(19) Europäisches Patentamt
European Patent Office
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(11) **EP 4 191 014 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.06.2023 Bulletin 2023/23

(21) Application number: **22207827.1**

(22) Date of filing: **16.11.2022**

(51) International Patent Classification (IPC):
E06B 9/302 *(2006.01)* ***E06B 9/322*** *(2006.01)*
E06B 9/327 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E06B 9/302; E06B 9/322; E06B 9/327;
E06B 2009/3222

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **06.12.2021 CZ 20210550**

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Remarks:
A request for correction of the translation has been filed pursuant to Rule 139 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

(54) **OUTSIDE-MOUNT WINDOW BLIND CONSISTING OF A FRAME WITH A CONTROL DEVICE FOR ADJUSTING THE POSITION OF THE SLATS**

(57) Outside-mount window blind (33) comprising a frame (32) with a control device for adjusting the position of the slats (21) with two guide rails (2) for the slats (21) of the blind (33) provided with a side chain slot (9) and a central cam slot (10), wherein the cam slot (10) has an operating arm (4) provided at its ends (4) with at least one arm opening (22) for a pin (16) which also connects the chain links (17, 18), wherein a slat (21) is attached to the control arm (4) and perpendicular lateral slots (11) project from the cam slot (10) at regular intervals therefrom and two flexible little sheets (7, 8) are arranged opposite each other below the cam slot (10), the press arms (30, 30') of the flexible little sheets (7, 8) are preloaded towards the bottom surface of the cam slot (10), whereas the cam (12) is provided with two wedge sectors (19) whose thickness decreases from the top to the bottom surface of the cam (12) and one rectangular flat sector (20) of the full thickness of the cam (12), and a driving worm (5) is arranged on the side of each of the guide rails (2).

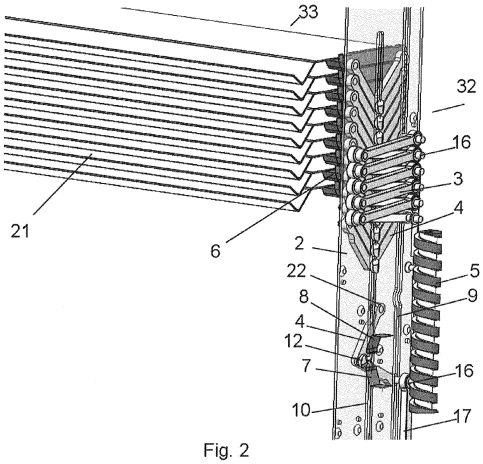

Fig. 2

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Description

Technical field

[0001] The invention relates to the guiding of outside-mount window slats of the blind, mounted in particular on inclined windows, with a control device for adjusting their position, i.e. sliding and rotation.

State of the art

[0002] By the construction of the slats of the outside-mount window blinds, there are basically two systems used. In both systems, frames with slots for guiding side pins of the slats are usually arranged on both sides of the blinds assembly. The first system, so called roller shutters, consists of a storage box arranged in the upper part of the frame in which the individual slats are wound and connected together and they are dropped or raised in the slots of the said side frames. The disadvantage of this system is that the slats cannot be individually positioned and they are therefore either pulled down, because of complete shading at night or for safety reasons, or pulled up partially to let some light through, or rolled up to the top position into the storage box when it is desired to keep the window uncovered. Such a system is described, for example, in CZ 1993-636 A1.

[0003] In the second system, rails are arranged along the sides of the window opening only for guiding the side pins of the slats, the blinds are terminated at the bottom by a massive rail on which the lowering or raising belts are anchored, which pass through the individual slats and which are wound on winding wheels arranged at the top of the assembly.

[0004] The slats are also connected via string ladders, which can also be operated and which can tilt the slats. The disadvantage of this system is the relatively low rigidity, which can threaten the compactness of the assembly by strong wind. Furthermore, this system works on the principle of gravity and therefore cannot be used for tilted windows. The slats can be pushed by the bottom rail to the stacking position at the top of the window. Such a system is described, for example, in EP 2669462 A1, AT 007694 U1, AT 501293 B1 or DE 29913131 U1.

[0005] The aim of the invention is to provide an outside-mount window blind consisting of a frame with a control device for adjusting the position of the slats, i.e. a system for both sliding and rotating the slats, where the system has a compact structure which can reliably withstand heavy weather and which would also provide suitable shading for buildings and would be able to reduce the temperature inside without additional air-conditioning means.

Summary of the invention

[0006] The above mentioned deficiencies are eliminated by the outside-mount window blind consisting of a frame with a control device for adjusting the position of the slats according to the invention, which is characterised by the fact that the slots are two, made as an side chain slot and a central cam slot, whereas below these slots there is space for the links of a chain in the chain slot and for a cam of a control arm for the position of the slats of the blind in the cam slot, whereas in the cam slot the control arm is placed with the through a cam pin of the cam, whereas the control arm is at its ends provided with at least one arm opening for a chain connecting pin which also connects chain links, whereas the slat of the blind is fixed to the control arm and perpendicular lateral slots protrude from the cam slot at regular intervals and below the cam slot, two flexible little sheets are arranged opposite to the lateral slots, whereas two flexible little sheets are fixed by their fixing parts in the base of the guide rail, the press arms of the flexible little sheets are preloaded towards the bottom surface of the cam slot and are oriented with their stops facing each other, wherein the cam is provided with two wedge sectors thickness of them decreases from the upper to the lower surface of the cam and one rectangular flat sector of the full thickness of the cam, whereby the wedge sectors are oriented against the fingers of the control arm and on the side of each of the guide rails a driving worm for engagement with the chain connecting pin of the chain links and the control arm is arranged.

[0007] In a preferred embodiment, on the control arm the slat of the blind is arranged such, that on the chain connecting pin put in the chain links and in one of arm openings and on the supporting pin in the other arm opening, the holder is arranged on which the slat is fixed.

[0008] In another preferred embodiment are the control arms provided with recesses at the edges of their fingers to allow the control arms to fit tightly when the slats of the blind are in the stacked position.

Brief description of drawings

[0009] The invention will be explained by use to drawings, where Fig. 1 shows an outside-mount window blind according to the invention, where all slats of the blind are stacked in a basic position, Fig. 2 shows a detail of the internal arrangement of the control device from Fig. 1, Fig. 3 is a view of the droping the slats in the initial phase, Fig. 4 is a view of the dropping in the advanced phase, Fig. 5 is a view of the slats in the final phase of droping, when the slats are in the maximum open position, Fig. 6 is a view of the slats in the final stage of lowering, but the slats are in the half-open position, Fig. 7 is a detail of the control arm of the slats, Fig. 8 is a detail of the cam of arm from Fig. 7, Fig. 9 is a schematic section of the frame according to the line A-A of Fig. 1 with elements of the control device, Fig. 10 is the chain and control arm assembly corresponding to the arrangement in Fig. 9, Fig. 11 shows a situation where all the slats in the horizontal position are dropped to the fully shaded position, Fig. 12 shows a situation where all slats in the vertical position

are pulled up to the fully stacked position, Fig. 13 to 18 show the individual stages of controlling the position of the slats by the arms from Figures 7 and 8.

Preferred embodiment of the invention

[0010] Outside-mount window blind 33 with frame 32 is used for tilted roof windows. Fig. 1 shows the basic frame 32 for guiding the oitside-mount window slats 21 of the blind 33 operated by the control device 1 for sliding and rotating them. All slats 21 of the blind 33 are here stacked in a packet in the upper base position. The basic elements of the device are arranged in two vertical parallel and mirror-symmetrical guide rails 2, each of which is provided with a central cam slot 10 and a side chain slot 9 which, when mounted, is closer to the window glass. The control arm 4 of the slats 21 is partially visible, and perpendicular lateral slots 11 project from the cam slots 10 at regular intervals therefrom.

[0011] Fig. 2 shows in detail that each slat 21 has a holder 6 on both sides which is fixed to the control arm 4. Furthermore, the links of the chain 3 in the stacked position and also the control arms 4 in the stacked position are shown. At the side of each guide rails 2 a worm 5, driven via a distribution shaft and an angular motor gearbox is arranged. Flexible little sheets 7, 8, the function of which will be discussed later, are also visible. This worm drive 29 of the worm 5 can be seen in Fig. 3 and is located under the transverse connecting beam. Chain connecting pins 16 protrude from the chain 3, and the worm 5 always catches one pin 16 and thus always moves this one pin downwardly when the slats 21 are moved downwardly, and conversely, when the direction of rotation of the worm is reversed, it pulls the chain 3 with the slats 21 upwardly by these chain connecting pins 16.

[0012] Fig. 3 shows the stacked slats 21 and the assembly of stlats 21 of the blind 33 in a state in which the first slat 21 is rotated by the control device 1 to the fully shading position, i.e. perpendicular to the stacked position. The mechanism for droping and rotating the slats 21 will be described in detail later. The holder 6 on which the slats 21 of the blind 33 are fixed is also clearly visible, and this holder 6 is arranged on the arm 4 via the chain connecting pin 16 and the supporting pin 14. This can be clearly seen in Fig. 10. The slat 21 may be fixed directly on the arm 4, or preferably the slat 21 of the blind 33 may be arranged such that on the chain connecting pin 16 put in the chain links 17, 18 and in one of arm openings 22 and on the supporting pin 14 in the other arm opening 22, the holder 6 is arranged on which the slat 21 is fixed - see Fig. 10.

