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(54) **A collapsible chair**

(57) A collapsible chair (10) has a frame (12) with two or more frame parts (32,48) relatively movable into and out of erected and collapsed states and a locking mechanism (26) for releasably holding the frame parts in the erected state. The locking mechanism (26) includes a catch member (28) rotatably mounted to a first

frame part (32) and a connecting arm (30). The connecting arm (30) is pivotably mounted at one end to the first frame part (32) below the catch member and at the other end with a second frame part (48) for movement between a frame collapsed position (Fig. 2) and a frame erected position in response to the relative movement of the frame parts as the chair frame is erected and collapsed.

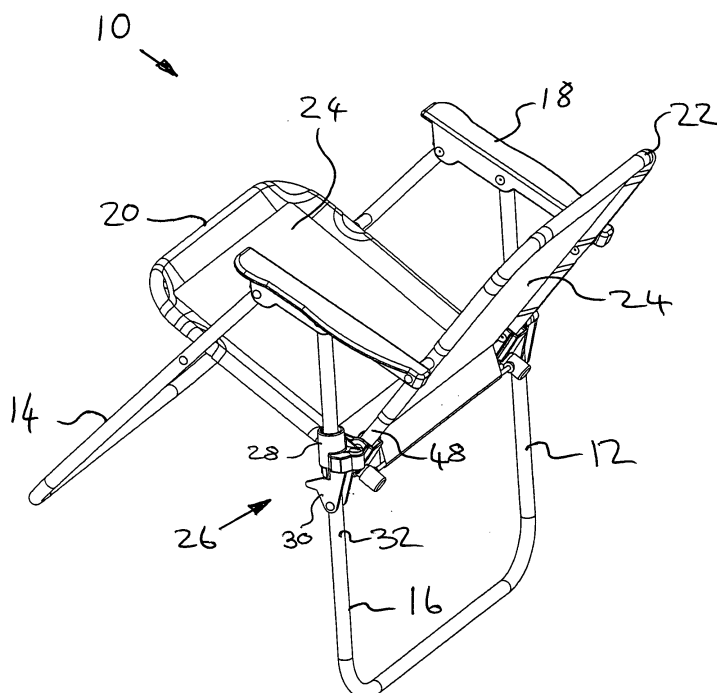


Fig. 1

Description

[0001] This invention relates to a collapsible chair particularly although not exclusively for use by children.

[0002] Collapsible chairs for use by children are well known and generally such chairs comprise a frame having frame members which can be folded into a collapsed state for storage and/or ease of transport. Once erected, such assemblies include a locking mechanism which retains the frame in the correct erected position. The locking mechanism usually comprises a structure in which a locking member engages with a lock when the chair is fully erected to prevent further movement of the frame members in relation to each other thus retaining the chair in its erected condition.

[0003] Due to the configuration of these locking members, and the fact that they have to engage properly with a respective lock for safety in the erected condition, it is possible for small children to trap their hand, finger or other part of the body with the parts of the locking mechanism and this obviously can give rise to injury to a child and in some instances such injuries can be relatively painful and serious.

[0004] In an attempt to overcome this problem, many different types of locking mechanisms have been proposed and generally speaking, the amended arrangements do to a greater or lesser extent alleviate the main problem. In its simplest form, the locking member can comprise simply a screw or other retaining device which, when the chair is in the erected condition, can engage the lock thereby preventing undesirable and dangerous collapse of the chair. However, use of a simple screw as mentioned is not considered to be an acceptable solution to the problem and therefore more complex and somewhat better looking designs have been proposed. However, even these designs include a locking mechanism which includes engageable parts on the chair frame to provide a stable and proper locking to prevent collapsing of the chair and thereby to minimise the possibility for injury to small children. Thus, even the abovementioned designs do not address the problem sufficiently to alleviate the problems of injury.

[0005] It is an object of the present invention to provide a collapsible chair which overcomes or at least mitigates some or all of the problems mentioned above with existing chairs of such a kind.

[0006] In accordance with the present invention, there is provided a collapsible chair having a frame with two or more frame parts relatively movable into and out of erected and collapsed states, the chair further comprising a locking mechanism for releasably holding the frame parts in the erected state, the locking mechanism comprising a catch member mounted to a first frame part and a connecting arm pivotably mounted to the first frame part at a position spaced from the catch member for movement between a frame collapsed position and a frame erected position, the connecting arm also being connected with a second frame part such that relative movement be-

tween the first and second frame parts as the frame is moved between the collapsed and erected states causes the connecting arm to move between the frame collapsed and frame erected positions, **characterised in that** the catch member is rotatably mounted to the first frame part for movement between a release position, in which the connecting arm is free to move between the frame erected and frame collapsed positions, and a latch position, in which the catch member is operable to hold the connecting arm in the frame erected position.

[0007] With this arrangement it is possible to provide collapsible chair with a locking mechanism which is secure in terms of operation but which has no projecting or other parts which can trap a child's finger.

[0008] The locking mechanism may have means for automatically moving the catch member between the release and latch positions to engage the connecting arm as the connecting arm is moved from the frame collapsed position to the frame erected position.

[0009] In one embodiment, the locking mechanism has a spring means for biasing the catch member towards the latch position, the connecting arm having a formation configured to engage a corresponding formation on the catch member as the connecting arm moves from the frame collapsed position towards the frame erected position to rotate the catch member from the latch position towards the release position against the bias of the spring means, the corresponding formations being configured such that as the connecting arm approaches the frame erected position, the catch member is released allowing the spring means to bias it back to the latch position to hold the connecting arm in the frame erected position.

[0010] In this embodiment, the formation on the connecting arm may comprise a protrusion which contacts a surface on the catch member over a range of the movement of the connecting arm from the frame collapsed position towards the frame erected position, the protrusion and the surface being shaped so as to disengage as the connecting arm approaches the frame erected position to release the catch member.

[0011] In an alternative embodiment, the locking mechanism has a spring means for biasing the catch member towards the release position, the connecting arm having a formation configured to engage a corresponding formation on the catch member as the connecting arm moves from the frame collapsed position towards the frame erected position to rotate the catch member from the release position to the latch position.

[0012] In either embodiment, the locking mechanism may also have a lock arrangement which can be selectively engaged to prevent the catch member rotating from the latch position to the release position when the connecting arm is in the frame erected position. The lock arrangement may comprise a groove in one of the connecting arm and the catch member and a lock pin rotatably mounted to the other of the connecting arm and the catch member, the pin having a head and a shaft eccentrically positioned relative to the head, the lock pin being

rotatable between a locked position in which the shaft engages in the groove to prevent the catch member from rotating the about the first frame part and an unlocked position in which the shaft is disengaged from the groove. The pin may be mounted to the catch member, in which case, the groove is defined in the connecting arm.

[0013] In either embodiment, the catch member may comprise a latch housing portion which is configured to partially surround part of the connecting arm when the connecting arm is in the frame erected position and the catch member is in the latch position to hold the connecting arm in the frame erected position. A first end of the connecting arm may be pivotally connected to the first frame part and a second end of the connecting arm may be pivotally connected to the second frame part, and the locking mechanism may be configured so that the second end of the connecting arm is partially surrounded by the latch housing portion. Where the lock mechanism includes a lock pin, the lock pin may be mounted to the latch housing portion so as to engage a groove in the second end of the connecting arm.

[0014] In either embodiment, the connecting arm and the catch member may have corresponding stop formations that co-operate when the connecting arm is in the frame erected position and the catch member is in the latch position to prevent the connecting arm from moving from the frame erected position to the frame collapsed position. The connecting arm may have a stop surface which extends substantially perpendicular to an axis of the catch member when the connecting arm is in the frame erected position and the catch member may have a stop formation that engages the stop surface.

