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(54) **Sínalátámasztó szerkezet**

RAIL SUPPORT DEVICE

The present invention relates to a rail support device having the features of the preamble of claim 1.

Rail support devices of this type are used to transport railway tracks on rail transportation waggons which have been assembled into rail transportation trains. In this respect, especially long-welded rails which have already been prepared or prefabricated from short rails in a rail welding plant (these being rail sections of up to several hundred metres in length) are transported to track construction sites, for example, in order to there be laid in the track and connected to the rail infrastructure.

In this respect, the long-welded rails are typically lined up in a plurality of layers on girders which are arranged vertically one above another and extend transversely to a longitudinal direction of the rail transportation waggons. Rail support devices of this type are known, for example, from DE 43 12 964 A1, DE 44 18 376 A1 and from DE 20 2004 019 248 U1. However, in these rail support devices known from these documents, the rails in the uppermost layer are arranged with their rail heads exposed in a vertical direction and are not further secured. Although the rails are secured there against sliding sideways by laterally arranged securing elements, it has been found that especially in the case of particularly lengthy long-welded rails and in the case of great transportation distances, the long-welded rails shift lengthways which, in the worst case, can result in collisions with structures on the rail transportation waggon and can thereby result in damage which can entail repair costs and malfunctions.

Accordingly, a solution to this problem has been devised, whereby in this solution basically a horizontally extending clamping bar is positioned on the uppermost layer of the rails, arranged on the rail support devices, and a pressing force is applied by a tensioning mechanism to this clamping bar in the direction of the rails heads. Thus, rail transportation waggons which have been devised and operated by Voestalpine AG, Austria, are known and are in use, which have rail support devices, in which supporting beams for supporting rails can be inserted into two U-shaped profiled, vertically extending supports directed towards one another with the openings of the U-profiles, and which

can be provided with a clamping bar which can be positioned on the uppermost layer of the rails which have been received and can be screwed together by clamping screws which pass through, on threaded rods, the openings in the outer ends of the clamping bars and can be pressed against the uppermost layer of rails. In this concept, rail transportation supports of this type which are provided with clamping bars are arranged distributed on the rail transportation waggons only in relatively large intervals, located in front and behind are rail transportation supports without such clamping bars and without a clamping of the deposited rails to thus allow the rails to move out during cornering manoeuvres and to prevent damage to the transported rails due to high bending moments in the intermediate region to short clamping intervals.

Although this previously known system can clamp the rails placed on the rail support device and can thereby prevent the rails from shifting lengthways, this construction nevertheless suffers from disadvantages and has room for improvement. In particular, the handling of the clamping bar which always has to be lifted out of the U-shaped guides of the vertical supports for loading and unloading the rails is difficult, it necessitates the use of a crane due to the weight of this clamping bar, which crane accordingly has to be kept available or has to be provided not only at the loading site, but particularly also at the unloading site which is often a construction site located outside the region of relatively large installations. Furthermore, the fixing and clamping of the clamping bar by the bolts is laborious and again requires the use of a specific tool, namely an appropriately configured combination spanner for tightening or loosening the nuts. Moreover, here the applied clamping forces cannot be set in a satisfactorily reproducible manner, which is also considered to be a disadvantage.

The clamping bar in the known solution described above has on its side facing for resting on the rail heads of the uppermost layer of the rails received in the rail support device a wooden board by which it rests on the rails heads. In this respect, it can be observed that different pressing forces are exerted on the rails received next to one another in the uppermost layer of the rails in the rail support device, on the one hand due to different dimensions of the rails ensuing on account of manufacturing tolerances (particularly in the height of the rail, measured level with the rail foot to level with the rail head) and on the other hand due to an imprecise shaping of the wooden board. Here, it can even

happen that in spite of the clamping bar being braced against the uppermost layer of rails, individual rails experience only a low contact pressure or even no appreciable contact pressure at all, and thus they are not securely fixed, as desired, by the clamping bar. Therefore, this also needs to be improved.

A further rail support device with supports (102, 104), a ground sill (2a), a clamping bar (26), a clamping mechanism (4), a bearing surface (58) of the clamping bar (26) which can be moved vertically relative to a body of the clamping bar (26), and can be actively advanced in the direction of the rail supporting surface by an actuating drive (70) is known from JP 2000 108 896 A.

Accordingly, the object of the present invention is to provide a rail support device of the type mentioned at the outset which has a clamping bar in combination with a tensioning mechanism for applying a clamping force to the uppermost layer of rails in the rail support device and which is easier to handle and has an improved reliability in respect of the clamping effect.

This object is achieved according to the invention by a rail support device having the features of claim 1. Advantageous developments of a rail support device of this type according to the invention are set out and described in detail in the dependent claims 2 to 14.

According to the invention, the novel rail support device thus has, and this is initially consistent with the prior art, two opposed vertical posts, laterally delimiting a support region, a ground sill extending in a vertically lower region between the posts, defining on an upper side a rail support surface for depositing rails, a horizontally extending clamping bar which is arranged above the ground sill, which can be fixed to the posts and which has a bearing surface on an underside for resting on rail heads of a layer of rails placed on the rail support device, and a tensioning mechanism for applying a clamping force which is vertically effective between the ground sill and the clamping bar.

The novel rail support device differs from the known prior art in that the rail support surface can be moved vertically relative to a body of the ground sill, and in that the bearing

surface can be moved vertically relative to a body of the clamping bar, and one of the mentioned surfaces, i.e. the rail support surface or the bearing surface can be actively advanced by means of a drive in the direction of the respective other surface, i.e. the bearing surface or the rail support surface, and the respective other surface, i.e. the bearing surface or the rail support surface is prestressed by an elastic resetting means in the direction of the one surface which can be actively advanced in the direction of the other surface by means of the drive, i.e. the rail support surface or the bearing surface.

Various advantages are realised by this innovation and constructive reconfiguration according to the invention compared to the known prior art:

Thus, an appropriate drive can be configured in particular such that it can be actuated without an accompanying tool. Furthermore, due to the combination of an active advance of one of the surfaces, bearing surface or rail support surface, and the passive release of a counter force by the elastic resetting means which prestresses the other surface, bearing surface or rail support surface, in a clamping direction, a uniform and more effective introduction of the clamping force is achieved. In this respect, the drive can advantageously also be configured such that it allows a reproducible application of a selectable clamping force, it can be provided, for example, with a device indicating and/or observing a variable representing the clamping force, for example in respect of the current consumption of an actuating drive, driven by an electric motor, or by the pressure of a hydraulically or pneumatically operated actuating drive.

In this respect, the drive is advantageously a hydraulically operated drive. The advantage of a hydraulically operated drive is that it can generate and transmit high forces. Likewise, as provided according to a further advantageous development of the invention, it can be configured as a manually operated drive if this has a hydraulic manual pump, for example. This form of the drive allows a configuration with no requirement of an energy supply fed from outside, for example a power supply, so that the rail support device according to the invention can ultimately be configured and formed as a self-sufficient unit.

The elastic resetting means can advantageously comprise spring packages which are arranged between the surface provided with the elastic resetting means, i.e. the bearing

surface or the rail support surface, and a housing in which this surface can be moved in a vertical direction. Spring packages of this type can be realised constructively in a relatively simple manner, for example they can be formed as laminated disc springs. Due to the configuration with a plurality of spring packages of this type which can be arranged in tandem in different positions particularly in the element in which they are fitted (ground sill or clamping bar) in the respective longitudinal direction of said element, i.e. in the direction in which the vertical posts are opposite one another, it is also possible to achieve a very specific distribution of the clamping force. Due to an individual configuration and choice of the spring force of the individual spring packages, it is even possible to influence a clamping force profile, to thereby be able to make appropriate adjustments of the required clamping force to the position which is required in respect of the horizontal and lateral positioning of the rails.

According to a further advantageous development of the invention, it is possible to provide in the rail support device according to the invention in a vertical direction between the ground sill and the clamping bar at least one girder which can be fixed on the posts such that it is vertically displaceable, extends in a horizontal direction and has on an underside a pressing surface for resting on rail heads of rails arranged under the girder and has on an upper side a bearing surface for rails which have been deposited and are supported on the girder. A girder of this type allows rails to be received in the rail support device in a further vertical stacking plane, so that a correspondingly greater number of rails can be deposited on the rail support device. In this respect, it is important that the girder can be fixed on the posts such that it can be moved in a vertical direction. It is thus possible, if a clamping force can be applied between the clamping bar and the ground sill by means of the tensioning mechanism comprising the vertically displaceable surfaces of rail support surface and bearing surface as well as the actuating drive, for the clamping force to be applied to the superimposed planes of the deposited rails and to be accordingly transferred vertically onto and above the girder. In this respect, more than one such girder can also be provided in particular, for example two such girders can be provided so that further superimposed layers of rails can be stacked for transportation, thus in the case of two girders accordingly three layers of rails. It is stressed that in the case of a plurality of such girders, it is crucial that all the girders are fixed on the posts in a vertically displaceable manner, so that the applied clamping force can act on all the

layers of the vertical superimposed rails. The girders respectively clamp with the pressing surface the lower layer of rails by applying the clamping force or by transferring the clamping force onto the rail heads of this layer, and clamp with the bearing surface the upper layer of rails from the rail foot side.

The one or the plurality of girders can advantageously be fixed to one of the posts such that it/they can pivot about the vertical axis thereof. This type of construction means that the girders, which can also be called "rotary sills" in this embodiment, do not have to be lifted off completely from the vertically extending posts in order to load rails onto or to unload them from the rail support device. Instead, the girders can simply be pivoted about the vertical axis of the post on which they are pivotally fixed, and they can thus be brought out of the overlap with the rails or with the surface provided for supporting the rails, so that the rail support device can be loaded and unloaded. In this respect, it is possible to provide on the post on which the girder is fixed such that it can pivot about the vertical axis thereof and is vertically displaceable on the post, girder lifting means which, during a pivoting movement of the girder about the longitudinal axis of the post on which it is pivotally fixed, cause the girder to perform a vertical movement. This produces at the same time, during the pivoting of the girder, a raising movement from the layer of rails on which the girder rests with its pressing surface, so that this raising movement is not accomplished by lifting the girder manually, but takes place at the same time as the pivoting movement. Here, a link guide for example (or a pivot bearing with a link guide of this type) can be formed, as described and disclosed in DE 202004019248 U1.