[0013] Fig. 4 shows the situation in the droping phase of the slats 21, when several slats 21 of the blind 33 are lowered to the fully shaded position. Both the chain slot 9 and the cam slot 10 can be seen here, as well as perpendicular lateral slots 11 which are arranged at regular intervals. When all of the stacked slats 21 of the blind 33 are shifted to a fully shading position, the shading will be completed, so all the slats 21 are in fully shading vertical position.

[0014] This can be clearly seen in Fig. 5, where all the slats 21 of the blind 33 are already drpped in the final droping phase. Prior to the droping position shown here, all slats 21 were in the fully shaded position. Here they are shown already in the maximum open position, when the most light is let in. How this change of position is achieved will again be explained later.

[0015] In Fig. 6, it can be seen that the slats 21 can also be brought into any slightly open position within the range of 90° where the slats 21 are tilted and when they are shading partially.

[0016] Fig. 7 shows a detail of the control arm 4. This serves to fix the holder 6 for the slat 21 of the blind 33 and to connect it to the chain 3, thereby also ensuring the rotation of the slat 21 of the blind 33. The control arm 4 is substantially V-shaped, consisting of two fingers 31 and at its ends is the control arm 4 provided with chain openings 15 for pins 14, 16 and are provided with recesses 23. The recesses 23 serve to allow stacked control arms 4 to fit tightly together in the stacked position of the blind 33. On the peak, the control arm 4 is provided with a cam 12 mounted on a cam pin 13.

[0017] As can be seen in detail in Fig. 8, the cam 12 is cylindrical and its upper face is provided with two wedge sectors 19 and one rectangular flat sector 20 of the full thickness of the cam 12.

[0018] Fig. 9 is a schematic section of the guide rail 2 according to line A-A of Fig. 1. The guide rail 2 consists of a base 27 and a guide rail cover 28. The chain 3 is guided in the chain slot 9 of the guide rail 2, the chain 3 consists of a base guide chain links 17 which connect connecting chain links 18 arranged above. Through the chain openings 15 of the chain links the chain connecting pins 16 are put in. On the chain connecting pin 16 the control arm 4 is put in by one of its arm openings 22, and the cam pin 13 is guided in the cam slot 10. In the base 27 of the guide rail 2 there is a storage slot 26 for the fixing parts 24 of the flexible little sheets 7, 8 mentioned in Fig. 2.

[0019] Fig. 10 is an assembly of two chain links and the control arm 4 corresponding spatially to the arrangement of Fig. 9. The chain 3 consists of guide chain links 17 and connecting chain links 18, the connecting chain link 18 is closer to the control arm 4. In the chain openings 15 and in one of the arm openings 22 there is a chain connecting pin 16 which connects both chain links 17, 18 and also carries at one end the blind slat holder 6 of the slat 21 of the blind 33. In the other arm opening 22, a supporting pin 14 is arranged for the other end of the blind slat holder 6.

[0020] As can be seen in Fig. 7 and 8, the wedge sectors 19 of the cam 12 are oriented opposite the fingers 31 of the control arm 4. This is very important for explanation why the cams 12 do not interfere when droping the slats 21 to the shading position or, conversely, when

pulling the slats 21 to the stacked position. If the cams 12 were not provided with these wedge sectors 19, the cam would lift and pass under one of the flexible little sheets 7, 8, but against the following flexible little sheet, or stop 25 thereof, preloaded towards the bottom surface of the cam slot 10, the cam 12 and the slat 21 would strike and could not continue in straight direction. This is explained with reference to Figs. 11 and 12, wherein Fig. 11 represents a situation in which all the slats 21 in the horizontal position are dropped to a fully shaded position. When dropped in the direction of the arrow, the cam 12 of the control arm 4 is oriented such, it has in the indicated direction of movement the wedge sector 19 oriented downwardly. The upper flexible little sheet 8 is easily passed under by the cam 12, since the arm 30' of the sheet 8 is raised from the cam slot 10 and the press arm 30 of the lower flexible little sheet 7 is raised due this wedge sector 19. This situation is the same for all the cams 12 of other slats 21 of the blind 33, and therefore they all descend easily to a completely shaded position.

[0021] Fig. 12, on the other hand, shows a situation in which all slats 21 of the blind 33 in the vertical position are pulled up to a fully stacked position. When pulling in the direction of the arrow, the cam 12 of the control arm 4 is oriented so that it has in the indicated direction of movement the wedge sector 19 oriented upwards. The lower flexible little sheet 7 is easily passed under by the cam 12, since the press arm 30 is raised from the cam slot 10 and the press arm 30' of the upper flexible sheet 8 is raised due to this wedge sector 19. This situation is the same for all the cams 12 of the other slats 21, and therefore, all of them, thus easily rise to the fully stacked position.

[0022] Figs. 13 to 18 show the various stages of operation of the slats 21 of the blind 33. This detailed description follows Fig. 1 to 6, starting from the situation shown in Fig. 4. The slats 21, originally stacked in the upper part of the frame 32, are after turnover from the horizontal to the vertical position by the worm 5 droped due to the pull of the chain 3, and all of them drop down.

[0023] How the slats 21 of the blind 33 are rotated from the vertical to the horizontal position will be explained by analogous movement in reverse alignment from the vertical to the horizontal position, as illustrated in Figs. 5 and 6, wherein the slats 21 can be rotated between these extreme positions, thereby regulating light entrance.

[0024] The most important components of the control device 1 are the control arms 4 with cams 12, wherein the cam 12 is moved by its cam pin 13 in the cam slot 10, under the surface of the guide rail 2. In the base 27 of the guide rail 2, the fixing parts 24 of the flexible little sheets 7, 8 are arranged in the storage slots 26, and these, by means of their press arms 30, 30', elastically abut from below the cam slot 10 and are centred relative thereto. The press arms 30, 30' of the flexible little sheets 7, 8 are terminated by stops 25 which project away from the guide rail 2 and have the same orientation as the fixing parts 24 of the flexible little sheets 7, 8. The basic mechanism for controlling the rotation of the slats 21 of the blind 33 is the interaction between the cam 12, respectively its shaped parts such as the wedge sector 19 and the flat sector 20, and flexible little sheets 7, 8, respectively their stops 25.

[0025] As noted in description of Fig. 8, the cam 12 is cylindrical and its upper face is provided with two wedge sectors 19 and one rectangular flat sector 20 which has the full thickness of the cam 12. The wedge sectors 19 decrease in thickness from the upper face to the lower face, thereby forming a sharp ramped wedge.

[0026] Thus, if the cam 12 comes into contact with the flexible little sheets 7, 8 by means of its wedge sector 19, then, due to this wedge, the press arm 30 of the flexible little sheet 7 with the stop 25 is easily lifted, the cam 12 passes under it and continues to move without being forced to rotate, and thus to rotate the entire control arm 4, and thus the holder 6, and thus the slat 21 itself. In this movement, one of the flexible little sheet 7, 8 is very easily underrun, since the press arm 30 of the lower flexible little sheet 7 is at an angle and therefore the chamfer of the wedge sector 19 is not so important, but the other flexible little sheet 8, which by its stop 25 abuts to the surface of the cam slot 10, must be, by this wedge, actively lifted and passed under. In this way the individual slats 21 are allowed to slide down one after the other into their basic shaded position without changing their vertical orientation. The above-described situation is illustrated in Fig. 13, at the moment, when by moving from above, the cam 12 has easily passed under the upper flexible little sheet 8, and then has lifted the lower flexible little sheet 7 and passed it under.

[0027] However, if the cam 12 comes into contact with flexible little sheets 7, 8 by its flat sector 20, the first flexible little sheet 7 is easily lifted, because the press arm 30 of the flexible little sheet 7 is at an angle and therefore the thickness of the flat sector 20 does not interfere while lifting, however, in the case of the second flexible little sheet 8, which with its stop 25 abuts the surface of the cam slot 10, the flat sector 20 hits this stop 25 and cannot continue to move. This can be seen in Fig. 14.

[0028] As can be seen in Fig. 15, as a result of the continued tension of the chain 3, the cam 12 is forced to drive completely into the lateral slot 11 which is at a level between the stops 25 of the flexible little sheets 7, 8. And since the control arm 4 is connected to the chain 3 at one end, the control arm 4 is rotated, thereby rotating the holder 6 of the slats 21 of the blind 33, and also the slats 21 themselves. The lateral slot 11 is not visible here, as it is completely hidden by the control arm 4. The slats 21 are partially changed from a vertical position to an inclined position, as can be seen in the partial rotation in Fig. 6.

[0029] Fig. 17 then shows a situation in which, during the further movement of the chain 3, the cam 12, together with the entire control arm 4 and together with the slat 21 of the blind 33, continues to rotate and, after the complete exit of the lateral slot 11 back into the cam slot 10,

the slat 21 reaches a complete horizontal position. The cam 12, having already left the lateral slot 11 and rotated, is now oriented with respect to the stop 25 of the upper flexible little sheet 8 by its wedge sector 19, as shown in Fig. 17.

