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(54) Double action pawl latch

(57) The invention relates to a double action pawl latch having a tubular latch body 10,20 for attachment to a door, panel or the like, and having an enlarged head 11 for abutment against a front surface of the door or panel. Disposed within the latch body 10,20 are an actuating spindle 50 and a pawl operating spindle 60 axially and rotationally movable relative to one another under the action of a helical cam connection 58,58,62 between the actuating spindle and the pawl operating spindle. The pawl operating spindle 60 has a pawl 40 attached at its rear end. The tubular latch body 10,20 and the pawl 40 have pawl abutments 29-31,42,43 which allow rotation of the pawl 40 from a first angular position in a first axial position of the pawl and axial movement of the pawl to a second axial position in a second angular position of the pawl. The actuating spindle 50 and the tubular latch body 10,20 have rotationally engaging abutments 18,19,81,82 limiting the rotation of the actuating spindle within the tubular latch body to rotation of substantially 180° between a first angular position corresponding to the first angular position of the pawl 40 and a second angular position corresponding to the second angular and axial positions of the pawl 40.

Fig 2.

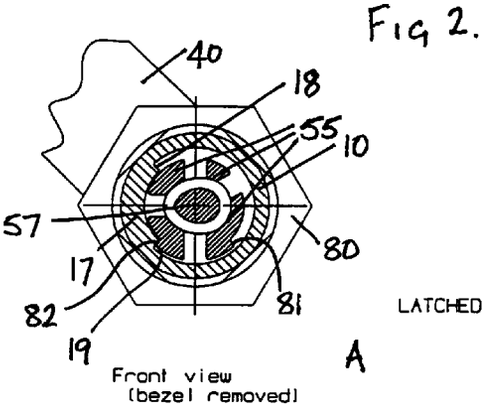
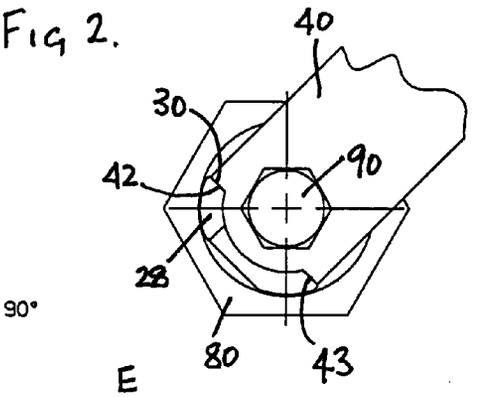


Fig 2.



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Description

[0001] The present invention relates to a pawl latch and, more particularly, to a so-called double action pawl latch for use in latching a door or panel for example, in which rotation of an actuator such as a handle or key causes both rotation of the pawl into or out of the latched position and translation of the pawl between a withdrawn position and a drawn-up position in which the pawl engages the surround of the door or panel say.

[0002] Latches of this type are generally well-known from eg. US-A-2 860 904 & US-A-3 402 958 (to Barry), US-A-2 269 264 (to Haim), GB-B-2 158 866 & GB-B-2 172 648 & others (to Southco) and from Eldon. In some latches, eg. Barry or Eldon, the drawing-up of the latch and its withdrawal are achieved by a screw-thread, in others, eg Haim or Southco, this is achieved by a camming action, and in most of these, there are stops or the like to prevent over-rotation and to guide the motion of the pawl in the rotational and translational directions. The applicants have manufactured different latches of this general type for many years, recently, for example, the Dzus "Series 43 latch".

[0003] Where a reasonably high level of security is required, the latch may have an operating lock or special actuator form to prevent operation without an appropriate key or actuator. However, it is also desirable to ensure that, when a key such as a T-shaped handle or the like is used, the torques generated in use do not cause distortion or damage to the components of the latch. These requirements may result in a complex assembly and a lengthy fitting operation.

[0004] There is a need for further improvement in the design of these latches and the present invention sets out to achieve this.