[0015] In either embodiment, the catch member may have stop formations for co-operation with corresponding stop formations on the first part of the frame to limit the rotational movement of the catch member about the first part.

[0016] Several embodiments of the invention will now be described, by way of example only, reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a collapsible chair assembly in accordance with a first embodiment of the invention, shown in an erected condition;

Figure 2 is a perspective view of the chair of Figure 1 in a collapsed condition;

Figure 3 is a cross-sectional view through a locking mechanism forming part of the chair of Figures 1 and 2; and

Figures 4 to 9 are a series of perspective views of the locking mechanism of the chair of Figures 1 and 2 showing the locking mechanism in different stages of operation.

[0017] Referring to the drawings, there is shown one embodiment of a collapsible chair 10 in accordance with the invention.

[0018] The chair 10 has a frame 12 comprising a

number of frame members or parts pivotally connected together such that the chair can be moved between an erected state as shown in Figure 1 and a collapsed state as shown in Figure 2. The frame defines front legs 14, rear legs 16, arm rests 18, a seat portion 20 and a back rest 22. Material 24 is stretched over the seat portion 20 and the back rest 22 to support a user in a known fashion.

[0019] The collapsible chair 10 has a locking mechanism 26 that is operative to lock the chair frame in its erected disposition in a manner to be hereinafter described.

[0020] The locking mechanism 26 comprises two lock parts, a catch member 28 and a connecting arm 30, both mounted on a first part 32 of a chair frame for co-operation with each other. In the present embodiment, the first part 32 of the frame is one of the rear legs of the chair.

[0021] The connecting arm 30 comprises a pair of spaced side members 34, 36 which are connected together at one end by means of a head portion 38. The opposite ends of the side members locate on opposite sides of the leg 32 and have holes for pivotally mounting the side members on a pin 40 which passes through the leg 32. The pin 40 has an enlarged head 42 on either side to hold the side members 34, 36 in position. The head portion 38 of the connecting arm has a through bore 44 by means of which the head portion is pivotally mounted on a pin or shaft 46 attached to a second part of the frame 48, which in this case is part of a lower region of the back rest 22 adjacent the leg 32. A cylindrical spacer 50 is mounted about the pin between the side member 34 and back rest 22.

[0022] The leg 32 and the second part 48 of the frame are movable relative to one another as the chair is moved between erected and collapsed states and the connecting arm 30 is arranged so that it pivots about the pin 40 in response to their relative movement. The arrangement is such that when the frame is fully erected, the connecting arm 30 is constrained to adopt a frame erected position, in which the leg 32 is received between the two side members 34, 36 and the head portion 38 is located above the pin 40 adjacent the leg 32 as shown in Figure 3. When the frame is fully collapsed, the connecting arm 30 is moved to a frame collapsed position in which the head portion 38 is displaced from leg 32 and is located on the opposite side of the pin 40 than in the frame erected position, as shown in Figures 2 and 4.

[0023] The catch member 28 is rotatably mounted to the leg 32 at a position spaced from the point at which the connecting arm 30 is mounted to the leg 32. In the present embodiment, the catch member 28 is mounted above the connecting arm but this is not essential.

[0024] The catch member 28 has a tubular main body portion 52 which surrounds the leg 32. The main body portion has a lower portion 54 with an inner diameter that is a close sliding fit on the leg 32 and an upper portion 56 with an increased inner diameter. A torsion spring 58 is mounted about the leg 32 and a pin 60 extends through the leg 32, both being accommodated within the in-

creased inner diameter of the upper portion 34. One end of the spring 58 is connected with the pin 60 whilst the other end is attached to the catch member 28. The spring 58 is pre-tensioned to bias the catch member 28 in a first rotary direction about the leg 32 to a latch position, in which it is capable of locking the connecting arm in the frame erected position as will be described below. The catch member 28 can be rotated in the opposite direction against the bias of the spring 58 to a release position, as shown in Figure 6, in which the connecting arm 30 is free to move between the frame erected and frame collapsed positions.

[0025] Below the tubular main body portion 52, the catch member 28 has a latch housing portion 62. The latch housing portion 62 includes an upper wall 64 which extends in a plane substantially perpendicular to the axis of the main body portion 52. Depending downwardly, as shown, from an outer edge of the upper wall 64 is a side wall 66. The side wall extends along one side and around a front edge of the upper wall 64. The upper wall 64 and the side wall 66 define a cavity or housing in which the head portion 38 of the connecting arm 30 is received when the connecting arm is in the frame erected position and the catch member 28 is in the latch position, as shown in Figures 1 and 3.

[0026] At the front of the latch housing portion 62 and forming an extension of the side wall 66 is a part cylindrical lock member housing 68. The lock member housing 68 has bore 70 which receives a shaft 72 of a lock pin 74. The lock pin 74 has a head 76 which rests on the upper surface of the upper wall 64 and is accessible by a user to rotate the lock pin. When the connecting arm 30 is in the frame erected position and the catch member 28 is in the latch position, the lock pin 74 co-operates with a groove 78 (Fig. 7) in the outer surface of the head portion 38 of the connecting arm to releasably lock the catch member 28 to the connecting arm 30 to prevent it from being inadvertently rotated to the release position. To this end, the shaft 72 is mounted eccentrically to the head 76 so that a user can rotate the head 76 to move the shaft 72 between a locked position, in which it engages in the groove 78, and an unlocked position, in which it is positioned outside the groove. The head 76 may be marked with an arrow 80 or other indicia to provide a visual indication to a user of whether it is in the locked or unlocked position. In the present embodiment, the arrow 80 points inwardly toward a picture 82 of an unlocked padlock on the upper wall 64 of the latch housing portion 62 when the pin 74 is in an unlocked position and outwardly when locked. The arrow may be in the form of a slot to enable the pin 74 to be turned using a screwdriver or the like.

[0027] Towards the rear of the catch member 28 opposite the lock member housing 68, a further arcuate wall portion 84 depends downwardly (as shown) from the main body portion beyond the lower edge of the side wall 66 of the latch portion 62. A lower edge 86 of the arcuate wall 84 rests on the head 88 of a screw or other fastening

which is inserted into the leg 32 to position the catch member on the leg. A strengthening rib 90 extends downwardly along one edge of the arcuate wall 84. At the other end of the arcuate wall 84, a further wall portion 92 extends generally radially outwardly for co-operation with a projection 94 on one of the side members 30.

[0028] The projection 94 has a curved end region 96 which is arranged to contact the further wall portion 92 as the connecting arm 30 moves towards the frame erected position from the frame collapsed position, so as to rotate the catch member 28 about the leg 32 from the latch position towards the release position. The projection 94 has an angled edge 98 which is uppermost when the connecting arm 30 is in the frame erected position and which leads to a stop surface 100. The stop surface is aligned generally perpendicularly to the axis of the catch member 28 and the leg 32 when the connecting arm 30 is in the frame erected position, as shown in Figures 1, 8 and 9. A lower edge 102 of the further wall portion 92 is arranged to engage with the stop surface 100 when the connecting arm is in the frame erected position and the catch member is in the latch position - see Figure 8.

[0029] Rotary movement of the catch member 28 about the leg 32 is limited by means of a pair of diametrically opposed arcuate stop formations 104 on the inner surface of the upper portion 56 that engage with the pin 60. The stop formations 104 are arranged to prevent the catch member 28 from rotating in the first direction beyond the latch position and to prevent over rotation of the catch member in the opposite direction beyond the release position.