[0030] In Fig. 18, it can be seen that rotation of the cam 12 by its wedge sector 19 easily lifts the stop 25 of the upper flexible little sheet 8 and the cam 12 passes under this upper flexible little sheet 8 and continues in the cam slot 10 further upwards, with the slats 21 already rotated to a horizontal position.

[0031] The above phase staged rotation will be the most common operation in practice when adjusting the position of the dropped slats 21 of the blind 33, i.e. in the basic position of the vertically rotated slats 21.

List of reference signs

[0032]

1 control device
2 guide rail
3 chain
4 control arm
5 worm
6 blinds slat holder
7 lower flexible little sheet
8 upper flexible little sheet
9 chain slot
10 cam slot
11 lateral slot
12 cam
13 cam pin
14 supporting pin
15 chain opening
16 chain connecting pin
17 guide chain link
18 connecting chain link
19 wedge sector
20 flat sector
21 slat of blinds
22 arm opening
23 recess
24 fixing part of the little sheet
25 stop of the little sheet
26 storage slot
27 base of the guide rail
28 guide rail cover
29 worm drive
30 press arm of the lower flexible little sheet
30' press arm of the upper flexible little sheet
31 finger
32 frame
33 blind

Claims

1. Outside-mount window blind consisting of a frame with a control device for adjusting the position of the slats consisting of two vertical parallel mirror-symmetrical guide rails, wherein between them slats of the blind are arranged, whereas each of the rails is provided with slots, and the pulling means are accommodated in each slot, **characterized in that** the slots are two, made as an side chain slot (9) and a central cam slot (10), whereas below these slots (9, 10) there is space for the links of a chain (3) in the chain slot (9) and for a cam (12) of a control arm (4) for the position of the slats (21) of the blind (33) in the cam slot (10), whereas in the cam slot (10) the control arm (4) is placed with the through a cam pin (13) of the cam (12), whereas the control arm (4) is at its ends provided with at least one arm opening (22) for a chain connecting pin (16) which also connects chain links (17, 18), whereas the slat (21) of the blind (33) is fixed to the control arm (4) and perpendicular lateral slots (11) protrude from the cam slot (10) at regular intervals and below the cam slot (10), two flexible little sheets (7, 8) are arranged opposite to the lateral slots (11), whereas two flexible little sheets (7, 8) are fixed by their fixing parts (24) in the base (27) of the guide rail (2), the press arms (30, 30') of the flexible little sheets (7, 8) are preloaded towards the bottom surface of the cam slot (10) and are oriented with their stops (25) facing each other, wherein the cam (12) is provided with two wedge sectors (19) thickness of them decreases from the upper to the lower surface of the cam (12) and one rectangular flat sector (20) of the full thickness of the cam (12), whereby the wedge sectors (19) are oriented against the fingers (31) of the control arm (4) and on the side of each of the guide rails (2) a driving worm (5) for engagement with the chain connecting pin (16) of the chain links (17, 18) and the control arm (4) is arranged.

2. Outside-mount window blind according to claim 1, **characterized in that** on the control arm (4) the slat 21 of the blind (33) is arranged such, that on the chain connecting pin (16) put in the chain links (17, 18) and in one of arm openings (22) and on the supporting pin (14) in the other arm opening (22), the holder (6) is arranged on which the slat (21) is fixed.

3. Outside-mount window blind according to claim 1 or 2, **characterized in that** the control arms (4) are provided with recesses (23) at the edges of their fingers (31) to allow the control arms (4) to fit tightly when the slats (21) of the blind (33) are in the stacked position.

