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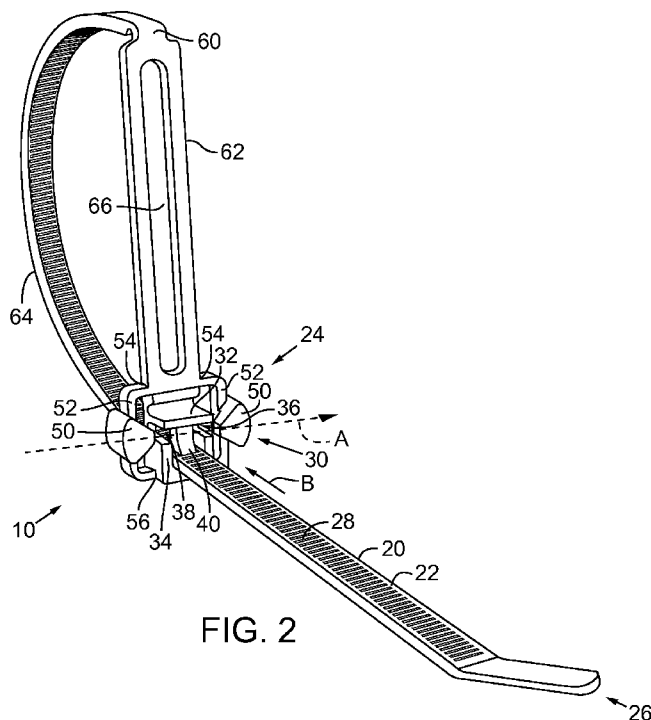
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(54) Title: FASTENER



(57) Abstract: A fastener (10) is provided for securing two or more objects together. The fastener (10) includes a strap (20), a plurality (28) of teeth, a buckle (30), an aperture (38) within the buckle (30) to receive the strap (20), and a pawl (40) mounted on the buckle (30) for selective engagement with the plurality (28) of spaced-apart teeth in order to prevent movement of the strap (20) through the aperture (38) in a release direction. In one aspect, the fastener (10) includes a first portion (32) and a second portion (34) separated by a channel (36), and a separating member (50) that may be engaged with the channel (36) to separate the first and second portions, disengaging the pawl (40) from the plurality (28) of spaced-apart teeth. In another aspect, the strap (20) may include multiple sections (62, 64) of variable rigidity.

FASTENER

BACKGROUND

- 5 The present disclosure relates generally to fasteners for securing two or more objects together. More specifically, the present disclosure relates to releasable tie fasteners, sometimes referred to as “cable ties.” The present disclosure also relates to methods of using releasable fasteners.
- 10 Examples of fasteners and/or cable ties are disclosed in the following patents and patent applications: US3098271; US3537146; US3860997; US390092; US3991444; US4236280; US4272047; US4557455; US4711002; US4727630; US4728064; US4958414; US5687455; US5901416; US6185791; US6332227; US6457210; US7100248; US7124975; US7246383; US20030070263; US20070151081; US20080060166; and US20080066265. The disclosures
- 15 of all the above-referenced patents and publications are incorporated herein by reference.

SUMMARY

- A fastener is provided for securing two or more objects together, the fastener comprising: a
- 20 strap having a first end and a second end; a plurality of spaced-apart teeth on a surface of the strap between the first and second ends; a buckle adjacent the first end, the buckle comprising: first and second portions at least partially separated by a channel; an aperture between the first and second portions for receiving the strap; a pawl mounted on one of the first and second portions within the aperture; wherein the first and second portions are movable relative to one
- 25 another for selective engagement of the pawl and the spaced-apart teeth to prevent movement of the strap through the aperture in a release direction; and a separating member adjacent the buckle and movable to engage the channel to cause the first and second portions to separate from one another, disengaging the pawl from the spaced-apart teeth and permitting movement of the strap through the aperture in the release direction. A fastener may also include a pivot
- 30 point between the first and second ends, the pivot point providing for pivotal movement of a first section of the strap in between the pivot point and the first end of the strap relative to a second section of the strap in between the pivot point and the second end of the strap.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a view of an exemplary embodiment of a fastener where the strap is not inserted through the aperture of the buckle and the plurality of teeth are visible.

