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(54) **An adjustable armrest assembly**

(57) An armrest assembly for a chair (2) having armrests (10a,b) arranged on laterally opposite sides of a seat (4). A collective actuation and support member (14) is configured for connection to each arm rest and is movably supported by bearing means (19) that are connected to the chair. The bearing means are arranged such that the armrests are movable by translational motion between a forward position (F) and a rear position (R). The collective actuation and support member (14) is arranged transversely below the seat and provides a rigid connection between the armrests (10a,b), whereby one armrest (10a) is movable by operation of the other armrest (10b) and vice versa.

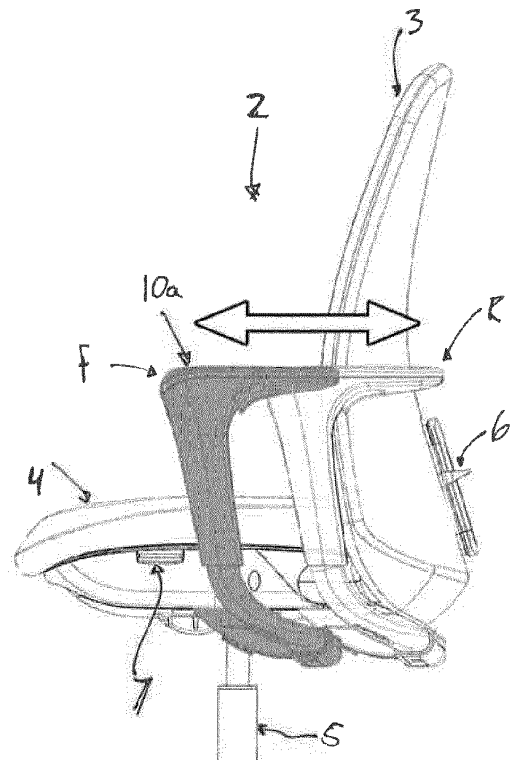


Figure 1

Description

Field of the invention

[0001] The invention relates to an armrest, particularly an armrest for an office chair. More specifically, the invention concerns an adjustable armrest assembly as specified in the preamble of claim 1.

Background of the invention

[0002] The state of the art includes a number of mechanisms for adjusting the armrest of a chair.

[0003] WO 2006/094260 describes an office chair having two arm support assemblies. Each arm assembly includes a latching assembly to permit adjustment of the height of an arm cap thereof while maintaining the arm cap at a selected elevation. The latch assembly is engageable with an inner liner provided within a support post. Further, the armrest assembly has a plurality of interconnected and relatively movable plates which permit adjustment of the angular orientation of the arm cap along with adjustment of the arm cap in the front-to-back direction and the side-to-side direction.

[0004] NO 20010459 and the corresponding DE 101 03 569 A1 disclose an office chair where each armrest is arranged to rotate on a vertical axis, such that each armrest is rotatable in the horizontal plane, independently of one another.

Summary of the invention

[0005] The invention is set forth and characterized in the main claim, while the dependent claims describe other characteristics of the invention.

[0006] It is thus provided an armrest assembly for a chair having armrests arranged on laterally opposite sides of a seat; each armrest comprising respective support structures; the armrest assembly being characterised by a collective actuation and support member configured for connection to each support structure and being movably supported by bearing means that are connected to the chair; the bearing means being arranged such that the armrests are movable by translational motion between a forward position and a rear position on the chair.

[0007] In one embodiment, the collective actuation and support member is movably supported by bearing means via respective connection means and carriage means; said connection means and carriage means being structurally connected via fixtures.

[0008] The carriage means are in one embodiment translationally supported by the bearing means and movable between end stops connected to the bearing means.

[0009] In one embodiment, the carriage means comprises rollers for rotationally supporting the carriage means in the bearing means, a main body and an inner body movably connected via locking means to the main

body, and at least one resilient element disposed between the main body and the inner body; said resilient element configured to provide a biasing force between the main body and the inner body.

[0010] In one embodiment, the bearing means comprises an indexed element having grooves configured for receiving at least a portion of the rollers, and said biasing force serves to force said portion of the rollers into at least one of the grooves.

[0011] In one embodiment, the collective actuation and support member is a cross bar arranged transversely and below the seat, and provides a rigid connection between the armrest, whereby one armrest is movable by operation of the other armrest and vice versa.

[0012] The bearing means comprise in one embodiment a pair of bearing assemblies, each comprising a carriage.

[0013] Thus, both armrests may be moved/adjusted by using only one hand (push/pull action). The invented armrest assembly encourages the user to easily and intuitively to push the armrest out of the way.

Brief description of the drawings

[0014] These and other characteristics of the invention will become clear from the following description of a preferential form of embodiment, given as a non-restrictive example, with reference to the attached drawings, wherein:

Figure 1 is a side view of a chair having an embodiment of the adjustable armrest assembly according to the invention, showing the armrest in a forward position and a rear position;

Figure 2 is a perspective view illustrating that the individual armrests are joined by a collective cross bar, and the armrests are connected to the chair via the cross bar;

Figure 3 is a perspective view illustrating how the cross bar is connected to the chair via connection members and a support frame;

Figures 4 and 5 are perspective views illustrating the connection between the cross bar, connection members and the support frame;

Figure 6 is a perspective view illustrating a pair of bearing assemblies of the support frame, and how the cross bar is connected to the bearing assemblies;

Figure 7a is a perspective view of an embodiment of the bearing assembly according to the invention, illustrating i.a. an embodiment of carriage inside the bearing assembly;

Figure 7b is a perspective longitudinal sectional view

of the bearing assembly shown in figure 7a;

Figure 7c is a longitudinal sectional side view of the bearing assembly shown in figures 7a and 7b;

Figures 8a and 8b are different perspective views of the carriage shown in figure 7a;

Figure 8c is a perspective longitudinal sectional view of the carriage shown in figures 8a and 8b;

Figure 8d is a perspective sectional view of a part of the carriage, cut along a section line A-A as indicated in figure 8c, and

Figure 9 is an exploded view of the carriage.