Furthermore, if the rail support device according to the invention provides at least one girder, the pressing surface and/or the bearing surface of this girder can be provided with an elastic cover. An elastic cover of this type can be, for example, a hard rubber mat which is applied to the appropriate surface or is introduced into said surface. An elastic cover of this type can advantageously produce a further and improved fixing of the rails placed on the respective surface, in that due to the elastic deformation of the cover, the pressing surface or the bearing surface is deformed on account of the clamping force applied by the actuating drive and possible differences in height, arising due to tolerances in the rail dimensions, are compensated thereby, thus ensuring that all the rails experience a corresponding clamping effect.

According to a development of the invention, the clamping bar can advantageously be fixed to one of the posts such that it can pivot about the longitudinal axis thereof. In a similar manner to the above description concerning the girders which are to be optionally provided, in the context of the clamping bar a solution of this type also provides the advantage that the clamping bar does not have to be completely lifted off the vertical posts. Instead, it is sufficient to pivot the clamping bar, expending only a relatively small amount of force, thus exposing underlying rails or a surface for supporting the rails. In this respect, it can advantageously be provided that the clamping bar is fixed to the post not only pivotally about the vertical axis thereof, but furthermore also displaceably in a vertical direction. Thus, the clamping bar can be adjusted in height accordingly to provide the pressing force or clamping force. At the same time, during the pivoting movement, the clamping bar can also be raised from the layer of rails on which it rests. In a similar manner to the above description in respect of the optional girders, this lifting movement can be supported by clamping bar lifting means which, during a pivoting movement of the clamping bar about the vertical axis of the post on which the clamping bar is pivotally fixed, cause the clamping bar to perform a vertical movement. Here as well, it is possible to advantageously select a link guide, as described and disclosed in DE 20 2004 019 248 U1.

Further advantages are provided by a development of the rail support device in which the rail support surface of the ground sill and/or the bearing surface of the clamping bar is/are provided with an elastic cover. An elastic cover of this type can be applied to the bearing surface or to the rail support surface or it can be introduced into the relevant surface. Here again, it can be in the form of a hard rubber mat, for example. In the manner described above for the analogous elastic cover which is possible as a configuration option for the girders to be optionally provided, an elastic cover of this type affords the advantage of a clamping effect, ensured for all the rails, by compensating height differences within layers of rails, which height differences arise due to manufacturing tolerances, for example.

A further development provides that the rail support device of the invention can have a mechanical locking means which causes the releasable locking of the surface advanced by

the actuating drive (i.e. the rail support surface or the bearing surface) in a vertical position adjusted by the actuating drive. When the required or desired clamping force is applied by means of the actuating drive, a mechanical locking means of this type can advantageously lock or fix in position the surface which is actively moved by the actuating drive, so that the actuating drive can be disconnected and does not have to be kept continually activated to apply or maintain the core force during a period of use, for example during a transportation journey for transporting rails. If the clamping effect is then to be stopped to release rails which are arranged on the rail support device and are clamped therein, the locking means is released and is brought into a release position from a locking position. In order to release the locking means, for example the actuating drive can be activated to relieve the locking means by applying a clamping force and to allow the locking means to move into the release position. By a locking means of this type, the actuating drive is thus equally provided with a self-locking effect which maintains the once assumed position of the element positioned by the actuating drive, even if the actuating drive is connected without power.

In a further advantageous constructive development in which the clamping bar is arranged in a vertically displaceable manner on the vertical posts, the rail support device according to the invention can have on the vertical posts counter-bearing elements which are arranged above the clamping bar and are vertically adjustable in the longitudinal direction of the posts. This type of embodiment allows an adjustment of the vertical height position of the clamping bar so that it can be adapted to the stacking height of the rails received in the rail support device. Counter-bearing elements of this type can be formed, for example, by threaded bushes which are advantageously secured by counter nuts and which form on their surface facing the clamping bar a corresponding counter-bearing surface. In this respect, cylindrical holding portions, for example, can be formed which project above the counter-bearing surfaces in the direction of the clamping bar and which have a greater diameter than a stop portion of the posts, so that the clamping bar can be placed over the post with an open annular receiving region which has a circumferential enclosure including more than 180° and an opening width which is greater than the diameter of the contact portion of the posts in the contact portion and then by vertically advancing a counter-bearing element of this type such that the cylindrical

holding portion passes inside the annular receiving region, it can be locked in a form-fitting manner.

In the rail support device according to the invention, the rail support surface in the ground sill can advantageously be the surface which can be actively advanced in the direction of the bearing surface by means of the drive, whereas the bearing surface in the clamping bar is prestressed in the direction of the rail support surface by the elastic resetting means. A solution of this type has proved to be advantageous since the clamping bar must always be moved and displaced for loading and unloading the rail support device, whereas the ground sill is arranged to be stationary all the time. The actuating drive can be integrated into a stationary element more easily and with less constructive effort.

Further advantages and features of the invention will become apparent from the following description of an embodiment based on the accompanying figures, in which:

Fig. 1 is a three-dimensional view of an embodiment of a rail support device according to the invention with its essential elements;

Fig. 2 is a view from the front of the rail support device shown in Fig. 1;

Fig. 3 is a three-dimensional view of the arrangement of the elements of ground sill and posts of the rail support device according to Fig. 1, with further attachments from a viewing direction opposite the viewing direction of Figs. 1 and 2, of the rail support device;

Fig. 4 is a side view of the clamping bar of the rail support device according to Fig. 1 with a cut-away side wall;

Fig. 5 is a party cut plan view of the clamping bar;

Fig. 6 is a partly cut side view of the clamping bar;

Fig. 7 is an enlarged view of the detail denoted by A in Fig. 6;

Fig. 8 is a view, comparable to Fig. 2, of the rail support device with a separate enlarged view of a detail including a view of second rails arranged therein, to illustrate the effect of an elastic cover arranged on an underside of the clamping bar;

Fig. 9 is a view similar to that in Fig. 3, but without a covering on the body of the ground sill, so that internal elements used for locking purposes, are visible;

Fig. 10 is an enlarged view of a detail of the inner structure in the body of the ground sill with the locking mechanism, including an enlargement of a detail of this view;

Fig. 11 shows, in a detail which is again enlarged compared to Fig. 10, further details from the interior of the body of the ground sill;

Fig. 12 is a detail view of the cooperation between the threaded bush and the holding claw of the clamping bar for a positive fixing of the clamping bar on the supporting strut, against which the holding claw rests;

Fig. 13 shows a view of the interior in the body of the ground sill to illustrate the hydraulic tensioning mechanism and the actuating drive thereof, and

Fig 14 shows the rail support device with girder and clamping bar pivoted into the open position.

The figures show and represent an embodiment of a rail support device, configured according to the invention, in different views. In the following, this embodiment will be described with reference to the figures. In this respect, it is stressed that the figures are not complete constructional drawings, but are substantially schematic drawings of the elements which are essential to the invention, and of further advantageous configurations and features.

In the figures, a rail support device according to the invention is denoted very generally by reference numeral 1. It contains as essential elements two mutually opposite posts 2

and 3 which are arranged at a distance from one another and extend vertically by their longitudinal direction, as well as a horizontally extending ground sill 4 which bridges the distance between the posts 2, 3 in a lower portion of the rail support device 1. Formed in the ground sill 4 is a rail support surface 5 which is vertically displaceable relative to a body 6 of the ground sill 4.

Vertically above the ground sill 6 it is possible to see a clamping bar 7 which is shown in Figs. 1, 2, 8 and 13 in a position which is fixed on the two posts 2, 3 and bridges the distance between the posts 2 and 3. On an underside facing the ground sill 6, this clamping bar 7 has a bearing surface 8 which, during operation of the rail support device 1 with rails arranged thereon, rests on rail heads of an uppermost layer of rails. This bearing surface 8 is vertically displaceable with respect to a body 9 of the clamping bar 7.

The clamping bar 7 itself is fixed pivotally and in a vertically displaceable manner on the vertical post 2, having a bearing sleeve 10 which encompasses the post 2, which is circular in cross section, and is formed integrally with the clamping bar 7. The clamping bar 7 engages around the vertical post 3 with a holding claw 11, formed to be partly annular in cross section, in the position shown in Figs. 1, 2, 8 and 13. In this respect, the clamping bar 7 can be pivoted about the post 2 out of the position shown in Figs. 1, 2, 8 and 13 to expose the underlying region. As the clamping bar 7 pivots, the holding claw 11 is then released from the post 3, the bearing sleeve 10 naturally remains connected to the post 2. During a pivoting movement of this type which, in the view of Fig. 1, takes place in a movement directed forwards to the right, a link track 12, formed on an underside of the bearing sleeve 10 runs over a roller pin 13 fixed to the post 2, a vertical lifting movement being initiated at the same time by the pivoting movement due to the cooperation of roller pin 13 and link track 12. In order to be able to easily pivot the clamping bar 7, a handle 14 is formed thereon. Fig. 14 shows the position in which the clamping bar 7 has been swivelled into the open position. In this position, the clamping bar 7 has been placed down on a support 48 formed integrally with a stacking post 47, so that the bearing sleeve 10 does not have to permanently bear the weight of the holding bar 7 at the end of a one-armed lever.

Vertically displaceable counter-bearing elements in the form of threaded bushes 15 and 16 with annularly protruding stop collets 17 respectively formed thereon are arranged on the vertical posts 2 and 3 above the clamping bar 7. Introduced into the stop collet 17 over the circumference are openings 18 which serve as a tool attachment to be able to attach a tool for screwing the threaded bushes 15 and 16 into place. As shown in particular by Fig. 5, the holding claw 11 is provided with a partly annular recess 19, the circumferential extent of which is above 180°. Via an access opening 20, a support portion of the post 3, the diameter of which is selected such that it can be guided through the access opening 20 can be introduced into the recess 19. The threaded bush 16 has a cylindrical extension 43 which is reduced in diameter compared to the diameter of the stop collet 17, it projects downwards above the stop collet 17 (cf. Fig 12) and is formed in diameter corresponding to the diameter of the partly annular recess 19, so that this extension can be introduced from above into the recess 19. Thus, by a corresponding displacement of the threaded bush 16 vertically downwards by the screwing thereof, this cylindrical extension 43 can be introduced into the recess 19 and it then positively locks the holding claw 11 due to the encompassing overlap above 180° of the recess 19.

