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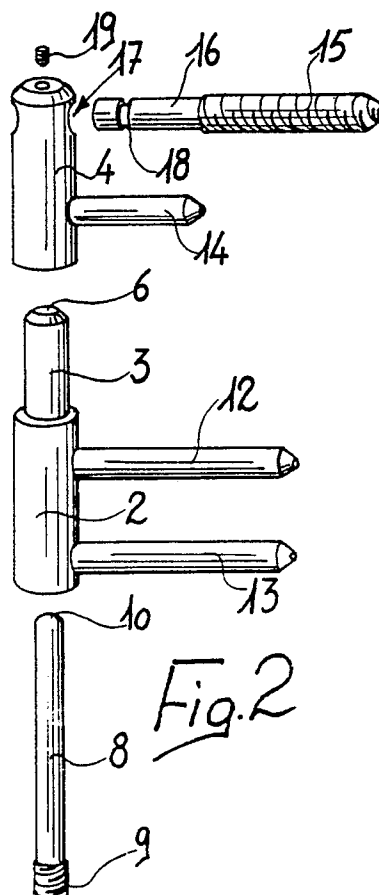
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54 Hinge with three-axis adjustment particularly for window and door frames.

57 The hinge comprises a male element (2) with a protruding vertical pivot (3) and a female element (4) which caps the pivot (3) and is rotatively associated therewith. The hinge also comprises a slideable element (8) inserted in an axial hole (6) of the male element and protruding with one of its ends from the top of the pivot. The axial sliding of said element can be independent, by means of a threaded coupling, or can be obtained by appropriate means arranged in the male element. The hinge has threaded dowels (15) for fixing to jambs and to window and door frames which are rotatively associated with the male and female elements.



EP 0 300 292 A1

## HINGE WITH THREE-AXIS ADJUSTMENT PARTICULARLY FOR WINDOW AND DOOR FRAMES

The present invention relates to a hinge with three-axis adjustment particularly for window and door frames.

It is known that the hinges normally used for the rotatable support of window and door frames on jambs are constituted by a cylindrical male element with a protruding pivot and by a female cap-like element rotatively coupled to each other.

The female element is usually screwed onto the vertical side of the window or door frame and the male one is also screwed to the jamb.

There are usually at least two hinges mounted on window and door frames, so that the axes of rotation have to be coincident to achieve a perfect opening and closure of said window and door frames.

Furthermore, in order to better distribute the weight of the window or door frame on both hinges, it is convenient that the relative axial position of the male element be adjustable with respect to the female element.

A type of adjustable hinge currently being produced comprises a threaded ring which caps the pivot of the male element and is coaxially screwed into the female element, being therefore able to assume, with respect thereto, different axial positions depending on its screwing down.

The fastening pins to the jambs and to the window or door frames are slideable and guided in appropriate holes provided diametrically on said male and female elements.

This hinge, however, is complicated to manufacture, since the couplings require narrow tolerances for the correct operation of the assembly.

All this naturally affects production costs and subsequently the sales costs, which are excessively high.

In another type of adjustable hinge currently available on the market, the pivot for the rotation of the male element is inserted therein with a threaded end which allows the adjustment of its height.

The pivot is fastened in the required position by means of a threaded bush which is screwed between the pivot and the male element and acts as lock-nut.

The pins for fastening the hinge to the jambs and to the window and door frames, adjustable by screwing their threaded ends, are inserted in diametral holes provided on the male and female elements and are rotatively coupled thereto by means of indentations executed from the outside on said elements which engage with corresponding raised portions in annular recesses with which said pins are provided.

The execution of said indentations, however, is

difficult to carry out perfectly, since if they are slightly deeper than required they completely compromise the rotative coupling of the pivots in the holes.

The adjustment of the height of said second type of hinge is also rather complicated and does not meet the ordinary requirements of practical use demanded by the customer.

The aim of the present invention is to provide an adjustable hinge for window and door frames which eliminates the above described disadvantages and allows to achieve the perfect coaxiality of the axes of rotation when it is applied in two or more sets.

Within this aim, an important object is to provide an easily adjustable hinge without the need of particular tools.

An important object is to provide a structurally simple, adjustable hinge which is composed of the smallest possible number of elements.

Another object is to provide a cheap, functional and aesthetically valid adjustable hinge.

This aim, these objects and others which will become apparent hereinafter are achieved by a window and door frame hinge comprising a male element with a protruding vertical pivot and a female element which caps said pivot and is rotatively associated to said male element, characterized in that it comprises a slideable element inserted into an axial hole of said male element and protruding with its end from the top of said pivot, adjusting means being provided to position said slideable element relatively to said male element, the hinge further comprising threaded fastening dowels for fastening said hinge to jambs and to window and door frames, said fastening dowels being rotatively associated to said male and female elements at respective diametral holes provided on said elements.

