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(71) Applicant: **Abloy Oy**
80100 Joensuu (FI)

(72) Inventors:
- **Saarinen, Jarmo**
  FI-33880, Lempäälä (FI)
- **Seppänen, Sauli**
  FI-80160, Joensuu (FI)

(74) Representative: **Gustafsson, Aulis Valdemar**
AWEK Industrial Patents Ltd Oy
P.O. Box 230
00101 Helsinki (FI)

(54) **Cover plate**

(57) A cover plate (1, 11) according to the invention comprises at least one threaded hole (3, 4, 14) for a fastener. The mouths of the threaded hole or holes are on the back side of the cover plate. The mouth of the threaded hole comprises an expansion (8, 13, 17, 18) so that the diameter of the expansion crosswise to the axis of the threaded hole (3, 4, 14) is greater than the outer diameter of the thread in the threaded hole at least in part of the expansion area.

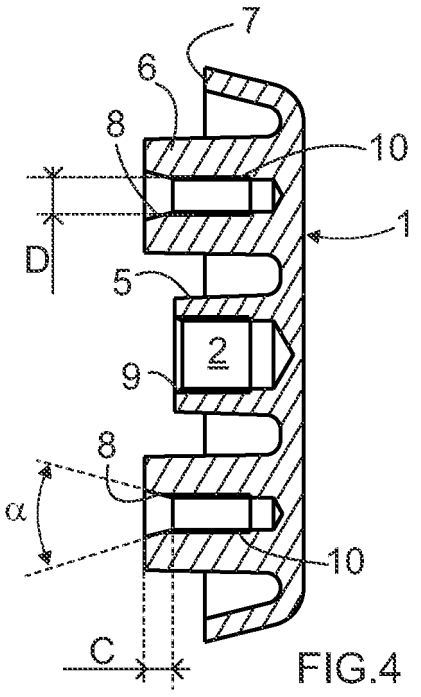

FIG.4

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Description

Field of technology

[0001] The present invention relates to cover plates used in connection with locks on doors, hatches etc. Cover plates can be associated with handles, pulls, knobs, other lock accessories or cylinder bodies.

Prior art

[0002] Cover plates are used in connection with locks on doors, hatches etc. to cover machined openings made in the mounting base, for example a door. In some cases, mounting plates are used for attaching lock accessories. Machined openings are required for lock accessories and the cylinder body. In other words, machined openings are required for using the lock. Common lock accessories include a handle, a knob and a pull. A machined opening is often made through the door, creating holes on both sides of the door. When there are cover plates on opposite sides of the door to cover the machined opening, a normal way is to fasten the cover plates to each other using through-screws or through-bolts that make the cover plates press against the door. The fasteners - that is, the through-screws or through-bolts - are arranged to go through holes in the lock body within the door.

[0003] If the intention is to fit a handle with spindle into an opening made in the cover plate for the spindle, the plate is often called a handle plate. On the other hand, if the cover plate is intended for installation in connection with a cylinder body, it is often called a cylinder body plate or protective ring. A cover plate with no opening for a handle, cylinder body or other component is normally used for covering the machined opening on the opposite side of the door. The cover plate may also be designed for fitting a knob, in which case it is called a knob plate. Thus a cover plate generally refers to all types of cover plates that cover the machined opening made in the mounting base.

[0004] The purpose of cover plates is to protect the lock body and spindle within the door against external contamination and vandalism. A cover plate is also aesthetically more appealing than an open machined opening. Particularly in connection with external doors, a cover plate is required to have a protective effect against burglary. The burglar protection features of cover plates are already quite good but should be improved for particularly demanding installations.

Short description of invention

[0005] The objective of the invention is to improve the burglar protection features of cover plates. The purpose will be achieved as described in Claim 1. The other claims describe various embodiments of the invention.

[0006] A cover plate 1, 11 according to the invention comprises at least one threaded hole 3, 4, 14 for a fastener. The fastener is usually a screw or a threaded bolt. The mouths of the threaded hole or holes are on the back side of the cover plate. The mouth of the threaded hole comprises an expansion 8, 13, 17, 18 so that the diameter of the expansion crosswise to the axis of the threaded hole 3, 4, 14 is greater than the outer diameter of the thread in the threaded hole at least in part of the expansion area.

