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(72) Inventor:  
**McDINE, Roy  
Littlemarsh, Semington  
Trowbridge  
(GB)**

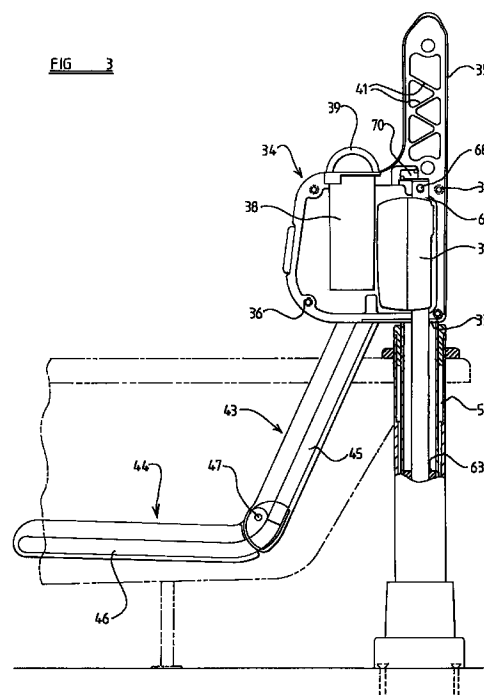
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(74) Representative: **Lally, William  
FORRESTER & BOEHMERT  
Franz-Joseph-Strasse 38  
80801 München (DE)**

(71) Applicant: **Parker Bath Ltd.  
Wollaston, West Midlands DY8 4PS (GB)**

**(54) Lifting apparatus**

(57) Apparatus for assisting a bather into and out of a bath, comprises a base (20); a telescopic lifting pillar with a second part (32) telescopically moveable upwardly and downwardly relative to a first part (31); a housing (22) secured to said second part; an actuator (61, 62) operable to cause upwards and downwards movement of said second part relative to said first part, said actuator including a drive motor (37) disposed within said housing (22) and further being arranged to apply lifting loads occurring in use to said housing; a support means (23) for a bather, carried by said housing; and means providing for translatory movement of said support means.



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## Description

[0001] This invention relates to lifting apparatus for a person. The apparatus has been devised for the purpose of lifting a person to assist the person into and out of a bath tub: such assistance may be required if the person wishing to bathe has a physical disability or for some other reason is unable to enter and leave the bath tub by the usual method of stepping over a side thereof.

[0002] Various forms of lifting apparatus for this purpose are well known. Broadly the elements they have in common are a means for supporting a person, a mechanism by which the person-supporting means can be raised and lowered, and some means providing for translatory movement of the person-supporting means so that it can be moved between positions respectively above the bath and above the ground alongside the bath. The person-supporting means may be a seat so that a person can sit thereon outside the bath, be lifted, moved above the bath and lowered into the bath, and when bathing is completed lifted out of the bath and returned to, e.g., a wheelchair standing alongside the bath. The seat must, of course, be unaffected by being immersed in water in the bath.

[0003] In one known form of apparatus the lifting means is in the form of a pillar or column which is supported at its lower end on the floor surface adjacent the bath and comprises first and second parts relatively moveable telescopically. One part is fixed and the other carries the person-supporting means. A, suitable actuator for causing raising or lowering movement of the second part relative to the first part is provided. Whilst this arrangement of apparatus is compact and, if suitably designed, can be neat in appearance, those examples of such apparatus known hitherto have been expensive and complex in their construction. Thus while they have been suitable for installation in institutions they have not in general been appropriate for domestic installation.

[0004] It is broadly the object of the present invention to provide apparatus which, by virtue of being relatively simple in construction and thus economical in manufacture, is suitable for domestic installation as well as being more generally usable.

[0005] According to the invention, we provide apparatus for assisting a bather into and out of a bath, comprising:

a base adapted to be floor-mounted;  
a lifting pillar extending upwardly from the base and comprising a first part fixed to the base and a second part telescopically movable upwardly and downwardly relative to the first part;  
a housing secured to said second part;  
an actuator operable to cause upwards and downwards movement, as required, of said second part relative to said first part, said actuator including a drive motor disposed within said housing and further being arranged to apply lifting loads occurring

in use to said housing;

a support means for a bather, said support means being carried by said housing; and  
means providing for translatory movement of said support means.

[0006] Preferably said support means for a bather is a seat disposed alongside said housing and at least partly extending downwardly therefrom, so as to be able to be lowered into the bath and raised therefrom.

[0007] In apparatus according to the invention, the housing contains at least the drive motor of the actuator and serves as a load-carrying structural item. This enables a great simplification in construction of the apparatus to be achieved, as compared with those generally known hitherto.

[0008] Conveniently the housing is a casting, and comprises two parts which together define an internal space in which at least the drive motor of the actuator is accommodated, and which are able to receive same and be fitted together to constrain the actuator in force-transmitting relationship therewith.

