Innovation, Sciences et Développement économique Canada
Office de la Propriété Intellectuelle du Canada

Innovation, Science and Economic Development Canada
Canadian Intellectual Property Office

CA 2940154 C 2021/08/24

(11)(21) 2 940 154

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

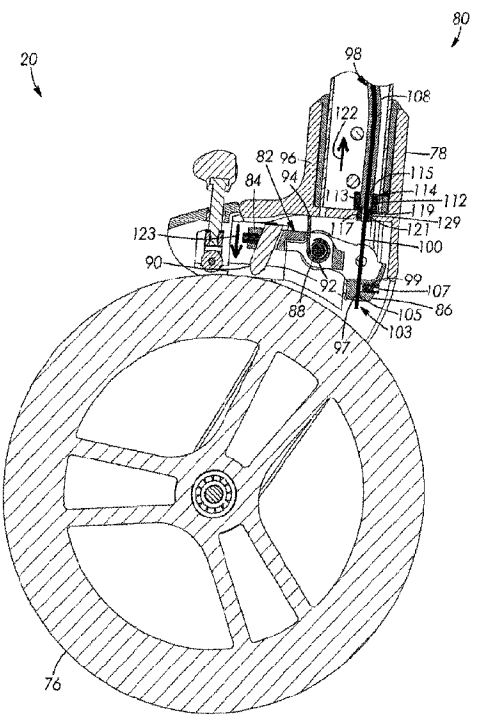
(86) Date de dépôt PCT/PCT Filing Date: 2016/08/19
(87) Date publication PCT/PCT Publication Date: 2017/03/02
(45) Date de délivrance/Issue Date: 2021/08/24
(85) Entrée phase nationale/National Entry: 2016/08/25
(86) N° demande PCT/PCT Application No.: CA 2016/050978
(87) N° publication PCT/PCT Publication No.: 2017/035633
(30) Priorités/Priorities: 2015/09/02 (US62/213,566); 2015/12/11 (US14/966,572)

(51) Cl.Int./Int.Cl. *A61H 3/04* (2006.01), *B62B 5/04* (2006.01)
(72) Inventeur/Inventor:
LIU, JULIAN, CA

(73) Propriétaire/Owner:
EVOLUTION TECHNOLOGIES INC., CA

(74) Agent: PALMER IP INC.

(54) Titre : MECANISME DE FREIN DESTINE A UN DISPOSITIF DE DEAMBULATEUR A HAUTEUR AJUSTABLE
(54) Title: BRAKE ASSEMBLY FOR A HEIGHT-ADJUSTABLE WALKER APPARATUS



(57) Abrégé/Abstract:
There is provided a brake assembly for a height-adjustable walker apparatus. The brake assembly includes a brake actuator, a wheel-engaging brake member and a brake cable assembly. The brake cable assembly includes a flexible, inner cable. The brake cable assembly includes a flexible, outer casing through which the inner cable extends and is moveable relative to. The inner cable has a first end coupled to the brake actuator and a second end coupled to the wheel- engaging brake member. The brake assembly includes a brake cable housing shaped to enclose a slack portion of the brake cable assembly.

ABSTRACT

There is provided a brake assembly for a height-adjustable walker apparatus. The brake assembly includes a brake actuator, a wheel-engaging brake member and a brake cable assembly. The brake cable assembly includes a flexible, inner cable. The brake cable assembly includes a flexible, outer casing through which the inner cable extends and is moveable relative to. The inner cable has a first end coupled to the brake actuator and a second end coupled to the wheel-engaging brake member. The brake assembly includes a brake cable housing shaped to enclose a slack portion of the brake cable assembly.

BRAKE ASSEMBLY FOR A HEIGHT-ADJUSTABLE APPARATUS

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] There is provided a brake assembly. In particular, there is provided a brake assembly for a height-adjustable apparatus, such as a height-adjustable walker apparatus.

Description of the Related Art

[0002] United States Patent No. 4,325,561 to Lynn discloses a transport table with telescoping members 38 and 40 as seen in Figure 1 thereof. The table includes wheels 44 with brakes 59 which are actuated via cable wires 57 and 61. In order to allow the telescoping members 38 and 40 to extend between an extended position and a retracted position out of the rear legs 34 and 36, the cable wires 57 and 61 are provided with slack so as to not interfere with this operation. This length or slack is provided by looping the cable wires 57 and 61 at the lower end of the telescoping members 38 and 40.

[0003] However, the above system may result in cable wires that are susceptible to being entangled with other objects or a person's clothing, for example. In such cases, the wire may be subject to premature wear and damage. Also, such a configuration of cable wires may inhibit safe operation of the transport table by causing persons adjacent thereto to become entangled and/or fall down, for example.

[0004] International Patent Publication Number WO 2004/073578 to Lonkvist to discloses a wheeled walker. The walker includes a frame member 2 having a lower end 3, a handle support rod 4 having an upper end 5, and a brake-control means 6 arranged at the upper end of the handle support rod. The brake-control means is movable between a neutral position and a brake-application position. The walker includes a wheel 7 located at the lower end 3 of the frame member. The distance between the wheel 7 and the brake-control means 6 is changeable. The walker includes a brake element 8 located adjacent the wheel 7. An upper force-transmission member 9 is connected to the brake-control means 6 and disposed within the frame member 2. A lower force-transmission member 10 is connected to the brake element 8 and disposed within the frame member 2. There is also provided a coupling means 11 for coupling-together the upper and the lower force-transmission members 9, 10. The upper force-transmission member and the lower force-transmission member are arranged to move freely relative to one another when the brake-control means 6 assumes its neutral position. The upper force-transmission member 9 and the lower force-transmission member 10 are arranged to be interconnected by means of the coupling means 11 when the brake-control means 6 leaves the neutral position in response to which braking force is transferred to the brake element 8.

[0005] However, such a system may be complicated, require many parts and thus be relative expensive to manufacture, for example.

[0006] There may accordingly be a need for an improved brake cable assembly for a walker apparatus.

BRIEF SUMMARY OF INVENTION

[0007] There is accordingly provided a brake assembly for a height-adjustable walker apparatus. The brake assembly includes a brake actuator, a wheel-engaging brake member and a brake cable assembly. The brake cable assembly includes a flexible, inner cable. The brake cable assembly includes a flexible, outer casing through which the inner cable extends and is moveable relative thereto. The inner cable has a first end coupled to

the brake actuator and a second end coupled to the wheel-engaging brake member. The brake assembly includes a brake cable housing shaped to enclose a slack portion of the brake cable assembly.

[0008] There is also provided a walker apparatus. The walker apparatus includes a length-adjustable assembly of elongate members. The length-adjustable assembly has an upper end, a lower end spaced-apart from the upper end, and an aperture interposed between the upper end and the lower end thereof. The walker apparatus includes a brake actuator operatively connected to the upper end of the length-adjustable assembly. The walker apparatus includes a wheel-engaging brake member operatively connected to the lower end of the length-adjustable assembly. A brake cable housing operatively connects to the length-adjustable assembly at a location between the brake actuator and the wheel-engaging brake member. The walker apparatus includes a brake cable assembly. The brake cable assembly includes a flexible, inner cable. The brake cable assembly includes a flexible, outer casing through which the inner cable extends and is moveable relative thereto. The inner cable has a first end operatively connected to the brake actuator and a second end operatively connected to the wheel-engaging brake member. The brake cable assembly is primarily enclosed within the length-adjustable assembly. A slack portion of the brake cable assembly extends through the aperture of the length-adjustable assembly and is enclosed within the brake cable housing.

[0009] There is further provided a cable housing for bowden cable. The cable has a first end coupled to a first portion of an elongate assembly. The cable has a second end coupled to a second portion of the assembly. Positioning of the second portion of the assembly relative to the first portion of the assembly is adjustable. The housing is shaped to enclose a loop-shaped portion of the cable which is interposed between the first and the second ends thereof.

BRIEF DESCRIPTION OF DRAWINGS

[0010] The invention will be more readily understood from the following description of preferred embodiments thereof given, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a top, front, left side perspective view of a walker apparatus according to one aspect, the walker apparatus including a folding mechanism, a seat assembly, and a brake assembly, the brake assembly including a pair of spaced-apart brake cable housings;

Figure 2 is a front elevation view thereof;

Figure 3 is a left side elevation view thereof, the right side elevation view of the walker apparatus being a mirror image thereof;

Figure 4 is a side elevation, cross-sectional view of one of the ground-engageable wheels of the walker apparatus of Figure 1, together with a wheel fork thereof and a wheel-engaging brake member for the brake assembly of Figure 1;

Figure 5 is a side elevation, partially fragmented, cross-sectional view of the interior of a handle bar assembly of the walker apparatus of Figure 1;

Figure 6 is a top, front, left side perspective view of the walker apparatus of Figure 1, with the brake cable housings thereof being removed;

Figure 7 is an outer side elevation view of one of the brake cable housings of Figure 1;

Figure 8 is an inner side elevation view thereof;

Figure 9 is a top, rear, outer side perspective view thereof;

Figure 10 is a bottom, rear, outer side perspective view thereof;

Figure 11 is a rear elevation view thereof;

Figure 12 is a front elevation view thereof;

Figure 13 is a rear, top perspective view thereof, the brake cable housing comprising two half sections with the half sections of the brake cable housing being angled apart relative to each other to reveal features of the interior of the brake cable housing;

Figure 14 is an enlarged view of the brake cable housing of Figure 7, with one of the half sections of the housing being removed to reveal the interior of the housing, and a fragmented view of a telescoping assembly and laterally-extending elongate side members of the left side of the walker apparatus of Figure 1, the telescoping assembly and part of the brake cable housing being shown partially in ghost;

Figure 15 is a left side, front perspective view of the walker apparatus of Figure 14, with the folding mechanism and seat assembly not being shown, with telescoping tubes of the walker apparatus being shown in a retracted position and a brake cable extending therethrough being shown in ghost;

Figure 16 is a left side, front perspective view similar to Figure 15 of the walker apparatus of Figure 15, with the folding mechanism and seat assembly not being shown, with the telescoping tubes of the walker apparatus being shown in an extended position and with brake cable extending therethrough being shown in ghost; and

Figure 17 is a top, front, left side perspective view of a walker apparatus according to a second aspect, the walker apparatus including a folding mechanism, a seat assembly, and a brake assembly, the brake assembly including a pair of spaced-apart brake cable housings;

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0011] Referring to the drawings and first to Figure 1, there is shown a height-adjustable walker apparatus 20. The apparatus has a rear 22 and a front 24 best seen in Figure 2. As seen in Figure 1, the apparatus 20 has a pair of spaced-apart sides 26 and 28, a top 30 and a bottom 32 which is spaced-apart from the top. The rear 22 and front 24 of the walker apparatus extend between the sides 26 and 28 thereof and the top 30 and bottom 32 thereof. The top and bottom of the apparatus also extend between the sides 26 and 28 thereof.

[0012] The walker apparatus 20 includes a pair of spaced-apart, height/length-adjustable upright assemblies 34 and 36 aligning with respective ones of the sides 26 and 28 thereof. Each of the upright assemblies has a lower end and an upper end, as seen by lower end 38 and upper end 40 for assembly 34. Each of the upright assemblies is height adjustable in this example and telescopic, with a lower outer elongate member or tube, and an upper inner elongate member or tube shaped to fit within the lower outer tube. This is seen by outer tube 42 and inner tube 44 for assembly 34.

[0013] As seen in Figure 16, each of the inner tubes 44 has a plurality of longitudinally spaced-apart apertures 46 which define a length L of adjustment range. The walker apparatus 20 includes a pair of coupling mechanisms for selectively coupling the pairs of telescoping tubes 42 and 44 together, in this example in the form of thumb screws 48. The thumb screws are rotatably coupled to the outer tubes 42 in this example. Selective rotation of the thumb screws 48 causes the thumb screws to be selectively inserted through one of said apertures 46 of the inner tube 44 to fixedly adjust the height of the telescoping tubes. This enables the height of the walker apparatus 20 to be adjusted to provide an optimized handlebar height for the user. The height of the walker apparatus is thus adjustable from a retracted position of the tubes 42 and 44 seen in Figure 15 to an extended position of the tubes seen in Figure 16 as well as positions therebetween.

[0014] As seen in Figure 6, each of the outer tubes 42 of the upright assemblies 34 has an aperture 51 extending therein and which is slot shaped and obround in this example. The apertures face the front 24 of the walker apparatus 20 in this example. Each aperture 51 is interposed between the lower end 38 and upper end 40 of its upright assembly 34. Each aperture is adjacent to and spaced-apart upwards from the corresponding end 38 of its upright assembly.

