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(54) Benævnelse: **Monteringsplade og indretning og anordning til fastsurring af containere om bord på skibe**

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WO-A1-92/05049
WO-A1-2014/117211
DE-A1- 4 033 704
DE-A1- 10 056 341
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Description

Fitting Plate As Well As a Device and an Arrangement for Lashing Containers on Board of Ships

The invention relates to a fitting plate for lashing containers on board of ships, comprising a first accommodation and two further accommodations, wherein the two further accommodations form a two-armed lever in relation to the first accommodation and are provided with one pocket each for receiving a tensioning screw stud of a lashing rod. The invention further relates to a device and an arrangement for lashing containers on board of ships with a fitting plate of this kind.

Such a fitting plate is known from DE 40 33 704 A1.

Container stacks are lashed on board of ships by means of lashing rods and tensioning screws. The so-called external lashing, as it is illustrated and described in DE 10 2013 103 951 A1, has turned out to be particularly advantageous and effective in this case.

In order not to exceed particular threshold values of the forces to be discharged, the application of two lashings which are arranged in parallel generally lends itself. In this manner, the forces absorbed at the container are to be absorbed via two fastening points instead of one fastening point. The lashing means as such may be dimensioned smaller, which facilitates handling. In practice, the two parallel lashings are preferably fastened to two containers which are coupled to each other by container couplings, such as e.g. twist lock or mid lock, namely the one lashing at the upper corner fitting of the lower container and the other lashing at the lower corner fitting of the upper container. Since, however, the container couplings do not couple the containers free of play, it has to be assumed that the two lashings are not loaded uniformly.

The ship's motion produces accelerations which, in combination with the container masses, result in forces which have to be absorbed via the lashings. These forces act, for instance, in the upper tiers and are then first and foremost absorbed by the lashing fastened to the lower corner fitting of the upper container. The other parallel lashing will

start to take up forces only after the slack in the connections of this lashing has been used. Here, the danger exists that the first lashing or the fastening points thereof are already overloaded.

This danger is avoided by a fitting plate in accordance with the initially mentioned DE 40 33 704 A1 or the WO 92/05049 A1. The fitting plates illustrated therein form a kind of see-saw. As soon as one of the lashings, or both lashings, introduce(s) a tensile force into the fitting plate, it will twist in accordance with the force and leverage ratios and will assume a rest position as soon as a moment equilibrium has been reached. Any asymmetrical change of the force introductions will immediately result in a new adjustment of the fitting plate until the moment equilibrium has been reached again. This achieves the advantage that the fastened lashings and/or the corresponding fastening points are loaded optimally. Possible inaccuracies such as non-uniformly tensioned lashings, component tolerances or large plays of the twist locks which result in asymmetrical loading of the lashings are automatically balanced by means of the fitting plate. However, the accommodations may tilt or kink relative to the fitting plate parts if the lashing is not tensioned. Furthermore, a changed alignment between the lashing rods and the tensioning screw cannot be compensated for if the total system length changes when adapted to other container heights.

Starting out from this it is the problem underlying the invention to propose a fitting plate of the initially mentioned kind which avoids the afore-mentioned disadvantages.

To solve this problem, a fitting plate is provided with accommodations in accordance with claim 1.

With the fitting plate in accordance with the invention a sufficiently pivotable attachment of the lashing rods at the fitting plate is ensured. The accommodations cannot tilt or kink relative to the fitting plate parts if the lashing is not tensioned. The hinged mounting of the accommodations further compensates for the changing alignment between the lashing rod and the tensioning screw if the entire system length changes when adapted to other container heights.

The two accommodations form a two-armed lever for the lashings with equal lever arms in relation to the first accommodation. In this case the two lashings are loaded

uniformly. Alternatively, however, different lever arms may also be used. In this case the distribution of forces on the two lashings may be controlled. Namely, it may indeed be advantageous to load the upper corner fitting of the lower container (and hence the roof structure of the lower container) more strongly than the lower corner fitting of the upper container. The distribution of forces may e.g. be 60 % for the lower to 40 % for the upper container.

Other further developments of the invention will result from the further dependent claims.

The invention will be explained in detail by means of an embodiment illustrated in the drawing. The drawing shows:

Fig. 1 an arrangement not belonging to the invention in a front view;

Fig. 2 a detail II of the arrangement of Fig. 1;

Fig. 3 the detail II of Fig. 2 in a side view;

Fig. 4 a first embodiment of an arrangement with the features of the invention in a front view;

Fig. 5 a tensioning screw with fitting plate for the arrangement of Fig. 4 in a front view;

Fig. 6 the tensioning screw with fitting plate of Fig. 5 in a cross section in the plane V-V;

Fig. 7 the tensioning screw with fitting plate of Fig. 5 in a side view;

Fig. 8 another embodiment of a tensioning screw for another arrangement with the features of the invention in a perspective view;

Fig. 9 the tensioning screw of Fig. 8 in a front view;

Fig. 10 the tensioning screw of Fig. 8 in a side view;

Fig. 11 the tensioning screw of Fig. 8 in a sectional view in the plane XI-XI.

Fig. 1 shows a stack 10 of a plurality of stacked containers, wherein in Fig. 1 the lowermost container 11 of the first tier, the second container 12 of the second tier and the third container of the third tier (counted from the bottom to the top) can be recognized, which are stacked on the deck 14 of a ship. In practice, eight or even ten tiers of stacked containers are transported. Furthermore, a plurality of stacks 10 of containers which are arranged side by side and one behind the other are loaded on the deck 14 of the ship.

The container 11 of the lowermost (first) tier is coupled at the lower corner fittings 15 thereof by means of a bottom lock with container bases 16 which are welded with the deck 14 or a hatch cover. The containers 11, 12, 13, etc. are coupled to each other by twist locks or mid locks which engage in an upper corner fitting 17 of the respective lower container 11, 12, 13, etc., on the one hand, and in the lower corner fitting 15 of the respective upper container 12, 13, on the other hand.

