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(56) Documents Cited  
**GB 1316862 A**                      **US 6185791 B**  
**US 4272047 A**                      **US 3855669 A**

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INT CL<sup>7</sup> **B65D 63/08 63/10 63/16, F16L 3/137**  
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(54) Abstract Title  
**Releasable tie with a pivotally mounted locking lever**

(57) A releasable tie comprises a one-piece body portion 10 formed of moulded plastics material and a separate actuator 11 pivotally mounted to the body portion. The body portion 10 comprises an elongate serrated strap 12 having an apertured head 14 at one end of the strap 12, and a pawl 21 disposed in the head aperture 19 for engaging the strap serrations 13 when the free end of the strap 12 is formed into a loop and inserted into the aperture 19.

The actuator 11 comprises a camming surface 25 which can be moved between a locked position in which it constrains the strap 12 against the pawl 21 and an unlocked position in which the strap 12 is free to move away from the pawl 21.

A highly resiliently flexible pawl 21 can be provided to withstand large holding forces, since there is no need to bend back the pawl 21 to release the tie. Furthermore, the pawl 21 will not suffer from any fatigue problems. Also, since the strap 12 freely disengages from the pawl 21, the risk of damage to the pawl 21 or strap serrations 13 is alleviated.



FIG. 4

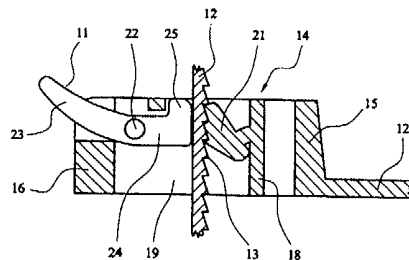


FIG. 5

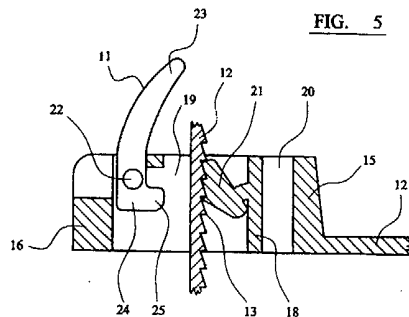


FIG. 6

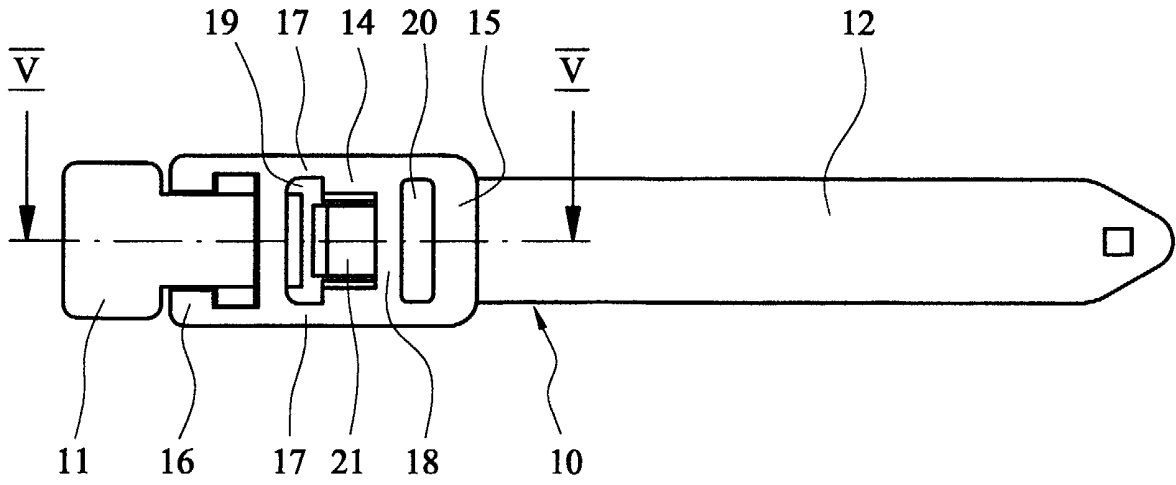


FIG. 1

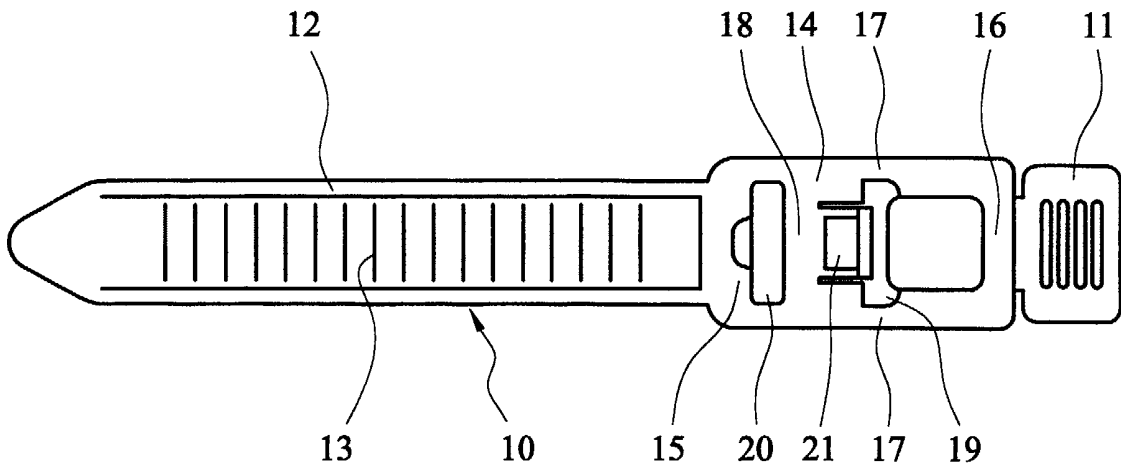


FIG. 2

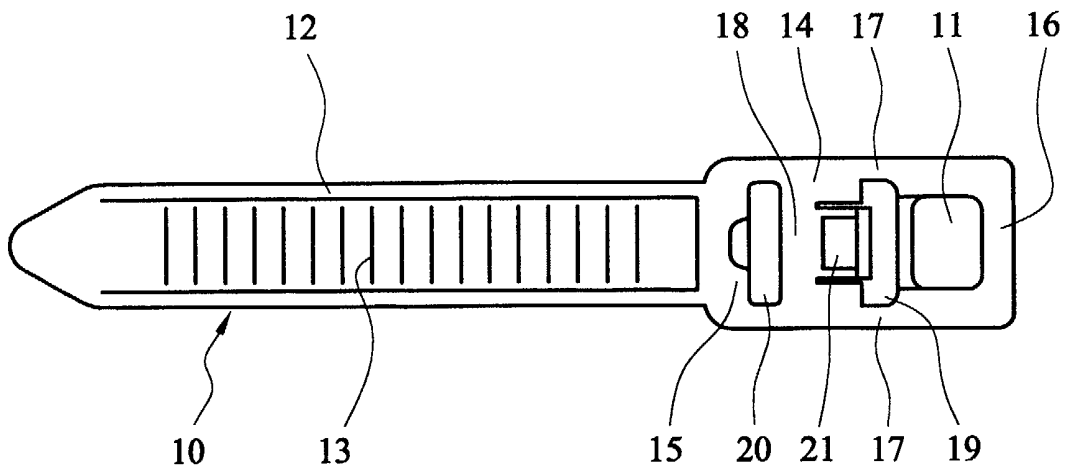


FIG. 3

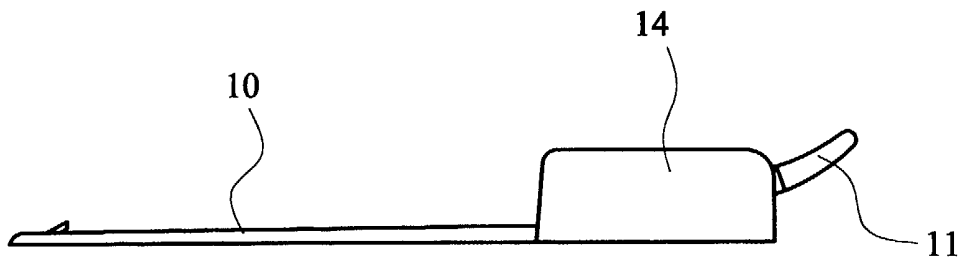


FIG. 4

-3/3-

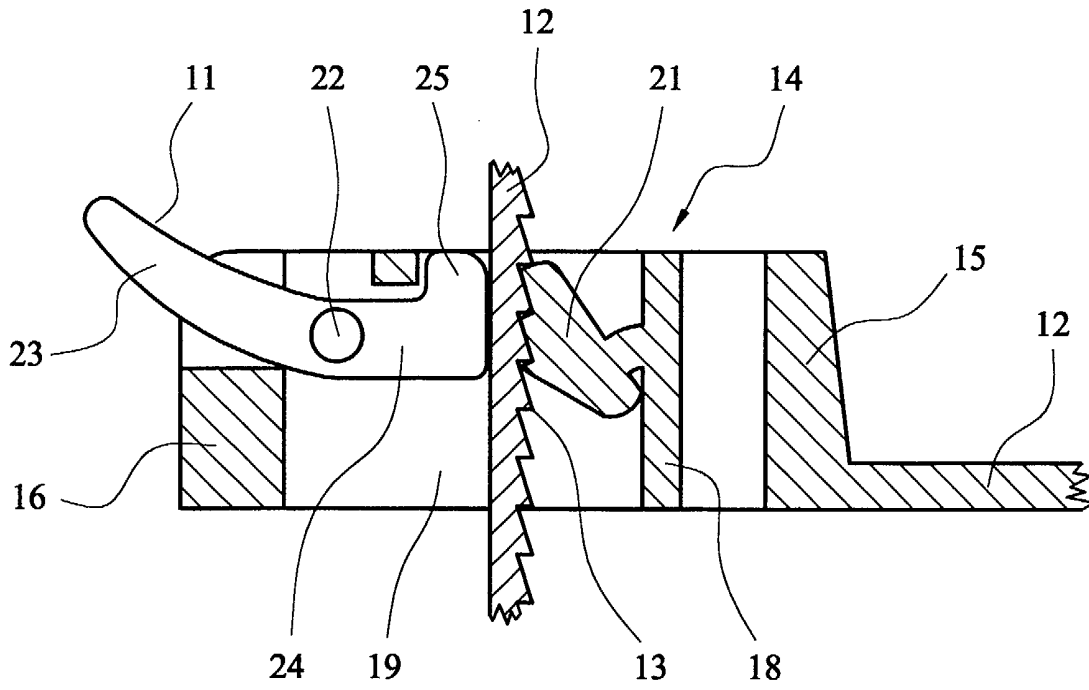


FIG. 5

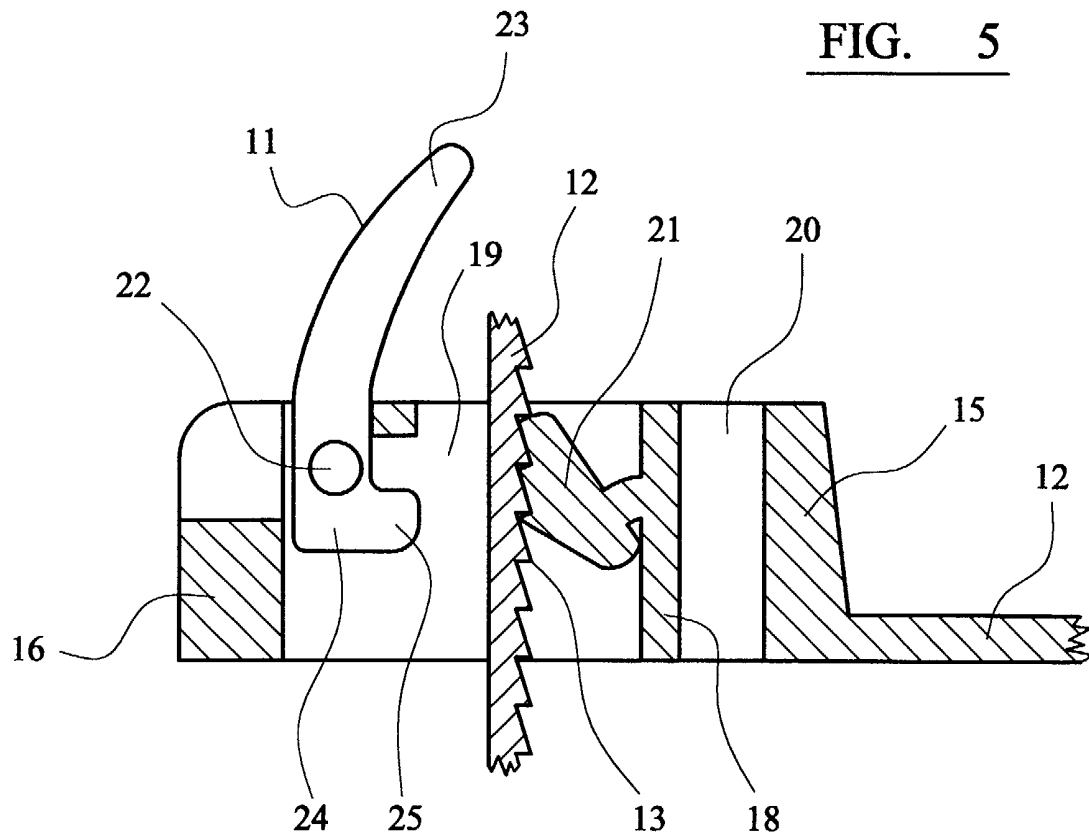


FIG. 6

RELEASABLE TIE

This invention relates to a releasable tie for fastening around one or more objects.

Ties or so-called cable ties are well known which comprise an elongate serrated strap having an apertured head at one end thereof and a pawl disposed inside the head aperture for engaging the strap serrations when the free end of the strap is formed into a loop around the object(s) and inserted into the head aperture, in order to prevent loosening of the tie.

10 It has been proposed to provide a tab on the pawl which enables the pawl to be disengaged from the strap serrations in order to loosen the tie.

A disadvantage of this arrangement is that the engagement surface of the pawl and/or the strap serrations can be damaged as the pawl is pulled out of engagement and the strap loosened. Furthermore, it can be difficult to release the pawl if the strap is under tension.