[0015] Referring back to Figure 1, the walker apparatus 20 includes a pair of spaced-apart, laterally-extending assemblies 50 and 52. The laterally-extending assemblies align with respective ones of the sides 26 and 28 of the walker apparatus and extend from near the bottom 32 towards the top 30 thereof. Each of the laterally-extending assemblies includes a pair of spaced-apart, elongate upper and lower side members, with the upper side members being in the form of tubes 54 in this example and the lower side members being the form of rods 56 in this example. Each rod has a proximal end 58 coupled to corresponding outer tube 42 and a distal end 60 spaced-apart from its proximal end. Each rod 56 extends laterally-outwards and perpendicular from its corresponding outer tube 42 towards the front 24 of the walker apparatus 20, in this example. Each rod has a longitudinally-extending top 61 which faces corresponding tube 54 of its laterally-extending assembly 50. As seen in Figure 6, the tops of the rods are curved at least in part in lateral cross-section and outwardly convex in lateral cross-section in this example.

[0016] Each tube 54 includes a substantially-straight portion 62 in this example which is coupled to and extends laterally-outwards from corresponding outer tube 42 towards the front 24 of the walker appartus 20. Aperture 51 of tube 42 is interposed and extends between rod 56 and substantially-straight portion 62 of tube 54, and is positioned adjacent to rod 56 in this example. Referring to Figure 1, each straight portion 62 of the tubes 54 has a longitudinally-extending bottom 63 which faces the top 61 of its corresponding rod 56. The bottoms of the straight portions of the tubes 54 are curved at least in part in lateral cross-section and are outwardly convex in lateral cross-section in this example. Each tube 54 includes a curved portion 64 in this example which couples to

and is interposed between the straight portion 62 thereof and distal end 60 of its corresponding rod 56.

[0017] As seen in Figure 1, the walker apparatus 20 includes folding mechanism 66 in this example coupled to and extending between the laterally-extending assemblies 50 and 52. The folding mechanism is configured to enable the walker apparatus to selectively fold laterally. The walker apparatus 20 includes a seat assembly 68 which extends between and couples to the straight portions 62 of tubes 54 of the laterally-extending assemblies 50 and 52 in this example. The various parts and functionings of the folding mechanism 66 and seat assembly 68 are described in more detail in United States Patent No. 8,083,239.

[0018] As seen in Figure 1, the walker apparatus 20 includes a first or front pair of ground-engageable wheels 70 operatively coupled to and pivotable relative to the distal ends 72 of the curved portions 64 of tubes 54 by way of wheel forks 74. The walker apparatus includes a second or rear pair of ground-engageable wheels operatively coupled to and rotatable relative to the lower ends of the upright assemblies. This is shown by wheel 76 operatively coupled to end 38 of assembly 34 via wheel fork 78.

[0019] The walker apparatus 20 includes a pair of brake assemblies for respective ones of its second pair of ground-engageable wheels, as shown in Figure 4 by brake assembly 80 for wheel 76.

[0020] As seen in Figure 4, each brake assembly includes a wheel-engaging brake member 82. Each wheel-engaging brake member has a first end 84 and a second end 86 spaced-apart from the first end. In this example each wheel-engaging brake member 82 pivotally connects to its respective wheel fork 78 at a pivot point 88 which is interposed between the first and second ends of the wheel-engaging brake member. Each wheel-engaging brake member 82 includes a brake pad 90 in this example coupled to and extending downwards from the first end 84 thereof. Each brake pad faces its corresponding wheel 76. Each wheel-engaging brake member 82 includes in this example

a resilient member in the form of a coiled spring 92. The coiled spring extends about the pivot point 88 of the wheel-engaging brake member. The coiled spring 92 has an elongate end 94 which abuts a side wall 96 of the wheel fork 78 in this example. The coiled spring is configured to spring-bias the brake pad 90 upwards from wheel 76.

[0021] Each wheel-engaging brake member 82 includes a first bore 97 extending therethrough adjacent to the second end 86 thereof in this example. Each wheel-engaging brake member includes a second bore 99 which is threaded in this example and which is adjacent to the second end thereof. The second bore in communication with and extends perpendicular to bore 97 in this example. Each brake assembly 80 includes a securing mechanism, in this example in the form of a set screw 107 that extends through bore 99 and threadably engages therewith.

[0022] Each brake assembly further includes a brake cable assembly, in this example in the form of bowden cable 98. The bowden cable includes a flexible, inner cable 100. As seen in Figure 5, the inner cable has an upper or first end 101 with a protrusion, in this example nipple 102 thereat. The nipple is cylindrical in shape in this example. As seen in Figure 4, each inner cable 100 has a lower or second end 103. The second end of the inner cable is operatively coupled to the second end 86 of wheel-engaging brake member 82 by portion 105 of the cable, which extends through bore 97, and thereafter by set screw 107 engaging with said portion 105. The set screw enables the tension of inner cable 100 to be adjusted by lowering or elevating end 103 of the inner cable and thereafter securing the cable in place via the set screw.

[0023] As seen in Figure 15, each bowden cable 98 is primarily enclosed within its corresponding upright assembly 34 with a slack portion 109 thereof extending through the aperture 51 of the assembly 34. The slack portion of the brake cable assembly is a coiled section of the brake cable assembly that is loop-shaped in this example.

[0024] Referring to Figure 5, each bowden cable 98 includes a flexible outer casing 108 through which the inner cable 100 extends and is moveable relative thereto. The

casing has a first end 110 seen in Figure 5 and a second end 112 seen in Figure 4. Second end 112 of casing 108 is operatively coupled to wheel fork 78 via a mount 114 through which inner cable 100 extends. Each mount is tubular in this example with a first or upper sleeve 113 with a bore 115 extending therethrough. Each upper sleeve is shaped to extend about and receive corresponding end 112 of its casing 108. Each mount 114 includes a second or lower sleeve 117 coupled to and extending downwards from the upper sleeve 113 thereof. Each lower sleeve includes a bore 119 extending therethrough. Bore 119 is shaped to slidably receive inner cable 100 therethrough. Bore 119 is in communication with bore 115 and has a diameter that is smaller than that of bore 115 in this example. Lower sleeve 117 is shaped to fit within an inner aperture 121 of the wheel fork 78. Upper sleeve 113 is configured to abut portions 129 of the wheel fork adjacent to said aperture 121.

[0025] Upward movement of inner cable 100 causes end 86 of wheel-engaging brake member 82 to more upwards relative to Figure 4, as shown by arrow of numeral 122. The upward movement of the cable in turn causes end 84 and brake pad 90 of the wheel-engaging brake member to move downwards, as shown by arrow of numeral 123, for engaging the pad against the wheel 76 and braking the wheel. Thus, each wheel-engaging brake member 82 operatively connects to the lower end 38 of its upright assembly 34 seen in Figure 1. The wheel-engaging brake member 82 as herein described is one example only for walker apparatus 20, and the brake assembly 80 may use other braking systems for the bowden cable 98 in other embodiments.

[0026] As seen in Figure 1, the walker apparatus 20 includes a pair of handle bar assemblies 124 and 125 coupled to the upper ends 40 of respective ones of the upright assemblies 34 and 36. The walker apparatus includes an arcuate-shaped backrest 127 in this example positioned along the front 24 thereof. The backrest is in the shape of a flexible strap in this example and extends between and couples together the handle bar assemblies 124 and 125.

[0027] Each of the handle bar assemblies, as seen by assembly 124 in Figure 5; includes a first handle lever 126. Each first handle lever has a first end 128 and a second end 136 spaced-apart from its first end. Each brake assembly 80 includes a brake actuator, in this example in the form of a gripping handle 130 coupled to and extending from end 128 of its lever 126. Each handle bar assembly 124 has a handle bar housing 134. Each first handle lever 126 is pivotally mounted via pivot 132 to the handle bar housing 134.

[0028] Each of the handle bar assemblies 124 includes a second handle lever 138. Each second handle lever has a first end 142, a second end 144 spaced-apart from its first end, a first side 143 facing casing 108 and a second side 145 opposite the first side. Ends 142 and 144 of the lever 138 extend between sides 143 and 145 of the lever. Each second handle lever 138 is pivotally mounted to its corresponding handle bar housing 134 via pivot 140 located adjacent to the first end 142 thereof. Second end 136 of first handle lever 126 is positioned to be engageable with second handle lever 138 at a location 164 between ends 142 and 144 of lever 138.

[0029] Each handle bar assembly 124 includes a link 146 which pivotally connects first handle lever 126 to second handle lever 138 via pivot 148 which is between ends 128 and 136 of the first handle lever, and pivot 150 which is between ends 142 and 144 of the second handle lever. Lever 138 has a tapered bore 152 extending therethrough in this example adjacent to end 144 thereof. The bore extends from side 143 of the lever towards side 145 of the lever and is wider in cross-section at side 143 compared to its cross-section adjacent to side 145. Put another way, bore 152 enlarges from side 145 to side 143 of the lever 138. Each lever 138 further includes in this example a seat 153 that is circular in section in this example and which is in communication with bore 152. Each seat 153 is adjacent and recessed relative to side 145 of lever 138.

[0030] First end 101 of inner cable 100 operatively couples to second end 144 of lever 138, and thus operatively connects to gripping handle 130, by portion 154 of the inner cable adjacent to nipple 102 extending through bore 152. Nipple 102 is larger than

bore 152 and is shaped to be received by seat 153. As seen in Figure 1, the gripping handles 130 thus operatively connect to the upper ends 40 of their upright assemblies 34. Referring back to Figure 5, the outwardly tapered nature of bore 152 enables portion 154 of the inner cable 100 to selectively tilt upwards and downwards as indicated by arrow of numeral 157.

[0031] End 110 of casing 108 couples to handle bar housing 134 via a mount 156 through which inner cable 100 extends. The mount is generally cylindrical in shape in this example and has a first side 159 facing casing 108 and a second side 161 opposite the first side. Each mount 156 includes in this example a seat 163 that is cylindrical in shape and recessed relative to side 159 thereof in this example. End 110 of casing 108 is shaped to be received within seat 163. Each mount 156 includes in this example a tapered bore 165 which extends from side 161 towards side 159 thereof. The bore is wider in cross-section at side 161 relative to where the bore is adjacent to side 159. Put another way, bore 165 enlarges from side 159 to side 161 of the mount 156. Bore 165 is in communication with seat 163. Portion 167 of inner cable 100 extends through bore 165 as the cable extends to nipple 102. The outwardly tapered nature of bore 165 enables portion 167 of the inner cable 100 to selectively tilt upwards and downwards as indicated by arrow of numeral 169.

[0032] In operation and referring to Figure 5, upward movement of the gripping handles 130, as shown by arrow of numeral 162, causes end 136 of lever 126 to engage lever 138 at location 164 interposed between ends 142 and 144 of lever 138. This causes lever 138 to selectively rotate towards the front 24 of the walker apparatus 20 in a clockwise direction relative to Figure 5, as shown by arrow of numeral 166. End 144 of lever 138 and thus end 101 of inner cable 100 are pulled to the right relative to Figure 5 thereby. This causes the inner cable 100 to be actuated and move relative to casing 108 for selectively actuating wheel-engaging brake member 82 seen in Figure 4.

[0033] Referring to Figure 4, each bowden cable 98 thus has a first end coupled to a first portion of an elongate assembly, in this example in the form of the wheel-engaging

brake member 82 seen in Figure 4 of upright assembly 34 seen in Figure 15. Referring to Figure 5, each cable has a second end coupled to a second portion of the elongate assembly with the second portion's positioning relative to the first portion being adjustable, in this example in the form of handle bar assembly 124 for the upright assembly.

[0034] The gripping handle 130 seen in Figure 5 and related linking assembly as herein described are one example only for walker apparatus 20, and the brake assembly 80 may use other brake actuators for the bowden cable 98 in other embodiments.

[0035] The walker apparatus 20 described to this stage is directed to one example of a walker apparatus and walker apparatuses of other shapes and configurations are possible, as would be clear to one skilled in the art. For example, the laterally-extending assemblies, handles, backrest, folding mechanism, wheel assemblies and seat assembly of the walker apparatuses set out in United States Patent No. 8,083,239 and United States Patent No. 9,339,432 could be used in other embodiments.

[0036] As seen in Figure 1, the walker apparatus 20 includes a pair of hollow, brake cable housings corresponding to respective ones of the upright assemblies, as seen by brake cable housing 168 for upright assembly 34. As seen in Figure 14, each housing is shaped to enclose the slack portions 109 of its corresponding bowden cable 98. Each brake cable housing 168 is generally in the shape of a hollow, rectangular prism in this example.

[0037] As seen in Figure 9, each brake cable housing has an elongate top 170 and an upper peripheral edge portion 172 extending along the top. As seen in Figure 11, the upper peripheral edge portion is u-shaped and outwardly concave in an upwards direction in this example. Referring to Figure 14, the upper peripheral edge portion 172 of the housing 168 is shaped to align with and receive the bottom 63 of the substantially-straight portion 62 of tube 54 in this example.

[0038] As seen in Figure 10, each housing 168 has an elongate bottom 174 opposite its top 170 and a lower peripheral edge portion 176 extending along said bottom. As seen in Figure 11, the lower peripheral edge portion 176 is u-shaped and outwardly concave in a downwards direction in this example. Referring to Figure 14, the lower peripheral edge portion of the housing 168 is shaped to align with, extend along in part and receive the top 61 of rod 56 in this example. Each housing 168 is thus extends between corresponding rod 56 and corresponding substantially-straight portion 62 of tube 54.