Detailed description of a preferential embodiment

[0015] The following description will use terms such as "horizontal", "vertical", "lateral", "back and forth", "up and down", "upper", "lower", etc. These terms generally refer to the views and orientations as shown in the drawings and that are associated with a normal use of the chair. The terms are used for convenience only and shall not be limiting.

[0016] Figure 1 and figure 2 show an office chair 2 having a back rest 3 and a seat 4. The chair is supported by a base (not shown), conventionally having a plurality of wheels, via a height-adjustable column 5 preferably having a shock absorber. Such chair-support means are well known in the art. Levers 6, 7 are operable to adjust the back rest and the seat, respectively, vertically (up and down). Such levers and mechanisms are well known and need therefore not be described in detail here.

[0017] Two armrests 10a,b are arranged on laterally opposite sides of the seat. The armrests may be individually height-adjustable via known means (thus not shown). The armrests are movable back and forth as shown in figure 1. The forward position "F" and rear position "R" (phantom drawing). The double arrow indicates this movement. It will be appreciated that the armrests provide support for the elbows when they are in the rear position.

[0018] Figure 2 shows that each arm rest 10a,b is connected to a collective cross bar 14, via respective support bars 12. The cross bar 14 is connected to the chair via a pair of connection members 17 that extend into the chair body through slits 16 in a cover 13 underneath the seat.

[0019] In figure 3, the seat, back rest and cover have been removed to better illustrate the invention. Figure 3 also shows that the column 5 is connected to an interface element 15, which in turn is connected to the seat and back rest (not shown in figure 3). The cross bar connection members 17 are connected to a support frame 18. In the illustrated embodiment, the support frame is connected to the seat (not shown in figure 3) via the interface

element 15. Referring to figures 4 and 5, the support frame 18 generally comprises a pair of bearing assemblies 19 (one for each connection member 17) interconnected via spars 20a,b so as to provide the required rigidity. The support frame 18 (i.e. the bearing assemblies 19 and spars 20a,b) has a number of holes 27 by means of which the support frame may be secured to the seat and/or interface element.

[0020] Figure 6 illustrates how the cross bar connection members 17 are connected to their respective bearing assembly 19. The armrests and support bars (not shown in figure 6) are conveniently connected to opposite ends of the cross bar 14 via a respective receptacle 31. Referring additionally to figure 7a, each bearing assembly 19 comprises an elongate housing 28 having an internal longitudinal race groove 29 and a longitudinal opening 30. A carriage 23 is arranged inside the bearing assembly housing and configured for running back and forth along the race groove 29. End stops 33 (for the carriage) are provided at both ends of the race groove. The carriage 23 comprises support protrusions 21 a,b that protrude out through the longitudinal opening 30. The cross bar connection member 17 is thus connected to the carriage 23 via the support protrusions 21a,b, and secured to the carriage by means of screws 22a (figure 6) in corresponding screw holes 22b (figure 7a). The cross bar connection member 17 (and hence the cross bar, and hence the arm rests) it thus movable back and forth in the longitudinal race groove 29 in the bearing assembly 19.

[0021] Figure 7b shows various components of the carriage 23, i.e. upper vertical bearing wheels 44a,b and lower vertical bearing wheels 45a,b. The lower bearing wheels 45a,b and lateral bearing wheels 46a,b are supported by the race groove 29, which in the illustrated embodiment comprises a lower, U-shaped, insert 24 that serves to reduce the sound generated by the moving carriage. Referring additionally to figure 7c, the bearing assembly housing 19 also comprises an upper insert 25, arranged to be in contact with the upper bearing wheels 44a,b. The upper insert 25 comprises a series of grooves 32 that serves as an indexing feature for the carriage. The upper bearing wheels 44a,b are pressed into the grooves (as is explained below), thus providing a slight resistance and giving a feed-back to the user moving the carriage (when moving the armrests). The inserts 24, 25 are made of a hard and durable plastic material, such as polyamide (PA) or polyoxymethylene (POM).

[0022] Referring now to figures 8a-d and figure 9, the carriage 23 comprises a main body 40 having an elongated shape that corresponds to the internal shape of the bearing assembly. The main body 40 is configured for support against the race groove by the above mentioned lower vertical bearing wheels 45a,b, that are rotatably connected to the main body via a respective axle 47a and axle support 47b. Lateral support for the carriage 23 is provided by the lateral bearing wheels 46a,b, rotatably connected to the main body 40 by respective axles

47c and axle supports 47d. A locking plate 43 is configured for locking engagement with the main body 40, and thus secures the lateral bearing wheels to the main body.

[0023] The main body 40 comprises a cavity 48, having regions 49 that each is configured for supporting a respective resilient element 42. In the illustrated embodiment, four such resilient elements are arranged within the cavity, two of which are provided at respective ends of the main body and having a portion protruding beyond the main body end. These two resilient elements arranged at respective ends of the main body thus serve as shock absorbers for the carriage, as they abut against the end stops 33 (figure 7c). The resilient element comprises a resilient material such as natural or synthetic rubber, micro cellular urethane (MCU), and/or a spring element.

[0024] An inner body 41 is configured for partial insertion into the cavity 48 and for mating engagement with the main body 40 via detents 34a and corresponding ledges 34b. As illustrated by figure 8c, the length of the detent arms are dimensioned such that there is a play P between the detent and the ledge, whereby the inner body 41 may move up and down with respect to the main body 40 and still being secured to the main body. The inner body 41 and the resilient elements 42 are dimensioned such that the resilient elements are held in compression between the inner body 41 and the main body 40. The resilient elements 42 are thus effectively elastic buffers, or resilient shock absorbers, between the inner body and the main body.

[0025] The inner body 41 comprises upper vertical bearing wheels 44a,b, rotatably supported via respective axles 47a and supports 47b. The wheels extend partially outside the inner body. When the carriage 23 is in an assembled state and placed inside the bearing assembly 19 (e.g. in figures 7a-c), the carriage is rotatably supported by the insert 24 in the race groove 29 via the lower vertical bearing wheels 45a,b and the lateral bearing wheels 46a,b. The resilient elements 42 serve to press the inner body upwards and hence bias the upper bearing wheels 44a,b against the upper insert 25. The upper bearing wheels 44a,b are thus pressed into the grooves 32, which provides a slight motion resistance and a feedback to the user moving the carriage.