In this embodiment, two girders 21 are arranged in the vertical region between the ground sill 4 and the clamping bar 7. They respectively have a bearing surface 22 on the upper side thereof, onto which rails can be placed by their rail feet. On their underside, the girders 21 respectively have a pressing surface 23 by which they rest on rail heads of a layer of rails arranged below the respective girder 21. The girders 21 are arranged pivotally and vertically displaceably on the post 2 similarly to the clamping bar 7. The girders 21 also respectively have a bearing sleeve 24 surrounding the post 2 which is circular in cross section. On the post 3, the girders 21 are fixed in a releasable manner by locking elements 25 in the position shown in Figs. 1, 2, 8 and 13. When the girders 21 are pivoted, a simultaneous vertical lifting movement is also produced due to a link guide. The bearing sleeves 24 of the girders 21 also have for this purpose on their respective underside a link track 26 which cooperates with a corresponding roller pin 27 which is fixed on post 2. The positions of the girders 21, pivoted into an open position, can be seen in Fig. 14. In this respect, the girders 21 have also been placed on supports 48 of the stacking post 47.

To securely clamp rails received in the rail support device 1, a tensioning mechanism applies a vertically acting clamping force on the rails. This tensioning mechanism comprises the vertically displaceable rail support surface 5, an actuating drive, to be described in more detail in the following, for the active vertical displacement of the rail support surface 5 in the direction of the clamping bar 7, the bearing surface 8 and also an elastic resetting means which vertically prestresses the bearing surface 8 in the direction of the ground sill 4.

As can be seen in particular in Fig. 4, in this embodiment, the elastic resetting means consists of a number of spring packages 28 which are arranged in tandem in the longitudinal direction of the clamping bar 7 and accordingly exert an elastic resetting force on the bearing surface 8. These spring packages 28 respectively have a plurality of disc springs 29 which are arranged in a superimposed manner and are combined into the spring packages 28. Fig. 7 is a more precise view of an enlarged detail of a spring package 28 of this type. It is formed by the superimposed disc springs 29 which are placed over a bolt 30, and by a guide bushing 31 which has been placed on the disc springs 29, acts as a stop and is fixed and held in position by a crown nut 32, screwed onto the bolt 30. The individual spring packages 28 can be adjusted with a varying spring force in the longitudinal direction of the clamping bar 7 to thus form a resetting force profile.

The rail support surface 5 is vertically displaceable relative to the body 6 of the ground sill 4 by means of a hydraulic drive operated by a manual pump 44 (see Fig. 13). A hydraulic fluid reservoir and the manual pump 44 are located in an equipment box 34 closable by a door 33. The throughflow quantity of the hydraulic fluid can be regulated by a valve 49.

Actuation of the manual pump 44 pressurises the hydraulic fluid which is conveyed via hydraulic lines 45 to hydraulic rams 46 which are arranged in the body 6 and act on the rail support surface 5. The rail support surface 5 is displaced vertically relative to the body 6 of the ground sill 4 by the hydraulic rams 46, namely it is moved upwards in the direction of the clamping bar 7.

When the rail support device 1 has been fully equipped with the rails which are to be received, i.e. when rails have been received on the rail support surface 5 of the ground sill

4 and on the bearing surfaces 22 of the girders 21, the clamping bar 7 is attached and is placed on the rail heads of the uppermost layer of rails. The girders 21 and the clamping bar 7 are then positioned such that the lower girder 21 rests on the rail heads of the underlying rails, the upper girder 21 rests on the rail heads of the rails placed on the lower girder 21 and the clamping bar 7 rests with its bearing surface 8 on the rail heads of the rails placed on the upper girder 21. In this position, the threaded bushes 15, 16 are then tightened so that they rest with the stop collets 17, forming the counter-bearing surface, on corresponding bearing surfaces of the clamping bar 7, in the case of threaded bush 15 on an upper peripheral surface of the bearing sleeve 10, and in the case of threaded bush 16 on an upper surface of the holding claw 11. Then, the hydraulic fluid is pressurised by actuating the manual pump 44 so that the hydraulic rams 46, charged with hydraulic fluid via the hydraulic lines 45, move the rail support surface 5 vertically upwards out of the body 6 of the ground sill 4 and towards the clamping bar 7. The clamping force applied thereby results in an elastic deformation of the spring packages 28 and in a yielding of the bearing surface 8, the spring packages 28 applying a corresponding counter force and thus exerting a clamping force which acts in the opposite direction. In this way, the clamping force on the rails, received in the rail support device 1, is exerted in two directions, namely vertically upwards from below (by the rail support surface 5 displaced upwards by the actuating drive) and downwards from above (by the counter force exerted by the spring packages 28 on the bearing surface 8). These particular measures and this concept mean that it is possible to achieve the application of the clamping force necessary for providing a secure retention of the rails in the rail support device 1 in a simple manner without a specific, complex tool, in particular without a crane or a large hand tool. In addition, the applied clamping force is distributed uniformly and is very effective due to the force effect in two opposite directions in the vertical extent.

Fig. 8 shows that the bearing surface 8 has an elastic cover 35 in any case which, when the clamping force is applied, is elastically deformed and is thus placed around and fixes the rail heads of the rails S against which it rests. This can be seen particularly well in the enlarged view on the right in Fig. 8, and here it can also be seen that the two rails S, shown by way of example, are formed in different heights, i.e. with different spacings between the underside of the rail foot and the upper side of the rail head, the rail S on the right of the figure being higher than the rail S on the left. An elastic cover 35 of this type can also

be formed on the girder 21, at least on the pressing surface 23 thereof. It is likewise possible to also provide the rail support surface 5 and the bearing surfaces 22 with corresponding elastic covers 35.

The tensioning mechanism of the rail support device 1 according to the invention can be provided in particular with a locking means which blocks or locks the rail support surface 5 in a position which is adjusted by means of the hydraulic system and the manual pump 44 once the clamping force has been applied. A locking means of this type can help to ensure in particular that the actuating drive does not have to remain permanently active while the rails are stored and held in a clamped manner in the rail support device 1. Thus, for example, after the locking means has been positioned, the hydraulic system can be relaxed.

A locking means of this type can be realised as follows and as shown in Figs. 9 to 11, as is also shown in the embodiment.

A bolt slide 37 is arranged in a horizontally displaceable manner in the body 6 of the ground sill 4. The bolt slide has stepped portions 38, here three such stepped portions 38 arranged in tandem in the direction of its longitudinal extent (which corresponds to the longitudinal extent of the ground sill 4). Formed in the stepped portions 38 are horizontal bearing surfaces which are arranged in tandem in a step-like and graduated manner and are respectively spaced apart from one another by the same vertical separation and are respectively formed with the same width in the direction of the longitudinal extent of the bolt slide 37.

Formed on the element which forms the rail support surface 5 and is vertically movable relative to the body 6 are downwardly projecting stepped portions 39 which correspond to the stepped portions 38 of the bolt slide 37 and which have in the same way stepped bearing surfaces with the same height graduations and width dimensions.

The bolt slide is pretensioned in a direction oriented to the left in Figs. 10 and 11, a direction in which the stepped portions 38 slope in a wedge-shaped manner, by a pressure

spring 40 which is positioned on a shank 41 formed on the bolt slide 37 and is supported on an abutment.

When the rail support surface 5 is moved out by the actuation of the manual pump 44 and by the moving-out action of the hydraulic rams 46, and is raised against the force from the spring packages 28 in the clamping bar 7, the pressure spring 40 presses the bolt slide 37 in the direction on the left in Figs. 9 to 11, so that the stepped portions 38 of the bolt slide rest in a wedge-like manner against the stepped portions 39 which are joined to the rail support surface 5. Due to the cooperation of the bearing surfaces, which thus come to rest opposite one another, of the two respectively cooperating stepped portions 38 and 39, a stop is formed which, due to the clamping force exerted by the spring packages 28 in the clamping bar 7, produces a force and form fit and holds the position of the rail support surface 5 relative to the body 6 of the ground sill 4 even when the hydraulic pressure is disconnected and thus when the hydraulic rams 46 have been deactivated. The hydraulic pressure can be released via a lever (not visible) on the manual pump 44.

To release this locking effect, hydraulic pressure is built up again using the manual pump 44, the hydraulic rams 46 are moved out again until the wedge fastening of the stepped portions 38 and 39 is released. Via a swivel lever 42, the bolt slide can then be drawn back again against the spring force of the pressure spring 40 in the direction on the right in Figs. 9 to 11 into a starting position in which the stepped portions 38 and 39 allow the rail support surface 5 to be returned into the lowest starting position. Thereafter, the hydraulic pressure is released and the rail support surface 5 yields downwards due to the applied weight force, and it arrives back in its starting position. The clamping bar 5 can then be raised and the rail support device 1 can be unloaded.

The described rail support device 1 presented in the embodiment which is shown is typically installed on a rail transportation waggon, for which purpose it is provided with fastening plates 36 which, for example, can be screwed down on a load receiving surface, planked with wood sills, of the rail transportation waggon. In this respect, the rail support device 1 according to the invention is usually arranged with two such devices in tandem in a central portion of a rail transportation waggon, the rail transportation waggon

moreover being fitted with conventional rail support devices in particular not equipped with clamping bars 7. It is thus ensured that the transported rails are only fixed at a few points, that an adequate freedom of movement is retained in the intermediate portions in order to be able to respond to deformations which arise, for example, while travelling through a bend or up an incline, without running the risk of the rails being damaged or that the smooth travel of the rail transportation train is jeopardised, that for example there is a risk of derailing, namely if the rail transportation waggons of the rail transportation train cannot follow curve radii or if they cannot respond to bends in the course of inclines due to a stiffening effect of the rails which have been loaded on the waggons and are no longer sufficiently flexible.

