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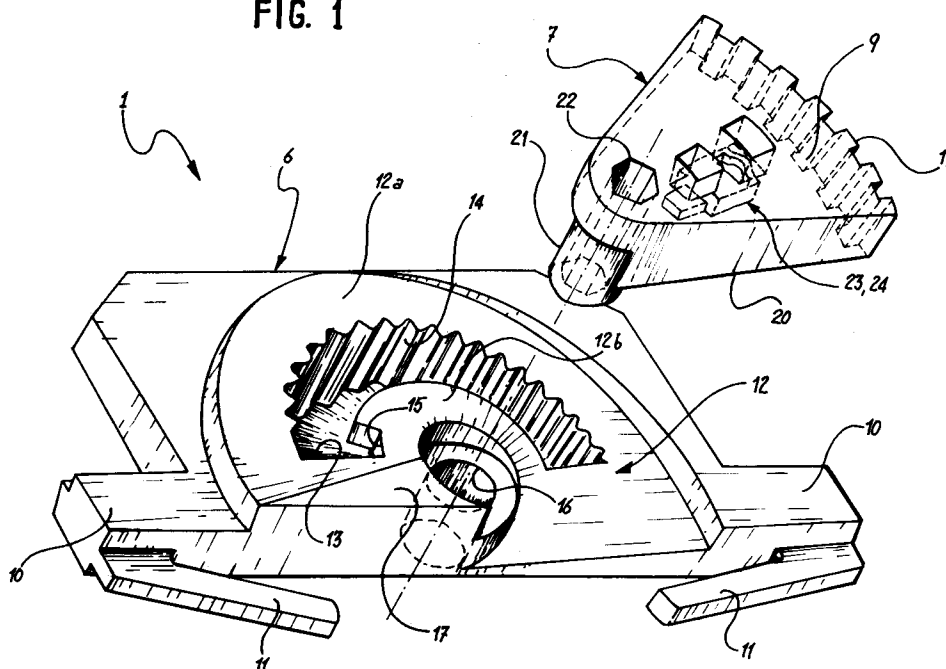
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I-35030 Sarmeola di Rubano (Padova)(IT)**(54) **a distance device for fixture frames.**

(57) A distance device for fixture frames, being of a type adapted for insertion between a frame portion of the fixture and a juxtaposed false frame, or a masonry bearing surface, comprises a first element (6) in the form of a face cam having a helical ramp-like working surface (12) with a predetermined an-

gular span and a second, or abutting element (7) having a smaller angular span than the corresponding span of the ramp, which is shiftable angularly on the ramp to vary the relative distance between juxtaposed bearing surfaces (8,9) of the device.

FIG. 1**EP 0 477 684 A1**

This invention relates to a distance device for fixture frames, being of a type adapted to fit in between a frame portion of the fixture and a juxtaposed false frame, or masonry bearing surface, and comprising first and second elements having respective juxtaposed bearing surfaces guided for movement toward and away from each other.

Distance devices of the above-outlined type are widely used for installing a fixture frame fixedly in corresponding opening in the masonry work.

In this environment, and especially in the technical field of fixtures constructed from aluminum alloy sections, there have been known essentially drop foot devices comprising a plate-like base for attachment to the fixture which has a throughgoing tapped hole therein into which a tang of the foot is threaded. Once the device is emplaced, it can be adjusted by varying the depth of engagement of the tang into the base.

This prior approach, while in many ways beneficial, only proves effective with the device applied substantially centered on the section of the fixture frame. On the other hand, due to the small size of the bearing base, the device will perform poorly at the corners, or when mounted at an offcentered position relatively to said frame section.

A further prior approach provides for the use of wedge pairs sliding over each other. This kind of device also suits offcentered mount situations and can be readily adjusted edgewise, such as by inserting a screwdriver blade between the frame and the false frame, but it is on this account, in fact, that it is difficult to adjust where the fit of the frame to the false frame includes undercut portions hindering access to the wedges or forbidding it altogether.

An adjustable spacer, albeit intended for different applications, having two elements whose facing surfaces are in the pattern of a helical ramp, is known from UK Patent Application No. 2176828. The spacer of this prior document is intended for glazed fixture frames, such as doors and the like, and for adjusting glass panes in position relatively to their frame. However, that spacer is unsuited to the applications envisaged by this invention because of the unfavorable ratio of the minimum axial dimension of the spacer, as measured with the two elements turned to a corresponding limit position, to the maximum axial travel of the two elements, with the latter turned to their opposite limit positions.

In fact, with the surface of the face cam-forming element spanning a full helix turn, the minimum axial dimension of the spacer is of necessity greater than the helix pitch length, in view of such contributory dimensions as the thickness of parts, etc.. On the other hand, being the slide element rotatable through about 180°, the maximum rela-

tive travel distance of the two elements can in no case exceed one half the pitch length of the helix.

