

(12) UK Patent Application (19) GB (11) 2476672 (13) A

(43) Date of A Publication

06.07.2011

(21) Application No: 1000026.3

(22) Date of Filing: 04.01.2010

(71) Applicant(s):
Hellermannntyton Limited
(Incorporated in the United Kingdom)
Stoner House, London Road, Crawley,
West Sussex, RH10 8LJ, United Kingdom

(72) Inventor(s):
Paul Andrew Gingell

(74) Agent and/or Address for Service:
Urquhart-Dykes & Lord LLP
UDL Intellectual Property, 7th Floor,
Churchill House, 17 Churchill Way, Cardiff,
CF10 2HH, United Kingdom

(51) INT CL:
B65D 63/02 (2006.01) F16L 3/137 (2006.01)
F16L 3/233 (2006.01)

(56) Documents Cited:
GB 2304367 A EP 1283176 A2
EP 0065543 A1 US 4366602 A

(58) Field of Search:
INT CL B65D, F16L
Other: online: WPI, EPODOC, TXTE, TXTT

(54) Title of the Invention: Tie
Abstract Title: Tie with Approachment Formation

(57) A tie comprising a head 10, a locking member 12 captively mounted in the head, an elongate flexible strap 11 attached to the head and having a free end arranged to be secured by the locking member and having an approachment formation to guide the free end to pass the locking member in a predetermined manner. The tie forms a loop for holding cables etc. The approachment formation may be a tapering guide channel or slot in the longitudinal direction of the strap to form two tongues (figure 5) and may cooperate with the locking member at various engagement heights and depths to deflect the strap past the bottom of the locking member if misaligned to provide smooth and easy tightening of the tie. The locking member may be a ball or roller. The tie may be metal e.g. stainless steel. The head may be formed with an opening 19, through which the ball is inserted. The tie may be attached to the head by a loop section 24 having two engaging barbs 22, 23, and this may close the opening 19.

