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(54) **PEOPLE CONVEYOR DRIVE AND PEOPLE CONVEYOR**

(57) People conveyor drive (40) of a people conveyor (1) comprising a plurality of treads (13) interconnected to form an endless tread band (12). The people conveyor drive (40) comprises a tension member drive system (25) configured to drive the tread band (12) and a shaft (42; 30; 35) having a shaft main portion (48) and at least one shaft support portion (44), the at least one shaft support portion (44) being supported by at least one shaft bearing

(46) to be rotatable around a shaft axis (A). The shaft (42; 30; 35) is configured for engaging with an endless tread drive tension member (15) to drive the endless tread band (12). The shaft (42; 30; 35) has a split shaft configuration with the shaft main portion (48) being detachably coupled to the at least one shaft support portion (44).

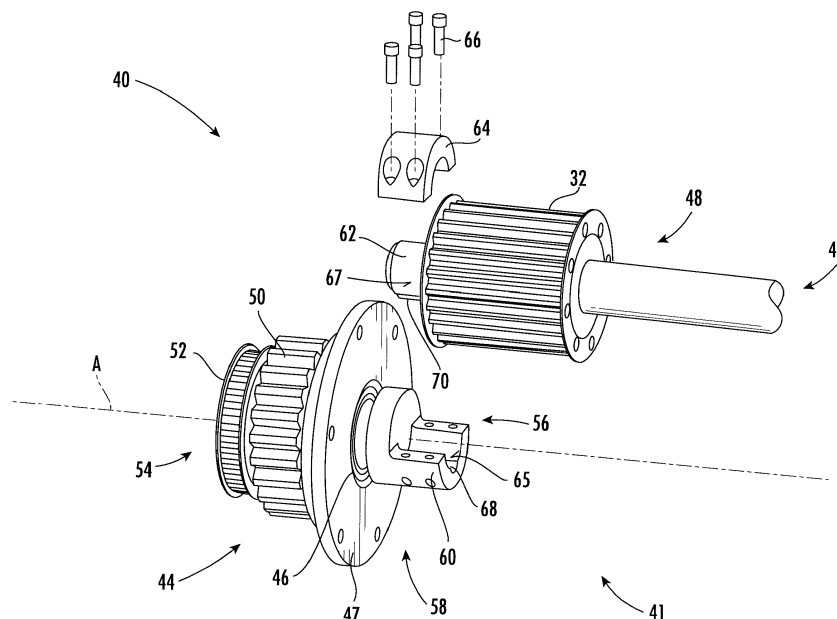


FIG. 3

Description

[0001] The invention relates to a people conveyor drive. The invention further relates to a people conveyor comprising such people conveyor drive.

[0002] People conveyors, such as escalators, moving walkways, moving sidewalks, etc. are widely used these days to effectively transport passengers from one location to another. Areas of usage of these people conveyors often include airports, hotels, shopping malls, museums, railway stations and other public buildings. Such people conveyors typically have two landings (e.g., a top landing and a bottom landing in case of an escalator) and a plurality of treads, such as steps or pallets, interconnected to form an endless tread band driven by a tension member drive system comprising an endless tread drive tension member, e.g. a tread drive belt or a tread drive chain.

[0003] It would be beneficial to provide a people conveyor drive allowing convenient replacement of the endless tread drive tension member, thereby reducing maintenance time, maintenance costs and downtimes of the people conveyor.

[0004] An exemplary embodiment of the invention relates to a people conveyor drive of a people conveyor comprising a plurality of treads interconnected to form an endless tread band. The people conveyor drive comprises a tension member drive system configured to drive the tread band, and a shaft having a shaft main portion and at least one shaft support portion, the at least one shaft support portion being supported by at least one shaft bearing to be rotatable around a shaft axis. The shaft is configured for engaging with an endless tread drive tension member to drive the endless tread band. The shaft has a split shaft configuration with the shaft main portion being detachably coupled to the at least one shaft support portion.

[0005] A further exemplary embodiment relates to a people conveyor comprising the people conveyor drive according to any of the exemplary embodiments described herein, and a plurality of treads interconnected to form an endless tread band driven by the people conveyor drive.

[0006] The people conveyor may comprise a support structure, in particular a truss, and the people conveyor drive may be mounted to the support structure.

[0007] The people conveyor may comprise a first support structure, a second support structure, and at least one connecting structure connecting the first support structure to the second support structure.

[0008] The at least one connecting structure may be positioned outside a region defined by the endless path of the endless tread band, in particular beneath the endless tread band. This allows an easy replacement of an endless tread drive tension member, as the endless tread drive tension member can be removed without interfering with the at least one connecting structure.

[0009] The first and second support structure may each be a truss. The at least one connecting structure

may be a crossbeam.

[0010] The people conveyor may be an escalator comprising a plurality of steps forming the endless tread band. The people conveyor may be a moving walkway comprising a plurality of pallets forming the endless tread band.

[0011] A people conveyor drive according to the exemplary embodiment allows reducing maintenance time and maintenance costs when replacing the endless tread drive tension member, since the shaft main portion can be removed without removing the at least one shaft support portion. Moreover, it allows to install the endless tread drive tension member in its endless configuration, i.e. without disconnecting the endless tread drive tension member to open its endless configuration.

[0012] A number of optional features are set out in the following. These features may be realized in particular embodiments, alone or in combination with any of the other features.

[0013] The endless tread drive tension member may be a drive belt, particularly a toothed drive belt, or a drive chain.

[0014] The split shaft configuration enables to detach the shaft main portion from the shaft support portion to allow a quick replacement of the tread drive tension member in its endless configuration. This is particularly beneficial in case the endless tread drive tension member is a belt, as it is normally difficult to connect two ends of the belt with each other to restore the endless configuration of the belt, e.g. by splicing.

[0015] The shaft main portion may be nonrotatably coupled to the shaft support portion via a positive lock coupling, particularly by a spline coupling like a shaft key coupling, or a toothed coupling. A positive lock coupling enables synchronous movement of the shaft main portion and the shaft support portion and is very reliable. The shaft main portion can be detached from the shaft support portion easily even in case the particular lock coupling transmits large drive torques during operation.

[0016] The shaft main portion may be configured for engaging with the endless tread drive tension member. In this case, the split shaft configuration allows fast replacement of the endless tread drive tension member by detaching the shaft main portion from the shaft support portion.

[0017] Alternatively, it may be conceivable that the shaft support portion is configured for engaging with the endless tread drive tension member. Also in this case detaching the shaft main portion from the shaft support portion allows the required access for removing and/or installing the endless tread drive tension member.

[0018] The shaft support portion may comprise a shaft main portion receiving part configured to receive a first end of the shaft main portion to couple the shaft main portion to the at least one shaft support portion.

[0019] The shaft main portion receiving part may comprise a receptacle supporting the first end of the shaft main portion. A clamping part may be detachably coupled

to the receptacle to fix the shaft main portion in the receptacle. The receptacle and the clamping part together allow for an efficient coupling of the shaft main portion to the shaft support portion, while enabling a quick detachment of the shaft main portion from the shaft support portion. The receptacle may be configured to support and transmit drive torque during operation, while the clamping part is merely required to fix the first end of the shaft main portion in the receptacle.

[0020] Particularly, the receptacle of the shaft main portion receiving part may be integrally formed with the shaft support portion.

[0021] The clamping part in combination with the receptacle may clamp the first end of the shaft main portion between the receptacle and the clamping part. This is a cost efficient option to connect the shaft main portion to the shaft support portion. The shaft main portion may be detached by opening or removing the clamping part.