- 5 Fig. 2 is a view of the fastener of Fig. 1 where the strap is inserted through the aperture of the buckle and is prevented from movement in a release direction by virtue of the pawl being engaged with the plurality of teeth.

Figs. 3A and B are close-up views of the front and rear, respectively, of the buckle of the fastener of Fig. 1.

- 10 Figs. 3C-F are cross sectional views of the buckle of in Fig. 1 in various stages of operation.

Fig. 4 depicts an alternative exemplary embodiment of a fastener with the strap is not inserted through the aperture of the buckle and the plurality of spaced-apart teeth are visible.

- Fig. 5 depicts an additional embodiment of a fastener with the strap inserted through the aperture of the buckle so that the strap is prevented from movement in a release direction by
15 virtue of the pawl being engaged with the plurality of teeth.

Figs. 6A-C are close-up front and back views of the buckle of the fastener of Fig. 4.

Figs. 7A and B are close-up front and back views of the buckle of the fastener of Fig. 5.

Figs. 8A and B depict the fastener of Fig. 1 being used to secure an object to a package.

20 DETAILED DESCRIPTION

Referring first to Figs. 1 and 2, a fastener 10 is provided for securing two or more objects together. Fastener 10 includes a strap 20 having a first surface 22, a first end 24 and a second, opposite end 26. A plurality 28 of spaced-apart teeth is disposed on first surface 22 of strap 20.

- 25 Adjacent first end 24 is a buckle 30. For clarity, similar numbering is used in later figures for parts of different embodiments that are similar to the corresponding parts of the fastener shown in Fig. 1.

- Referring to Figs. 2, 3A and 3B, buckle 30 comprises a first portion 32 and a second portion 34 separated by a channel 36. First portion 32 and second portion 34 collectively define an
30 aperture 38 configured to receive strap 20. A pawl 40 is disposed on first portion 32, and one or both of the first portion 32 and second portion 34 is movable relative to the other to selectively engage and disengage pawl 40 from plurality 28 of spaced-apart teeth. While pawl 40 is on first portion 32 in this example, in other embodiments, pawl may be on second

portion 34.

A separating member 50 may be provided adjacent buckle 30 and is movable to engage channel 36 in order to separate first portion 32 from second portion 34, thus disengaging pawl 40 from plurality 28 of spaced-apart teeth. Separating member 50 may be tapered in a direction parallel to an axis (labeled A in Fig. 2) along which channel 36 extends, in order to selectively engage channel 36.

In this particular embodiment, channel 36 has a width (labeled W in Fig. 3A) that is as wide as or wider than a depth (labeled D in Fig. 3A) of channel 36. Thus, separating member 50 may be tapered up to an abrupt edge, or cutoff (thus saving material cost), and still engage channel 36. However, this is not required, and other embodiments, such as those shown in Figs. 4-7, have channels of different sizes, such as channels that are less than 1 mm wide. Furthermore, while two separating members 50 are included in this embodiment and other embodiments disclosed herein, this is not meant to be limiting. One, two, or even more separating members 50 may be included.

A flexible member 52 may be provided to mount separating member 50 to fastener 10 and provide for movement of separating member 50 to selectively engage channel 36. In the embodiment shown in Figs. 4 and 6A-C, flexible member 52 is only attached to fastener 10 at a first end 54 of flexible member 52. In other embodiments, such as those shown in Figs. 1-3, 5 and 7A-B, flexible member 52 extends beyond separating member 50 and is further attached to fastener 10 at a second end 56 which is opposite first end 54 of flexible member 52.

Figs. 3C through F depict cross-sectional views of buckle 30 as it controls the movement of strap 20 through aperture 38. In Fig. 3C, flexible member 52 is in a first (or nominal) position where it does not cause separating member 50 to engage channel 36. Fig. 3D is a cross-sectional view of the embodiment of Fig. 3C shown from the plane labeled C in Fig. 3C.

It can be seen in Figs. 3C and D that strap 20 is fed through aperture 38 and pawl 40 engages plurality 28 of spaced-apart teeth. When fastener 10 is arranged in such a way, movement of strap 20 in a release direction (indicated by arrow B in Fig. 3D) through aperture 38 is prevented. However, in some embodiments, when pawl is engaged with plurality 28 of spaced-out teeth, movement of strap 20 in a direction opposite to the release direction B is possible, similar to the one-way movement permitted by a ratchet.