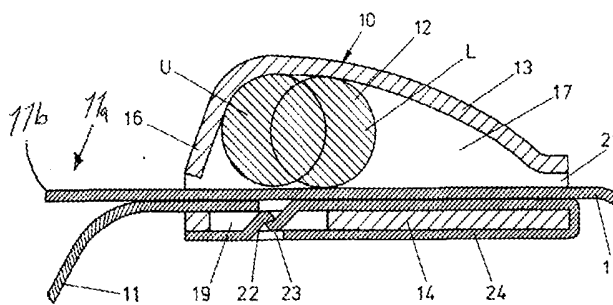
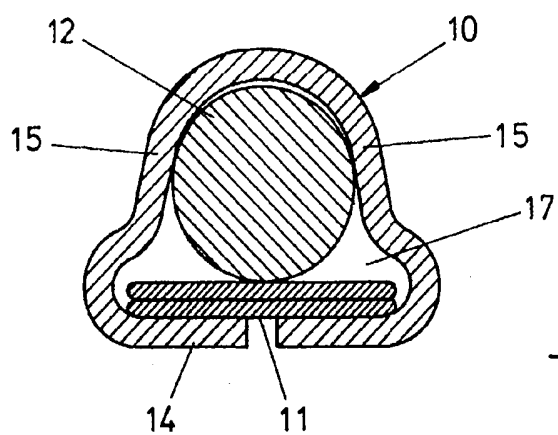
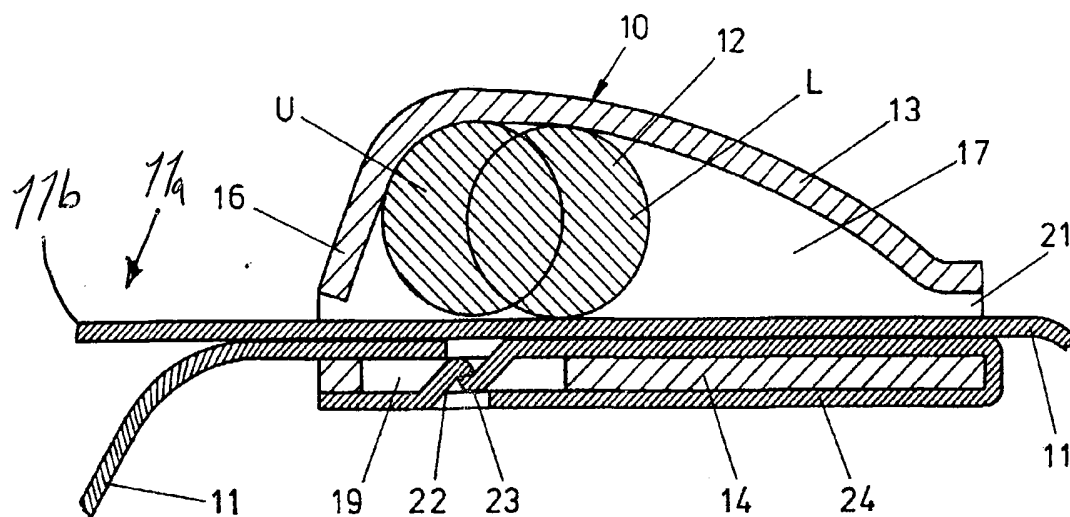
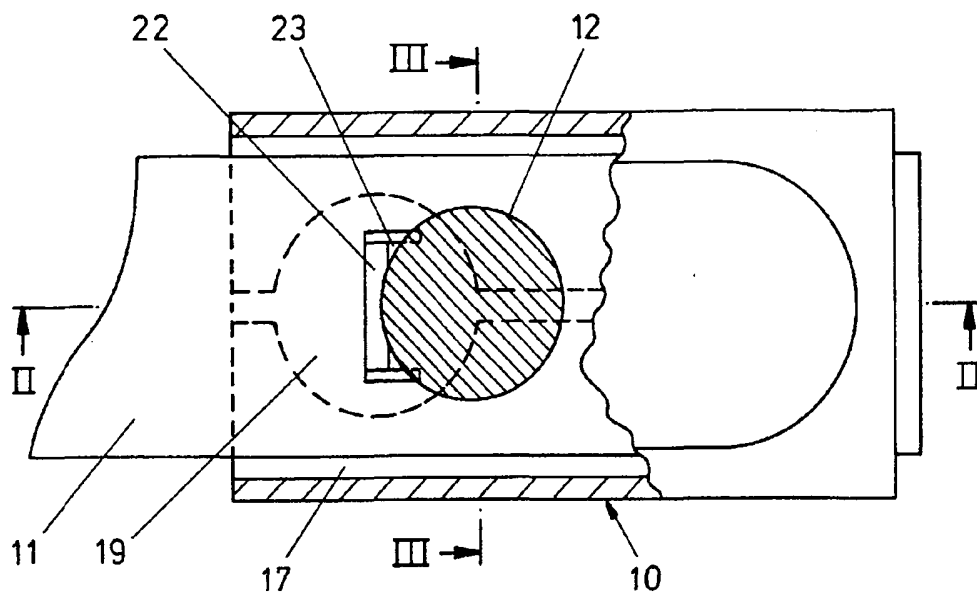