Another disadvantage is that the projecting tab can be difficult to engage if the user is wearing gloves. Also, ties that are designed to withstand large holding forces generally have a large pawl which is relatively inflexible, so that the pawl does not fail under large holding forces. Pawls of this type are therefore difficult to release from engagement with the strap serrations.

25 Another disadvantage of ties designed to withstand large holding forces is that the strap can be difficult to insert into the head aperture, owing to the inflexibility of the pawl to pivot back as it rides over the strap serrations during tightening.

30 We have now devised a releasable tie which alleviates the above-mentioned problems.

In accordance with this invention there is provided a releasable tie comprising a one-piece body portion formed of moulded plastics material and a separate actuator pivotally

mounted to the body portion, the body portion comprising an elongate serrated strap, a head at one end of the strap, a passageway extending through the head and a pawl on the floor of the passageway for engaging the strap serrations when the  
5 free end of the strap is formed into a loop and inserted into the passageway, the actuator comprising a camming surface and an outwardly projecting lever for rotating the camming surface about a pivotal axis which extends across the head, perpendicular to the through axis of the passage, between a  
10 locked position in which it constrains the strap against the pawl and an unlocked position in which the strap is free to move away from the pawl.

In its locked position, the actuator constrains the serrated strap against the pawl and thus prevents loosening of  
15 the tie. In the unlocked position, the strap is free to move away from the tie, so that the strap can be loosened without any difficulty.

The present invention does not rely on the bending back of the pawl to release the tie and thus a highly resiliently  
20 flexible pawl can be provided to withstand large holding forces. Furthermore, the pawl will not suffer from any fatigue problems.

Another advantage is that the strap freely disengages from the pawl thereby alleviating the risk of damage to the  
25 pawl or strap serrations.

In order to secure the tie, the free end of the strap can be inserted into the passageway when the actuator is in the unlocked position and it will be appreciated that there is no requirement for the pawl to pivot back, since there is  
30 sufficient room between the pawl and the camming surface for the strap to pass freely. This alleviates the requirement to provide a pawl which is sufficiently resiliently flexible to allow the strap to be inserted with a low insertion force and thus a highly resiliently flexible pawl can be provided to  
35 withstand large holding forces.