In practice, it is typical for a distance device suiting the applications contemplated by this invention to have a minimum axial dimension of about 8-9 mm, and it is mandatory that it can ensure a maximum relative travel distance of no less than 5-6 mm between the two elements. In the instance of the aforementioned UK Patent Application, this cannot be accomplished due to the shape of the spacer and the thickness of its components.

The technical problem that underlies this invention is to provide a distance device for fixture frames which has such constructional and functional features as to overcome the drawbacks mentioned above in relation to the devices proposed by the cited prior art.

This problem is solved by a distance device as indicated being characterized in that said first element is a face cam having a helical ramp-like working surface and the second element is a cursor shiftable angularly along said ramp, said cursor having a smaller angular dimension than the angular span of said ramp.

The features and advantages of a device according to this invention will become apparent from a detailed description of three embodiments thereof, to be taken in conjunction with the following illustrative and non-limitative drawings.

In the drawings:

Figure 1 is an exploded perspective view of the distance device of this invention;

Figure 2 is a top plan view of the device shown in Figure 1;

Figure 3 is a side view of the device shown in Figure 1;

Figure 4 is a perspective view of the device of Figure 1, shown in operation;

Figure 5 is a perspective detail view of the device shown in Figure 1;

Figure 6 is a perspective view of a variation of the device according to the invention;

Figures 7 and 8 are top and bottom views, respectively, showing in perspective the two elements of a device according to a further embodiment of this invention.

In Figure 1 to 5, generally shown at 1 is a distance device embodying the principles of this invention.

The device 1 is adapted to fit, in use, between a section 2 of a fixture frame and a false frame 3. In quite an equivalent manner, the false frame 3 could be a masonry bearing surface framing an opening intended for accommodating the fixture.

The distance device 1 comprises first and second elements shown at 6 and 7, respectively, which have respective juxtaposed, substantially flat surfaces 8, 9 adapted to fit, in use, close to the

false frame and the frame, or vice versa. By reason of their intended function, these surfaces will be referred to hereinafter as the bearing surfaces of the distance device.

The first element 6 includes an essentially rectangular plate-like base having, at one and the same major side, two juxtaposed and aligned projections 10, each provided with an elastically deformable lug 11. The projections 10 and lug 11 serve, by snap fitting into a groove (not shown) on the section 2, to anchor the element 6 removably on the fixture frame.

On the juxtaposed side to the bearing surface 8, said element 6 is contoured as a face cam with the working surface 12 in the shape of a single-thread helical ramp approximately half-pitch long (180°).

The surface 12 is formed with a circular half-ring opening 13 dividing the surface 12 into an outward ring 12a and an inward ring 12b. At the outward ring 12a, the opening has a serrated crown-like surface 14. The inward ring 12b has a segment jutting lip-fashion radially into the opening 13, and has at one end a cutout 15 spanning said lip-like segment. Both the rings 12a, b and the opening 13 are concentric to one another and have a bore 16 forming a journal seat for the second element 7.

It may be seen in Figure 1 that the surface 12 has, at its remote end from the surface 8, a flat surface portion 17 which interrupts the helical ramp along a substantially radial direction thereto, and whose function will be explained hereinafter.

The second element 7 is shaped, at least at the bearing surface 9, as a circular segment having an angular dimension which is smaller than the angular span of surface 12, preferably smaller than 90° . As a preferred example, angular dimensions on the order of 40° - 70° may be mentioned for element 7. Said element has, on its side juxtaposed to the surface 9, a helical ramp segment surface 20 mating with the contour of the surface 12 and being associated in sliding relationship therewith. It is engaged pivotally with the first element 6 by means of a cylindrical tang 21 engaged in the bore 16, with the elements 6, 7 in their assembled condition. Said tang 21 is formed with a through-hole 22 with hexagonal cross-sectional shape which provides a socket for engagement by a wrench to be used for adjusting the device 1, as well as for passing a screw V (Figure 4) for mounting the frame 2 to the false frame 3.

The second element 7 is also provided with a detent tooth 23 and a pawl-like stopper 24, both fast with a lug 25 which extends from the surface 20 at the opening 13.

The detent tooth 23 engages beneath the lip-like section of the inward ring 12b, after insertion

beneath the same through the cutout 15, and acts as a loss-preventing device to avoid incidental separation of the elements 6, 7 from each other.

The pawl-like stopper 24 serves, by co-operating with the serrated crown surface 14, to restrict freedom of rotation of the second element 7 about the first (6), thereby making the device 1 easier to adjust.

With specific reference to the example shown in Figure 6, a variation will be now described, co-operating details and parts whereof which have the same construction and operation as in the previous embodiment are denoted by the same reference numerals.

In this variation, the distance device is shown generally at 100 and comprises a first element 26 having a flattened cylindrical shape with a flat base 8 bearing against the frame 2, or the false frame 3, and a juxtaposed surface defined by two semicircular, helical pattern ramps 12.