Figs. 3E and F are views from the same perspectives as 3C and D, respectively. They illustrate fastener 10, and in particular, buckle 30, being operated to disengage pawl 40 from plurality 28 of spaced-apart teeth to allow movement of strap 20 in the release direction

labeled B. In particular, two flexible members 52 are manipulated simultaneously towards buckle 30 along the axis labeled A to a second position, causing separating members 50 to engage channel 36 and separate first portion 32 from second portion 34. As best seen in Fig. 3F, as first portion 32 and second portion 34 separate, pawl 40 is disengaged from plurality 28 of spaced-apart teeth, permitting movement of strap 20 in the release direction labeled B.

Additional embodiments of fastener 10 are shown in Figs. 4-7. Each of the embodiments shown in Figs. 4-7 differs from that shown in Figs. 1-3 in that separating member 50 is tapered entirely to a point (i.e., is wedge-shaped), rather than ending at an abrupt edge. This is because channel 36 in these embodiments is narrower than channel 36 of the embodiments shown in Figs. 1-3. For example, in some embodiments, channel 36 is less than 1 mm wide, which is too narrow to receive the abrupt-edged separating member 50 of Figs. 1-3.

The embodiments of Figs. 4 and 6A-C are different in one additional aspect. In particular, flexible member 52 is only connected to fastener 10 at a first end 54 of flexible member 52. In the embodiments shown in Figs. 1-3, 5 and 7A-B, flexible member 52 further is connected to fastener 10 at its second end 56. The latter configuration may provide more support for separating member 50 than the former configuration, but may require more materials during manufacture.

In another aspect, strap 20 may be divided into multiple sections of variable rigidity. Referring once again to Figs. 1 and 2, strap 20 includes a pivot point 60 spaced from buckle 30. Pivot point 60 provides for pivotal movement between a first section 62 of strap 20 in between buckle 30 and pivot point 60, and a second section 64 of strap 20 in between pivot point 60 and second end 26. Pivot point 60 may be a portion of strap 20 that is more flexible (e.g., by virtue of being thinner) than the first section 62 or the second section 64, as is seen, for example, in Figs. 1 and 2.

One of the first or second sections of strap 20 may be more or less rigid than the other in order to provide for customizable fastening. For example, first section 62 of fastener 10 shown in Fig. 2 has a thickness which is greater than a thickness of second section 64 of strap 20. Thus, as can be seen in Fig. 2, first section 62 tends to remain straight, while second section 64 tends to flex or bend.

In Figs. 8A and B, fastener 10 is depicted being used to secure an object 70 to a flat surface of packaging 72 to form a product 74 to be sold or distributed. In Fig. 8A, first section 62, which is more rigid than second section 64, is flush against a back surface of a package 72. Such a configuration gives product 74 a smaller profile than would be the case if first section 62 were

more flexible and thus, more curved. This provides for more efficient storage and distribution than was possible using prior art.

In contrast, second section 64 is more flexible than first section 62. Thus, as seen in Fig. 8B, second section 64 may threaded through a first aperture in package 72 so that pivot point 60 is adjacent the first aperture in package 72, curled around object 70, threaded through a second aperture in package 72, and fed into aperture 38 of buckle 30. Being flexible allows for second section 64 to be curled around objects of various shapes, including shapes other than the shape of object 70 in Figs. 8A and B.

In some embodiments, such as the embodiments in Figs. 1-8, first section 62 further includes a portion defining an elongate aperture 66 extending along its axis. Defining such an aperture 66 reduces the amount of materials required to produce fastener 10 without significantly decreasing its effectiveness. Although aperture 66 is shown in first section 62 of strap 20, second section 64 of strap 20 may additionally or alternatively include an aperture. In some embodiments, more than one aperture 66 may be provided, and aperture 66 may be of shapes and sizes that differ from those shown in the drawings.

Fastener 10 may be manufactured using any suitable materials. For instance, many embodiments may be constructed out of synthetic materials, such as plastic, nylon and the like. Some fasteners may be manufactured using injection molding or other similar techniques. Other materials or methods of manufacturing are contemplated herein.