Furthermore, the containers 11 and 12 of the first and second tiers are provided with a so-called external lashing, as it is illustrated and described in DE 10 2013 103 951 A1, wherein a first lashing 18 and a second lashing 19 are arranged on each side of the container stack 10. Each lashing 18, 19 comprises a tensioning screw 20 and a lashing rod 21. The first lashing 18 is fastened to the lower corner fitting 15 of the second container 12 of the second tier. This container 12 will therefore be called upper container 12 in the following. The second lashing 19 is fastened to the upper corner fitting 17 of the first container 11 of the first, lowermost tier. This container 11 will therefore be called lower container 11 in the following.

In accordance with usual practice, the lashings 18, 19 are each hooked with the upper end of the lashing rods 21 into the associated corner fitting 15 and/or 17. The lower end of the lashing rod 21 is hooked into the upper end of the associated tensioning screw 20 of the lashing 18, 19, which is in turn connected by means of a shackle 22 at the lower end with the deck 14 in a manner that will still be described in detail in the following. It is to be understood that it would also be conceivable that the tensioning screw 21 is

assigned to the respective container 11, 12 and the lashing rod 20 is assigned to the deck 14.

In accordance with the previous practice, the shackle 22 is screwed with a lashing plate welded to the deck of the ship or to a hatch cover, and then the tensioning screw 20 is tightened. In the present case, however, each of the two shackles 22 of one of the tensioning screws 20 is screwed with an accommodation, namely a bore 23 of a fitting plate 24. The mutual distance of the two bores 23 is aligned with the lashings 18, 19 such that the lashings 18, 19 advantageously extend approximately parallel to each other, which is not mandatorily necessary, though.

The fitting plate 24 comprises a further accommodation, namely the bore 25. Furthermore, at least one, preferably however, two lashing plates 26 which are arranged in parallel to each other and whose distance from one another is dimensioned such that the fitting plate 24 may be arranged and pivoted freely between them are provided on the deck 14. The lashing plates 26 are provided with bores 27 aligned with each other. The fitting plate 24 is arranged between the lashing plates 26 such that also the bore 25 in the fitting plate 24 is aligned with the bores 27 in the lashing plates 26 and is connected with the lashing plates 26 by means of a bolt 28. The bolt 28 is guided through the bores 25 and 27 and forms a swivel axis for the fitting plate 24. Stop latches 29 welded to the lashing plates 26 limit the possible pivoting of the fitting plate 24, so that it is always positioned in a position which can be accessed easily by the stevedore personnel for fastening the shackles 22 of the tensioning screws 20. However, the stop latches 29 are arranged also so far outside of the normal pivoting range of the fitting plate 24, which results during the see passage due to the maximum pivoting angles of the fitting plate 24, that this normal and intended pivoting is not hindered during the see passage.

If one assumes an imaginary line 30 which extends through the longitudinal central axis of the bolt 28 and between and in parallel to the lashings 18 and 19 (Fig. 2), the bores 23 are positioned at both sides of this line 30. The fitting plate accordingly forms a two-armed lever. It is particularly advantageous, but not mandatorily necessary, if, as in the illustrated embodiment, the bores 23 and 27 form an equilateral triangle with the bore 27 and/or the bolt 28 as a tip. The respective distance h of the bores 23 to the line 30 is thus equal, so that equal lever arms result for the lashings 18, 19.

The fitting plate 24 accordingly forms a see-saw. As soon as one or both of the lashings 18, 19 introduce(s) a tensile force into the fitting plate 24, the fitting plate 24 will twist in accordance with the force and leverage ratios. As soon as a moment equilibrium has been reached, the fitting plate assumes a rest position. Any asymmetrical change of the force introductions will, however, immediately result in a new adjustment of the fitting plate 14 until a moment equilibrium has been reached again. Thus, the fastened lashings 18, 19 and/or the corresponding fastening points are loaded optimally. Possible inaccuracies such as non-uniformly tensioned lashings 18, 19, component tolerances or large plays of the twist locks which result in asymmetrical loading of the lashings 18, 19 are automatically balanced by means of the fitting plate 24.

In the afore-described example according to Figs. 1 to 3 which does not belong to the invention, the tensile force compensation is assigned via the fitting plate 24 to the shackles 22 attached to the lashing plates 26. Alternatively it is also possible to assign the tensile force compensation to the lower ends of the lashing rods 21 which are facing the tensioning screws 20. This variant in accordance with the invention is illustrated in Fig. 4:

In the present case the fitting plate 31 is fastened to a joint tensioning screw 32. The two lashing rods 21 are fastened to the fitting plate 31. In this case, only one tensioning screw 32 is thus required, which is fastened with the other, lower end thereof to a lashing plate 26 which is possibly reinforced appropriately.

A tensioning screw 32 with a fitting plate 31 attached thereto is illustrated in detail in Figs. 5 to 7 for the variant pursuant to Fig. 4. In this embodiment the fitting plate 31 is designed like a see-saw as a two-armed lever. The fitting plate 31 is, by means of a bolt 34 guided through a central bore 33, hingedly fastened to the tensioning screw 32. The lashing rods 31 are designed in the usual manner and are hooked with its tensioning screw knobs 35 in pockets 36 of accommodations 37, so-called head mountings, which are hingedly held at the fitting plate 31 in a manner that will still be described (Fig. 6). “Central” means in this context that the central bore 33 is arranged between the outer bores 36 without the central bore 33 necessarily having to be arranged exactly in the middle between the outer bores 36. Thus, unequal lever arms of the accommodations 37 to the bore 33 are also conceivable. It is, however, also preferred in the present

embodiment that the fitting plate 31 is designed as a two-armed lever with equal lever arms, i.e. equal distances of the accommodations 37 to the bore 33.