[0039] Referring to Figure 9, each housing 168 further includes a rear 178 which extends between the top 170 and bottom 174 thereof and which is generally u-shaped in cross-section in this example. As seen in Figure 14, the rear of the housing extends along and is shaped to abut and receive a portion 180 of tube 42 of its corresponding upright assembly 34 extending between the tube 54 and rod 56.

[0040] As seen in Figure 9, each brake cable housing 168 includes a hollow protrusion 182 which extends outwards from rear 178 thereof. Each protrusion includes a peripheral rim portion 181 which couples to and extends outwards from the rear of the housing. The rim portion is obround in this example as best seen in Figure 11. Rim portion 181 is shaped to fit within oblong aperture 51 of tube 42 as seen in Figure 6. Referring to Figure 14, portions 53 of tube 42 extending around the aperture are configured to snugly abut with the rim portion 181 in this example.

[0041] As seen in Figure 9, the protrusion 182 includes a lower section 177 that is generally in the shape of a right triangular prism in this example and which couples to and extends outwards from rim portion 181. Each protrusion 182 includes an elongate bottom 183 which aligns with and is adjacent to bottom 174 of housing 168. The lower section 177 of the protrusion includes a pair of spaced-apart planar sides 185 and 187 which are generally triangular in shape in this example. The sides of the protrusion 182 extend from the bottom 183 of the protrusion towards the top 170 of the housing 168. As seen in Figure 11, sides 185 and 187 are inwardly spaced-apart from and extend in parallel with sides 186 and 188 of housing 168 in this example.

[0042] Referring to Figures 9 and 11, each protrusion 182 includes a pair of resilient members, in this example in the form of resilient tabs 189 and 191 outwardly extending from respective ones of sides 185 and 187. As seen in Figure 14, the tabs are shaped to outwardly abut portions adjacent portions 55 of tube 42 when the lower section 177 of the protrusion 182 is positioned within aperture 51 of the tube 42.

[0043] Referring to Figure 9, the lower section 177 of protrusion 182 includes a rear 195 which is slanted in this example and which extends from bottom 183 towards the top 197 of rim portion 181. Rear 195 is elongate and extends between sides 185 and 187 of the lower section 177 of the protrusion. Each protrusion includes a recessed aperture 193 extending through rear 195 of the lower section 177 thereof. The aperture is interposed between the sides 185 and 187 and bottom 183 of the protrusion.

[0044] As seen in Figure 14 and mentioned above, the lower section 177 of protrusion 182 extends through aperture 51 of the corresponding tube 42 for mounting the brake cable housing 168 to the upright assembly 34. As seen in Figure 1, each brake cable housing 168 thus operatively connects to its corresponding upright assembly 34 at a location between its gripping handle 130 and wheel-engaging brake member 82.

[0045] As best seen in Figure 12, each housing 168 has a front 184 spaced-apart from the rear 178 thereof as best seen in Figure 11. Referring back to Figure 12, the front of the housing extends between the top 170 and bottom 174 thereof. As seen in Figure 15, the front 184 of the housing 168 is substantially vertically-extending and straight in this example.

[0046] The brake cable housings have inner sides which face each other, as seen in Figure 8 by inner side 186 for housing 168. Each housing includes an outer side 188 facing opposite from its inner side. The inner and outer sides of the housing 168 are substantially planar and rectangular in this example and extend between the top, bottom, rear and front of the housing. This is seen in Figure 9 by outer side 188 extending between the top 170, bottom 174, rear 178 and front 184 of housing 168.

[0047] As seen in Figure 11, each brake cable housing 168 includes a first part 190 which extends between top 170, bottom 174, rear and front thereof and which extends from its inner side 186 towards outer side 188. As seen in Figure 1, the first part of the housing extends between and abuts rod 56 and portion 62 of tube 54 at a first or inner side 196 thereof seen in Figure 2.

[0048] As seen in Figure 9, each brake cable housing 168 includes a second part 192 that is complementary to, selectively connectable to and selectively removable from part 190. Parts 190 and 192 are respective halves of the housing in this example though this is not strictly required. Part 192 extends between the top 170, bottom 174, rear 178 and front 184 of the housing 168, and extends from the outer side 188 of the housing towards the inner side 186 of the housing. Part 192 is shaped to selectively couple with part 190 via a plurality of fasteners 194 in this example as seen in Figure 8. As seen in Figure 1, part 192 extends between and abuts rod 56 and portion 62 of tube 54 at a second or outer side thereof 198. The brake cable housing 168 selectively couples to its corresponding laterally-extending assembly 50 of the walker apparatus 20 thereby.

[0049] As seen in Figure 14, each brake cable housing 168 has an interior space 200 that is generally crescent-shaped in this example. Each brake cable housing has an outer portion 202 which extends along the top 170, bottom 174, rear 178, and front 184 thereof and, as seen in Figure 11, between sides 186 and 188 thereof. As seen in Figure 14, the outer portion 202 of the housing has an inner peripheral edge 204 which encloses the interior space 200 thereof along with the sides of the housing. The inner peripheral edge of the outer portion is inwardly concave and is generally tear-drop shaped in this example. The outer portion 202 of the housing has a central axis 206 in this example.

[0050] Each housing 168 includes an inner portion 208 positioned within the interior space 200 thereof. The inner portion of the housing has an outer peripheral edge 210 which is outwardly convex in this example. The inner portion 208 of the housing 168 has a central axis 212 which is axially offset from the central axis 206 of the outer portion 202 of the housing.

[0051] As seen in Figure 14, the brake cable housing 168 receives slack portion 109 of bowden cable 98 within interior space 200 thereof. The brake cable housing includes an upper passageway 214 within the interior space thereof. The upper passageway extends from the rear 178 of the housing adjacent to aperture 51 towards the top 170 and front 184 of the housing. The upper passageway 214 is downwardly concave in shape in this example. The upper passageway is shaped to receive excess portions 216 of the bowden cable 98 extending from the wheel-engaging brake member 82 and thus lower end 103 of inner cable 100 seen in Figure 4.

[0052] Referring back to Figure 14, the brake cable housing 168 includes a lower passageway 218 within the interior space 200 thereof. Aperture 193 of lower section 177 of protrusion 182 is part of the lower passageway in this example. The lower passageway 218 thus extends through protrusion 182 of the housing 168 in this example towards the bottom 174 and front 184 of the housing. The lower passageway 218 is upwardly concave in shape in this example. The lower passageway 218 is shaped to receive excess portions 220 of bowden cable 98 extending from the gripping handle 130 as seen in Figure 5 and thus extending from end 101 of inner cable 100.

[0053] As seen in Figure 14, each brake cable housing 168 includes a chamber 222 within the interior space 200 thereof. The chamber is interposed between and in communication with the passageways 214 and 218. The cross-sectional widths of the upper passageway and the lower passageway taper so as to increase as the passageways extend from the upright assembly 34 towards the chamber 222. This is shown by width W_1 of passageway 218 adjacent to tube 42 being smaller than width W_2 of the passageway 218 adjacent chamber 222. The chamber is shaped to receive further excess portions 224 of bowden cable 98 coupled to and integrally formed with excess portions 216 and 220 thereof. The chamber 222 is concave in this example in a direction facing the upper passageway 214 and the lower passageway 218. The chamber is larger in volume and cross-section width W_3 compared to the upper passageway 214 and compared to the lower passageway 218.

[0054] In operation and referring to Figure 15, slack portion 109 of bowden cable 98 abuts the inner peripheral edge 204 of the outer portion 202 of its corresponding housing 168 when the walker apparatus 20 is its retracted position. As seen in Figure 14, the slack portion of the bowden cable 98 extends at least in part between the outer peripheral edge 210 of the inner portion 208 of housing 168 and inner peripheral edge 204 of outer portion 202 of the housing when the walker apparatus 20 is in an intermediate position between the retracted position seen in Figure 15 and the extended position seen in Figure 16.

[0055] As seen in Figure 16, slack portion 109 of bowden cable 98 abuts the outer peripheral edge 210 of the inner portion 208 of its corresponding housing 168 when the walker apparatus 20 is its extended position. The slack portion 109 of bowden cable 98 is a larger loop in shape when the walker apparatus 20 is in its retracted position seen in Figure 15 compared to the size of the loop shape of portion 109 of the cable when the walker apparatus is in its extended position seen in Figure 16.

[0056] Figure 17 shows a height-adjustable walker apparatus 20.1 according to a second aspect. Like parts have like numbers and functions as the height-adjustable walker apparatus 20 shown in Figures 1 to 16 with the addition of decimal extension ".1". Walker apparatus 20.1 is substantially the same as walker apparatus 20 shown in Figures 1 to 16 with the following exceptions. Front 184.1 of each housing 168.1 is outwardly convex in a direction facing the front 24.1 of the walker apparatus 20.1 in this example instead of being substantially vertically-extending and straight like the fronts 184 of housings 168 seen in Figure 1.

ADDITIONAL DESCRIPTION

[0057] Examples of brake assemblies for a height-adjustable walker apparatus have been described. The following clauses are offered as further description.

(1) A brake cable housing shaped to enclose a slack portion of the brake cable assembly, the housing having an interior space, the housing including an outer portion, the outer portion of the housing having an inner peripheral edge which encloses said interior space, the inner peripheral edge of the outer portion of the housing being inwardly concave, and the housing including an inner portion positioned within the interior space thereof, the inner portion of the housing having an outer peripheral edge which is outwardly convex.

(2) A brake cable housing for a walker apparatus that is adjustable from a retracted position to an extended position, a brake cable assembly thereof abutting an outer peripheral edge of an inner portion of the housing when the walker apparatus is in the extended position and the brake cable assembly abutting an inner peripheral edge of an outer portion of the housing when the walker apparatus is in the retracted position.

(3) A cable housing for bowden cable in which the cable has a first end coupled to a first elongate member of a walker apparatus and a second end coupled to a second elongate member of the walker apparatus whose positioning relative to the first elongate member is adjustable, the housing being shaped to enclose a loop-shaped portion of the cable which is interposed between the first and the second ends thereof.

(4) The housing of clause 3, the first end of the cable being an upper end, the second end of the cable being a lower end, and wherein the housing includes an upper passageway shaped to receive portions of the cable extending from the lower end of the cable, a lower passageway shaped to receive portions of the cable extending from the upper end of the cable and a chamber in communication with said passageways.

(5) In combination, the cable housing and the bowden cable of any one of clauses 3 and 4, the cable including a flexible, outer casing coupled the first elongate

member and the second elongate member of the walker apparatus at first and second ends thereof, and a flexible, inner cable which extends through and is moveable relative to the outer casing.

(6) A brake assembly for a height-adjustable walker apparatus, the brake assembly comprising a brake actuator, the brake assembly comprising a wheel-engaging brake member, the brake assembly comprising a brake cable assembly including a flexible, inner cable and a flexible, outer casing through which the inner cable extends and is moveable relative thereto, the inner cable having a first end coupled to the brake actuator and a second end coupled to the wheel-engaging brake member, and a brake cable housing according to any one of clauses 1 to 4.

(7) A walker apparatus comprising the cable housing of any one of clauses 1 to 6.

[0058] It will be appreciated that many variations are possible within the scope of the invention described herein. It will also be understood by someone skilled in the art that many of the details provided above are by way of example only and are not intended to limit the scope of the invention which is to be determined with reference to at least the following claims.

WHAT IS CLAIMED IS:

1. A walker apparatus, comprising:

a height-adjustable assembly;

at least one elongate side member coupled to and extending outwards from the height-adjustable assembly;

a brake cable assembly primarily extending along the height-adjustable assembly; and

a brake cable housing abutting, extending along, and receiving a portion of at least one of the height-adjustable assembly and said elongate side member, a slack portion of the brake cable assembly being enclosed by the brake cable housing, wherein the brake cable housing abuts and extends along both the height-adjustable assembly and the at least one elongate side member.

2. A walker apparatus comprising:

a height-adjustable assembly;

at least one elongate side member coupled to and extending outwards from the height-adjustable assembly;

a brake cable assembly primarily extending along the height-adjustable assembly; and

a brake cable housing abutting, extending along, and receiving a portion of at least one of the height-adjustable assembly and said elongate side member, a slack

Date Reçue/Date Received 2021-02-12

portion of the brake cable assembly being enclosed by the brake cable housing, wherein the brake cable housing comprises a rear side having

an upper passageway shaped to receive the slack portion of the brake cable assembly extending from a lower end of a brake cable assembly, and

a lower passageway shaped to receive the slack portion of the brake cable assembly extending from a brake actuator of the walker apparatus.

3. The walker apparatus as claimed in claim 2, wherein the slack portion of the brake cable assembly is loop-shaped.

4. The walker apparatus as claimed in claim 2, wherein the brake cable housing includes a chamber which extends between and is in communication with said passageways.