[0022] The clamping part may be fastened to the receptacle by fixing elements, in particular by screws or bolts. Such a configuration is an efficient and simple way to fasten the clamping part to the receptacle.

[0023] The receptacle may allow the shaft main portion to be removed or inserted orthogonally to the shaft axis. This allows fast and easy removal or installation of the shaft main portion from/to the shaft support portion.

[0024] The receptacle may be configured to nonrotatably accommodate the first end of the shaft main portion in the receptacle. This allows to transfer torsional forces from the shaft support portion to the shaft main portion when the first end of the shaft main portion is installed in the receptacle.

[0025] The receptacle may comprise at least one coupling element that is configured to nonrotatably fix the first end of the shaft main portion to the receptacle.

[0026] Basically, it will be sufficient to nonrotatably fix the first end of the shaft main portion to the shaft support portion by its coupling to the receptacle. If desired, the clamping part also may comprise at least one coupling element that is configured to nonrotatably fix the end of the shaft main portion to the clamping part.

[0027] The receptacle may have a half-pipe, semicircular, triangular or rectangular profile, and the first end of the shaft main portion may have a corresponding profile.

[0028] A triangular, rectangular, or otherwise non-circular, profile provides the coupling element to nonrotatably fix the first end of the shaft main portion to the receptacle. In addition, or alternatively, the receptacle may be provided with a first spline structure and the first end of the shaft main portion may be provided with a second spline structure configured to engage with the first spline structure. The spline structure may be configured as a shaft key provided at the first end of the shaft main portion or the receptacle and a corresponding groove in the other part.

[0029] The shaft may comprise a first shaft support portion detachably coupled to a first end of the shaft main

portion and a second shaft support portion detachably coupled to a second end of the shaft main portion. The first and second ends of the shaft main portion may be opposing ends of the shaft main portion. Such a configuration allows a fast and easy removal of the shaft main portion from the first and second shaft support portions located at two lateral sides of the people conveyor.

[0030] The first shaft support portion and the second shaft support portion may comprise an identical configuration. Hence, the detailed description of the first shaft support portion set out herein also applies to the second shaft support portion.

[0031] The shaft may be a main drive shaft driven by a motor of the tension member drive system and drivingly coupled to the endless tread drive tension member, in particular a (toothed) drive belt or drive chain.

[0032] The shaft may be a non-driven turnaround shaft. The turnaround shaft may comprise an idler wheel to engage with the endless tread drive tension member such as to turnaround a moving direction of the endless tread drive tension member, particularly from a conveying portion to a return portion, and vice versa.

[0033] The shaft may be a tension shaft. The tension shaft may comprise a tension wheel configured to engage with the endless tread drive tension member such as to tension the endless tread drive tension member. Particularly, the tension shaft may be adjusted to reduce free play of the endless tread drive tension member.

[0034] With split shaft configurations of the drive shaft, the turnaround shaft, and the tension shaft replacement of the endless tread drive tension member is simplified.

[0035] In the following exemplary embodiments of the invention are described with reference to the enclosed figures.

Figure 1 depicts a schematic side view of a an escalator.

Figure 2 depicts a schematic side view of a moving walkway.

Figure 3 shows an exploded view of a drive shaft of a people conveyor drive according to one embodiment.

Figure 4 depicts a schematic view of the drive shaft of Figure 3 in an assembled configuration.

Figure 5 depicts a sectional view of the drive shaft of a people conveyor drive.

Figure 6 depicts a perspective view of the drive shaft of the people conveyor drive of Figure 5.

Figure 7 depicts a sectional view of a left side of the moving walkway of Figure 2 along a conveyance direction of the moving walkway.

[0036] Figure 1 shows a schematic side view of a people conveyor 1, in particular an escalator 1a, comprising a plurality of treads 13 (steps 13a) interconnected to form an endless tread band 12 extending in a longitudinal conveyance direction between a lower landing 20 and an upper landing 21. For clarity, only some of the treads 13, in particular treads 13 in the conveyance portion 16, are depicted in Figure 1. Further, not all treads 13 are denoted with reference signs.

[0037] In an upper turnaround portion 17 next to the upper landing 21 and in a lower turnaround portion 24 next to the lower landing 20, the endless tread band 12 passes from a conveyance portion 16 extending between the upper and lower landings 21, 20 into a return portion 18, and vice versa.

[0038] The upper turnaround portion 17 is a driving portion and comprises a tension member drive system 25. The tension member drive system 25 comprises a motor driving a drive shaft 42 via a transmission element 26, particularly a toothed belt, a belt or a chain. The drive shaft 42 supports a drive wheel 32, e.g. a toothed belt drive sheave, a traction sheave or a sprocket.

[0039] The drive shaft 42 drivingly engages an endless tread drive tension member 15. The endless tread drive tension member 15 may be a belt, particularly a toothed belt, or a chain. The endless tread drive tension member 15 is drivingly coupled to the treads 13 and thereby drives the treads 13 to travel along the endless path of the tread band 12. The endless tread drive tension member 15 is endless and thus extends along a closed loop. The endless tread drive tension member 15 is in engagement with, and driven by, the drive wheel 32 supported by the drive shaft 42.

[0040] The lower turnaround portion 24 comprises a turnaround element 36, e.g. an idler wheel or an idler sprocket attached to a turnaround shaft 30. The turnaround element 36 engages with the endless tread drive tension member 15 to guide the endless tread drive tension member 15 from the conveyance portion 16 to the return portion 18.

[0041] In a tension portion 34 the endless tread drive tension member 15 engages a tension shaft 35 having a tension element, e.g. an idler sprocket or an idler wheel. The tension element is configured to adjust tension of the endless tread drive tension member 15 while traveling along its endless path, such that wear of the endless tread drive tension member 15 is reduced. For example, the tension portion 34 may be positioned in the return portion 18.

[0042] In further embodiments, the tension portion 34 may be located in the upper and/or lower turnaround portions 17, 24. In such case, the upper/lower turnaround shaft may also provide the function of the tension shaft.

[0043] Alternatively, the turnaround portion 24 next to the lower landing 20 may be the driving portion.

[0044] The people conveyor 1 further comprises a brake 31 which is configured for braking movement of the endless tread band 12. The brake 31 is depicted as

a separate component of the tension member drive system 25 in Figure 1. The brake 31, however, may be integrated with another component of the tension member drive system 25. For example, the brake 31 may engage with the drive wheel 32 or the drive shaft 42.

[0045] Balustrades 4 supporting moving handrails 6 extend parallel to the conveyance portion 16. The balustrades 4 are each supported by a separate truss 39. Only one of the balustrades 4, and the trusses 39 are visible in the side view shown in Figure 1. The trusses 39 are connected to each other by one or more crossbeams 100 forming a connecting structure. The crossbeams 100 may comprise different profiles, for example, a rectangular, a triangular, or a circular profile. The crossbeams 100 are fixed to the trusses 39 by a detachable connection, such as by at least one bolt or screw, or by a fixed connection, such as by at least one weld. The crossbeams 100 are positioned under the endless tread band 12 and the endless tread drive tension member 15. This allows easy removal of the endless tread drive tension member 15 during maintenance or repair, since the endless tread drive tension member 15 does not have to be opened.

[0046] Figure 2 depicts a schematic side view of a people conveyor 1, which is provided as a moving walkway 1b. The moving walkway 1b comprises a plurality of treads 13 (pallets 13b) interconnected to form an endless tread band 12 moving in a longitudinal conveyance direction in an upper conveyance portion 16 and moving in a return direction opposite to the conveyance direction in a lower return portion 18. For clarity not all treads 13 (pallets 13b) are provided with reference signs.

