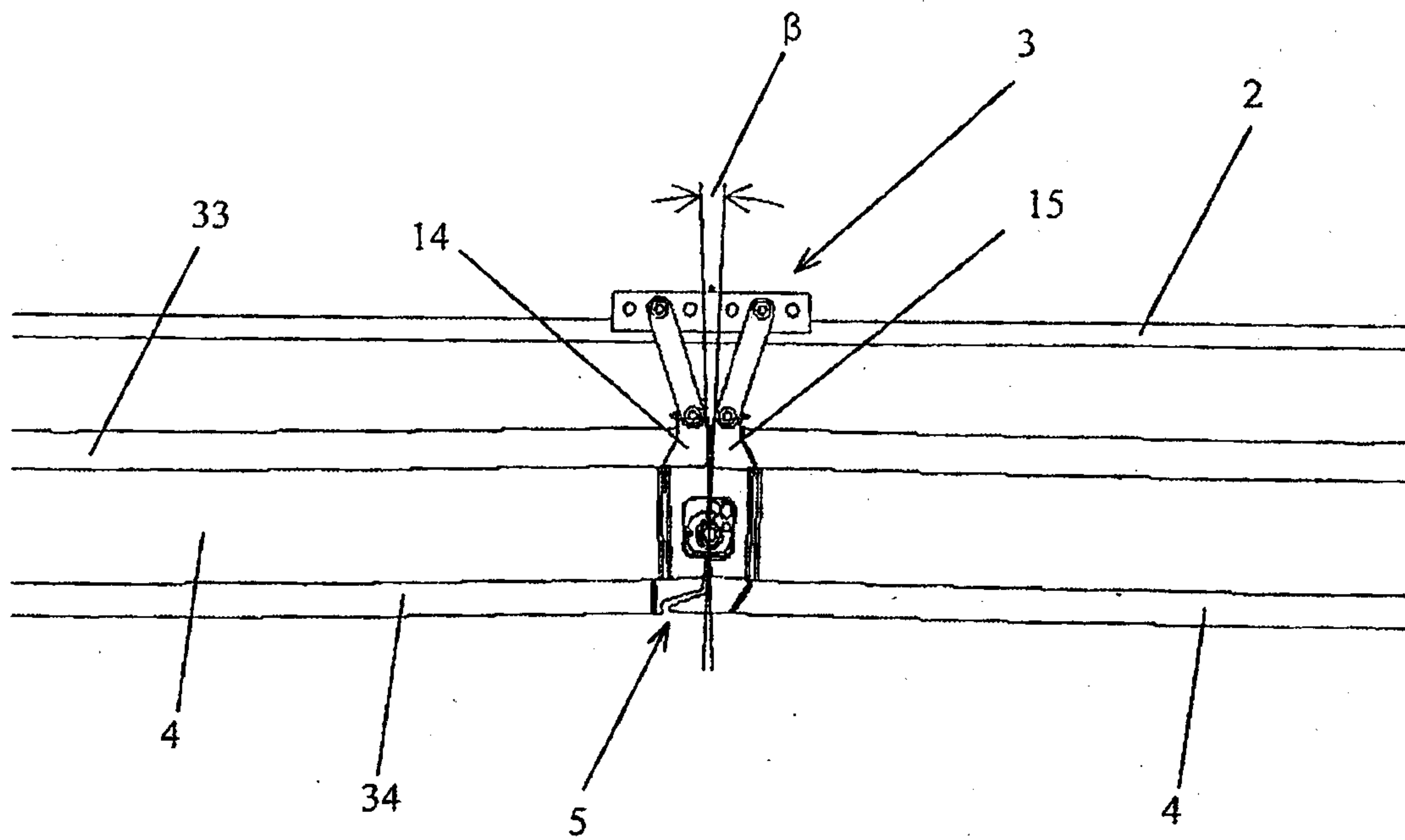


Fig. 4