List of reference signs

1	rail support device
2	post
3	post
4	ground sill
5	rail support surface
6	body
7	clamping bar
8	bearing surface
9	body
10	bearing sleeve
11	holding claw
12	link track
13	roller pin
14	handle
15	threaded bush
16	threaded bush
17	stop collet
18	opening
19	recess
20	access opening
21	girder
22	bearing surface
23	pressing surface
24	bearing sleeve
25	locking element
26	link track
27	roller pin
28	spring package
29	disc spring
30	bolt
31	guide bushing

32	crown nut
33	door
34	equipment box
35	elastic cover
36	fastening plate
37	bolt slide
38	stepped portion
39	stepped portion
40	pressure spring
41	shank
42	swivel lever
43	extension
44	manual pump
45	hydraulic line
46	hydraulic ram
47	stacking post
48	support
49	valve
S	rail

717741/DO

SÍNALÁTÁMASZTÓ SZERKEZET

SZABADALMI IGÉNYPONTOK

1. Sínalátámasztó szerkezet (1), amelynek része

– két függőleges támoszloppal (2, 3), amik egymással szemben vannak, és kétoldalt egy alátámasztási területet határolnak,

– egy függőlegesen alsó területen a támoszlopok (2, 3) között elhelyezkedő alaptalppal (4), ami felső oldalon sínek (S) lerakására sínalátámasztó felületet (5) képez,

– egy vízszintes helyzetű leszorítógerendával (7), ami az alaptalp (4) fölött van elhelyezve, a támoszlopokon (2, 3) rögzíthető, és alsó oldalon a sínalátámasztó szerkezetre (1) lerakott sínek (S) egy rétegének sínfejeire felfekvésre támfelülettel (8) rendelkezik,

– egy feszítőmechanizmussal az alaptalp (4) és a leszorítógerenda (7) között függőlegesen ható szorítóerő létrehozására,

azzal jellemezve, hogy a sínalátámasztó felület (5) az alaptalp (4) testéhez (6) képest függőleges irányban eltolható, és hogy a támfelület (8) a leszorítógerenda (7) testéhez képest függőleges irányban eltolható, továbbá az egyik felület – a sínalátámasztó felület (5), illetve a támfelület (8) – a feszítőmechanizmushoz tartozó helyzetállító mű (44, 46) segítségével a mindenkori másik felület – a támfelület (8), illetve a sínalátámasztó felület (5) – irányában aktívan előtolható, a mindenkori másik felület – a támfelület (8), illetve a sínalátámasztó felület (5) – pedig egy rugalmas visszaállító eszköz (28) útján az egyik felület – a sínalátámasztó felület (5), illetve a támfelület (8) – irányában elő van feszítve.

2. Az 1. igénypont szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy a helyzetállító mű (44, 46) hidraulikusan működtethető helyzetállító mű.

3. A 2. igénypont szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy a hidraulikusan állítható helyzetállító mű (44, 46) magában foglal egy hidraulikus kéziszivattyút (44).

4. Az előző igénypontok egyike szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy a rugalmas visszaállító eszköz (28) magába foglal rugókötegeket, amik a rugalmas visszaállító eszközzel (28) ellátott felület – a támfelület (8), illetve a sínalátámasztó felület (5) – és azon elem teste (6) között van elhelyezve, amelyben ez a felület (5, 8) függőleges irányban eltolhatóan van tartva.

5. Az előző igénypontok egyike szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy függőleges irányban az alaptalp (4) és a leszorítógerenda (7) között legalább egy tartógerenda (21) van, ami a támoszlopokon (2, 3) függőleges irányban eltolhatóan rögzíthető, vízszintes irányban helyezkedik el, és alsó oldalon a tartógerenda (21) alatt elhelyezett sínek (S) sínfejeire felfekvésre nyomófelülettel (23) rendelkezik, felső oldalon pedig a tartógerendán (21) alátámasztott sínek (S) lerakására alátámasztó felülettel (22) rendelkezik.

6. Az 5. igénypont szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy a legalább egy tartógerenda (21) az egyik támoszlopon (2) annak függőleges tengelye körül elfordíthatóan van rögzítve.

7. A 6. igénypont szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy a tartógerenda (21) azon támoszlopon (2), amelyen annak függőleges tengelye körül elfordíthatóan van rögzítve, függőleges irányban eltolhatóan van rögzítve, továbbá alkalmazva vannak tartógerenda-emelő eszközök (26, 27), amik a tartógerenda (21) azon támoszlop (2) függőleges tengelye körüli elfordító mozgatásakor, amelyen a tartógerenda elfordíthatóan rögzítve van, a tartógerenda (21) függőleges eltolását idézik elő.

8. Az 5–7. igénypont egyike szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy a legalább egy tartógerendának (21) a nyomófelülete (23) és/vagy az alátámasztó felülete (22) el van látva rugalmas felfekvő résszel van ellátva.

9. Az előző igénypontok egyike szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy a leszorítógerenda (7) az egyik támoszlopon (2) annak függőleges tengelye körül elfordíthatóan van rögzítve.

10. A 9. igénypont szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy a leszorítógerenda (7) azon támoszlopon (2), amelyen annak függőleges tengelye körül elfordíthatóan van rögzítve, függőleges irányban eltolhatóan van rögzítve, továbbá alkalmazva vannak leszorítógerenda-emelő eszközök (12, 13), amik a leszorítógerenda (7) azon támoszlop (2) függőleges tengelye körüli elfordító mozgatásakor, amelyen a leszorítógerenda elfordíthatóan rögzítve van, a leszorítógerenda (7) függőleges eltolását idézik elő.

11. Az előző igénypontok egyike szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy az alaptalpnak (4) a sínalátámasztó felülete (5) és/vagy a leszorítógerendának (7) a támfelülete (8) rugalmas felfekvő résszel (35) van ellátva.

12. Az előző igénypontok egyike szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy a helyzetállító művel (44, 46) előtolt felületnek – a sínalátámasztó felületnek (5), il-

letve a támfelületnek (8) – a helyzetállító mű (44, 46) segítségével beállított függőleges pozícióban való oldható blokkolására egy mechanikus blokkolóeszköz (37, 38, 39) van alkalmazva.

13. Az előző igénypontok egyike szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy a leszorítógerenda (7) a támoszlopokon (2, 3) függőleges irányban eltolhatóan van elhelyezve, és hogy a függőleges támoszlopokon azok hosszirányában magasságban állítható, a leszorítógerenda (7) fölött elhelyezett ellentartó elemek (15, 16, 17) vannak alkalmazva.

14. Az előző igénypontok egyike szerinti sínalátámasztó szerkezet (1), **azzal jellemezve**, hogy a sínalátámasztó felület (5) a helyzetállító mű (44, 46) segítségével a támfelület (8) irányában aktívan előtolható, a támfelület (8) pedig a rugalmas visszaállító eszköz (28) útján a sínalátámasztó felület (5) irányában elő van feszítve.