[0047] Left and right landings 20, 21 are provided at both ends of the moving walkway 1b. A left turnaround portion 17 is provided at the left landing 20, and a right turnaround portion 24 is provided at the right landing 21. In the left turnaround portion 17 next to the left landing 21 and in the right turnaround portion 24 next to the right landing 21, the endless tread band 12 passes from a conveyance portion 16 extending between the left and right landings 20, 21 into a return portion 18, and vice versa.

[0048] The left turnaround portion 17 is a driving portion and comprises a tension member drive system 25. The tension member drive system 25 comprises a motor driving a drive shaft 42 via a transmission element 26, particularly a toothed belt, a belt or a chain. The drive shaft 42 supports a drive wheel 32, e.g. a toothed belt drive sheave, a traction sheave or a sprocket.

[0049] The drive shaft 42 drivingly engages an endless tread drive tension member 15. The endless tread drive tension member 15 may be a belt, particularly a toothed belt, or a chain. The endless tread drive tension member 15 is drivingly coupled to the treads 13 and thereby drives the treads 13 to travel along the endless path of the tread band 12. The endless tread drive tension member 15 is in engagement with, and driven by, the drive wheel 32 supported by the drive shaft 42.

[0050] The right turnaround portion 24 comprises a turnaround element, e.g. an idler wheel or an idler sprocket attached to a turnaround shaft 30. The turnaround element engages with the endless tread drive tension member 15 to guide the endless tread drive tension member 15 from the conveyance portion 16 to the return portion 18.

[0051] In a tension portion 34, the endless tread drive tension member 15 engages a tension shaft 35 having a tension element, e.g. an idler sprocket or an idler wheel. The tension element is configured to adjust the tension of the endless tread drive tension member 15 while traveling along its endless path, such that wear of the endless tread drive tension member 15 is reduced. For example, the tension portion 34 may be positioned in the return portion 18.

[0052] In further embodiments, the tension portion 34 may be located in the left and/or right turnaround portions 17, 24. In such case, the left/right turnaround shaft may also provide the function of the tension shaft.

[0053] Alternatively, the turnaround portion 24 next to the right landing 21 may be the driving portion.

[0054] The people conveyor 1 further comprises a brake 31 which is configured for braking movement of the endless tread band 12. The brake 31 is depicted as a separate component of the tension member drive system 25 in Figure 2. The brake 31, however, may be integrated with another component of the tension member drive system 25. For example, the brake 31 may engage with the drive wheel 32 or the drive shaft 42.

[0055] Balustrades 4 supporting moving handrails 6 extend parallel to the conveyance portion 16. The balustrades 4 are each supported by a separate truss 39. Only one of the balustrades 4, and the trusses 39 are visible in the side view shown in Figure 2. The trusses 39 are connected to each other by one or more crossbeams 100 forming a connecting structure. The crossbeams may comprise different profiles, for example, a rectangular, a triangular, or a circular profile. The crossbeams are fixed to the trusses 39 by a detachable connection, such as by at least one bolt or screw, or by a fixed connection, such as by at least one weld. The crossbeams 100 are positioned under the endless tread band 12 and the endless tread drive tension member 15. This allows easy removal of the endless tread drive tension member 15 during maintenance or repair, since the endless tread drive tension member 15 does not have to be opened.

[0056] Figure 3 shows an exploded view of a section 41 of the people conveyor drive 40 showing the drive shaft 42 including its shaft main portion 48 and left support portion 44. Figure 4 shows a schematic view of the first section 41 in an assembled state. Figure 5 depicts a sectional view of the drive shaft 42 of the people conveyor drive 40 supported in a truss 39. Figure 6 depicts a schematic view of the drive shaft 42 of the people conveyor drive 40 placed in the truss 39 of the people conveyor 1, particularly of the escalator 1a or moving walkway 1b. For clarity reasons, the endless tread drive ten-

sion member 15 and the endless tread band 12 are not shown in Figures 3 to 6.

[0057] The drive shaft 42 has a shaft main portion 48 and at least one shaft support portion 44. The at least one shaft support portion 44 is supported by a shaft bearing 46. The shaft bearing 46 allows the drive shaft 42 to rotate around a drive shaft axis A. The shaft bearing 46 is positioned in a plate 47 which is fixedly connected to, or formed integrally with, the truss 39 of the people conveyor 1. The shaft 42 has a split shaft configuration with the shaft main portion 48 being detachably coupled to the at least one shaft support portion 44.

[0058] The shaft main portion 48 supports the at least one drive wheel 32 which engages with the endless tread drive tension member 15. The at least one drive wheel 32 may be a separate component fixedly coupled for concurrent rotation with the shaft main portion 48. Alternatively, the at least one drive wheel 32 may be formed integrally with the shaft main portion 48. In another, not shown embodiment, the at least one drive wheel 32 may be coupled to or formed integrally with the shaft support portion 44.

[0059] The shaft support portion 44 further supports a drive motor drive wheel 50 and a handrail drive wheel 52 arranged at a laterally outer side 54 of the shaft support portion 44, and a shaft main portion receiving part 56 is arranged at a laterally inner side 58 of the at least one shaft support portion 44.

[0060] The shaft main portion receiving part 56 comprises a receptacle 60 and a clamping part 64. The receptacle 60 extends towards the shaft main portion 48. The receptacle 60 may be integrally formed with the shaft support portion 44, or, alternatively, may be attached to the shaft support portion 44 by using fixing elements (not shown).

[0061] The receptacle 60 has a half-pipe profile extending in axial direction. The half-pipe profile comprises a semicircular recess. Hence, the recess of the receptacle 60 may receive a first end 62 of the shaft main portion 48. In further embodiments, the recess of the receptacle 60 may comprise a different profile, such as a triangular profile or a rectangular profile (not shown).

[0062] In the Figures, the clamping part 64 comprises a half-pipe profile that is detachably connected to the receptacle 60 by fixing elements 66, such as screws or bolts. The clamping part 64 is positioned on the receptacle 60 to form a closed-pipe profile corresponding to the cylindrical form of the first end 62 of the shaft main portion 48. In embodiments where the first end 62 of the shaft main portion 48 has a form different from a cylinder, the first end 62 of the shaft main portion 48 will be positioned in the receptacle 60, which may have a corresponding form to the first end 62 of the shaft main portion 48, and the clamping part 64 will be positioned on the receptacle 60 to fix the first end 62 of the shaft main portion 48 in the receptacle 60. The clamping part 64 may have a corresponding form to the first end 62 of the shaft main portion 48.

[0063] An inner surface 65 of the closed-pipe profile engages with a circumferential surface 67 of the first end 62 of the shaft main portion 48. The clamping part 64 and the receptacle 60 provide clamping forces to the first end 62 of the shaft main portion 48 when attached to each other, irrespective of the form of the first end 62 of the shaft main portion 48.

[0064] The receptacle 60 comprises on its inner side a coupling element, in particular a spline structure, like a groove or a key, or teeth (not shown), with which a corresponding coupling element at the first end 62 of the shaft main portion 48 engages to provide a rotationally fixed coupling between the shaft support portion 44 and the first end 62, in particular a positive lock. This allows synchronous rotation of the shaft support portion 44 and the shaft main portion 48.

[0065] Particularly, as shown in Figure 5, a shaft key 70 may be positioned in a recess 71 formed in the first end 62 of the shaft main portion 48 and the shaft key 70 may engage with a corresponding groove 68 in the receptacle 60 to provide a positive lock enabling synchronous rotation of the shaft support portion 44 and the shaft main portion 48.