[0005] According to the invention there is provided a double action pawl latch having a tubular latch body for attachment to a door, panel or the like, and having an enlarged head for abutment against a front surface of the door or panel; and, disposed within the latch body, an actuating spindle and a pawl operating spindle axially and rotationally movable relative to the actuating spindle under the action of a helical cam connection between the actuating spindle and the pawl operating spindle and having a pawl attached thereto at a rear end, the tubular latch body and the pawl having pawl abutments which allows rotation of the pawl from a first angular position in a first axial position of the pawl and axial movement of the pawl to a second axial position in a second angular position of the pawl, characterised in that

> the actuating spindle and the tubular latch body have rotationally engaging abutments limiting the rotation of the actuating spindle within the tubular latch body to rotation of substantially 180° between a first angular position corresponding to the first angular position of the pawl and a second angular position corresponding to the second angular and axial positions of the pawl.

[0006] This construction increases the strength of the latch by allowing operational torque loadings to be removed from the pawl abutments and moved to the more robust position of the tubular latch body and actuating spindle.

[0007] One example of a double action pawl latch according to the invention will now be described with reference to the accompanying drawings in which:

> Figure 1 is an exploded isometric view of the latch;
> Figures 2A-F indicate front (with latch head removed) and rear views of the latch in a number of a positions;
> Figures 3A-D are partial isometric views of the latch showing insertion of corresponding key and stages of operation; and,
> Figures 4A-D are front views (partially sectioned) of the latch in positions corresponding to the positions shown in Figures 3A-D.

[0008] Figure 1 shows the various components of the double action pawl latch of the example in exploded view, with the exception of the securing nut. The latch 1 comprises a front tubular latch body 10 which has an enlarged head or bezel 11 which, in use, engages around the sides of an aperture at which the latch is fastened in a door, panel or the like which is to be secured using the latch 1. The front tubular latch body 10 has four screw-threaded portions 12 equally spaced around its circumference, separated by flats 13. A pair of deformable detents 14 are provided on opposite sides (one only shown in figure 1) and a locating slot 15 is provided at the rear end of the front latch body 10. In use a washer 16 is inserted over the front latch body 10 to engage the rear of the door, panel or the like and a screw-threaded nut is used to back-up the washer in order to secure the latch body in place.

[0009] A rear tubular latch body 20 which, on assembly, mates with and is secured to the front tubular latch body 10 provides a tubular housing for securing the working components of the latch. The rear tubular latch body 20 has a barrel 21 with a pair of opposed apertures 22 into which the detents 14 are deformed to secure the rear latch body inside the front latch body. The barrel 21 may be partially splined about an annular portion 23 to provide an press fit within the front tubular latch body 10. A pair of diametrically opposed cross pin access slots 24 are provided in the annular portion 23 as is a location protrusion 25 which in use mates with the location slot 15.

[0010] The rear tubular latch body 20 incorporates an enlarged diameter portion 26 which has a diameter similar to that of the front tubular latch portion 10 and a pawl control section 27 which is again of slightly increased diameter. The pawl control section 27 has a part-annu-

lar protrusion 28 which provides a pair of abutments 29, 30 to limit rotation of the pawl 40 to approximately 90° when it is axially aligned with the protrusion 28, and a further abutment 31 is provided which, in combination with the abutment 30, substantially completely prevents rotation of the pawl 40 when it is axially aligned with the abutment 31, as will be described below.

[0011] An actuating spindle 50 which comprises a cylindrical spigot 51, has an enlarged front end portion 52 which includes a pair of annular ribs 53 to receive a synthetic rubber O-ring 54 and also provides plural part-annular abutment segments 55 separated by radial key slots 56. The front end portion 52 also includes a central axial protrusion 57. A spring washer 58 is disposed on the spigot 51 against the annular flange 53 and in use engages against the corresponding end of the barrel 21 of the rear tubular latch body 20. The spigot 51 includes a cross bore 58 for receipt of a cross pin 59.

[0012] A pawl operating spindle 60 in the form of a hollow sleeve 61 has a pair of helical cam slots 62 which are diametrically opposed and has an enlarged diameter rear end portion 63 on which the pawl 40 is non-rotatably secured in use by means of a bolt 90 secured through a threaded counter bore 64 which is formed in a non-circular end protrusion 65 which extends, in use, through a similarly shaped aperture 41 in the pawl 40.