Accordingly, while embodiments have been particularly shown and described with reference to the foregoing disclosure, many variations may be made therein. The foregoing embodiments are illustrative, and no single feature or element is essential to all possible combinations that may be used in a particular application. Where the claims recite “a” or “a first” element or the equivalent thereof, such claims include one or more such elements, neither requiring nor excluding two or more such elements. Further, ordinal indicators, such as first, second or third, for identified elements are used to distinguish between the elements, and do not indicate or imply a required or limited number of such elements, and do not indicate a particular position or order of such elements unless otherwise specifically stated.

CLAIMS

1. A fastener comprising:
a strap having a first end and a second end;
5 a plurality of spaced-apart teeth on a surface of the strap between the first and second ends;
a buckle adjacent the first end, the buckle comprising:
first and second portions at least partially separated by a channel;
an aperture between the first and second portions for receiving the strap;
10 a pawl mounted on one of the first and second portions within the aperture;
wherein the first and second portions are movable relative to one another for selective engagement of the pawl and the spaced-apart teeth to prevent movement of the strap through the aperture in a release direction; and
a separating member adjacent the buckle and movable to engage the channel to cause
15 the first and second portions to separate from one another, disengaging the pawl from the spaced-apart teeth and permitting movement of the strap through the aperture in the release direction.
2. The fastener of claim 1, wherein the separating member is at least partially
20 tapered in a direction parallel to an axis along which the channel extends.
3. The fastener of claim 2, wherein the separating member is generally wedge-shaped.
- 25 4. The fastener of claim 1 further comprising a flexible member attached to the fastener at a first end of the flexible member, wherein the separating member is mounted on the flexible member and the flexible member is manipulable between a first position where the separating member is disengaged from the channel, and a second position where the separating member is engaged with the channel.
- 30 5. The fastener of claim 4, wherein the flexible member is attached to the fastener at a second end of the flexible member opposite the first end of the flexible member.

6. The fastener of claim 1, wherein the channel separating the first and second portions has a width that is less than 1 mm.

5 7. The fastener of claim 1, wherein a width of the channel is greater than a depth of the channel.

8. The fastener of claim 1, wherein the pawl is on the first portion and engagement of the separating member with the channel causes the first portion to move away
10 from the second portion.

9. The fastener of claim 1 further comprising a pivot point spaced from the buckle on the strap, the pivot point providing for pivotal movement of a first section of the strap in between the pivot point and the buckle relative to a second section of the strap in
15 between the pivot point and the second end of the strap.

10. The fastener of claim 9, wherein the first section of the strap is more rigid than the second section of the strap.

20 11. The fastener of claim 10, wherein the first section of the strap has a thickness that is greater than a thickness of the second section of the strap.

12. The fastener of claim 9 wherein a portion of the first section defines an elongate aperture and the plurality of spaced-apart teeth is on the second section of the strap.

25

13. A fastener comprising:
a strap having a first end, a second end and a pivot point therebetween, the pivot point providing for pivotal movement of a first section of the strap in between the pivot point and the first end of the strap relative to a second section of the strap
30 in between the pivot point and the second end of the strap;
a plurality of spaced-apart teeth on a surface of the second section of the strap; and
a buckle adjacent the first end of the strap, the buckle comprising an aperture for receiving the strap and a pawl mounted within the aperture, the pawl being

selectively engagable with the plurality of spaced-apart teeth to prevent movement of the strap through the aperture in a release direction.

14. The fastener of claim 13, wherein the first section of the strap is more rigid
5 than the second section of the strap.

15. The fastener of claim 14, wherein the first section of the strap has a thickness that is greater than a thickness of the second section of the strap.

10 16. The fastener of claim 13 wherein a portion of the first section of the strap defines an elongate aperture.

17. The fastener of claim 13 further comprising:
first and second portions integrally formed in the buckle to be at least partially
15 separated by a channel and movable relative to one another for selective engagement of the pawl and the spaced-apart teeth, the pawl being mounted within the aperture on one of the first and second portions; and
a separating member adjacent the buckle and movable to engage the channel to cause
the first and second portions to separate from one another, disengaging the
20 pawl from the spaced-apart teeth and permitting movement of the strap through the aperture in the release direction.