[0066] Figure 5 shows a sectional view of the drive shaft 42 of the people conveyor drive 40. The drive shaft 42 has two shaft support portions 44, 74 located on opposite ends of the shaft main portion 48. A first shaft support portion 44 is located on the left side of the shaft main portion 48. A second shaft support portion 74 is located on the right side of the shaft main portion 48. The first shaft support portion 44 is detachably coupled to the first end 62 of the shaft main portion 48. The second shaft support portion 74 is detachably coupled to a second end 75 of the shaft main portion 48. In other words, the shaft main portion 48 is arranged in between the shaft support portions 44 and 74.

[0067] The shaft support portions 44 and 74 may comprise an identical configuration. The first end 62 and the second end 75 of the shaft main portion 48 may comprise an identical configuration. Reference is made to Figures 3 and 4 and their description above, which applies to both the first shaft support portion 44 and the second shaft support portion 74.

[0068] The second shaft support portion 74 is supported by a second shaft bearing 76. The second shaft bearing 76 allows the drive shaft 42 to rotate around the drive shaft axis A. The second shaft bearing 76 is positioned in a second plate 77 which is fixedly connected to, or formed integrally with, the truss 39 of the people conveyor 1.

[0069] The first bearing 46 of the first shaft support portion 44 is supported at one lateral end of the drive shaft 42 in the truss 39 and the second shaft bearing 76 of the second shaft support portion 74 is supported in the truss 39 at an opposite lateral end of the drive shaft 42.

[0070] The shaft main portion 48 comprises a first drive wheel 32 in proximity to the first end 62 of the shaft main portion 48 and a second drive wheel 72 in proximity to

the second end 75 of the shaft main portion 48. However, more than two drive wheels may be attached to the shaft main portion 48. In other not shown embodiments, the first drive wheel 32 may be supported by the first shaft support portion 44 and/or the second drive wheel 72 may be supported by the second shaft support portion 74.

[0071] In order to replace the endless tread drive tension member 15, the following steps are taken: The drive shaft 40 may be rotated such that the clamping part 64 of the first shaft support portion 44 and a clamping part 94 of the second shaft support portion 74 are accessible from above. In Figures 5 and 6, the drive shaft 40 may be rotated by 180° around the drive axis A, such that the clamping parts 64 and 94 are facing upwards. The shaft main portion 48 may be detached from the shaft support portions 44, 74, by unscrewing the fixing elements 66 (not shown in Figure 5) and removing the clamping part 64 of the first shaft support portion 44 and the clamping part 94 of the second shaft support portion 74. Then, the shaft main portion 48 is lifted from the receptacle 60 formed in the first shaft support portion 44 and a receptacle 90 formed in the second shaft support portion 74. The endless tread drive tension members 15 (not shown in Figure 5) in engagement with the drive wheels 32, 72 are removed from the drive wheels 32, 72 by slipping the endless tread drive tension members 15 from the drive wheels 32, 72 and from the shaft main portion 48. New endless tread drive tension members 15 are slipped on the drive wheels 32, 72 and then the shaft main portion 48 is lowered into the receptacle 60 and into the receptacle 90. Then, the clamping part 64 is positioned on the receptacle 60 and the clamping part 94 is positioned on the receptacle 90 such that the shaft main portion 48 is nonrotatably fixed to the shaft support portions 44, 74.

[0072] Figure 6 depicts a perspective view of the drive shaft 42 of the people conveyor drive 40 as depicted in Figure 5. The truss 39 is configured to support the drive shaft 42 via the shaft bearings 46, 76. The drive shaft 42 is attached to the truss 39 via the plates 47, 77 and fixing elements. The drive motor drive wheel 50 and the hand-rail drive wheel 52 attached to the first shaft support portion 44 is positioned on a laterally outer side of the truss 39, and the drive wheels 32, 72 are attached to the shaft main portion 48 at a laterally inner side of the truss 39. For clarity, not every feature in Figure 6 is denoted by reference sign.

[0073] This split shaft configuration is particularly suited for people conveyors using endless belts, e.g. toothed belts as endless tread drive tension members 15.

[0074] The split shaft configuration described above may be used for the turnaround shaft 30 and the tension shaft 35 as well. For constructional details reference is made to the above description with respect to Figures 3 to 6 which applies as well.

[0075] Figure 7 shows a sectional view of a left side of the moving walkway 1b along the conveyance direction at a position I-I in Figure 2. The balustrade 4 is mounted to an upper portion 96 of the truss 39 in a balustrade

mounting element 98. The handrail 6 moves between the balustrade mounting element 98 and the truss 39 in a return direction of the handrail 6. The crossbeam 100 is attached to a lower portion 99 of the truss 39. Guide rail 104 and guide channel 106, which provide guidance to rollers 14 mounted to the tread 13 in the endless tread band 12, are mounted on a side wall 102 of the truss 39. The side wall 102 faces a side wall of the opposite truss, not shown in Figure 7. The crossbeam 100 has a lower position on the truss 39 than the guide rail 104 and the guide channel 106. The conveyance portion 16 is formed by the guide rail 104, and the lower return portion 18 is formed by the guide channel 106. The endless tread band 12 is attached to the endless tread drive tension member 15 between the rollers 14. The rollers 14 are rotatably positioned at opposite ends of the tread 13.

[0076] While the invention has been described with reference to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adopt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention is not limited to the particular embodiments disclosed, but that the invention includes all embodiments falling within the scope of the claims.

References

[0077]

1	people conveyor
1a	escalator
1b	moving walkway
4	balustrade
6	moving handrail
12	endless tread band
13	treads
13a	steps
13b	pallets
14	roller
15	endless tread drive tension member
16	conveyance portion
17	driving portion
18	return portion
20, 21	landing portions
24	turnaround portion
25	tension member drive system
26	transmission element
30	turnaround shaft
31	brake
32	drive wheel
34	tension portion
35	tension shaft
36	turnaround element
39	truss

40	people conveyor drive
41	section of the drive shaft
42	drive shaft
44	shaft support portion
5 46	shaft bearing
47	plate
48	shaft main portion
50	drive motor drive wheel
52	handrail drive wheel
10 54	laterally outer side
56	shaft main portion receiving part
58	laterally inner side
60	receptacle
62	first end of the shaft main portion
15 64	clamping part
65	inner facing surface
66	fixing elements
67	circumferential surface
68	groove
20 70	shaft key
71	recess
72	second drive wheel
74	second shaft support portion
75	second end of the shaft main portion
25 76	second shaft bearing
77	second plate
80	drive motor drive wheel
82	handrail drive wheel
90	receptacle of the second shaft support portion
30 94	clamping part of the second shaft support portion
96	upper portion
98	balustrade mounting element
99	lower portion
35 100	connecting structure
102	side wall of the truss
104	guide rail
106	guide channel
A	drive shaft axis

Claims

1. People conveyor drive (40) of a people conveyor (1) comprising a plurality of treads (13) interconnected to form an endless tread band (12), the people conveyor drive (40) comprising:

a tension member drive system (25) configured to drive the endless tread band (12); and
a shaft (42; 30; 35) having a shaft main portion (48) and at least one shaft support portion (44), the at least one shaft support portion (44) being supported by at least one shaft bearing (46) to be rotatable around a shaft axis (A);

wherein the shaft (42; 30; 35) is configured for engaging with an endless tread drive tension member