[0026] The lateral bearing wheels 46a,b that bear against the sides of the U-shaped race groove 29 compensate for any misalignment between the bearing assemblies, and thus prevent jamming. Lateral impact forces, due to e.g. the armrests being pulled by the user or colliding with a desk, are also accommodated by the lateral bearing wheels.

[0027] When the assembled chair 2 is in use and the user is applying loads onto one or both armrests 10a,b, these loads are transferred to the carriage 23 via the collective cross bar 14 and the cross bar connection members 17. The moment induced by applying a load onto one of the armrests results in oppositely directed forces in the two carriages and respective bearing as-

semblies. For example, a downward force F on one of the armrests may generate a moment that results in a downward force of a magnitude 2F on one of the bearing assemblies and an upward force of a magnitude F on the other bearing assembly. Thus, the pair of bearing assemblies 19 accommodate the moments generated by asymmetric loads on the armrests.

[0028] The invented armrest assembly makes it easy for the user to move the armrests back and forth. The collective cross bar and the dual bearing assembly configuration enables the user to effectively move both armrests by operating only one of the armrests.

[0029] While the illustrated embodiment shows the cross bar being connected to the seat via the support frame, it should be understood that the invented armrest assembly may be connected to the seat, the back, a seat tilting mechanism, or any other structure on the chair.

[0030] While the invention has been described with reference to the illustrated embodiment, it should be understood that modifications and/or additions can be made to armrest assembly, but these shall remain within the field and scope of the invention.

Claims

1. An armrest assembly for a chair (2) having armrests (10a,b) arranged on laterally opposite sides of a seat (4); each armrest comprising respective support structures (12); the armrest assembly being **characterised by** a collective actuation and support member (14) configured for connection to each support structure (12) and being movably supported by bearing means (19) that are connected to the chair; the bearing means being arranged such that the armrests are movable by translational motion between a forward position (F) and a rear position (R) on the chair.
2. The armrest assembly of claim 1, wherein the collective actuation and support member (14) is movably supported by bearing means (19) via respective connection means (17) and carriage means (23); said connection means and carriage means being structurally connected via fixtures (21 a,b, 22a,b).
3. The armrest assembly of claim 2, wherein the carriage means (23) is translationally supported by the bearing means (19) and movable between end stops (33) connected to the bearing means (19).
4. The armrest assembly of claims 2 and 3, wherein the carriage means (23) comprises rollers (44a,b, 45a,b, 46a,b) for rotationally supporting the carriage means in the bearing means, a main body (40) and an inner body (41) movably connected via locking means (34a,b) to the main body, and at least one resilient element (42) disposed between the main

body and the inner body; said resilient element configured to provide a biasing force between the main body and the inner body.

5. The armrest assembly of claim 4, wherein the bearing means (19) comprises an indexed element (25) having grooves (32) configured for receiving at least a portion of the rollers (44a,b), and said biasing force serves to force said portion of the rollers into at least one of the grooves. 5 10
6. The armrest assembly of any one of the preceding claims, wherein the collective actuation and support member (14) is a cross bar arranged transversely and below the seat, and provides a rigid connection between the armrests (10a,b), whereby one armrest (10a) is movable by operation of the other armrest (10b) and vice versa. 15
7. The armrest assembly of any one of the preceding claims, wherein the bearing means comprise a pair of bearing assemblies (19), each comprising a carriage (23). 20

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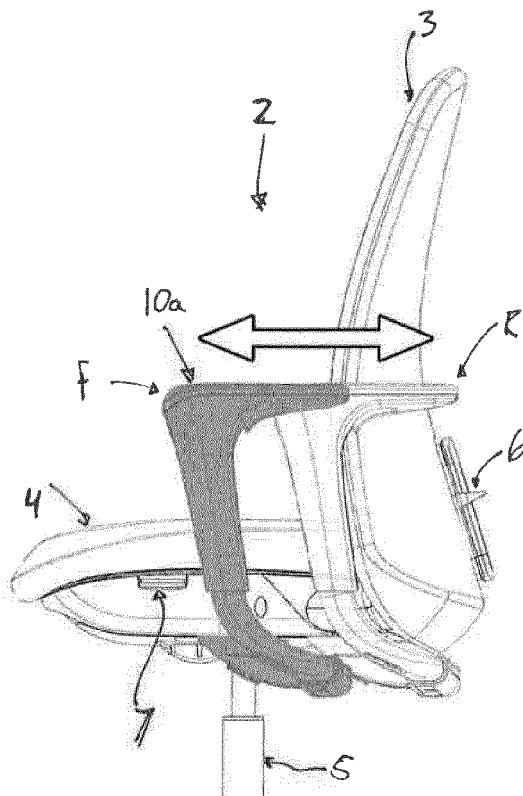