The projecting portion of the actuator can project a considerable distance from the head and can carry an enlarged end, thereby making it easy for a person wearing gloves to lock or unlock the tie.

5 Preferably, the camming surface is spaced apart from the pawl by a distance which, in said locked position, is less than or equal to the thickness of the strap and which, in said unlocked position, is substantially greater than the thickness of the strap.

10 Preferably the radial diameter of the cam towards the pawl is greater between the locked position and the unlocked position than it is at said locked position, so that an over-centre action is provided to securely hold the actuator in the locked position.

15 Preferably the actuator is pivoted intermediate its opposite ends to the head, with the camming surface being provided at one end and the lever being provided at its opposite end.

Preferably the length of the end forming the lever is  
20 substantially longer than the opposite end of the actuator, in order to provide a mechanical advantage.

Preferably the camming surface comprises a flat portion which abuts the strap in said locked position.

An embodiment of this invention will now be described  
25 by way of an example only and with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a releasable tie in accordance with this invention, when locked;

Figure 2 is a bottom view of the tie of Figure 1, when  
30 locked;

Figure 3 is a bottom view of the tie of Figure 1, when unlocked;

Figure 4 is a side view of the tie of Figure 1, when locked;

35 Figure 5 is a sectional view along the line V - V of

Figure 1, when locked; and

Figure 6 is a sectional view along the line V - V of Figure 1, when unlocked.

Referring to Figures 1 to 4 of the drawings, there is shown a two-piece releasable tie formed of moulded plastics material comprising a body portion 10 and an actuator portion 11.

The body portion 10 comprises an elongate flat strap 12 having a series of transverse ratchet serrations 13 along its underside and an apertured head 14 at one end, which projects from the opposite side of the strap 12.

The head 14 comprises an inner end wall 15, an outer end wall 16 and opposite side walls 17, which are interconnected intermediate their opposite ends by a central wall 18. A first aperture 19 extends through the head 14, perpendicular to the plane of the strap 12, between the central wall 18 and the outer end wall 16. A second aperture 20 also extends through the head 14, parallel to the first aperture 19, between the central wall 18 and the inner end wall 15.

A resiliently flexible pawl extends from the central wall 18 into the first head aperture 19 for engaging the strap serrations 13 when the strap 12 is formed into a loop and inserted into the first aperture 19 from the underside of the head 14.

Referring to Figures 5 and 6 of the drawings, the actuator 11 comprises an elongate plastics member which is pivoted intermediate its opposite ends between the opposite side walls 17 of the head 14 for rotation about an axis 22 which extends parallel to the transverse axis of the flat strap 12, adjacent the outer end wall 16 of the head 14.

A first end of the actuator 11 projects outwardly of the head and is enlarged at its outer end to form a tab 23 which can easily be grasped by a person to pivot the actuator 11 about its rotational axis 22.

The second end 24 of the actuator 11 extends into the



first head aperture 19 and is moveable between a locked position (Figure 5), in which it extends perpendicular to the through axis of the first head aperture 19 towards the pawl 21, and an unlocked position (Figure 6), in which it extends  
5 axially of the first head aperture 19 towards the underside of the tie and along the inner surface of the outer end wall 16 of the tie. The outer end of the second end 24 of the actuator 11 comprises a projection 25 which projects towards the central wall 18 of the tie when the actuator 11 is in its  
10 unlocked position (Figure 6). The outer end surface of the actuator 11 is substantially flat and lies in a plane which extends normal to the axis of the first head aperture 19 when the actuator 11 is in its unlocked position.

In use, the actuator 11 is initially moved to the  
15 locked position (Figure 5) and preferably means (not shown) are provided for biasing the actuator 11 into this position or for retaining the actuator 11 in this position. The strap 12 of the tie is then formed into a loop around the object(s) to be tied and its free end inserted into the first head  
20 aperture 19 from the underside of the tie.