[0007] In an embodiment of the invention, the mouth of the threaded hole is bevelled to make a conical shape in which the conical bevelled surface 8, 13 becomes narrower from the mouth of the hole towards the bottom of the hole; the threaded edges 10, 15 of the hole are bevelled along the narrower section of the conical bevelling, and along the wider section of the conical bevelling, the diameter of the bevelled hole is greater than the outer diameter of the thread in the threaded hole.

[0008] The expansion at the mouth of the threaded hole reduces the shearing force imposed on the fastener when an attempt is made to strike the cover plate off the mounting base by an impact parallel to the mounting base surface.

List of figures

[0009] In the following, the invention is described in more detail by reference to the enclosed drawings, where

- Figure 1 illustrates an example of a cover plate viewed from the side of the front face,
- Figure 2 illustrates the example of Figure 1 viewed from the back,
- Figure 3 illustrates the example of Figure 1 viewed from the side,
- Figure 4 illustrates a cross-section of the example of Figure 1,
- Figure 5 illustrates another example of a cover plate according to the invention,
- Figure 6 illustrates the example of Figure 5 viewed from the side,
- Figure 7 illustrates a cross-section of the example of Figure 5,
- Figure 8 illustrates an expansion to the mouth of the threaded hole according to the invention, and
- Figure 9 illustrates another example of an expansion to the mouth of the threaded hole according to the invention.

Description of the invention

[0010] An embodiment of a cover plate 1 according to the invention is illustrated in Figure 1 viewed from the side of the front face of the plate. Figure 2 illustrates the same embodiment viewed from the back, while Figure 3 illustrates it viewed from the side. This embodiment is intended for so-called profile doors having a metal structure. The front face 7 of the cover plate covers the machined openings or opening made in the mounting base.

Figure 4 illustrates a cross-section of this embodiment.

[0011] The embodiment in Figures 1 to 4 comprises two threaded holes 3, 4 for fasteners that are used to attach the cover plate against the mounting base. The fasteners are usually screws or threaded bolts. The mouths of the threaded holes 3, 4 are on the back side of the cover plate. Furthermore, this embodiment has a separate threaded hole 2 for the end of the spindle of the handle. Thus the cover plate 1 in the figures is intended for installation in the machined openings or opening on the opposite side of the door while the handle is on the other side. The cover plate also comprises a support structure 6, 5 specific to each threaded hole, and each hole is located within said support structure.

[0012] A cover plate according to the invention can naturally be implemented in some other way as well. For example, the cover plate may have only one threaded hole for a fastener, or the plate may be of some other type of cover plate. The support structure may be common to all of the threaded holes.

[0013] Thus a cover plate 1 according to the invention comprises at least one threaded hole 3, 4 for a fastener. In this embodiment, the expansion at the mouth of the threaded hole is bevelled to make a conical shape in which the conical bevelled surface 8 becomes narrower from the mouth of the hole towards the bottom of the hole; the threaded edges 10 of the hole are bevelled along the narrower section of the conical bevelling, and along the wider section of the conical bevelling, the diameter of the bevelled hole is greater than the outer diameter of the thread in the threaded hole.

[0014] Figure 4 illustrates the outer diameter D of the thread 10 of the hole. As can be seen, the diameter of the hole is greater than D along the part of the bevelling that goes towards the mouth. Along the part of the bevelling going towards the bottom of the hole, the threads 10 of the hole are bevelled in accordance with the conical bevelled surface. Such a bevelling reduces the shearing force imposed on the fastening screw or bolt when the installed cover plate receives a lateral impact. A lateral impact has a force component parallel to the surface of the mounting base. In other words, the bevelling is sufficiently deep and its outer diameter is sufficiently large.