FIG. 2

GB 2476672 A



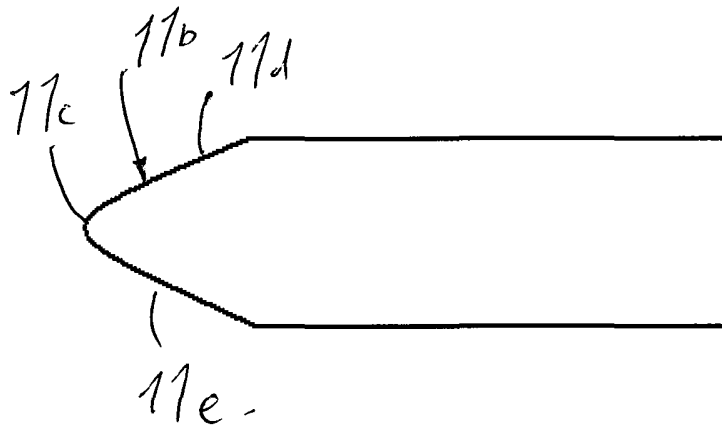


Fig. 4

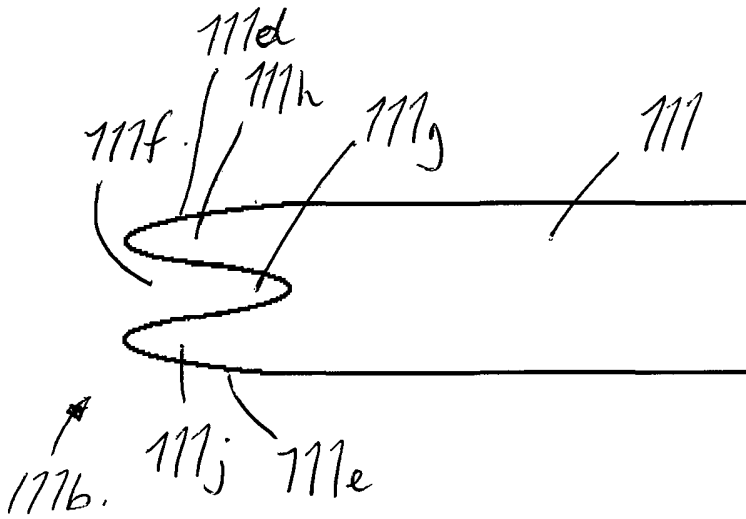


Fig. 5

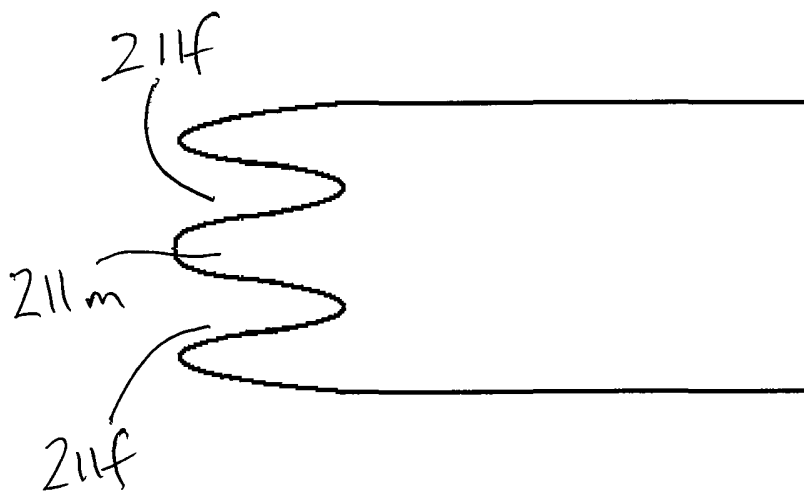


Fig. 6

Tie

This invention relates to a tie for forming into a loop around cables and other objects.

5

Ties for forming into loops around cables etc. are well known. One such tie comprises an elongate strap extending from an apertured head. In use, the tie can be formed into a loop by passing the free end of the strap through the apertured head. A flexible pawl inside the head engages serrations on the strap and prevents the strap from loosening.

10

An advantage of such ties is that they can conveniently be formed as a one piece plastics moulding. However, a disadvantage of plastics ties is that they break relatively easily under load, particularly once the plastic has become brittle. Another disadvantage of plastics ties is that they are unsuitable for use in some environments, say where extremes
15 of temperature exist.

Ties formed from metal are also well-known. Such ties are generally stronger and are more suitable for use in some environments. A disadvantage of metal ties is that they cannot be formed as a one-piece moulding.

20

WO82/02035 and US 5 291 637 each disclose a tie comprising an apertured head and an elongate flexible strap attached at a first end thereof to the head, and a locking member in the form of a ball mounted in a cavity inside the head and arranged to engage the strap, when the second end of the strap is passed through the head aperture. The elongate flexible
25 strap is attached to the head by folding the first end thereof through substantially 180° to form a U-shaped portion, which engages over a bottom wall of the head. A barb on the distal end of the U-shaped portion of the strap engages a location in the bottom wall of the head.

30

The ball is inserted into the head cavity through an open end wall of the head during assembly of the tie. A tab on the head is then folded over to close the open end wall and captively retain the ball inside the head cavity: This assembly operation is difficult and time consuming.