On board of ships lashing rods 21 of different lengths are held available so as to adapt the total length of the lashings 18, 19 to different stacking heights. The background of this is that the adjustment travel of the tensioning screw is approx. 1400-1500 mm at lashing angles of approx. 40°-45°. This is due to the fact that with the conventional lashings the lashing rod is aligned with the tensioning screw and therefore the lower lashing rod end at some time collides with the upper end of the threaded spindle of the tensioning screw. In the present variant the distance of the accommodations 37 to the bore 33 is chosen such that the lower ends of the lashing rods 21 do not collide with the tensioning screw 32 even if the longest well-established lashing rods 21 indeed do not collide with the tensioning screw 32 with the smallest conceivable of the usual stacking heights (only containers with a height of 8 foot and 6 inch). As may be taken from Fig. 4, the lashing rods 21 are always guided past the tensioning screw 32 then. In the simplest manner this is ensured by choosing the distance of the accommodations 37 to the bore 33 such that the lashing rods 21 in practice extend in parallel to each other or are arranged at such an angle (α) to each other that they open towards the fitting plate 31, as is illustrated in Fig. 4. Thus, it is not necessary to have lashing rods of different lengths available on board of the ship, which are otherwise usual due to different container heights, but only the otherwise usual longest lashing rods. Thus, lashing rods 21 with many tensioning screw knobs 35 may be used without the tensioning screws 32 colliding with the lashing rods 21. In this manner, adjustment travels of approx. 1400-1500 mm at lashing angles of approx. 40° - 45° are conceivable. In the practical implementation one could thus support container stacks at the lower edge of the seventh tier. The costs and the feasibility of this variant are also realistic since the technologies applied orient themselves largely at known standards.

The fitting plate 31 is of two-part design and has, as may be gathered from the sectional view pursuant to Fig. 6, approximately the form of an X, wherein the two fitting plate parts 38 and 39 contact each other in the region of the bore 34 and form an open fork in the outer regions thereof. In this furcate region the fitting plate parts 38, 39 comprise bores 40 in which a respective pivot 41 of the associated accommodation 37 engages rotatably. In this manner the accommodations 37 are hingedly connected with the fitting plate 31. Furthermore, due to the x-shaped / furcate design of the fitting plate

31 a uniform, torque-free force introduction of the lashing rod forces into the fitting plate 31 is guaranteed. Also, the slack unit of tensioning screw 31, fitting plate 31 and lashing rods which are possibly suspended therein loosely will not sag or kink.

During assembly the accommodations 37 are inserted between the two fitting plate parts 38, 39 so that the pivots 41 engage in the bores 40, and the fitting plate parts 38, 39 are thus joined. Then, the pre-assembled fitting plate 31 is hingedly fastened by means of the bolt 34 to the one shackle 42 of the tensioning screw 32. A separate The two fitting plate parts 38, 39 are thus also fixed in their mutual positions and require no separate mutual connections, although this would certainly be conceivable additionally or alternatively, e.g. by welding, gluing or riveting.

The tensioning screw 32 comprises two forks 43, 44 which are screwed with the tensioning screw body by means of their threaded spindles 45, 46 in a per se known manner. In a known manner the threaded spindles 45, 46 and the associated nuts 47, 48 are provided with opposed threads. The threads of the threaded spindles 45, 46 are enclosed with a tube, concretely a square tube 49, each. The length of the square tube 49 matches with the gap in the tensioning screw housing 50. Furthermore, the square tube 49 is twist-proof relative to the threaded spindles 45, 46. Thus, the mutual relative position of the forks 43, 44 remains constant. When twisting the tensioning screw housing 50 relative to the forks 43, 44 during tensioning and/or releasing of the tensioning screw 32 it is ensured that both nuts 47, 48 rotate uniformly along the threaded spindles 45, 46. Thus, the longitudinal adjustment of the tensioning screw 32 distributes uniformly on both threaded spindles.

Furthermore, it is also possible to assign the tensile force compensation to the upper ends of the lashing rods 21 which are facing the corner fittings 15 and 17. In this case only one single lashing might be used, to which the fitting plate is coupled. The fitting plate might then be hooked directly into the corner fittings 15, 17. Where the tensile force compensation is in the end implemented within the lashings 18/19 is secondary. It is merely important that the tensile forces acting at the corner fittings 15, 17 are compensated for.

It is illustrated here that the containers 11, 12 of the two lower tiers are secured with lashings 18, 19. It is also known to secure containers of higher tiers with lashings

18, 19 in a similar manner, which are then fastened to a lashing bridge instead to the deck 14. For this application the invention is also suited.

A further embodiment of a tensioning screw 51 which may be used in an arrangement similar to the arrangement of Fig. 4 is illustrated in Figs. 8 to 11.

Like the tensioning screw 32 pursuant to Figs. 4 to 7 the tensioning screw 51 according to the present embodiment comprises two fitting plate parts 52 and 53 which jointly form a fitting plate in accordance with the present invention. The fitting plate, i.e. the two fitting plate parts 52, 53, are rotatably connected with one of the two threaded spindles 55 of the tensioning screw 51 via a bolt 54. The bolt 54 accordingly forms again an axis of rotation for the fitting plate parts 52, 53 which form in turn a two-armed lever.

At the outer, free ends, between the fitting plate parts 52, 53, one accommodation 56 and 57 each is arranged for one lashing rod each which are, via bolts 58 and/or 59, each mounted rotatably in bores 60 and/or 61 in the fitting plate parts 52, 53.

The distances L1 and L2 between the bolt 54, on the one hand, and the bolts 58 and/or 59, on the other hand, are equal in the present embodiment (L1 = L2). The fitting plates 51, 52 form accordingly again an equal-armed lever, which causes a uniform load distribution on the lashing rods. This may, however, not be desired in particular cases, but a load distribution which is non-uniform in a particular proportion may be preferred. In such a case the distances L1 and L2 may deviate from each other in a desired degree ($L1 \neq L2$). Possibly, one or both of the distances L1, L2 may also be adjustable.

