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(54) **Vehicle door latch**

(57) A vehicle door latch comprising a main body having a latch bolt, a pawl arranged to selectively retain the latch bolt in a latched condition, a release mechanism to transmit an input from a door handle to the pawl, and a locking mechanism to control whether the input results

in transmission via the release mechanism of an unlatching output to the pawl, wherein the latch further comprises an additional self-contained module secured to the main body via a standardised interface, the module comprising a mechanism configured to provide an additional function to the latch.

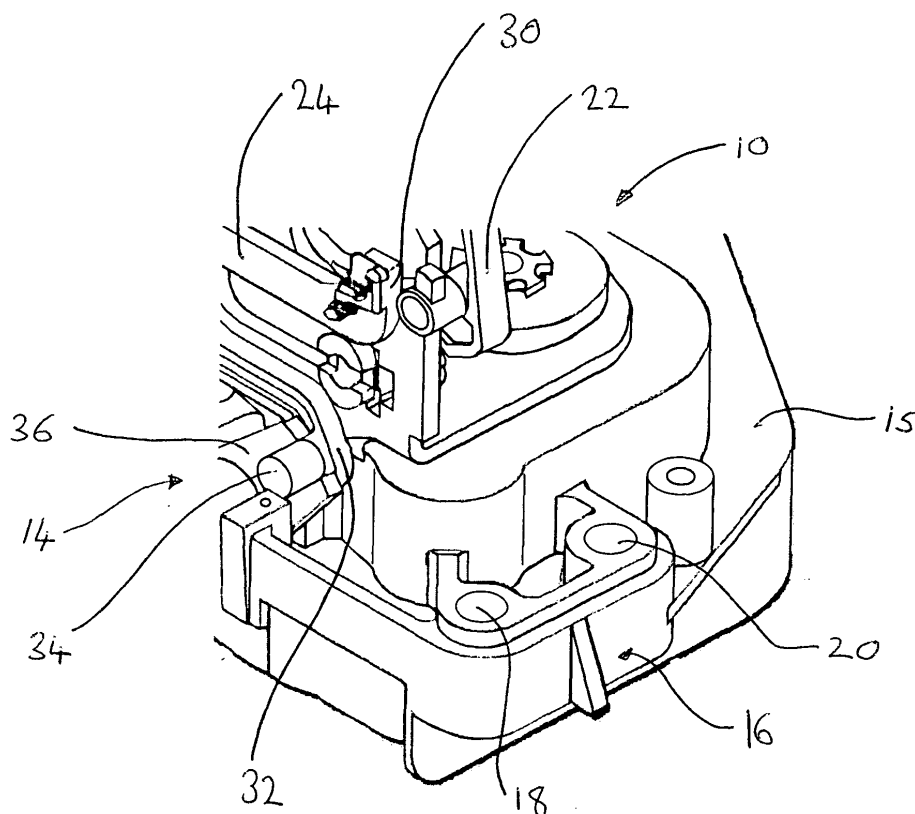


FIGURE 1

Description

[0001] The present invention is related to a vehicle door latch and a method of assembling a vehicle door latch.

[0002] Vehicle door latches are known. Typically, a vehicle door latch is positioned in a vehicle door and comprises a mechanism configured to hold the vehicle door shut when the latch is in its latched state, and to allow the door to be opened when the latch is in its unlatched state. Unlatching can be achieved by operation of an inside or outside door handle, for example.

[0003] Known vehicle door latch mechanisms consist of a number of components, typically including a claw type latch bolt mounted to a latch retention plate, the latch bolt positioned to engage and retain a door-post mounted striker when the door is closed. Known latches also include a pawl configured to engage the latch bolt to hold the bolt in a latched position, and a pawl lifter for lifting the pawl in and out of engagement with the latch bolt to allow the striker to be released from the latch bolt when the door is opened.

[0004] Known latches also typically have a locking mechanism configured to maintain the latch in its latched state when the latch is locked. This aims to prevent unauthorised entry into the vehicle. Only authorised persons are permitted to unlock the latch from the exterior, for example by use of a key or a remote key fob. However, actuation of an inside release handle will enable the vehicle to be exited.

[0005] Certain known latches also have mechanisms to provide further functions to the latch. These functions can include superlocking, which allows the latch to be put into a superlocked state in which actuation of either of the inside or outside door handle will not unlatch the latch. Another known function comprises a child-safety mechanism, wherein when the child-safety function is on, operation of an inside door handle does not unlatch the latch but operation of an outside door handle does unlatch the latch (if the latch is unlocked).

[0006] It is also known for at least one door on a vehicle to have a key barrel that allows the door or doors to be unlocked by operation of a key. Such a latch must therefore have a formation to allow the key barrel to be connected to the latch by a cable, linkage or other transmission means.

[0007] It can therefore be appreciated that there are a number of different requirements to be fulfilled by vehicle door latches, the actual requirement depending upon the type of vehicle and the position of the door latch within the vehicle. For example, door latches having a child-safety lock function are typically positioned on the rear doors of a vehicle, whereas door latches having a key barrel function will typically only be on the front doors, and perhaps only the driver's door. Furthermore, different levels of specification or different geographical markets may require different latch functionality on the same model of vehicle.

[0008] There is therefore a problem that any one vehicle may require a number of different door latch designs. Vehicle door latch manufacturers therefore have to produce a large number of different door latch types, which drives up costs because of the number of different parts required.

[0009] Vehicle door manufacturers must also keep a large number of different door latch types in stock to cater for their requirements, which also drives up their costs.

[0010] It would therefore be advantageous to have a latch design having as many common parts as possible irrespective of the latch function, the latch being capable of modification to provide for any additional function required.

[0011] Attempts have previously been made to do this, as shown in EP1350913 and EP1035284 which both show latch mechanisms that can be modified to provide differing functions depending upon the requirement.

[0012] However, to modify the latches disclosed in both these documents, the main body of the latch mechanism itself needs to be significantly modified.

[0013] This is a relatively time consuming task, and makes them less suitable for being modified at the point of fitment to a vehicle door.

[0014] It is therefore an object of the present invention to overcome or at least mitigate these problems.

[0015] Accordingly, the present invention provides a vehicle door latch comprising a main body having a latch bolt, a pawl arranged to selectively retain the latch bolt in a latched condition, a release mechanism to transmit an input from a door handle to the pawl, and a locking mechanism to control whether the input results in transmission via the release mechanism of an unlatching output to the pawl, wherein the latch further comprises an additional self-contained module secured to the main body via a standardised interface, the module comprising a mechanism configured to provide an additional function to the latch.

[0016] The invention also provides a method of assembling a vehicle door latch comprising the steps of :

providing a vehicle door latch main body having a latch bolt, a pawl arranged to selectively retain the latch bolt in a latched condition, a release mechanism to transmit an input from a door handle to the pawl, and a locking mechanism to control whether the input results in transmission via the release mechanism of an unlatching output to the pawl; providing an additional self contained module comprising a mechanism configured to provide an additional function to the latch;

attaching said additional self contained module to said main body via a standardised interface on the main body.

[0017] Preferably, the additional module comprises a key lever module, a key nut module, or a mechanical child-safety module.

[0018] The key lever module is configured to be connected to a door key-barrel, such that when a key is turned in the key barrel, the movement is transmitted through the key lever module and into the main body of the latch to selectively lock or unlock the latch.

[0019] The key nut module works in a similar fashion to the key lever module, except the mechanism within the key nut module transmits the movement to the latch main body in a different manner, as described in more detail further below.

[0020] The mechanical child-safety mechanism module is configured such that when the child-safety mechanism is activated operation of an inside door handle will not unlatch the latch, but operation of an outside door handle will unlatch the latch. Actuation of the inside handle will nevertheless unlock a latch with child-safety on.

[0021] Whichever module is connected to the main body of the latch it connects via the standardised interface. Preferably, the additional module comprises a pair of extending legs that engage in a push-fit manner into corresponding apertures in the latch main body, thus securing the module to the main body and allowing it to be quickly and easily fitted.