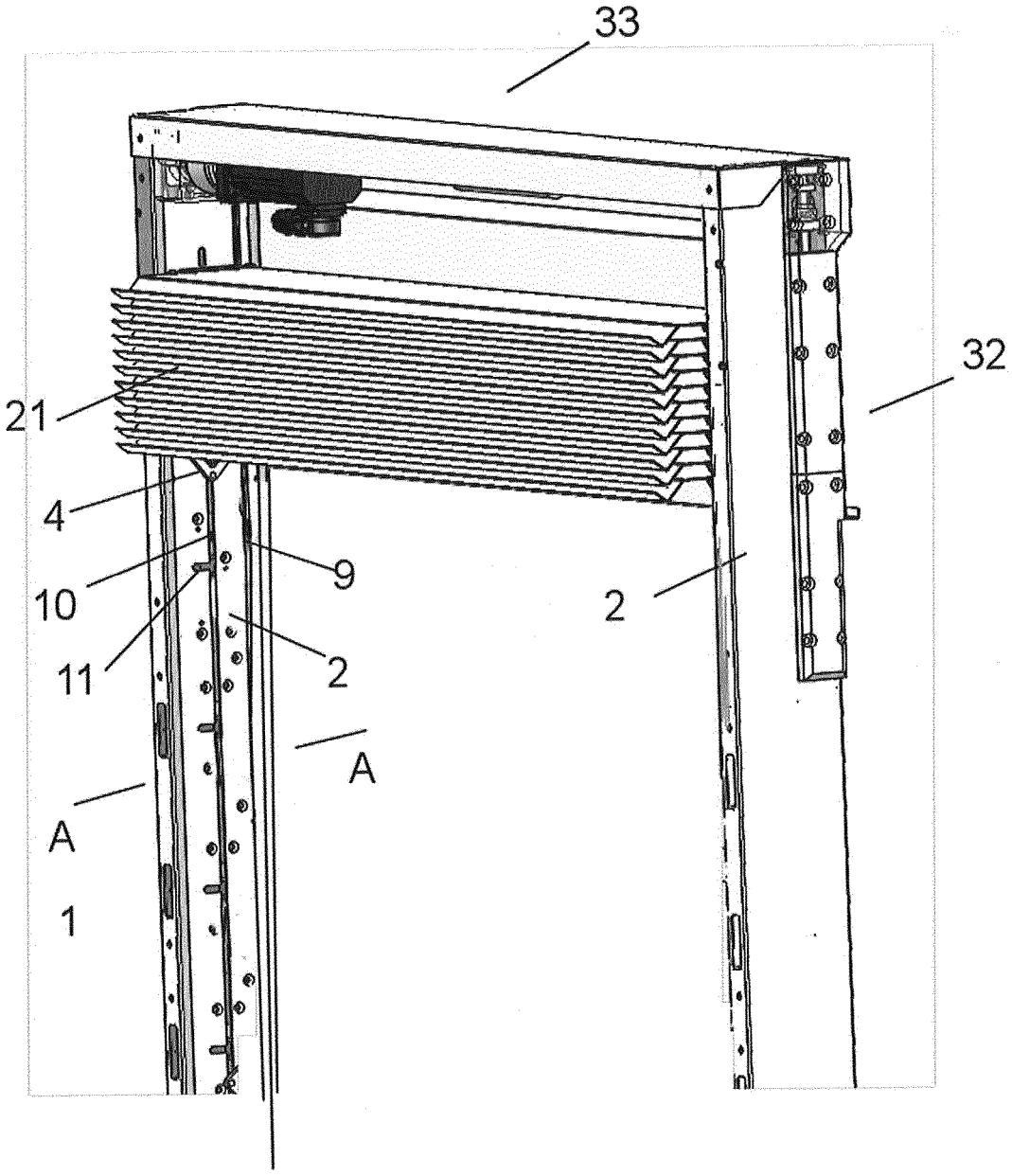


Fig. 1

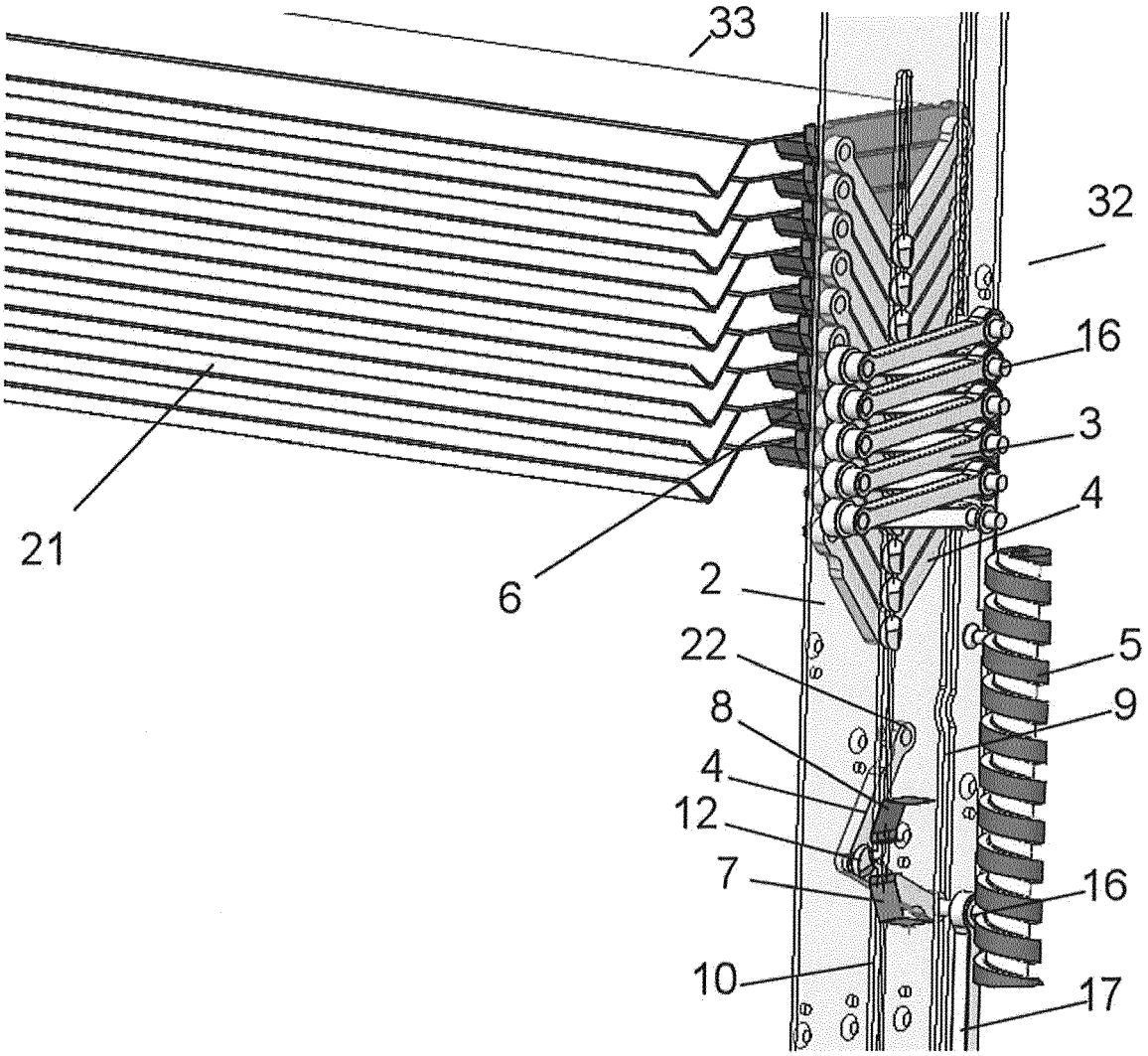


Fig. 2

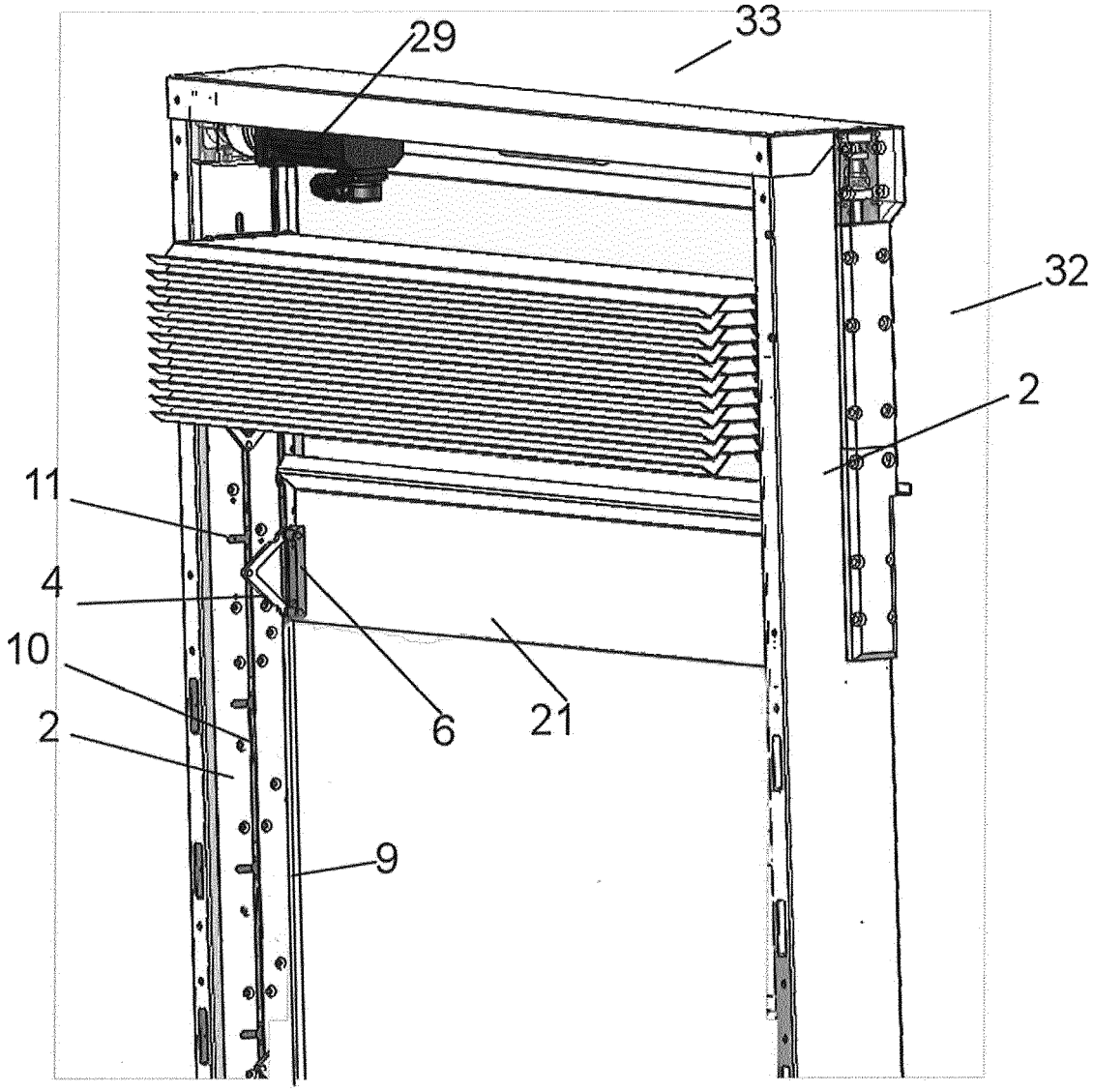


Fig. 3

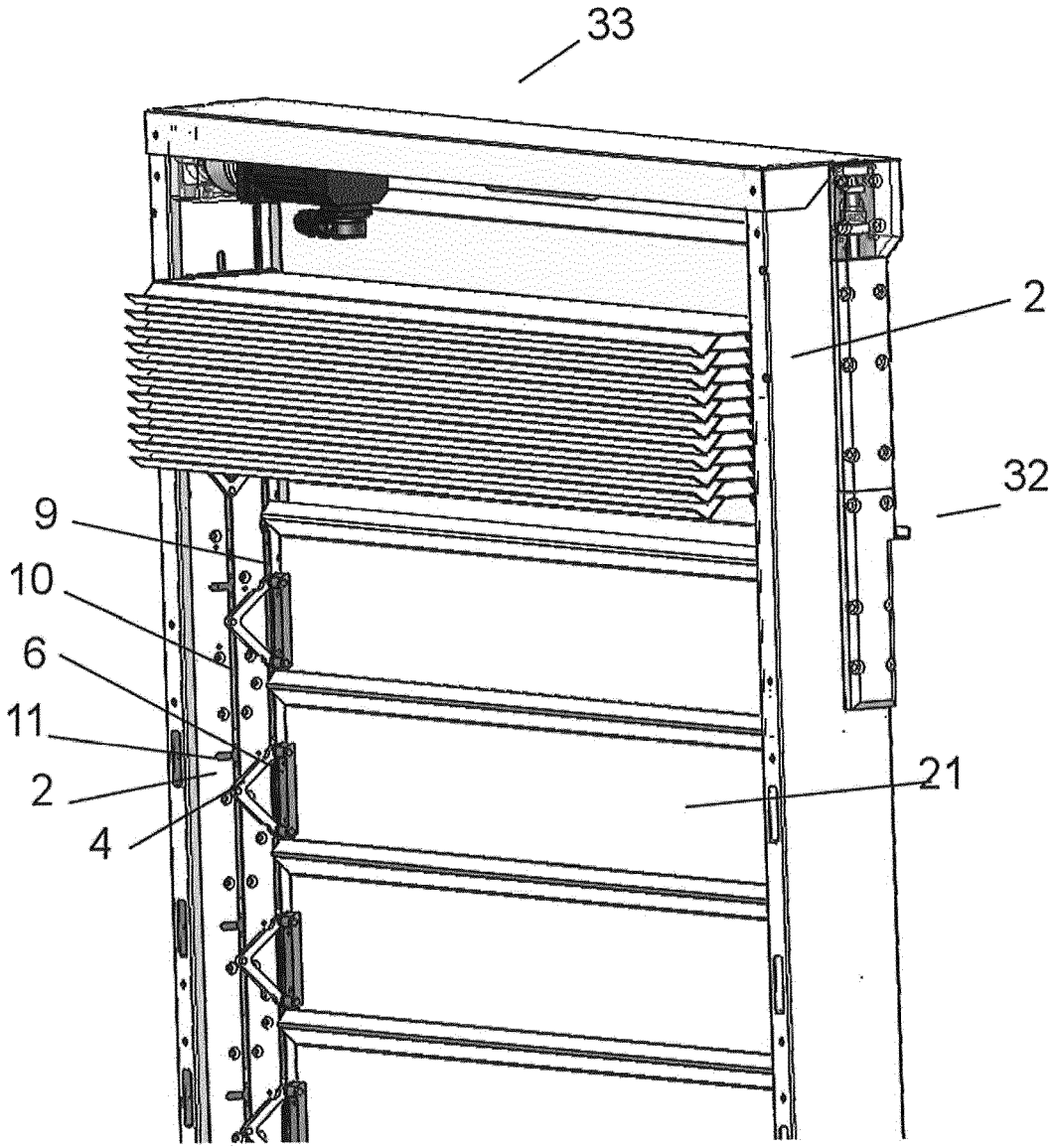


Fig. 4

