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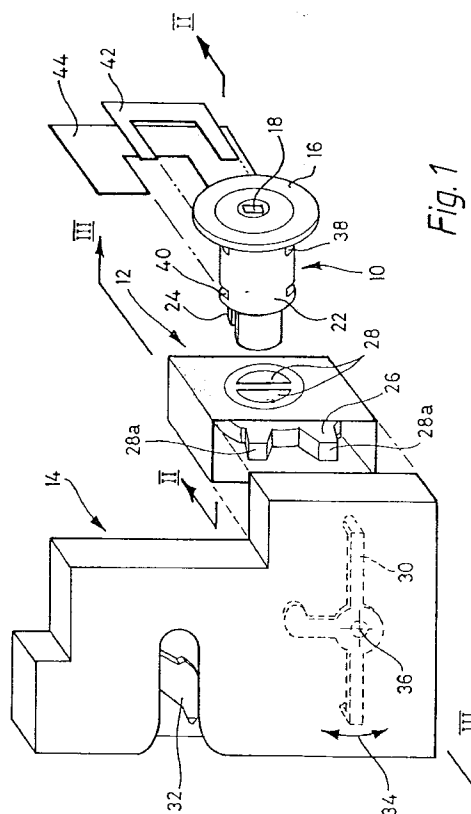
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(54) **Door latch and lock assembly.**

(57) A door latch and lock assembly provides a direct and enclosed connection between a lock unit 10, a switch housing 12 and a latch assembly 14. All the moving parts between the keyhole 18 and the latch arm 32 are enclosed in a housing and are therefore inaccessible to a thief.



This invention relates to a door latch and lock assembly particularly for use on the doors (including the tail gate and boot lid) of a motor vehicle.

Motor vehicles are very much exposed to theft and so it is highly desirable that the door locks should have a high degree of security. Most known locks comprise a key cylinder which has a key slot accessible outside of the vehicle for receiving a key. The inner end of the key cylinder is connected to a latch mechanism which actually holds the door shut by means of a link. This link is often accessible to a thief, and by obtaining access to the link otherwise than through the lock, the thief can open the door.

It is known from GB-A-1 492 149 to mount the exterior door handle, the lock cylinder and the door latch in a single, enclosed cassette. This has the advantage that all the moving parts which connect the door handle, the lock and the latch are enclosed within a common housing and are not accessible to a thief.

The practicalities and styling considerations in motor vehicle door design however militate against the location of the door handle and lock barrel close to the edge of the door. If a preassembled cassette construction is used, these components are either too close to the door edge, or an excessive amount of internal volume in the door is occupied by the cassette. Furthermore the need to have an aperture for receiving the cassette at the door edge adversely affects the strength of the door itself.

It is an object of the invention to improve security of a vehicle door lock.

According to the invention, there is provided a door latch and lock assembly in which a key-operated lock is connected to a latch which holds the door open or closed, wherein all the moving parts of the assembled assembly, between the aperture for receiving the key and the actual latch member are enclosed within a continuous housing, and wherein the latch member and the key barrel have mutually engageable mating features such that the latch member and the key barrel can be assembled separately to the door with their mating features engaging to form a continuous housing.

By enclosing the working parts in this way, they are all made inaccessible to a thief without the correct key.

In a second aspect, the invention also provides a door latch and lock assembly comprising a lock unit having a barrel and a cylinder which can rotate within the barrel after insertion of a key, a switch housing enclosing a rotatable member, with the rotatable member and the cylinder engaging directly with one another, inside the switch housing, so that rotation of the cylinder reduces rotation of the rotatable member, and a latch housing which encloses a latch locking mechanism and which is connected directly to the switch housing so that rotation of the rotatable member operates the latch locking mechanism.

The switch housing preferably encloses two microswitches which can be connected to an electronic control unit so that the action of turning the key is signalled to the control unit. This can then be used to activate or deactivate an alarm system or other electrical system.