18. The fastener of claim 17, wherein the separating member is at least partially tapered in a direction parallel to an axis along which the channel extends.
25

19. The fastener of claim 18, wherein the separating member is generally wedge-shaped.

20. The fastener of claim 17 further comprising a flexible member attached to the
30 fastener at a first end of the flexible member, wherein the separating member is mounted on the flexible member and the flexible member is manipulable between a first position where the separating member is disengaged from the channel, and a second position where the separating member is engaged with the channel.

21. The fastener of claim 20, wherein the flexible member is attached to the fastener at a second end of the flexible member opposite the first end of the flexible member.

5 22. The fastener of claim 17, wherein the channel separating the first and second portions has a width that is less than 1 mm.

23. The fastener of claim 17, wherein a width of the channel is greater than a depth of the channel.

10

24. The fastener of claim 17, wherein the pawl is on the first portion and engagement of the separating member with the channel causes the first portion to move away from the second portion.

15 25. A packaged item comprising:
packaging material; and
a fastener including:

a strap having a first end, a second end and a plurality of spaced-apart teeth on a surface of the strap between the first and second ends;

20 a buckle adjacent the first end, the buckle comprising:

first and second portions at least partially separated by a channel;
an aperture between the first and second portions for receiving the strap;
a pawl mounted on one of the first and second portions within the aperture;

25 wherein the first and second portions are movable relative to one another for selective engagement of the pawl and the spaced-apart teeth to prevent movement of the strap through the aperture in a release direction; and

30 a separating member adjacent the buckle and movable to engage the channel to cause the first and second portions to separate from one another, disengaging the pawl from the spaced-apart teeth and permitting movement of the strap through the aperture in the release direction;
wherein the strap is threaded through an aperture in the packaging material, around the

item, and through the aperture in the buckle to secure the item to the packaging material.

26. A packaged item comprising:

5 packaging material; and

a fastener including:

a strap having a first end, a second end and a pivot point therebetween,
the pivot point providing for pivotal movement of a first section of
the strap in between the pivot point and the first end of the strap
10 relative to a second section of the strap in between the pivot point
and the second end of the strap;

a plurality of spaced-apart teeth on a surface of the second section of the
strap; and

a buckle adjacent the first end of the strap, the buckle comprising an
15 aperture for receiving the strap and a pawl mounted within the
aperture, the pawl being selectively engagable with the plurality of
spaced-apart teeth to prevent movement of the strap through the
aperture in a release direction;

wherein the strap is threaded through a first aperture in the packaging material so that
20 the pivot point is adjacent the first aperture, around the item, through a second
aperture in the packaging material, and through the aperture in the buckle to
secure the item to the packaging material.

27. A method of releasing an object from packaging material, wherein the object is

25 secured to the packaging material with a fastener including a buckle with an aperture and a
strap inserted through the aperture, the method comprising:

moving a separating member to engage a channel in the buckle separating a first
portion and a second portion from one another, so that the first portion and
second portion separate from one another further, causing a pawl on one of the
30 first and second portions to disengage from a plurality of spaced-apart teeth on
the strap; and