[0022] Minimal alterations to the latch main body are required to connect the additional self-contained module to the latch mechanism.

[0023] Preferably, in the case of the key-lever and key-nut modules, an additional shuttle is fitted to the latch main body. The additional shuttle is elongate in shape and extends from the main latch into the additional module to interact with the mechanism of either the key-lever or key-nut module. Actuation of the key barrel is thus transmitted to the key-lever or key-nut module, and subsequently further transferred from the module to the latch main body via the additional shuttle.

[0024] The additional shuttle is configured to interact with a locking lever of the latch, the locking lever operable to selectively allow or prevent the input from an inside or outside door handle unlatching the latch.

[0025] In the case of the mechanical child-safety module, the only addition required to the main body of the latch is a child-safety lever, and possibly a modified inside release lever (discussed in more detail below). Preferably, when the child-safety mechanism is activated a linkage connected to the child-safety module slides within a slot in the child-safety lever to a position in which movement of an inside door handle release lever is blocked.

[0026] These and other features of the present invention are described in more detail below with respect to the drawings in which:

Figure 1 is an isometric view of a latch main body.

Figure 2 is an isometric view of the latch main body of figure 1 further comprising an additional shuttle for connection to an additional module.

Figure 3 is an isometric view of the latch of figure 2 further comprising a key-lever module.

Figure 4 is an isometric view of the key-lever module.

Figure 5 is an isometric view of the internal mechanism of the key-lever module of figure 4.

Figure 6 is an isometric view of a key-nut module.

Figure 7 is an isometric view of the internal mechanism of the key-nut module of figure 6.

Figure 8 is an isometric view of the latch main body of figure 1 further comprising a child-safety lever and a linkage for connecting the child-safety lever to an additional module.

Figure 9 is an isometric view of the latch of figure 8 further comprising a mechanical child-safety module.

Figure 10 is an isometric view of the internal mechanism of the mechanical child-safety module.

Figure 11 is an isometric view showing a complete and substantially sealed latch mechanism incorporating a child safety module.

[0027] With respect to figure 1 this shows a portion of a latch main body 10 of a latch for use in a side door of a vehicle. Within the latch main body is contained a claw-type latch bolt and a pawl (not shown). The latch main body 10 also comprises a locking mechanism having a number of components, certain of which are hidden from view in figure 1.

[0028] The main body 10 comprises a retention plate 11 (see figure 11) incorporating a mouth portion 12, through

which is received a door frame striker (not shown) when the door is closed.

[0029] The main body 10 has an inside face 14 which extends substantially parallel to the inside face of the door to which the latch is fitted. However the portion proximate the mouth 12 is only visible when the door is in an open position.

[0030] The latch main body 10 also comprises a moulded housing 15 which is configured to receive various latch components, and also to protect these components in use.

[0031] A standardised interface for receiving the additional-self contained module is shown generally at 16, the standardised interface being integrally moulded into the housing 15. The standardised interface comprises two circular bores 18 and 20 for receiving corresponding legs (see figure 4 items 62 and 64, figure 6 items 106 and 108, and figure 10 items 144 and 146) which are integrally moulded on the additional module which can thereby be secured to the main body 10.

[0032] In use, this arrangement securely holds the additional self-contained module to the main body 10 and prevents pivoting or rotation of the module relative to the main body when the module is actuated. The standardised interface 16 is also designed so that the central axes of the bores 18 and 20 are substantially perpendicular to the direction of applied force when the module is actuated. This prevents the applied force from pulling the legs of the module out of the standardised interface.

[0033] The standardised interface 16 is positioned so that in use the additional self-contained module is positioned above the latch bolt of the latch when the latch is installed in a vehicle side door.

[0034] An inside release lever 22 is configured to be connected to an inside door handle such that when the inside door handle is actuated the latch is unlatched.

[0035] Also fitted within the latch main body is a common release lever (not shown). The common release lever is connected to both inside release lever 22 and an outside release lever (not shown) so that when either an inside or outside door handle is pulled (and the locked state permits it) the latch is unlatched.

[0036] A locking shuttle 24 is connected to a locking lever (not shown) which acts to lock the latch when the locking shuttle 24 is placed in its lock position.

[0037] The locking shuttle 24 has an end 30 which engages with the inside release lever 22 and an arm 32 terminating in a pin 34 that engages with an emergency locking nut 36. Emergency locking nut 36 is positioned on the inside face 14 of the latch and located so as to be only visible when the vehicle door is in an open position. The purpose of emergency locking nut 36 is to enable the vehicle door to be locked in the event of power failure of the latch.

[0038] Turning now to figure 2, this shows the latch body 10 of figure 1 with an additional connecting lever component 38 for connecting an additional key-nut or key-lever module to the main body 10 shown.

[0039] The connecting lever 38 slides relative to, but does not interact with, locking shuttle 24. In this particular latch the connecting lever 38 operates the locking lever (not shown) by controlling a magnet proximate to the locking lever. The magnetically controlled locking lever is not central to the understanding of the present invention, and is fully described in patents EP1217153 and EP1217155. The content of these documents is specifically incorporated herein by reference.

[0040] First end 40 of lever 38 has an extending pin portion 42 for engaging with a mechanism of a key-lever module (figure 3, 44) or a key-nut module (figure 6, 90), as explained further below.

[0041] Figure 3 shows the latch of figure 2 further comprising the additional key-lever module 44. The first end 40 (not shown) of connecting lever 38 extends into key-lever module 44 to interact with the key-lever module mechanism.

[0042] The key-lever module 44 has a first housing part 46 and a second housing part 48 that are detachable from each other. The key-lever module 44 further has integral corresponding clips 50 and 52 that allow the first and second parts to be securely connected by engaging ramped abutments on the other housing part.

[0043] The key-lever module 44 is shown in more detail in figure 4. In this figure, in which the module is viewed from an opposite side to figure 3, it can be seen that the module comprises a further clip and ramped abutment arrangement 54 and a lever 56 projecting from within the module 44. The lever 56 has a hole 58 for connection to a key barrel (not shown) via a suitable known linkage arrangement e.g. a solid rod shown schematically at 59 arranged to translate under the influence of a rotatable lever attached to the key barrel output (not shown).

[0044] The second housing part 48 of module 44 also has integrally moulded legs 62 and 64 which extend downwardly from the second housing part (when viewing figure 4). The legs 62 and 64 are circular in cross section and are dimensioned to be a close push-fit in bores 18 and 20 of the latch main body 10 (see figure 1).

[0045] It should be appreciated that other suitable joining arrangements may be used, such as enlarged ends on the legs of the additional module that provide a snap-fit with an open end of the corresponding bores 18 and 20, or a simple clipping arrangement.

[0046] The key lever module 44 also includes an aperture 65 configured to receive a screw (not shown) so that the key lever module can be screwed to the main body 10 via a corresponding threaded hole on the main body, thus connecting them even more securely.

[0047] The first part 46 has an opening 66 so that the module 44 can be received by the latch main body 10, and to allow connecting lever 38 to enter the key-lever module.

[0048] Figure 5 shows the key-lever module 44 with the first part 46 removed, thus showing the internal mechanism

of the key-lever module. As can be seen from figure 5, the lever 56 is pivoted about axis X and can move back and forth within slot 68 of second part 48.

[0049] Connected to the lever 56 at position 70 is a substantially U-shaped linkage 72. Whilst one side of linkage 72 is connected to lever 56, the other side 74 is configured to slide along the length of track 76.

[0050] The linkage 72 has a portion 78 for receiving pin 42 of connecting lever 38 (see figure 2). Since the U-shaped linkage 72 can slide in track 76, then movement from the key barrel is transmitted to the locking mechanism via lever 56, U-shaped linkage 72 and connecting lever 38.