The engagement between the cylinder and the rotatable member is preferably achieved by a non-round male member on one component engaging in a correspondingly shaped female socket on the other component. Preferably the male member is on the cylinder and the female part is on the rotatable member.

The rotatable member may have two radial fingers which extend into the latch housing, on either side of a latch operating member, so that rotation of the key which rotates the rotatable member also results in contact between one or other of the fingers and the latch operating member, to operate the latch mechanism.

The lock unit may be secured to a vehicle door panel by inserting the barrel through a hole in the panel and then mounting a retaining clip on the barrel on the inside of the door panel.

The lock unit may be connected to the switch housing by passing the barrel through a hole in a wall of the housing and then mounting a retaining clip inside the housing, on the lock barrel.

The switch housing may be connected to the latch housing by riveting the two parts together, and the latch housing and switch housing may be pre-assembled and then mounted in a door as a single unit.

The invention therefore also provides a door latch assembly comprising a switch housing enclosing a rotatable member, the rotatable member having an exposed drive member, and a latch housing which encloses a latch locking mechanism and which is connected directly to the switch housing so that rotation of the rotatable member operates the latch locking mechanism.

Preferably the exposed drive member is a non-round socket adapted to receive a correspondingly shaped projection on the end of a key cylinder.

The invention will now be further described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is an exploded view of a door latch and lock assembly in accordance with the invention; Figure 2 shows a cross section through the assembly of Figure 1, on the lines II-II; Figure 3 shows a section through the assembly of Figure 1 on the lines III-III; and Figure 4 illustrates the positioning of the lock unit retaining clips.

Figure 1 shows a lock unit 10, a switch housing 12 and a latch housing 14. The lock unit 10 has a head 16 with a slot 18 for receiving a key. The head 16 will normally be mounted on the outside of a vehicle door panel 20, as illustrated in Figure 2. The unit 10 has a

barrel 22, and a cylinder rotates within the barrel 22 and ends in a rotatable spigot 24. When the correct key is inserted in the slot 18 and rotated, then the spigot 24 turns relative to the barrel 22.

The switch housing 12 encloses a rotatable member 26, the shape of which is shown most clearly in Figure 3. This member 26 has two sockets 28 which receive the spigot 24, such that rotation of the cylinder with the spigots produces rotation of the rotatable member 26. The member 26 has two fingers 28 which extend radially from the member and lie either side of a latch operating member 30 mounted within the latch housing 14. The operating member 30 is connected to a latch arm 32 by a mechanism which is not illustrated in detail in the Figures, but which will be familiar to the skilled man. The operating member 30 can be moved in the directions indicated by the double headed arrow 34, about an axis 36. Thus rotation of the correct key in the slot 18 will turn the rotatable member 26 which will turn the latch operating member 30 which will move the latch arm 32 to lock and unlock the latch.

On assembly, the switch housing 12 will be connected directly to the latch housing 14 so that neither the operating member 30 nor the rotatable member 26 are accessible. The engagement between the spigots 24 and the sockets 28 will be wholly inside the housing 12, as indicated with reference to Figures 1 and 2. From Figure 1 it can be seen that the barrel 22 has two pairs of slots 38 and 40, and two retaining clips 42 and 44 are illustrated. Figure 2 shows how the retaining clip 42 is fitted to secure the barrel 22 to the door panel 20, and how the clip 44 is fitted (inside the switch housing 12) to secure the barrel to the switch housing with the rotatable spigots 24 and the rotatable member 26 concealed within the switch housing.

Figure 3 also illustrates two microswitches 46 and 48 which are mounted on an end wall of the housing 12 and will be operated by respective ones of cam surfaces 50, 52 on the rotatable member 26. Therefore when the key is inserted and turned, one or other of the microswitches 46, 48 will be closed so that a corresponding signal is sent to an electronic control unit 54.

