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(58) Field of search **B7C**
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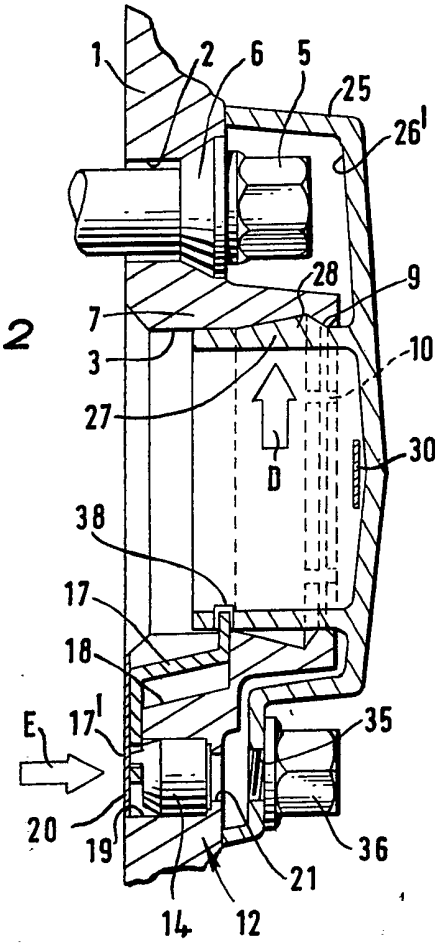
(54) **Vehicle wheel with a lockable hub cover**

(57) A vehicle wheel assembly comprises a wheel (1) adapted to be mounted on a hub by fasteners (5, 6), a hub cover (25) removably mounted on the wheel (1) to prevent access to each fastener (5, 6), and a key-operated lock (14, 17) on the wheel for locking the cover (25) to the wheel (1). The cover (25) and wheel (1) have interengaging flanges (7, 27) as shown, and on fitting the cover to the wheel ribs (28) on the flange (27) are passed through slots (10) in the flange (7) and then the cover is rotated relative to the wheel. The cover also carries a spring clip (30) which engages beneath a lip (9) on the flange (7). The bolt (17) of the lock engages a slot (38) in the flange (27). Access to the lock cylinder (14) is gained through an aperture (35) closed by a cap (36) in the form of a wheel nut matching similar formations on the cover (25).