Figure 1

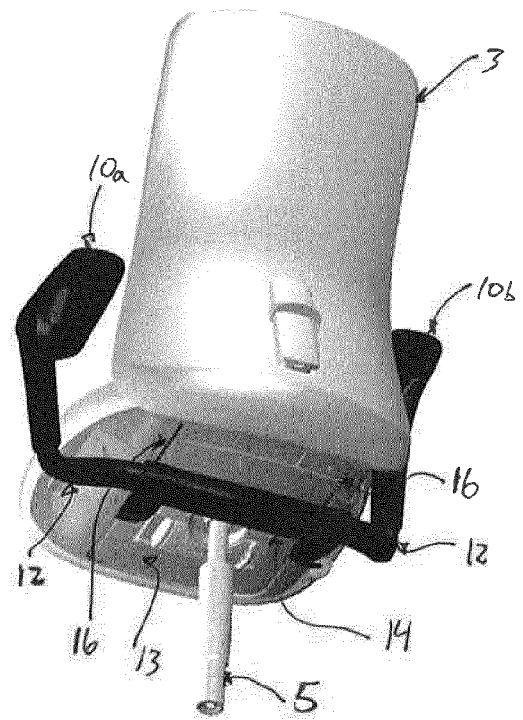


Figure 2

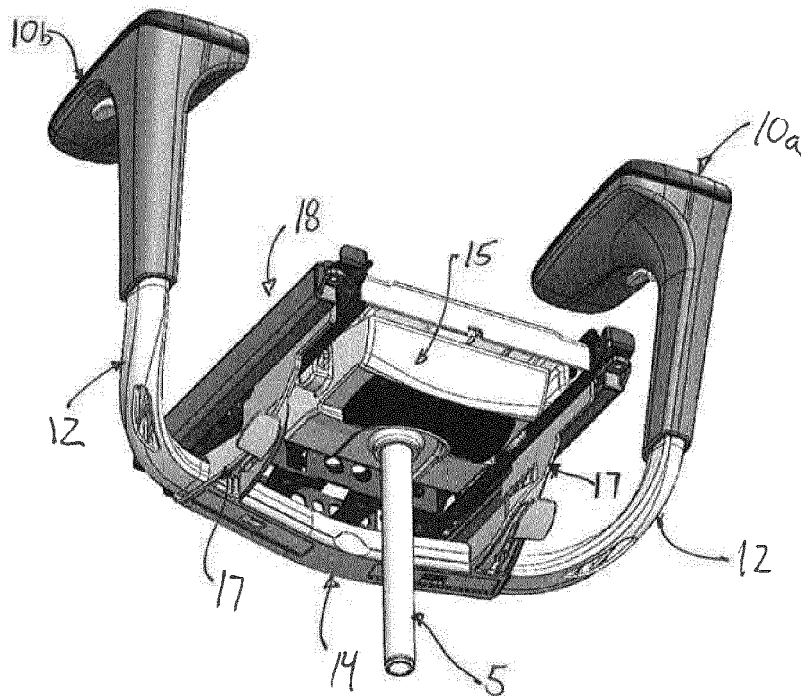


Figure 3

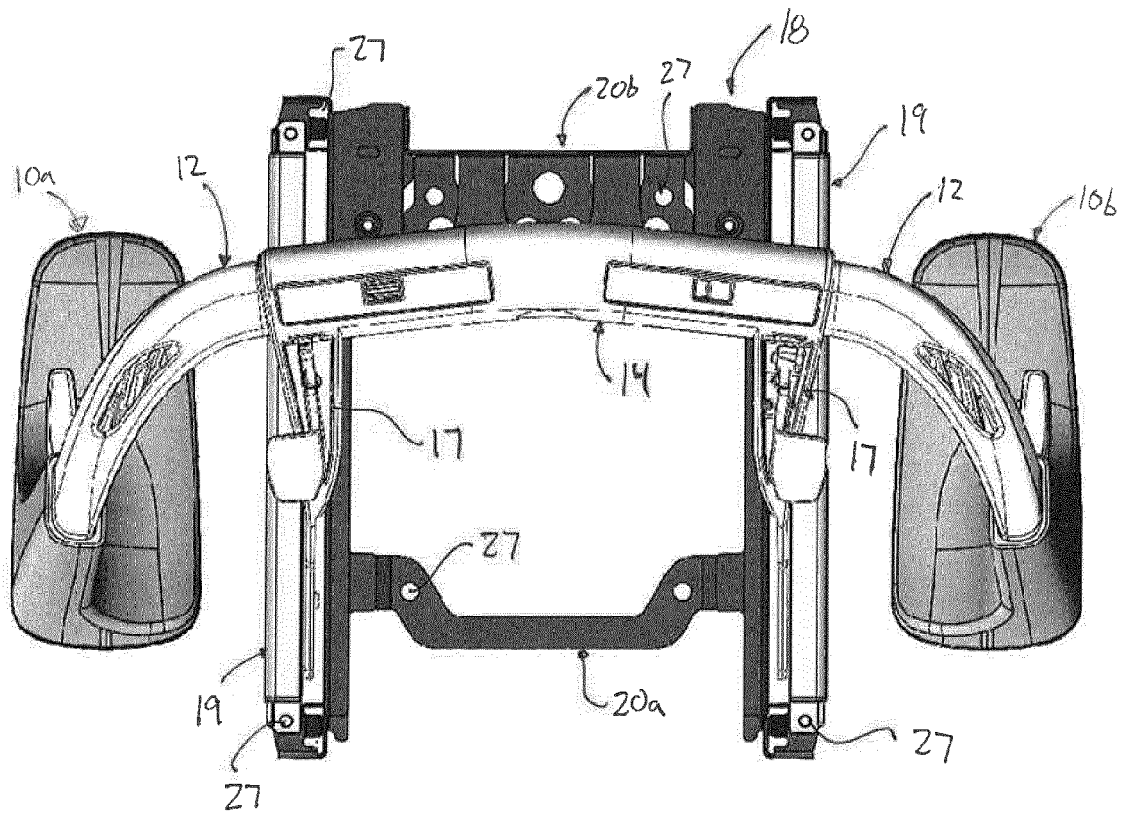


Figure 4

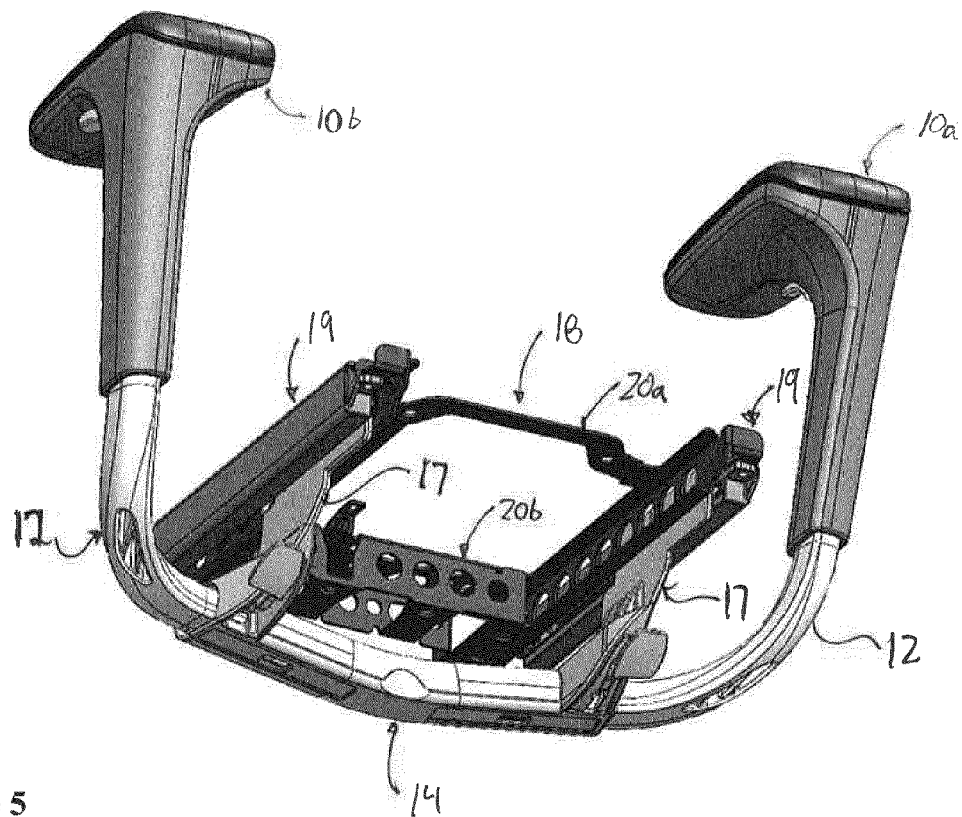