1/12

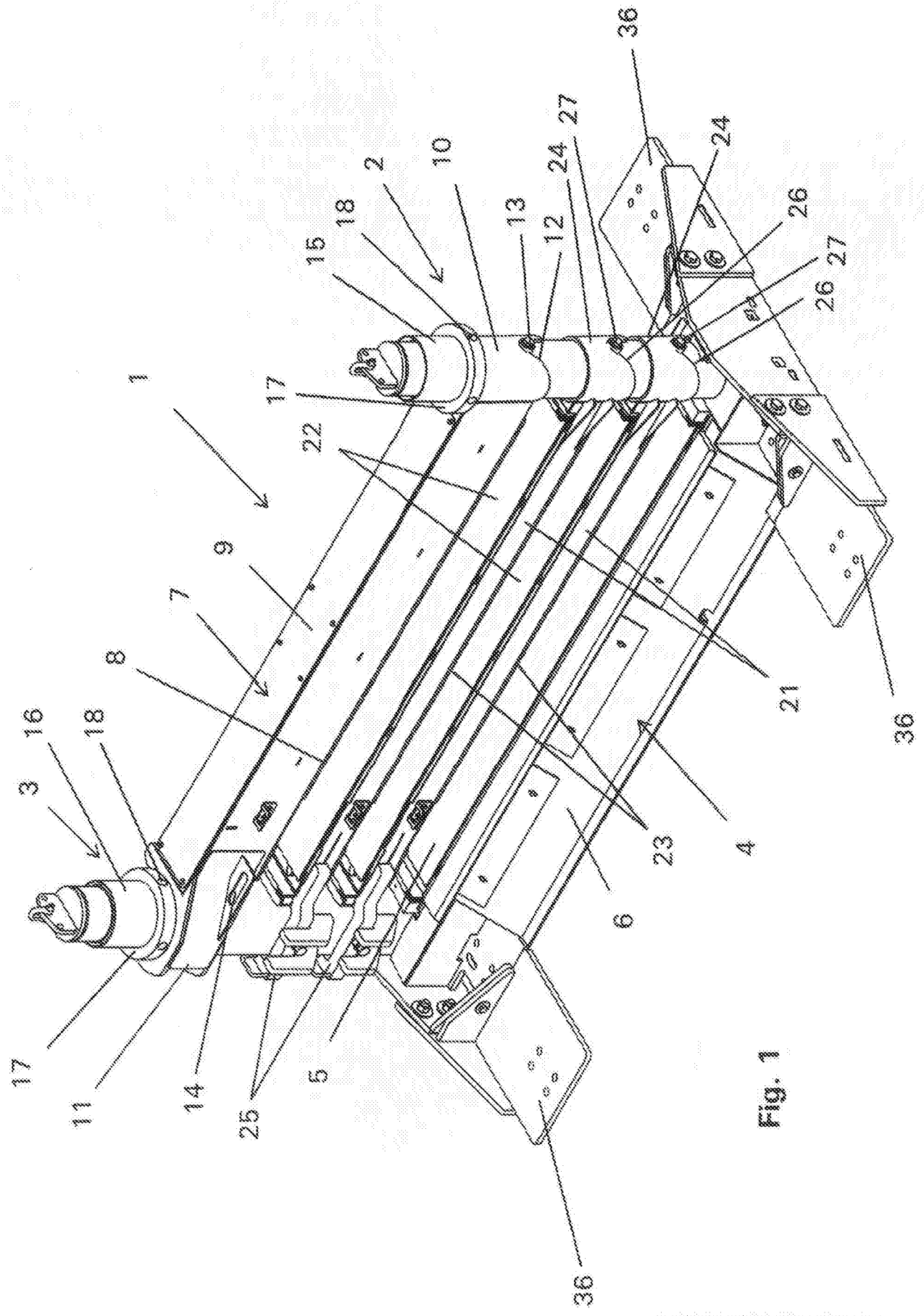

Fig. 1

2/12

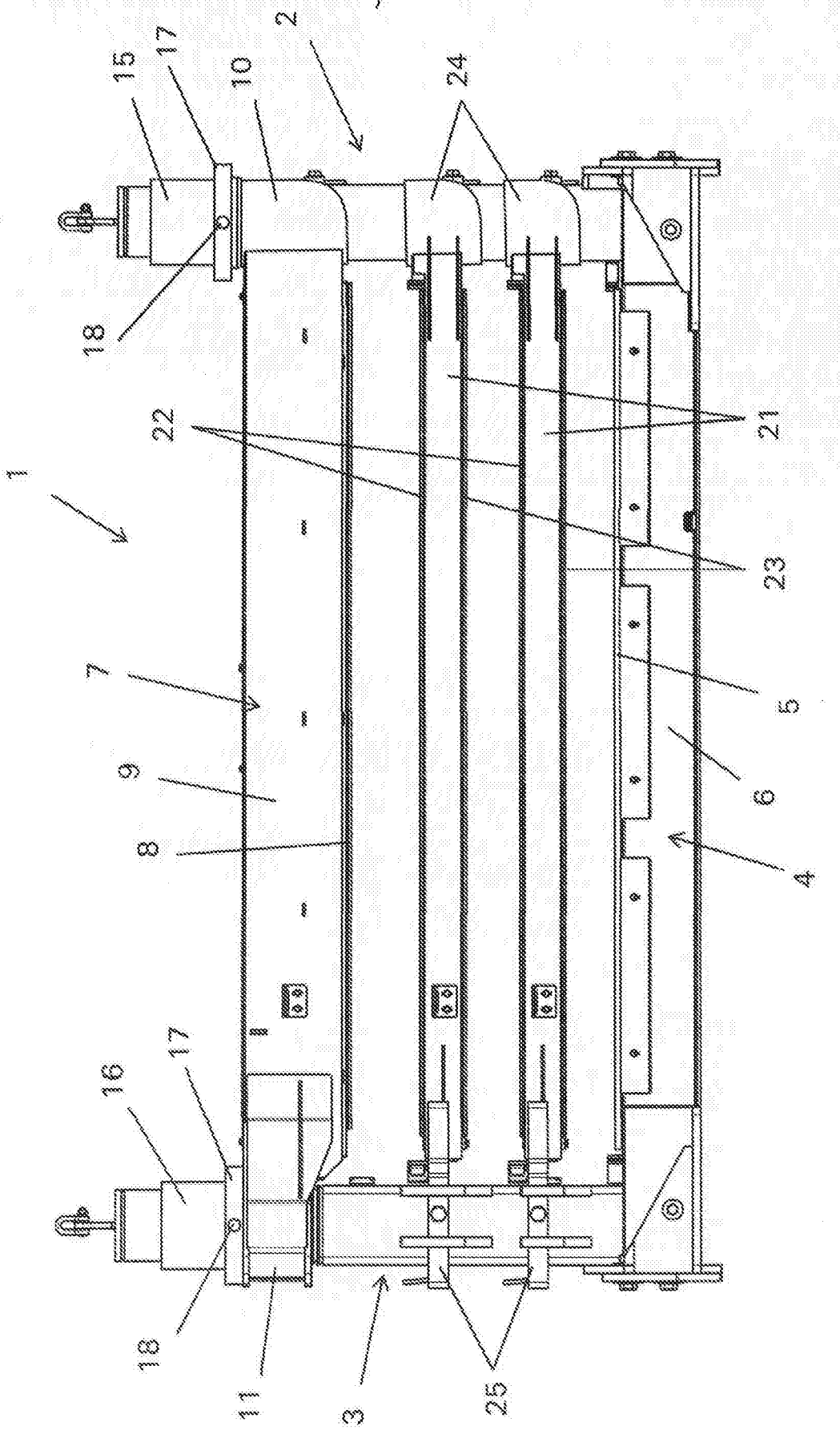

Fig. 2

3/12

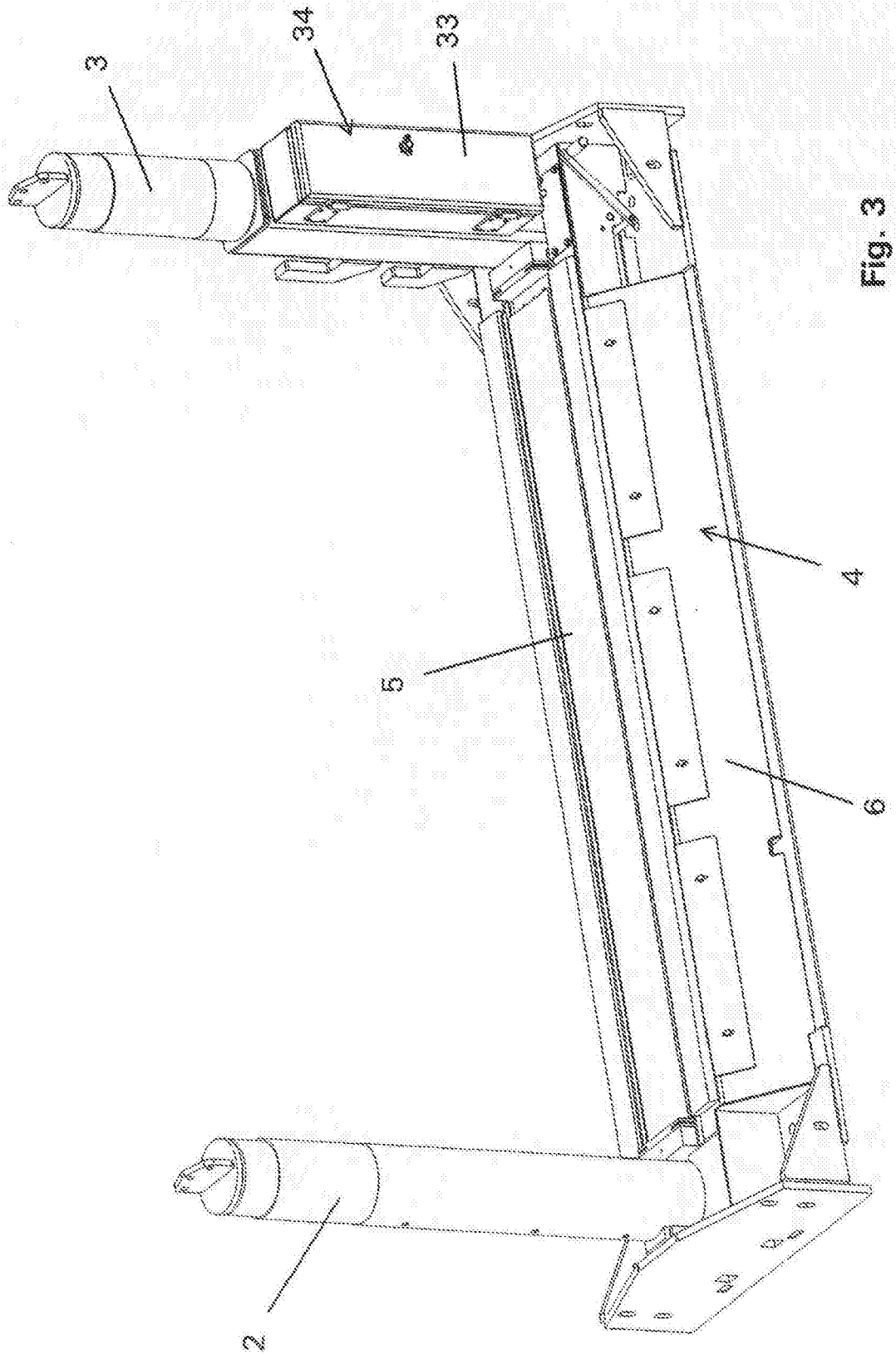

Fig. 3

4/12