FIG. 2



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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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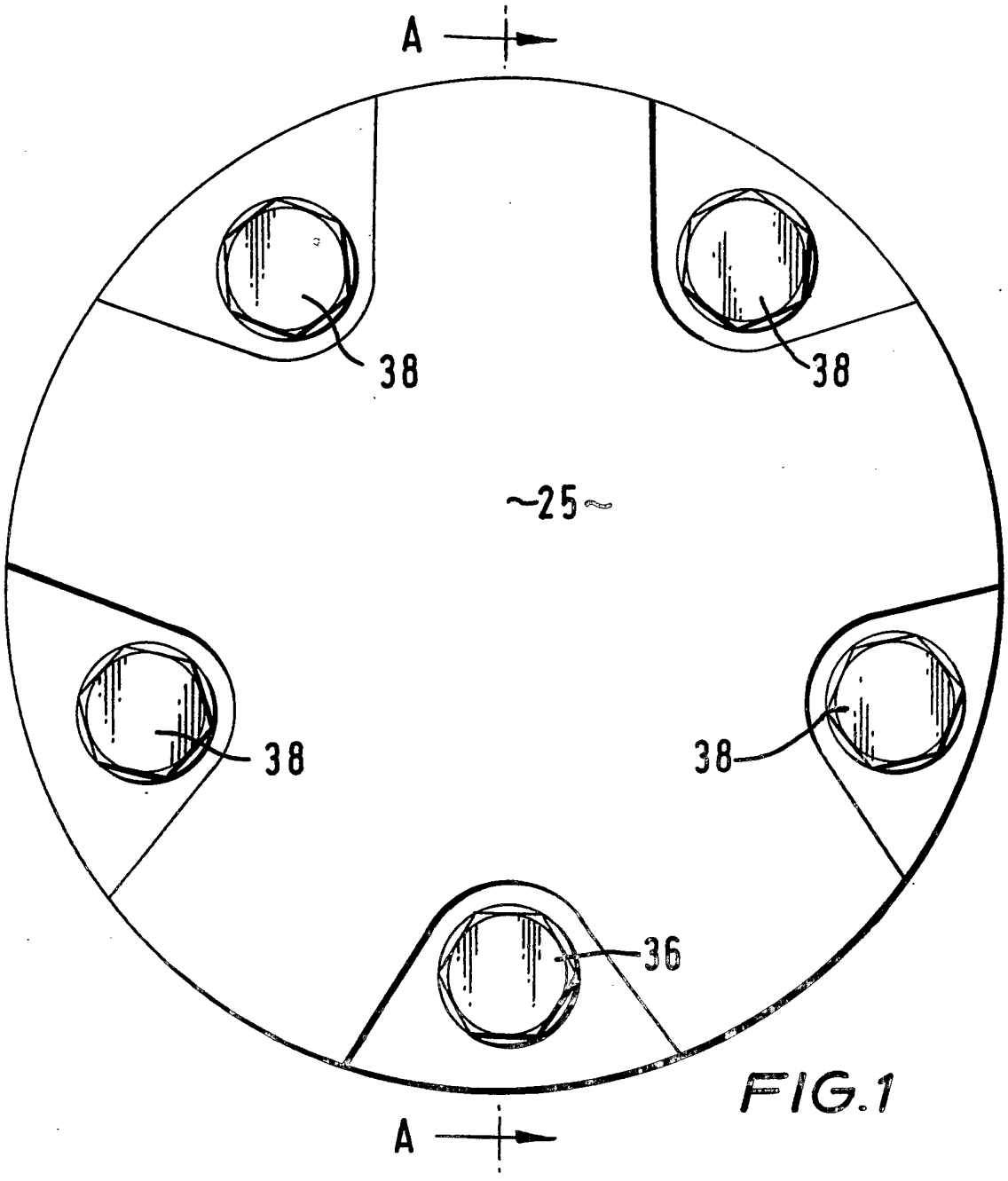