[0030] Operation of the locking mechanism 26 will now be described with reference in particular to Figures 4 to 9.

[0031] When the chair frame is collapsed, the locking mechanism 26 is arranged as shown in Figure 4 with the connecting arm 30 in the frame collapsed position and the catch member 28 biased to the latch position by the spring 58. The lock pin 74 is in the unlocked position.

[0032] As the chair frame is erected, relative movement between the leg 32 and the second part 48 of the frame causes the connecting arm 30 to pivot about the pin 40 until the curved end region 96 of the projection 94 contacts the radially extending further wall portion 92 of the catch member 28, as shown in Figure 5. This occurs before the frame is fully erected.

[0033] Further relative movement between the leg 32 and the second part 48 of the frame as the chair frame continues to be erected causes the projection 94 to push on the further wall portion 92 rotating the catch member 28 against the bias of the spring 58 from the latch position towards the release position. This moves the latch housing 62 to one side, allowing the upper end of the connecting arm 30, including the head portion 38, to move past the latch housing and approach the leg 32. This phase is illustrated in Figures 6 and 7. Prior to the connecting arm 30 reaching the frame erected position, the end 96 of the projection disengages from the further wall

portion 92 allowing the spring 58 to rotate the catch member back towards the latch position. However, at this stage the side wall 66 of the latch housing portion 62 contacts the side member 36 of the connecting arm 30, preventing the catch member 28 from moving fully to the latch position, as shown in Figure 7.

[0034] As the chair frame is moved into the fully erected condition, the upper end of the connecting arm 30 moves closer to the leg 32. Eventually, as the arm 30 approaches the frame erected position, the side wall 66 of the latch housing 62 is able to pass around the outside of the head portion 38 of the connecting arm 30. The catch member 28 is then able to rotate fully back to the latch position under the bias of the spring 58 so that the side wall 66 of the latch housing 62 partially surrounds the head and bringing the lower edge 102 of the further wall portion 92 onto the stop surface 100 of the connecting arm 30, as shown in Figure 8. To prevent the catch member 28 from being inadvertently rotated to the release position, the lock pin 74 can now be rotated to engage the shaft 72 in the groove 78 as illustrated in Figure 9.

[0035] With the connecting arm 30 in the frame erected position and the catch member 28 in the latch position, the upper end and head portion 38 of the connecting arm 30 is enclosed within the latch housing portion 62 with the shaft 72 of the lock pin 74 in contact with the head portion 78. This holds the connecting arm 30 in the frame erected position preventing the leg 32 and the second part 48 of the frame from moving relative to one another such that the chair cannot be collapsed. Engagement of the further wall 92 on the stop surface 100 assists in holding the connecting arm in the frame erected position.

[0036] To collapse the chair, a user must first rotate the lock pin 74 to disengage the shaft 72 from the groove 78 and then physically rotate the catch member 28 towards the release position against the bias of the spring 58. Once the catch member 28 has been moved sufficiently to enable the connecting arm 30 to move from frame erected position towards the frame collapsed position, the frame can be collapsed.

[0037] With this arrangement it is possible to provide a secure lock which when in operation, minimises or removes the risk of children suffering injuries to their hands and fingers and other limbs such as toes etc.

[0038] In an alternative embodiment which is not shown, the spring 58 can be arranged to bias the catch member 28 to the release position. In this embodiment, the connecting arm 30 will be provided with a projection 94 which engages a surface 92 of the catch member as the arm 30 is moved towards the frame erected position to rotate the catch member against the bias of the spring toward the latch position. The projection 94 and the corresponding surface on the catch member 92 are configured so that the catch member 28 is brought into the latch position as the connecting arm 30 reaches the frame erected position. In this arrangement, the connecting arm 30 is held in the frame erected position by engagement of the upper end of the connecting arm 30 in the latch

housing 62 of the catch member 28. The lock pin arrangement 74 is used to lock the catch member to the connecting arm 30 to prevent the catch member from returning to the release position unintentionally.

[0039] The collapsible chair 10 in accordance with the invention has an innovative locking mechanism 26 that is simple to use and highly effective at holding the chair in its erected condition. The locking mechanism 26 is automatically engaged as the chair is erected and, once locked, cannot be easily disengaged by accident.

[0040] It should be understood the invention is not intended to be restricted to the details of the above embodiments which are described by way of example only. For example, it will be appreciated that the locking mechanism arrangement as described can be applied to many different collapsible chair arrangements and is not limited to use on a chair as shown in the drawings. Furthermore, whilst it is convenient to have the locking mechanism operative between a rear leg of the frame and a lower portion of the back rest, this is not essential and the locking mechanism can be positioned between any two suitable frame members which move relative to one another when the frame is erected and collapsed.

Claims

1. A collapsible chair (10) having a frame (12) with two or more frame parts (32, 48) relatively movable into and out of erected and collapsed states, the chair further comprising a locking mechanism (26) for releasably holding the frame parts in the erected state, the locking mechanism comprising a catch member (28) mounted to a first frame part (32) and a connecting arm (30) pivotably mounted to the first frame part at a position spaced from the catch member for movement between a frame collapsed position and a frame erected position, the connecting arm also being connected with a second frame part (48) such that relative movement between the first and second frame parts as the frame is moved between the collapsed and erected states causes the connecting arm to move between the frame collapsed and frame erected positions, **characterised in that** the catch member (28) is rotatably mounted to the first frame part (32) for movement between a release position, in which the connecting arm is free to move between the frame erected and frame collapsed positions, and a latch position, in which the catch member is operable to hold the connecting arm in the frame erected position.
2. A collapsible chair as claimed in claim 1, in which the locking mechanism (26) comprises means (58, 92, 94) for automatically moving the catch member (28) between the release and latch positions to engage the connecting arm as the connecting arm (30) is moved from the frame collapsed position to the

frame erected position.

3. A collapsible chair as claimed in claim 2, in which the locking mechanism (26) has a spring means (58) for biasing the catch member (28) towards the latch position, the connecting arm (30) having a formation (94) configured to engage a corresponding formation (92) on the catch member as the connecting arm moves from the frame collapsed position towards the frame erected position to rotate the catch member (28) from the latch position towards the release position against the bias of the spring means, the corresponding formations (92, 94) being configured such that as the connecting arm (30) approaches the frame erected position, the catch member is released allowing the spring means (58) to bias it back to the latch position to hold the connecting arm in the frame erected position. 5
4. A collapsible chair as claimed in claim 3, in which the formation on the connecting arm comprises a protrusion (94) which contacts a surface (92) on the catch member (28) over a range of the movement of the connecting arm (30) from the frame collapsed position towards the frame erected position, the protrusion and the surface being shaped so as to disengage as the connecting arm approaches the frame erected position to release the catch member. 10
5. A collapsible chair as claimed in claim 2, in which the locking mechanism (26) has a spring means (58) for biasing the catch member (28) towards the release position, the connecting arm (30) having a formation (94) configured to engage a corresponding formation (92) on the catch member as the connecting arm (30) moves from the frame collapsed position towards the frame erected position to rotate the catch member (28) from the release position to the latch position. 15
6. A collapsible chair as claimed in any one of the previous claims, in which the locking mechanism (26) further comprises a lock arrangement (74, 78) which can be selectively engaged to prevent the catch member (28) rotating from the latch position to the release position when the connecting arm (30) is in the frame erected position. 20
7. A collapsible chair as claimed in claim 6, in which the lock arrangement comprises a groove (78) in one of the connecting arm (30) and the catch member (28) and a lock pin (74) rotatably mounted to the other of the connecting arm and the catch member, the pin having a head (76) and a shaft (72) eccentrically positioned relative to the head, the lock pin being rotatable between a locked position in which the shaft (72) engages in the groove (78) to prevent the catch member from rotating the about the first 25

frame part and an unlocked position in which the shaft is disengaged from the groove.