[0013] The pawl 40 includes a pair of abutments 42, 43, which in use engage, respectively, with the abutment 30 and the abutment 29 or 31 of the rear tubular latch portion 20.

[0014] To assemble the latch for use, the actuating spindle 50, carrying the spring washer 57, is inserted in the front end of the rear tubular latch body 20 and the pawl operating spindle 60 is inserted from the opposite end, a helical spring 70 being disposed within the pawl operating spindle 60 between the two to bias them apart. The cross pin 59 is then inserted, through one of the cross pin access apertures 24, through the helical cam slots 62 of the pawl operating spindle 60 and the bore 58 of the actuating spindle 50. The two spindles are thus secured together within the rear tubular latch body 20 and are free to rotate within it. The rear tubular latch body is then presented to the front tubular latch body with the locating protrusion 25 aligned with the location slot 15 and it is press-fitted into the front tubular latch body 10, capturing the actuating spindle 50 between the two latch bodies. The detents 14 are then deformed inwardly into engagement with the apertures 22 to secure the rear tubular latch body within the front tubular latch body 10.

[0015] The assembled latch body may then be presented from the front through an aperture to which it is to be secured, the washer 16 inserted over the rear tubular latch body 20 and onto the front tubular latch body 10 and the securing nut 80 similarly positioned and tightened up on the screw threaded portions 12 to fix the latch in position. The pawl 40 can then be attached to the pawl operating spindle 60 by means of the bolt 90.

[0016] After assembly the latch is in the unlocked or unlatched position with the pawl axially aligned with the abutments 29 and 30 and capable of rotation over a 90° angle defined by engagement of the abutment 42 with the abutment 30 and the abutment 43 with the abutment 29. In order to operate the latch the actuating spindle is rotated by means of a key engaged through the head or bezel 11 with the front end portion 52 of the actuating spindle 50 so as to enable rotation of the pawl from a first angular position in which the abutment 43 engages the abutment 29 to a second angular position in which the abutment 42 engages the abutment 30 (i.e. through 90°), the pawl actuating spindle being driven by means of its connection with the cross pin 59 from the actuating spindle 50. When the abutment 42 engages the abutment 30 the pawl actuating spindle can no longer rotate and thereafter continued rotation of the actuating spindle 50 causes the cross pin 59 to move along the cam slots 52 drawing the pawl actuating spindle 60 against the biasing action of the spring 70 further around the spigot 51 of the actuating spindle 50, carrying the pawl 40 with it. Rotation of the pawl is substantially completely prevented by continued engagement of the abutments 42 and 30 and also by the abutments 43 and 31. When the cross pin 59 reaches the ends of the cam slots 62 which have a detent 66, the latch is fully locked or latched in a position drawn-up towards the front of the latch, against the frame or surround on which the door or panel is secured.

[0017] For unlatching, the reverse operations occur, the key being required to disengage the cross pin 59 from the detents 66 and thereafter the pawl moving axially while the abutment 43 is engaged against the abutment 31 until the pawl clears the abutment 31, after which the pawl is free to rotate until the abutment 43 engages the abutment 29 of the protrusion 28 on the rear tubular latch body 20.

[0018] It will be appreciated that providing a two-part latch body enables a relatively simple assembly procedure to be followed and also securely retains the actuating spindle 50 in a position trapped between the two latch bodies 10, 20. The actuating spindle 50 is held in a position in which it is not removal from the front of the latch and has reduced accessibility, thus improving securing.

[0019] In order to further strengthen the latch and allow operational torque loadings to be partly removed from the pawl abutments 42, 43, 29-31 and as is best seen from figures 2A-F, the front tubular latch body 10 has an internally thickened wall portion 17 which provides a pair of axially extending abutments 18,19. These are capable of engagement with abutments 81, 82 which are provided on respective protrusions 83, 84 on adjacent ones of the part-annular portions 55 of the head 52 of the actuating spindle 50.