- (15) to drive the endless tread band (12); and wherein the shaft (42; 30; 35) has a split shaft configuration with the shaft main portion (48) being detachably coupled to the at least one shaft support portion (44).
2. People conveyor drive (40) according to claim 1, wherein the shaft main portion (48) is nonrotatably coupled to the shaft support portion (44) via a positive lock coupling, particularly a spline coupling, like a grooved coupling or a shaft key coupling.
 3. People conveyor drive (40) according to claim 1 or 2, wherein the shaft main portion (48) is configured for engaging with the endless tread drive tension member (15).
 4. People conveyor drive (40) according to any of the previous claims, wherein the at least one shaft support portion (44) comprises a shaft main portion receiving part (56) configured to receive a first end (62) of the shaft main portion (48) to couple the shaft main portion (48) to the at least one shaft support portion (44).
 5. People conveyor drive (40) according to claim 4, wherein the shaft main portion receiving part (56) comprises a receptacle (60) supporting the first end (62) of the shaft main portion (48), and a clamping part (64) detachably coupled to the receptacle (60) to fix the first end (62) of the shaft main portion (48) in the receptacle (60).
 6. People conveyor drive (40) according to claim 5, wherein the receptacle (60) allows the shaft main portion (48) to be removed or inserted orthogonally to the shaft axis (A).
 7. People conveyor drive (40) according to claim 5 or 6, wherein the clamping part (64) is fastened to the receptacle (60) by fixing elements (66), in particular by screws or bolts.
 8. People conveyor drive (40) according to any of claims 5 to 7, wherein the receptacle (60) is configured to nonrotatably accommodate the first end (62) of the shaft main portion (48) in the receptacle (60).
 9. People conveyor drive (40) according to any of claims 5 to 8, wherein the receptacle (60) has a half-pipe, semicircular, triangular or rectangular profile, and the first end (62) of the shaft main portion (48) has a corresponding profile.
 10. People conveyor drive (40) according to claim 8 or 9, wherein the receptacle (60) is provided with a first spline structure and the first end (62) of the shaft main portion (48) is provided with a second spline structure configured to engage with the first spline structure.
 11. People conveyor drive (40) according to any of the previous claims, wherein the shaft (42; 30; 35) comprises a first shaft support portion (44) detachably coupled to a first end (62) of the shaft main portion (48) and a second shaft support portion (74) detachably coupled to a second end (75) of the shaft main portion (48).
 12. People conveyor drive (40) according to any of the previous claims, wherein the shaft (42; 30; 35) is a main drive shaft (42) driven by a motor of the tension member drive system (25) and drivingly coupled to the endless tread drive tension member (15), wherein the endless tread drive tension member (15) is a belt or chain, particularly a toothed belt.
 13. People conveyor drive (40) according to any of the previous claims, wherein the shaft (42; 30; 35) is a non-driven turnaround shaft (30); and/or wherein the shaft (42; 30; 35) is a tension shaft (35).
 14. People conveyor (1) comprising:
the people conveyor drive (40) according to any of the previous claims; and
a plurality of treads (13) interconnected to form an endless tread band (12) driven by the people conveyor drive (40).
 15. People conveyor (1) according to claim 14, comprising:
a first support structure (39) and a second support structure (39); and
at least one connecting structure (100) connecting the first support structure (39) and the second support structure (39),
wherein the at least one connecting structure (100) is positioned outside a region defined by the endless path of the endless tread band (12), in particular beneath the endless tread band (12).