[0009] Preferably the drive motor of the actuator is an electric motor operable from a low-voltage power source, namely a battery pack, and the housing also accommodates such a battery pack. The use of a low voltage, battery powered, actuator is, of course, desirable for safety in a piece of apparatus which operates in the vicinity of water, and is virtually guaranteed to receive water splashes in use and be subject to a damp atmosphere.

[0010] Preferably the translatory movement of the bather-supporting means, namely a seat, between its two positions above the bath and above the floor adjacent the bath, is arcuate, provided by angular movement of the housing about an upwardly extending axis of the lifting pillar. Preferably such angular movement can take place only when the second part of the lifting pillar has been raised to or approaching its maximum height relative to the first part of the lifting pillar.

[0011] This may be achieved by providing the first part of the lifting pillar, within which the second part is telescopically accommodated, with an internal shape which includes circumferentially spaced part-cylindrical portions for guidance of the second part and, between said part-cylindrical portions, outwardly extending locating portions with which a locating member of the second part engages, the first part having, towards its upper end, an internally enlarged portion which, when it is entered by the locating member, permits rotational movement of the second part within the first part.

[0012] Preferably the first part of the lifting pillar is an aluminium alloy extrusion.

[0013] The actuator part accommodated by the housing may be supported therein for limited upwards and downwards movement relative thereto, and there may be provided means for detecting any such movement of the actuator from its normal position when the appara-

tus is normally loaded. Particularly, if any obstruction is encountered when the housing is in the course of being lowered, which implies the danger of some person or thing being trapped beneath the seat of the apparatus, such movement may be detected and operate to cause the downward movement to cease. Such detection may be provided by a micro-switch engaged or engagable by the actuator.

**[0014]** As above referred to, the person-supporting means of the apparatus preferably is a seat, which conveniently is a tubular frame structure covered with and protected by a plastics, e.g. polyurethane, foam material with a waterproof skin or cover.

**[0015]** These and other features of the invention will now be described by way of example with reference to the accompanying drawings, of which:-

Figure 1 is a diagrammatic plan view of a bath and an apparatus in accordance with the invention disposed in association therewith;

Figure 2 is a diagrammatic elevation of the apparatus disposed in relation to a bath;

Figure 3 is an enlarged partly sectioned elevation of the apparatus according to the invention;

Figures 4, 5 and 6 are enlarged details of the apparatus according to the invention.

**[0016]** Referring firstly to Figures 1 and 2 of the drawings, these show, diagrammatically, apparatus in accordance with the invention disposed in relation to a bath. The bath, indicated in outline at 10, is a conventional bath such as might be installed in a private dwelling, and comprises a tub portion 11 which is an upwardly facing concavity with, a base 12, relatively upright side walls 13, 14 and an end wall 15, and a more inclined and curved end wall 16. Around its top it has a peripheral flange 17 which in plan view is rectangular. The bath is supported on a floor surface by supports, as indicated at 18.

**[0017]** An apparatus in accordance with the invention is disposed in association with the bath, the apparatus comprising the principal components of a base indicated generally at 20, a lifting pillar or column 21 extending upwardly therefrom, a housing 22 at the top of the pillar 21, and a support means for a bather, namely a seat, 23 carried by the housing 22. The base 20 comprises a base casting 25 which extends transversely beneath the head end of the bath 10 i.e. the end which has the inclined and curved end wall 16), and is adapted to be held down to the floor surface by suitable fastenings extending through formations as indicated at 26 in the base casting. Two tubular outriggers 27 extend from the base casting 25 lengthwise beneath the bath and these engage outrigger floor plates 28 which are secured to the floor surface beneath the bath. Thus the base casting 25 is firmly secured to the floor in the vicinity of the bath and is well able to withstand loads likely to be imposed in use as described hereafter. The base

casting may also be secured to adjacent walls by brackets and fastenings as indicated at 29. However, it will be appreciated that further forms of mounting may be provided to suit other installation situations: for example, whilst a substantial base casting and outriggers as described above may be desirable for a domestic situation where a bathroom floor is most likely to comprise simple floorboards in relation to which loads have to be widely spread, in some installation situations such load spreading might not be required and a more simple pedestal form of base which can be firmly anchored to a floor of suitable load-bearing capabilities can be utilised.

**[0018]** At an end thereof which lies beneath one corner of the peripheral flange 17 of the bath, the base casting 25 has an upstanding collar 30 which supports the lifting pillar 21. The top of the lifting column extends through an aperture in the flange 17 of the bath. The construction of the lifting pillar 21 will be described in greater detail hereafter, but in broad terms it comprises an outer column element 31, and an inner column element 32 which is telescopically movable upwardly and downwardly within the outer column 31. The inner column 32 is a tubular steel member with a hard-chromed external bearing surface, and at its upper end the inner column 32 is friction welded to a carrier flange 33. The carrier flange 33 carries the housing 22.