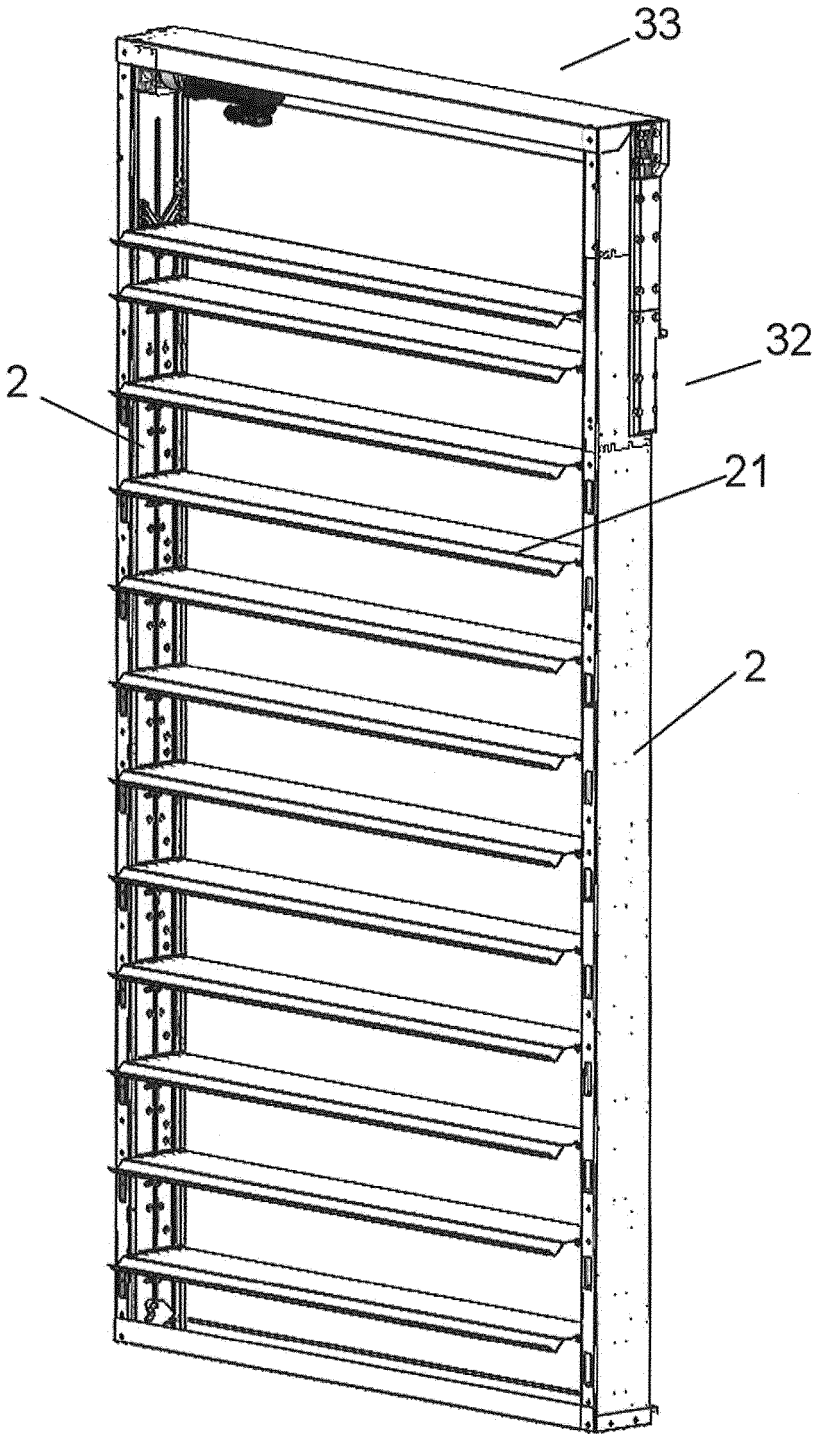


Fig. 5

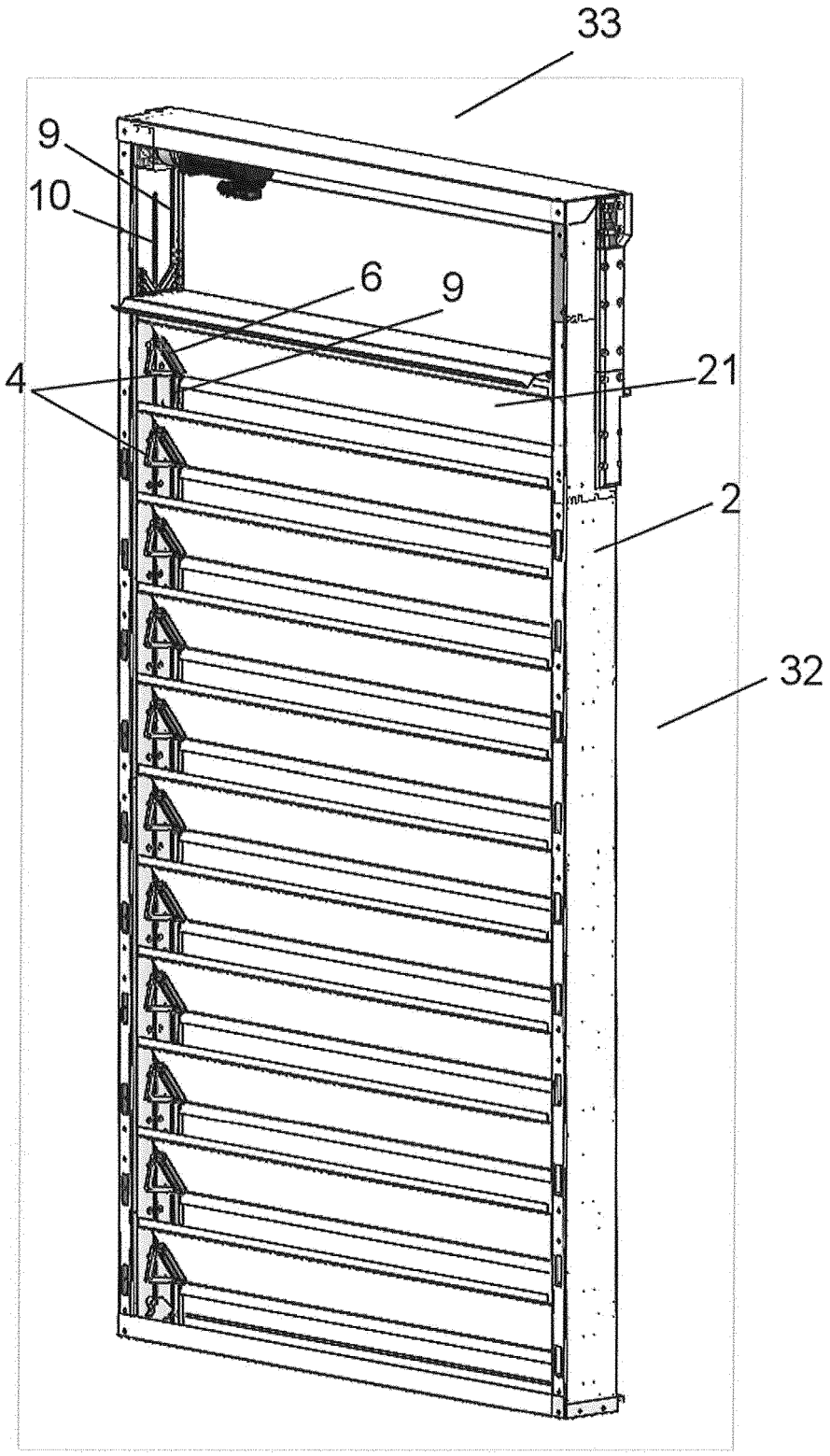


Fig. 6

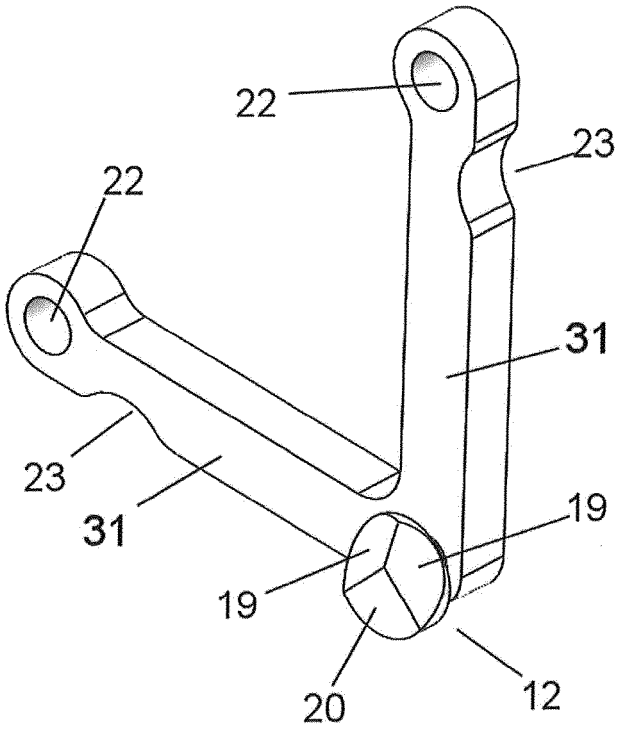


Fig. 7

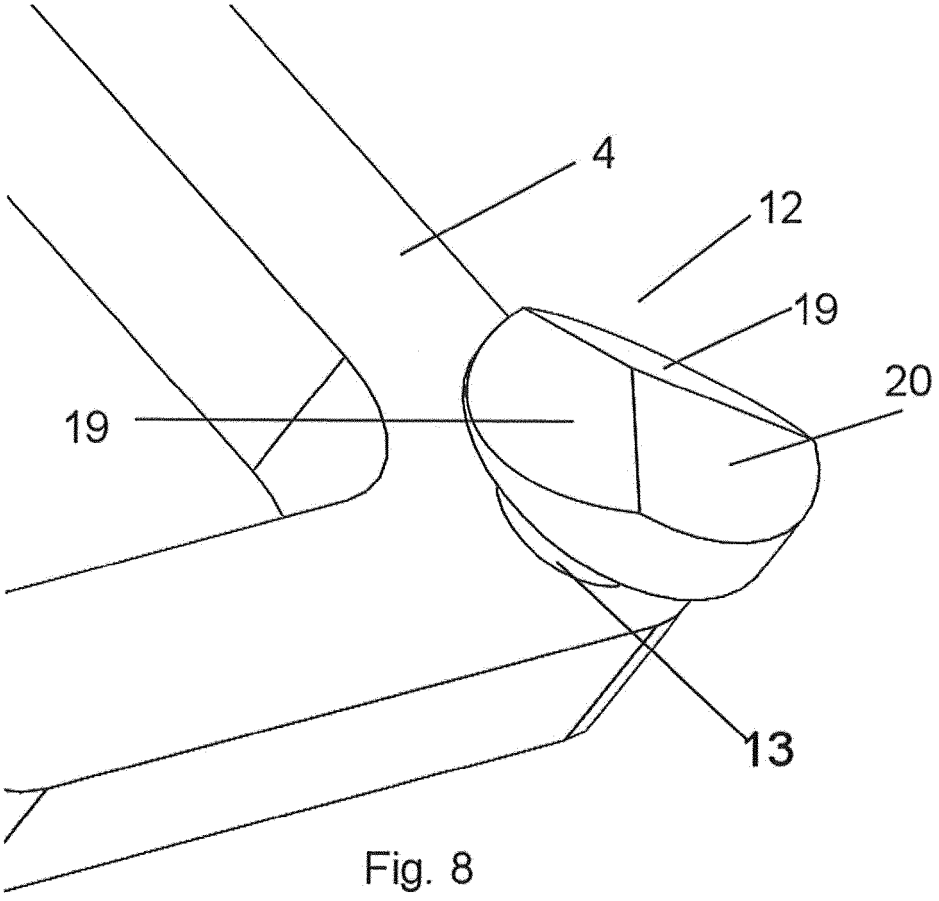
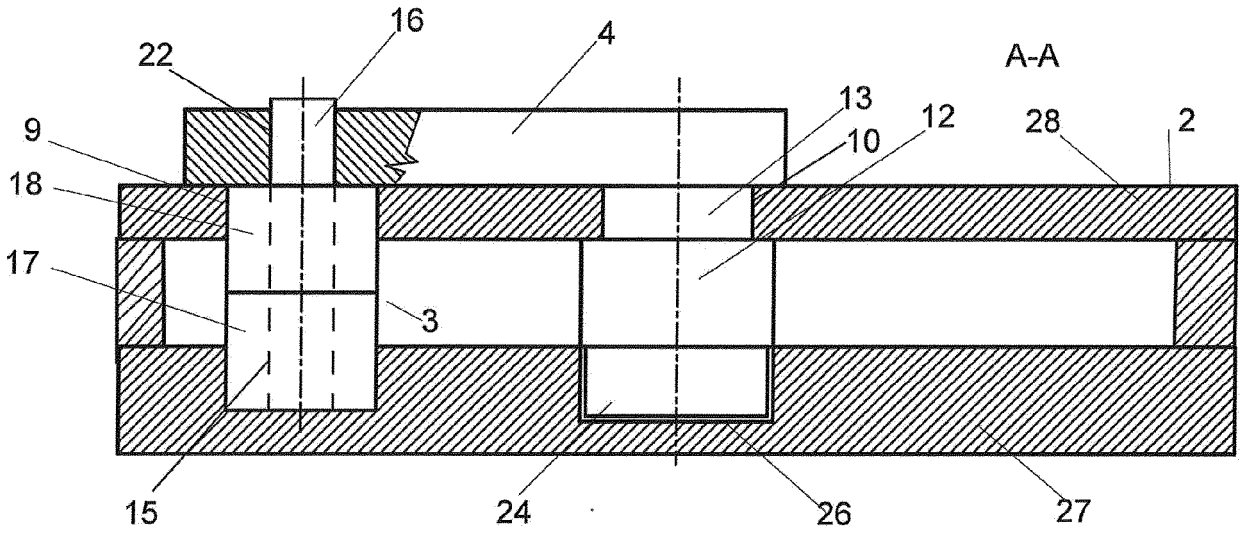


Fig. 8