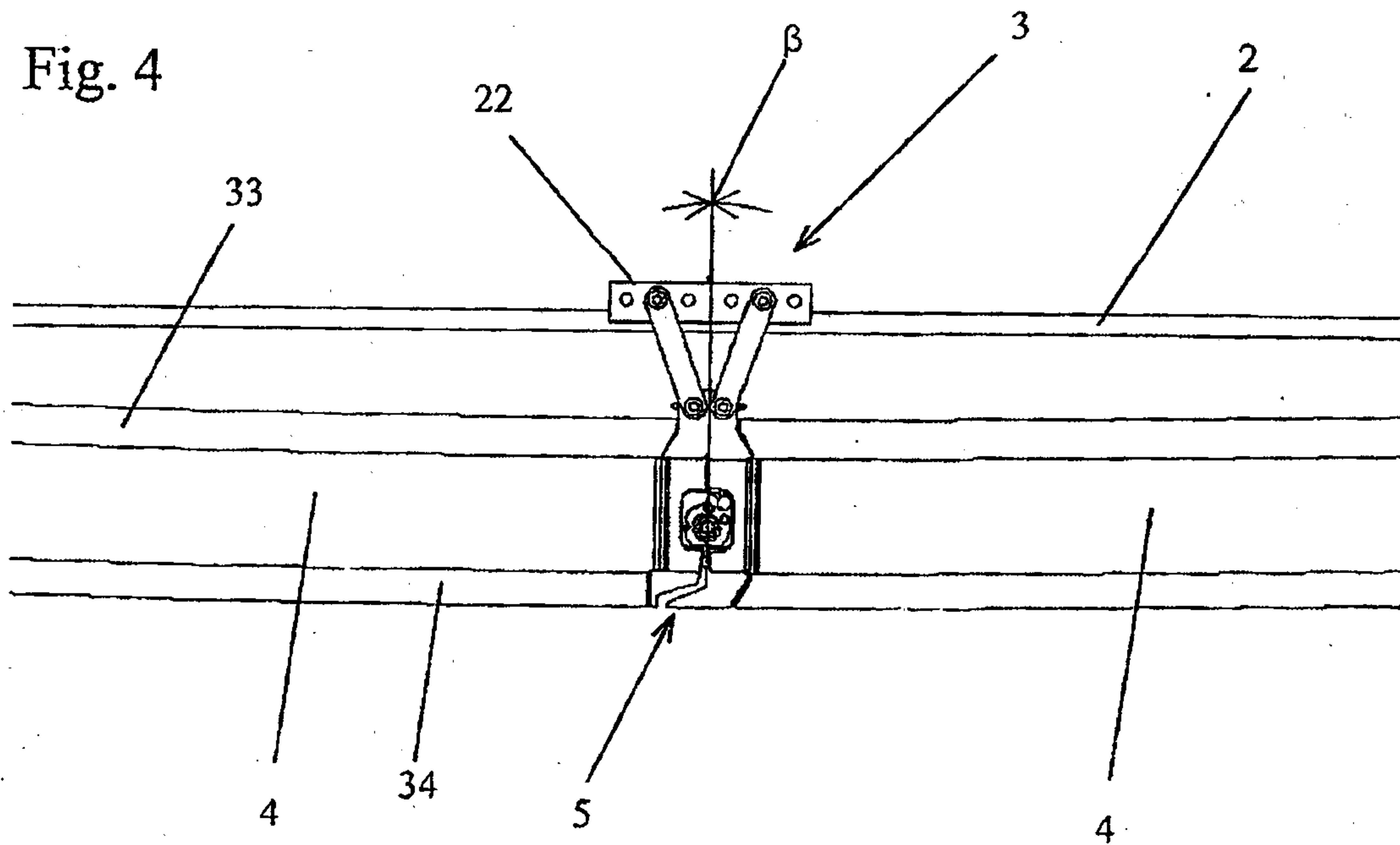
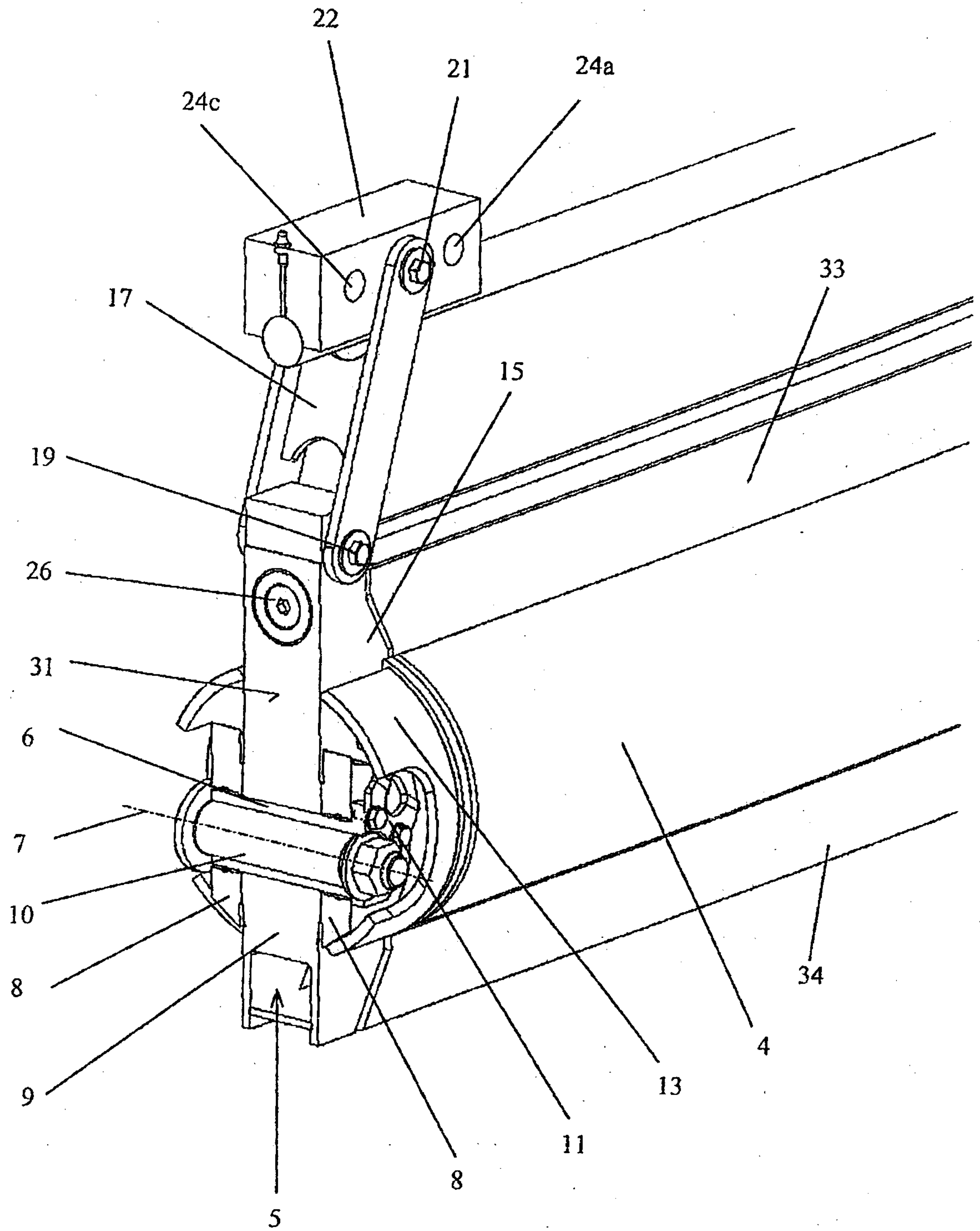