5. The walker apparatus as claimed in claim 4, wherein the upper passageway is downwardly concave in shape and wherein the lower passageway is upwardly concave in shape.

6. The walker apparatus as claimed in claim 4, wherein the chamber is concave in shape in a direction facing the upper passageway and the lower passageway.

7. The walker apparatus as claimed in claim 4, wherein the chamber is larger than the upper passageway and larger than the lower passageway.

Date Reçue/Date Received 2021-02-12

8. The walker apparatus as claimed in claim 4, wherein the upper passageway and the lower passageway have cross-sectional widths, the cross-sectional widths of the upper passageway and the lower passageway increasing in a direction extending from the height-adjustable assembly and towards the chamber.

9. The walker apparatus as claimed in claim 2, wherein the housing has an interior space that is generally crescent-shaped.

10. The walker apparatus as claimed in claim 2, wherein the height-adjustable assembly has an aperture interposed between a lower end and an upper end of the height-adjustable assembly, the slack portion of the brake cable assembly extending through said aperture of the height-adjustable assembly, and wherein the brake cable housing couples to and extends outwards from the height-adjustable assembly.

11. The walker apparatus as claimed in claim 2, wherein the walker apparatus has a front, and wherein the height-adjustable assembly has an aperture through which the slack portion of the brake cable assembly extends, the aperture of the height-adjustable assembly being slot-shaped and facing the front of the walker apparatus.

Date Reçue/Date Received 2021-02-12

12. The walker apparatus as claimed in claim 2, wherein the height-adjustable assembly includes a pair of telescoping tubes and wherein the brake cable housing extends along and is shaped to abut a portion of one of said tubes.

13. The walker apparatus as claimed in claim 2, wherein the brake cable housing includes a peripheral edge portion that is u-shaped in cross-section and abuts said at least one of the height-adjustable assembly and the elongate side member via said peripheral edge portion.

14. The walker apparatus as claimed in claim 2, wherein the height-adjustable assembly includes a lower elongate member and an upper elongate member shaped to fit within the lower elongate member, and wherein excess portions of the brake cable assembly enter and exit the brake cable housing at locations below the upper elongate member of the height-adjustable assembly.

15. The walker apparatus as claimed in claim 2, wherein the brake cable assembly abuts an outer peripheral edge of an inner portion of the housing when the walker apparatus is in an extended position and the brake cable assembly abuts an inner peripheral edge of an outer portion of the housing when the walker apparatus is in a retracted position.

Date Reçue/Date Received 2021-02-12

16. The walker apparatus as claimed in claim 15, wherein the inner peripheral edge of the outer portion of the housing is inwardly concave and the outer peripheral edge of the inner portion of the housing is outwardly convex.

17. A walker apparatus comprising:

a height-adjustable assembly of elongate members, the height-adjustable assembly having an upper end, a lower end spaced-apart from the upper end, and an aperture interposed between the upper end and the lower end thereof;

a brake actuator operatively coupled to the upper end of the height-adjustable assembly;

a brake member operatively coupled to the lower end of the height-adjustable assembly;

a pair of spaced-apart elongate side members coupled to and extending laterally-outwards from the height-adjustable assembly;

a brake cable housing operatively connecting to the height-adjustable assembly at a location between the brake actuator and the brake member, the brake cable housing being interposed between said side members and including an upper peripheral edge portion and a lower peripheral edge portion, the upper peripheral edge portion and the lower peripheral edge portion of the brake cable housing being u-shaped in cross-section and being shaped to abut with and receive respective ones of said side members for coupling to the walker apparatus thereby; and

a brake cable assembly including a flexible, inner cable and a flexible, outer casing through which the inner cable extends and is moveable relative thereto, the inner

Date Reçue/Date Received 2021-02-12

cable having a first end operatively connected to the brake actuator and a second end operatively connected to the brake member, the brake cable assembly being primarily enclosed within the height-adjustable assembly with a slack portion of the brake cable assembly extending through the aperture of the height-adjustable assembly and being enclosed within the brake cable housing.

Date Reçue/Date Received 2021-02-12

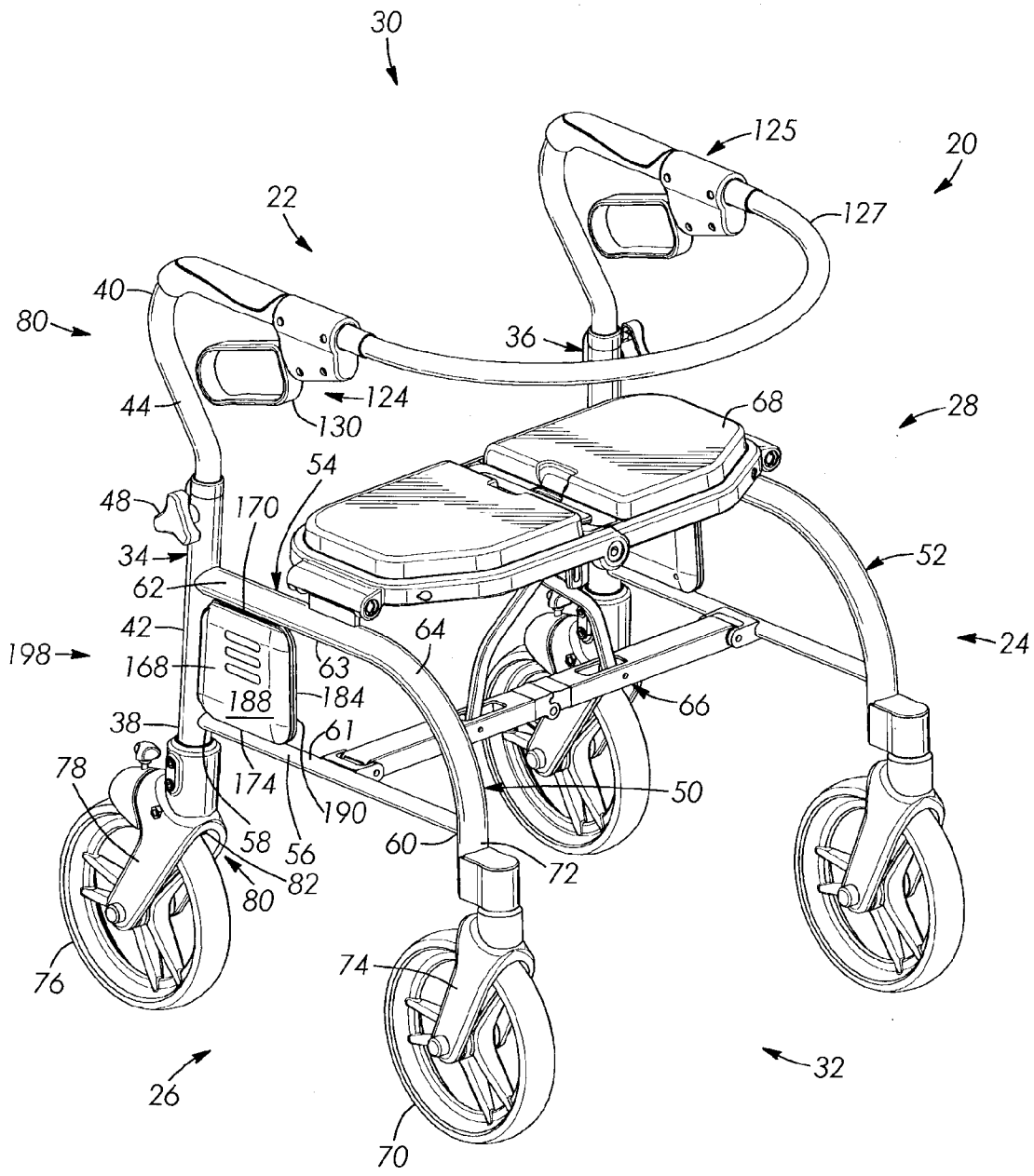

30
125
20
22
127
40
80
36
124
44
130
68
28
54
48
170
34
62
52
42
64
198
168
63
24
188
184
66
38
61
78
174
50
190
58
56
60
72
82
80
74
76
26
32
70