8. A collapsible chair as claimed in claim 7, in which the pin (74) is mounted to the catch member (28) and the groove is defined in the connecting arm (30). 30
9. A collapsible chair as claimed in any one of the previous claims, in which the catch member (28) comprises a latch housing portion (62) which at least partially surrounds a part (38) of the connecting arm (30) when the connecting arm is in the frame erected position and the catch member (28) is in the latch position to hold the connecting arm (30) in the frame erected position. 35
10. A collapsible chair as claimed in claim 9, in which a first end of the connecting arm (30) is pivotably connected to the first frame part (32) and a second end (38) of the connecting arm is pivotably connected to the second frame part (48), the locking mechanism (26) being configured such that the second end (38) of the connecting arm is partially surrounded by the latch housing portion (62). 40
11. A collapsible chair as claimed in claim 10 when dependent on claim 8, in which the lock pin (74) is mounted to the latch housing portion (62) and is configured to engage a groove (78) in the second end (38) of the connecting arm (30). 45
12. A collapsible chair as claimed in any one of the previous claims, in which the connecting arm (30) and the catch member (28) have corresponding stop formations (92, 100) that co-operate when the connecting arm (30) is in the frame erected position and the catch member (28) is in the latch position to prevent the connecting arm (30) from moving from the frame erected position to the frame collapsed position. 50
13. A collapsible chair as claimed in claim 11, in which the connecting arm (30) has a stop surface (100) which extends substantially perpendicular to an axis of the catch member (28) when the connecting arm (30) is in the frame erected position and the catch member (28) has a stop formation (92) that engages the stop surface. 55
14. A collapsible chair as claimed in any one of the previous claims, in which the catch member (28) comprises stop formations (104) for co-operation with corresponding stop formations (60) on the first part (32) of the frame to limit the rotational movement of the catch member (28) about the first part (32).