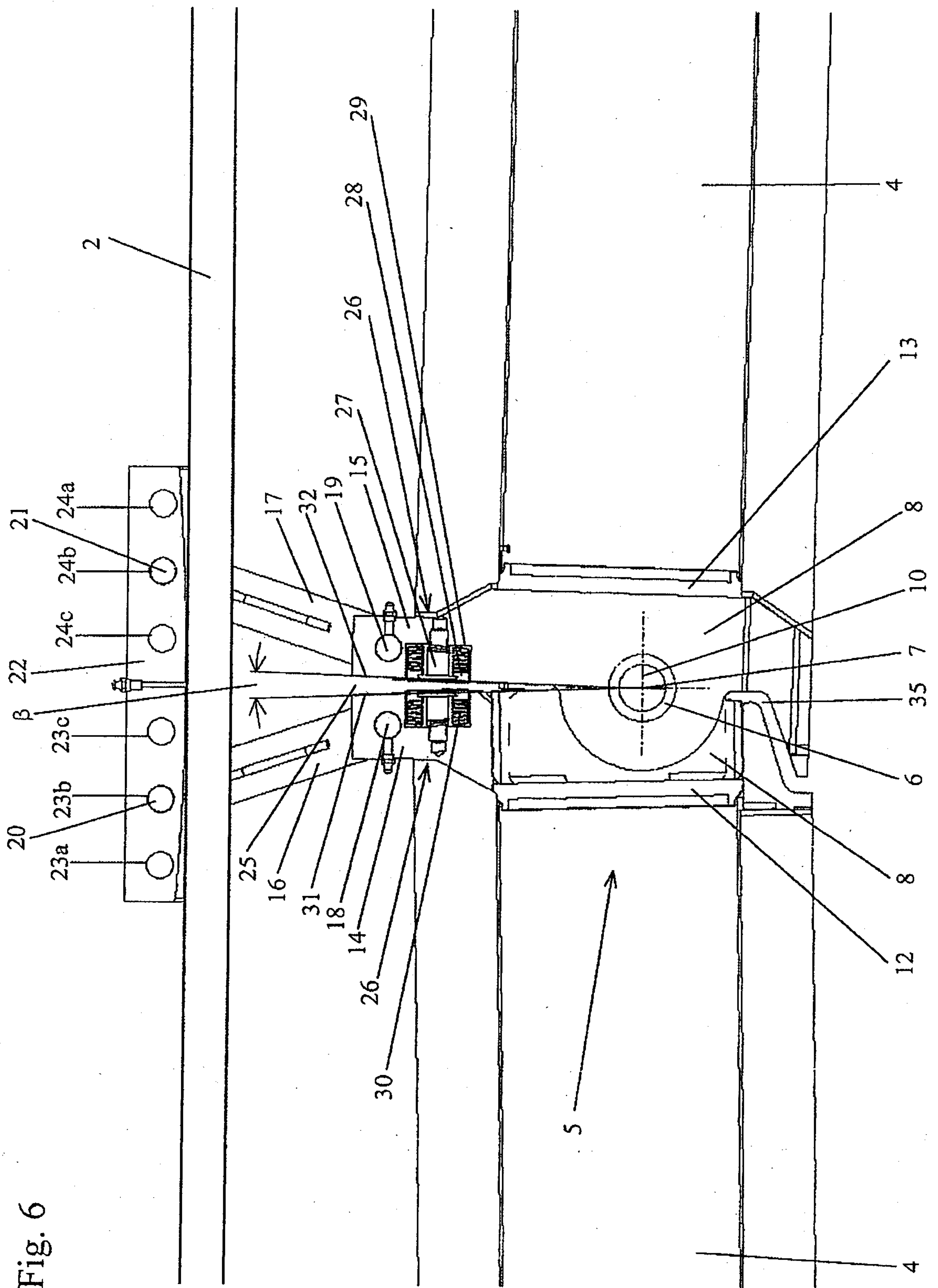


Fig. 5





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