16
4
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A-A
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Fig. 9

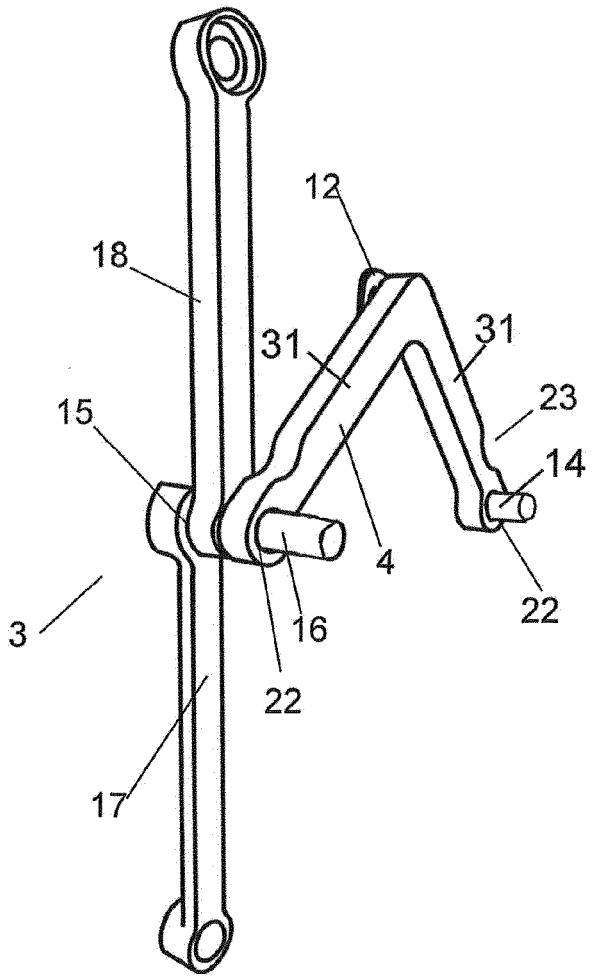
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Fig. 10