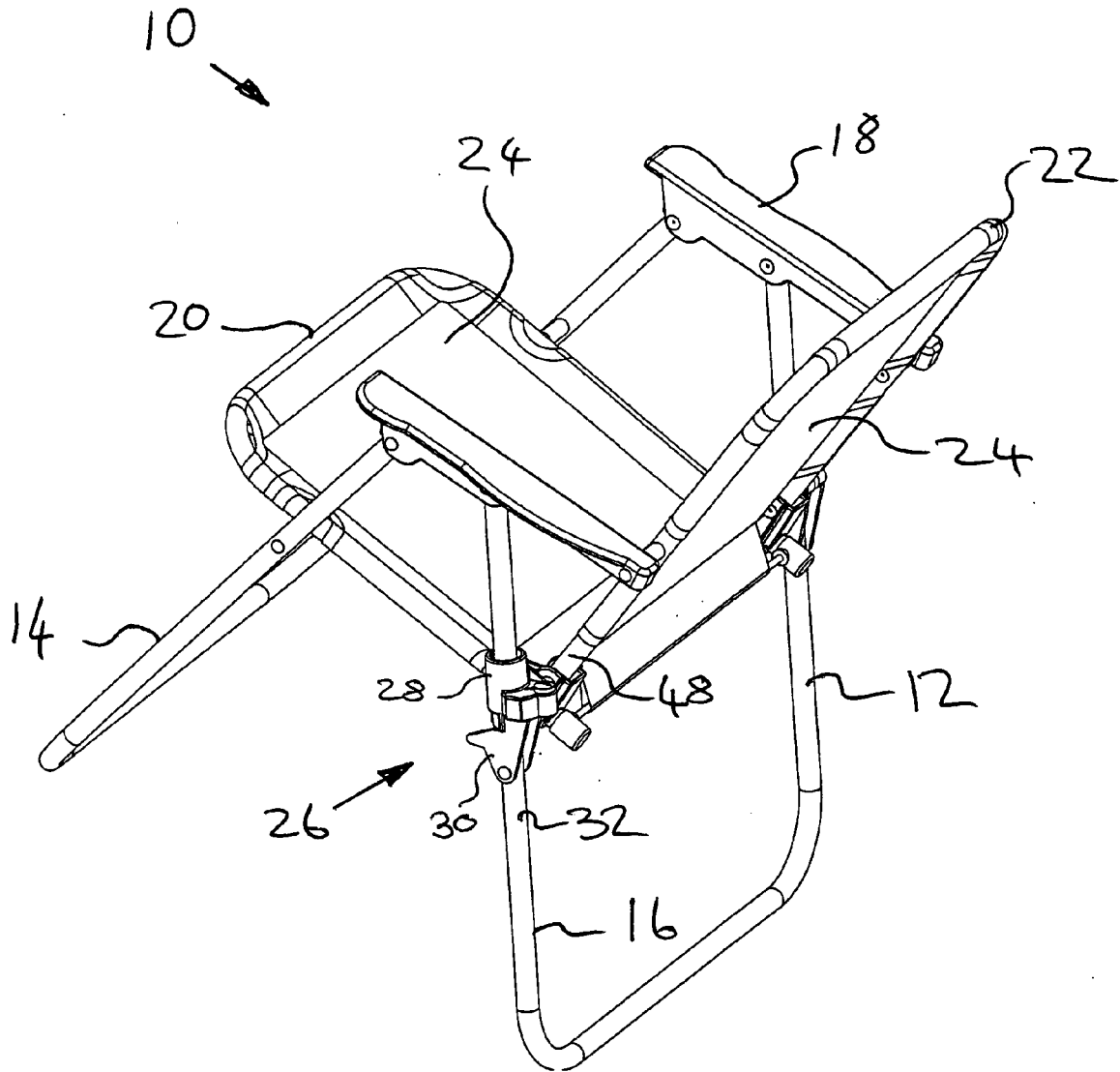


Fig. 1

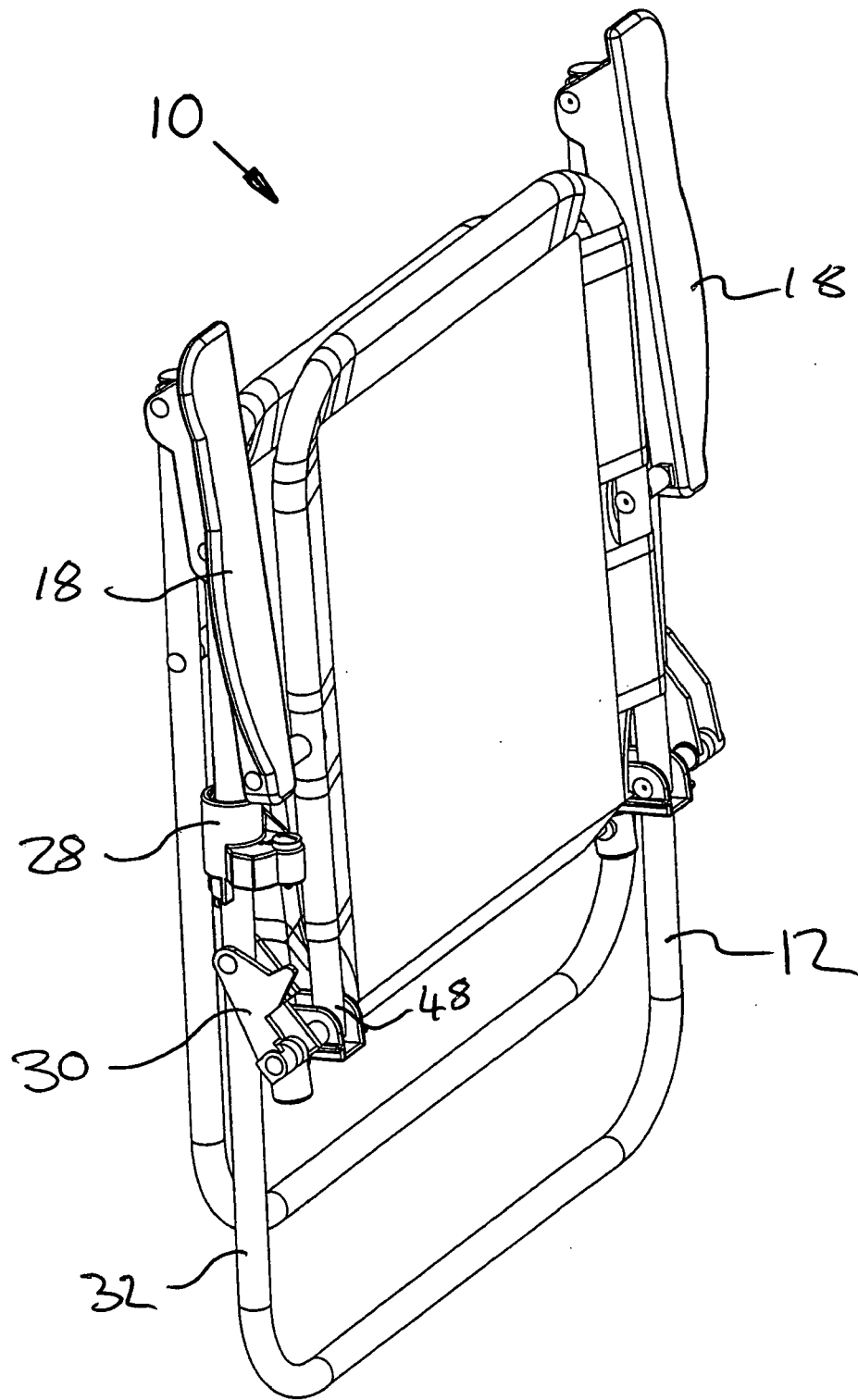


Fig. 2

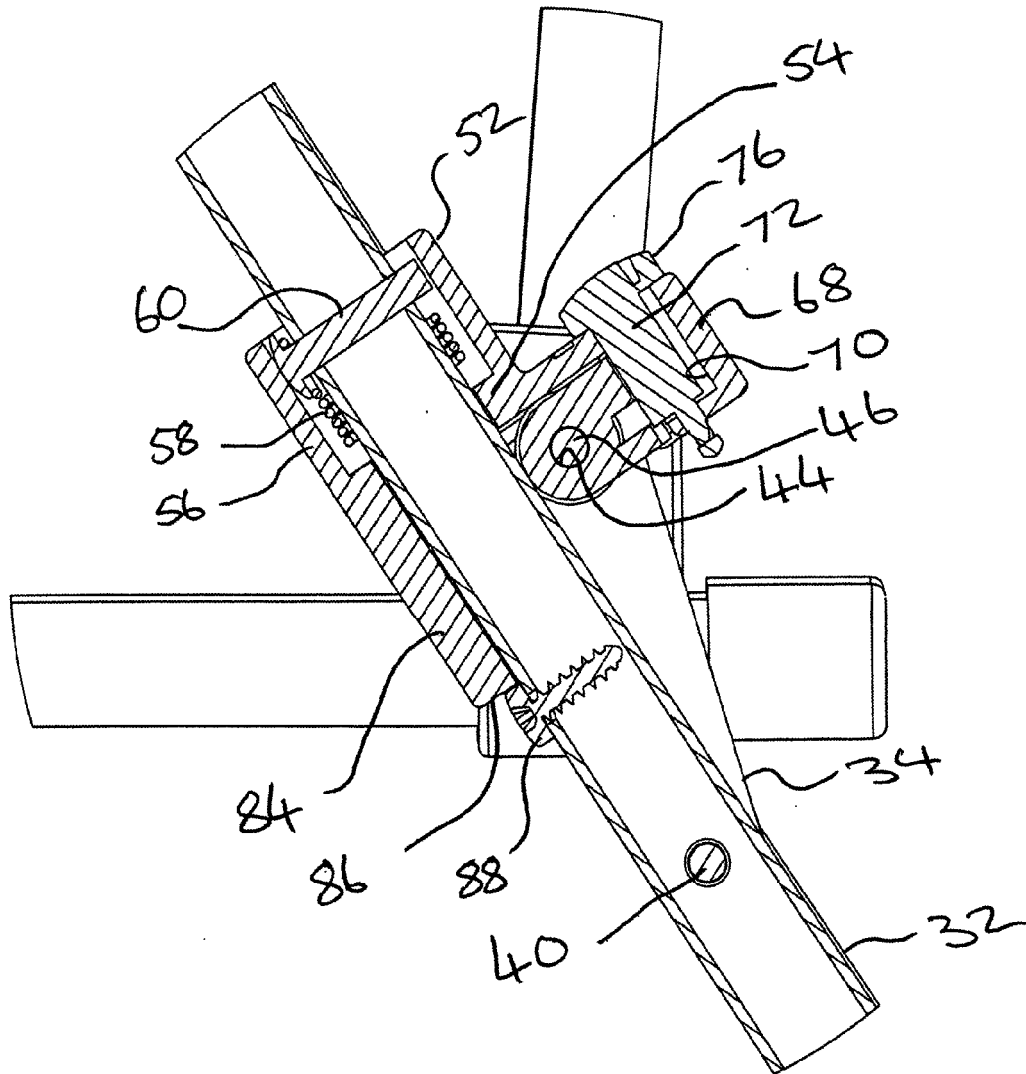