[0051] Also housed within the key-lever module is a helical spring 80. A first end 82 of the helical spring is non-rotatably connected to seat portion 84 of second part 48, and a second end 86 non-rotatably engages a receiving portion 88 of the linkage 72. When the lever 56 is moved due to turning of a key in the key barrel, then the lever 56 rotates clockwise or anticlockwise about axis X (depending upon whether the key is moved in the locking or unlocking direction), which subsequently translates linkage 72 thus causing the second end 86 of the spring 80 to be moved to an offset position away from its rest position, the first end 82 maintaining its position within seat portion 84 thus loading the spring. When a user lets go of the key then the spring automatically returns to its rest position, thus ultimately returning connecting lever 38 to its rest position.

[0052] This also results in the key returning to its central position in the key barrel after being moved in the locking or unlocking direction.

[0053] It should be appreciated that this is only one example of a suitable mechanism for the key-lever module, and that any other suitable mechanism can be used.

[0054] Figure 6 is an isometric view of a key-nut module 90, as distinct from key-lever module 44. The key-nut module comprises a first housing part 92 and a second housing part 94, a clip 96 for connecting the first part to the second part, and opening 98 for connecting the latch main body 10 and allowing entry to the key-nut module for connecting lever 38.

[0055] The first housing part 92 also has raised sections 100 and 102 to accommodate the key-nut module mechanism. The key-nut module 90 can also be distinguished from the key-lever module 44 by the circular aperture 104 through which a part of the key-nut module mechanism extends.

[0056] The key-nut module also has legs 106 and 108 which are attachable to bores 18 and 20 of latch main body 10.

[0057] In the same manner as the key-lever module 44, the key-nut module 90 has an aperture 95 configured to receive a screw (not shown) so that the key-nut module can be screwed to the main body 10, thus connecting it even more securely. The key-nut module mechanism is seen in figure 7. This mechanism has a barrel 110 having an outer ring 112 which sits in grooves 114 and 116 to retain it within the housing. The barrel 110 is rotatable about its central axis. A linkage 118 has an aperture through which an eccentrically mounted pin 122 of the barrel 110 passes, so rotation of barrel 110 results in translational movement of linkage 118 in either of the directions of arrow A.

[0058] Linkage 118 has a receiving portion 124 which receives pin 42 of connecting lever 38, so that translational movement of linkage 118 results in movement of connecting lever 38 when the key-nut module is fitted to the latch main body 10.

[0059] The key nut module 90 also has a helical spring 126 which acts to return the module mechanism to its rest position after actuation, in a similar manner to helical spring 80 of key lever module 44.

[0060] Therefore, as can be appreciated from figures 2 to 7, a key locking function can be quickly fitted to a latch main body according to the present invention.

[0061] Figure 8 shows the standard latch body 10 of figure 1, with the addition of a child-safety lever 130. The child-safety module has a linkage 132 for connecting the child safety lever to the mechanical child-safety module. The linkage 132 has a pin 134 which extends from both sides of a first end 133 of the linkage, and a pin 135 that extends from both sides of a second end 137 of the linkage. The inside release lever 128 is also slightly modified from the inside release lever 22 of figure 1 in order to have provision for child-safety functionality. In other embodiments, this particular arrangement of child-safety lever and inside release lever could be used in the standard latch main body irrespective of whether the provision of a child-safety module is required, to further standardise the latch main body 10.

[0062] Figure 9 shows the latch of figure 8 with a mechanical child-safety module 136 connected to the main latch body 10, the linkage 132 extending into the mechanical child-safety module 136. In figure 9 the pin 135 is engaged with a hooked portion 138 of inside release lever 128, and the child-safety mechanism is "off", i.e. actuation of an inside release lever will unlatch the latch.

[0063] This is because when the linkage 132 is in this position inside release lever 128 and child-safety lever 130 are coupled together by pin 135. The child-safety lever 130 also engages with the common release lever (not shown), so that drive from the inside release lever 128 is transferred to the common release lever via the linkage 132 and child-safety lever 130 and the latch may be unlatched.

[0064] Figure 10 is a detailed view of the mechanical child safety module 136, which consists of a first part 140 and a second part 142. The second part 142 has integrally moulded legs 144 and 146 which engage with bores 18 and 20 of the latch main body to hold the mechanical child-safety module 136 in place.

[0065] The module 136 also has a barrel 148 which is rotatable about its longitudinal axis. The barrel 148 has a slot

150 at one end to allow for the insertion of a key, coin or the like for rotation of the barrel. At the opposite end of the barrel 148 is a U-shaped receiving portion 152 that is configured for engagement with pin 134 of linkage 132. Therefore rotation of barrel 148 moves linkage 132 when in use.

[0066] Cross-referencing with figure 9, to turn the child-safety function "on", a user rotates barrel 148 clockwise when viewing figure 10. This pulls pin 135 out of engagement with the hooked portion 138 of inside release lever 128, so that rotation of the inside release lever is no longer transferred to the common release lever by the child-safety lever 130. Actuation of an inside door handle will therefore not unlatch the latch in this mode.

[0067] It should also be appreciated from figure 10 that no spring or biasing mechanism is present in the mechanical child-safety mechanism. The module therefore only has two states: child-safety "on" and child safety "off", and no central rest position.

[0068] Again it should be appreciated that this is only one example of how the mechanism of the child-safety module works, and any other suitable mechanism may be used (e.g. lever, rack and pinion etc.)

[0069] Figure 11 is a view showing the mechanical child-safety module 136 attached to the latch main body 10 of figure 1, the main body 10 encased within a moulded cover 160. The purpose of this figure is to demonstrate how, once the additional-self contained module has been attached to the latch main body 10, the mechanisms of both are substantially sealed from outer elements by virtue of the latch main body's cover and the additional self contained module's housing. Importantly, the regions of interface between the latch main body and the additional self-contained module are such that no gaps exist that would allow for ingress of contaminants that could potentially effect the performance of the latch.

[0070] The table below shows how the present invention minimises the number of additional parts required by the latch main body 10 to provide additional functionality.

Latch variant	Location of use	Retention plate	Cover	Housing	Additional module	Additional parts required for standard latch
Standard latch	(a)Keyless driver's door (b)Keyless front passenger door (c) Rear doors with electrical only child safety lock.	11	C1 (not shown)	15	None	None
Key-nut module	(a)Driver's door with key barrel (b) Front passenger door with key barrel	11	160	15	90	Connecting lever 38
Key-lever module	(a)Driver's door with key barrel (b) Front passenger door with key barrel	11	160	15	44	Connecting lever 38

(continued)

Latch variant	Location of use	Retention plate	Cover	Housing	Additional module	Additional parts required for standard latch
Mechanical child-safety	Rear passenger doors	11	160	15	136	Inside release lever 128 and child-safety lever 130 (although this could be standardised as explained above).

[0071] From the table it can be seen that for each latch type, regardless of functionality, the same retention plate 11 is used, thus reducing the number of different designs required for this component.

[0072] When the standard latch is used without an additional module, then it is encased in a cover C1 (not shown). When an additional module is used to provide a certain functionality, then a cover 160 is used, as shown in figure 11. Cover 160 differs from cover C1 so that it allows the additional module to connect to the standardised interface of the standard latch main body 10. Since the interface is standardised, then this cover 160 can be used whichever additional module is used.

[0073] The housing 15 of the main body 10 (shown in figure 1), is the same regardless of whether it is a standard latch being used or if there is an additional module connected to the standard latch.

[0074] As seen from the last column in the table, minimal alterations are required to the main latch body 10 to provide additional functionality. For the key-nut and key-lever modules the only additional component required is the connecting lever 38, and for the child-safety module the only additional components required are the inside release lever 128 and child-safety lever 130, but as discussed above these could be further standardised.

[0075] It should therefore be appreciated that additional functionality can be provided to the latch quickly and easily. Importantly, where additional components are required in the latch main body, they can be added easily without having to dismantle the rest of the latch for fitment.

[0076] The present invention may also be adapted for use on boot / trunk latches, and additional modules having functions other than those described herein may also be used. For example, power unlatching and / or power cinching may be provided by an additional self-contained module containing a motor.