FIG. 1

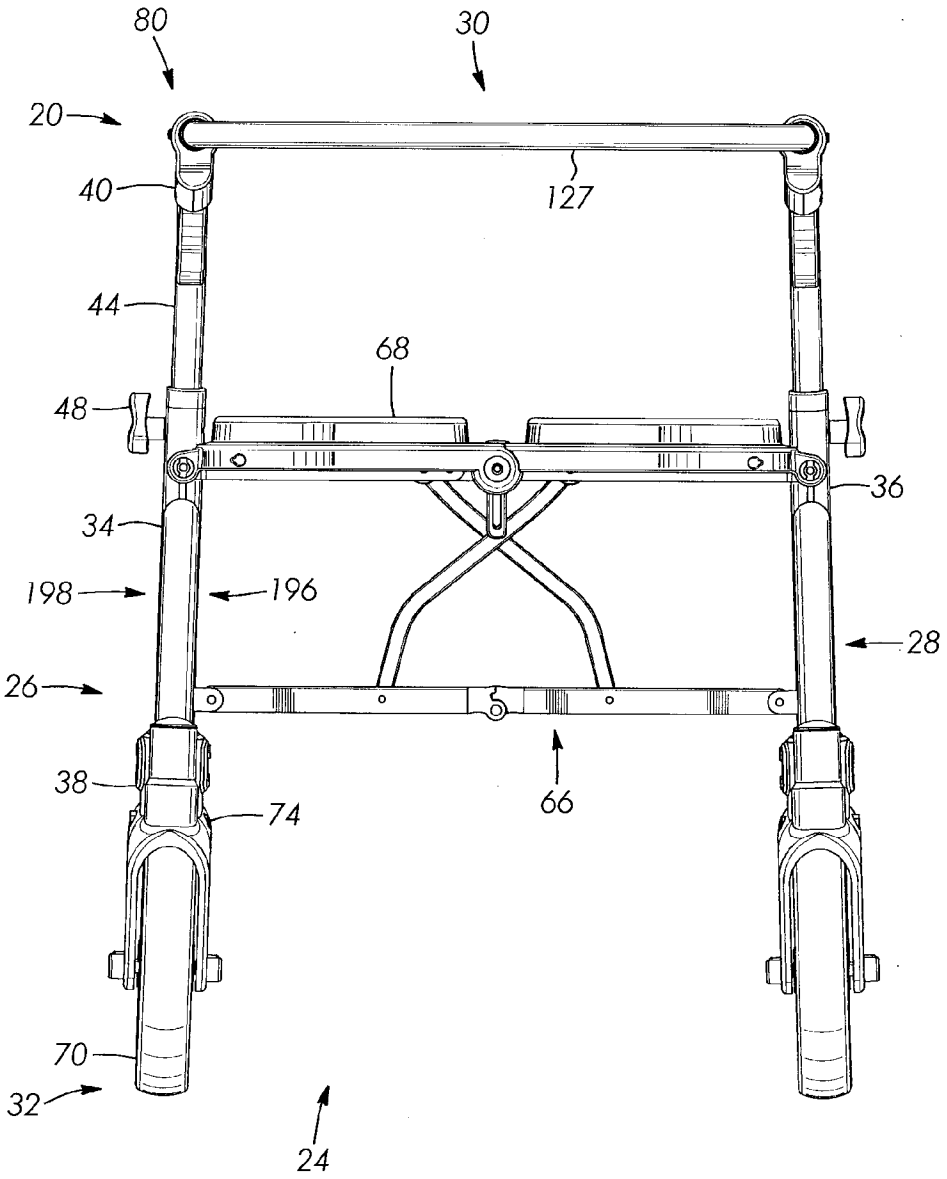


FIG. 2

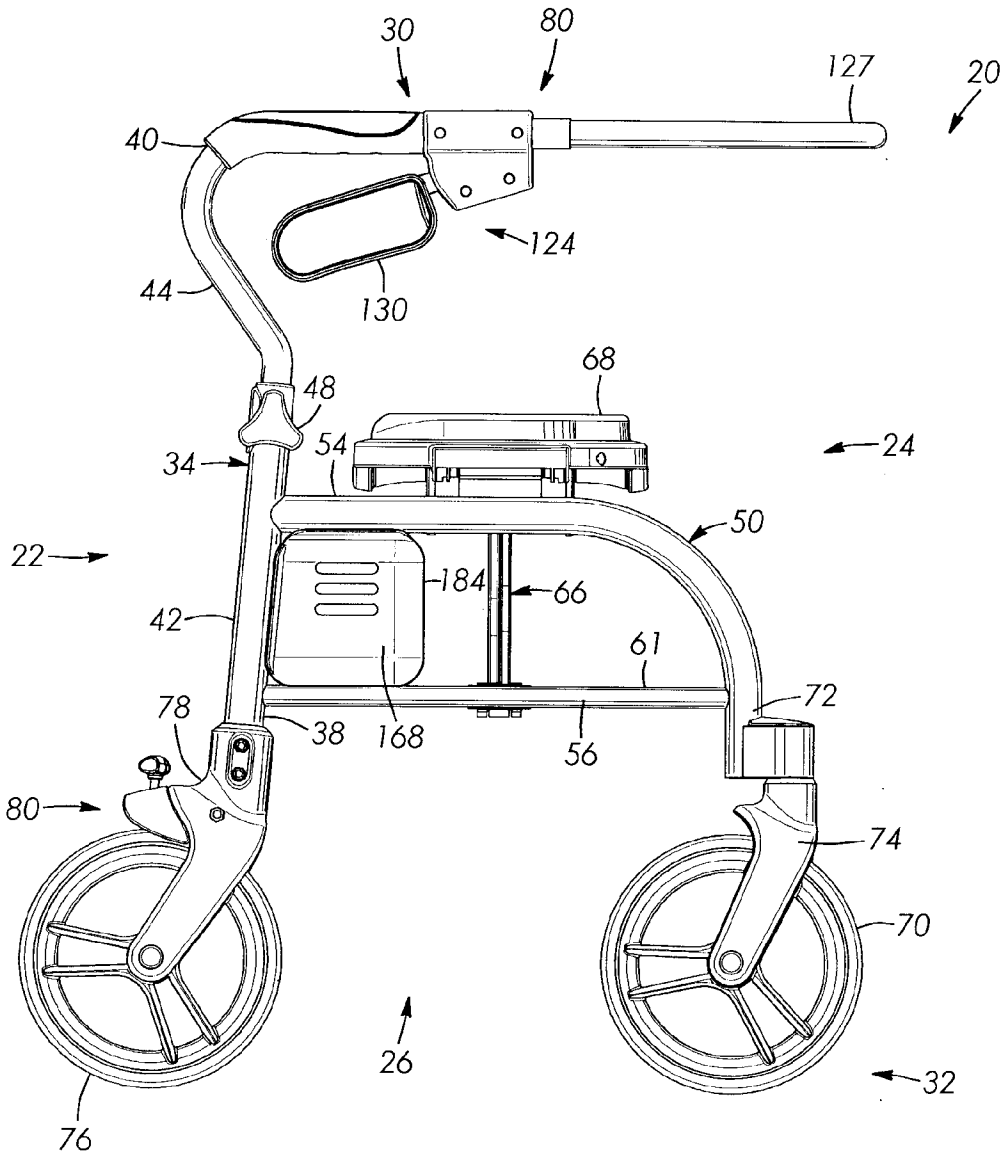

30
80
127
20
40
124
130
44
68
48
54
24
34
50
22
184
66
42
61
72
78
38
168
56
80
74
70
26
32
76

FIG. 3

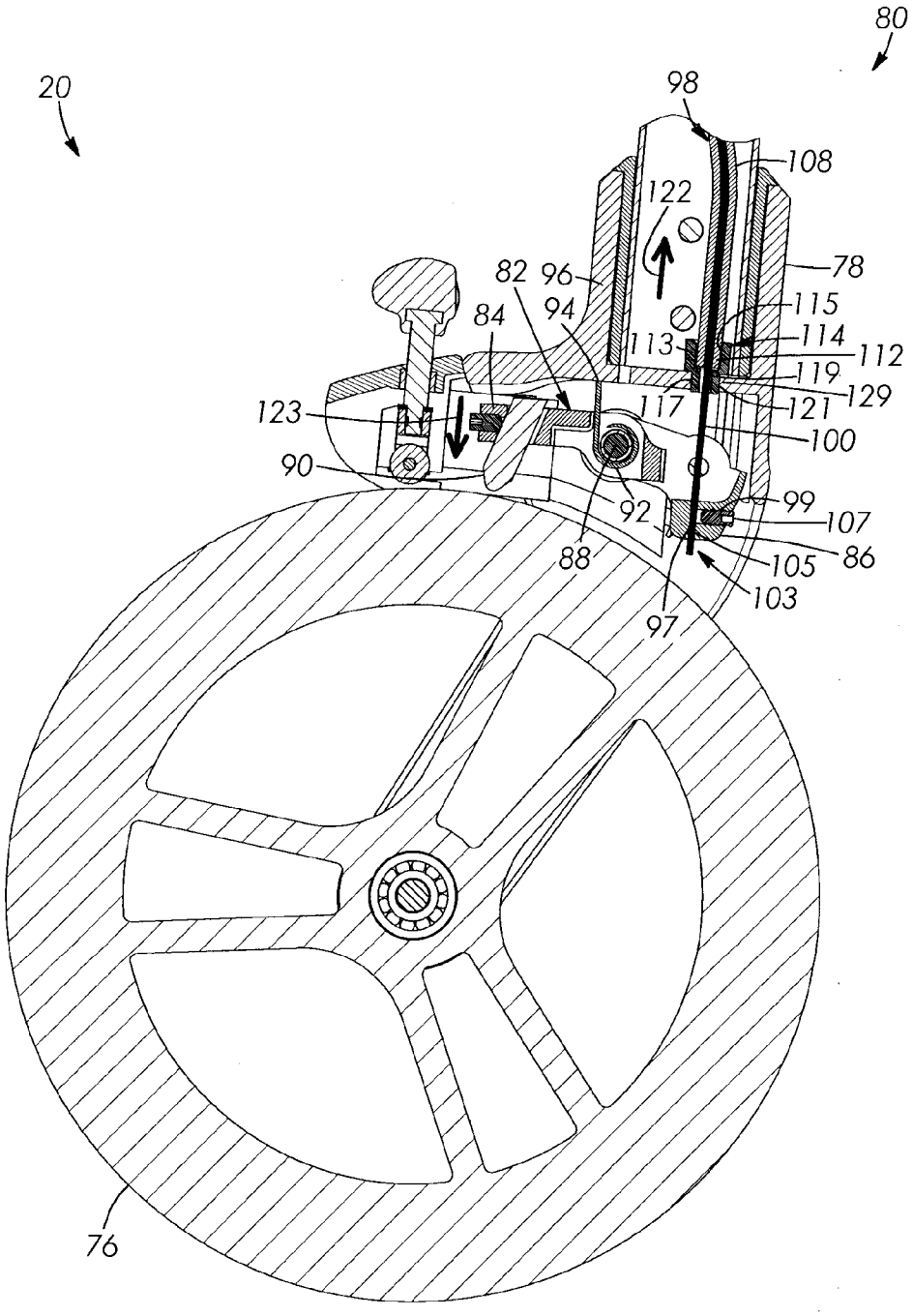

80
20
98
108
122
78
82
96
84
94
115
113
114
112
119
129
123
117
121
100
90
92
99
107
88
105
86
103
97
76

FIG. 4

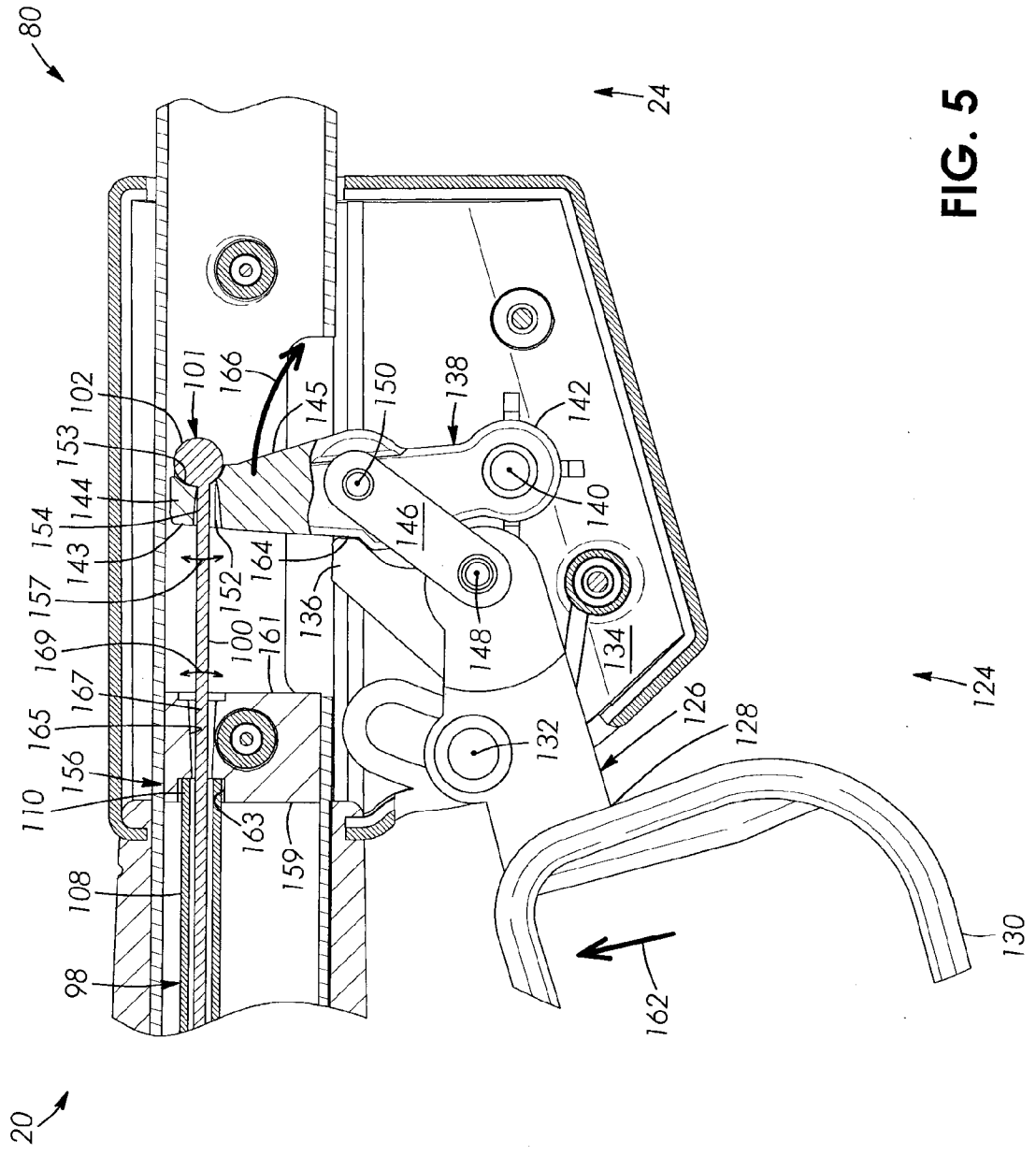

80
24
101
166
145
150
138
142
102
153
144
154
143
157
169
167
165
156
110
108
98
20
146
140
152
164
136
100
161
148
134
132
126
128
124
163
159
162
130

FIG. 5

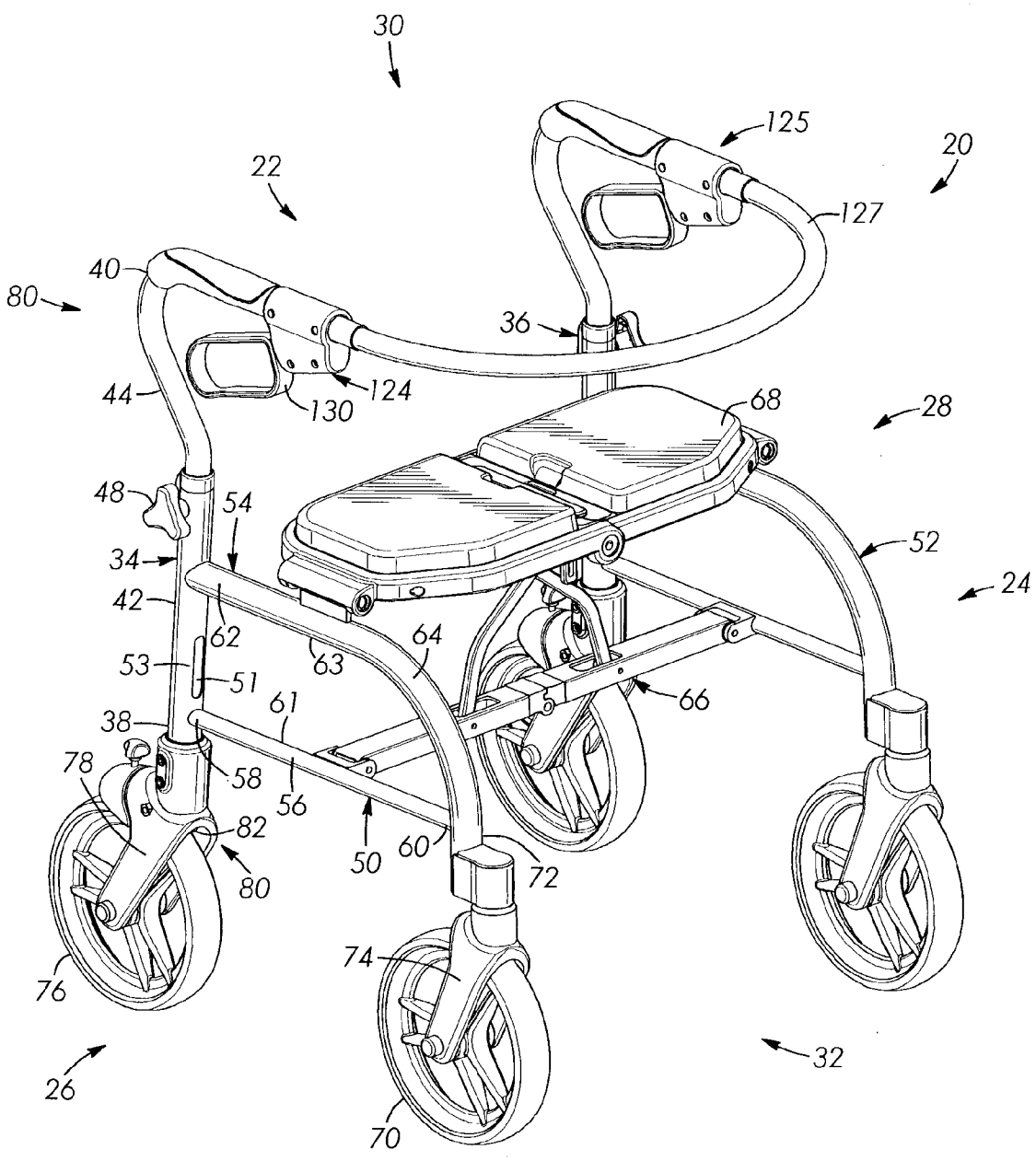

30
125
20
22
127
40
80
36
44
124
130
68
28
48
54
52
34
24
42
62
64
53
51
63
66
61
38
78
58
56
82
50
60
72
80
74
76
32
26
70

