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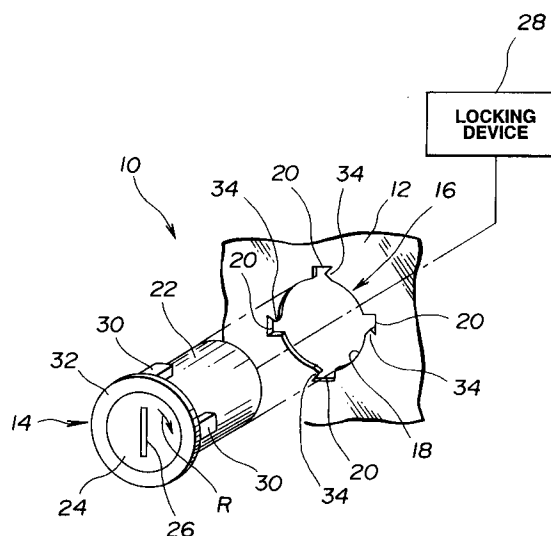
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DE FR GB(71) Applicant: **NISSAN MOTOR CO., LTD.**
No.2, Takara-cho, Kanagawa-ku
Yokohama City (JP)(72) Inventor: **Fujii, Hiroshi**
12 Whetstone Close,
Heelands
Milton Keynes, MK13 7PP (GB)
Inventor: **Kokuryo, Yoshiki**
No. 10-12, Mori 3-chome,
Isogo-ku
Yokohama City,
Kanagawa Pref. (JP)(74) Representative: **Patentanwälte Grünecker,**
Kinkeldey, Stockmair & Partner
Maximilianstrasse 58
D-80538 München (DE)(54) **Apparatus for restricting rotation of a cylinder lock relative to a vehicle body.**

(57) An apparatus including a panel (12) formed with an opening (16) which includes a hole (18) defined by a circular peripheral edge of the panel (12) and a radial cutout (20) communicating with the hole (18). Received in the hole (18) is a cylinder lock (14) which includes an outer cylinder housing (22) and a key operated inner cylinder (24) disposed in the outer cylinder housing (22). A radial projection (30) extending from the outer cylinder housing (22) is inserted into the radial cutout (20). The panel (12) has an integral flap (34) partly defining the radial cutout (20). The integral flap (34) is turnable about a hinge line at which the panel (12) abuts against the radial projection (30) to withstand stress from the radial projection (30).

FIG.1**EP 0 634 546 A2**

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for restricting rotation of a cylinder lock including an outer cylinder housing and a key operated inner cylinder disposed in the outer cylinder housing, relative to a panel of a vehicle body.

Japanese Utility Model Application First Publication No. 1-86658 discloses an apparatus for mounting an electronic lock on a panel of a vehicle body. The panel is formed with an opening including a hole defined by a circular peripheral edge of the panel and a radial cutout communicating with the hole. The electronic lock includes a cylindrical portion and a radial projection extending from the cylindrical portion. The cylindrical portion is disposed within the hole with the radial projection inserted into the radial cutout.

An object of the present invention is to provide an apparatus including a panel with an opening and a cylinder lock disposed within the opening, which is capable of preventing rotation of the cylinder lock relative to the panel without any increase in thickness of the panel or any provision of a reinforcing member.

SUMMARY OF THE INVENTION

According to the present invention, there is provided an apparatus comprising:

a panel formed with an opening including a hole defined by a circular peripheral edge of the panel and a radial cutout communicating with the hole; and

a cylinder lock including an outer cylinder housing, a key operated inner cylinder disposed in the outer cylinder housing, and a radial projection extending from the outer cylinder housing;

the outer cylinder housing being disposed within the hole with the radial projection inserted into the radial cutout;

characterized in that the panel has an integral flap partly defining the radial cutout, the integral flap being turnable about a hinge line at which the panel abuts against the radial projection to withstand stress from the radial projection.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded perspective view of an apparatus of a first embodiment according to the present invention, showing a panel with an opening and a cylinder lock;

Fig. 2 is a perspective view of the apparatus as viewed from a rear side thereof, showing the cylinder lock received in the opening of the panel;

Fig. 3 is an enlarged view in part of Fig. 2;

Fig. 4 is a front elevation of the panel of Fig. 1; and

Fig. 5 is an enlarged view similar to Fig. 3 but showing a modified cylinder lock.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to Fig. 1, an apparatus 10 according to the present invention includes a panel 12 of a vehicle body and a cylinder lock 14.