A substantial difference of the tensioning screw 51 to the tensioning screw 32 is formed by an elastic element, namely a spring 62, which pulls, at the side of the accommodations 56 and 57 which is facing the bolt 54, with a certain bias in the direction of the bolt 54 arranged between the accommodations 56 and 57. The spring 62 is in the present case guided through a bore 63 in the bolt 54. Due to the tensile force caused by the spring bias of the springs 62 the accommodations 56 and 57 are retained, approximately in the orientation illustrated in Figs. 8 to 11, with pockets which are open toward the outside, away from the bolt 54. This facilitates the inserting of the lashing rods in the pockets 64, 65 for the stevedore. Due to the fact that the one spring 62 is guided through the bore 63 in the bolt 54, a certain stabilizing effect is also exerted on the fitting

plate parts 52, 53, which further facilitates the inserting of the lashing rods. Alternatively, it is, however, obviously also possible to use two separate springs for each accommodation 56, 57, which are attached with their respective other end at the bolt or in some other manner at the threaded spindle or at least one of the two fitting plate parts 52, 53, possibly by means of a separate retaining element.

Another particularity of the present threaded spindle 51, also independently of the invention, is to be considered to be that its tensioning screw body 66 comprises three rods 67, 68 and 69 instead of the otherwise usual two rods, as may be well recognized for the tensioning screws 32 e.g. in Fig. 5. The rods 65..67 connect the threads 47 and 48 with each other in the otherwise usual manner and form the tensioning screw body 64 jointly therewith. Possibly, four or more rods may also be provided. The rods 65..67 are preferably distributed equidistantly at the circumference and thus form in cross-section, in the case of three rods an equilateral triangle, in the case of four rods a square, etc.

By the use of three or more rods 65..67 the forces introduced are absorbed uniformly. The variant with three rods 65..67 is particularly cost-efficient and therefore preferred.

As mentioned earlier, this tensioning screw 52 with three or more rods 65..67 may also be used advantageously beyond the invention, e.g. for conventional lashings.

Moreover, the tensioning screw 51 corresponds to the tensioning screw 32, so that equal parts are provided with the same reference signs.

List of Reference Signs:

10	container stack
11	container
12	container
13	container
14	deck
15	lower corner fitting
16	base
17	upper corner fitting
18	lashing
19	lashing
20	tensioning screw
21	lashing rod
22	shackle
23	bore
24	fitting plate
25	bore
26	lashing plate
27	bore
28	bolt
29	stop latch
30	line
31	fitting plate
32	tensioning screw
33	bore
34	bolt
35	tensioning screw knob
36	pocket
37	accommodation
38	fitting plate part
39	fitting plate part
40	bore
41	pivot
42	shackle
43	fork

44	fork
45	threaded spindle
46	threaded spindle
47	nut
48	nut
49	square tube
50	tensioning screw housing
51	tensioning screw
52	fitting plate part
53	fitting plate part
54	bolt
55	threaded spindle
56	accommodation
57	accommodation
58	bolt
59	bolt
60	bore
61	bore
62	spring
63	bore
64	pockets
65	pockets
66	tensioning screw body
67	rod
68	rod
69	rod

PATENTKRAV

1. Monteringsplade (31; 52, 53) til fastsurring af containere (11, 12) om bord på skibe, omfattende en første aptering (33) og yderligere to apteringer (37; 60, 61), hvor de to yderligere apteringer (37; 56, 57) danner en toarmet løftestang i forhold til den første aptering (33) og er forsynet med en lomme (36; 64, 65) hver til modtagelse af en spændeskruestik (35) på en fastsurringsstang (21), kendetegnet ved, at de to yderligere apteringer (37; 56, 67) er hængslet monteret mellem to monteringspladedele (38, 39; 52, 53).

2. Monteringsplade (31; 52, 53) ifølge krav 1, kendetegnet ved, at de to yderligere apteringer (37; 56, 57) danner en toarmet løftestang med ens løftestangsarm (L1, L2) eller forskellig løftestangsarm (L1, L2) i forhold til den første aptering (33).

3. Monteringsplade ifølge krav 1 eller 2, kendetegnet ved, at et fastholdelsesmiddel er tildelt til apteringerne (56, 57), hvor fastholdelsesmidlet holder apteringerne (56, 57) i en position, der letter indsættelse af en fastsurringsstang (21).

4. Monteringsplade ifølge krav 3, kendetegnet ved, at et fælles fastholdelsesmiddel er tildelt til apteringerne (56).

5. Monteringsplade ifølge krav 3 eller 4, kendetegnet ved, at fastholdelsesmidlet er en fjeder (62), især forspændt til trækspænding.

6. Indretning til fastsurring af containere (11, 12) om bord på skibe med mindst én første fastsurring (18), der er tildelt et hjørnebeslag (15) af én af containerne (12), og en anden fastsurring (19), som er tildelt et hjørnebeslag (17) af en anden af containerne (12), kendetegnet ved, at en spændingskompensation ved hjælp af en monteringsplade (24; 31; 52, 53) ifølge et hvilket som helst af kravene 1 til 5 er tilvejebragt mellem fastsurringerne (18, 19).

7. Indretning ifølge krav 6, kendetegnet ved, at monteringspladen (31) er hængselsforbundet med en spændeskrue (32, 51).

8. Indretning ifølge krav 7, kendetegnet ved, at afstanden mellem de yderligere apteringer (37; 56, 57) og den første aptering (33) vælges således, at fastsurringsstængerne (21) ved sædvanlige stablehøjder på containerstakken ikke kolliderer med spændeskruen (32, 51), især at fastsurringsstængerne (21) strækker sig parallelt med hinanden eller i en sådan vinkel (α) til hinanden, at de åbner sig mod monteringspladen (31).

9. Indretning ifølge krav 7 eller 8, kendetegnet ved, at spændeskruen (32) er forsynet med to gafler (43, 44) med gevindspindel (45, 46), som samvirker med spindelmøtrikker (47, 48).