Claims

1. A vehicle door latch comprising a main body having a latch bolt, a pawl arranged to selectively retain the latch bolt in a latched condition, a release mechanism to transmit an input from a door handle to the pawl, and a locking mechanism to control whether the input results in transmission via the release mechanism of an unlatching output to the pawl, wherein the latch further comprises an additional self-contained module secured to the main body via a standardised interface, the module comprising a mechanism configured to provide an additional function to the latch.
2. A vehicle door latch as set forth in claim 1 in which the self-contained module is releasably secured to the main body.
3. A vehicle door latch as set forth in any preceding claim in which the standardised interface comprises a push-fit connecting feature, preferably in which the push fit connecting feature comprises a projection on one of the main body or self-contained module for engagement with a corresponding bore on the other of the main body or self-contained module.
4. A vehicle door latch as set forth in claim 3 in which the push fit connecting feature comprises two projections on one of the main body or additional self contained module for engagement with two corresponding bores on the other of the main body or additional self contained module.
5. A vehicle door latch as set forth in claim 3 or claim 4 in which the or each projection comprises an enlarged end.

6. A vehicle door latch as set forth in any preceding claim in which the standardised interface is positioned at an end of the vehicle door latch main body so that in use the self-contained module is positioned above the latch bolt of the latch.

7. A vehicle door latch as set forth in any preceding claim in which the latch main body and the additional self-contained module are secured together with a screw connection.

8. A vehicle door latch as set forth in any preceding claim in which the latch main body and the self-contained module together comprise a substantially sealed unit.

9. A vehicle door latch as set forth in any preceding claim in which the latch main body comprises a cover to interface with the self-contained module.

10. A vehicle door latch as set forth in any preceding claim in which the self-contained module is connected to the main body with a linkage, preferably in which the linkage operably connects the self-contained module to a locking lever of the locking mechanism.

11. A vehicle door latch as set forth in any preceding claim in which the additional self-contained module is configured to receive an input from a key operated key barrel.

12. A vehicle door latch as set forth in claim 11 in which the self-contained module comprises a key nut to receive the input from the key barrel.

13. A vehicle door latch as set forth in claim 11 in which the self-contained module comprises a key lever to receive the input from the key barrel.

14. A vehicle door latch as set forth in any of claims 1 to 10 in which the self-contained module comprises a child-safety mechanism, preferably in which the child-safety mechanism is connected to a child-safety lever in the latch main body.

15. A method of assembling a vehicle door latch comprising the steps of :

providing a vehicle door latch main body having a latch bolt, a pawl arranged to selectively retain the latch bolt in a latched condition, a release mechanism to transmit an input from a door handle to the pawl, and a locking mechanism to control whether the input results in transmission via the release mechanism of an unlatching output to the pawl;

providing an additional self contained module comprising a mechanism configured to provide an additional function to the latch;

attaching said additional self contained module to said main body via a standardised interface on the main body.