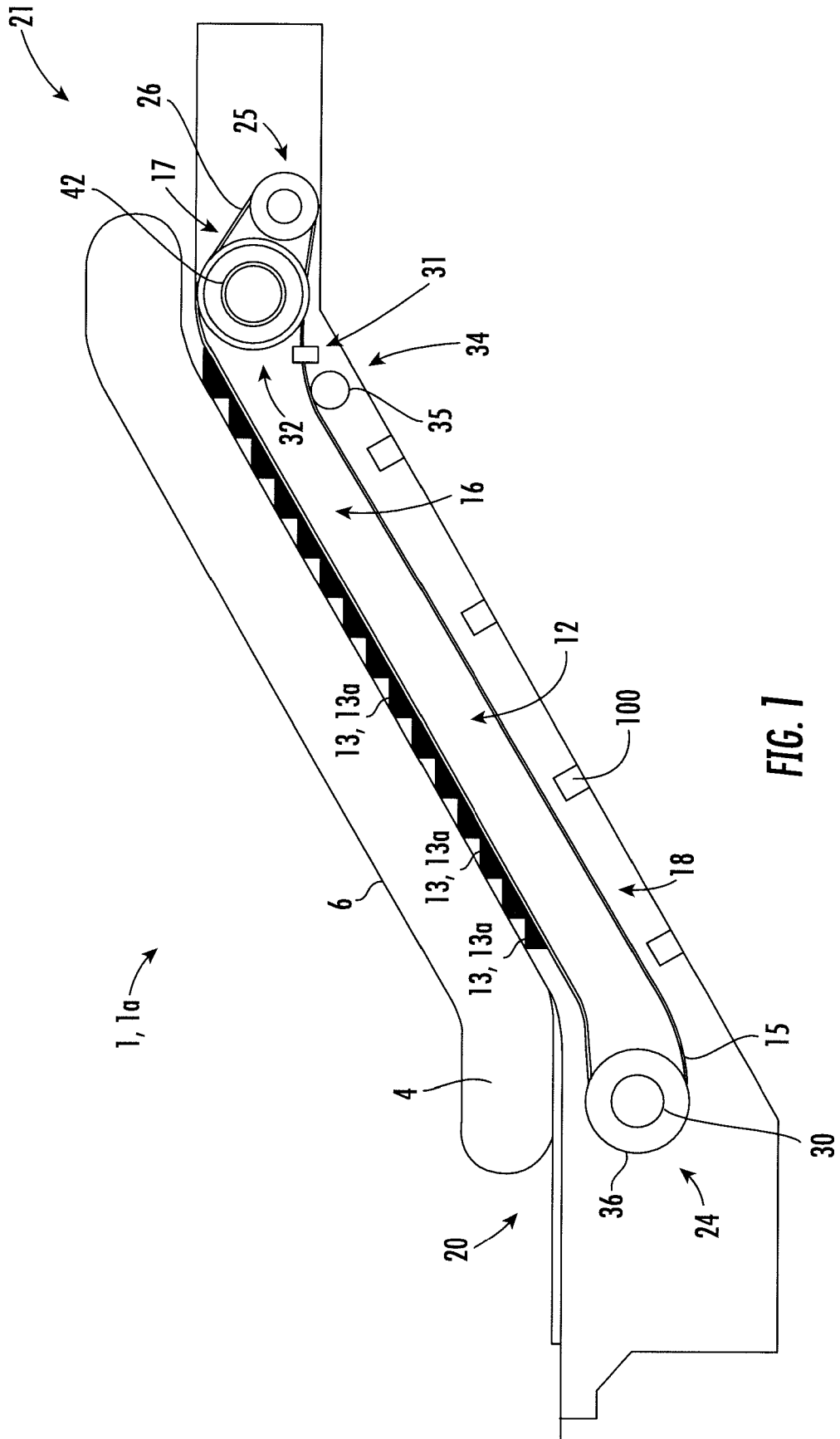


FIG. 1

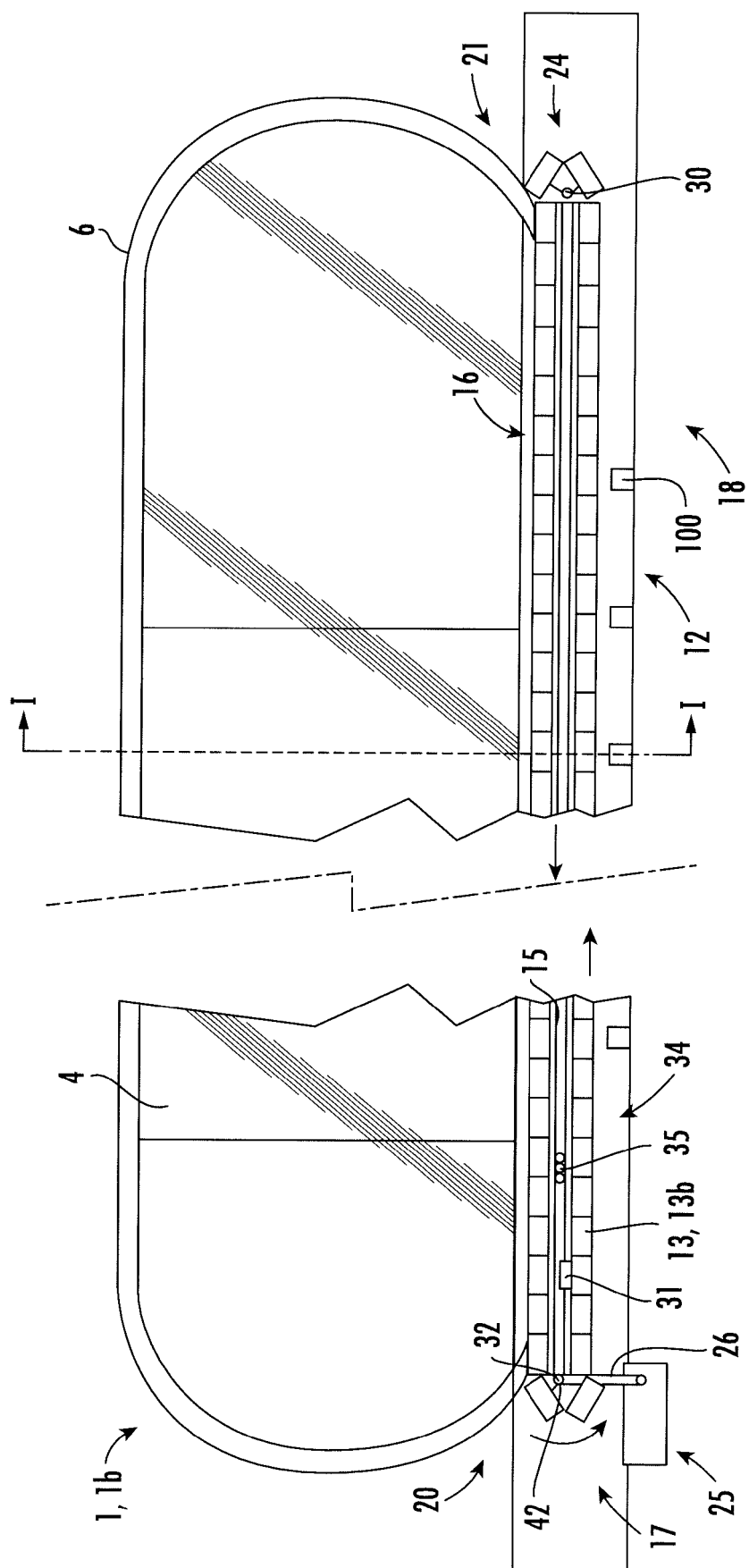