[0020] Figures 2A-2C show a front view of the latch with the head or bezel 11 removed and with internal

components in cross-section, in respective latched, 90° rotated from latched, and 180° fully unlatched positions and Figures 2D-2F show a rear view of the latch in corresponding positions. It can be seen how, in the latched position, in which the abutment 42 on the pawl 40 is engaged with the abutment 30 on the protrusion 28, the abutment 82 on the actuating spindle 50 is engaged with the abutment 19 on the front tubular latch body 10, in Figures 2A and 2D. Figures 2B and 2E illustrate the 90° from latched position with the abutment 42 riding against the abutment 30 during unlatching and with the actuating spindle 90° rotated from the latch position. Figures 2C and 2F illustrate the fully unlatched position in which the abutment 43 on the spindle 40 is engaged with the abutment 29 on the protrusion 28 and the abutment 18 on the actuating spindle 50 is engaged with the abutment 81 upon the front tubular latch body 10.

[0021] By this construction loadings on the latch can be shared between the respective pairs of abutments, to reduce overall loadings on the rear tubular latch body protrusion 28 and the pawl 40.

[0022] Figures 2A-2F also show the securing nut 80 and figures 2D-2F show the bolt 90 which secures the pawl 40 to the pawl operating spindle 60.

[0023] Figures 2A-2C also show, in cross-section, the central protrusion 57 which can be seen to be non-circular.

[0024] Figures 3A-3B and 4A-4D illustrate a further aspect of the latch.

[0025] As can be seen from Figure 3A and Figures 4A-4D the bezel or head 11 of the front tubular latch body 10 has a front aperture 100 which has radially outwardly extending key slots 101 which mate with corresponding radial protrusions 202 on the end of a tubular key 200. For simplicity in Figures 3A-3D the central protrusion 57 has been removed from the figures. In Figure 3A the position of the part-annular protrusions 55 and the radial key slots 56 in the actuating spindle 50 can be clearly seen. In Figure 3A the latch is shown in the latched position and it can be seen that the key slots 101 are not aligned with the key slots 56. This means that the key 200 can only be inserted until the ends of the key protrusions 202 engage against the front surfaces 55' of the protrusions or abutments 55.

[0026] In order to engage the key protrusions 202 with the radial key slots 56 the key is rotated anti-clockwise by 20°, this movement being accommodated by increased width of the key slots 101 at the rear of the bezel. After the key 200 has been so rotated it can be pushed further into the latch to engage the key protrusions 202 with the radial key slots 56 of the actuating spindle 50. This is shown in Figure 3B and Figure 4B.

[0027] Further 90° anti-clockwise rotation of the key 200, as described above, allows the pawl to move axially from its drawn-up position, the position of the actuating spindle 50 being shown in Figure 3C and Figure 4C.

[0028] Continuing further rotation through 90° moves the pawl 40 to the fully unlatched position by rotation and the position of the actuating spindle is shown in Figures 3D and 4D.

[0029] Once rotation of the key after engagement with the key slots 56 has commenced, i.e. in moving from the position shown in Figures 3B,4B to 3D,4D a part annular rearwardly extending abutment 102 within the head or bezel 11 prevents withdrawal of the key by engaging the rear ends (in the sense of the key rather than the latch) of the key protrusions 202.

[0030] By these measures, not only is the end of the actuating spindle 50 protected from intrusion and tampering, but also, the key is prevented from withdrawal when the latch is unlocked, so that the operator has to lock the latch before he or she can remove the key.

Claims

1. A double action pawl latch having a tubular latch body for attachment to a door, panel or the like, and having an enlarged head for abutment against a front surface of the door or panel; and, disposed within the latch body, an actuating spindle and a pawl operating spindle axially and rotationally movable relative to the actuating spindle under the action of a helical cam connection between the actuating spindle and the pawl operating spindle and having a pawl attached thereto at a rear end, the tubular latch body and the pawl having pawl abutments which allows rotation of the pawl from a first angular position in a first axial position of the pawl and axial movement of the pawl to a second axial position in a second angular position of the pawl, characterised in that

   the actuating spindle and the tubular latch body have rotationally engaging abutments limiting the rotation of the actuating spindle within the tubular latch body to rotation of substantially 180° between a first angular position corresponding to the first angular position of the pawl and a second angular position corresponding to the second angular and axial positions of the pawl.

2. A latch according to claim 1, wherein the tubular latch body has a screw-threaded outer surface for screw-threaded engagement with a nut by means of which the latch body can be secured to the door, panel or the like.