Fig. 3

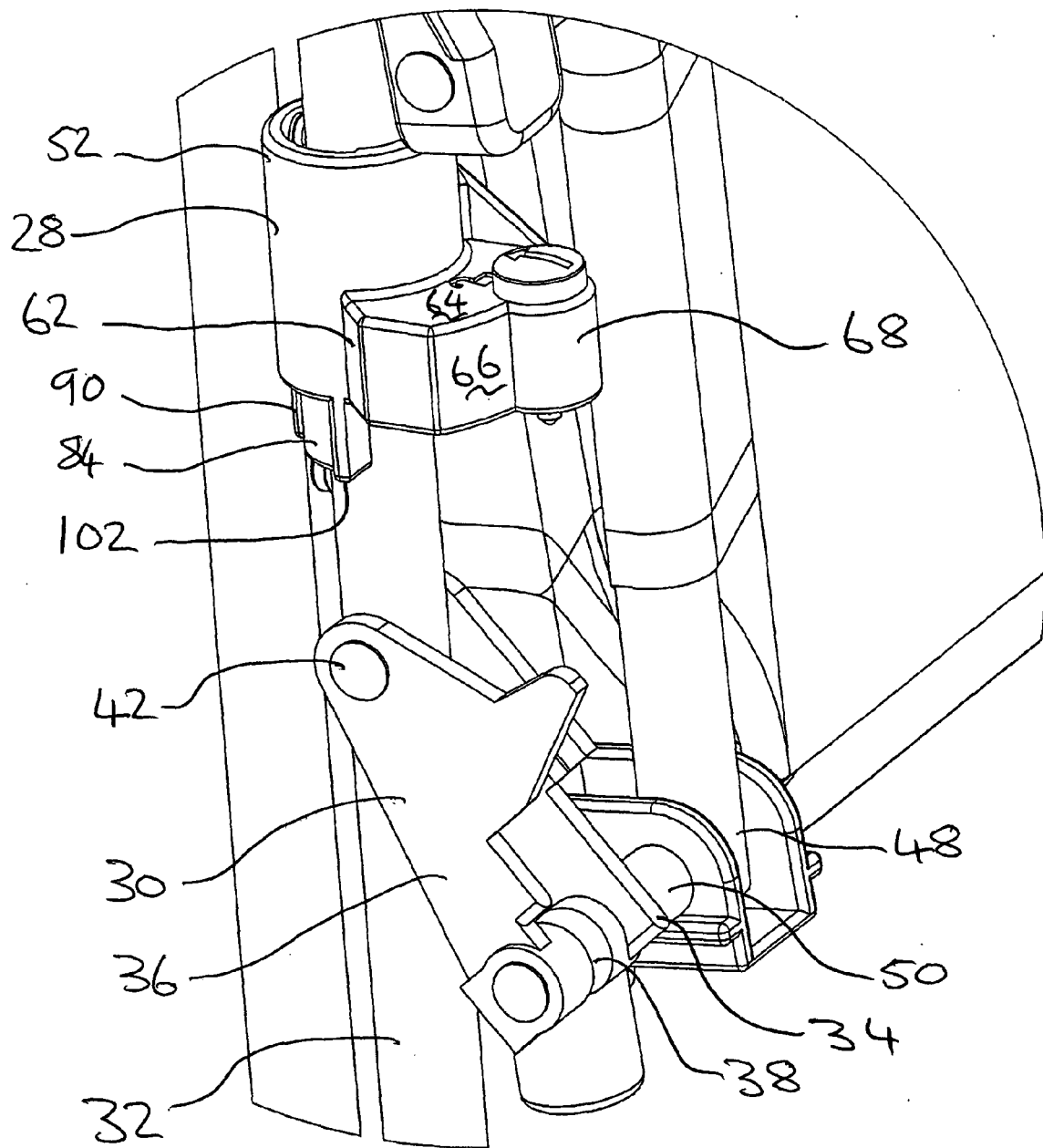


Fig. 4

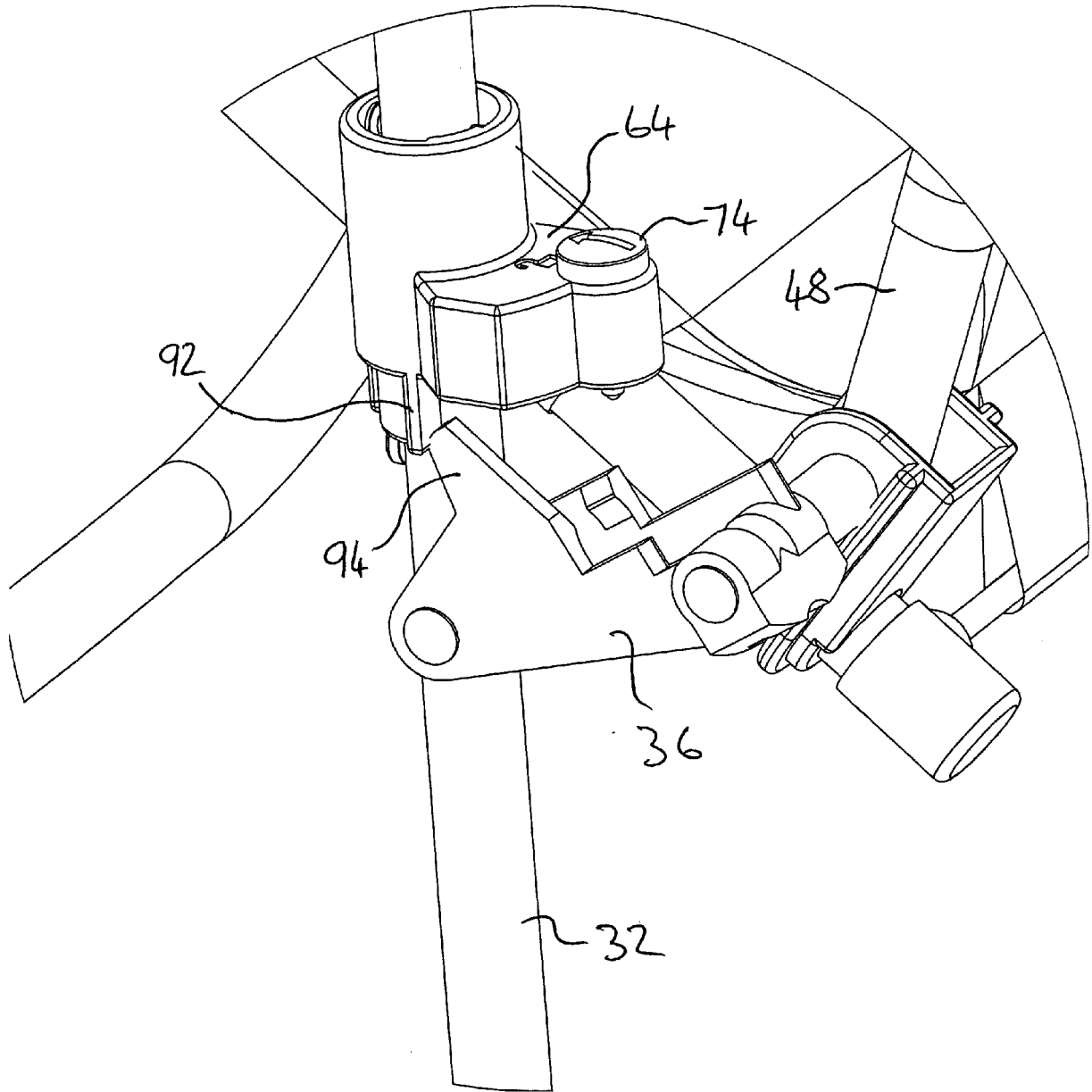


Fig. 5.