A second element 27 is pivoted centrally on the first element 26 and has an essentially butterfly-like shape with juxtaposed wings 28 and 29 displaceable angularly over each of the ramps 12.

Each wing 28 and 29 has substantially the same construction as the element 7 of the previously discussed embodiment.

A further variation of the device according to the invention is illustrated by Figures 7 and 8 wherein first and second elements 60, 70 of the device are respectively shown. Again, like reference numerals denote parts which correspond in construction and function to what has been said in connection with the previous examples. The two elements, 60 and 70, of this second variation differ from the corresponding elements, 6 and 7, shown in Figures 1-5 mainly by the provision, on both the inward ring 12b of element 60 and the facing portion of the surface 20 of element 70, of a dense arrangement of ridges 61, 71 designed to assist the pawl-like stopper 24 and the serrated crown surface 14 in restricting the freedom of relative rotation of the first and second elements 60, 70, especially when said elements are being pushed against each other. It is understood that similar ridges may be provided on the corresponding surfaces 12, 20 of the device 100 according to the second example herein described.

The distance device of this invention is applied to the sections of the frame 2 of a fixture so as to be interposed between the frame 2 and the false frame 3 in the assembled state. As already mentioned, it is held to the frame 2 by the projections 10, 11 engaging in corresponding slots in the section; thus, the element 6 is prevented from turning relatively to the frame 2. At the stage of assembling to the fixture frame, the second element 7

should be rotated from the first against the end of the ramp-like surface 12 juxtaposed to the flat portion 17, so as to minimize the overall thickness of the device 1 (the condition of Figure 2), that is to have it set with the bearing surfaces 8, 9 closest together.

It may be seen that in this position the overall thickness of the device 1 is unaffected by the theoretical development of the terminating portion of the helical ramp surface 12 on account of the latter being levelled off where shown at 17 in the drawings. Accordingly, the minimum thickness of the device 1 will be solely given by the sum of the thicknesses of each element 6, 7 in the position shown in Figure 2.

In order to guide the juxtaposed bearing surfaces 8 and 9 of the respective elements 6 and 7 mutually away from each other, it will be necessary to rotate the element 7 counterclockwise on the element 6 from the condition shown in Figure 2.

For this purpose, one could act, for example, with a suitable tool such as a blade of a screwdriver, on the serrated edge 19 of the element 7, where the latter is accessible, so as to turn it angularly over the helical ramp surface 12 which constitutes the face cam of the first element 6.

The mating fit of the helical profile of the ramp 12 with the surface 20 of the element 7 ensures that the juxtaposed bearing surfaces 8 and 9 will be parallel to each other at all times.

Where the serrated edge 19 of the second element 7 is not accessible, the latter could be rotated using a hexagon wrench of the type ordinarily employed to work socket head screws in engagement with the hole 22 in the tang 21.

The device of this invention affords a number of advantages over known devices, among which is that of presenting in practice the same bearing surface area as with the wedge pair arrangements, while providing the same convenient operation as the drop foot devices. This enables the stresses and sideways thrusts involved in the enplacement and installation of the fixture frame to be withstood best, even with an offcentered positioning of the device.

In addition, comparatively long relative travel distances can be provided for the two elements while keeping the minimum overall size of the device low.

Claims

1. A distance device (1) for fixture frames (2), being of a type adapted to fit in between a frame portion (3) of the fixture and a juxtaposed false frame, or masonry bearing surface, and comprising first (6) and second (7) elements having respective juxtaposed bearing

surfaces (8,9) guided for movement toward and away from each other, characterized in that said first element (6) comprises a face cam having a helical ramp-like working surface (12) and the second element (7) comprises a cursor shiftable angularly along said ramp (12), said cursor having a smaller angular dimension than the angular span of said ramp.

2. A device according to Claim 1, characterized in that said second element (7) is pivoted on the first element (6).
3. A device according to either Claim 1 or 2, characterized in that said helical ramp-like working surface (12) extends over a distance equal approximately to a half pitch length.
4. A device according to any of Claims 1 to 3, characterized in that said cursor has an angular extension of less than 90°.
5. A device according to one or more of the preceding claims, characterized in that said second element (7) is associated in sliding relationship with said face cam through a mating profile surface (20) with said helical ramp-like working surface (12).
6. A device according to either Claim 1 or 2, characterized in that it comprises, on said second element (7), a grip means for operating said element to become displaced angularly over said ramp (12).
7. A device according to Claim 6, characterized in that said grip means comprises a serrated edge (19) of said second element (7).
8. A device according to Claim 6 when appendant to Claim 2, characterized in that said grip means comprises a polygonal cross-section hole (22) formed in a tang (21) for journalling the second element (7) on the first element (6).
9. A device according to Claim 1, characterized in that it comprises, on said second element, a loss-preventing means whereby it is attached removably to the first element.
10. A device according to Claim 1, characterized in that it comprises, on said second element (7), a means (24,14) of restricting the angular displacement of the second element on the first element to thereby adjust stepwise the angular movement of the second element (7) over the ramp (12).