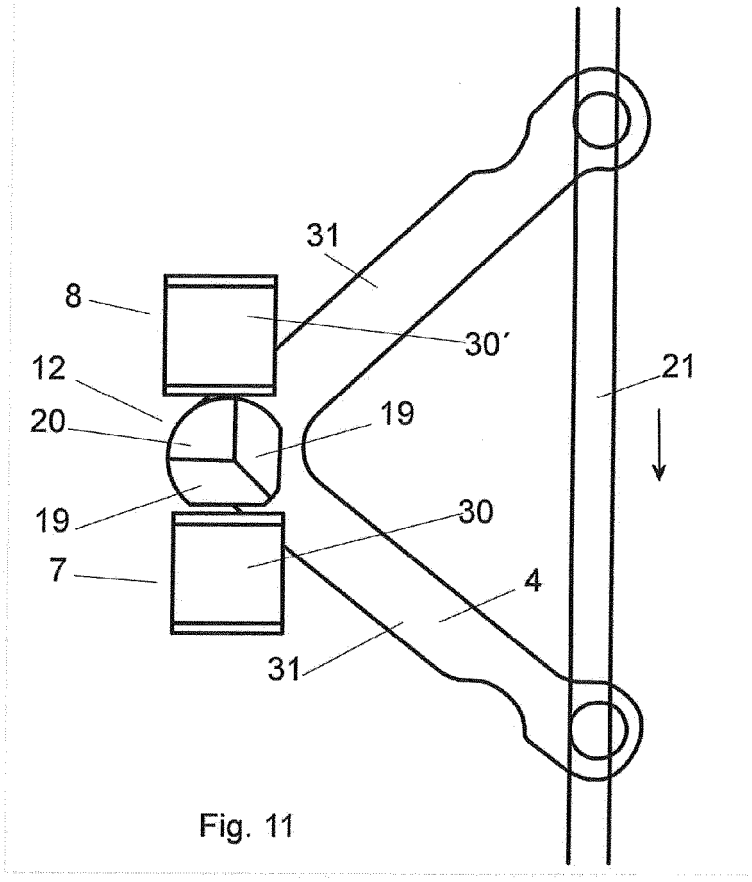
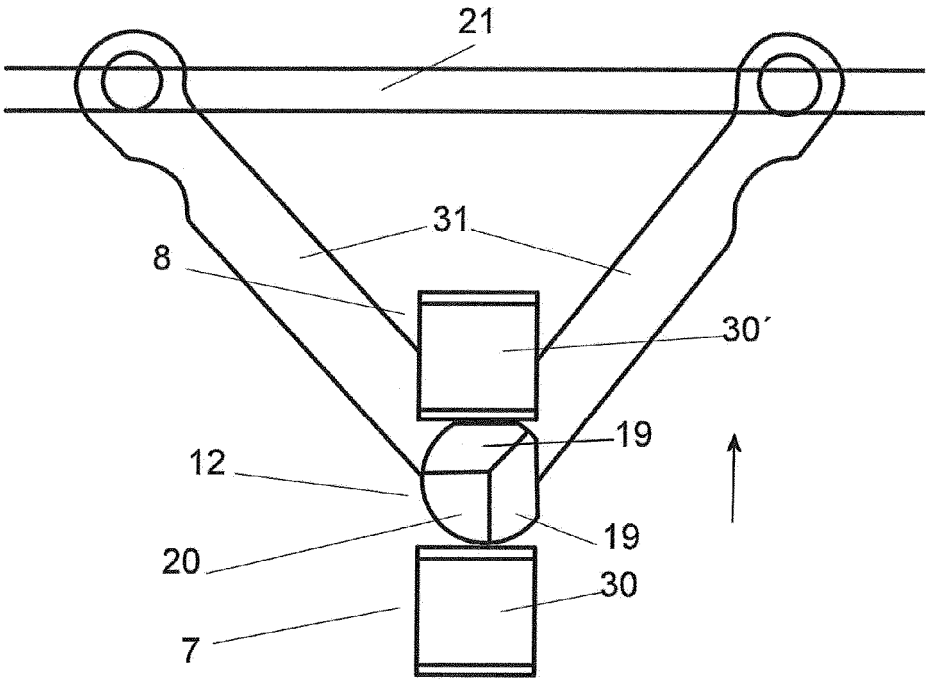


Fig. 11



Flg. 12

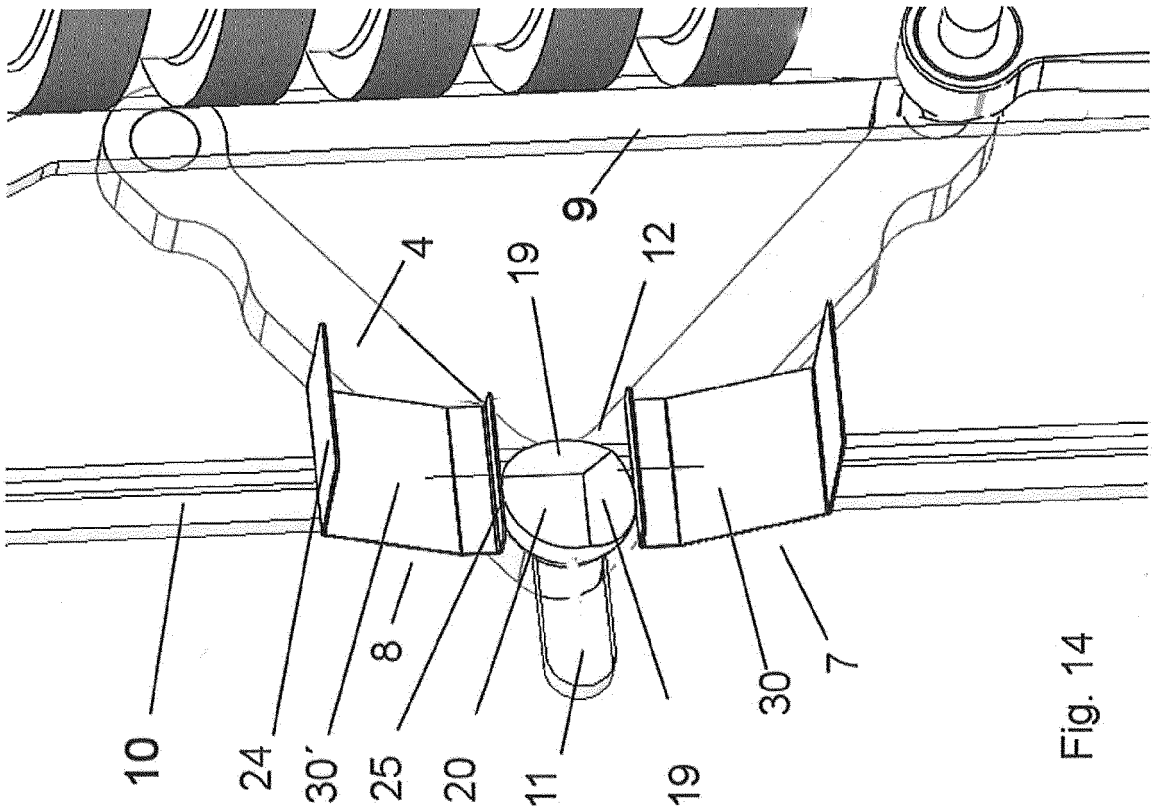

9
4
19
12
10
24
30'
25
8
20
11
19
30
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Fig. 14

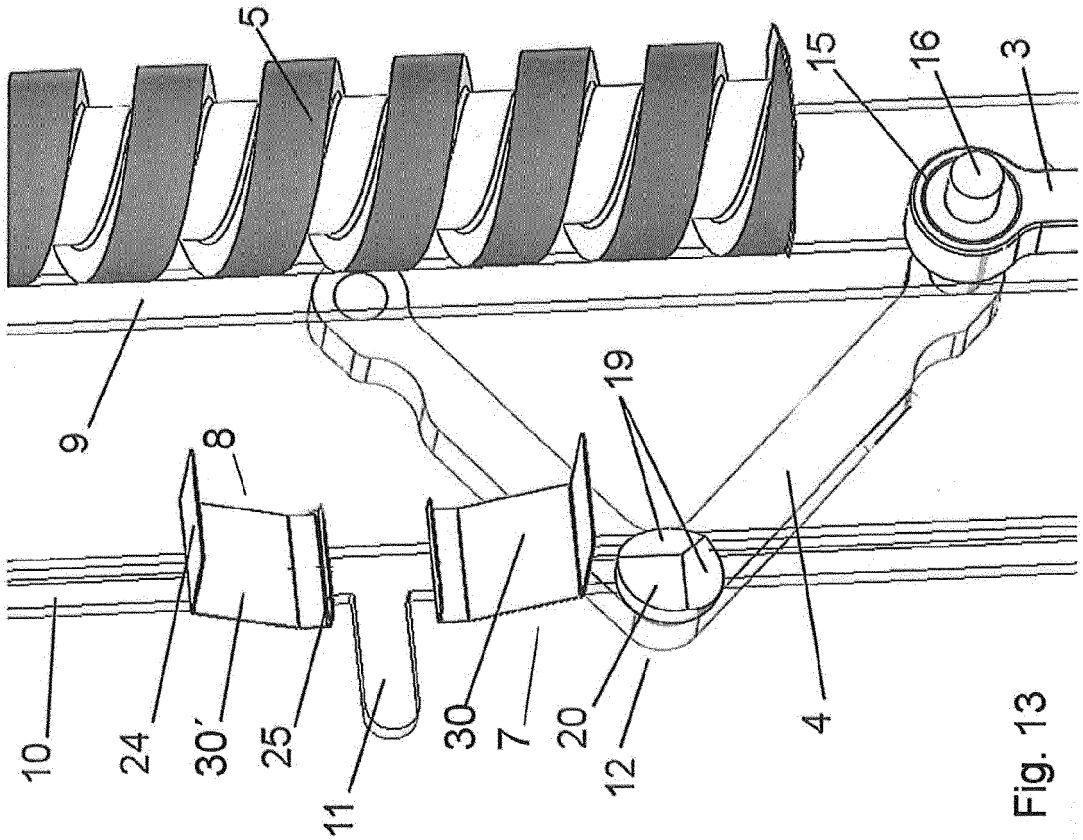
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Fig. 13