FIG.1

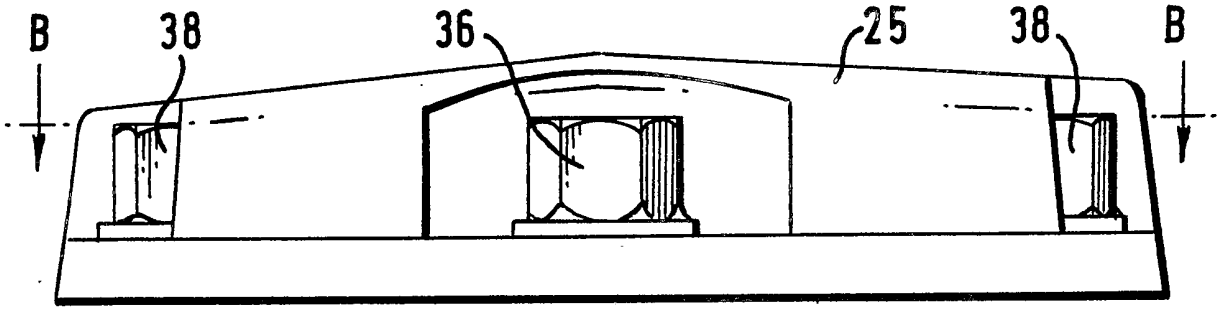


FIG.3

FIG. 2

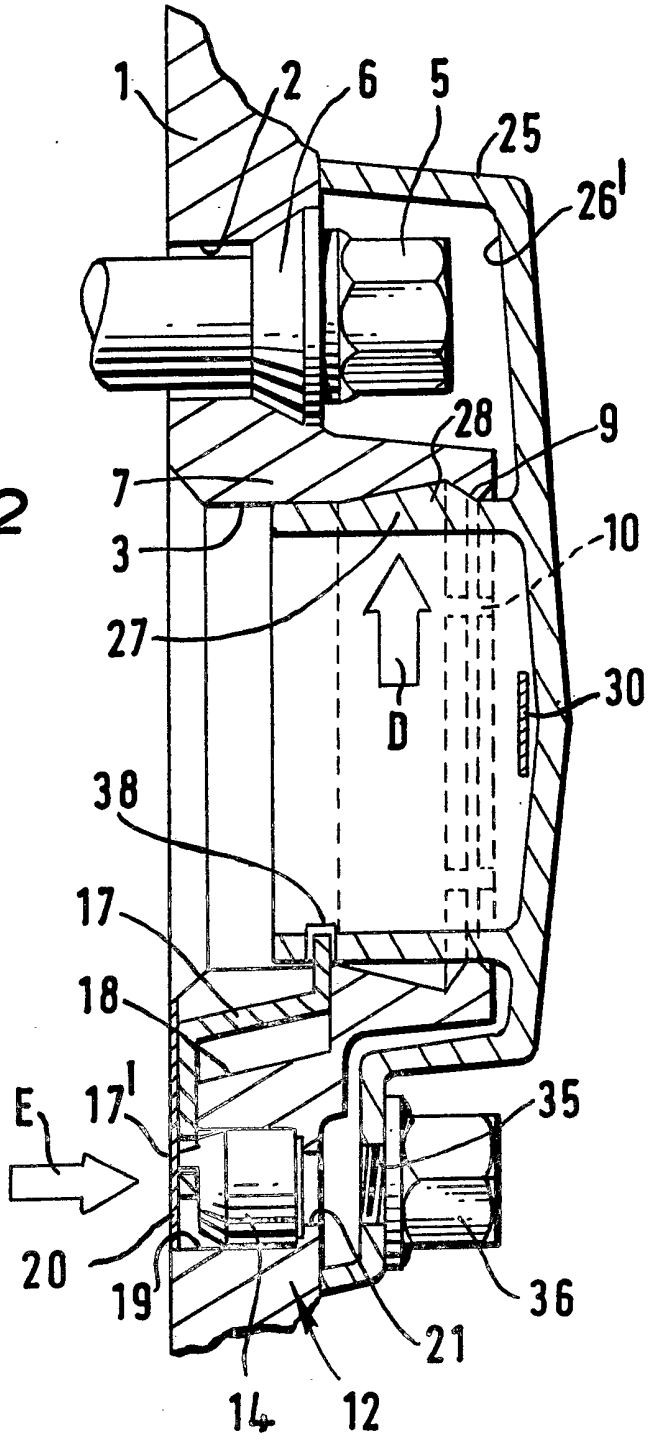

1
2
6
5
25
26'
28
9
7
3
10
27
D
30
38
17
18
E
17'
35
20
19
21
36
14
12

FIG. 5

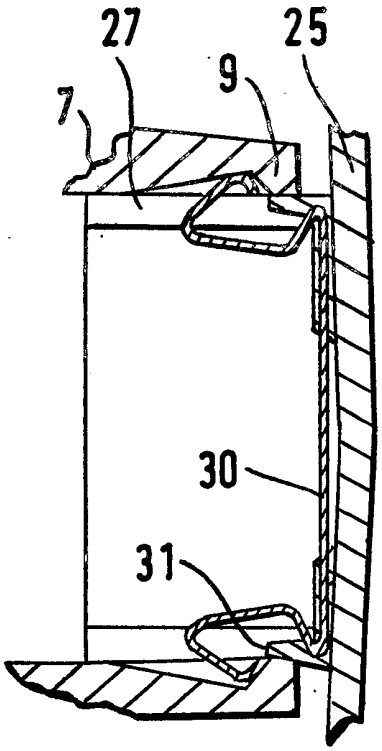

27
25
9
7
30
31

FIG.4