3. A latch according to claim 1 or claim 2, wherein the actuating spindle is a spigot on a front end of which is formed a shaped keyway for receiving a suitably correspondingly profiled key actuator.

4. A latch according to any of claims 1 to 3, wherein the actuating spindle is a spigot which has a cross

bore for receiving a pin by which the actuating spindle is secured to the pawl operating spindle.

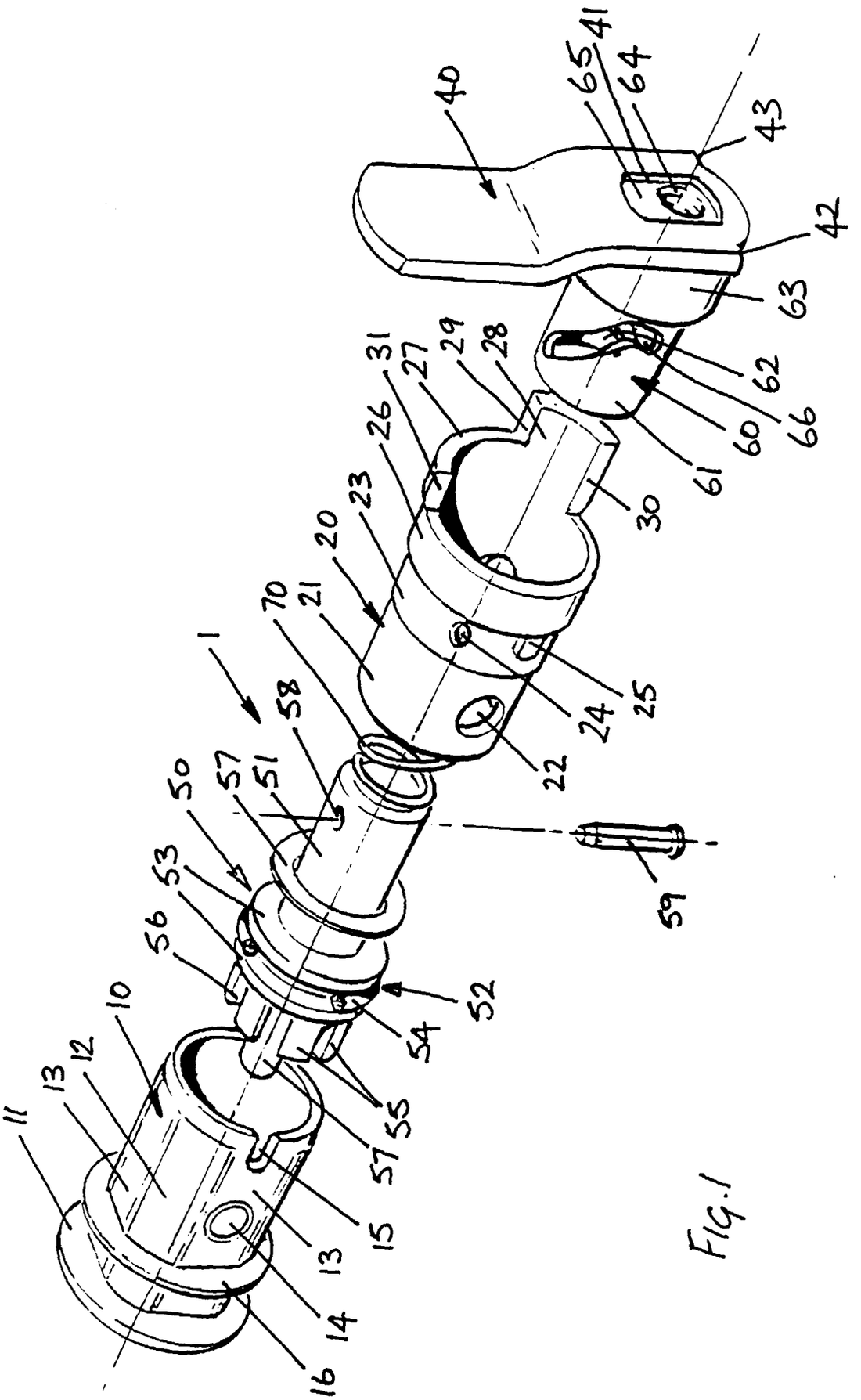

40
41
65
64
43
42
63
62
60
66
61
30
31
27
29
28
26
23
20
21
70
1
58
50
57
51
53
56
52
54
55
57
10
12
13
11
15
13
14
16
22
24
25
59