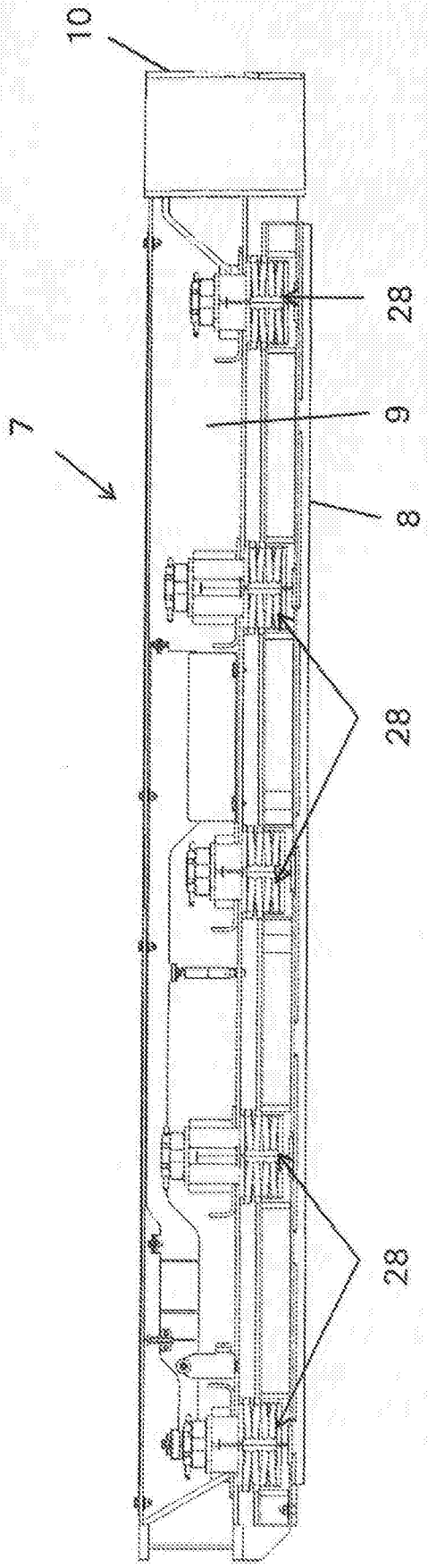

Fig. 4

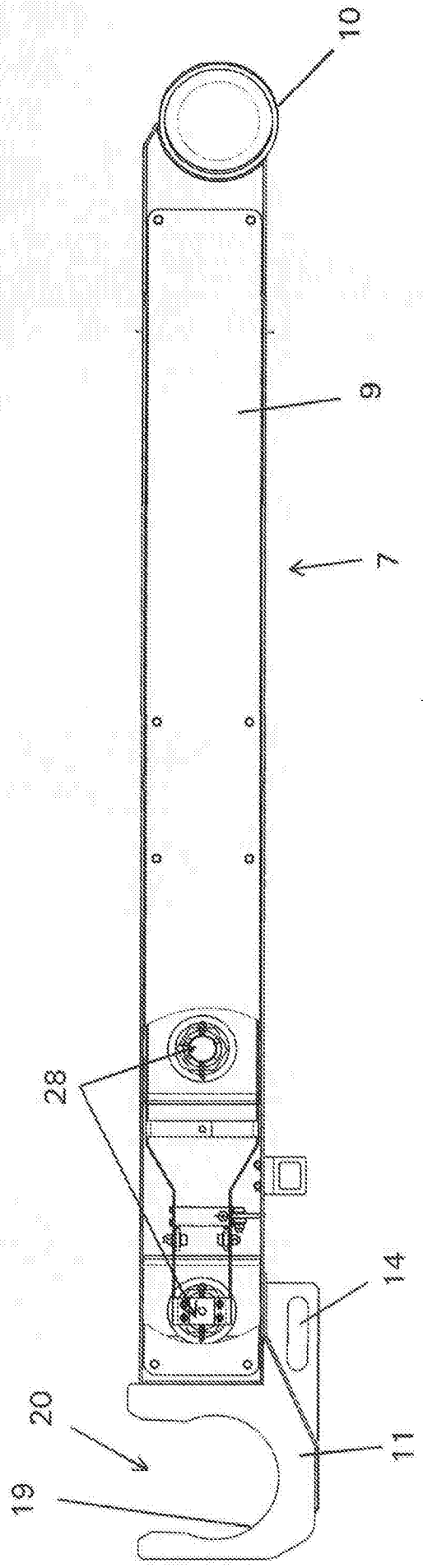

Fig. 5

5/12

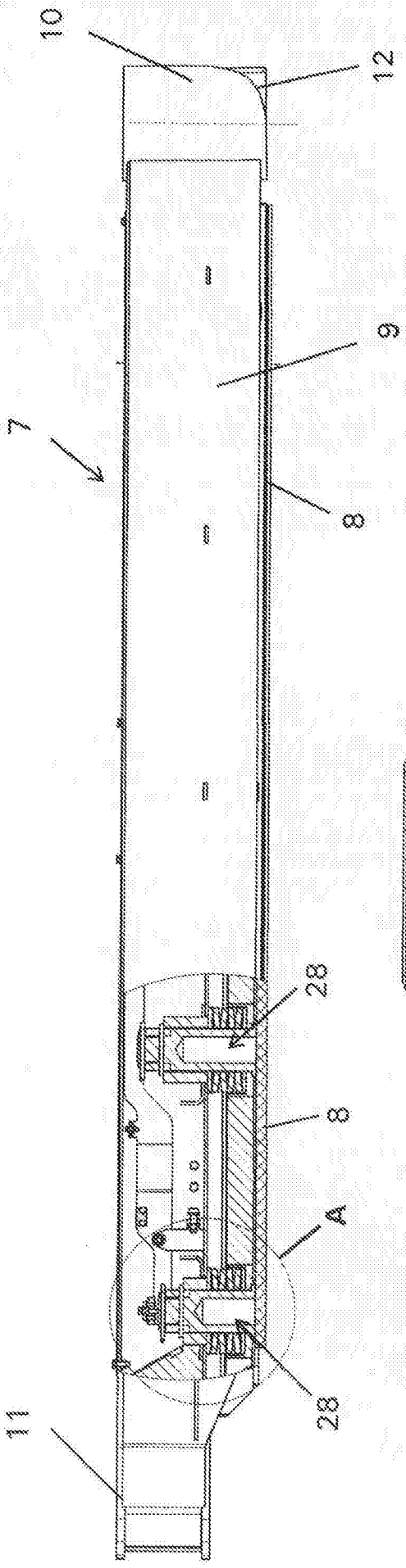

Fig. 6

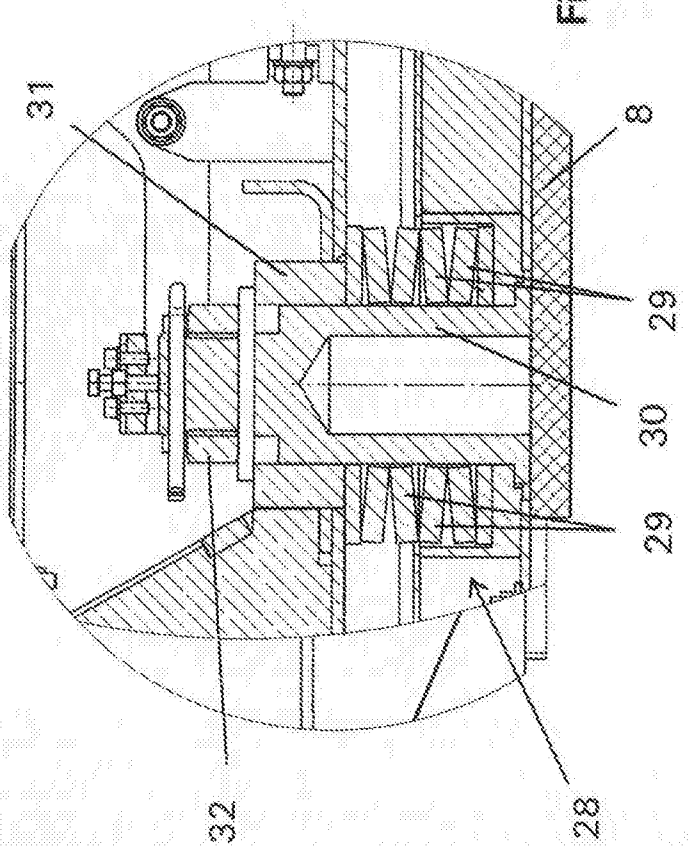

Fig. 7

6/12