10. Indretning ifølge krav 9, kendetegnet ved, at spændeskruen (32) omfatter et rør, især et kvadratisk rør (49), der omslutter gevindspindler (45, 46) og er sikret mod vridning i forhold til gevindspindlerne (45, 46).

11. Anordning til fastsurring af containere om bord på skibe med en monteringsplade (31; 52, 53) ifølge et hvilket som helst af kravene 1 til 5 og/eller en indretning ifølge et hvilket som helst af kravene 6 til 10.

12. Anordning ifølge krav 11, kendetegnet ved to fastsurringer (18, 19), således at den ene fastsurring (18) er tildelt den ene aptering (37; 56) til fastsurringerne (18, 19), og den anden fastsurring (19) er tildelt den anden aptering (37; 57) til fastsurringerne (18, 19).

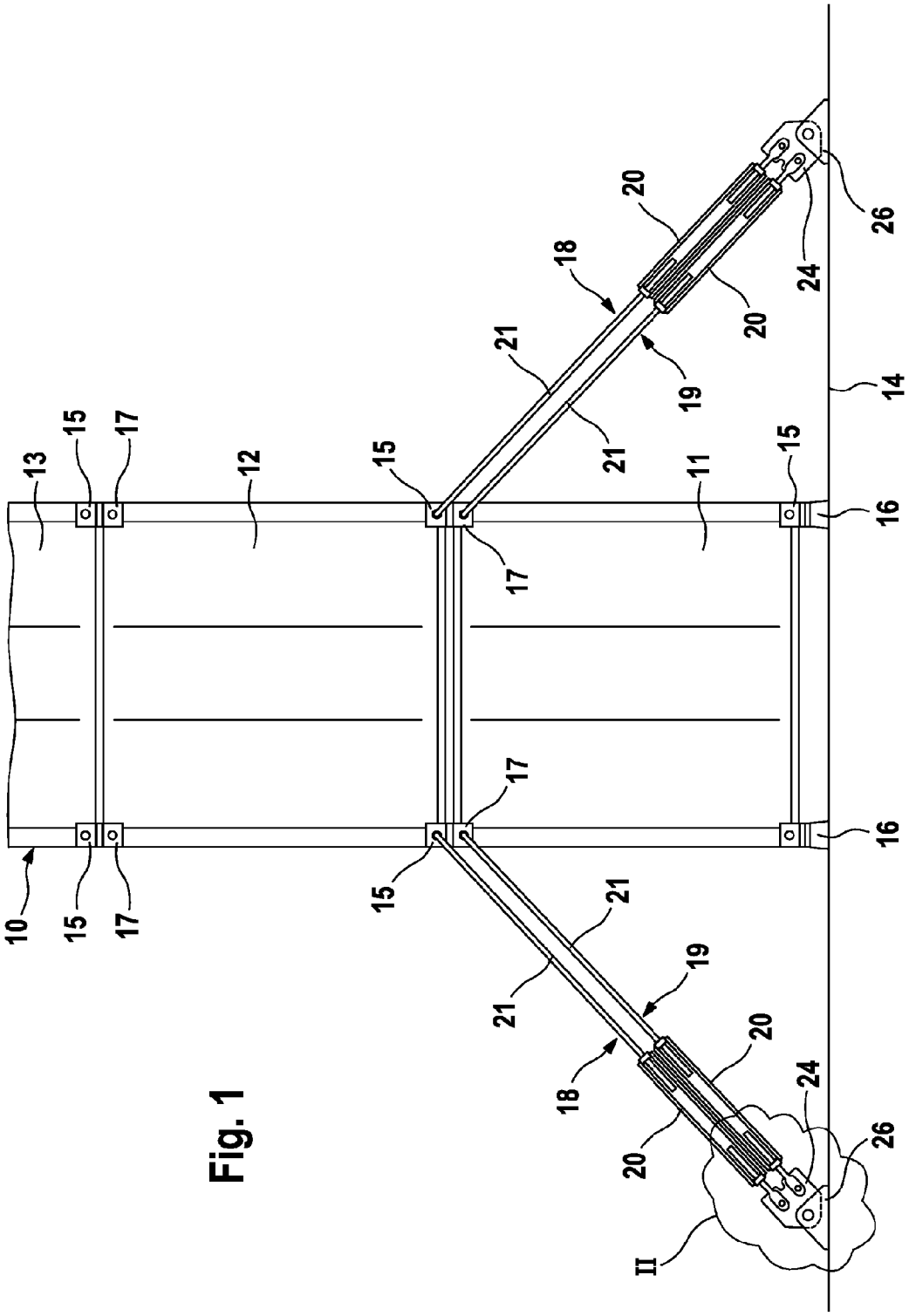


Fig. 1

Fig. 2

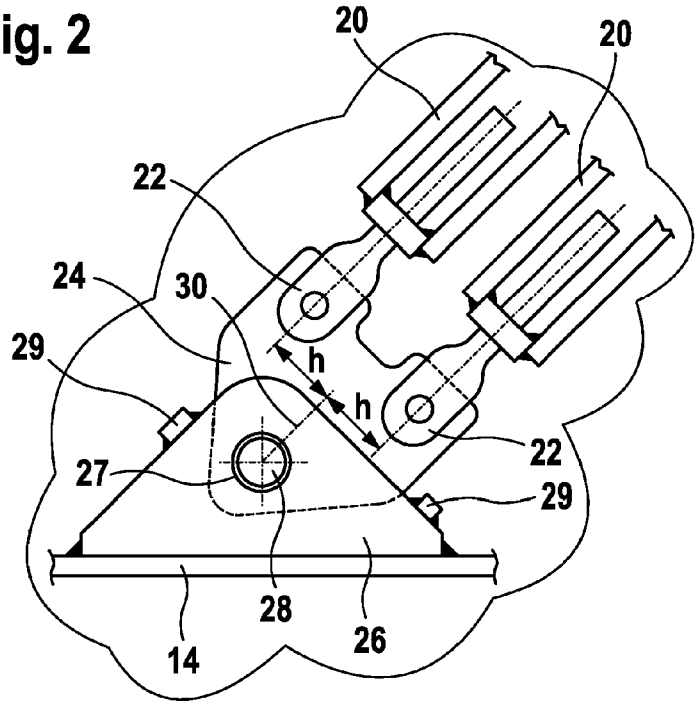
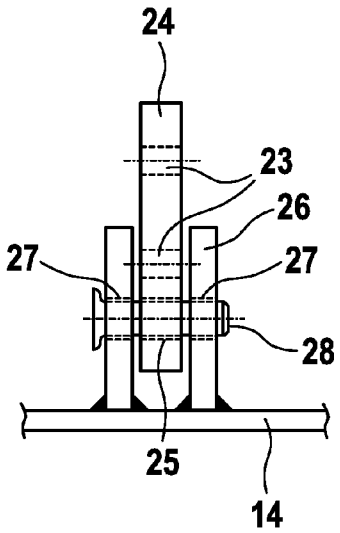