Fig.1

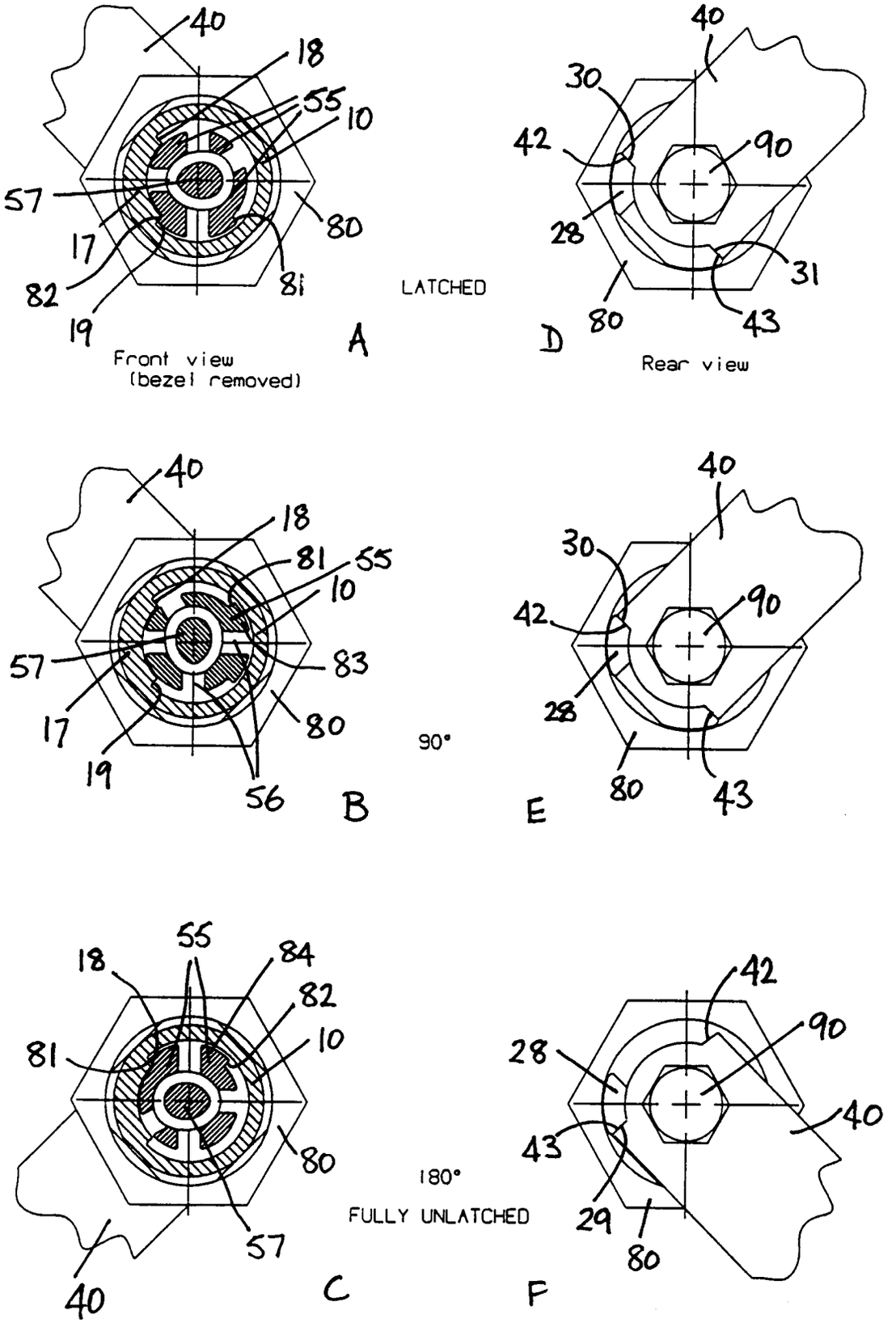