FIG. 2

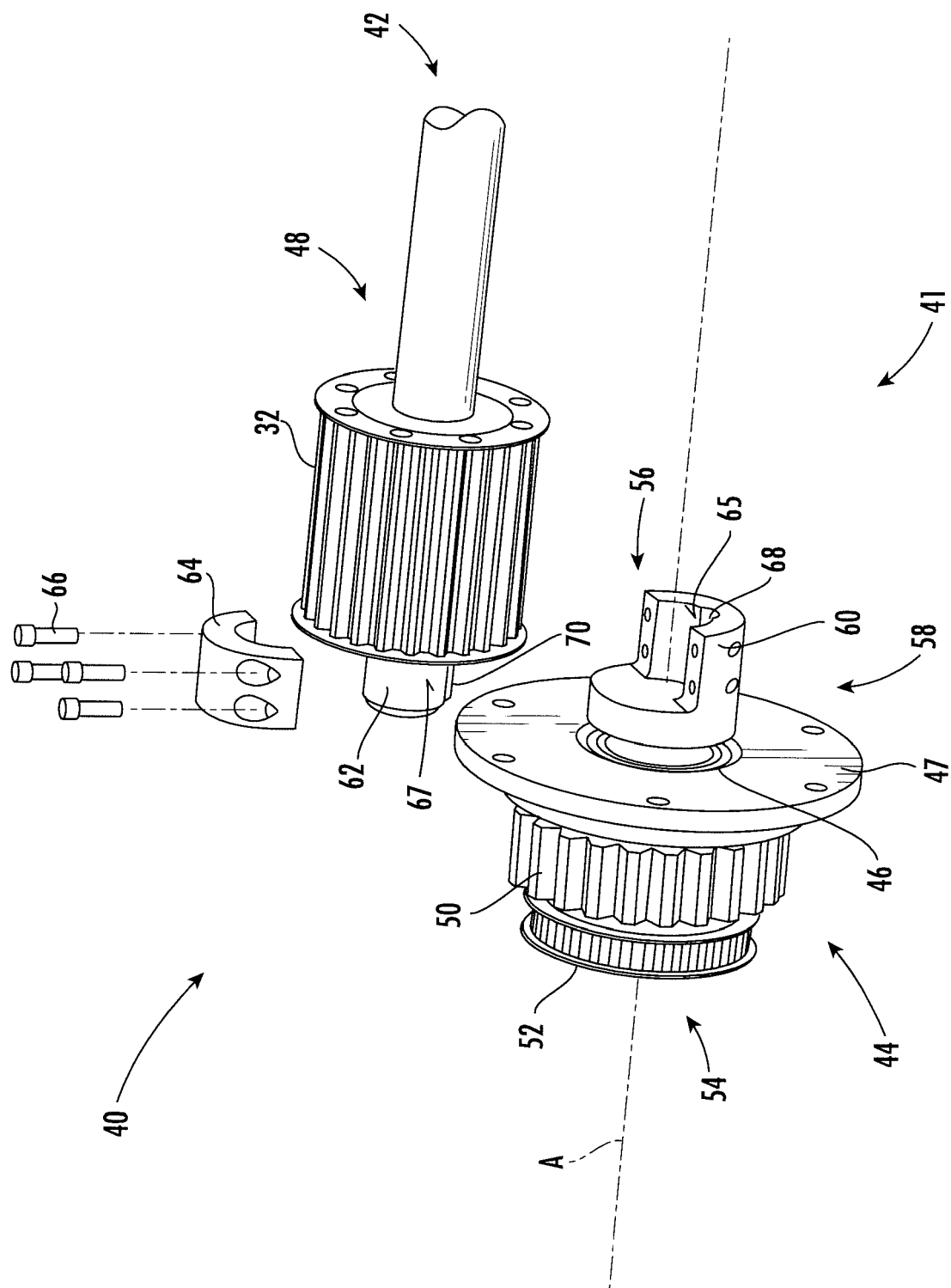
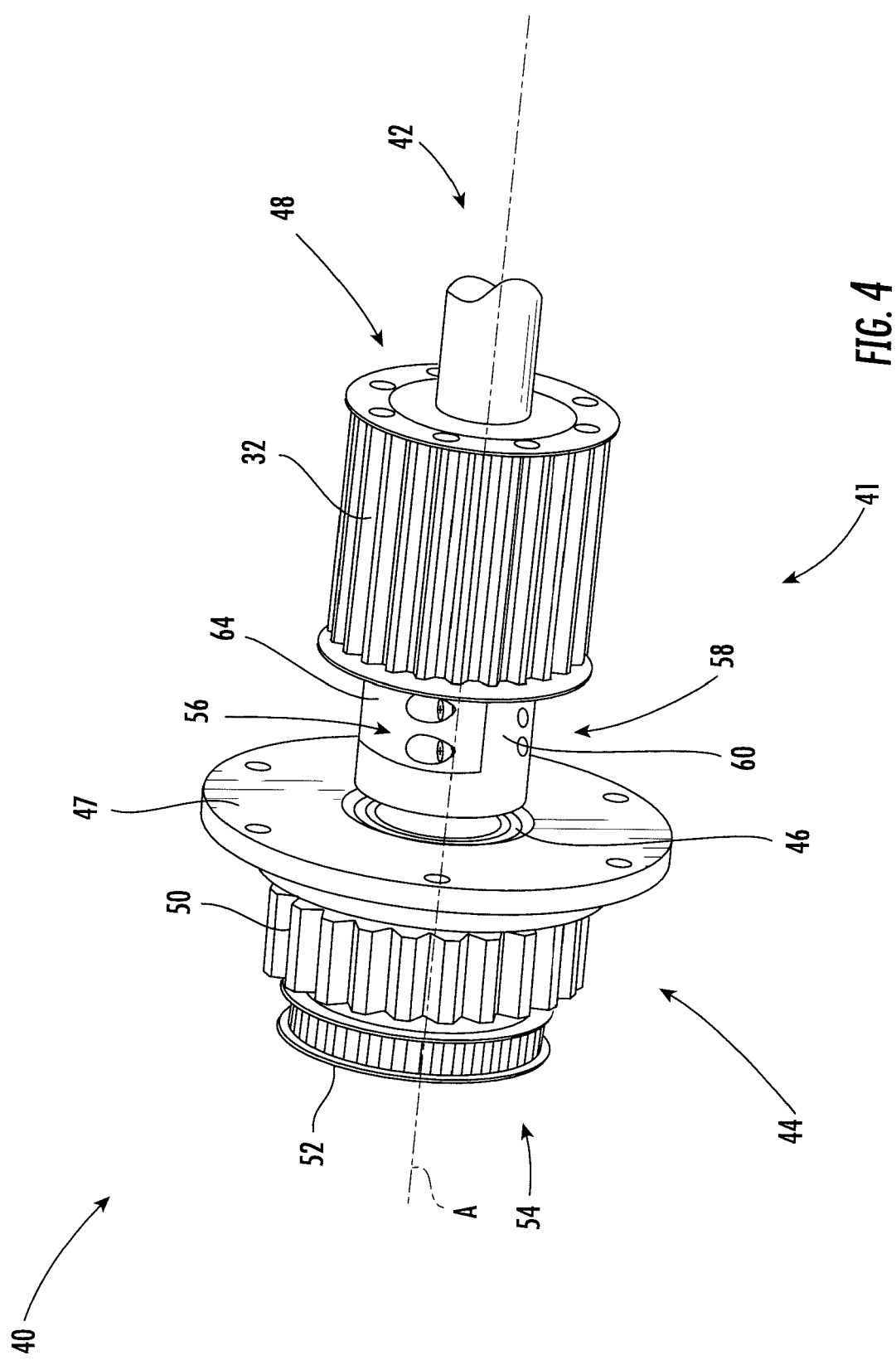