Fig. 3



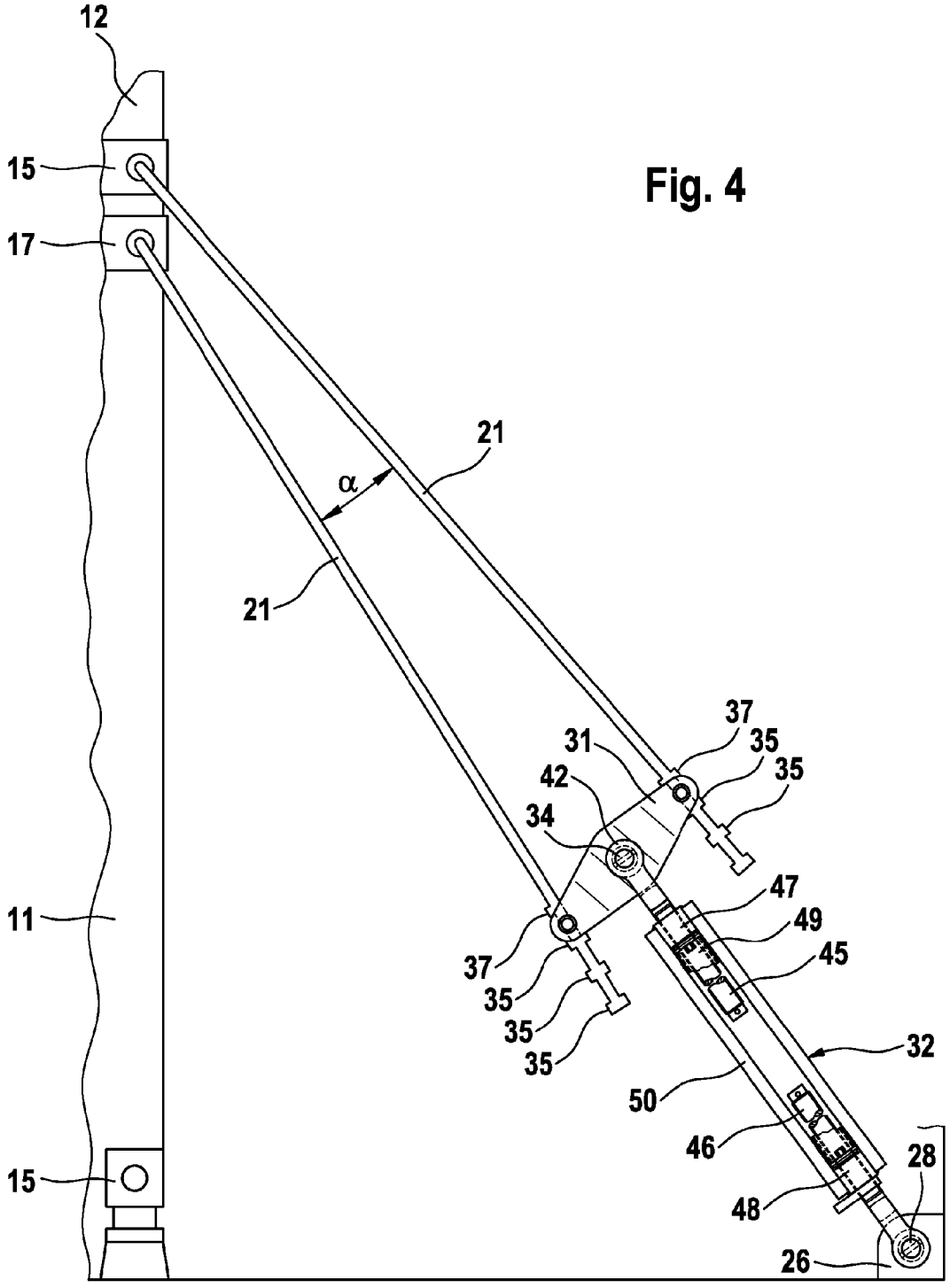

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Fig. 4

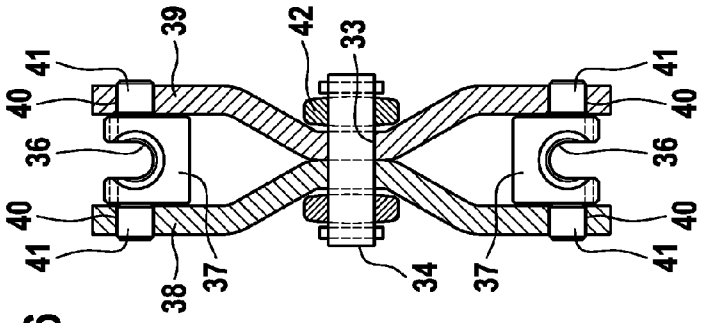