As shown in Fig. 1, the panel 12 is formed with an opening 16 including a hole 18 defined by a circular peripheral edge of the panel 12 and a plurality of radial cutouts 20 communicating with the hole 18.

As shown in Fig. 1, the cylinder lock 14 includes a flanged outer cylinder housing 22 and a key operated inner cylinder 24 disposed in the outer cylinder housing 22. The key operated inner cylinder 24 with a key slot 26 rotates in the outer cylinder housing 22 when the key operated inner cylinder 24 is subject to a torque with a proper key.

As seen in Fig. 1, the key operated inner cylinder 24 is operatively connected to a locking device 28 for locking a movable member such as door or hood, of the vehicle. The locking device 28 is so constructed and arranged within the vehicle as to be shiftable between a lock position in which a movement of the movable member is prevented and a release position in which the movement of the movable member is allowed. The locking device 28 shifts into the release position in response to rotation of the key operated inner cylinder 24 in a predetermined direction as indicated by the arrow R of Fig. 1, and into the lock position in response to rotation of the key operated inner cylinder 24 in a direction reverse to the direction R.

As shown in Figs. 1 and 2, a plurality of radial projections 30 extend outward from an outer periphery of a front portion of the outer cylinder housing 22 and join with a flange 32 of the outer cylinder housing 22.

As seen in Fig. 2, the outer cylinder housing 22 is disposed within the hole 18 with the radial projections 30 which are inserted into the radial cutouts 20, respectively.

As best shown in Fig. 3, the panel 12 has a plurality of triangular integral flaps 34 partly defining the radial cutouts 20. Each of the integral flaps 34 is turnable about a hinge line 36 as shown in Fig. 4, at which the panel 12 abuts against the radial projection 30 to withstand stress from the radial projection 30.

Referring to Fig. 4, a turning motion of the integral flaps 34 will now be explained.

As shown in Fig. 4, when the outer cylinder housing 22 is subject to a torque having a mag-

nitude smaller than a predetermined value but stays in place, the radial projection 30 is placed in a stationary position as indicated in the phantom line 38. When the outer cylinder housing 22 is subject to a torque having a magnitude greater than the predetermined value and rotated in the direction R, the radial projection 30 moves into a rotational position as indicated in the solid line 40.

During the movement of the radial projection 30, the integral flap 34 moves from a first position as indicated in the phantom line 42 of Fig. 4, into a second position as indicated in the solid line 44 of Fig. 4.

In the first position 42 as seen in Fig. 4, the integral flap 34 has a leading end 46 remote from the hinge line 36 in abutting engagement with the radial projection 30 to withstand stress from the radial projection 30 when the outer cylinder housing 22 is subject to the torque of the magnitude smaller than the predetermined value. Then, the integral flap 34 is forced to turn about the hinge line 36 by the radial projection 30 to be placed in the second position.

In the second position 44 as seen in Fig. 4, the integral flap 34 is formed with a bending edge 48 along the hinge line 36 in abutting engagement with the radial projection 30. The panel 12 has an increased structural strength at the bending edge 48, resulting from turning of the integral flap 34 about the hinge line 36. Thus, the panel 12 abuts against the radial projection 30 to withstand stress from the radial projection 30 when the outer cylinder housing 24 is subject to the torque of the magnitude greater than the predetermined value.

Unitary rotation of the outer cylinder housing 22 and the key operated inner cylinder 24 in the direction R is caused in a predetermined range in the cutout 20 when the outer cylinder housing 22 is subject to the torque of the magnitude greater than the predetermined value. The integral flap 34 is so constructed and arranged as to restrict the unitary rotation in the direction R within the predetermined range in which the locking device 28 connected with the key operated inner cylinder 24 is kept in the lock position and prevented from shifting into the release position.

Thus, the provision of the integral flap 34 serves for enhancing structural strength of the panel 12 which is capable of withstanding stress from the outer cylinder housing 22, without replacement of the panel with a panel having an increased thickness or without using any reinforcing member. By the enhancement, unitary rotation of the outer cylinder housing 22 and the key operated inner cylinder 24 is restricted so that the locking device 28 is prevented from shifting into the release position. This simple construction and arrangement of the integral flap 34 serves for saving a manufactur-

ing cost of the vehicle body. The apparatus of the invention serves for reduction in weight of the vehicle as compared with one utilizing a panel having an increased thickness or a reinforcing member for the enhancement of structural strength of the panel.