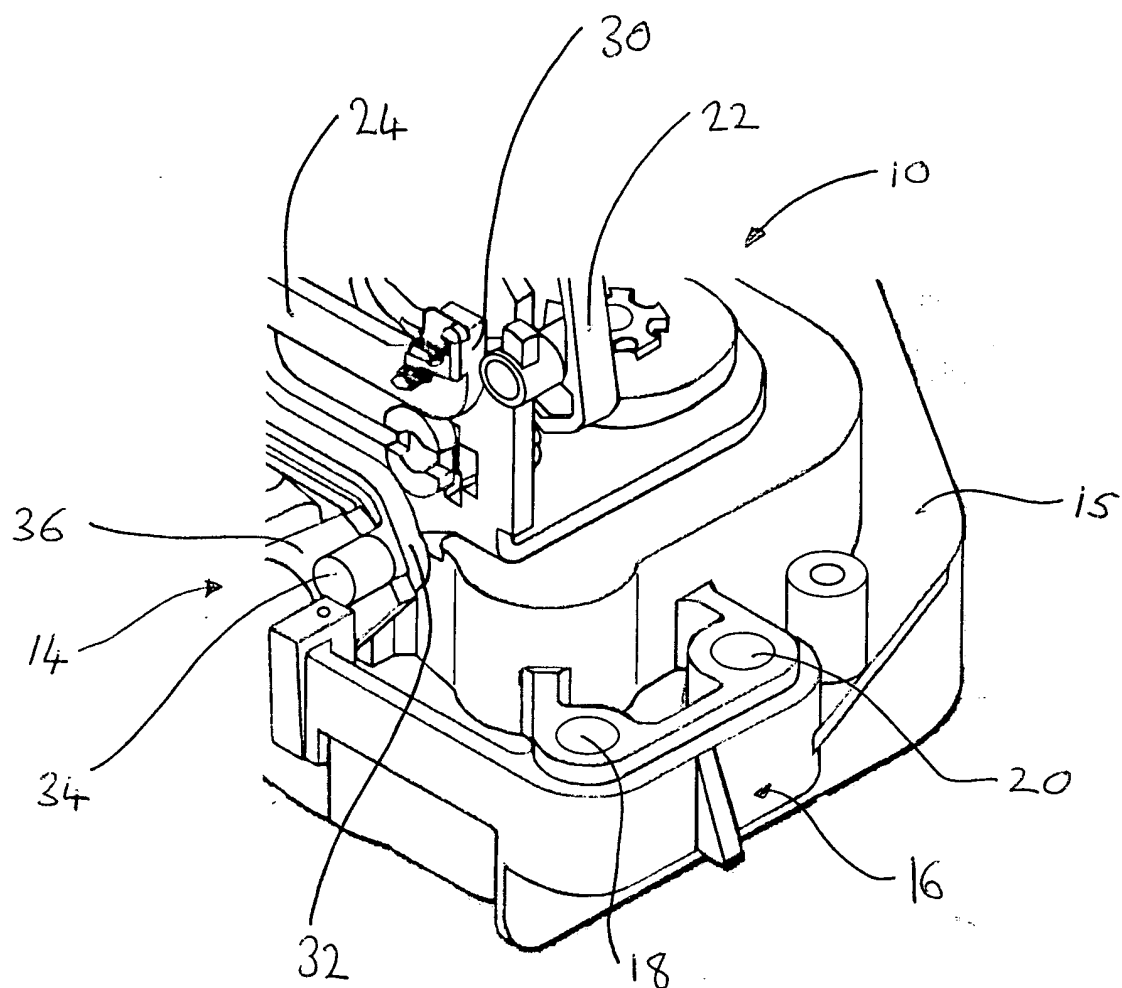


FIGURE 1

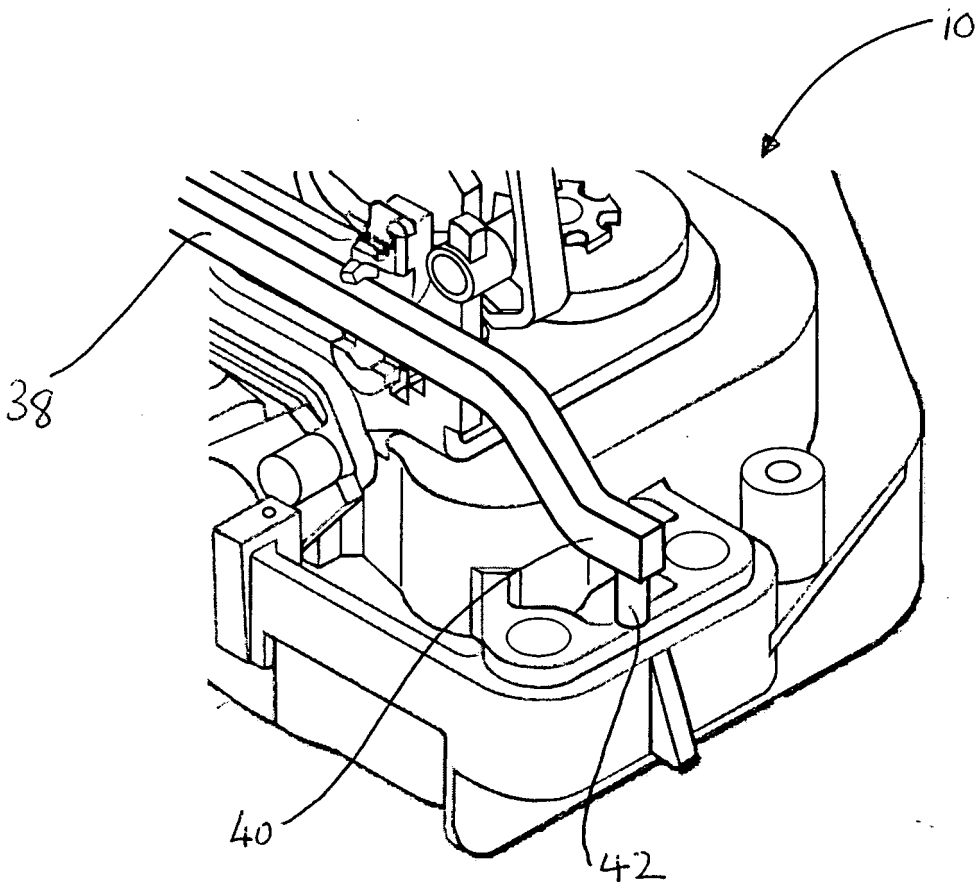


FIGURE 2