Fig. 6

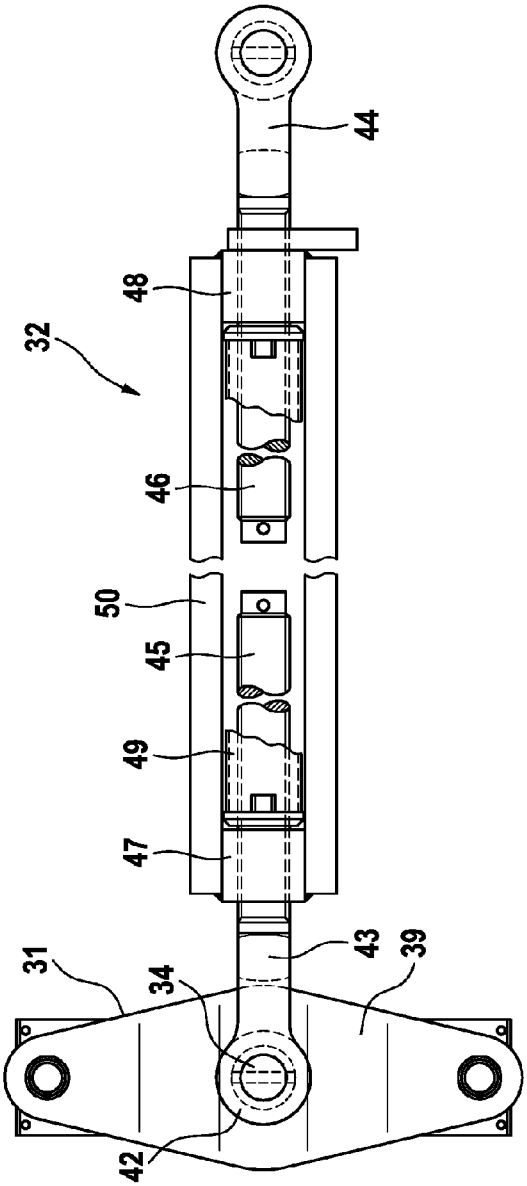

Fig. 5

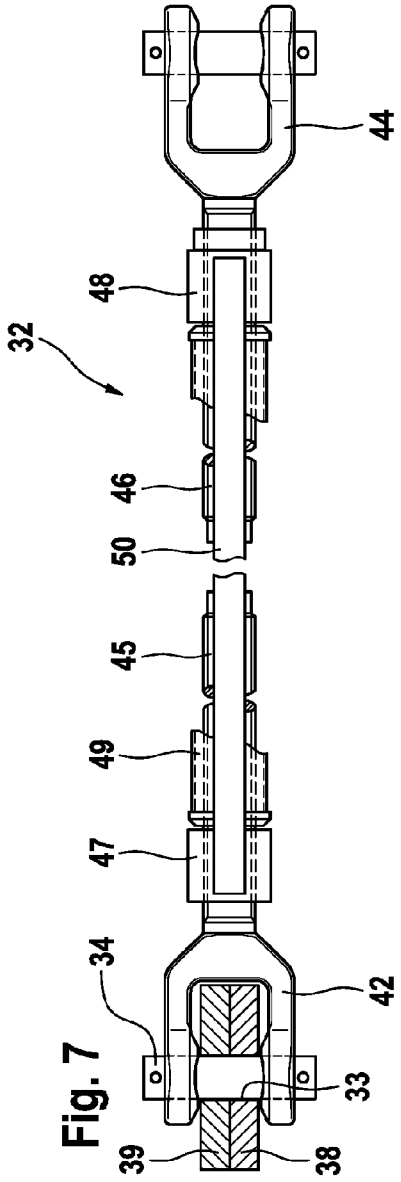

Fig. 7

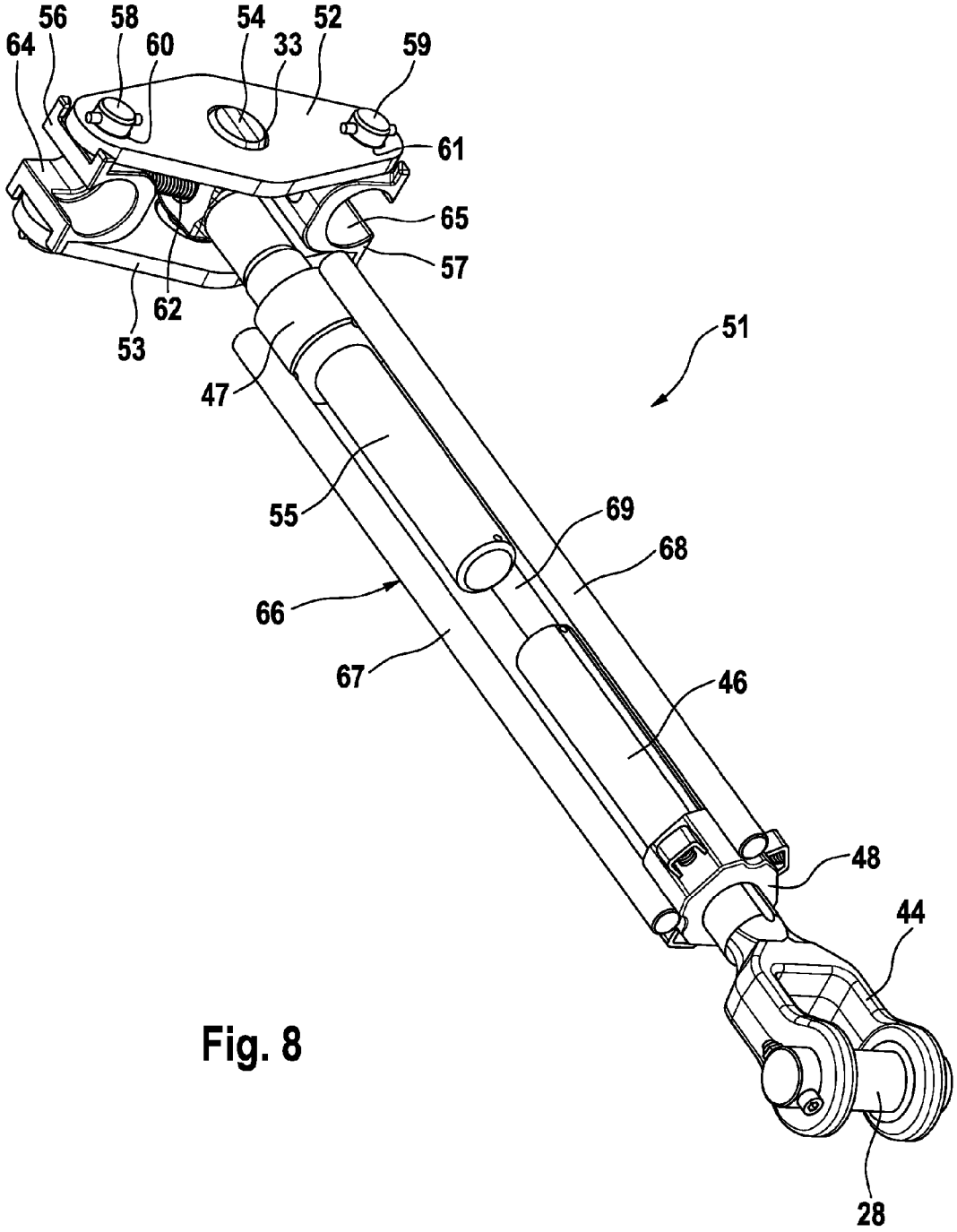