**[0019]** The housing 22 comprises a main part 34 and a seat-supporting part extending upwardly therefrom 35. The housing is hollow and comprises two cast-aluminium halves which fit together facing one another at a joint line which extends vertically substantially in or parallel to the section which is Figure 3 of the drawings. The two halves of the housing are held together by elongate threaded fasteners extending transversely there-through as indicated at 36. Within the part 34 of the housing there is defined an internal space which accommodates an electric drive motor casing 37 of an actuator described in greater detail hereafter, and also accommodates a removable re-chargeable battery pack 38. The battery pack 38 is able to be withdrawn vertically from the part 34 of the housing 22, having a handle 39 for this purpose and also one part of a plug and socket connector which establishes electrical connections with the battery pack when the latter is fitted into the housing. Also visible on the housing part 34 is a cushion member 40 on the exterior thereof.

**[0020]** The upwardly extending seat-supporting part 35 of the housing 22 is also hollow, with internal reinforcing webs 41. Two relatively large apertures 42 extend transversely through the part 35, for receiving the end parts of horizontally extending transverse supporting bars 49 which carry the seat 23. A quick-release mechanism for the seat may be provided, to enable it readily to be removed and replaced if the bath is required sometimes to be used by bathers who do not have access problems. The seat 23 comprises a back-rest part 43 and a base cushion part 44, and are of foamed plastics material with a waterproof skin or cov-

ering, candied by a welded tubular steel supporting structure. In Figure 3 of the drawings, tubes of such supporting structure of the backrest part 43 and cushion part 44 are indicated at 45, 46, respectively, and such tubes are provided with respective arcuate flanges at their adjacent ends, which flanges are pivoted together at a pivot 47 so that the cushion part 44 is able to be pivoted upwardly to lie substantially parallel to the backrest part 43. The limiting lower position of such pivoting movement of the cushion part 44 is illustrated in Figure 3, wherein the tubes 45, 46 abut one another to provide a stop. The seat further has one or more arm rests 48, pivoted to the backrest part 43.

[0021] Returning now to the pillar 21, the outer column 31 is an elongate extrusion of an aluminium alloy and its cross-sectional shape is shown in Figure 4. In such cross-section, its external shape is substantially square with rounded corners and its internal shape comprises four arcuate pails 50 of a circle, between which there are four outwardly extending recesses 52, in cruciform disposition relative to one another. The outer column 31 fits in the collar 30 of the base casting being located therein by an alignment bush 53 and retained by grub screws 54. At its upper end, the outer column 31 is counterbored as indicated at 55, and a bearing sleeve 56 having a part 57 which extends downwardly within the counterbore 55 fits on top of the outer column 31. The sleeve 56 is of a suitable plastics material to provide a good bearing surface for engagement by the inner column 32. The outer column 31 extends through a bath flange bush 60 bolted to the upper surface of the peripheral flange 17 of the bath and which extends around the aperture in the flange through which the top of the column extends.

[0022] At its lower end, the inner column 32 carries a glide bush 58, retained by a retaining ring 59 held to the inner column by four Allen cap screws 66. The heads of the screws 66 engage in the recesses 52, while the glide collar 58 runs against the arcuate parts 50 of the internal profile of the outer column.

[0023] Thus the inner column 32 is supported by the outer column 31 for vertical sliding movement relative thereto, relative angular movement about the vertical axis of the column not being possible as long as the screw heads 66 engage the cruciform recess parts 52 within the outer column. However, when the inner column has been raised relative to the outer column to a position in which the heads of the screws 66 enter the counterbore 55 at the top of the outer column, such relative angular movement is possible. At this position, the glide collar 58 still engages the arcuate surface parts 50 within the outer column 31, so that the inner column 32 is maintained in coaxial alignment with the outer column. It will be appreciated that from such position in which the heads of screws 66 are within the counterbore 55, the inner column is able to move downwardly within the outer column at any selected one of four angular positions at 90° displacements from one

another, and one of such positions will be required to position the seat 23 above the head end of the bath as shown in plan view in Figure 1, while another position at 90° to the first said position disposes the seat above the floor surface adjacent the head end of the bath. These, of course, correspond to lowering a seated bather into the bath (as indicated by an outline of a bather in Figure 2) and positioning the seat so that the bather can sit down thereon or alight therefrom outside the bath.

[0024] For moving the inner column upwardly and downwardly relative to the outer column there is the actuator whose motor casing is indicated at 37. The actuator is a screw type of actuator with a tubular body 61 extending downwardly from the motor casing 37 and from the lower end of the body 61 an output element 62 extends. When the motor 37 of the actuator is operated, and the element 62 is prevented from rotating, the latter is driven downwardly out of the tubular body 61 or retracted upwardly into it, depending on the direction in which the motor is operated. The tubular body 61 is supported centrally within the inner column 32 by a guide sleeve 63.