FIG. 6

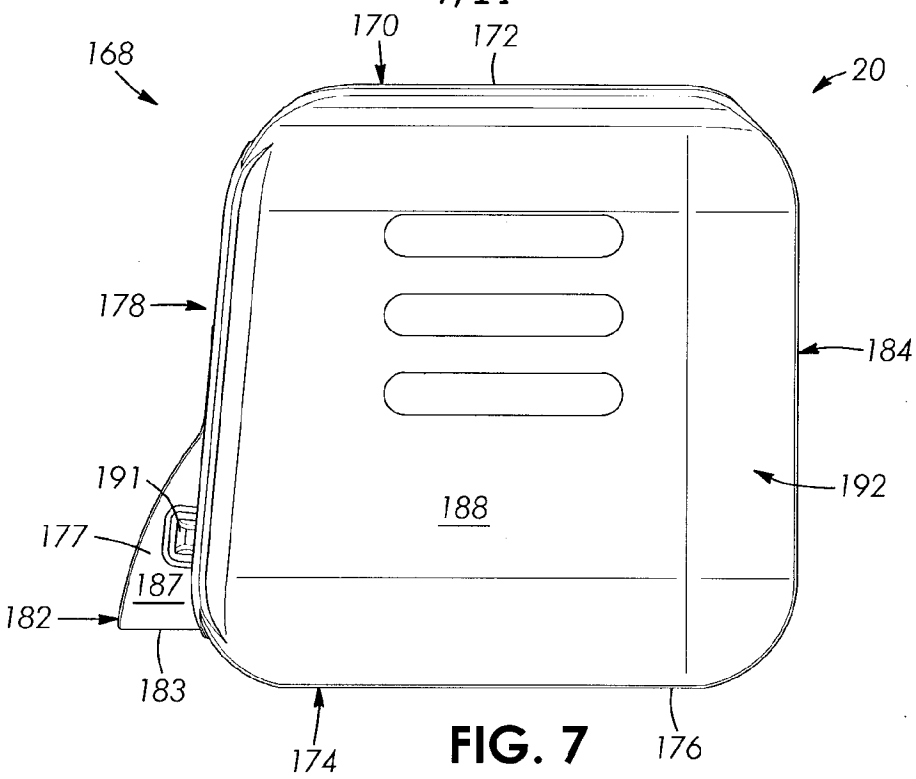

168
170
172
20
178
184
191
192
188
177
187
182
183
174
176

FIG. 7

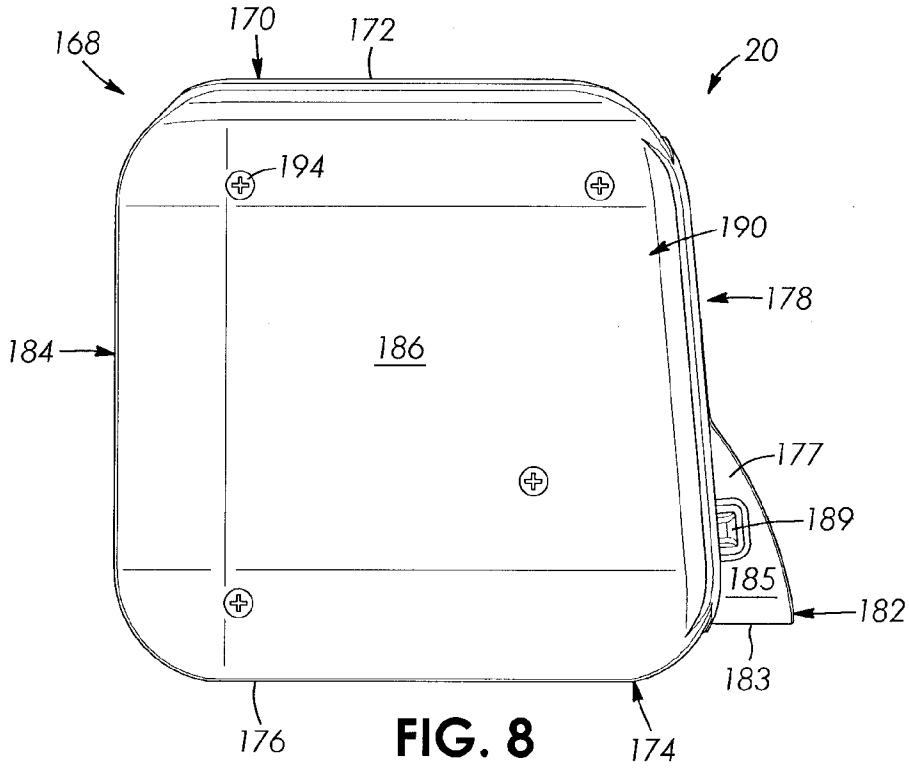

168
170
172
20
194
190
178
184
186
177
189
185
182
183
176
174

FIG. 8

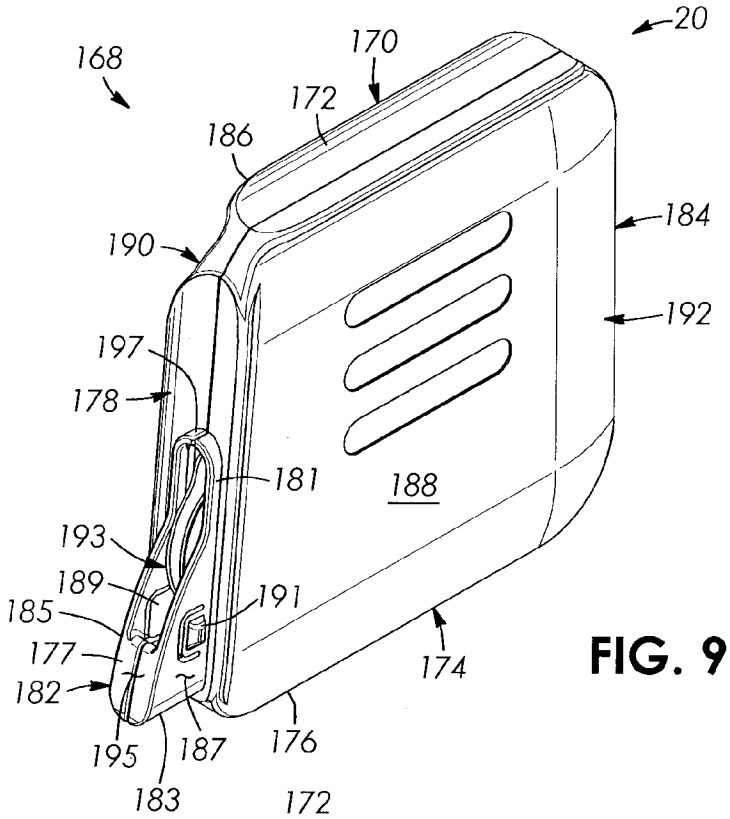

20
168
170
172
186
184
190
192
197
178
181
188
193
189
191
185
177
182
174
195
187
176
183

FIG. 9

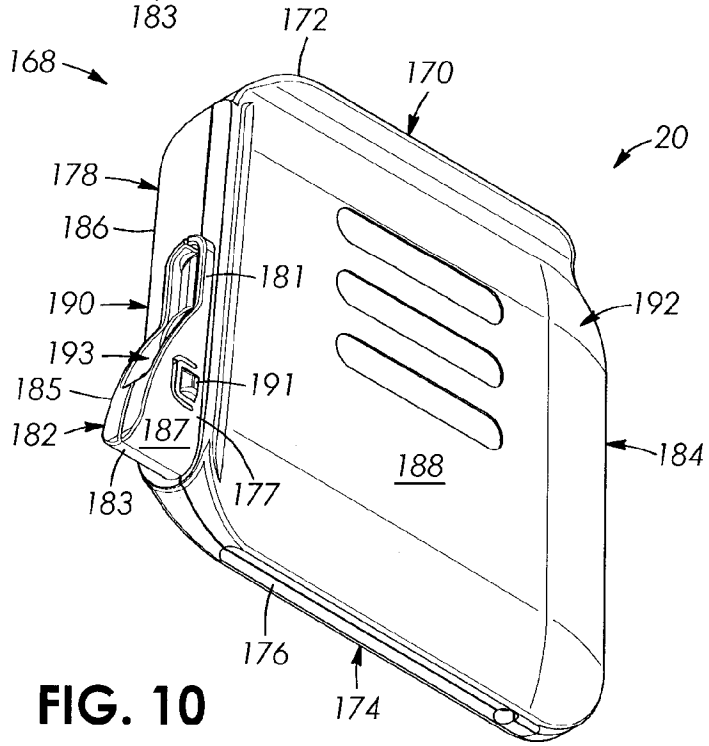

172
168
170
20
178
186
181
190
192
193
191
185
182
187
188
184
183
177
176
174

FIG. 10

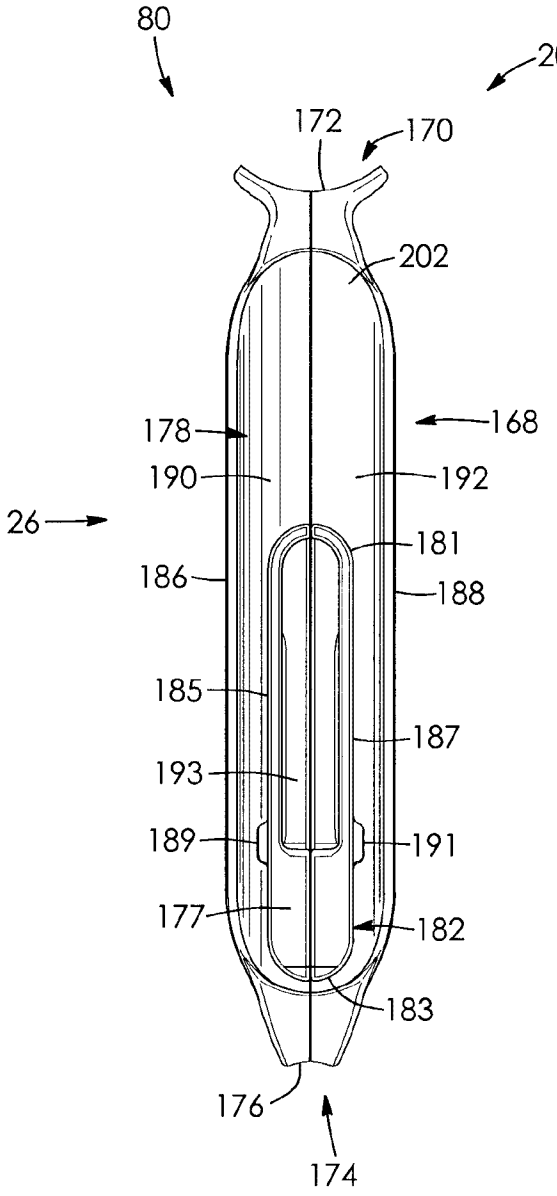

80
20
172
170
202
178
168
190
192
26
181
186
188
185
187
193
189
191
177
182
183
176
174