An alternative version of a tie using a locking member in the form of a ball is disclosed in EP0758616 which is less difficult and time consuming to assemble than the type disclosed in WO82/02035 and which is characterised in that an opening is formed in the head,

5 through which the locking member ball is inserted during assembly of the tie, the first end of the strap extending over the opening in the head and captively mounting the locking member in the head cavity. The tie is assembled by inserting the locking member through the opening in the head prior to attaching the strap to the head.

10 In use ties of this type operate by means of the tie being formed into a loop around the cables or other objects to be tied and the free end of the strap inserted through the head aperture. The locking member (typically a ball, as described) engages the strap as it is pulled through the head aperture in the tightening direction. The strap is released, once it has been sufficiently tightened, thereby causing it to withdraw slightly from the head. This
15 withdrawal movement causes the locking member ball to move to a locking position in which it becomes wedged between a wall of the head and the strap, so as to securely lock the latter to the head.

Occasionally, when inserting the free end of the strap into the aperture in the head, the
20 leading edge can impinge against the ball at a level too high towards the equator of the ball causing the strap to buckle at its free end and snag on feeding into the head. This can prevent the tie from being used adequately. This problem can occur particularly where the free end of the strap has been damaged (kinked or buckled) prior to use.

25 An improved arrangement has now been devised.

According to a first aspect, the present invention provides a tie comprising:

a head;

30

a locking member captively mounted inside the head;

and an elongate flexible strap attached to the head and having a free end arranged to be inserted into the housing and secured, such that retraction from the housing is inhibited by the locking member;

5 wherein the free end of the strap is provided with an approachment formation arranged to guide the free end of the strap to pass the locking member in a predetermined manner.

It is preferred that the approachment formation is arranged to engage with the locking
10 member at a variety of engagement orientations, and cooperate with the locking member upon further insertion into the head to deflect the strap past the locking member.

Beneficially, the approachment formation is arranged to engage with the locking member at a variety of engagement positions across the height or depth of the locking member, and
15 cooperate with the locking member upon further insertion into the head to deflect the strap past the bottom of the locking member.

The approachment formation may beneficially be arranged such that, if the free end of the strap is misaligned with respect to the locking member, the strap may be deflected, side to
20 side and/or downwardly to pass smoothly past the underside of the locking member.

In a preferred embodiment the approachment formation comprises a guide channel or slot extending in the longitudinal direction of the strap.

25 In one embodiment a pair of tongues may be provided one at either side of the guide channel or slot.

It is preferred that the approachment formation tapers to narrow from a wide mouth at the free end of the strap to an apex.

30

Preferably the locking member comprises a rotatable ball or roller.

Preferably the locking member is movable between an unlocked position and a locked position inside the head, the opening being disposed adjacent the locked position.

5 It is preferred that the strap is attached at one end (the end remote from the free end) to the head.

It is preferred that the locking member acts against the head and the strap so as to wedge the strap against retraction from the head.

10 Preferably the tie is formed from metal.

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

15 Figure 1 is a fragmentary plan view of a metal tie in accordance with this invention, with some parts being shown in section;

Figure 2 is a sectional view along the line II-II of Figure 1, when the tie is secured;

20 Figure 3 is a sectional view along the line III-III of Figure 1, when the tie is secured.

Figure 4 is a plan view of the free end of a prior art strap comprising a tie;

25 Figure 5 is a plan view of the free end of a strap comprising a tie in accordance with the invention;

Figure 6 is a plan view of the free end of a strap comprising an alternative embodiment of tie in accordance with the invention;

30 Referring to the drawings, there is shown a three-piece tie formed from stainless steel and comprising a head 10, an elongate flexible strap 11 attached to the head, and a locking ball 12 captively mounted within the head.

The head 10 comprises an inclined top wall 13, a flat bottom wall 14, opposite side walls 15,15 and a rear end wall 16, these walls defining an elongate internal cavity 17 inside the head. The top and bottom walls 13,14 converge towards a front end of the head 10. The head is preferably formed by stamping a pre-shaped sheet of metal to form a hollow which
5 defines the top, side and end walls 13,15,16 of the head. The bottom wall 14 of the head is subsequently formed by folding inwardly two tabs which extend from respective longitudinal lower edges of the opposite side walls 15,15.

Two semi-circular portions are cut out from the opposed side edges of the tabs so as to
10 form an opening in the bottom wall 14, which communicates with the cavity 17 adjacent the rear of the tie.