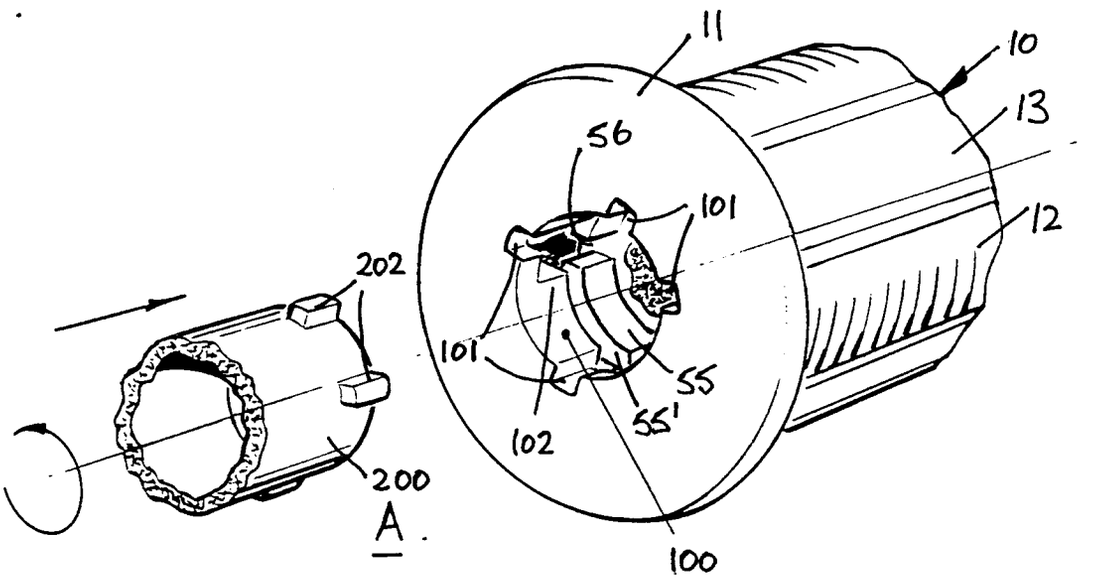
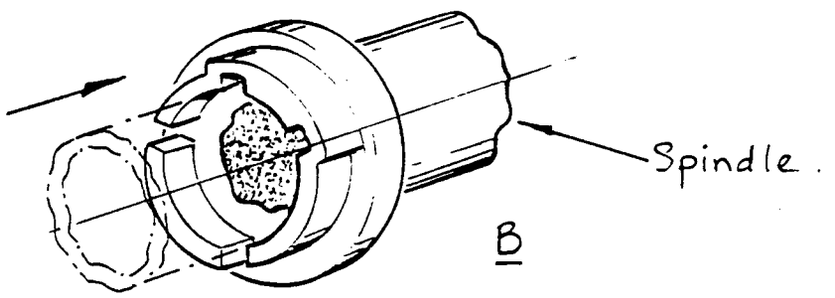