[0025] The output element 62 of the actuator extends downwardly to enter a boss 65 upstanding from the bottom of the base casting 25 within the collar 30 thereof. The output element 62 is held by a transverse roll pin 66. At its upper end, the motor casing 37 of the actuator is in vertical force-transmitting relation with the housing part 34, a pin 68 extending transversely across the housing and through a vertically elongated slot in a lug 69 at the upper end of the motor casing 37. A micro-switch 70 disposed within the housing 34 is responsive to the small amount of vertical movement which the motor 37 can undergo within the housing part 34, and provides a load-sensing device which is able to detect when the motor casing 37 of the actuator no longer bears the weight of the housing, seat and the bather who might be carried thereby. This enables detection of any obstruction encountered by the housing, seat, or bather during the lowering thereof, and may operate to cause cessation of such lowering as a safety feature in case any part of the bather becomes trapped or some other obstruction is encountered.

[0026] For controlling operation of the actuator of the apparatus to effect lifting and lowering as required, a control panel 75 is provided, having suitable manually operable switches for this purpose. As illustrated in Figure 2, the control panel 75 is at the end of a flexible electrical cable 76 and in Figure 2 the control panel is secured at a convenient position at one side of the part 35 of the housing 22. There may be cooperating clips or the like for holding the control panel in such position, a magnetic holding device, or other means such as a suction cup or cups. When in use, the control panel may be positioned on the bath or elsewhere, to be readily operable by the bather or a helper.

[0027] The features disclosed in the foregoing description, or the following claims, or the accompany-

ing drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately or in any combination of such features, be utilised for realising the invention in diverse forms thereof. of such features, be utilised for realising the invention in diverse forms thereof.

## Claims

1. Apparatus for assisting a bather into and out of a bath, comprising:

a base (20) adapted to be floor-mounted;  
a lifting pillar (21) extending upwardly from the base and comprising a first part (31) fixed to the base and a second part (32) telescopically movable upwardly and downwardly relative to the first part;

a housing (22) secured to said second part;  
an actuator (61, 62) operable to cause upwards and downwards movement, as required, of said second part relative to said first part, said actuator including a drive motor (37) disposed within said housing and further being arranged to apply lifting loads occurring in use to said housing;

a support means (23) for a bather, said support means being carried by said housing; and means providing for translatable movement of said support means.

2. Apparatus according to Claim 1 characterised in that said support means for a bather is a seat (23) disposed alongside said housing, and at least partly extending downwardly therefrom.

3. Apparatus according to Claim 1 or Claim 2 characterised in that said housing (22) is a casting.

4. Apparatus according to Claim 3 characterised in that said housing (22) comprises two parts together defining an internal space in which at least the drive motor (37) of the actuator is accommodated, said parts being adapted to be fitted together with said at least the drive motor of the actuator received thereby and constrained in force-transmitting relationship therewith.

5. Apparatus according to any one of the preceding claims characterised in that the drive motor (37) of the actuator is an electric motor operable from a low-voltage power source.

6. Apparatus according to Claim 5 characterised in that said power source is a removable battery pack (38) accommodated by said housing.

7. Apparatus according to any one of the preceding claims characterised in that the translatable movement of the bather-supporting means is arcuate, afforded by angular movement of the housing (22) about an upwardly extending axis of the lifting pillar (21).

8. Apparatus according to Claim 7 characterised in that said angular movement can take place only when the second part (32) of the lifting pillar has been raised to or approaching its maximum height relative to the first part (31) of the lifting pillar.

9. Apparatus according to Claim 8 characterised in that the first part (31) of the lifting pillar, within which the second part (32) is telescopically accommodated, has an internal shape including circumferentially spaced part-cylindrical portions (50) for guidance of the second part and, between said part-cylindrical portions, outwardly extending locating portions (52) with which locating means (66) of the second part engages, the first part having, at or towards its upper end, an internally enlarged portion (55) which, when it is entered by the locating means, permits angular movement of the second part within the first part.

10. Apparatus according to Claim 9 characterised in that said locating means (66) comprises locating formations in cruciform disposition.

11. Apparatus according to Claim 9 or Claim 10 characterised in that said first part (31) of the lifting pillar is an extrusion of an aluminium alloy.

12. Apparatus according to any one of the preceding claims characterised in that the actuator is supported relative to the housing by means (68, 69) providing for limited upwards and downwards relative movement therebetween, and there is means (70) for detecting any such movement of the actuator from its normal position assumed when the apparatus is normally loaded.

13. Apparatus according to Claim 12 characterised in that said means (70) for detecting movement of the actuator comprises a micro-switch.