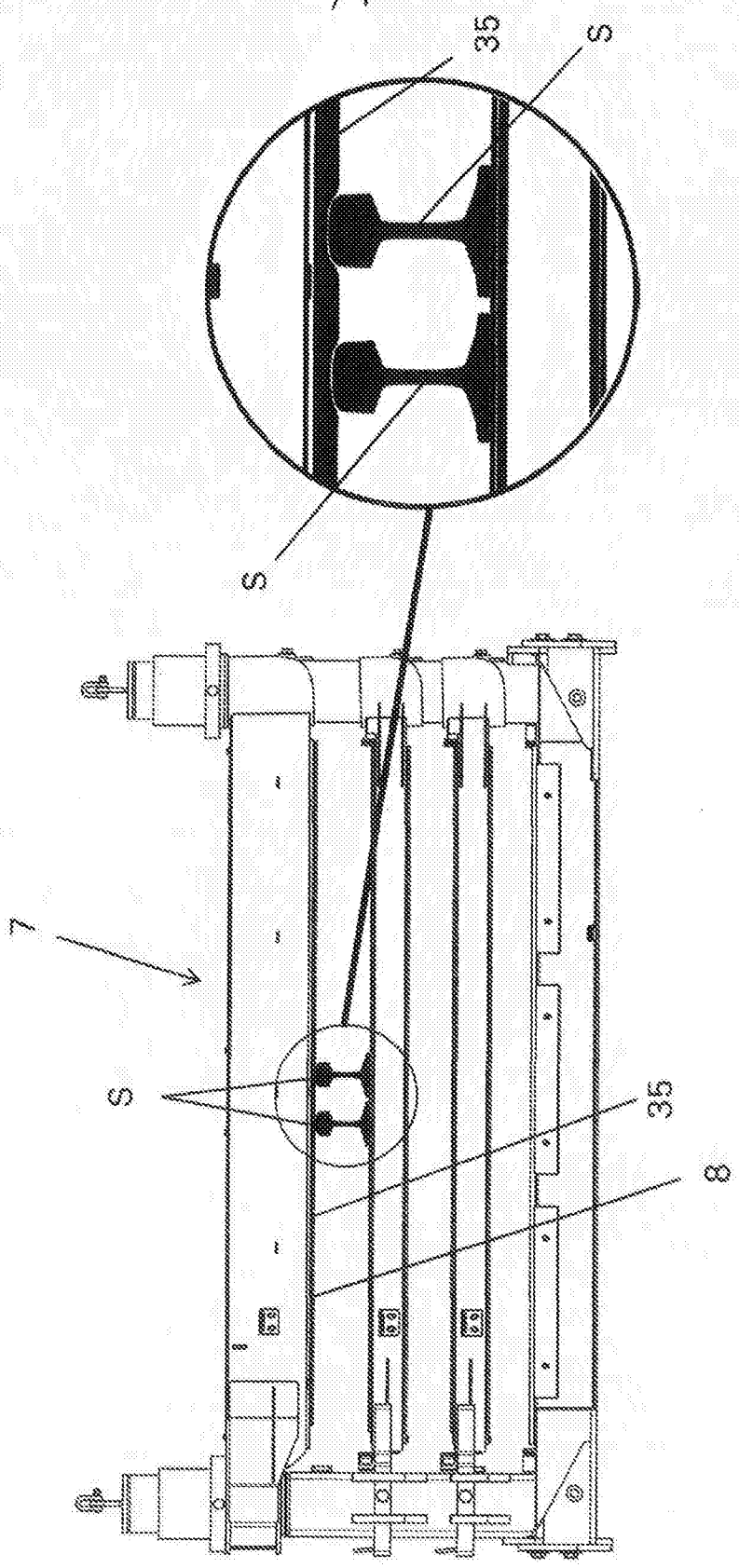

Fig. 8

7/12

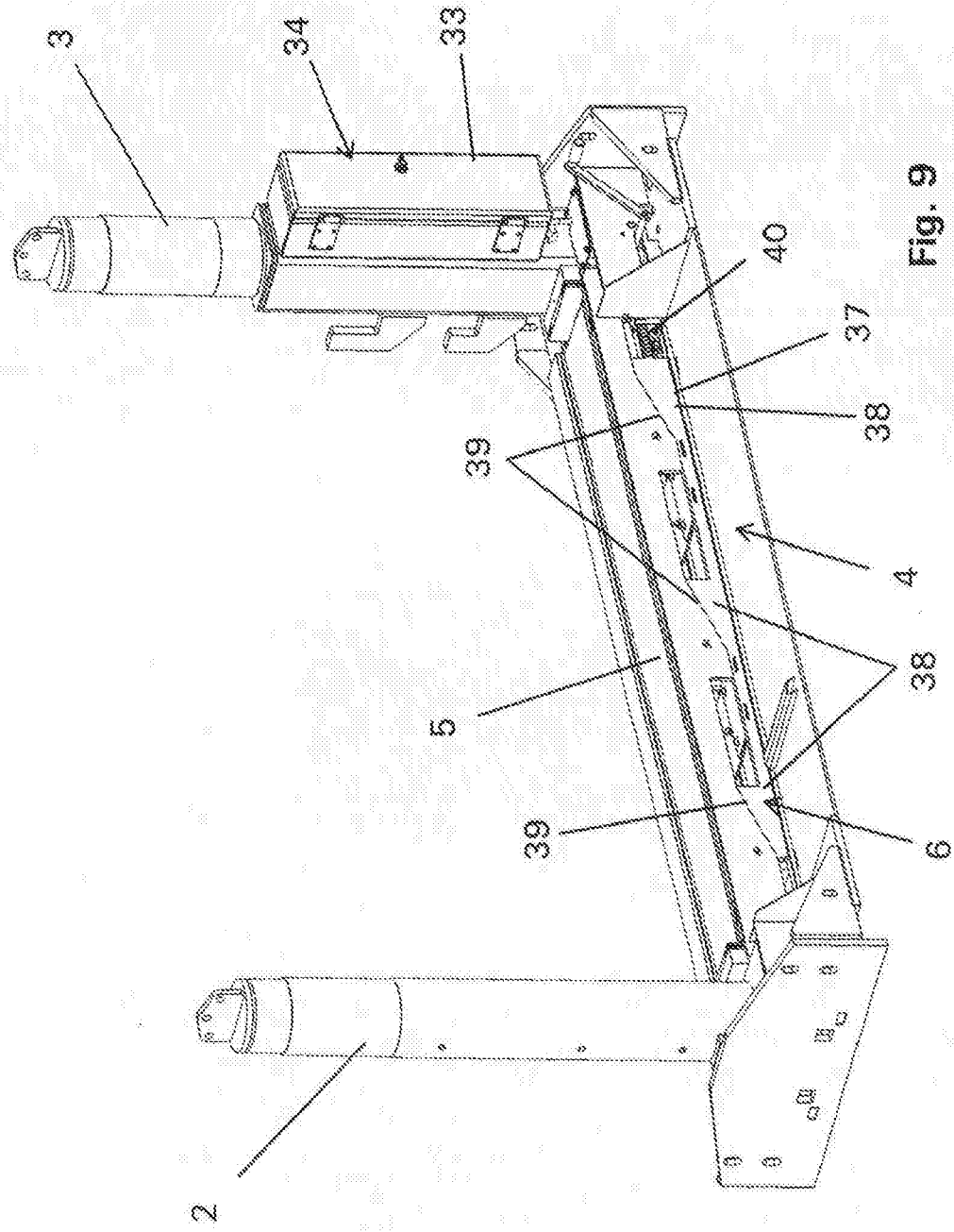

Fig. 9

8/12

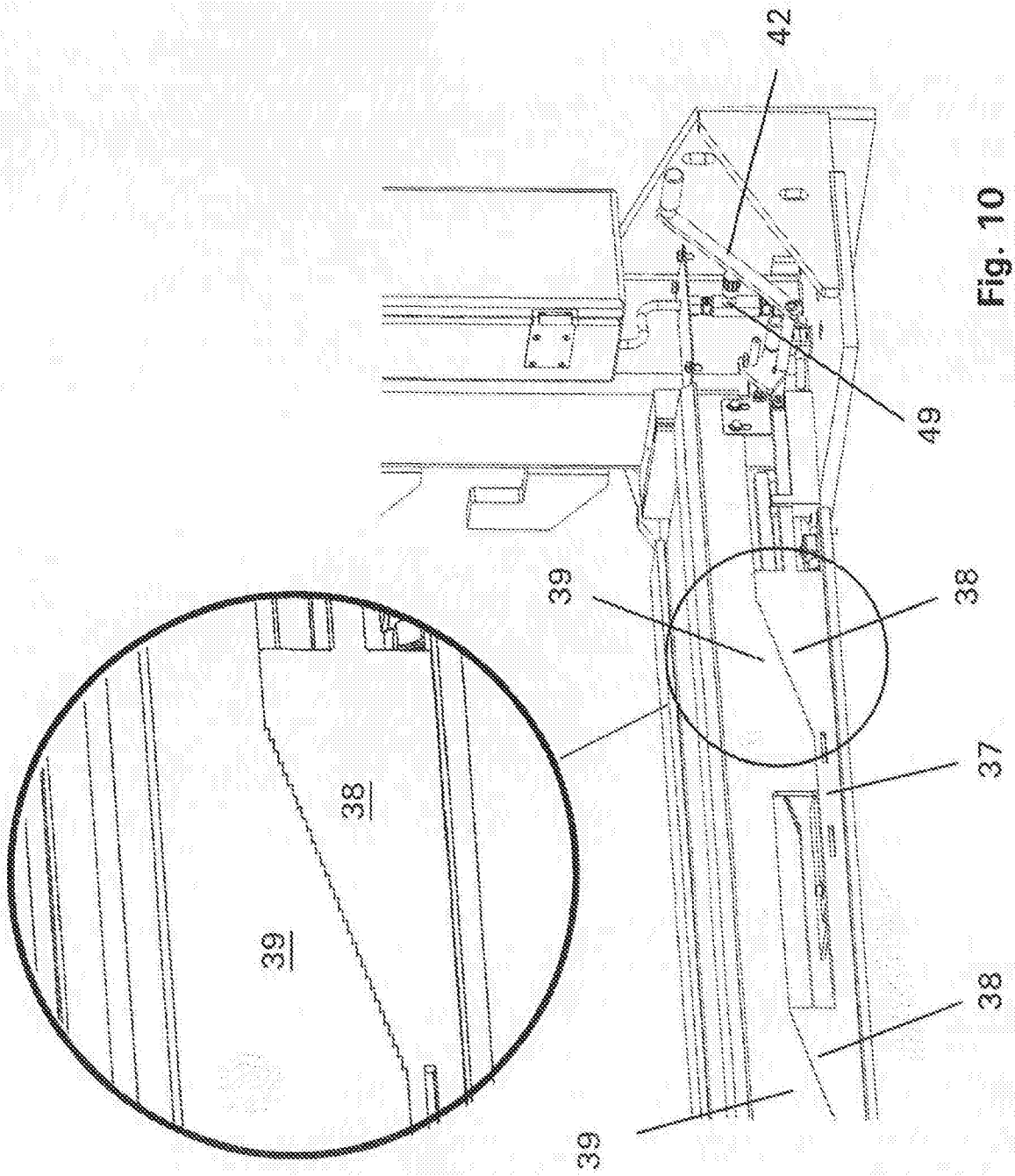

Fig. 10

9/12

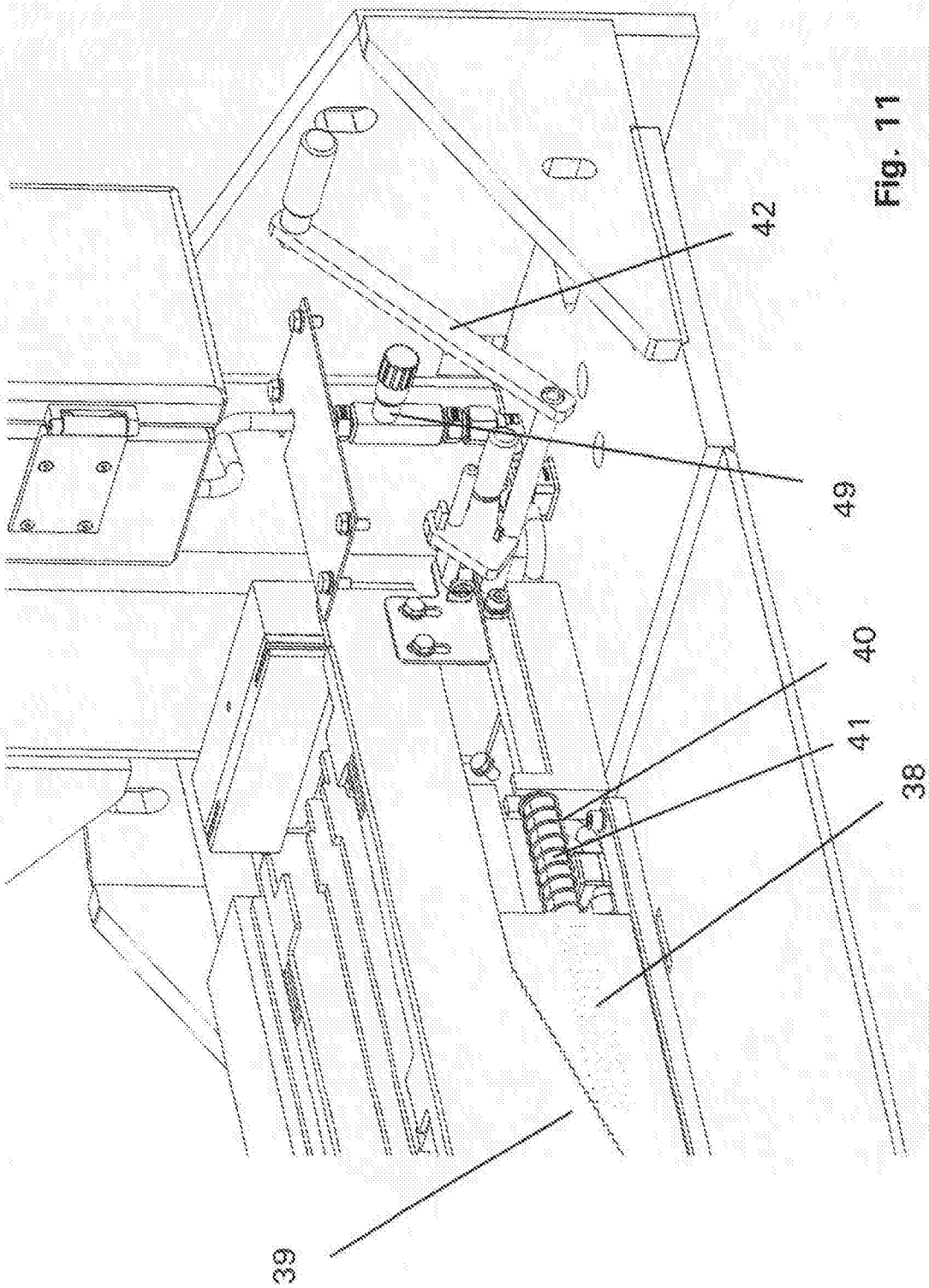