11. A device according to Claim 1, characterized in that, in order to limit the overall minimum thickness of the device, the helical ramp-like surface (12) of said first element is interrupted, at one of its ends and along a substantially radial line to said ramp, by a flat surface (17). 5

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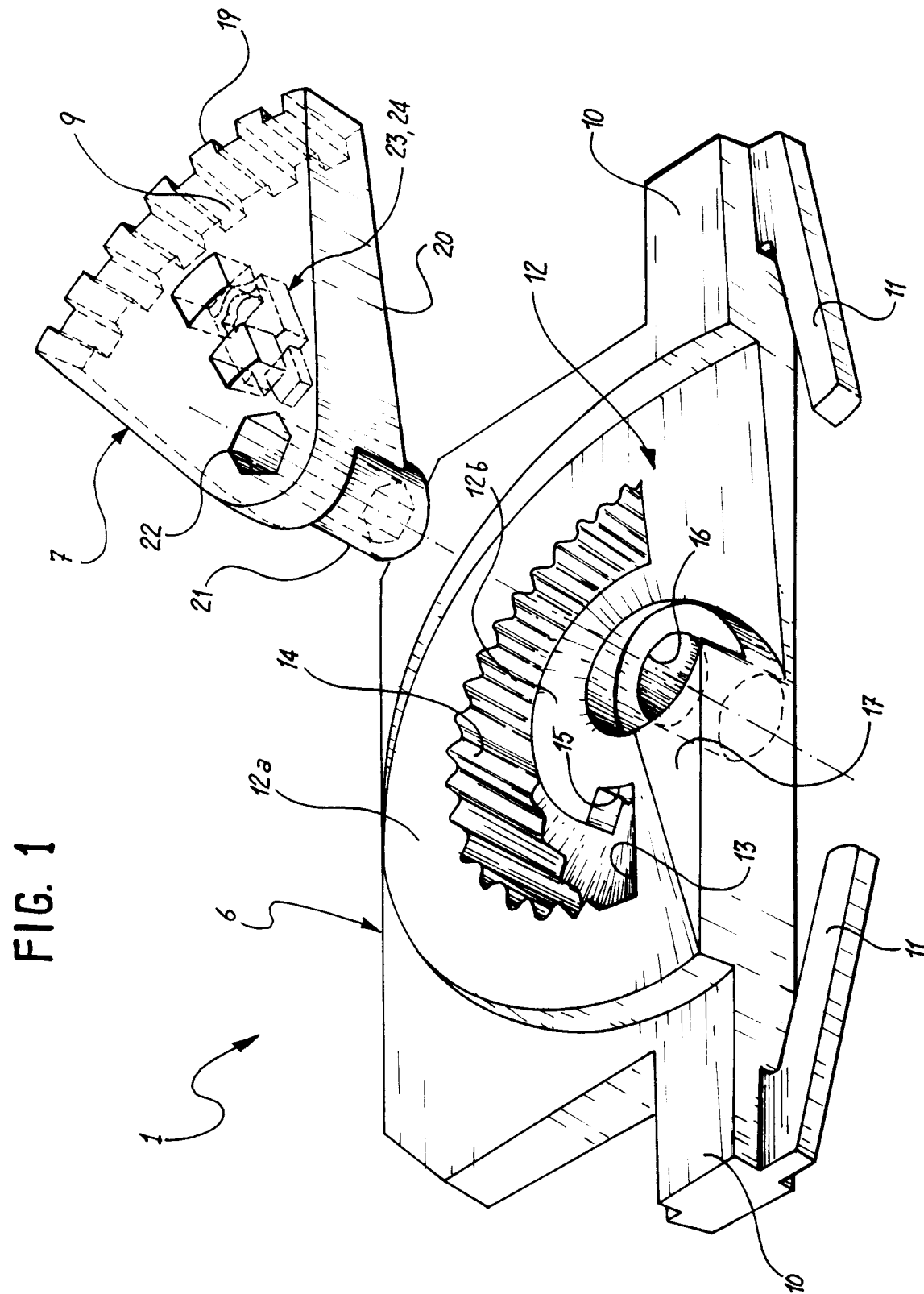