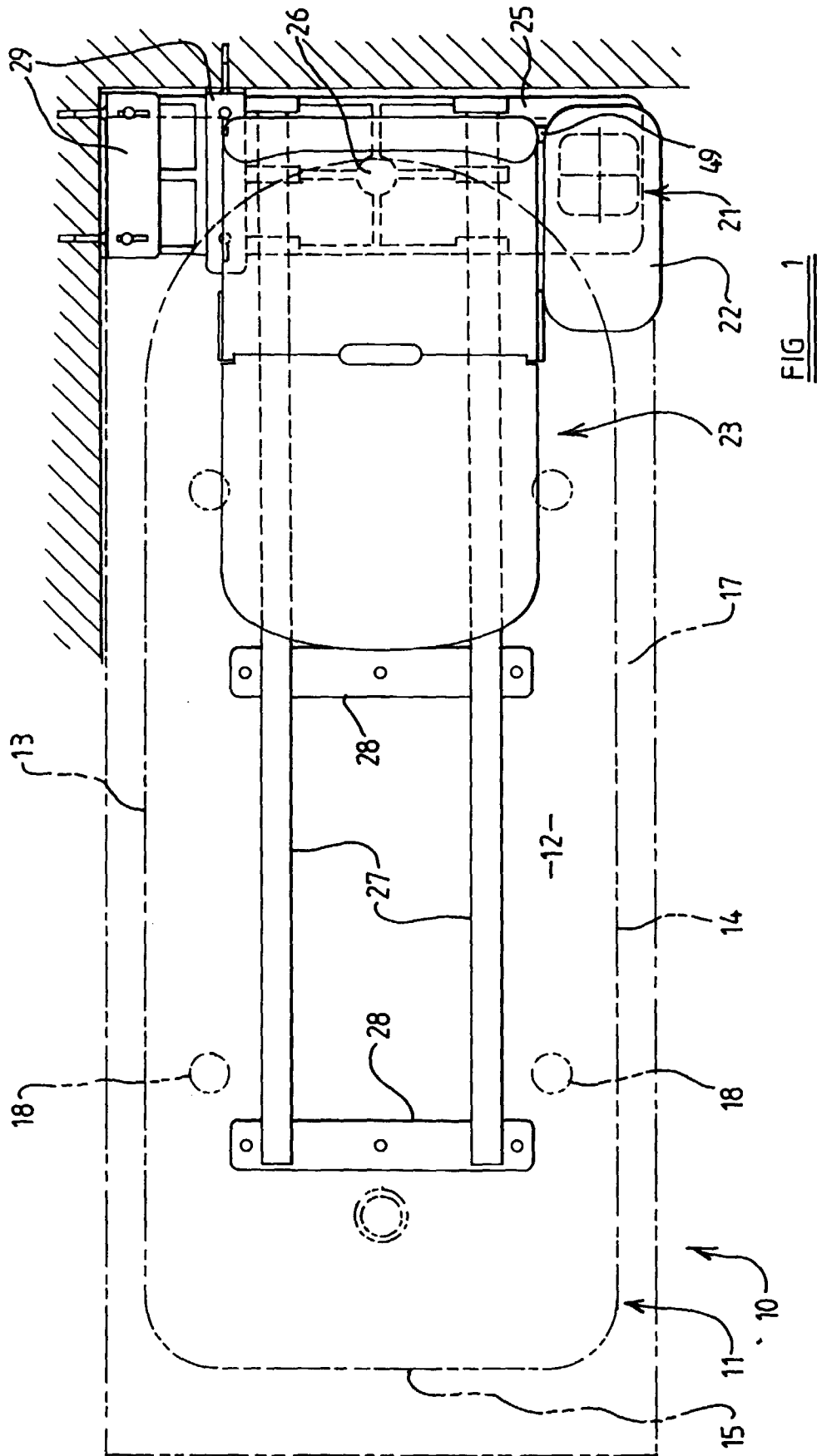


FIG 2

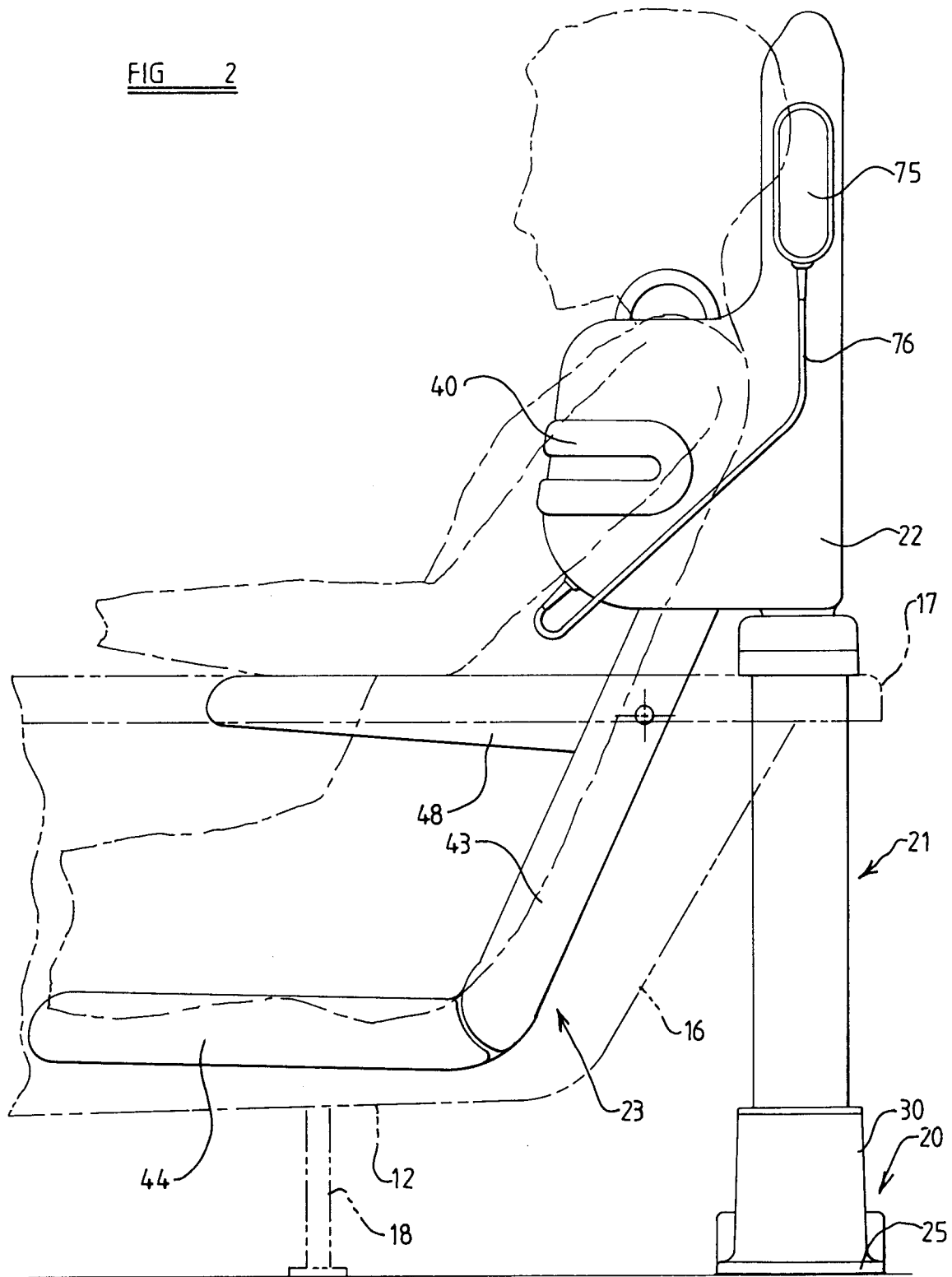