Further characteristics and advantages of the invention will become apparent from the detailed description of two embodiments, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a longitudinal sectional side view of a hinge according to the invention;

figure 2 is an exploded perspective view of the hinge of figure 1;

figure 3 is a sectional side view of an adjustable hinge according to a second aspect of the invention;

figure 4 is an exploded perspective view of the adjustable hinge of figure 3.

With reference to figures 1 and 2, the adjustable hinge, according to the invention, is generally

indicated by the reference numeral 1 and comprises a cylindrical male element 2 and a cylindrical female element 4. The male element 2 is provided with an axial end pivot 3 and the female element 4 caps the pivot 3 which is inserted in an axial recess 5 thereof.

Said male element 2 is axially traversed by a cylindrical hole 6 which is threaded at its end portion 7 opposite to said pivot 3.

A cylindrical dowel 8 is inserted in said hole 6 from said end portion until it screws therein with a threaded end 9 and protrudes from the top of the pivot 3 with its opposite cambered end 10.

Said threaded end 9 has a recessed seat 11 for a hexagonal adjustment wrench.

The male element 2 has two radially extending cylindrical dowels, respectively 12 and 13, for its fastening to the jamb of a window and door frame. The female element has a cylindrical dowel 14 and a threaded adjustment dowel 15 inserted with one of its ends 16 into a diametral hole 17 provided on the female element top.

In particular the end 16 has an annular recess 18 in which a threaded dowel 19 is engaged which is inserted in an axial hole provided on the top of said female element 4 so that the threaded dowel 15 is free to rotate inside the hole 17.

Said end 16 has a recessed seat 20 for a hexagonal adjustment wrench.

Figures 3 and 4 illustrate an adjustable hinge according to a second aspect of the invention, which is generally indicated by the reference numeral 101 and comprises a cylindrical male element 102, having an axial end pivot 103, and a cylindrical female element 104 which caps the pivot 103 inserted in an axial recess 105 thereof.

The male element 102 is provided with an axial cylindrical hole 107, in its upper portion 106. The hole 107 extends from the top of the pivot 103 to a threaded hole 108 which diametrically traverses said portion 106.

A cylindrical dowel 109 is inserted in said hole 107 and has an inclined end 110 in contact with the conical end 111 of a dowel 112 screwed into said hole 108.

Said cylindrical dowel 109 has a cambered end 113, opposite to said end 110, and protrudes from the top of said pivot 103. Dowel 109 also has an annular recess which is the seat of a locking ring 114 in plastics.

The male element 102 has a radially extending fastening dowel 115 at its central portion and a threaded adjustment dowel 117 at its lower portion inserted in a diametral hole 119. The end of dowel 117 inserted in hole 119 is retained by means of a dowel 121.

The female element 104 also has a radially extending fastening dowel 116 at its central portion

and a threaded adjustment dowel 118 at its upper portion inserted in a diametral hole 120. The end of dowel 118 inserted in hole 120 is retained by means of a dowel 122.

5 To adjust the height of the hinge 1 it is sufficient to screw or unscrew the dowel 8.

To adjust the height of the hinge 101 it is sufficient to screw or unscrew dowel 112 which cooperates with dowel 109.

10 The position of the fastening dowels, for the jambs or the window or door frames, is adjusted by screwing or unscrewing the threaded dowels 15, 117, 118.

15 In the hinge 101 of figures 3, 4, the locking ring 114 provides a certain sliding friction so that the dowel 109 cannot accidentally slip out of its seat.

20 From what has been described above it is apparent that the invention fully achieves the intended aim and objects, by providing an easily and rapidly adjustable hinge on three axes.

The hinge, according to the invention, is also aesthetically similar to ordinary non-adjustable hinges and has the great advantage of being structurally simple.

25 In its practical embodiment, any structurally and functionally equivalent modifications and variations may be executed without abandoning the scope of the invention.

30 In practice, the materials employed, as well as the dimensions, may be any according to the requirements.

35 Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

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## Claims

45 1. Window and door frame hinge comprising a male element (2, 102) with a protruding vertical pivot (3, 103) and a female element (4, 104) which caps said pivot and is rotatively associated to said male element, characterized in that it comprises a slideable element (8, 109) inserted into an axial hole (6, 107) of said male element (2, 102) and protruding with its end from the top of said pivot, adjusting means (9, 112) being provided to position said slideable element relatively to said male element, the hinge further comprising threaded fastening dowels (15, 117, 118) for fastening said hinge to jambs and to window- and door-frames, said

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fastening dowels being rotatively associated to said male and female elements at respective diametral holes (17, 119, 120) provided on said elements.

2. Hinge according to claim 1, characterized in that said male element (2) is traversed by a cylindrical axial hole (6) which is threaded at the end portion (7) opposite to said pivot (3).