Fig. 5 shows a modified cylinder lock of the apparatus according to the present invention, which only differs in provision of a guide groove 50. Like numerals denote like parts of the apparatus of the aforementioned first embodiment and therefore detailed explanations thereabout are omitted.

As shown in Fig. 5, the guide groove 50 extends on a face 52 of the radial projection 30 which abuts on the leading end 46 of the integral flap 34, in an axial direction of the outer cylinder housing 22. The guide groove 50 surely receives the leading end 46 of the integral flap 34 and serves for a smooth turn of the integral flap 34 about the hinge line 36.

Claims

1. An apparatus comprising:
 - a panel (12) formed with an opening (16) including a hole (18) defined by a circular peripheral edge of said panel (12) and a radial cutout (20) communicating with said hole (18);
 - a cylinder lock (14) including an outer cylinder housing (22), a key operated inner cylinder (24) disposed in said outer cylinder housing (22), and a radial projection (30) extending from said outer cylinder housing (22);
 - said outer cylinder housing (22) being disposed within said hole (18) with said radial projection (30) inserted into said radial cutout (20);
 - characterized in that
 - said panel (12) has an integral flap (34) partly defining said radial cutout (20), said integral flap (30) being turnable about a hinge line at which said panel (12) abuts against said radial projection (30) to withstand stress from said radial projection (30).
2. An apparatus as claimed in claim 1, characterized in that said integral flap (34) has a first position in which said integral flap (34) has a leading end remote from said hinge line in abutting engagement with said radial projection (30) to withstand stress from said radial projection (30) when said outer cylinder housing (22) is subject to a torque having a magnitude smaller than a predetermined value.
3. An apparatus as claimed in claim 2, characterized in that said integral flap (34) is forced to turn about said hinge line by said radial projec-

tion (30) to assume a second position when said outer cylinder housing (22) is subject to a torque having a magnitude greater than said predetermined value.