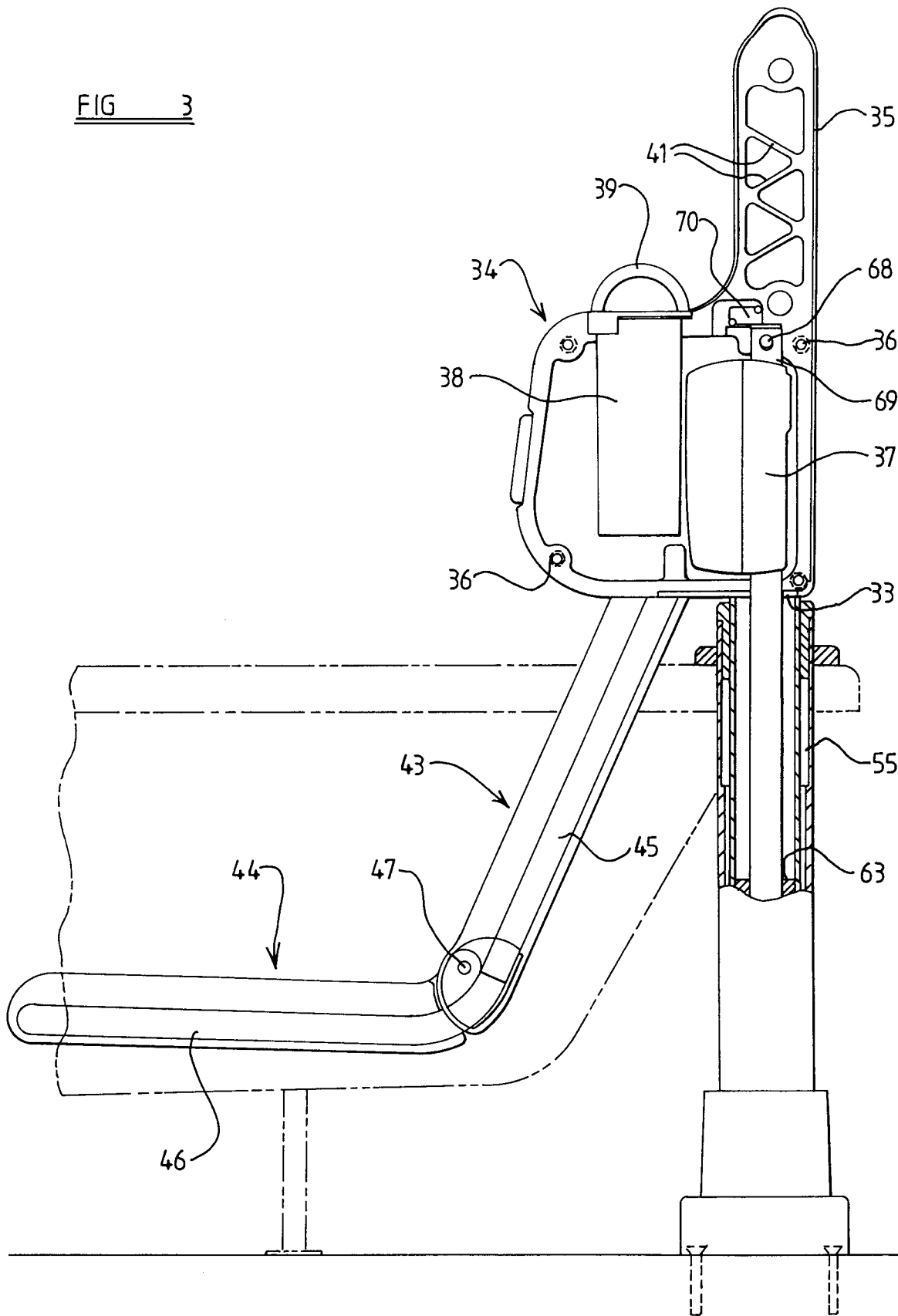