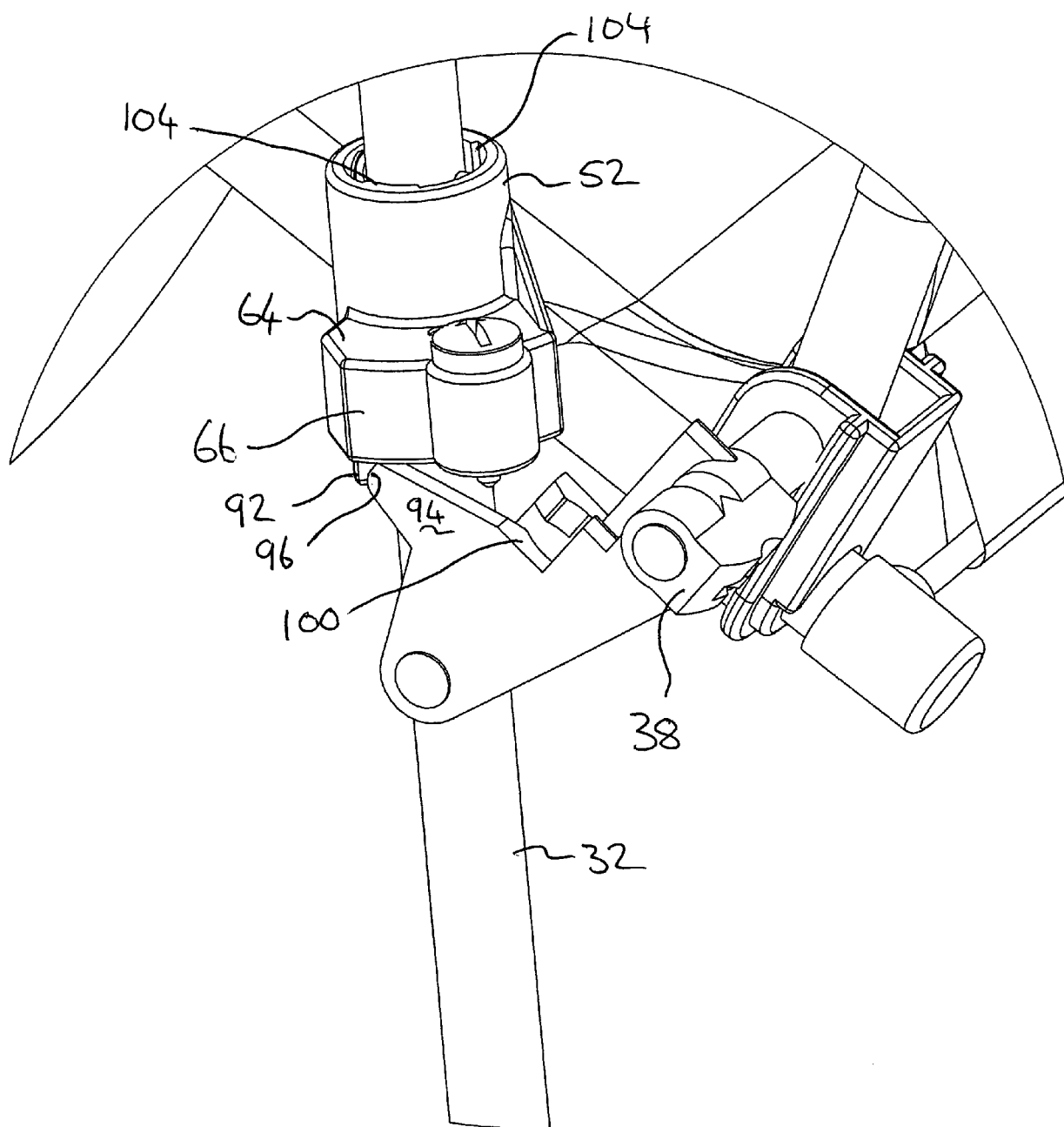


Fig. 6

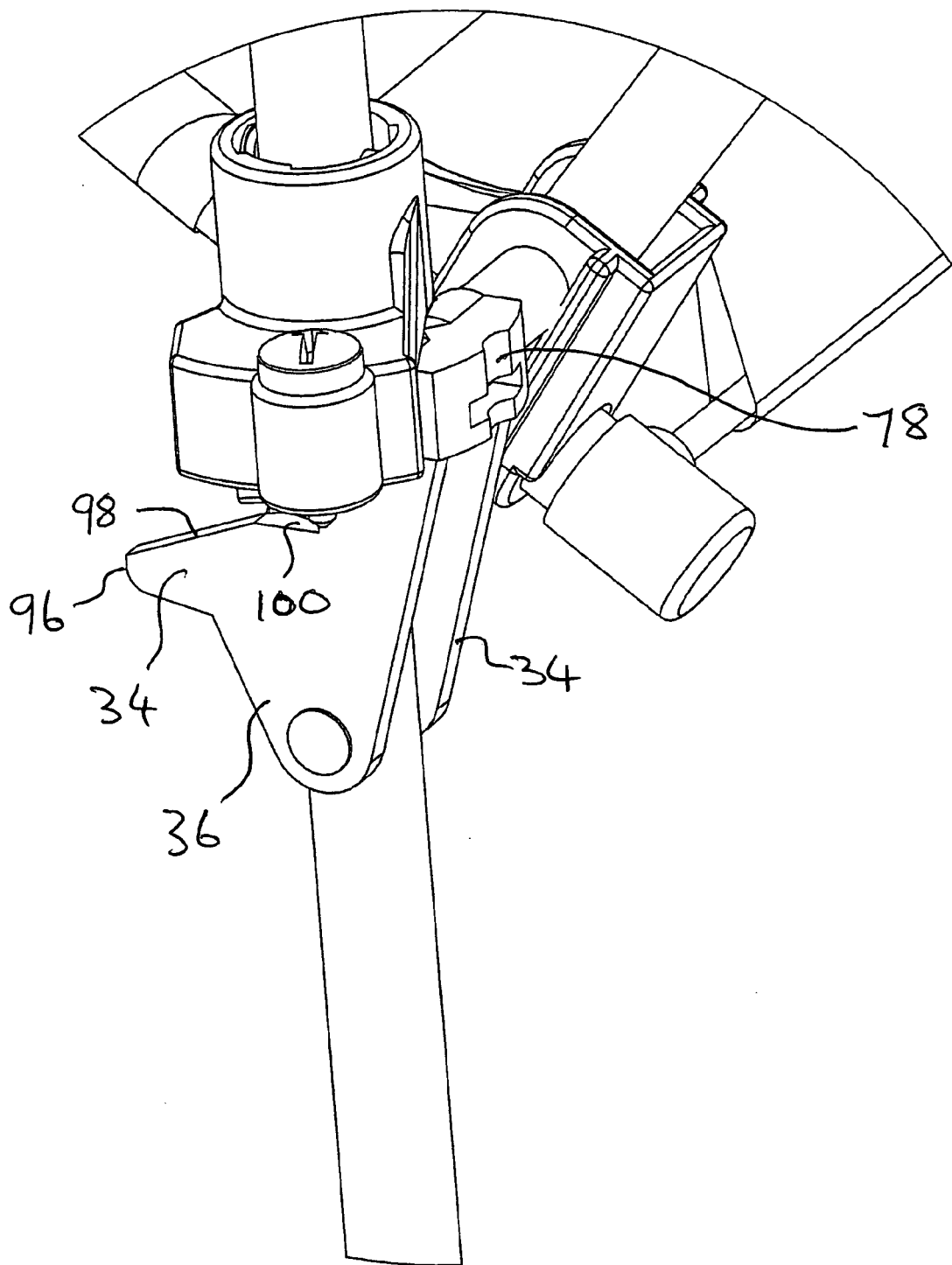


Fig. 7

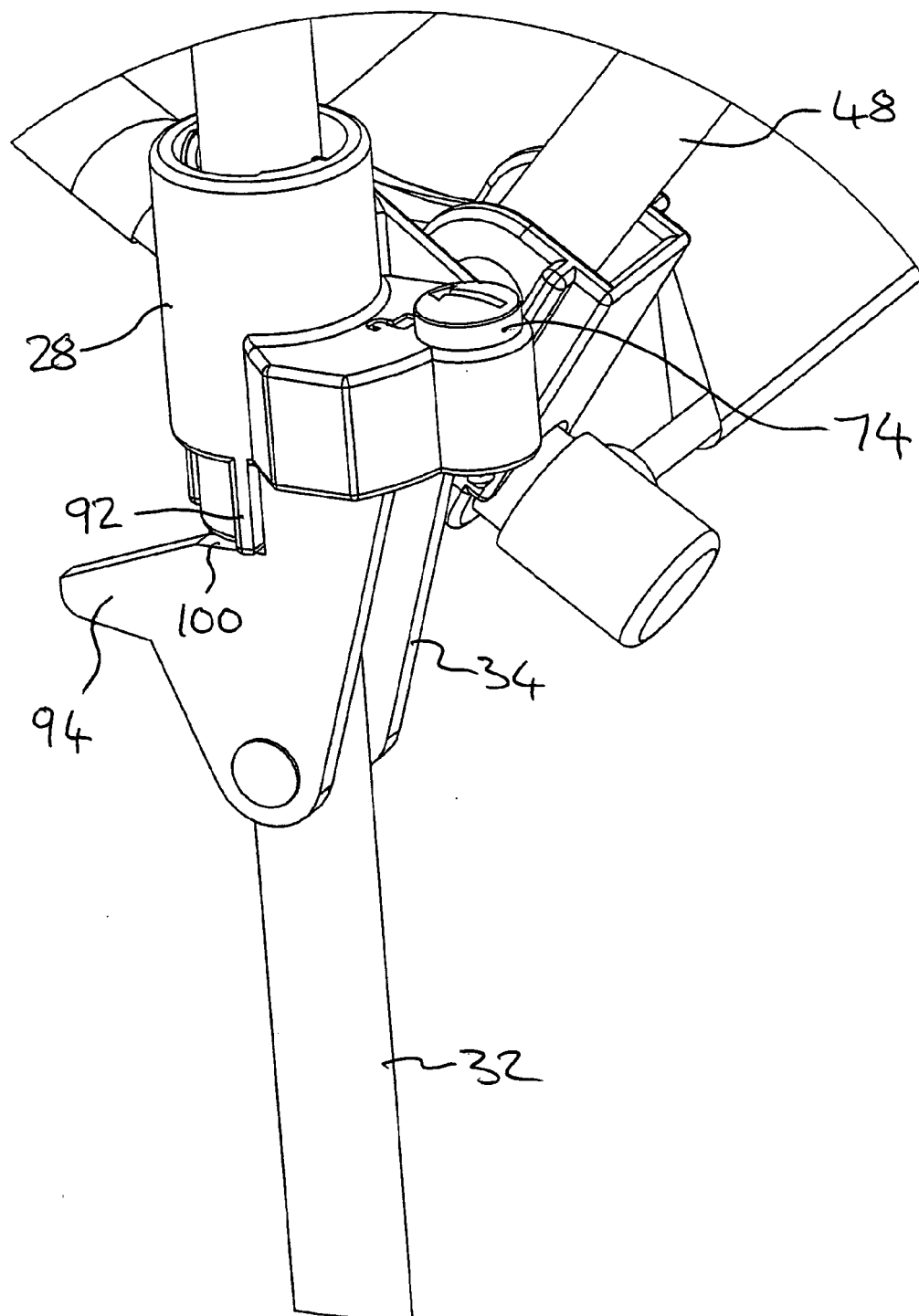


Fig. 8

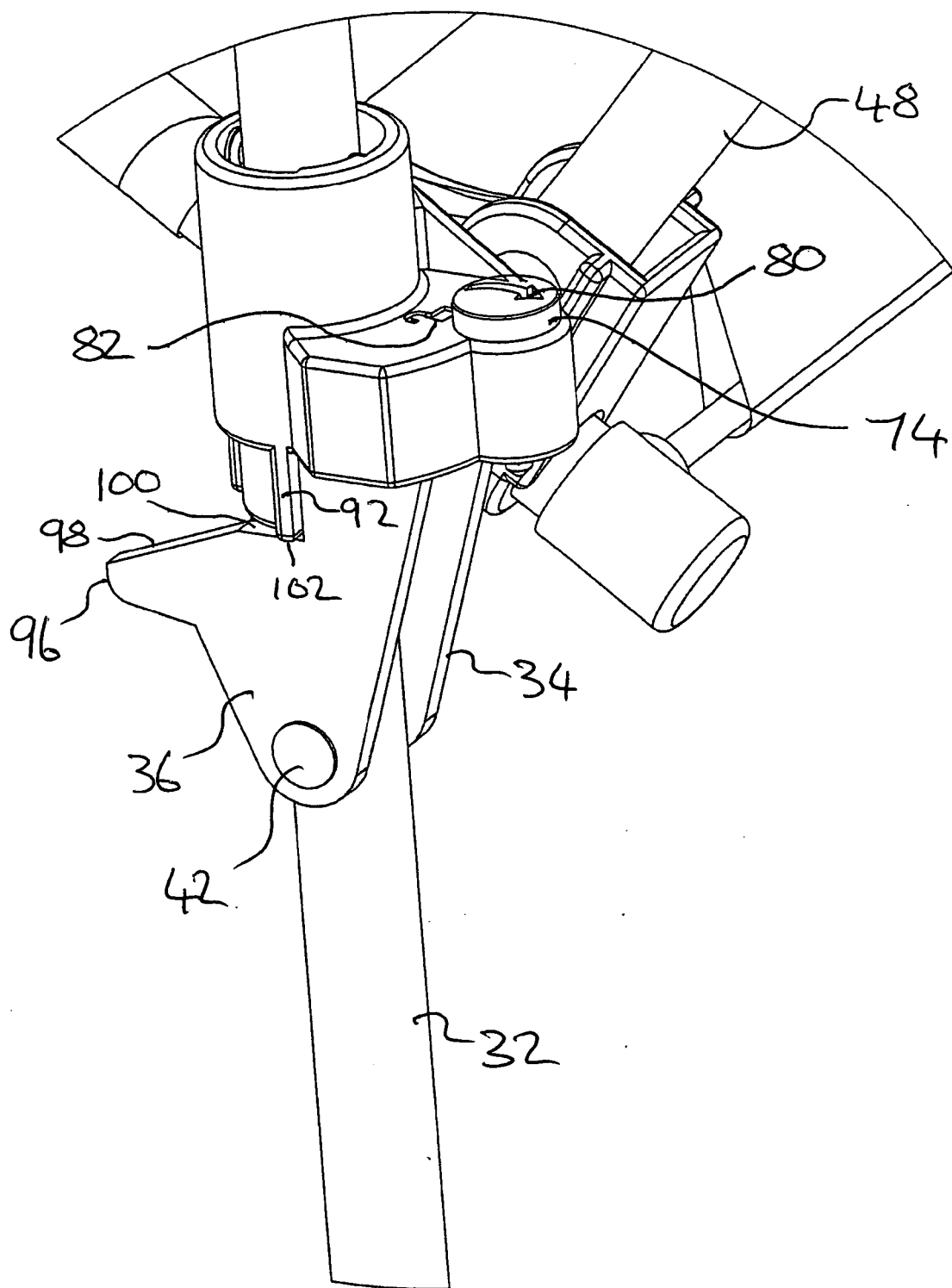


Fig. 9



EUROPEAN SEARCH REPORT

Application Number
EP 09 25 1371

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 361 633 A (HUANG MING TAI [TW] HUANG MING-TAI [TW]) 31 October 2001 (2001-10-31) * abstract * * figures 1-8 *	1	INV. A47D1/02
X	US 2002/171270 A1 (LIU LAUSAN [TW]) 21 November 2002 (2002-11-21) * page 1, column 1 * * figures 1-4 *	1	
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A	GB 2 425 943 A (HUANG MING-TAI [TW]) 15 November 2006 (2006-11-15) * abstract; figures *	1-14	TECHNICAL FIELDS SEARCHED (IPC) A47C A47D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 July 2009	Examiner MacCormick, Duncan
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 25 1371

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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15-07-2009

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