In the locked position, the flat outer end surface of the second end 24 of the actuator 11 extends parallel to the through axis of the first head aperture 19 and is spaced apart from the pawl 21 by a distance which is slightly less than the  
25 thickness of the strap 12 at the troughs of each strap serration 13. Accordingly, as the strap 12 is inserted into the first head aperture 19, the pawl 21 resiliently pivots back to allow the strap 12 to pass between the pawl 21 and the actuator 11.

30 Once the strap 12 has been tightened sufficiently, the pawl 21 seats in the strap serrations 13 and prevents the strap from being loosened.

In order to release the strap 12, the actuator 11 is pivoted upwards through  $90^\circ$  thereby moving its second end 24  
35 away from the strap 12. Accordingly, the strap 12 is no

longer held against the pawl 21 and thus the strap 12 can easily be loosened without causing any damage to the serrations 13 or the pawl 21. The enlarged projecting portion 23 of the actuator 11 is relatively large and thus can  
5 be grasped by a person wearing gloves.

In order to prevent the actuator 11 from inadvertently being unlocked, it preferably has an over-centre action which retains it in the locked position against the strap 12. In order to move from the locked to the unlocked position, the  
10 actuator 11 has to pass a point at which the distance between the point of the actuator abutting the strap 12 and the axis of rotation is greater than it is when the actuator 11 is in its locked position. Accordingly, the actuator 11 has a tendency to remain in the locked position.

15 It will be appreciated that the tie may also be fastened by passing the strap through the first strap aperture 19 when the actuator 11 is in the unlocked position (Figure 6). The strap is then secured by moving the actuator 11 to the locked position (Figure 5).

20 The free projecting end of the strap 12 may then be formed into a second loop and folded back through the second head aperture 20, in order to save having to cut the strap and to alleviate the risk of injury on the projecting portion.

Claims

1. A releasable tie comprising a one-piece body portion formed of moulded plastics material and a separate actuator pivotally mounted to the body portion, the body portion  
5 comprising an elongate serrated strap, a head at one end of the strap, a passageway extending through the head and a pawl on the floor of the passageway for engaging the strap serrations when the free end of the strap is formed into a loop and inserted into the passageway, the actuator comprising  
10 a camming surface and an outwardly projecting lever for rotating the camming surface about a pivotal axis which extends across the head, perpendicular to the through axis of the passage, between a locked position in which it constrains the strap against the pawl and an unlocked position in which  
15 the strap is free to move away from the pawl.

2. A releasable tie as claimed in claim 1, in which the lever comprises an enlarged end.

3. A releasable tie as claimed in claims 1 or 2, in which the camming surface is spaced apart from the pawl by a  
20 distance which, in said locked position, is less than or equal to the thickness of the strap and which, in said unlocked position, is substantially greater than the thickness of the strap.

4. A releasable tie as claimed in any preceding claim, in  
25 which the radial diameter of the cam towards the pawl is greater at a point between the locked position and the unlocked position than it is at said locked position, so that an over-centre action is provided.

5. A releasable tie as claimed in any preceding claim, in  
30 which the actuator is pivoted intermediate its opposite ends to the head, with the camming surface being provided at one end and the lever being provided at its opposite end.

6. A releasable tie as claimed in claim 5, in which the length of the end forming the lever is substantially longer than the opposite end of the actuator, in order to provide a mechanical advantage.
- 5 7. A releasable tie as claimed in any preceding claim, in which the camming surface comprises a flat portion which abuts the strap in said locked position.
8. A releasable tie substantially as herein described with reference to the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 0115419.4  
Claims searched: 1-8

Examiner: Barnaby Wright  
Date of search: 28 May 2002

### Patents Act 1977 Search Report under Section 17

#### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.T): E2A (AGH, AGMA, AGMB)  
Int Cl (Ed.7): B65D (63/08, 63/10, 63/16); F16L (3/137)  
Other: Online: EPODOC, JAPIO, WPI

#### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 1316862 (PANDUIT) See especially figs. 1-13, and page 4, lines 6-59, and page 5, lines30-58.	-
A	US 6185791 B1 (KHOKHAR) See especially figs. 6-8	-
A	US 4272047 (BOTKA) See especially figs. 1-11.	-
A	US 3855669 (MEYER) See especially figs. 1-4.	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.