40
18
55
10
57
80
17
81
82
19
A
Front view
(bezel removed)
LATCHED
40
30
42
90
28
31
80
43
D
Rear view
40
18
81
55
10
57
83
17
80
19
56
B
90°
40
30
42
90
28
80
43
E
55
18
84
82
81
10
80
57
40
C
180°
FULLY UNLATCHED
42
90
28
40
43
29
80
F

Fig 2.





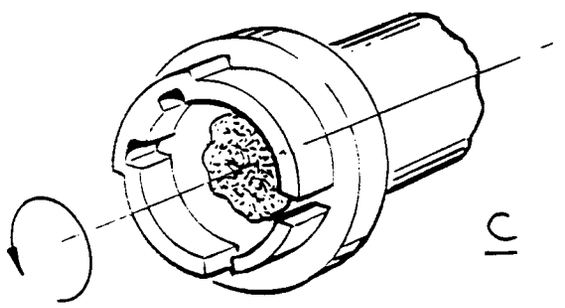
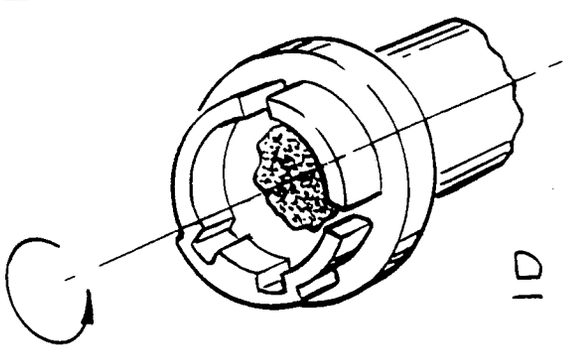
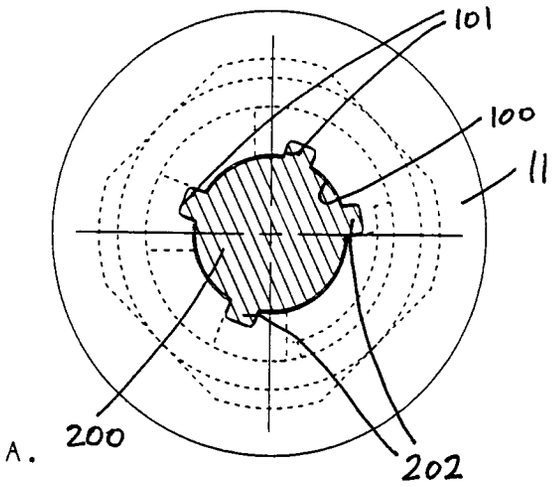


FIG 3.

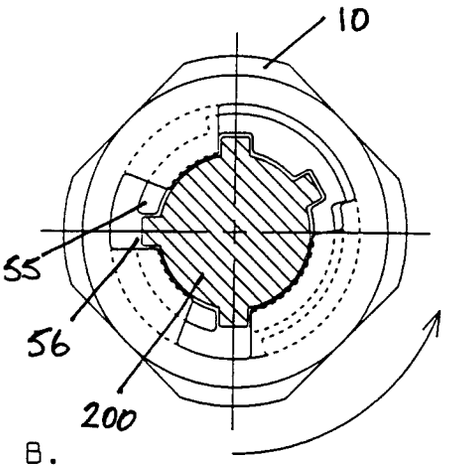




A.

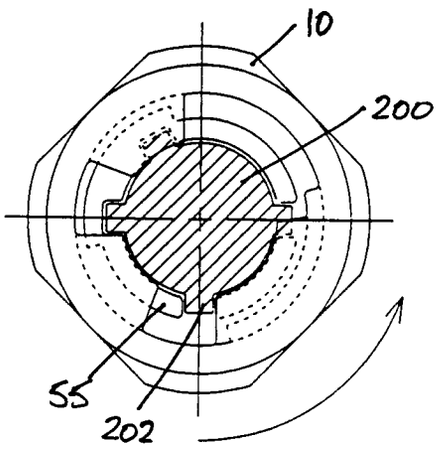
Key inserted

LATCHED



B.

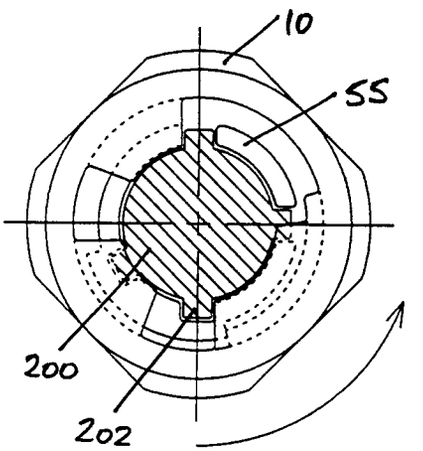
Key turned through 20°
and engaged in spindle.
(bezel removed for clarity)



C.

Key and spindle turned
through 90°

PULL-UP RELEASED



D.

Key and spindle turned
through further 90°

FULLY UNLATCHED

FIG 4.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 30 7455

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.6)
A	DE 35 02 418 A (SOUTHCO,INC.) * abstract; figures * ---	1-3	E05C3/04 E05C5/04
D,A	GB 2 158 866 A (SOUTHCO) * the whole document * -----	1,4	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E05C
E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 March 1998	Areso y Salinas, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
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