FIG. 3



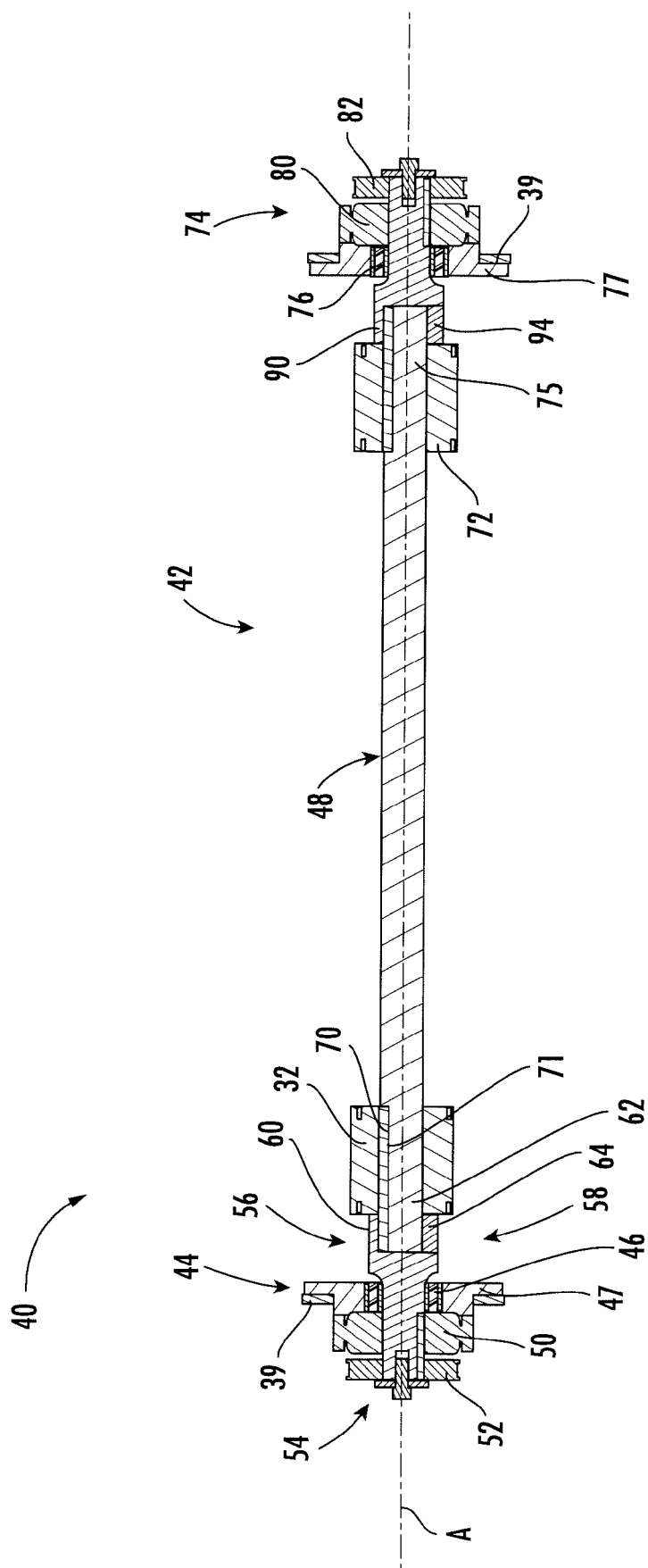


FIG. 5

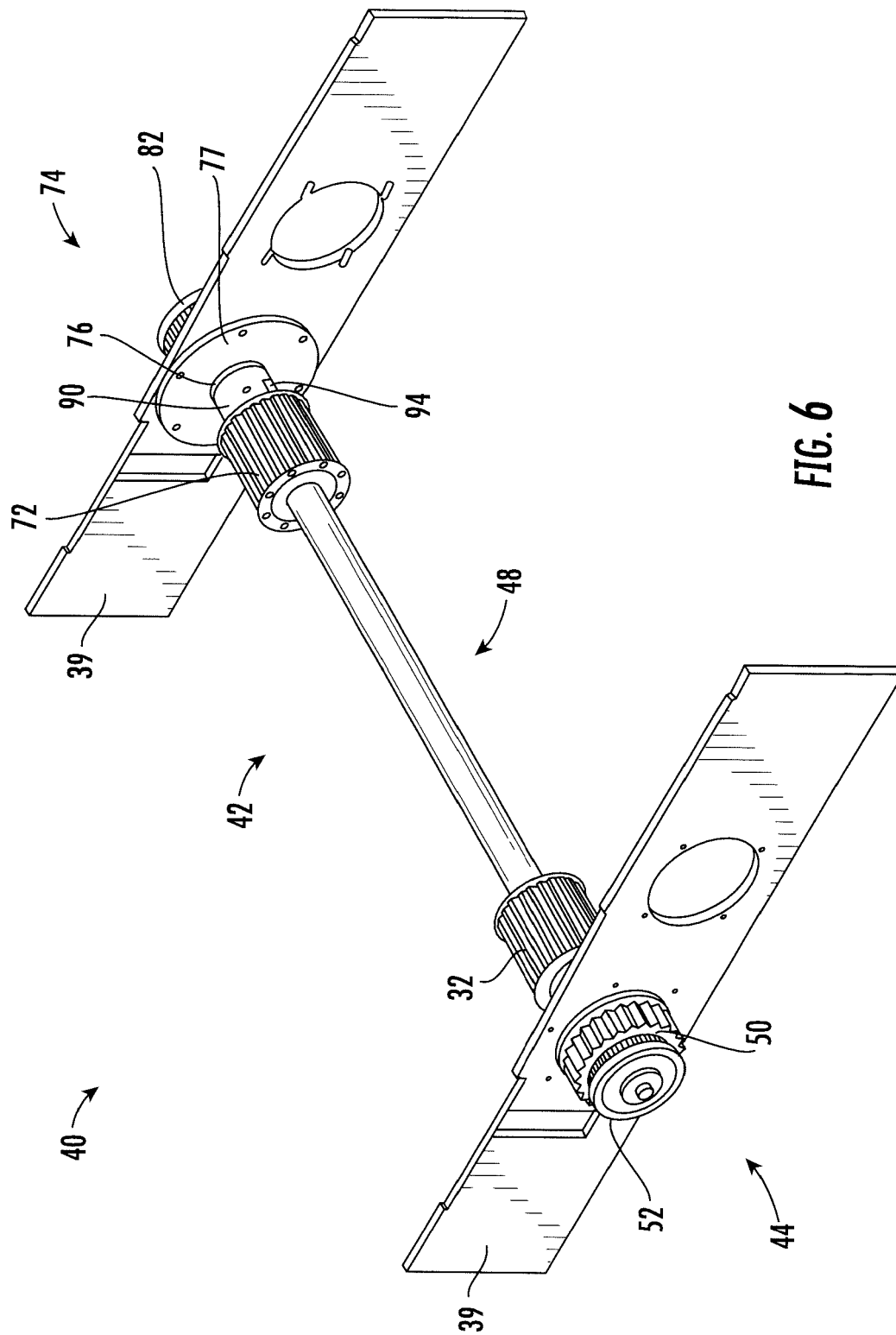


FIG. 6

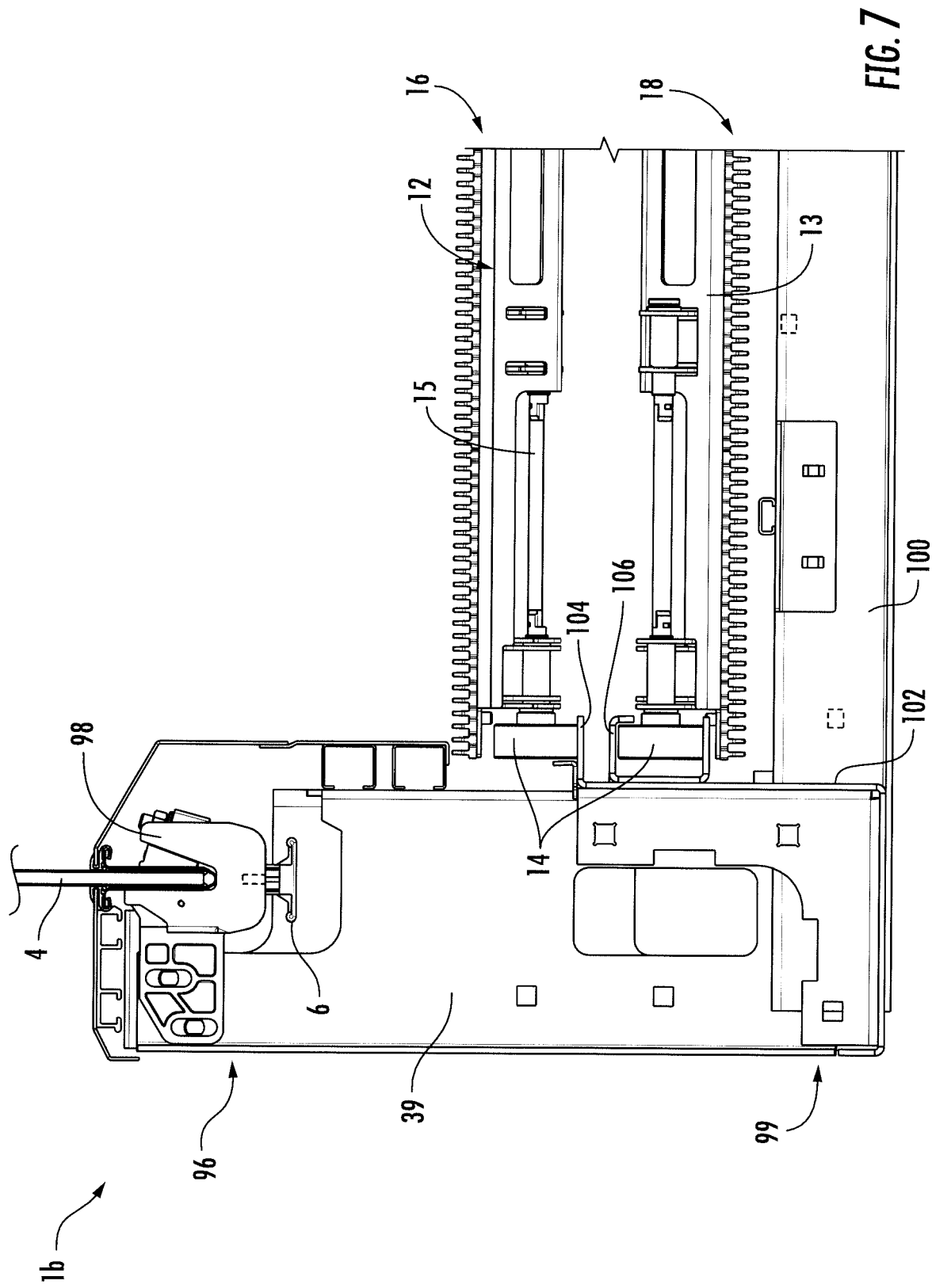


FIG. 7



EUROPEAN SEARCH REPORT

Application Number
EP 18 18 8524

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			B66B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 28 March 2019	Examiner Nelis, Yves
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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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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