FIG. 11

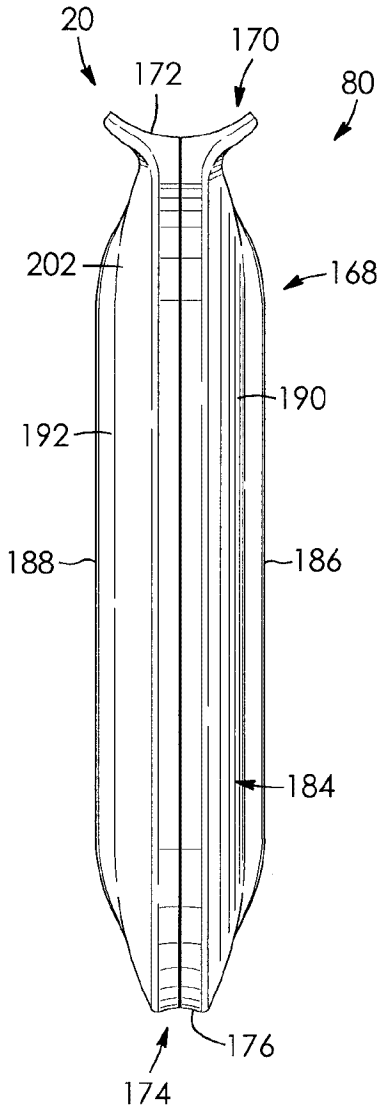

20
170
172
80
202
168
190
192
188
186
184
176
174

FIG. 12

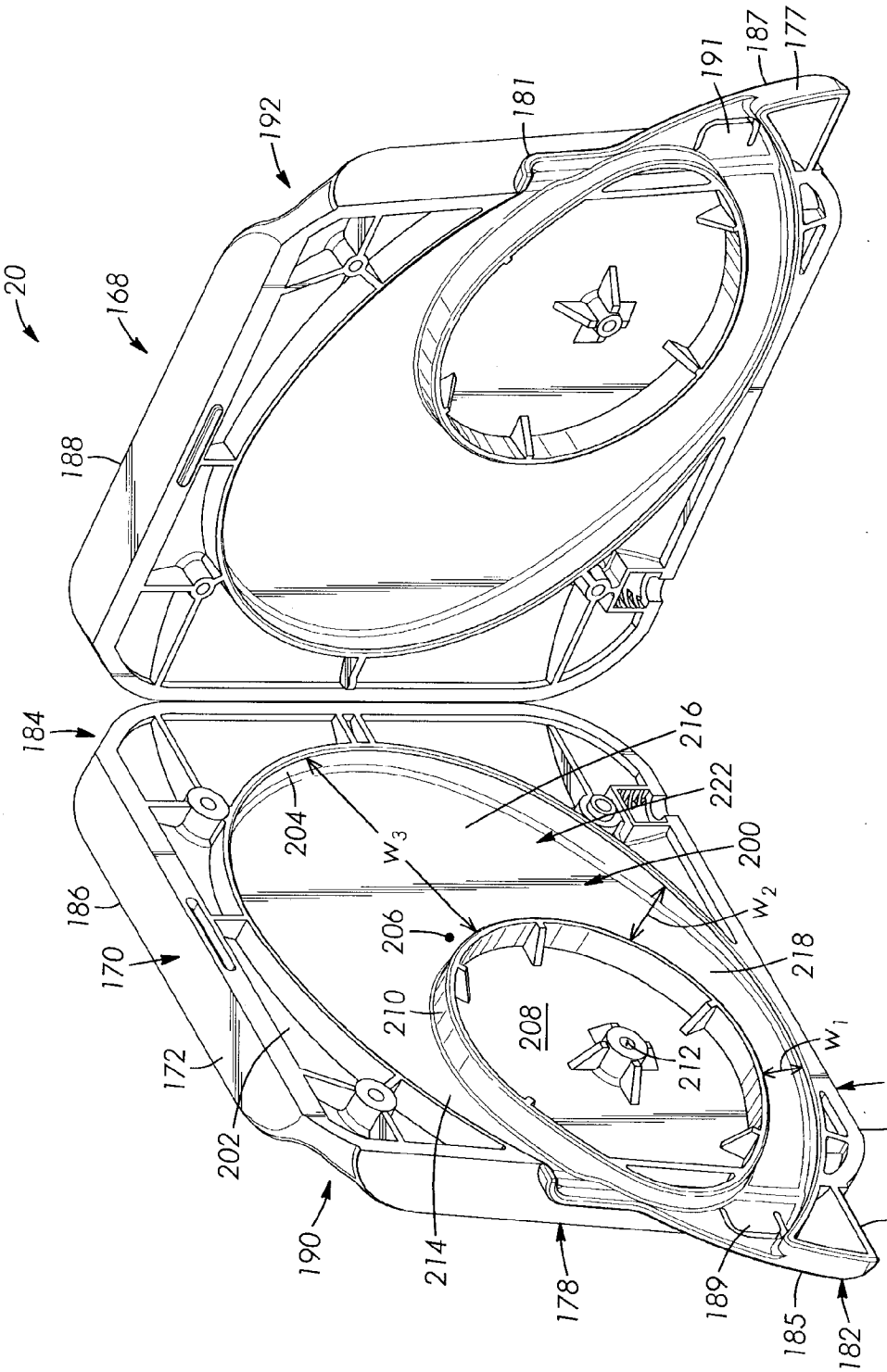

20
168
188
192
181
191
187
177
184
186
170
172
202
190
214
178
189
185
182
183
176
174
204
w_3
216
222
200
w_2
206
218
210
208
212
w_1

FIG. 13

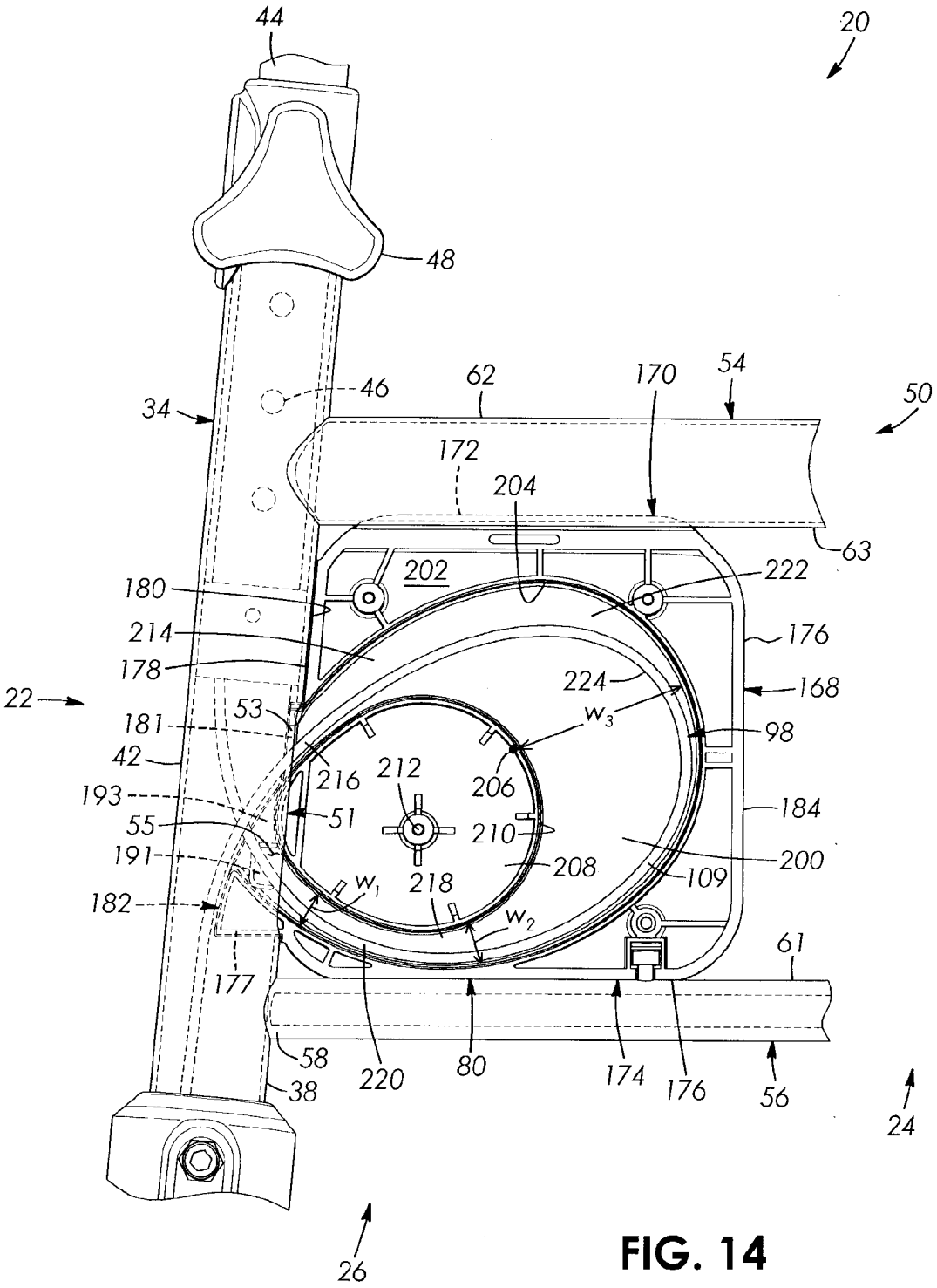

44
20
48
46
62
170
54
50
34
172
204
63
202
222
180
214
176
178
224
168
22
53
w_3
98
181
42
216
212
206
184
193
51
55
210
200
191
208
109
w_1
218
182
w_2
61
177
58
220
80
174
176
56
38
24
26

FIG. 14

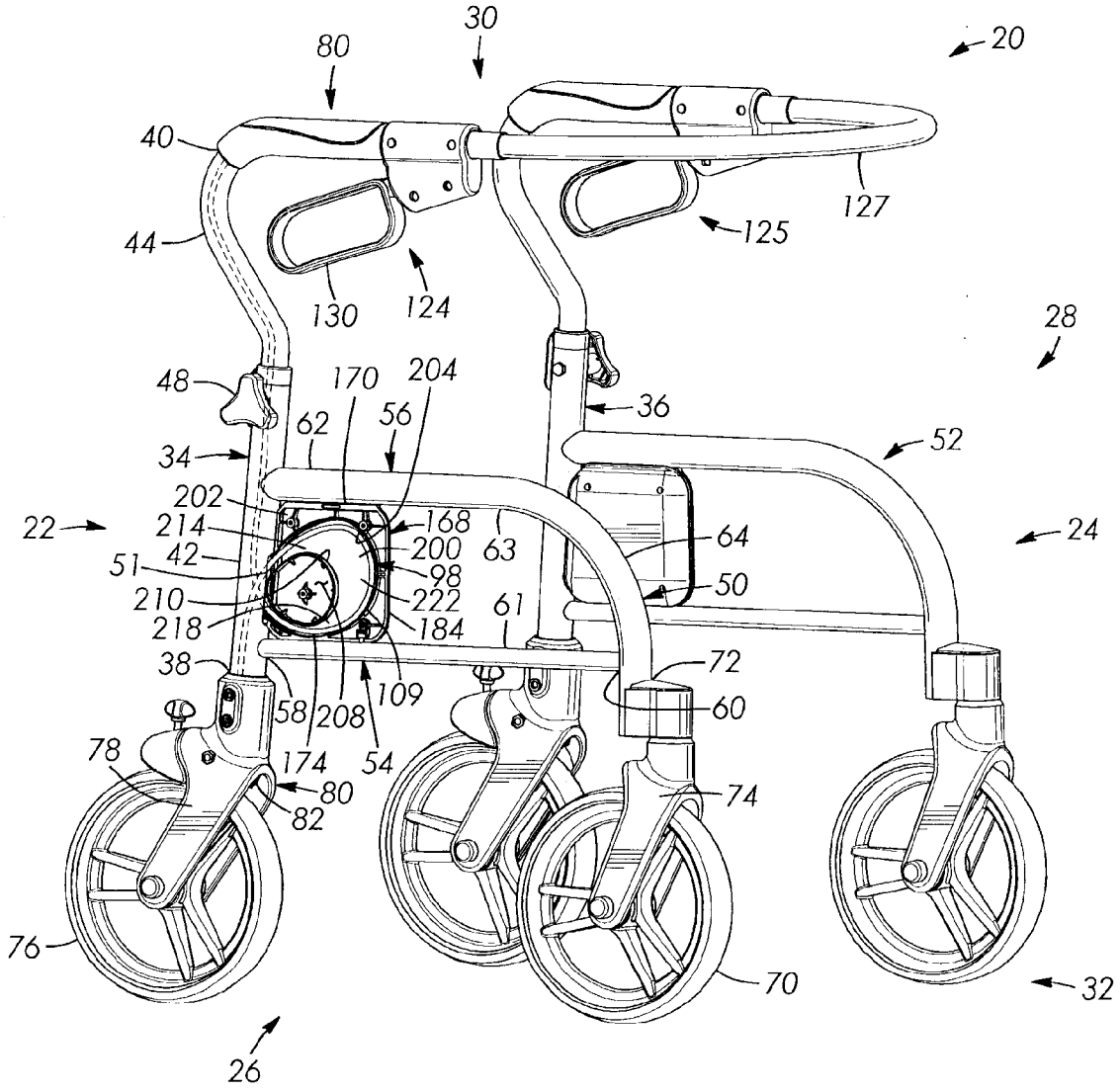

80
30
20
40
44
130
124
125
127
28
48
170
204
62
56
36
34
52
202
214
168
22
200
63
64
24
42
51
98
50
210
222
61
218
184
38
72
58
208
109
60
78
174
54
80
74
82
76
70
32
26