FIG. 3

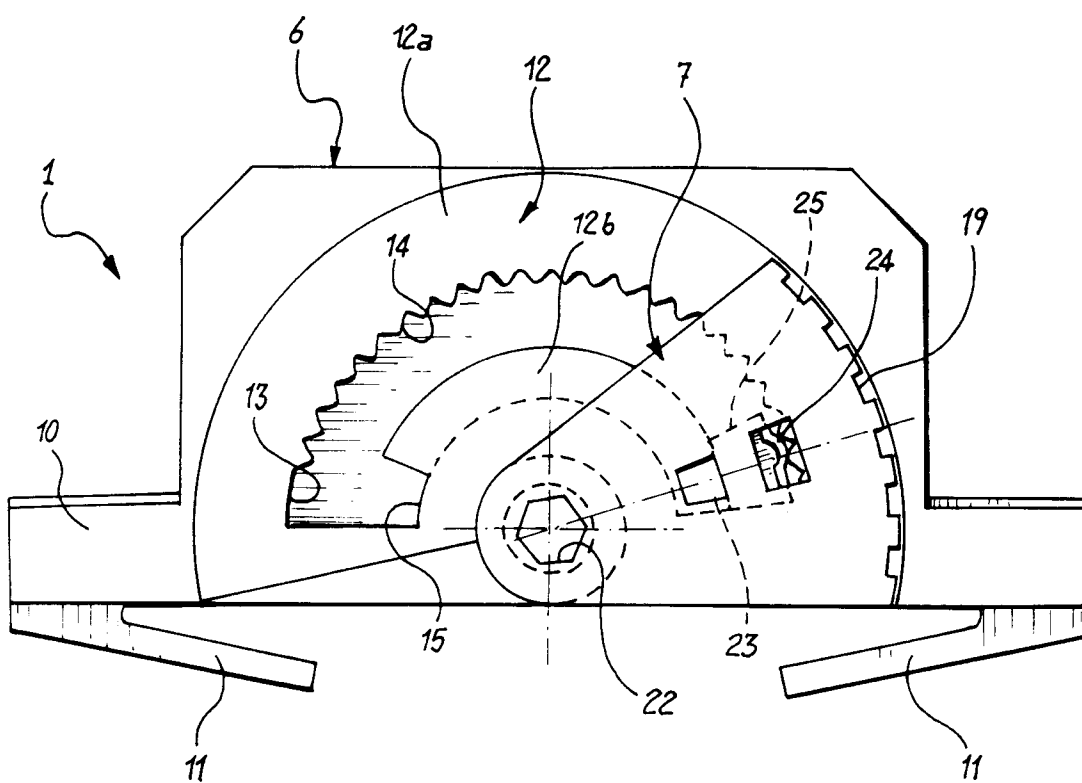
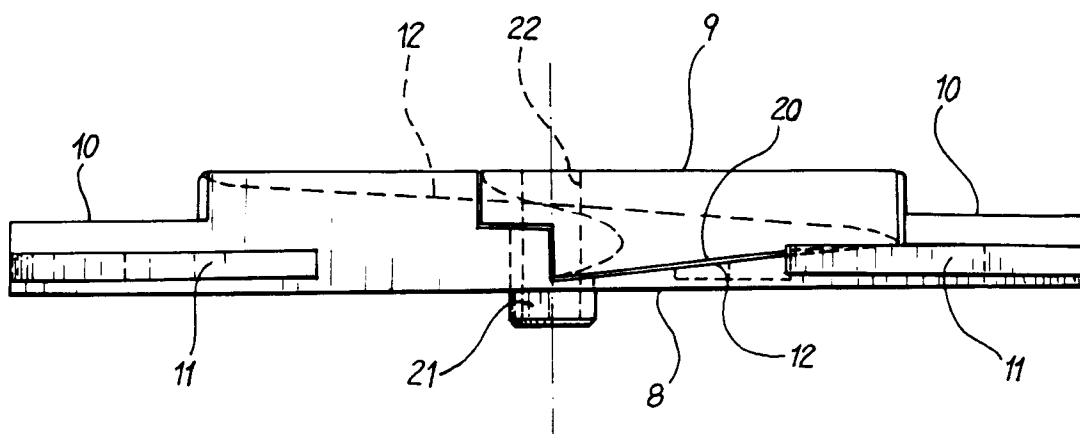