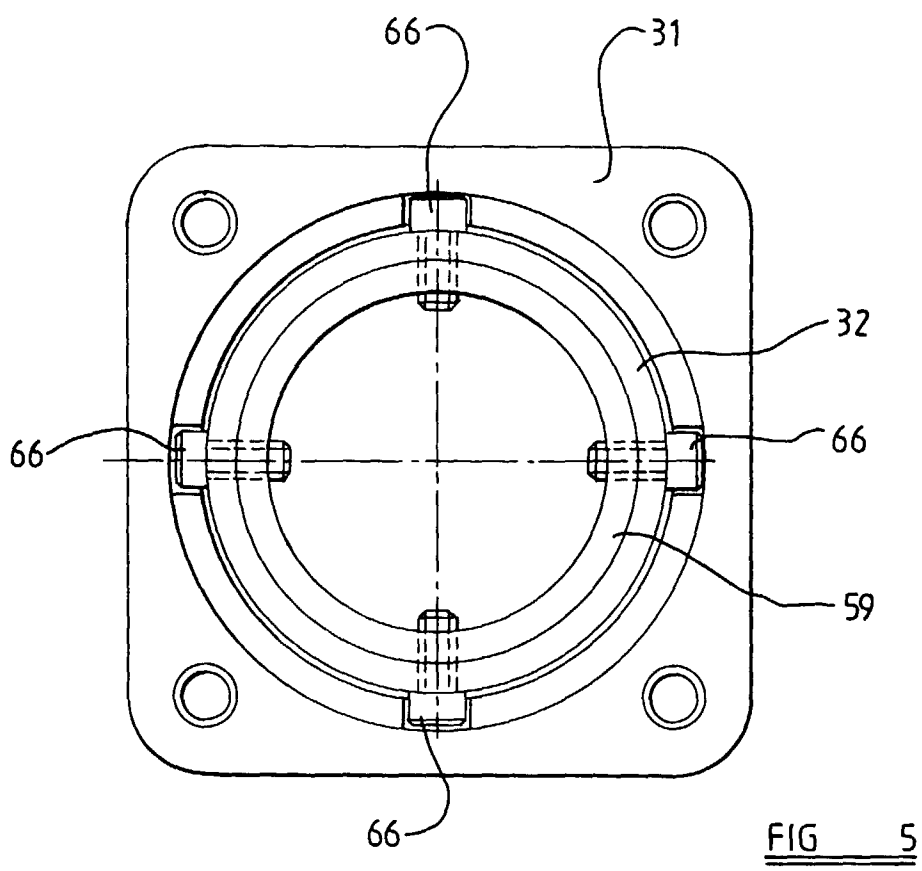
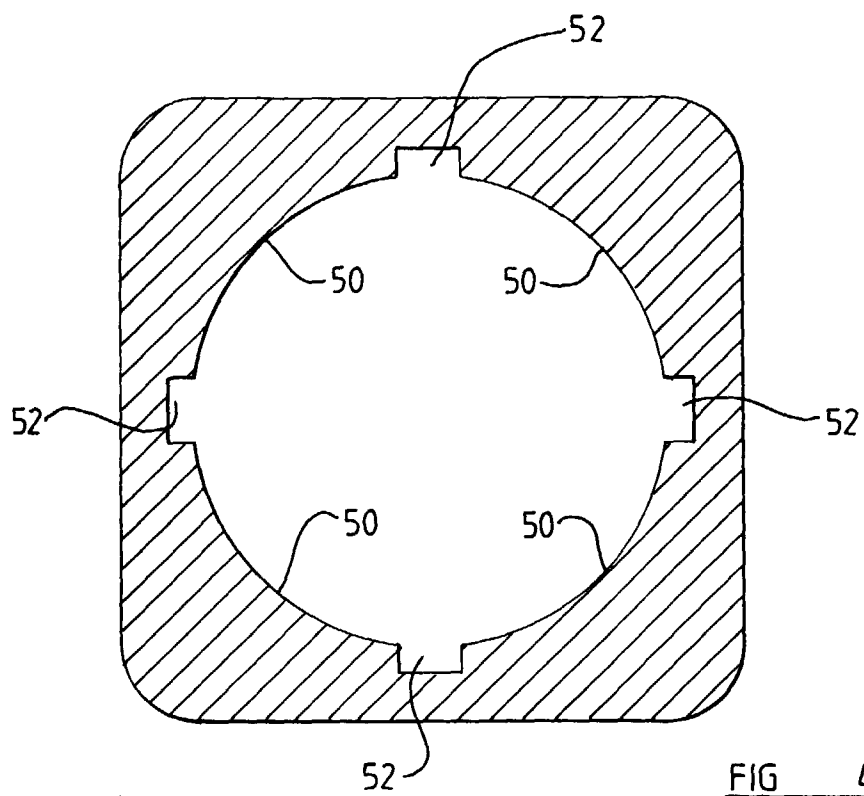