FIG. 15

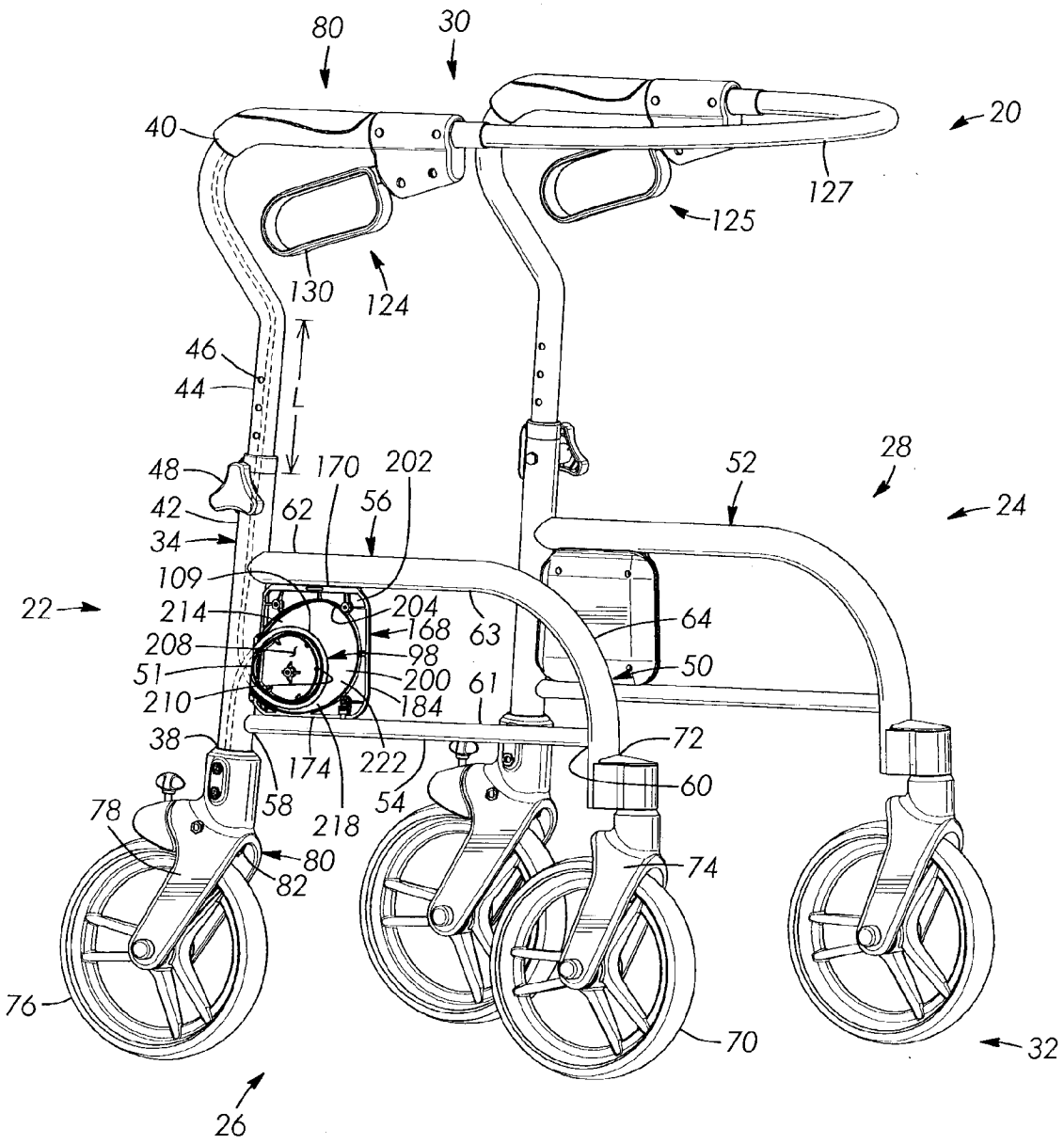

80
30
40
20
127
125
130
124
46
44
L
48
170
202
52
28
42
62
56
24
34
109
22
214
204
64
208
168
63
98
51
50
200
61
210
184
38
72
174
222
60
58
54
78
218
80
74
82
76
70
32
26

FIG. 16

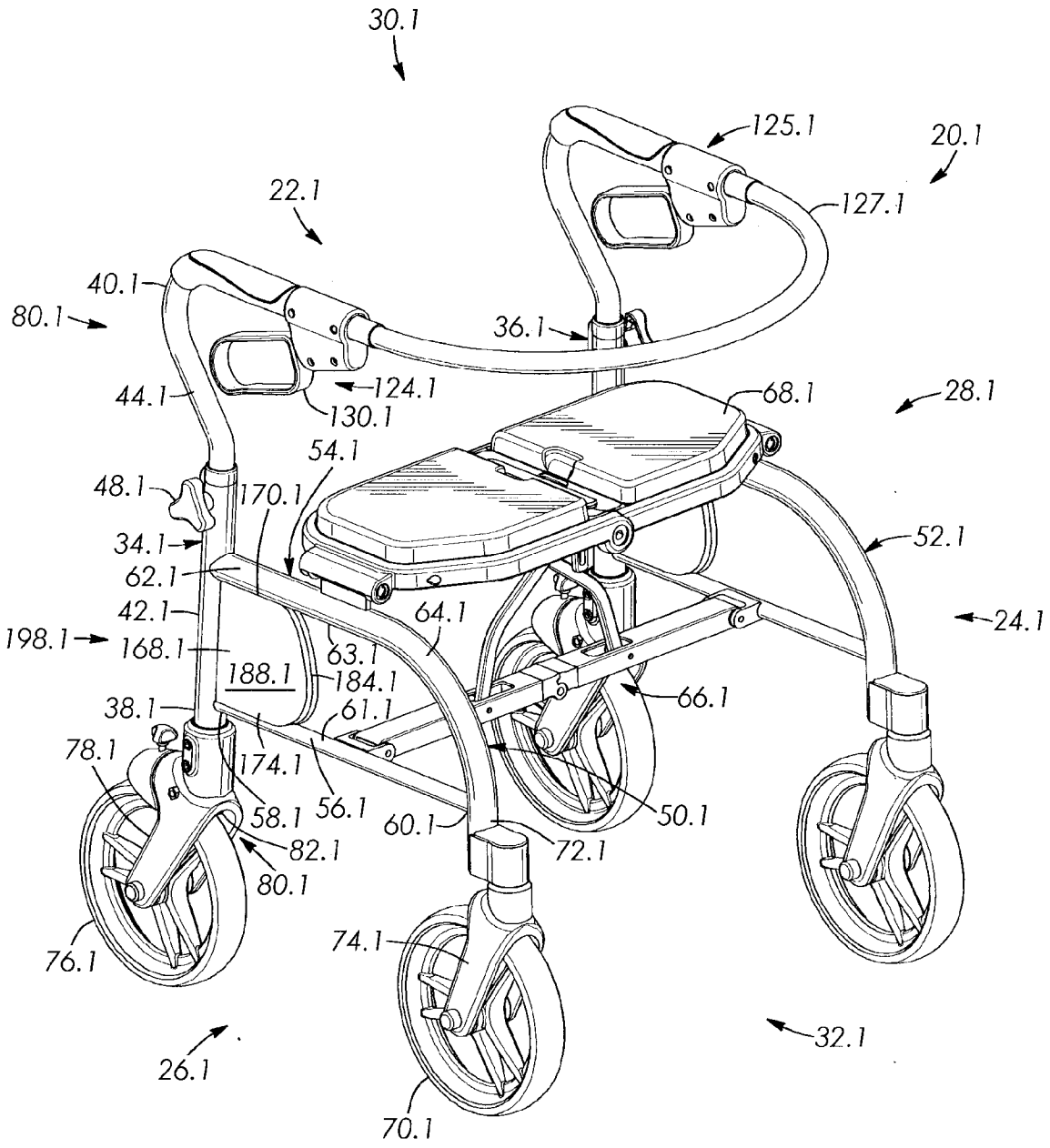
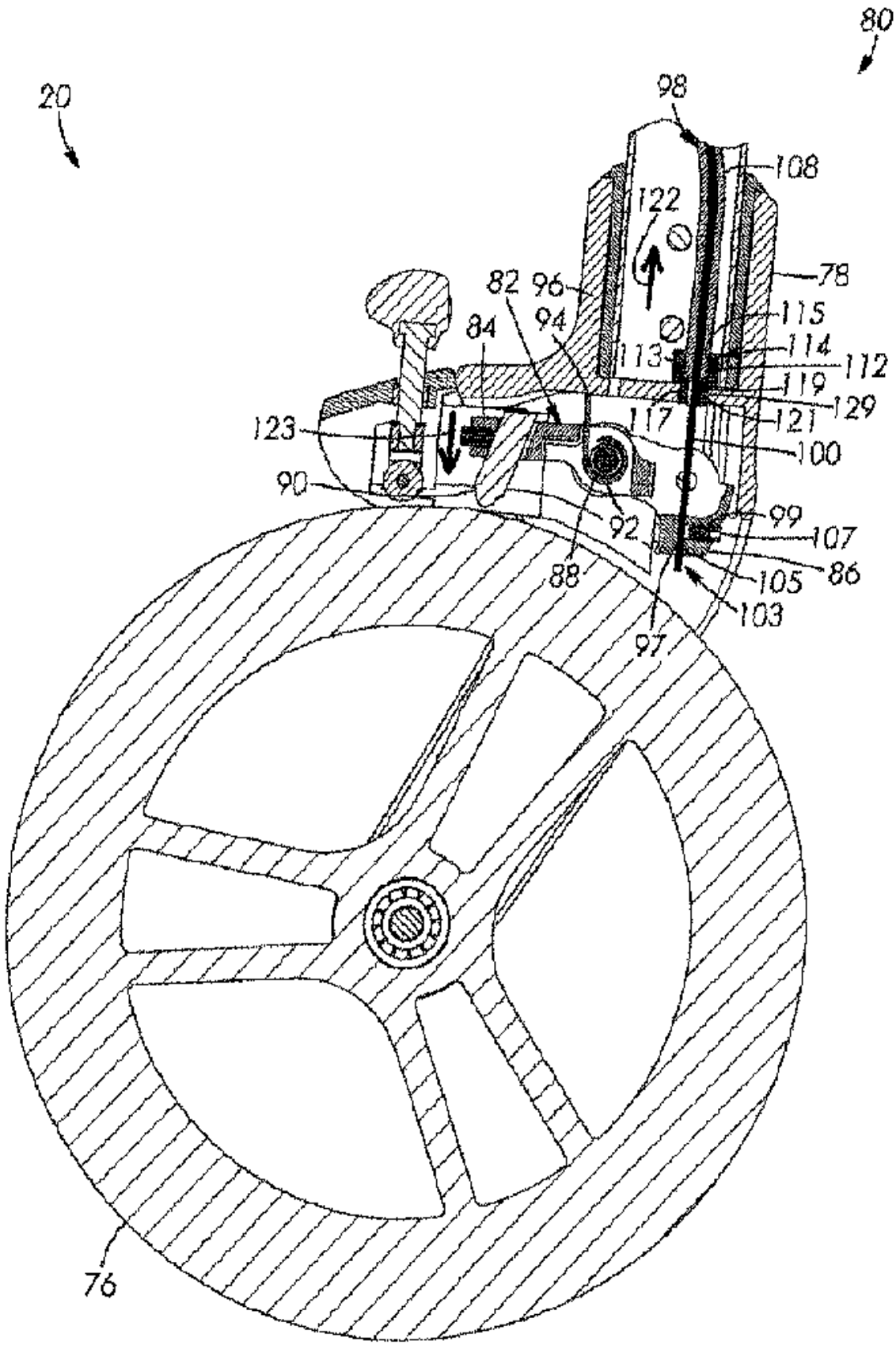

30.1
125.1
20.1
22.1
127.1
40.1
80.1
36.1
124.1
44.1
130.1
68.1
28.1
54.1
48.1
170.1
52.1
34.1
62.1
42.1
64.1
24.1
198.1
168.1
63.1
188.1
184.1
66.1
38.1
61.1
78.1
174.1
58.1
56.1
60.1
50.1
82.1
72.1
80.1
76.1
74.1
32.1
26.1
70.1

FIG. 17


80
20
98
108
122
78
82
96
94
84
115
114
113
112
119
129
123
117
121
100
90
92
99
107
88
105
86
103
97
76