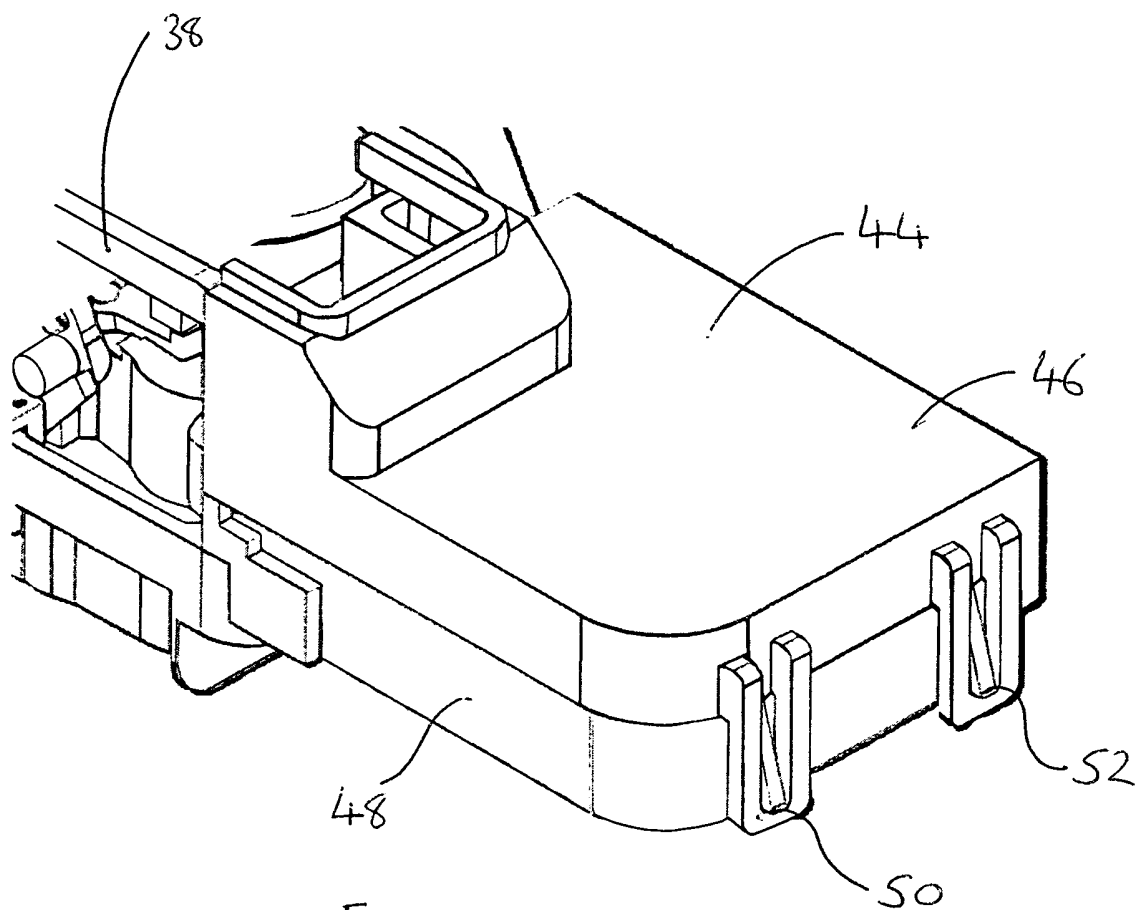
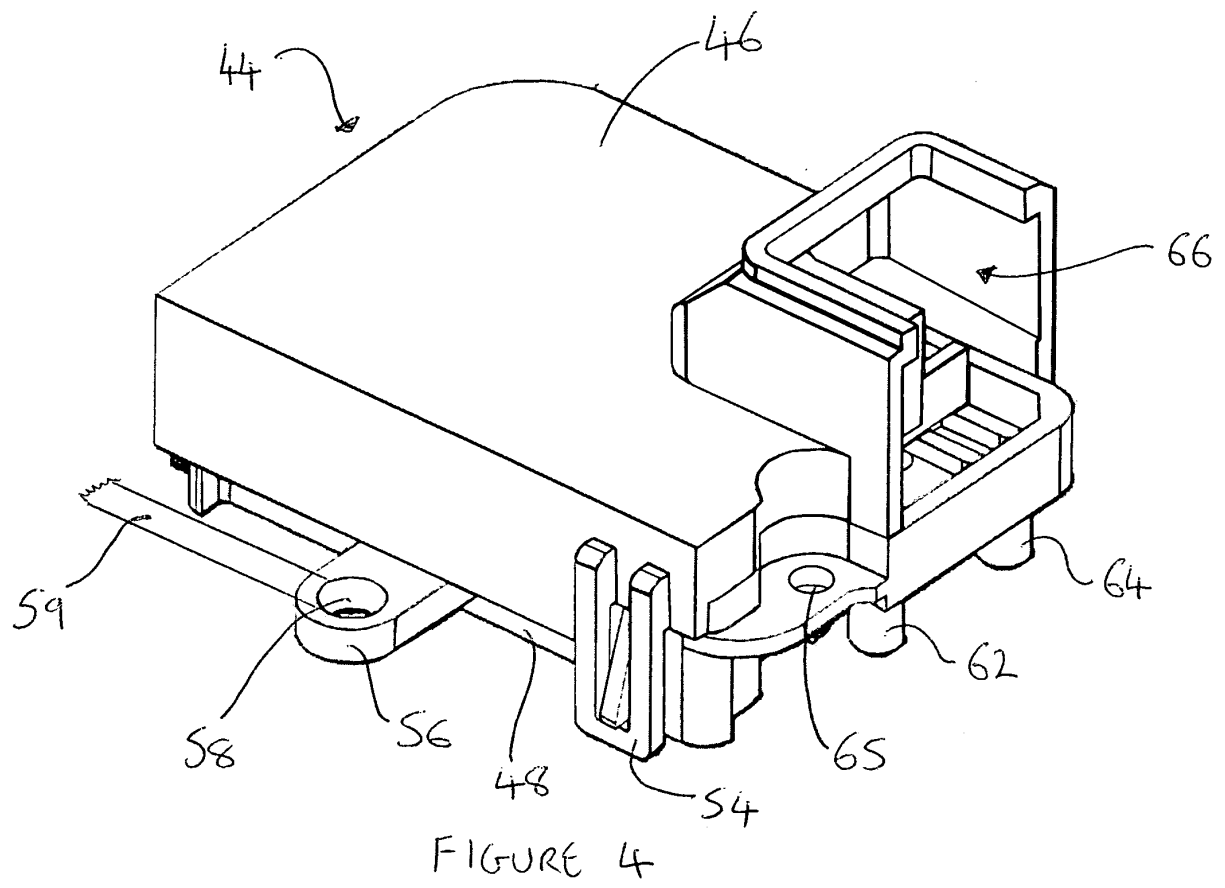
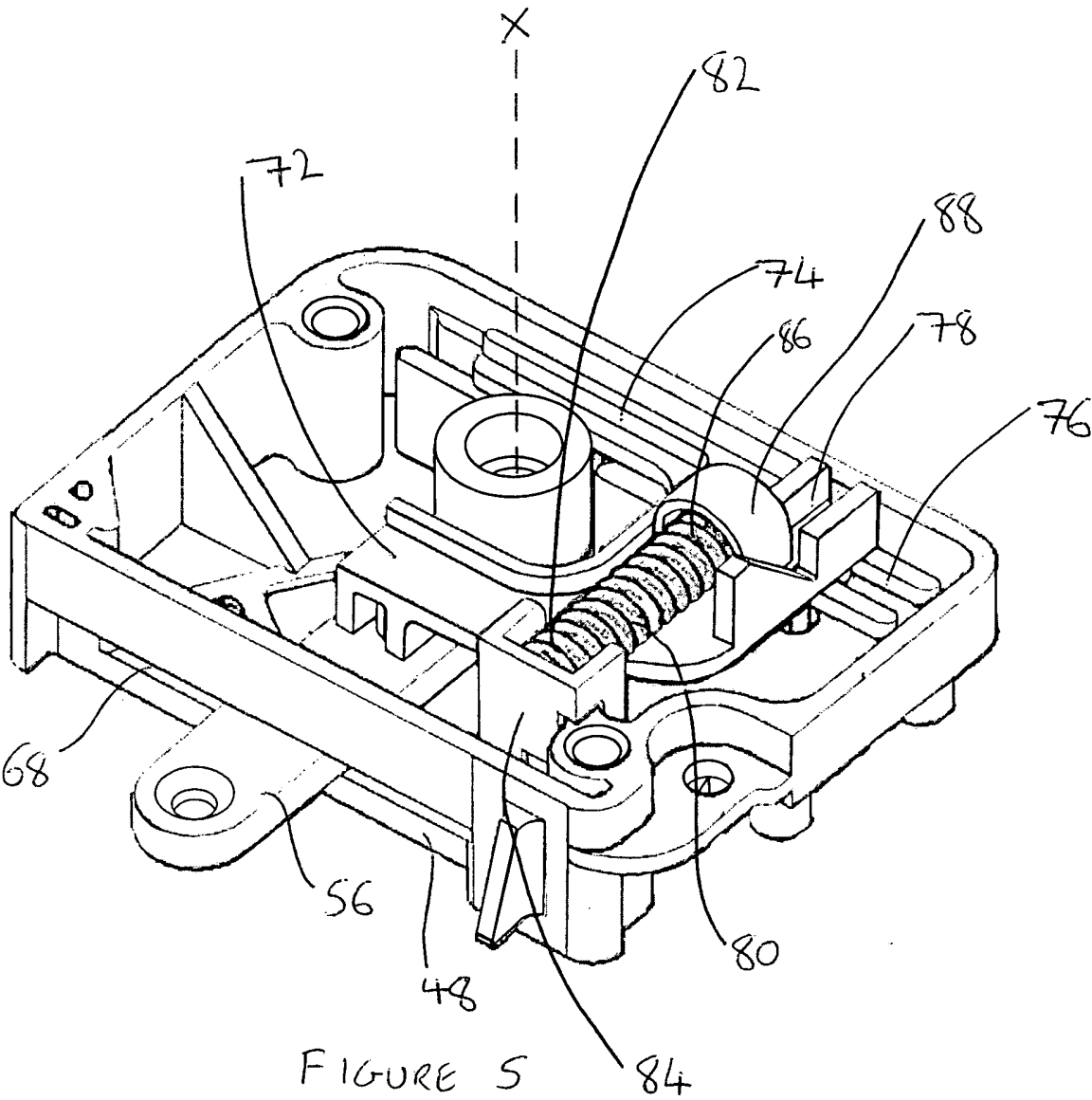