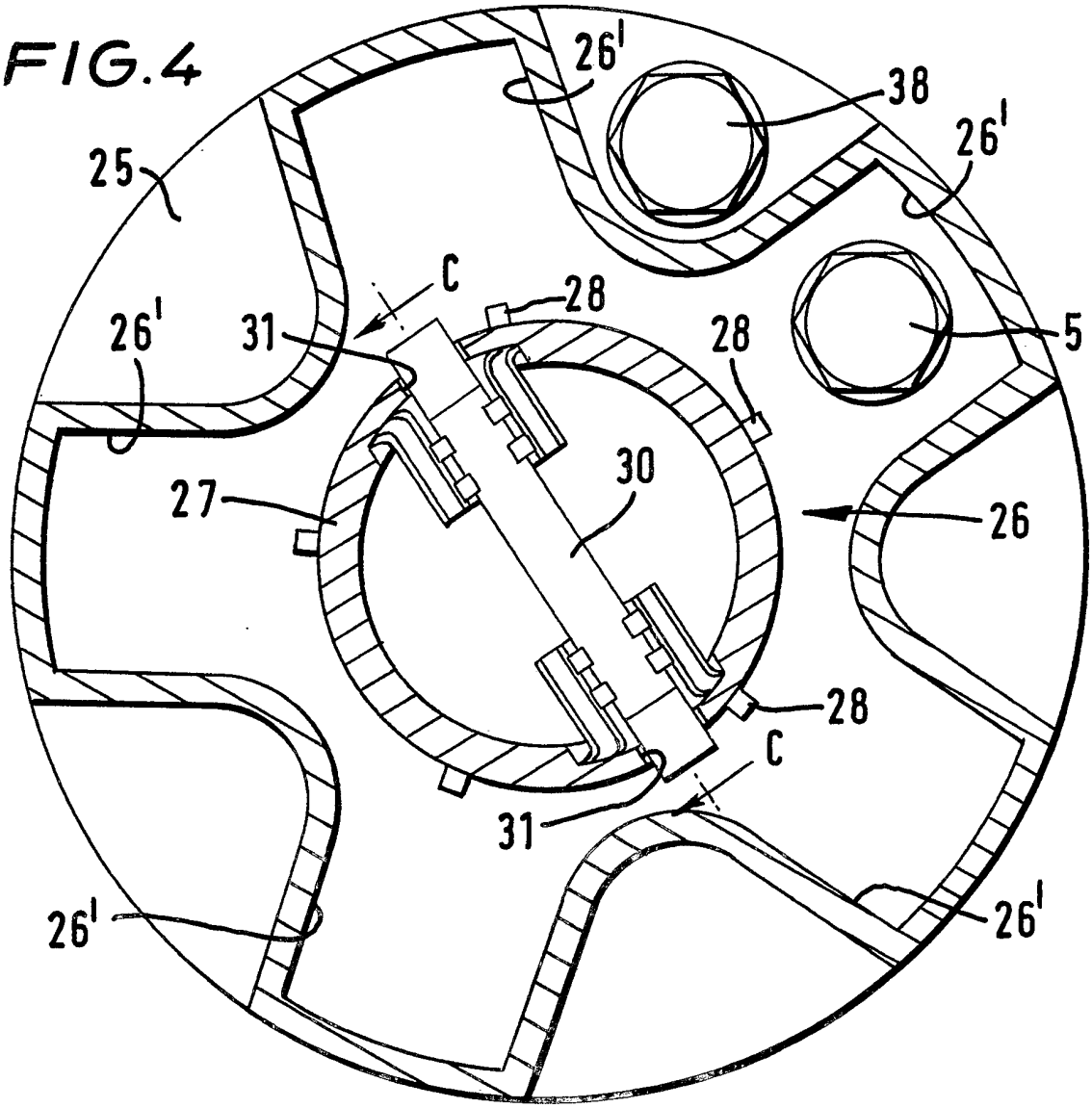


FIG.6

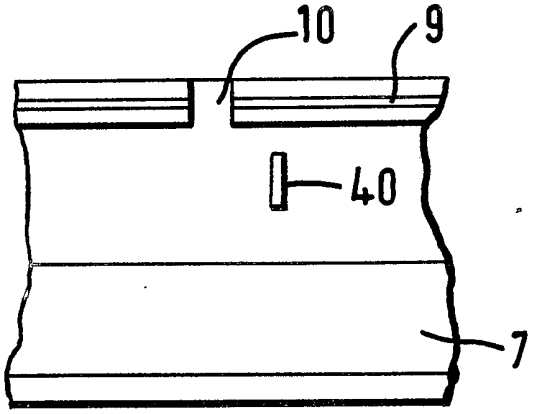
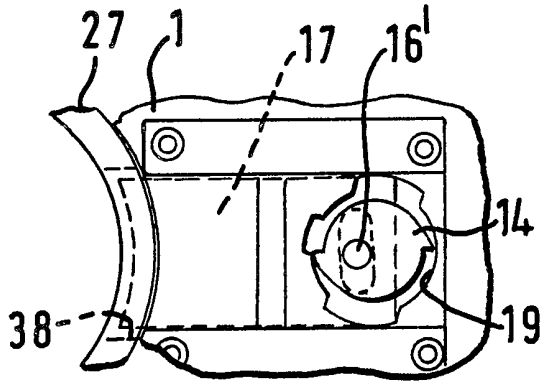


FIG.7



SPECIFICATION

Lockable vehicle wheel assembly

This invention relates to lockable vehicle wheel assemblies.