Fig. 11

10/12

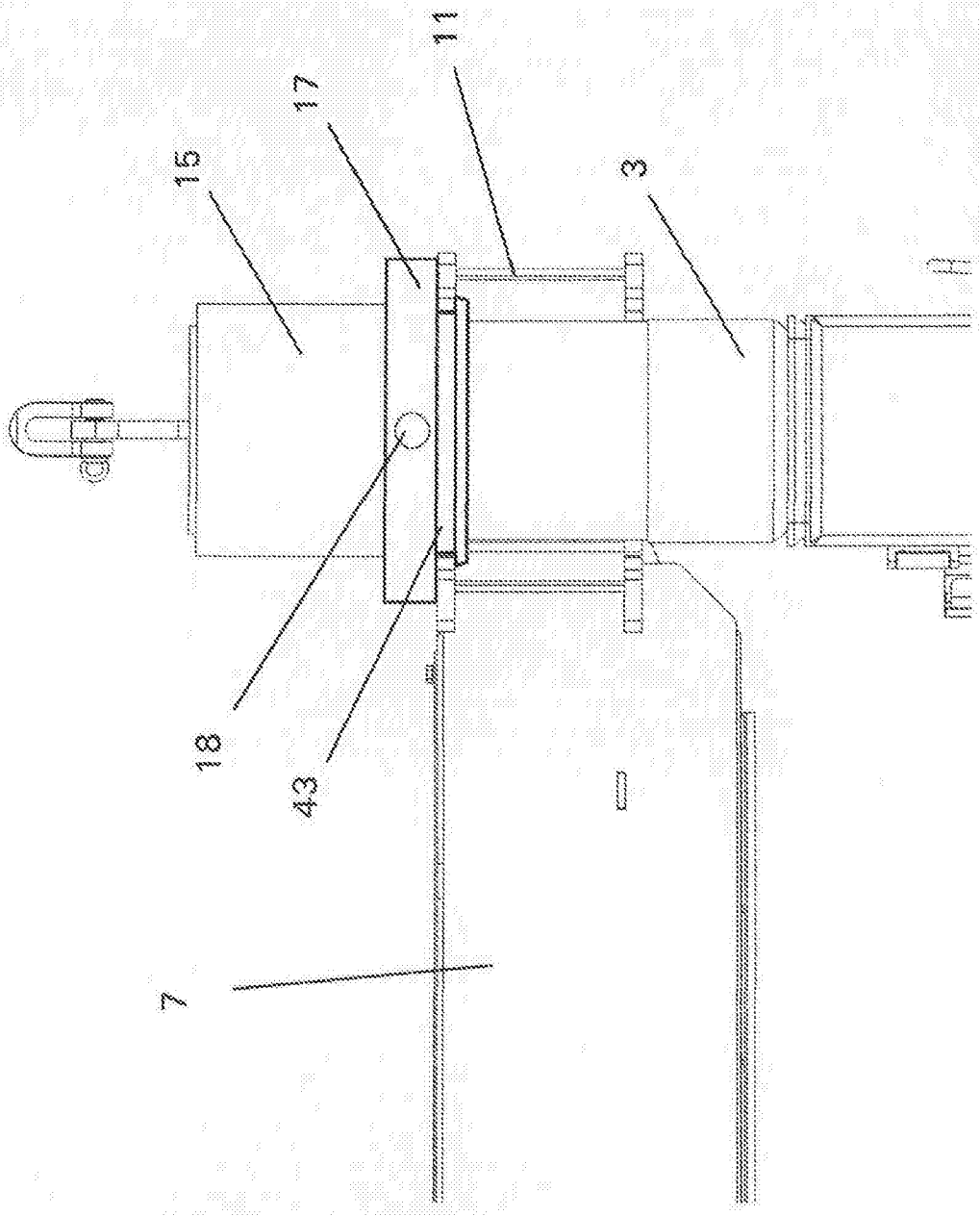

Fig. 12

11/12

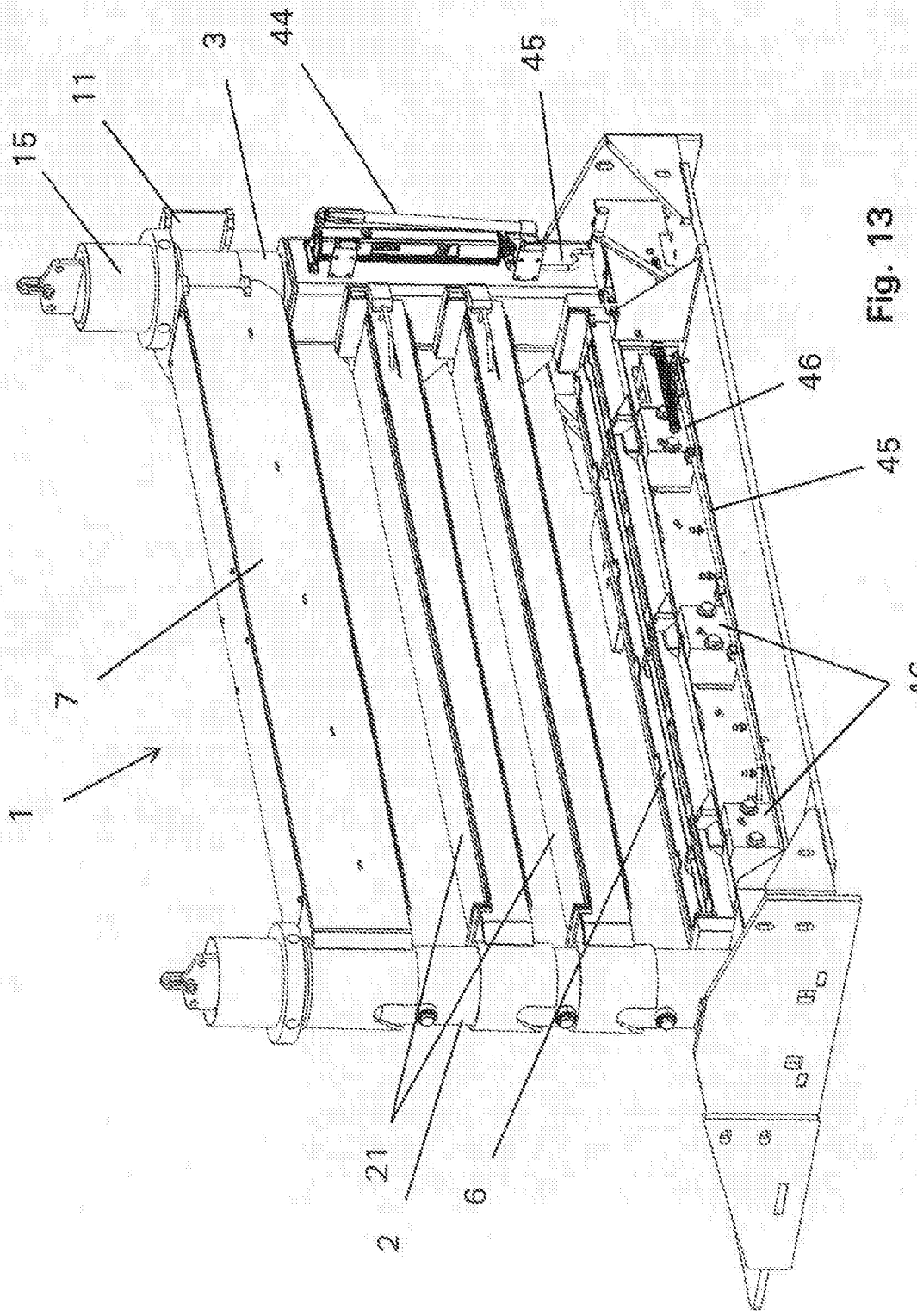

Fig. 13

12/12

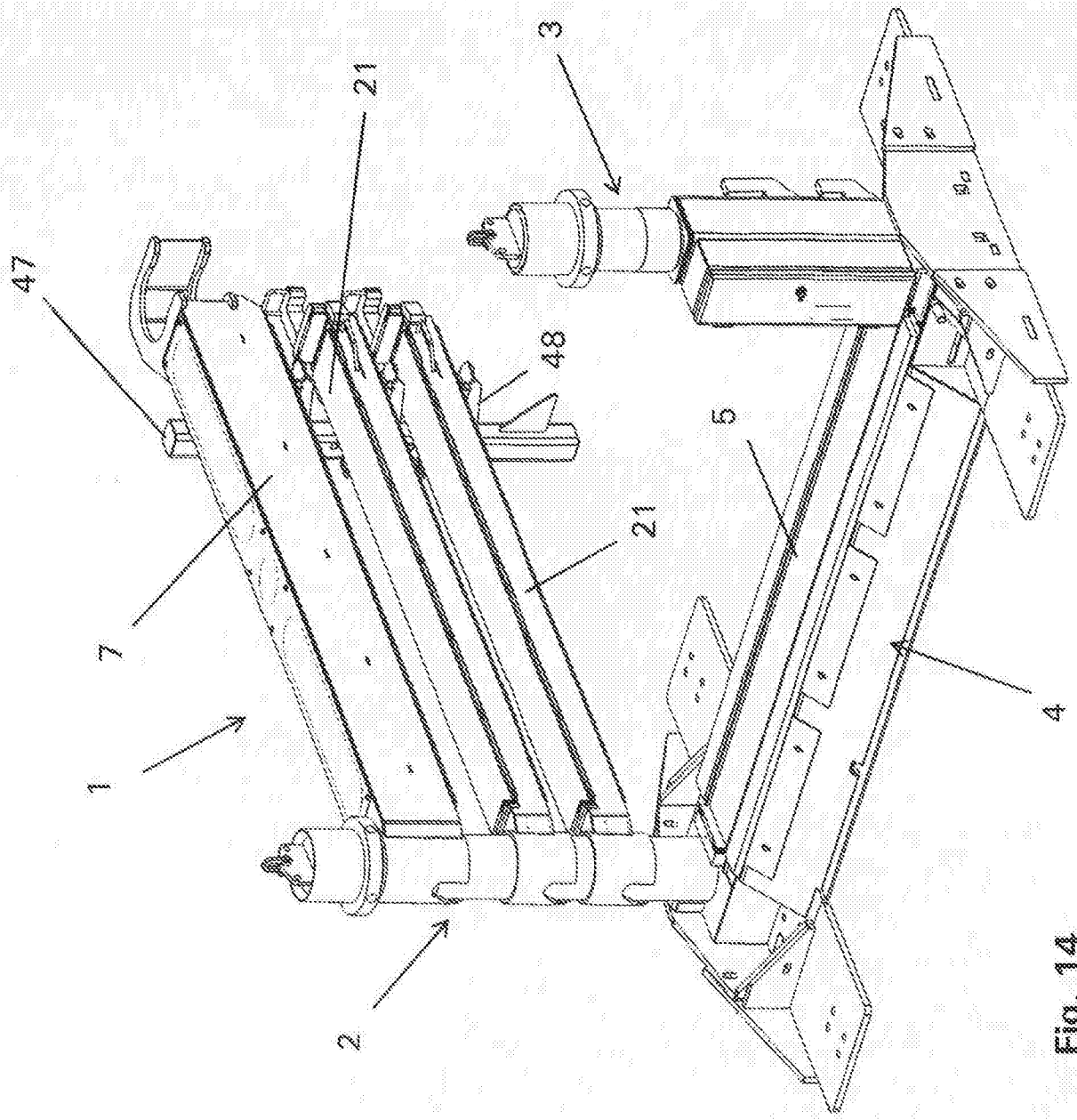

Fig. 14