[0015] The bevelling according to the invention and its operation differ from prior art bevellings at the mouths of threaded holes, the purpose of which is to facilitate screwing a screw into the hole. Figure 4 also illustrates a prior art bevelling 9 at the mouth of a threaded hole in connection with the spindle hole 2. In prior art bevellings, the outer diameter of the thread in the hole corresponds to the greatest diameter of the bevelling.

[0016] It has been observed that in the conical bevelling according to the invention, a solid angle α that is between 15 and 45 degrees and a length C of the bevelling in the direction of the hole that is between 3 and 6 mm are preferred dimensions for reducing the shearing force imposed on the fastener. The dimensions of the bevelling can naturally deviate from those specified here, particularly if the embodiment of the cover plate deviates greatly from conventional cover plates.

[0017] Figures 5 to 7 illustrate another type of a cover plate 11 containing a structure 12 that is intended to be embedded into the machined opening. The more extensive part of the cover plate structure is not intended to be embedded. The threaded holes 14 are placed within the entire structure of the cover place so that some of the holes are intended to be embedded into the machined opening together with the embedded structure. Furthermore, the embedded structure 12 is common to the threaded holes. The mouths of the threaded holes comprise a conical bevelling 13 according to the invention so that the threads 15 of the hole are bevelled only along the narrower part of the bevelling. In the centre, there is a hole 16 for the end of the spindle.

[0018] Figure 8 illustrates an embodiment of the invention in which the expansion at the mouth of the threaded hole has the shape of a cylinder 17, the diameter of said cylinder being greater than the outer diameter of the thread in the threaded hole. The diameter of the cylinder is preferably 0.3 to 2 mm greater than the outer diameter of the thread in the threaded hole.

[0019] Figure 9 illustrates an embodiment of the invention in which the expansion at the mouth of the threaded hole has the shape of a convex-surfaced funnel 18 that becomes narrower from the mouth of the hole towards the bottom of the hole; the threaded edges 10 of the hole are bevelled along the narrower part of the funnel, and along the wider part of the funnel, the diameter of the funnel is greater than the outer diameter of the thread in the hole. In the embodiments of both Figure 8 and Figure 9, the preferred length of the expansion in the axial direction of the hole is 3 to 6 mm.

[0020] As can be noted, the expansion at the mouth of the threaded hole can be implemented in many different ways. Methods other than those illustrated in the figures are also possible; an example is a square conical bevelling (pyramid-shaped bevelling). The dimensions specified above are preferable in connection with common implementations but different dimensions may also be used depending on the implementation.

[0021] The expansion at the mouth of the threaded hole is on the back side of the cover plate that faces the mounting base when installed. Thus the expansion remains hidden and is not intended for the head of a screw, for example, like bores located in connection with some holes on external surfaces. The hidden expansion efficiently distributes the force of a lateral impact imposed on the cover plate across several points or a more extensive area, reducing the shearing force imposed on the fastener.

[0022] The structure 6, 12 of the cover plate within which the threaded hole is located can be arranged to partially sink into the machined opening in the mounting base as illustrated in the examples in the figures. The structure may be specific to each threaded hole or common. A structure embedded into the machined opening

increases break-in strength and reduces the shearing force imposed on the fasteners as a lateral impact makes the embedded structure lean on the edge of the machined opening, receiving part of the force of the lateral impact.

[0023] At the depth A of the embedded structure, the mouth of the threaded hole can be moved away from the level of the mounting base, which will also reduce the shearing force manifested at the mouth of the threaded hole. Thus the expansion at the mouth of the threaded hole can be entirely located within the part of the structure that is intended to sink into the machined opening. The thickness B of the structure also affects break-in strength.

[0024] It is evident from the above that the invention is not limited to the embodiments described in this text but can be implemented in many other different embodiments within the scope of the inventive idea.

Claims

1. A cover plate (1, 11) arranged to cover a machined opening made in a mounting base for the purpose of using a lock, said cover plate (1, 11) comprising at least one threaded hole (3, 4, 14) for a fastener and the mouth of the threaded hole being on the back side of the cover plate, **characterised in that** the mouth of the threaded hole comprises an expansion (8, 13, 17, 18) so that the diameter of the expansion crosswise to the axis of the threaded hole (3, 4, 14) is greater than the outer diameter of the thread in the threaded hole at least in part of the expansion area.