Vehicle road wheels are usually connected to wheel hubs by a plurality of fasteners, e.g. bolts, which are directly accessible. In order to prevent theft of road wheels, it was hitherto been proposed to replace one of the bolts by a lockable fastener. Such fasteners often require removal by a special tool, and have a different appearance from the other bolts. The use of such fasteners therefore spoils the appearance of the road wheel and inconveniences the vehicle driver. Additionally, since the lockable fastener is exposed, it is susceptible to damage by impact and corrosion.

According to the present invention, there is provided a lockable vehicle wheel assembly comprising a wheel adapted to be mounted on a wheel hub by one or more fasteners, a hub cover removably mounted on the wheel to prevent access to the or each fastener and a lock for locking the hub cover to the wheel.

Since the lock acts between the hub cover and the wheel no additional tools are required for removal of the wheel.

Preferably the lock comprises an actuating mechanism mounted in the wheel and a locking bolt movable by the actuating mechanism into and out of locking engagement with the hub cover. By mounting the lock on the wheel, the mechanism can be protected from exposure to the road conditions by the hub cover. In this respect, the actuating mechanism is advantageously arranged to be accessible through an aperture in the hub cover which is closed by a removable cap.

In the preferred embodiment of the invention, the cap is in the form of a bolt head. In order to provide a neat external appearance to the assembly, and to hide the location of the lock, the hub cover is desirably formed with one or more projections of a similar shape to the cap disposed around the cover in a symmetrical pattern.

The hub cover and wheel are preferably so constructed to ensure that the hub cover is retained on the wheel even when the lock is unlocked. For example the hub cover and the wheel are preferably provided with inter-engaging bosses extending axially from the hub cover. In a preferred embodiment, the bosses are connected together by a bayonet fitting. A spring clip may also be provided to retain the hub cover and wheel in engagement.

A preferred embodiment of the invention will now be described, by way of example only, with reference to the drawings, in which:-

Figure 1 is a plan of a hub cover used in a preferred wheel assembly of the invention;

Figure 2 is a cross-section of the cover of Figure 1 installed on a wheel, the cross-section being taken along line A-A of Figure 1.

Figure 3 is a side view of the hub cover of Figure 1.

Figure 4 is a cross-section of the hub cover taken along line B-B of Figure 3.

Figure 5 is a partial cross-section taken along line C-C of Figure 4.

Figure 6 is a view of the wheel to which the hub cover of Figure 1 may be attached taken in the direction of the D in Figure 2 and

Figure 7 is a view of the wheel of Figure 6, taken in the direction of the arrow E in Figure 2.

Referring to the drawings, a lockable wheel asembly comprises a road wheel 1 (Figure 2) having five bolt holes 2 arranged symmetrically in a circular pattern about a central aperture 3. A fastener comprising a bolt 5 and a conical washer 6 is positioned in each hole 2, by means of which the road wheel 1 is secured to a hub (not shown).

An annular boss 7 is formed integrally with the wheel 2 about the central aperture 3. The boss 7 has an in-turned lip 9 which has axial slots 10 (Figure 6) at five equispaced positions around its internal circumference.

A lock 12 mounted in the wheel 1 comprises an actuating mechanism 14 in the form of a conventional key-operated locking cylinder 16, and a locking bolt 17. The cylinder 16 includes an eccentric peg 16' which engages in a slot 17' in the bolt. The cylinder and bolts are mounted in recesses 18, 19 in the wheel 1 and are retained therein by a cover plate 20. The cylinder 16 is rotatable by a key (not shown) which is inserted through a key-hole 21 in the wheel 1. Insertion of the key disengages a set of radially movable tumblers (not shown) from channels in the recess 19 allowing the cylinder to rotate. Rotation of the cylinder 16 causes the bolt 17 to reciprocate between a locked position (shown in Figure 2) in which the end of the bolt 17 projects beyond the inner surface of the boss 7 and an unlocked position in which the end of the bolt lies within the recess 18 in the wheel 1.