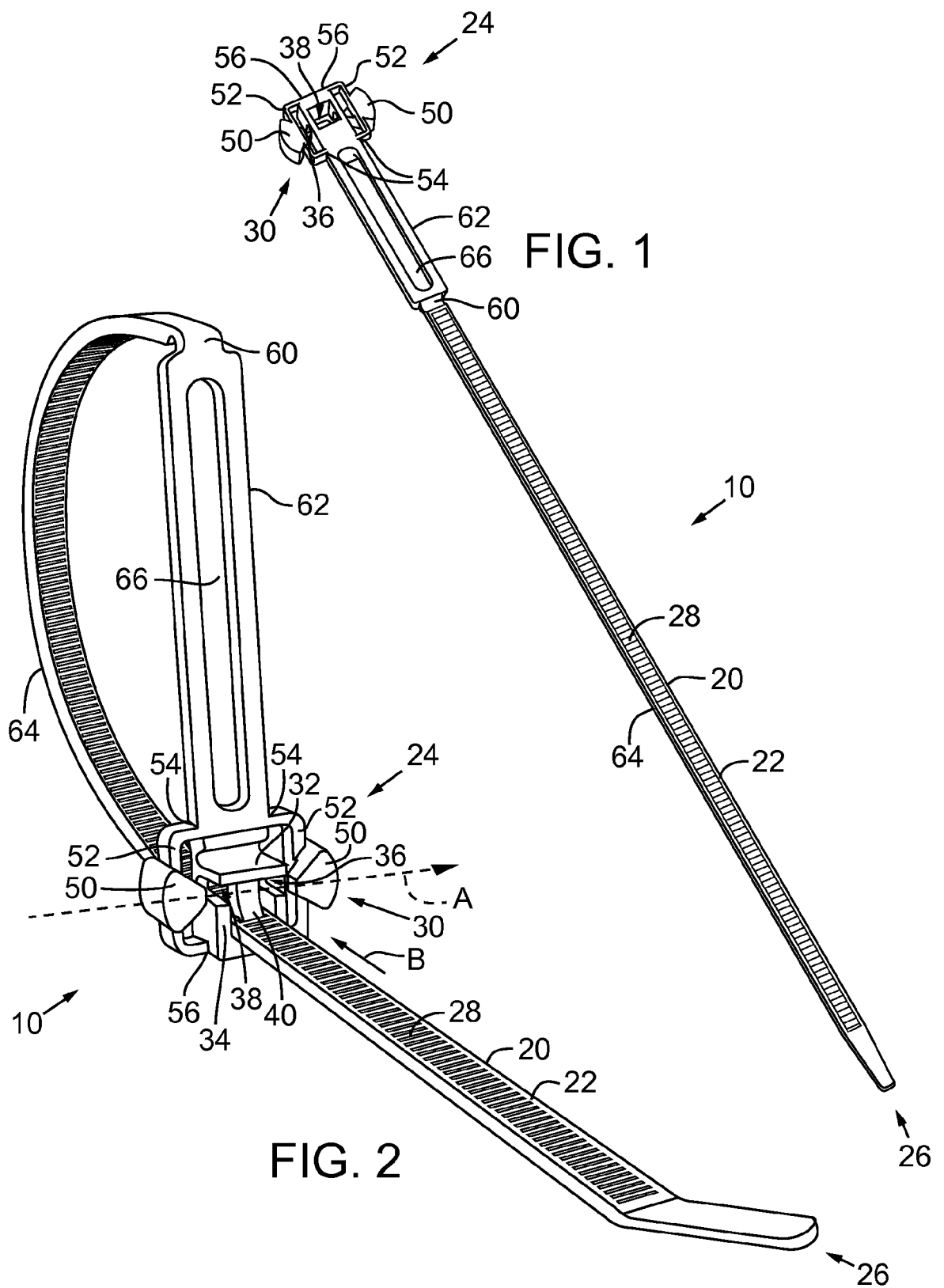
moving the strap in a release direction through the aperture.