FIGURE 3





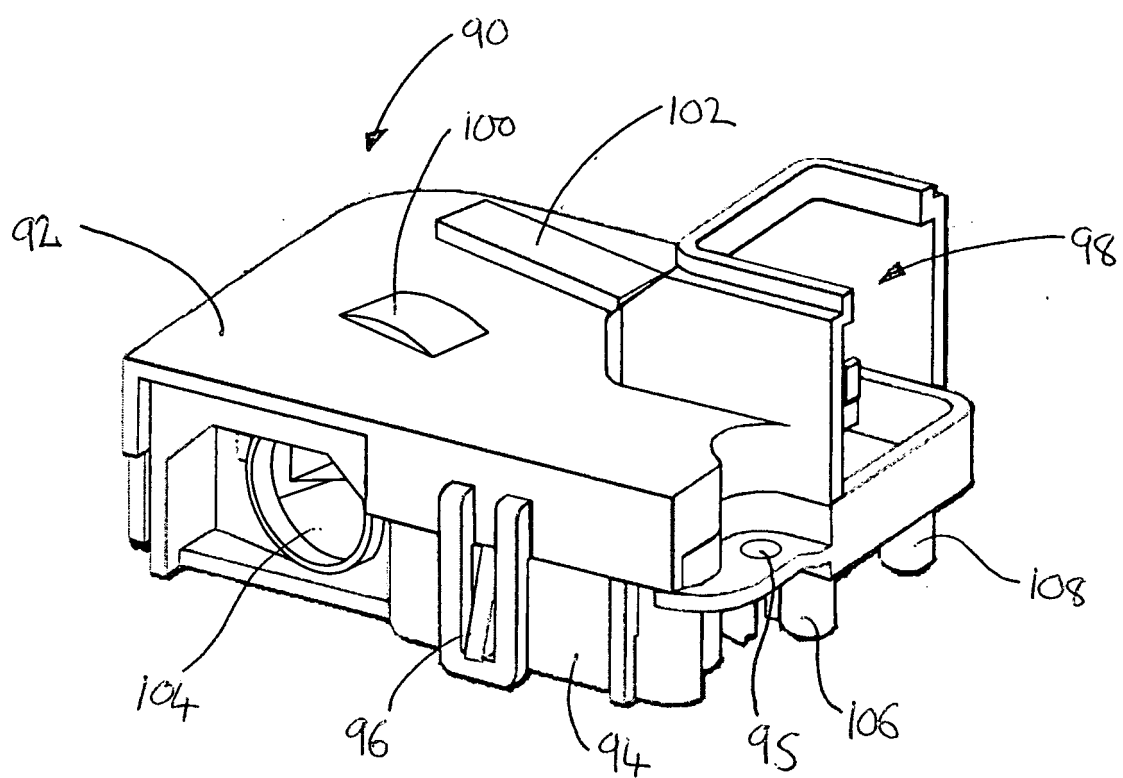


FIGURE 6

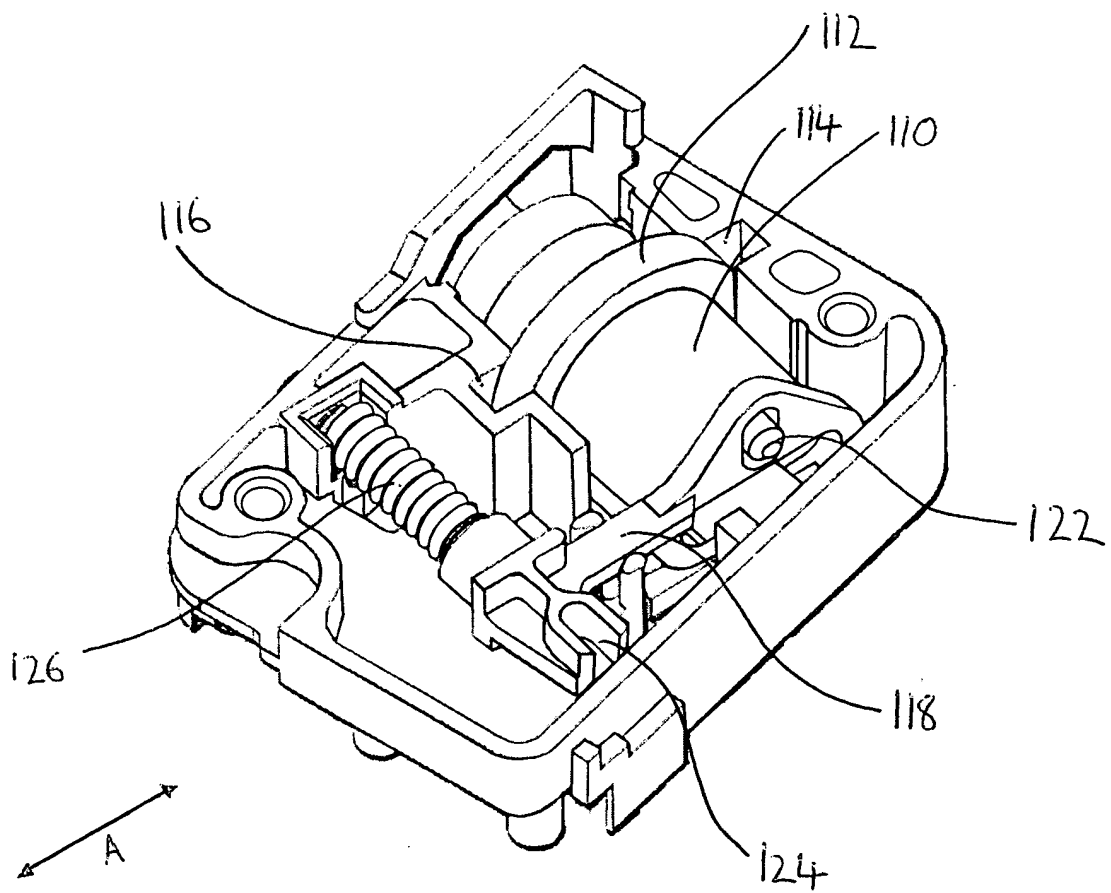


FIGURE 7

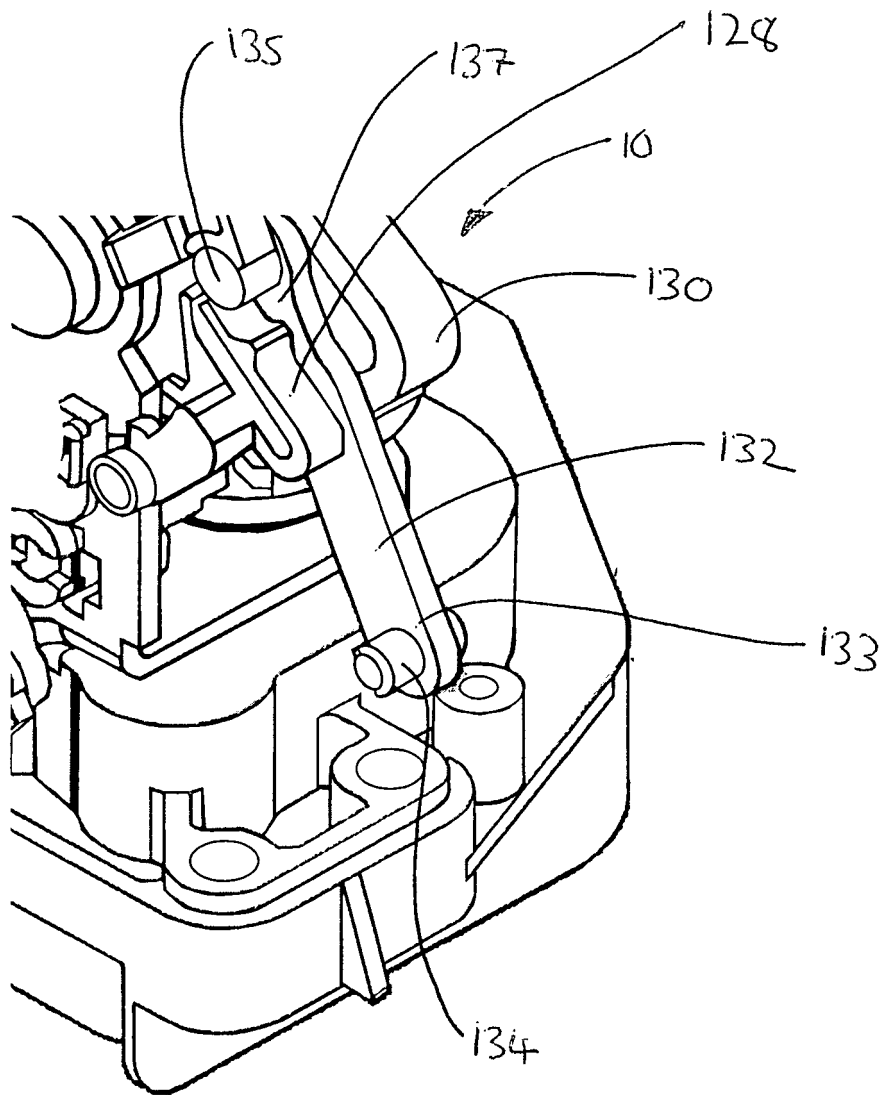


FIGURE 8

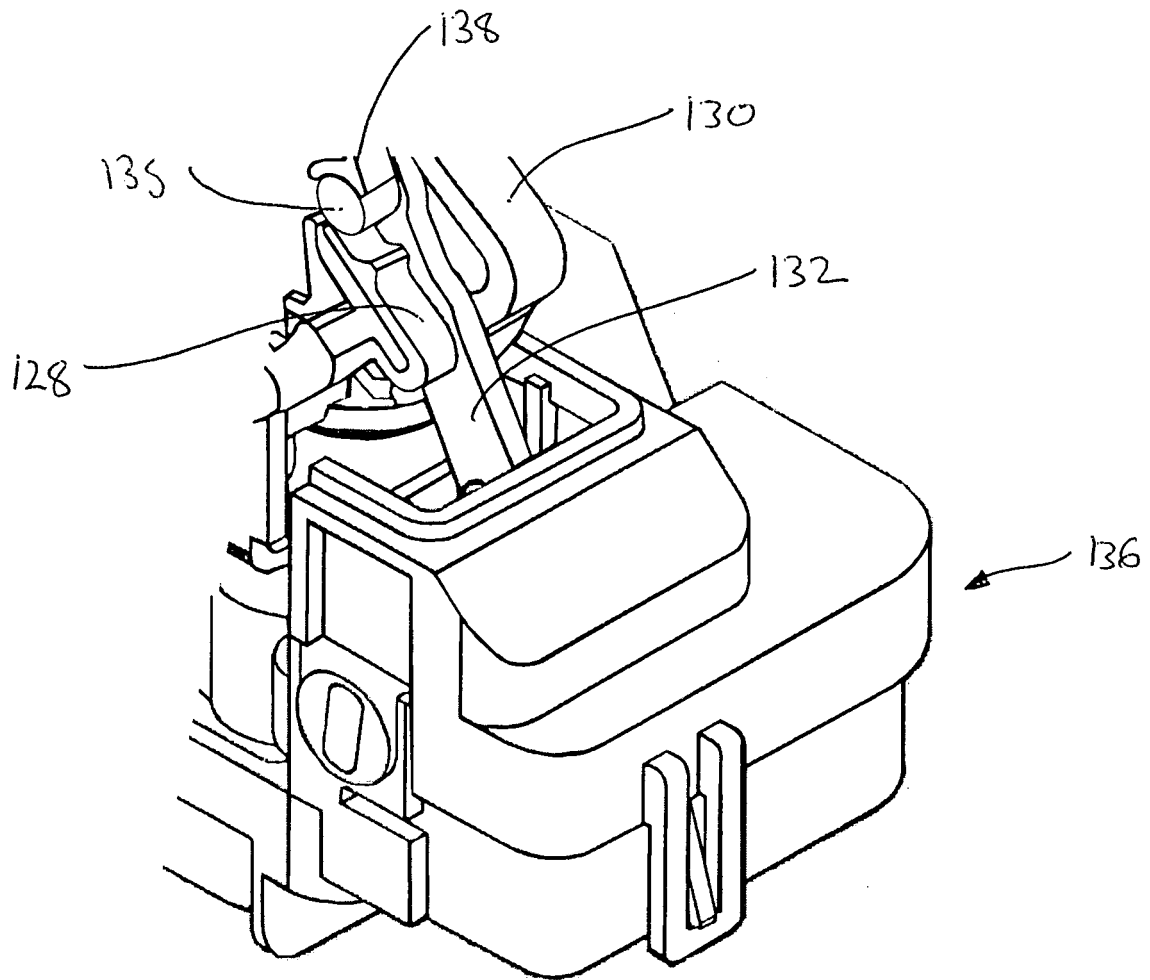


FIGURE 9

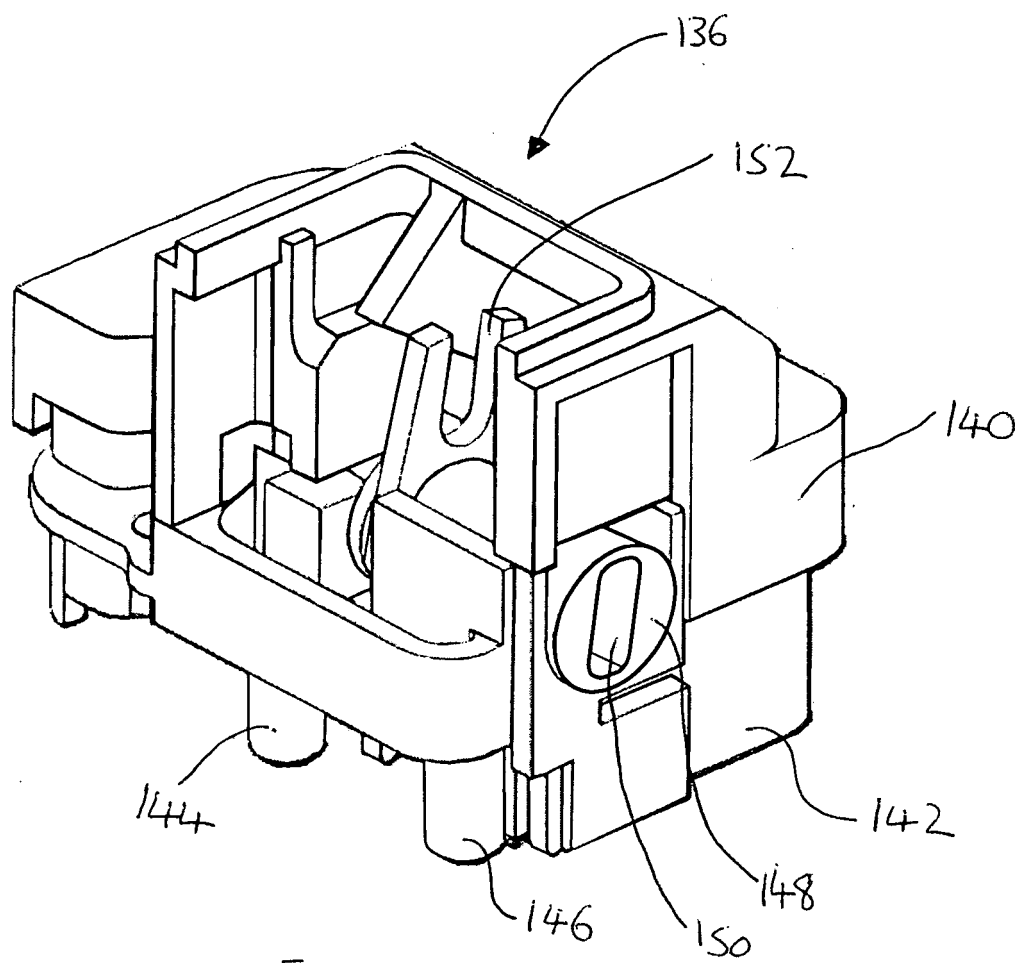