2. A cover plate according to Claim 1, **characterised in that** the expansion at the mouth of the threaded hole is conical so that the conical bevelled surface (8) becomes narrower from the mouth of the hole towards the bottom of the hole and that the threaded edges (10) of the hole are bevelled along the narrower section of the conical bevelling, and along the wider section of the conical bevelling, the diameter of the bevelled hole is greater than the outer diameter of the thread in the threaded hole.

3. A cover plate according to Claim 2, **characterised in that** the solid angle of the conical bevelling is 15 to 45 degrees and the length of the conical bevelling in the direction of the hole is 3 to 6 mm.

4. A cover plate according to Claim 1, **characterised in that** the expansion at the mouth of the threaded hole has the shape of a convex-surfaced funnel (18) that becomes narrower from the mouth of the hole towards the bottom of the hole and that the threaded edges (10) of the hole are bevelled along the narrower part of the funnel, and along the wider part of the funnel, the diameter of the funnel is greater than the outer diameter of the thread in the hole.

5. A cover plate according to Figure 1, **characterised in that** the expansion at the mouth of the threaded hole has the shape of a cylinder (17), the diameter of said cylinder being greater than the outer diameter of the thread in the threaded hole.

6. A cover plate according to Claim 5, **characterised in that** the diameter of the cylinder is 0.3 to 2 mm greater than the outer diameter of the thread in the threaded hole.

7. A cover plate according to Claim 4, 5 or 6, **characterised in that** the length of the expansion in the direction of the hole is 3 to 6 mm.

8. A cover plate according to any of the Claims from 1 to 7, **characterised in that** the structure (6, 12) of the cover plate in which the threaded hole is located is arranged to sink at least partially into the machined opening in the mounting base.

9. A cover plate according to Claim 8, **characterised in that** the expansion (8, 13, 17, 18) at the mouth of the threaded hole is located in a part of the structure (6, 12) that is intended to sink into the machined opening.