Figure 5

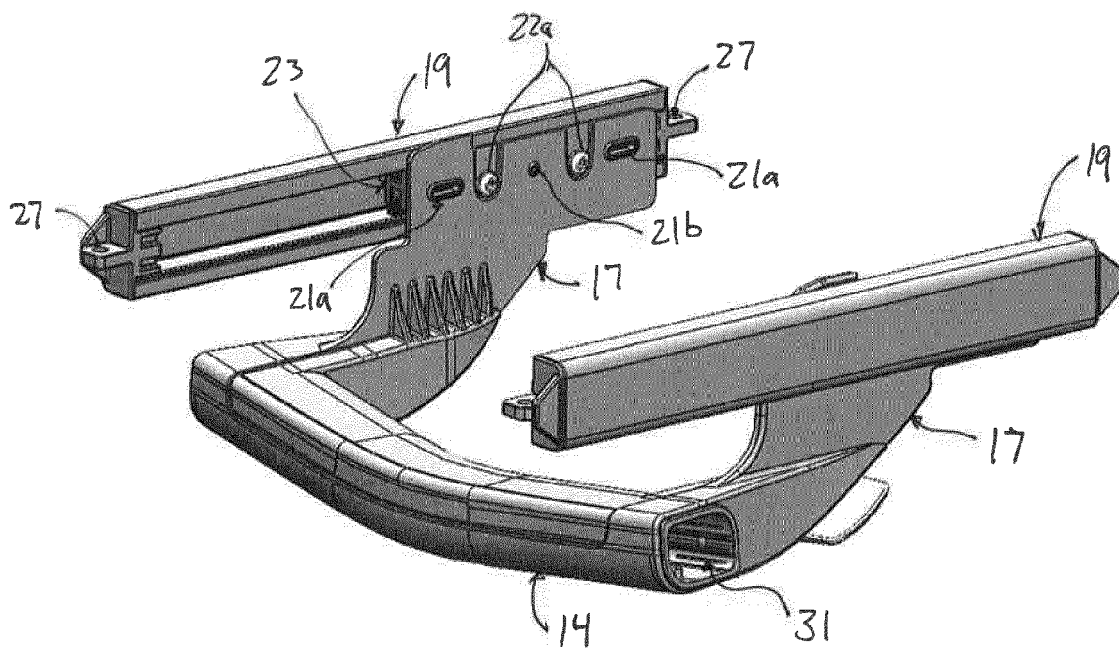


Figure 6

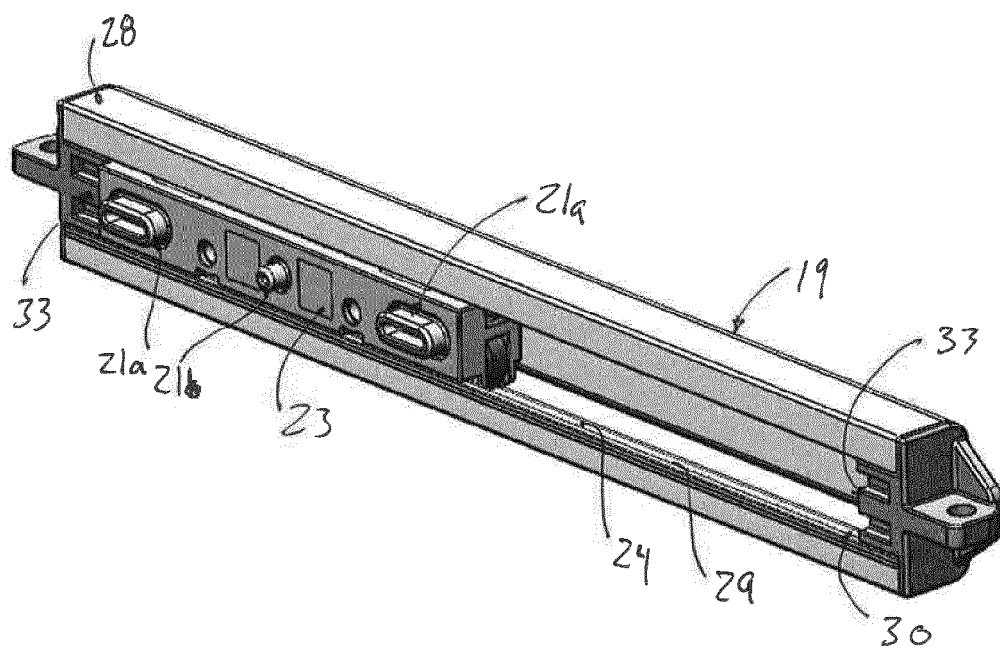


Figure 7a

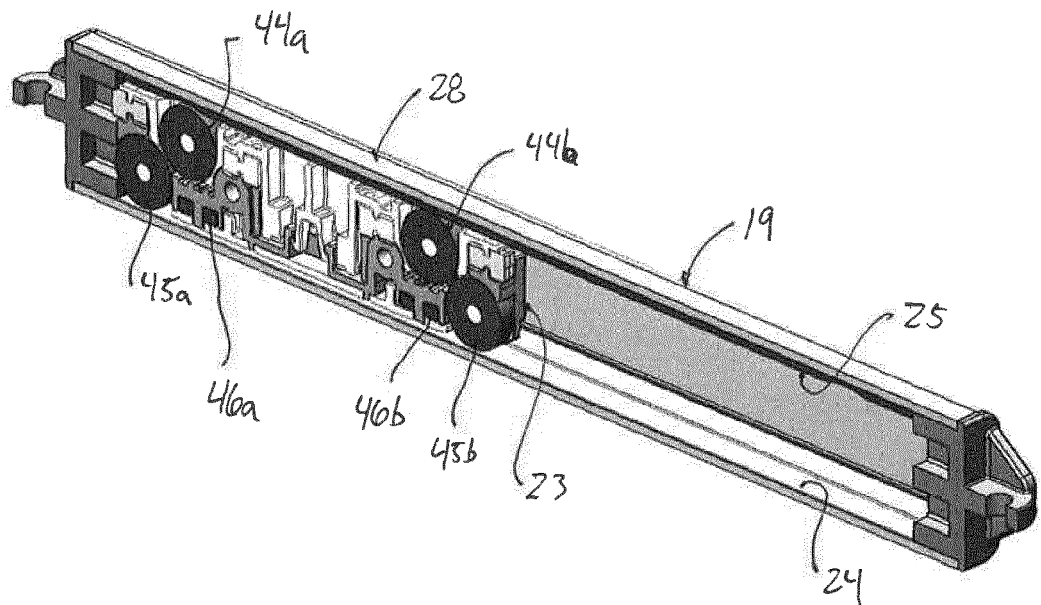


Figure 7b

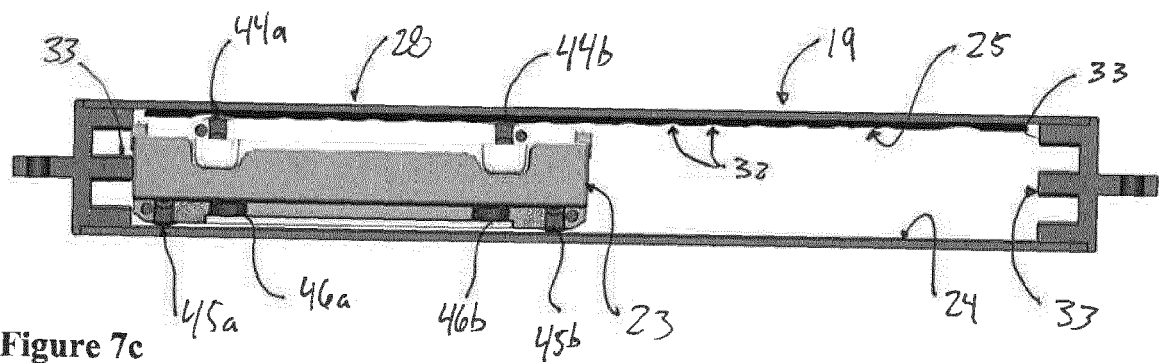