An elongate strap-receiving passage 21 extends from front to rear through the head 10 and passes through the cavity 17.

15

The strap 11 comprises an elongate flat metal strip which is stamped to form two barbs 22,23 which project outwardly from one side of the strap adjacent an end thereof. The barbs 22,23 are disposed on a longitudinal line which extends along the centre of the strap 11. The barbs 22,23 are each directed towards the opposite end of the strap 11. The strap
20 comprises a U-shaped head-engaging portion 24 which is formed by folding the strap transverse to its axis at a point intermediate the two barbs 22,23. The strap is folded through approximately 120° such that the barbs 22,23 project towards each other, but do not engage.

25 In order to assemble the tie, the locking ball 12 is inserted into the cavity 17 through the opening in the bottom wall 14. Next, the strap 11 is fed through the passage 21, from front to rear, until the U-shaped head-engaging portion 24 of the strap engages over the bottom wall 14 of the tie. The projecting arm of the head-engaging portion 24 of the strap is then folded a further 60° or so, so that it lies against the bottom wall 14 of the head: thus causes
30 the two barbs 22,23 to inter-engage through the opening 19. It will be appreciated that the strap 11 is positively locked in a loop around a portion of the bottom wall of the head, so that the head cannot easily become detached from the strap.

The strap 11 also closes the opening 19 in the head, so that the ball 12 is captively retained in the cavity 17.

In use, the leading edge 11b of the free end 11a of the strap is passed around a bundle of
5 cables and other objects to be secured, before being inserted into the strap-receiving
passage 21 from the front end 25 of the head. The strap 11 passes between the ball 12 and
the floor of the cavity 17. During insertion of the strap, the ball is pushed towards the rear
of the cavity 17(position U in figure 2), and thus the strap can be freely pulled through the
head.

10

The strap 11 is released once it has been fully tightened, so as to allow the strap to
withdraw slightly from the head 10. This causes the locking ball 12 to move from its un-
locked position U at the rear of the cavity 17 to a locked position L towards the front of the
cavity. In its locked position L the ball 12 wedges between the strap 11 and the top wall 13
15 of the head. The ball 12 thus engages the strap and prevents it from disengaging from the
head by being withdrawn back out of the passage 21. Continued tension to withdraw the
strap back out of the passage 21 causes the locking ball 12 to more firmly wedge into
engagement with the converging top and bottom walls 13,14 of the head. Figure 4 is a
plan view of a free end leading edge 11b of a prior art tie. The leading edge is shaped to
20 have a forward nose portion 11c and tapered edges 11d 11e sloping away from the
forward nose portion 11c this configuration is employed to aid ease of initial insertion into
the slot 21 at the forward end 25 of the head 10.

Occasionally, during insertion of the free end 11a of the strap, the leading edge 11b can
25 impinge upon the surface of the locking ball 12, at a level higher up the ball toward the
equator, rather than smoothly passing the underside of the ball 12. This can have the
undesirable consequence that the strap is caused to kink or buckle and thus preventing
complete or adequate insertion. This can occur as a result of careless insertion into the slot
21, such that the strap is inclined upwardly with respect to the slot, or in circumstances
30 where the leading edge 11b has been damaged, for example deformed, kinked or buckled,
prior to insertion in the slot 21.

The present invention seeks to at least ameliorate this problem by ensuring that the free end of the strap approaches the ball in a predetermined fashion, ensuring that the free end of the strap 111 is guided to pass smoothly past the underside of the ball, such that the ball rests on the upper surface of the strap. Conveniently this is achieved by the provision of an approachment guide formation in the form, in the embodiment shown in figure 5, of a guide channel or slot 111f. The guide channel or slot 111f as shown, tapers from a relatively wide mouth portion at the leading edge 111b of the free end 111a of the strap 111, to a closed apex 111g. This results in a pair of tongues 111h, 111j being provided, one at either side of the guide channel 111f. The tongues 111h, 111j act to locate on either side of the ball 12 and will ensure that the strap 111 is guided to pass smoothly below the ball, even in circumstances where the leading edge approaches the locking ball 12 at a level more toward the equator of the ball. The channel or slot 111f ensures that, if misaligned with respect to the locking ball 12, the free end 111b of strap 111 is deflected, both side to side and/or downwardly to pass smoothly past the underside of the locking ball 12. The channel or slot 111f is arranged to engage with the locking ball at a variety of engagement orientations (different heights below the equator of the ball 12), and cooperate with the locking ball 12 upon further insertion into the head 10 to deflect the strap past the locking member.