As a result of this construction of the door latch and lock assembly, there are no accessible levers which will affect door operation and which would affect the door locking function and which could be reached by a thief, and similarly there are no accessible switches. Twisting of the key barrel will be resisted by the two retaining clips 42 and 44 which will also resist attempts to axially pull out the key barrel. Rotation of the entire key barrel is resisted by the shape of the larger retainer 44 which, as can be seen in Figure 4, is prevented by rotating by its close fit inside the switch housing 12.

The assembly as described also allows for possible manufacturing tolerances, in that the fit between

the spigots 24 and the sockets 28 can allow a degree of lost motion without adversely affecting the operation, and axial tolerances between the lock unit and the switch housing can be accommodated by allowing different depths of insertion of the spigots 24 into the sockets 28.

Claims

1. A door latch and lock assembly in which a key-operated lock (10) is connected to a latch (12,14) which holds the door open or closed, wherein all the moving parts of the assembled assembly, between the aperture (18) for receiving the key and the actual latch member (32) are enclosed within a continuous housing, characterised in that the latch member (12) and the key barrel (22) have mutually engageable mating features such that the latch member (12) and the key barrel (22) can be assembled separately to the door with their mating features engaging to form a continuous housing.
2. A door latch and lock assembly comprising a lock unit (10) having a barrel (22) and a cylinder which can rotate within the barrel after insertion of a key, characterised in that the assembly includes a switch housing (12) enclosing a rotatable member (26), with the rotatable member and the cylinder (24) engaging directly with one another, inside the switch housing, so that rotation of the cylinder produces rotation of the rotatable member, and a latch housing (14) which encloses a latch locking mechanism and which is connected directly to the switch housing (12) so that rotation of the rotatable member operates the latch locking mechanism.
3. An assembly as claimed in Claim 2, wherein the switch housing (12) encloses two microswitches (46,48) which can be connected to an electronic control unit (54) so that the action of turning the key is signalled to the control unit.
4. An assembly as claimed in Claim 2 or Claim 3, wherein the engagement between the cylinder and the rotatable member (26) is achieved by a non-round male member (24) on one component engaging in a correspondingly shaped female socket (28) on the other component.
5. An assembly as claimed in Claim 4, wherein the male member (24) is on the cylinder and the female socket (28) is on the rotatable member (26).
6. An assembly as claimed in any one of Claims 2 to 5, wherein the rotatable member (26) has two

radial fingers (28) which extend into the latch housing (14), on either side of a latch operating member (30), so that rotation of the key which rotates the rotatable member (26) also results in contact between one or other of the fingers (28) and the latch operating member (30), to operate the latch mechanism.

7. An assembly as claimed in any one of Claims 2 to 6, wherein the lock unit (10) is secured to a vehicle door panel (20) by inserting the barrel (22) through a hole in the panel and then mounting a retaining clip (42) on the barrel on the inside of the door panel (20).
8. An assembly as claimed in any one of Claims 2 to 7, wherein the lock unit (10) is connected to the switch housing (12) by passing the barrel through a hole in a wall of the housing and then mounting a retaining clip (44) inside the housing, on the lock barrel.
9. An assembly as claimed in any one of Claims 2 to 8, wherein the switch housing (12) is connected to the latch housing (14) by riveting the two housings together, and the latch housing and switch housing are pre-assembled and then mounted in a door as a single unit.
10. A door latch assembly characterised in that it comprises a switch housing (12) enclosing a rotatable member (26), the rotatable member having an exposed drive member (28), and a latch housing (14) which encloses a latch locking mechanism and which is connected directly to the switch housing (12) so that rotation of the rotatable member (26) operates the latch locking mechanism.
11. An assembly as claimed in Claim 10, wherein the exposed drive member is a non-round socket (28) adapted to receive a correspondingly shaped projection (24) on the end of a key cylinder (10).
12. A door lock adapted for use as part of the door latch and lock assembly as claimed in any one of Claims 1 to 9.

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