Figure 7c

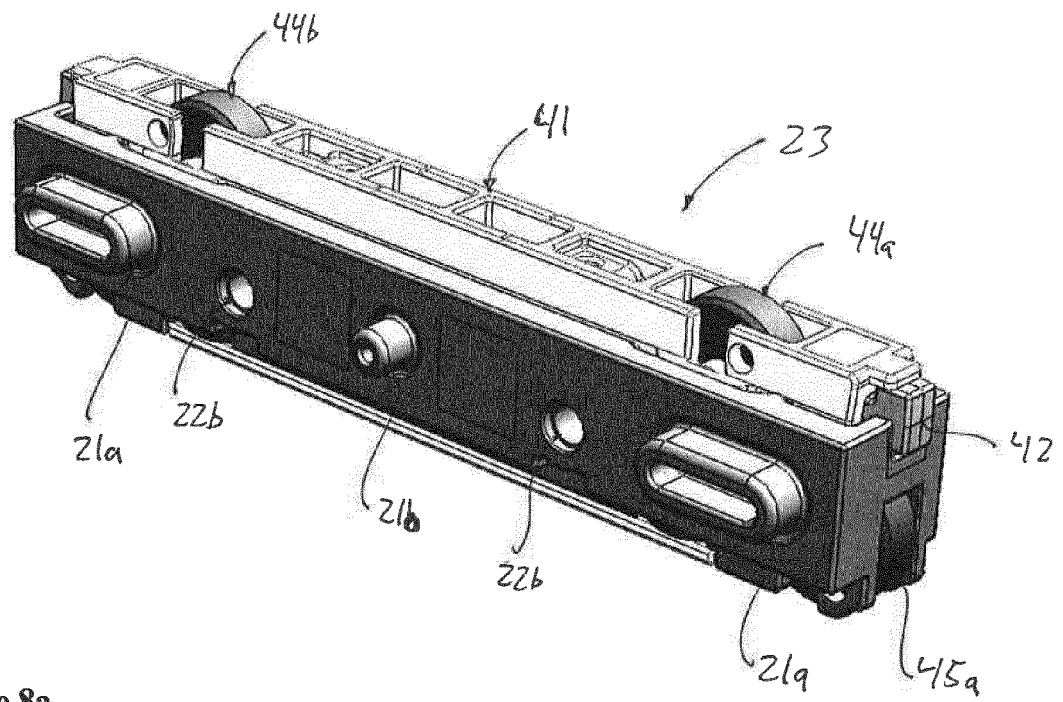


Figure 8a

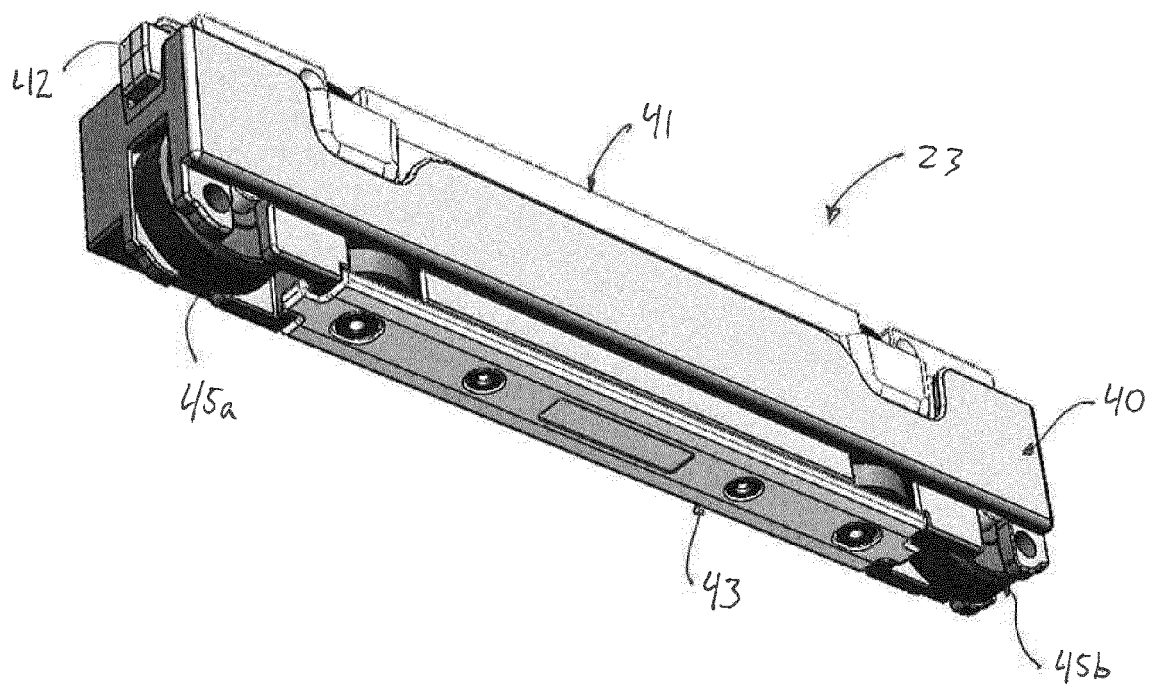


Figure 8b

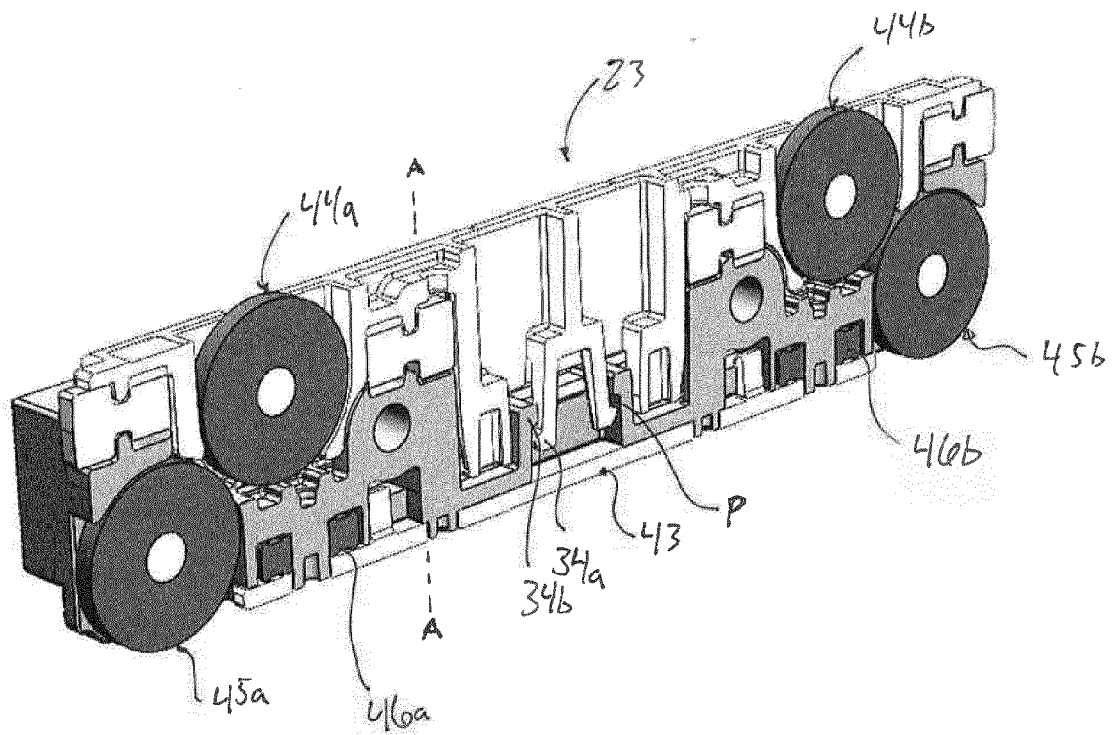


Figure 8c

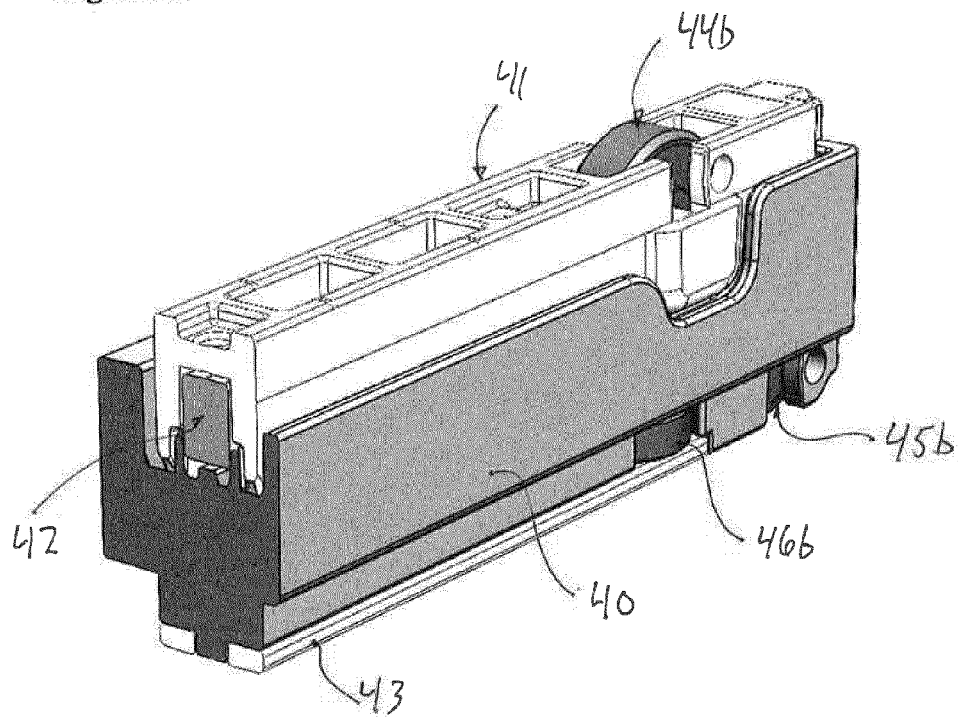