FIG 3







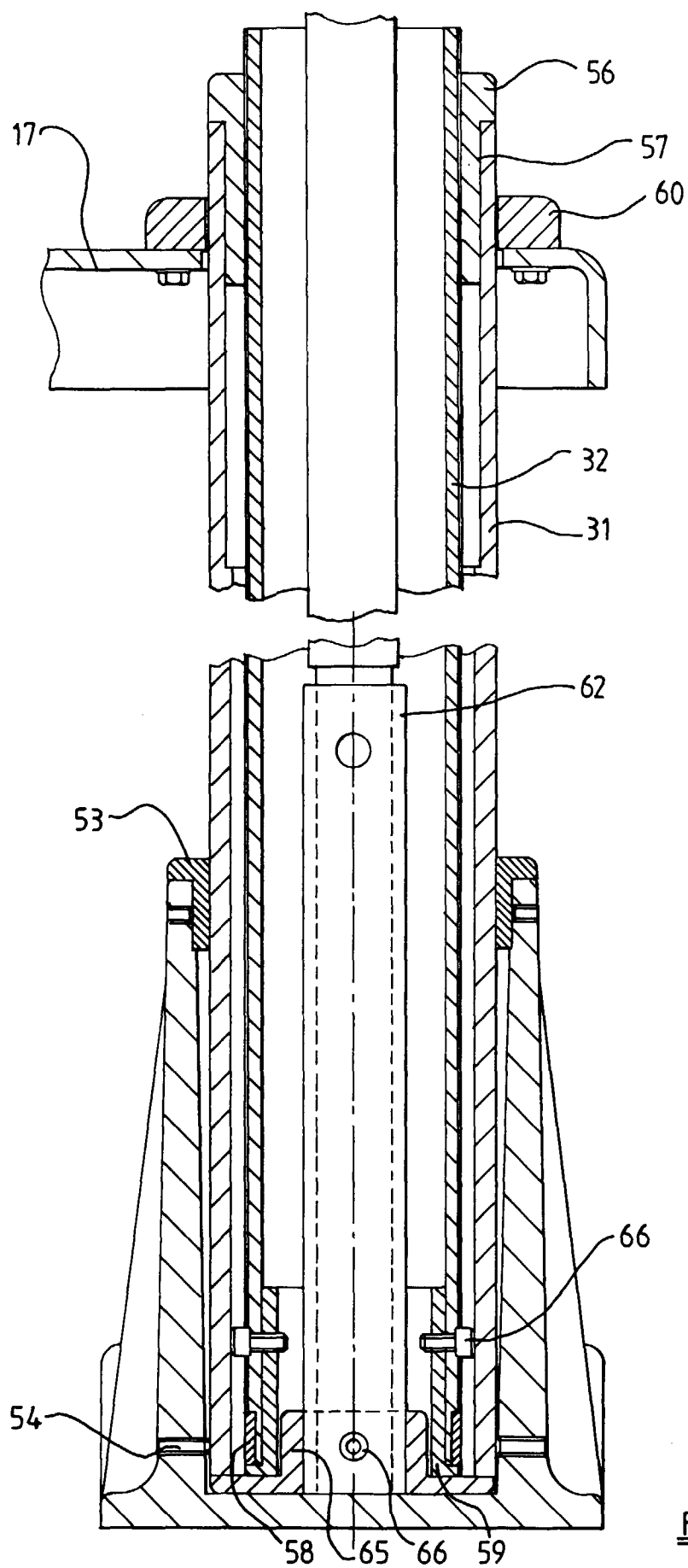


FIG 6