FIGURE 10

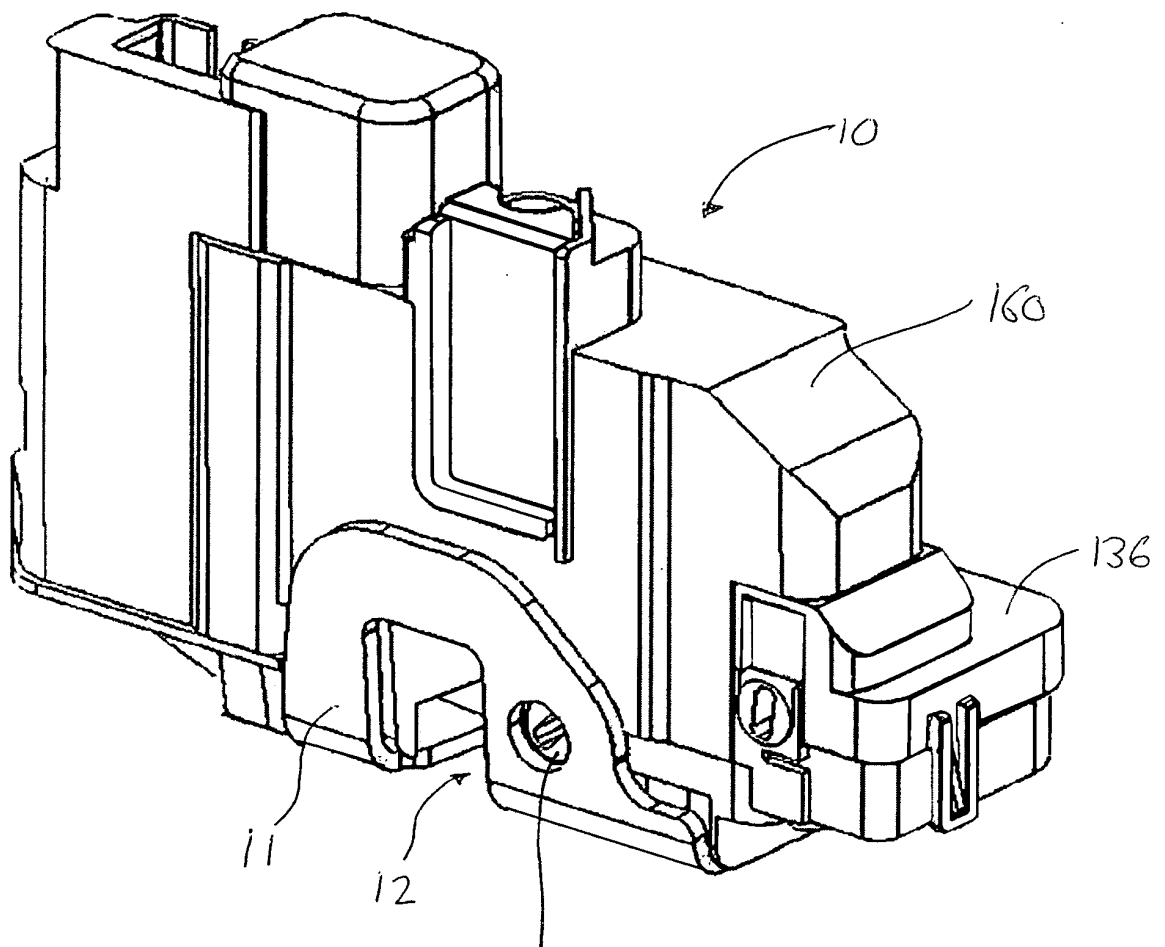


FIGURE 11 36



EUROPEAN SEARCH REPORT

Application Number
EP 08 25 0599

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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