FIG. 2

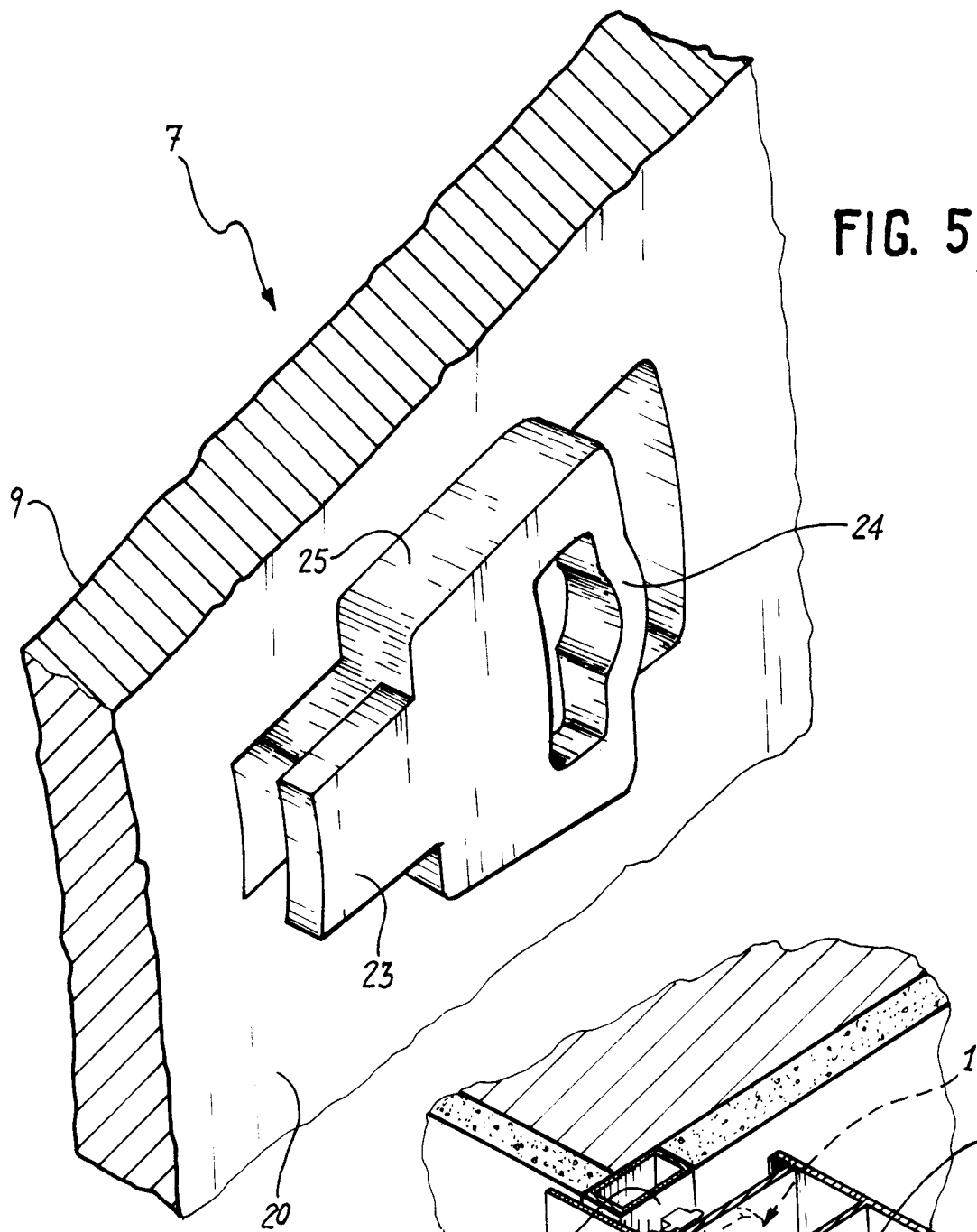
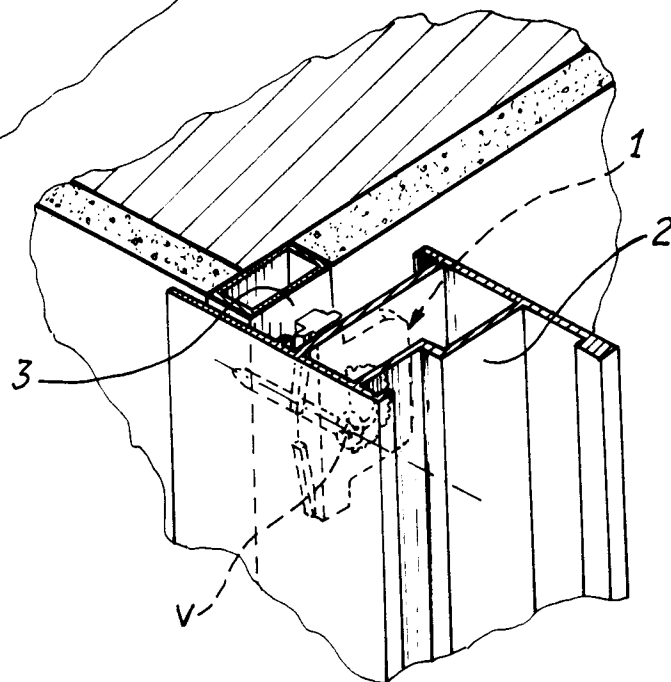