It has been found that even with undamaged strap free ends, and with carefully inserted free ends, the provision of the shaped approachment formation in the form of the channel or slot 111f provides a reassuringly positive contact tactile effect.

Tapered edges 111d, 111e aid ease of initial insertion into the slot 21 at the forward end of the head.

The embodiment shown in figure 6 is for use with a more heavy duty tie in which a tie head (not shown) is provided with a pair of locking balls in side by side relationship. In this case the free end 211a of the tie is provided with a pair of approachment guide formations in the form of the channels or slots 211f spaced either side of a central nose promontary 211m.

In the embodiments described, the locking member is in the form of a locking ball 12. It should be understood that the provision of locking members rather than in ball form are encompassed by the scope of the present invention. Hemispherical, oval, cam-form, or other geometrical shaped locking members may be employed to similar effect.

- 5 Furthermore whilst a specific means of securing the locking member with respect to the tie had has been described it will be appreciated that other embodiments employing alternative means of securing the locking member with respect to the head, will also fall within the compass of the invention. Additionally, whilst the invention has been described with respect to a metal tie, certain advantages of the invention will also be realised for ties of
- 10 other materials, for example plastics.

Claims:

1. A tie comprising:

5 a head;

a locking member captively mounted inside the head;

10 and an elongate flexible strap attached to the head and having a free end arranged to be inserted into the housing and secured, such that retraction from the housing is inhibited by the locking member;

15 wherein the free end of the strap is provided with an approachment formation arranged to guide the free end of the strap to pass the locking member in a predetermined manner.

20 2. A tie according to claim 1, wherein the approachment formation is arranged to engage with the locking member at a variety of engagement orientations, and cooperate with the locking member upon further insertion into the head to deflect the strap past the locking member.

25 3. A tie according to claim 2, wherein the approachment formation is arranged to engage with the locking member at a variety of engagement positions across the height or depth of the locking member, and cooperate with the locking member upon further insertion into the head to deflect the strap past the bottom of the locking member.

30 4. A tie according to claim 2 or claim 3, wherein approachment formation is arranged such that if the free end of the strap is misaligned with respect to the locking member, the strap may be deflected, side to side and/or downwardly to pass smoothly past the underside of the locking member.

5. A tie according to any preceding claim, wherein the approachment formation comprises a guide channel or slot extending in the longitudinal direction of the strap.
- 5 6. A tie according to claim 5, wherein a pair of tongues are provided one at either side of the guide channel or slot.
7. A tie according to any preceding claim, wherein the approachment formation tapers to narrow from a wide mouth at the free end of the strap to an apex.
- 10 7. A tie according to any preceding claim, wherein the locking member comprises a rotatable ball or roller.
8. A tie according to any preceding claim, wherein the locking member is movable
15 between an unlocked position and a locked position inside the head.
9. A tie according to any preceding claim wherein the strap is attached at one end to the head.
- 20 10. A tie according to any preceding claim wherein the locking member acts against the head and the strap so as to wedge the strap against retraction from the head.
11. A tie according to any preceding claim formed from metal.



Application No: GB1000026.3

Examiner: Sally Vinall

Claims searched: 1-11

Date of search: 14 April 2010

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-4, 7-11	US4366602 A PANDUIT CORP, See whole document, for example column 3 lines 37-40.
X	1-4, 7-11	GB2304367 A BOWTHORPE PLC, See especially figure 1.
X	1-4, 7-11	EP0065543 A1 PANDUIT CORP, See whole document, for example figure 5.
X	1-4, 7-11	EP1283176 A2 FOR M A S R L, See whole document, noting shaped tip 4.

Categories:

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.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X:

Worldwide search of patent documents classified in the following areas of the IPC

B65D; F16L

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, TXTE, TXTT

International Classification:

Subclass	Subgroup	Valid From
B65D	0063/02	01/01/2006
F16L	0003/137	01/01/2006
F16L	0003/233	01/01/2006