The wheel 1 carries a hub cover 25. The cover 25 is an integral casting which, as best seen in Figure 4 defines a recess 26 on its internal surface. The recess 26 has five lobes 26' each of which registers with a respective bolt 5. An annular boss 27 is formed on the interior surface of the cover 25. The boss 27 includes five axial ribs 28 on its external surface which register with the slots 10 in the lip 9 of the boss 7 on the wheel 1. The ribs and the radially outer surface of the boss 27 are shaped to conform to the internal surface of the boss 7 on the wheel 1 so that the cover 25 can be mounted on the wheel 1 with the two bosses interengaging, as illustrated in Figure 2. The lip 9, slots 5 and ribs 28 provide a bayonet fitting between the bosses 7 and 27 so that the cover 25 is securely retained on the wheel by interengagement of the bosses 7 and 27. In addition, a spring clip 30 (see Figure 5) is mounted within the boss 27 on the cover 25. Opposite ends of the clip project through slots 31 in the boss 27 to engage beneath the lip 9 on the boss 7. The edges of the lip 9 and the ends of the clip 30 are shaped to form cam surfaces which deflect the spring clip 30 when the cover 25 is moved axially, thereby permitting installation and removal of the cover 25.

An aperture 35 is formed in the edge of the cover 25 for registry with the keyhole 21 in the wheel 1. A cap 36 is threadedly mounted in the keyhole 21. The

cap 36 in the form of a bolt head, and is similar in external configuration to four other formations 38 (Figure 1) on the external surface of the cover 25.

The external appearance of the cover 25 is therefore of a wheel centre through which five bolts pass to secure the wheel to the hub.

A slot 38 is formed in the boss 27 for receiving the end of the locking bolt 17.

In use, the cover 25 is mounted on the wheel 1 by aligning the ribs 28 with the slots 10 with the aperture 35 approximately overlying the keyhole 21, and pressing the cover towards the wheel until the spring clip 20 engages beneath the lip 9. The cover 25 is then rotated to bring the aperture 35 into registry with the keyhole 21 and the ribs 28 out of alignment with the slots 10. Ribs 40 formed on the internal surface of the boss 7 provide stops for the movement of the cover 25. In this position the cover 25 is securely retained, but not locked, on the wheel 1.

To lock the cover, a key is inserted into the cylinder 16 through the aperture 35 and keyhole 21 and the locking cylinder 16 is rotated. This causes the end of the bolt 17 to move out of the recess 18 into the slot 38, thus locking the cover to the wheel. The key is then withdrawn and the cap 36 is threaded into the aperture 35.

The cover 25 thus conceals all the bolts 5 and prevents access thereto. The cover 25 also overlies and conceals the lock 12, thus protecting it from damage.

The external appearance of the cap is symmetrical and does not betray the presence or location of a locking device.

CLAIMS

1. A lockable vehicle wheel assembly comprising a wheel adapted to be mounted on a wheel hub by one or more fasteners, a hub cover removably mounted on the wheel to prevent access to the or each fastener and, a lock for locking the hub cover to the wheel.

2. A wheel assembly according to Claim 1 wherein the lock comprises an actuating mechanism mounted in the wheel and a locking bolt movable by the actuating mechanism into and out of locking enegagement with the hub.

3. A wheel assembly according to Claim 2 wherein the actuating mechanism is accessible through an aperture in the hub which is closed by a removable cap.

3. A wheel assembly according to Claim 2 wherein the actuating mechanism is accessible through an aperture in the hub which is closed by a removable cap.

4. A wheel assembly according to Claim 3 wherein the cap is in the form of a bolt head.

5. A wheel assembly according to any one of Claims 1 to 4 wherein means is provided for retaining the hub cover on the wheel when the lock is unlocked.

6. A wheel assembly according to Claim 5 wherein the hub cover is retained on the wheel by means of interengaging axially-projecting bosses on the wheel and the hub cover.

7. A wheel assembly according to Claim 6 wherein the bosses are connected together by a bayonet fitting.

8. A wheel assembly substantially as hereinbefore described and as illustrated in the drawings.

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