3. Hinge according to claims 1 and 2, characterized in that said slideable element comprises a cylindrical dowel (8) inserted in said axial hole (6) of said male element (2) from said end opposite to said pivot (3) until it screws therein with a threaded end (9) and it protrudes with its opposite cambered end (10) from the top of said pivot, said threaded end (9) of said dowel having a recessed seat (11) for a hexagonal adjustment wrench.

4. Hinge according to claim 1, characterized in that said male element (102) is provided, in its upper portion, with a cylindrical axial hole (107) which extends from the top (106) of said pivot (103) to a threaded hole (108) which diametrically traverses said upper portion (106).

5. Hinge according to claims 1 and 4, characterized in that said slideable element comprises a dowel (109) inserted in said hole (107) and having an inclined end (110) in contact with the conical end (111) of a dowel (112) which is screwed into said threaded hole (108) and constitutes an auxiliary sliding means, said dowel (109) superiorly protruding, with a cambered end (113) opposite to said inclined end (110), from said pivot (103) and having an annular recess acting as seat for a locking ring (114) in plastics.

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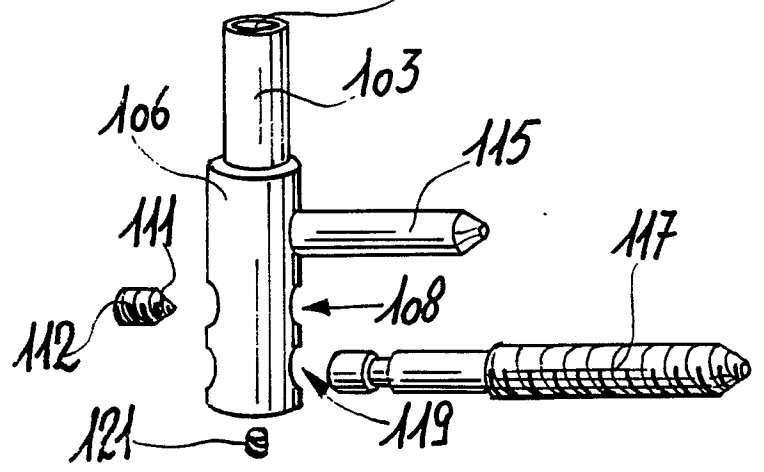
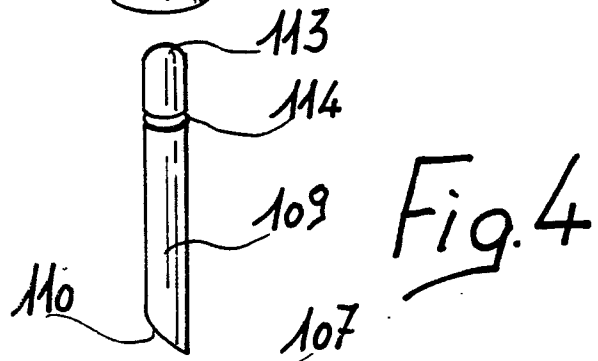
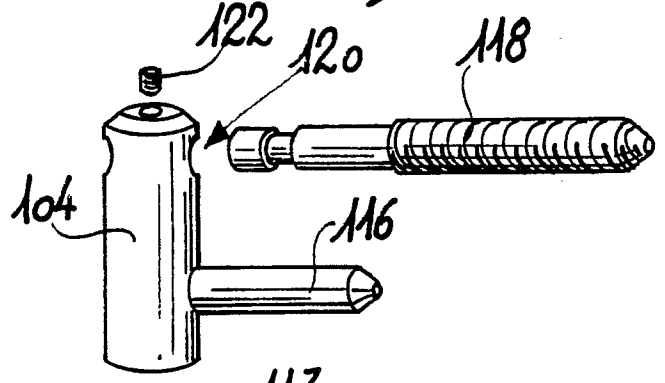
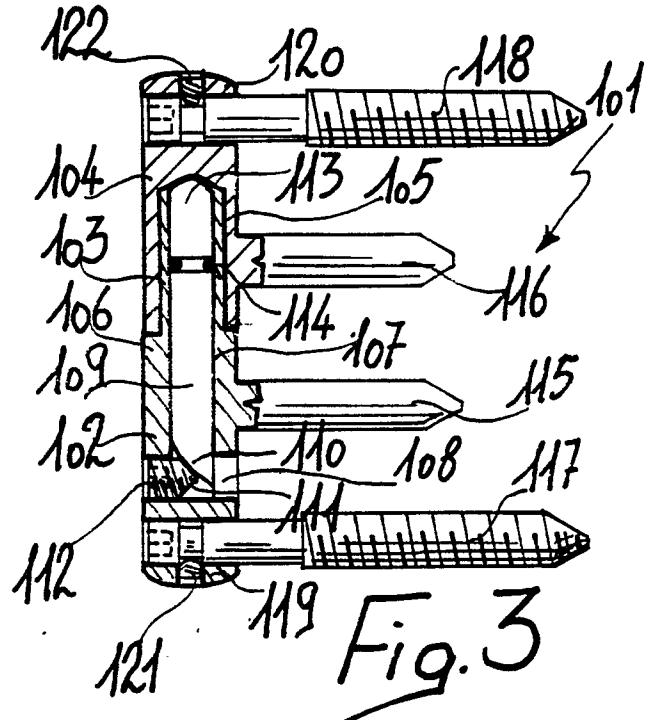
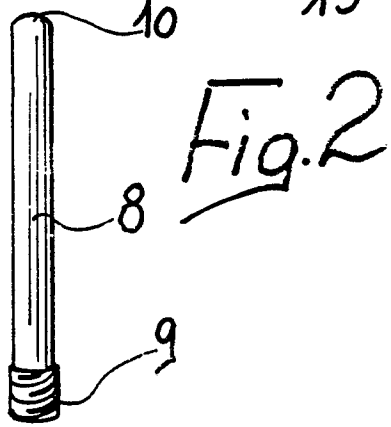
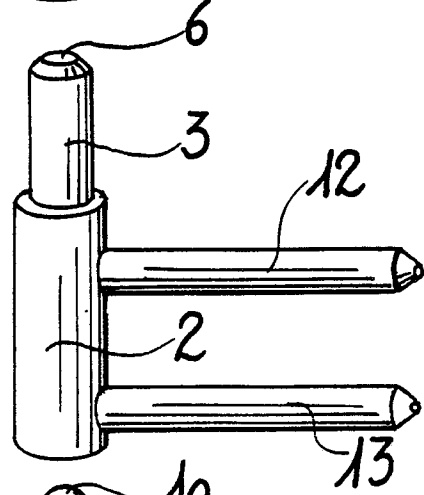
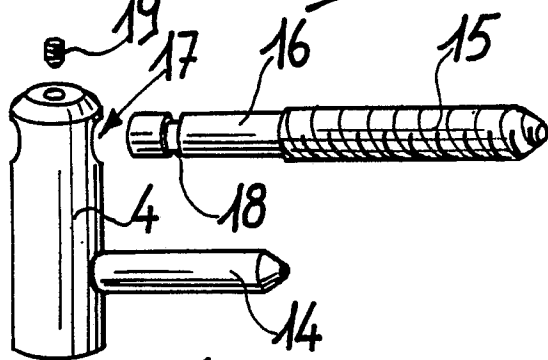
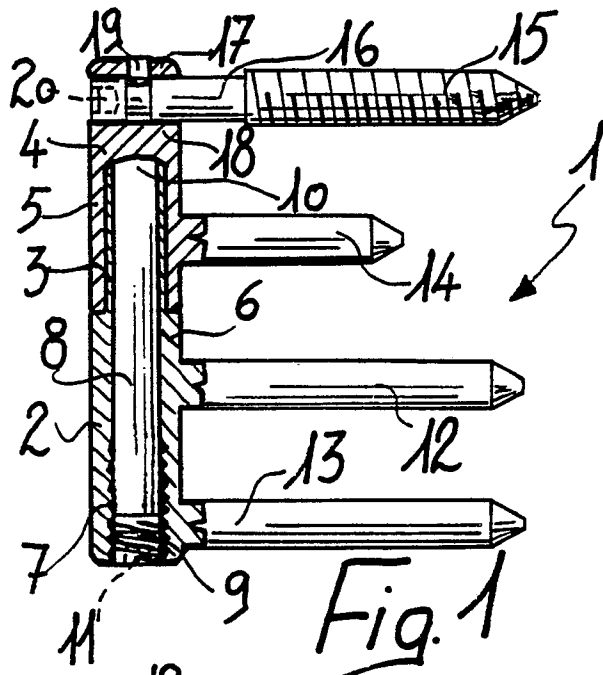
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
Y	CH-A- 544 872 (METTLER) * The whole document *	1,4,5	E 05 D 7/04
A	----	2	
Y	NL-A-6 807 297 (N.V. NEDERLANDSE METAALINDUSTRIE POLYNORM) * Figure 2 *	1,4,5	
A	----		
A	DE-A-2 313 293 (SUPPNER) * Figure 1 *	2	
A	----		
A	FR-A-2 533 615 (LAURENT) * Abstract; figure 1 *	2,3	
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			E 05 D
Place of search THE HAGUE		Date of completion of the search 25-10-1988	Examiner NEYS B.G.
<b>CATEGORY OF CITED DOCUMENTS</b> 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			