Figure 8d

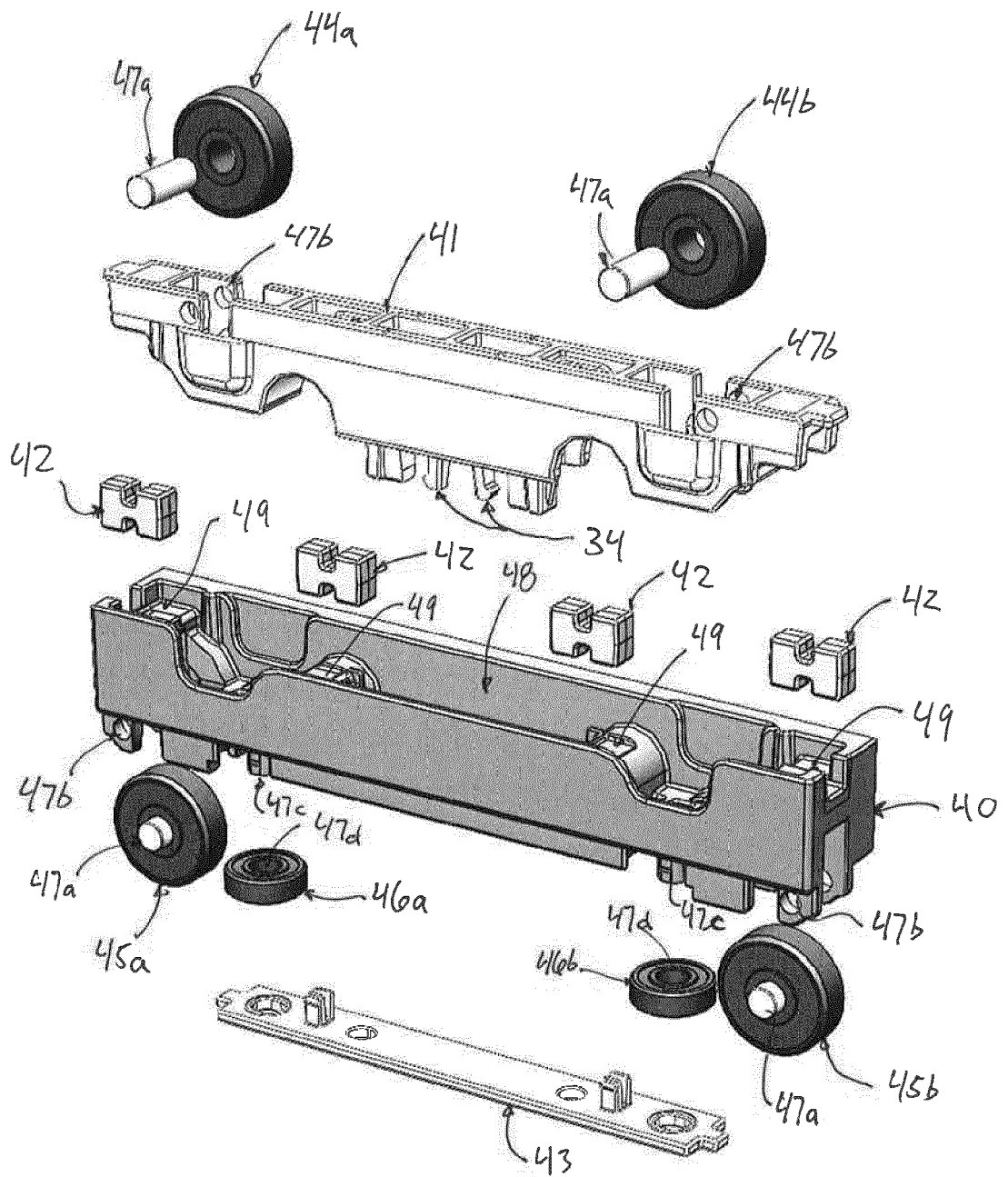


Figure 9



EUROPEAN SEARCH REPORT

Application Number
EP 13 18 9342

DOCUMENTS CONSIDERED TO BE RELEVANT			
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			A47C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 15 November 2013	Examiner Tempels, Marco
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 18 9342

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