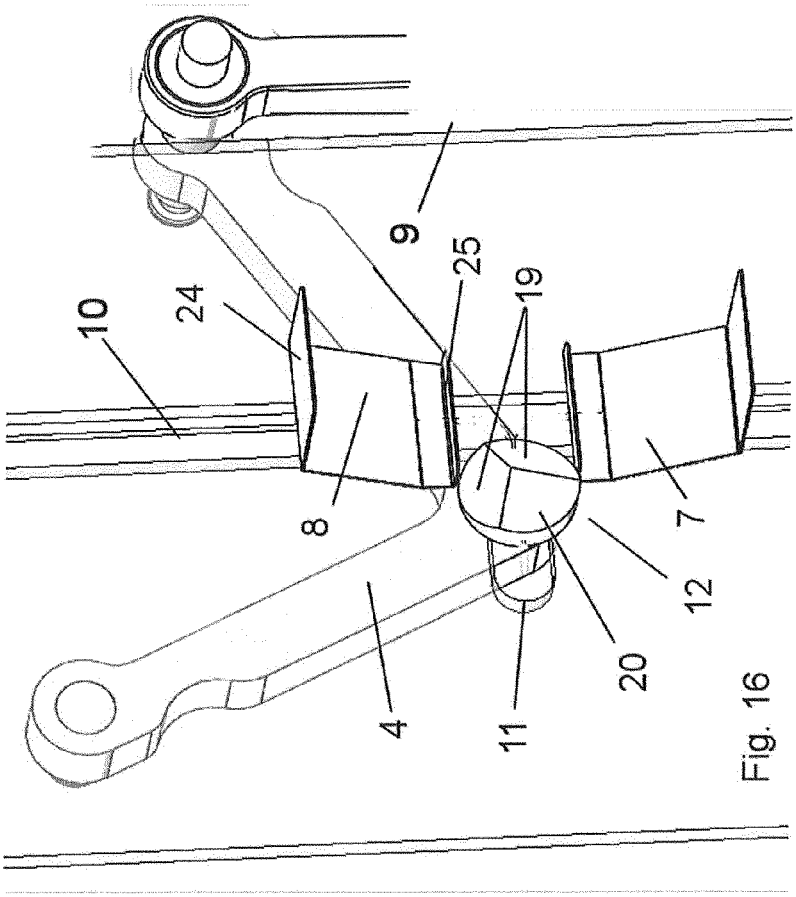

Fig. 16

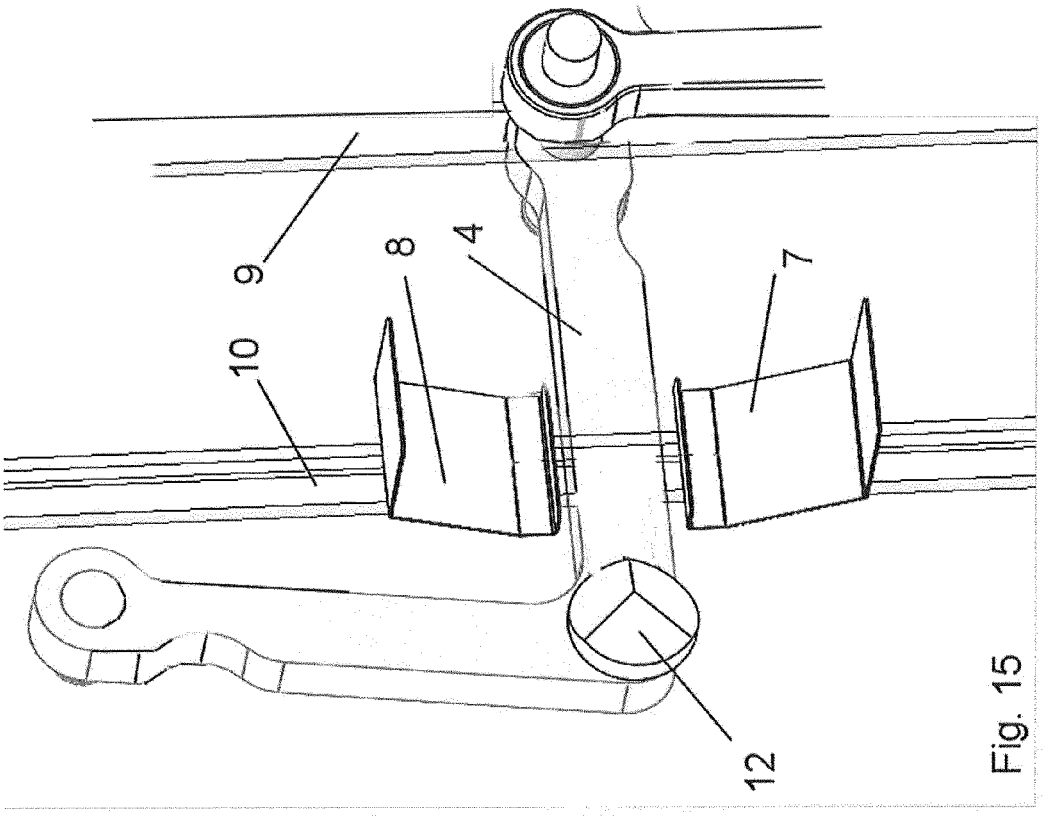

Fig. 15

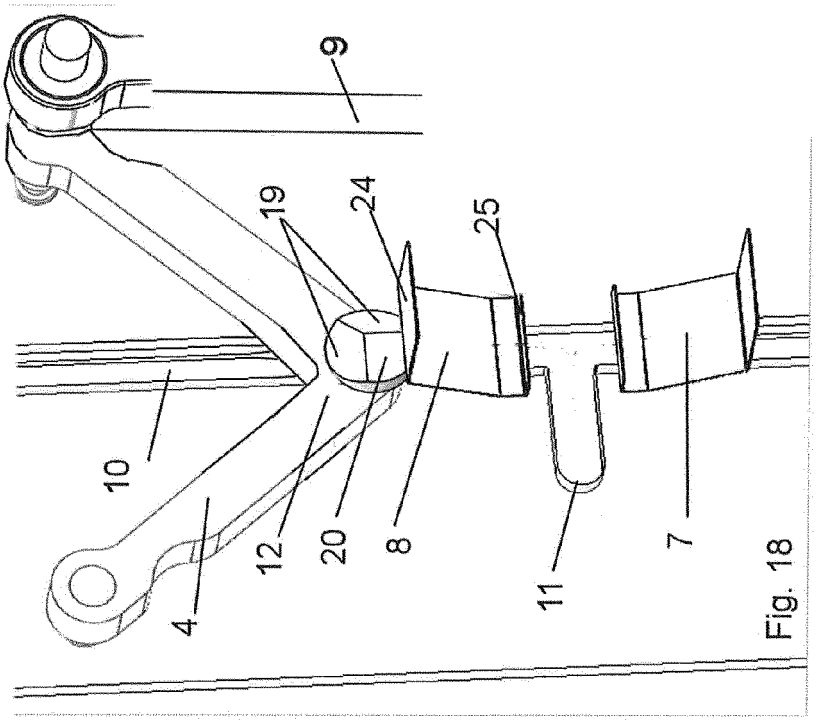

Fig. 18

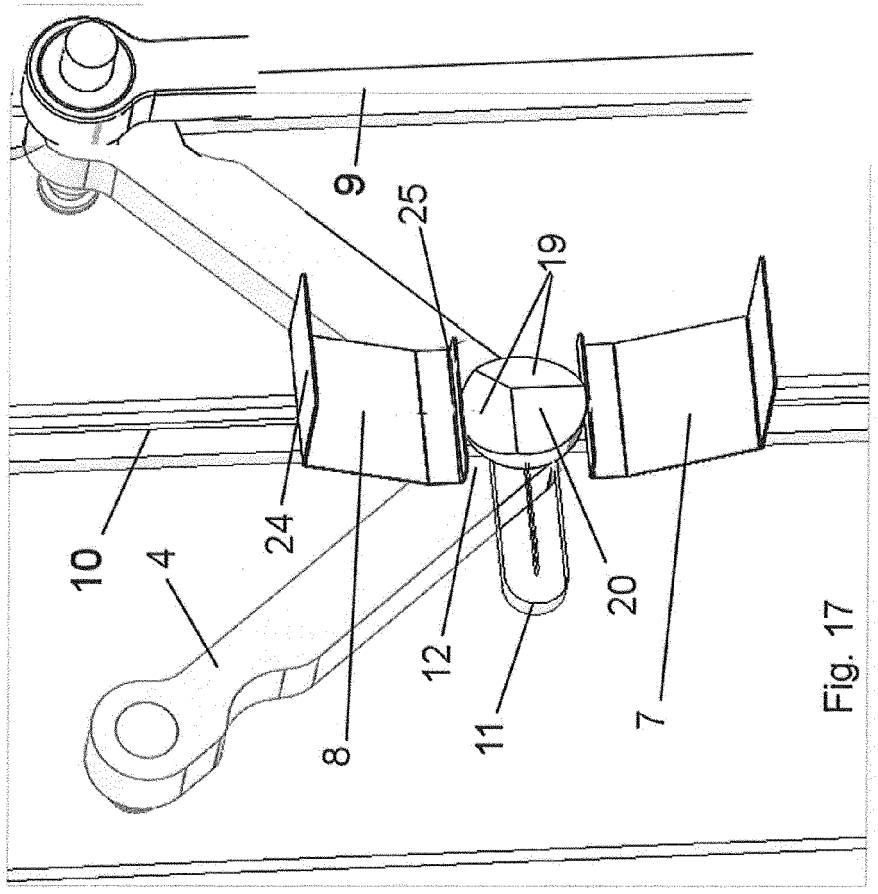

Fig. 17

REFERENCES CITED IN THE DESCRIPTION

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