FIG. 4



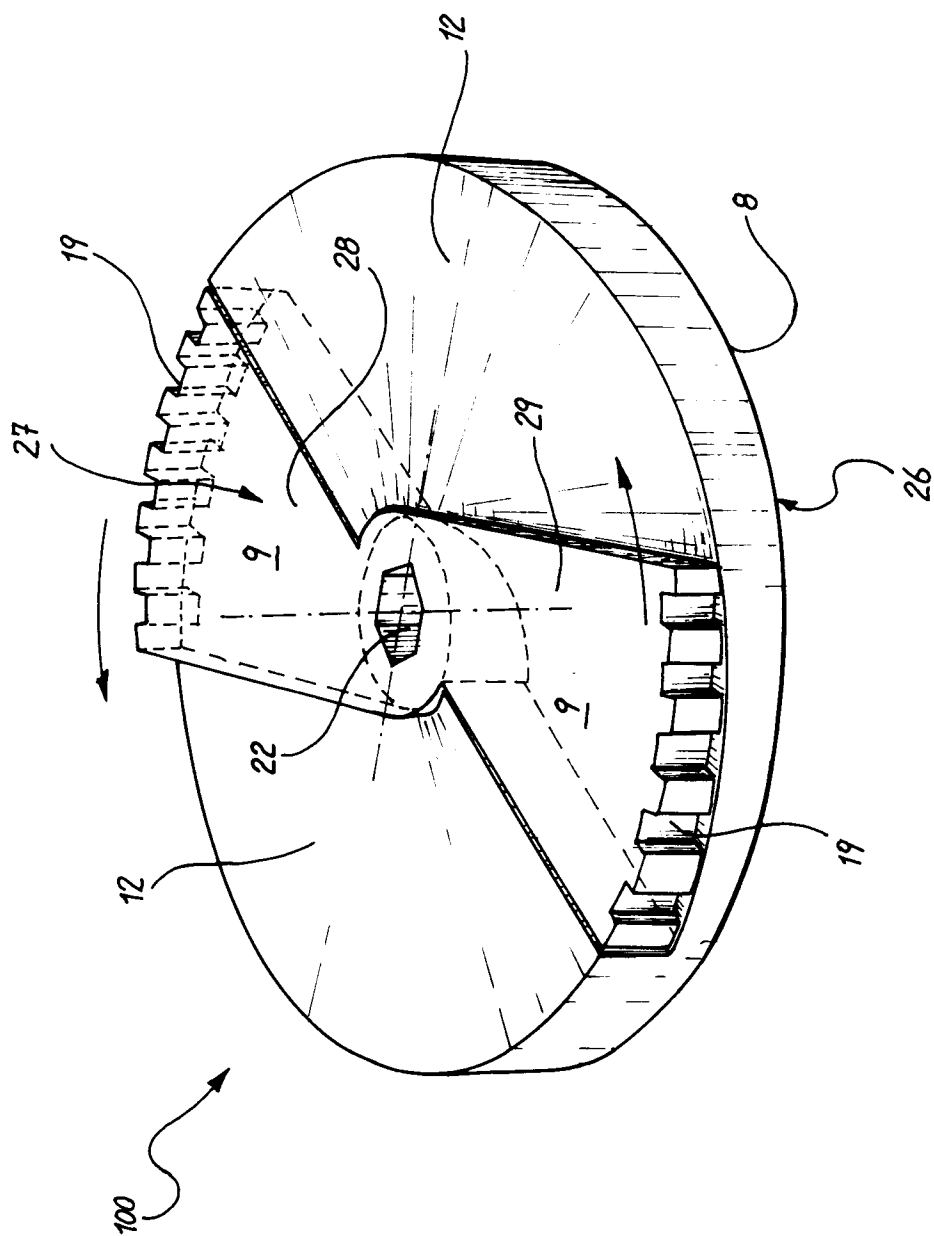


FIG. 6

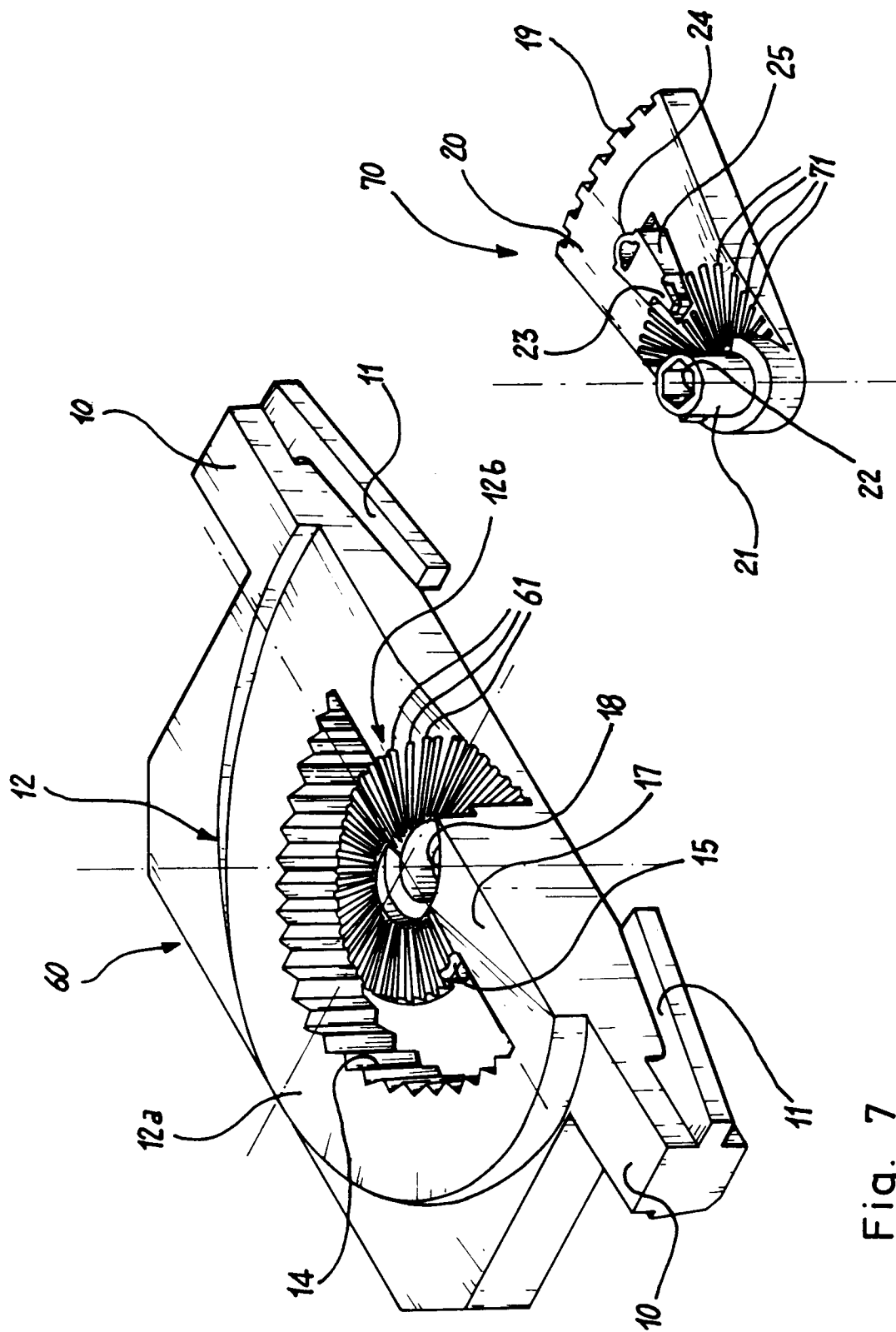
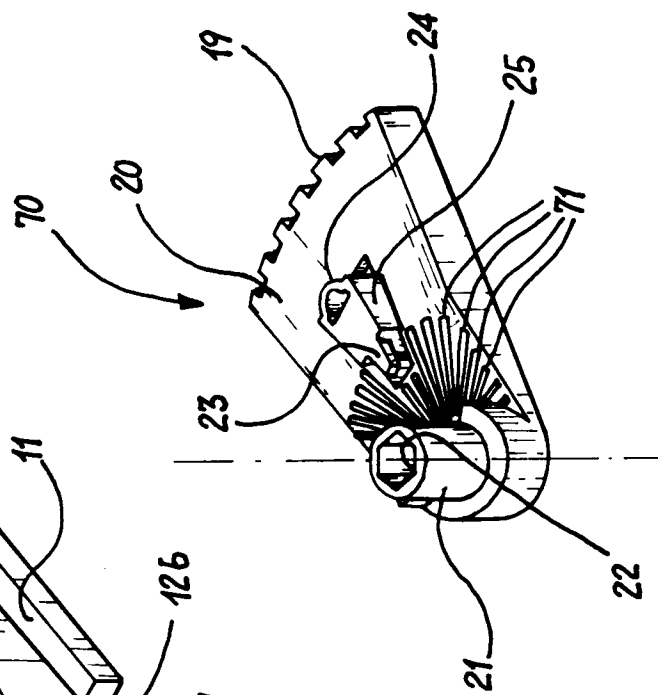


Fig. 7



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EUROPEAN SEARCH REPORT

EP 91 11 5452

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.5)
Y	DE-A-1 784 610 (BEILHACK) * the whole document ** -- --	1,4-7,9	E 06 B 1/60
Y	DE-A-1 683 548 (SCHÜRMANN) * page 5, line 1 - page 6, line 2 *** page 6, line 13 - page 7, line 12 *** figures 1-3 ** -- --	1,4-7,9	
D,A	GB-A-2 176 828 (NORCROSS INVESTMENTS) * page 1, line 96 - page 2, line 122; figures 1-3 ** -- --	1,2,5,6,8,9	
A	WORLD PATENTS INDEX LATEST Section PQ, Week 9010, Derwent Publications Ltd., London, GB; Class Q61, AN 90-073 & SE-A-8 802 131 (ERIKSSON L) 8 December 1989 & WO-A-9105933 (ERIKSSON L) 2 may 1991 * abstract* * -- --	1,2	
A	DE-A-1 659 096 (HAMMERS) * claims 1,6-9; figures 1,2 ** -- --	6,7,10	
A	GB-A-634 899 (GENERAL BRONZE CORPORATION) -- --		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	DE-C-839 888 (PILLER) -- --		E 06 B
A	DE-A-2 926 488 (MAINBAU) -- -- -- --		F 16 B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 19 December 91	Examiner DEPOORTER F.
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	