Fig. 8

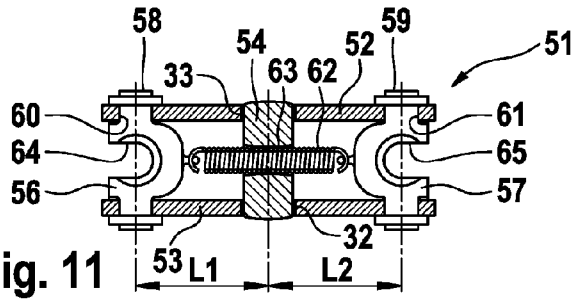

Fig. 11

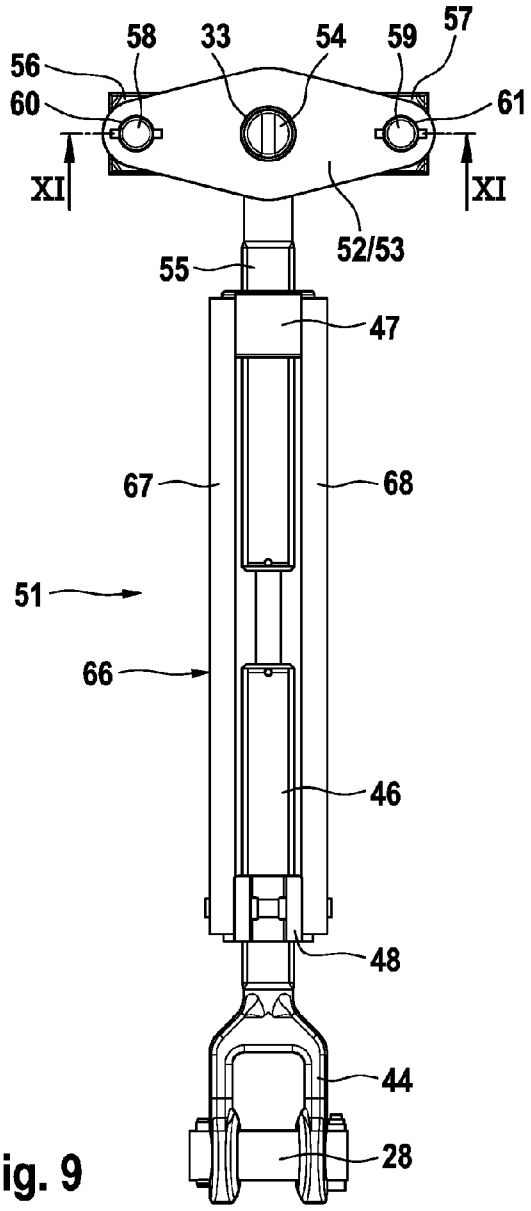

Fig. 9

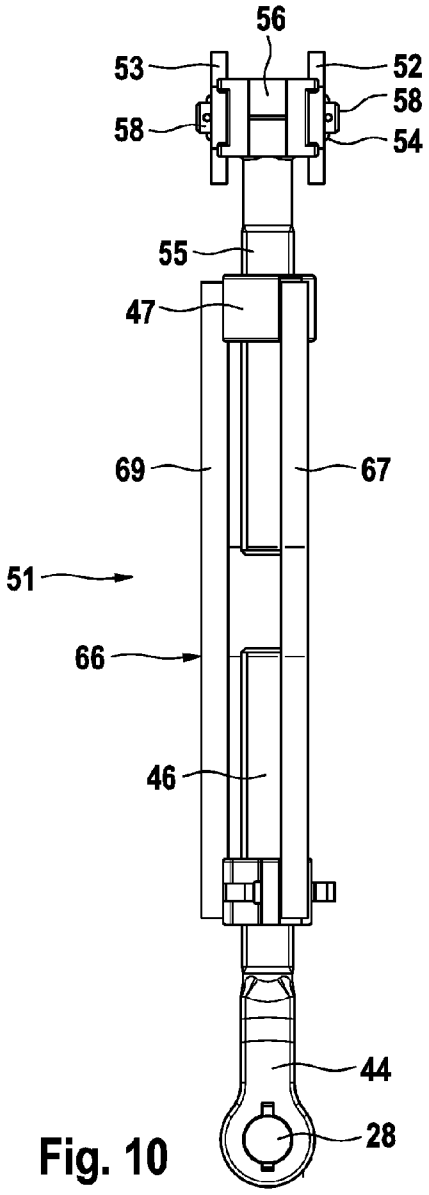

Fig. 10