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FIG.1

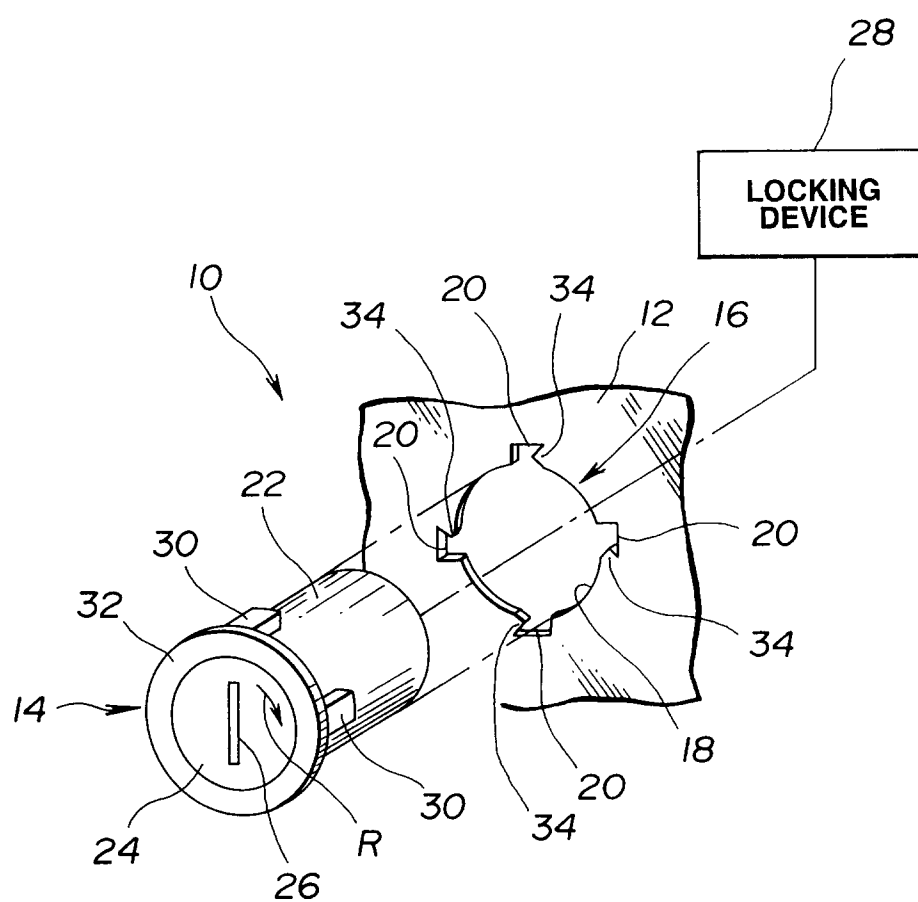


FIG.2

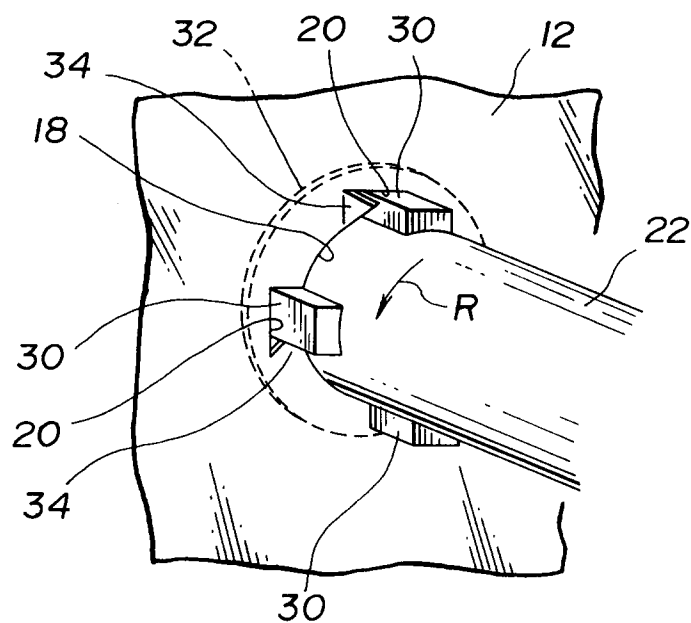


FIG.3

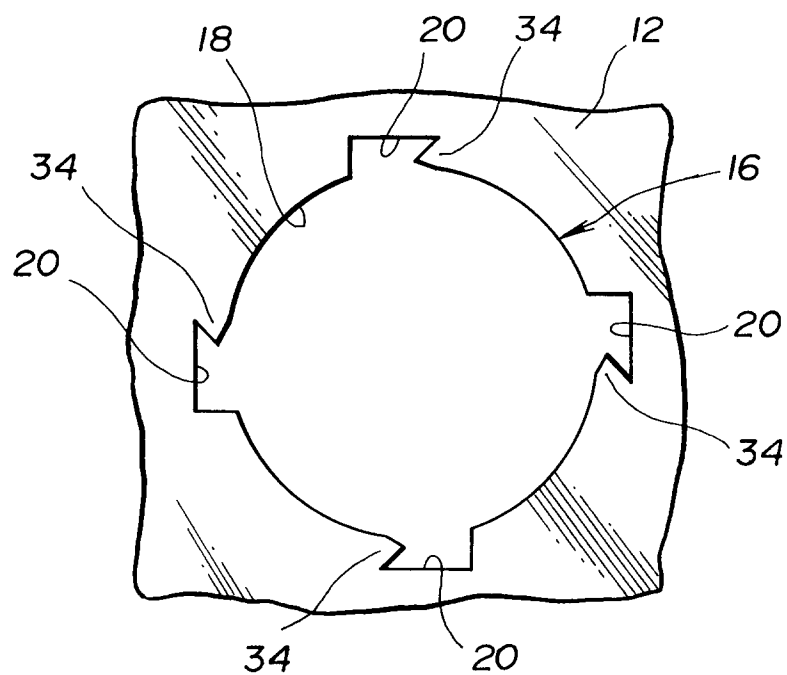


FIG.4

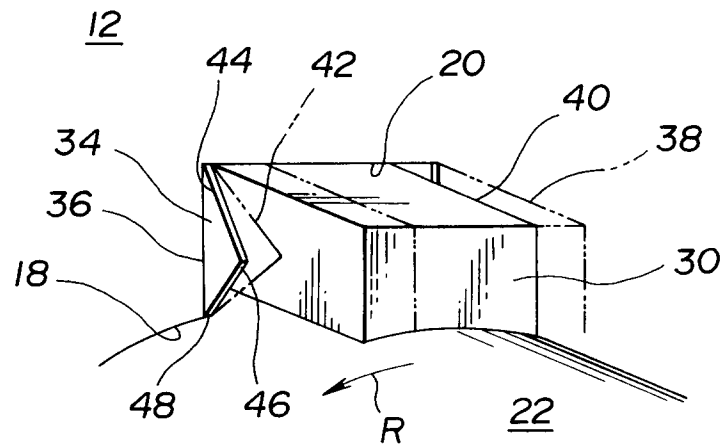


FIG.5