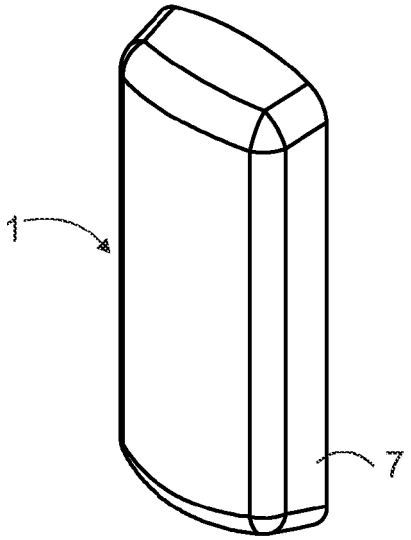

FIG. 1

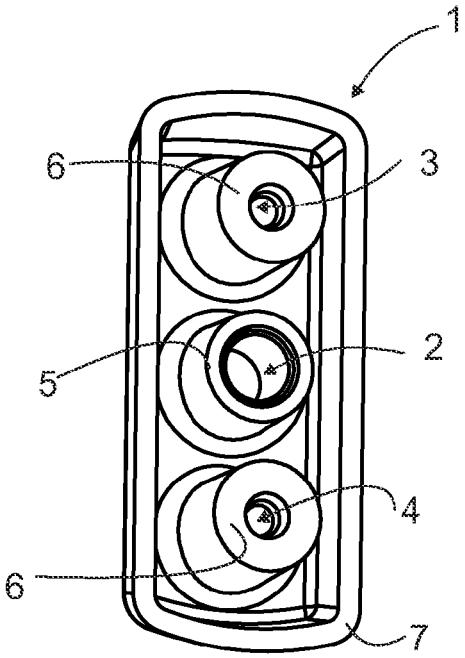

FIG. 2

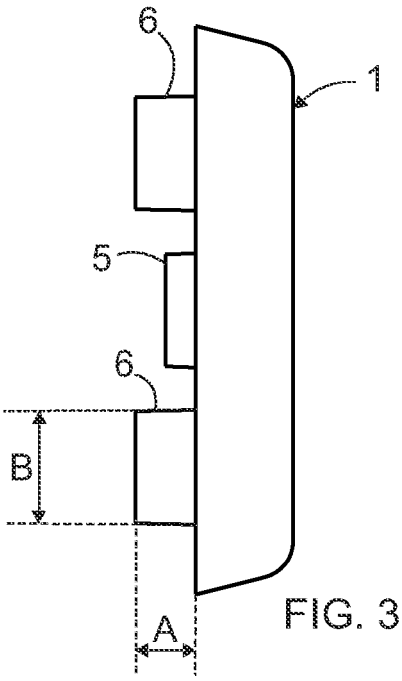

FIG. 3

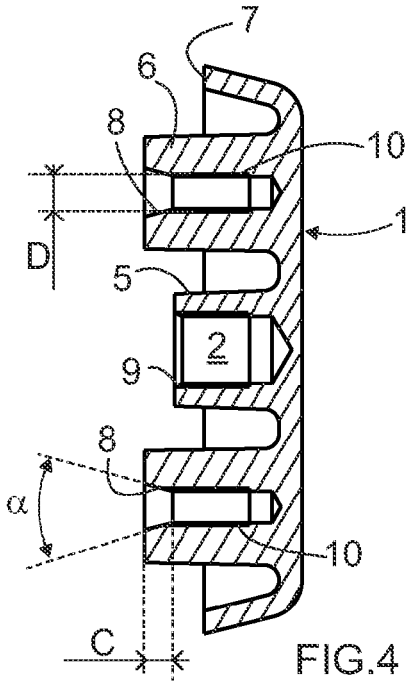

FIG.4

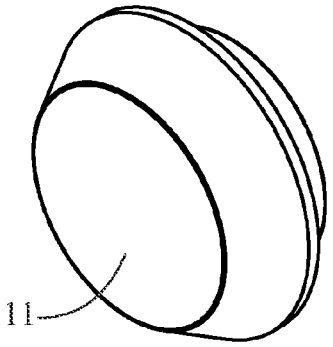

FIG. 5

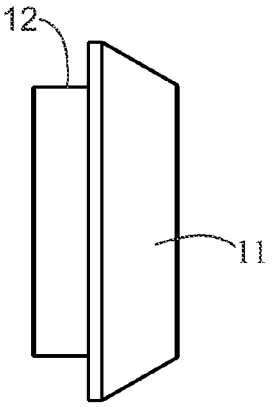

FIG. 6

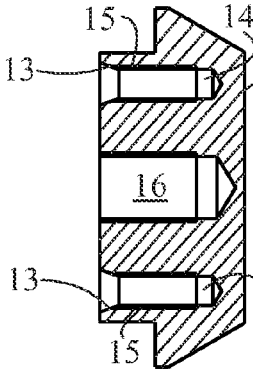

FIG. 7

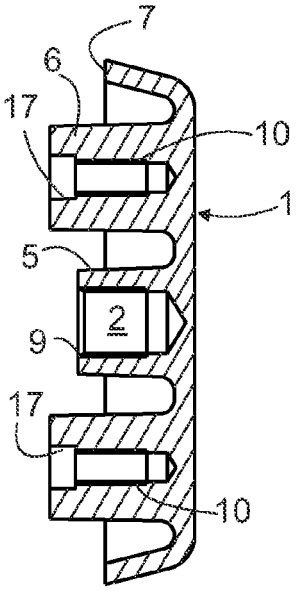

FIG.8

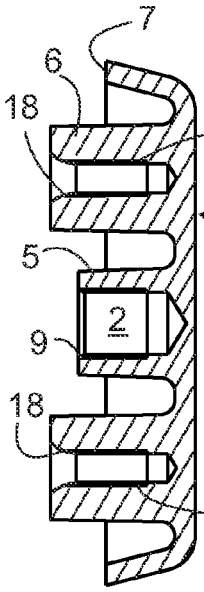

FIG.9