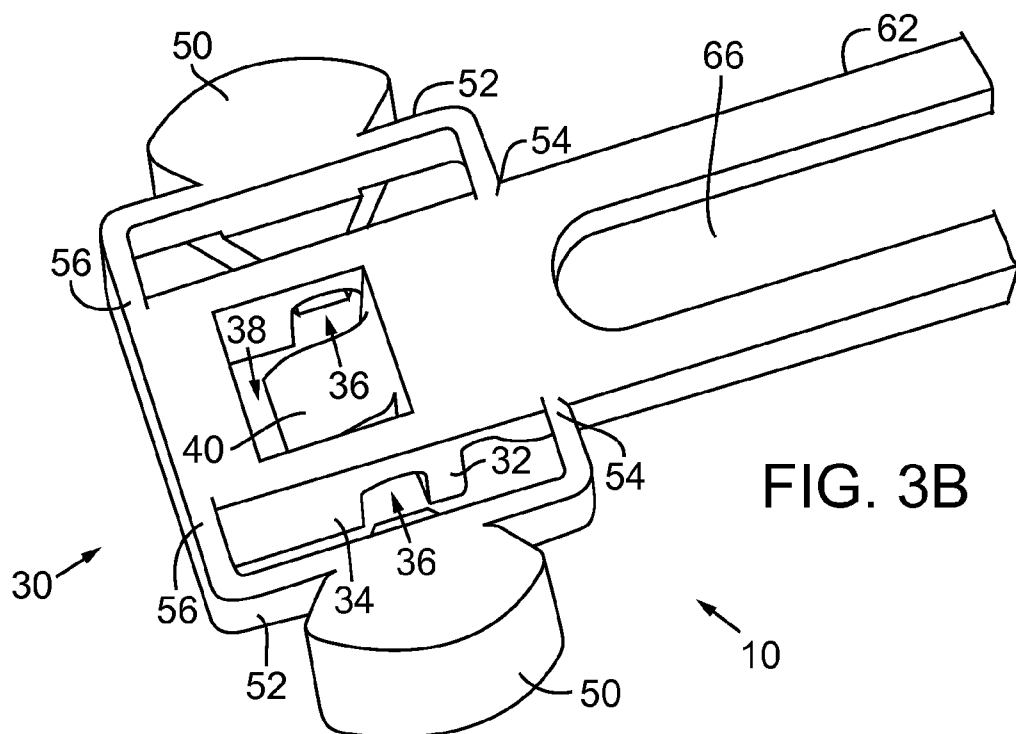
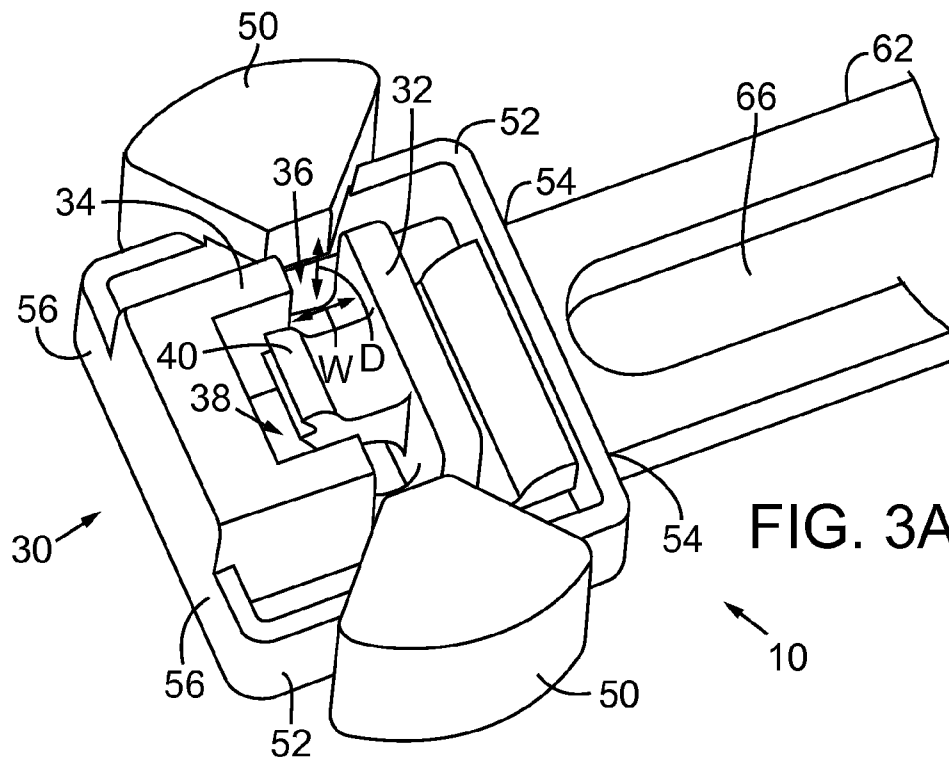
28. A method of securing an item to packaging material using a fastener including a strap and a buckle with an aperture for receiving the strap, wherein the strap includes a pivot point separating a first section of the strap from a second, more rigid section of the strap, the method comprising:

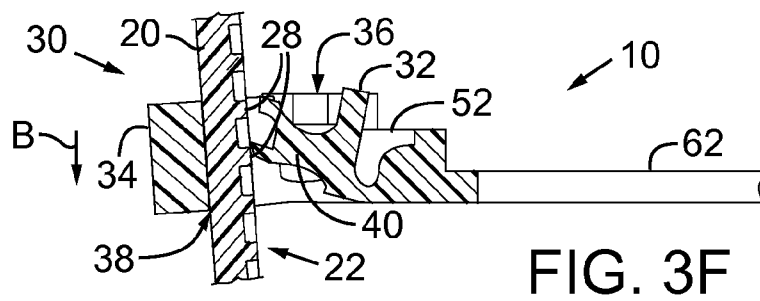
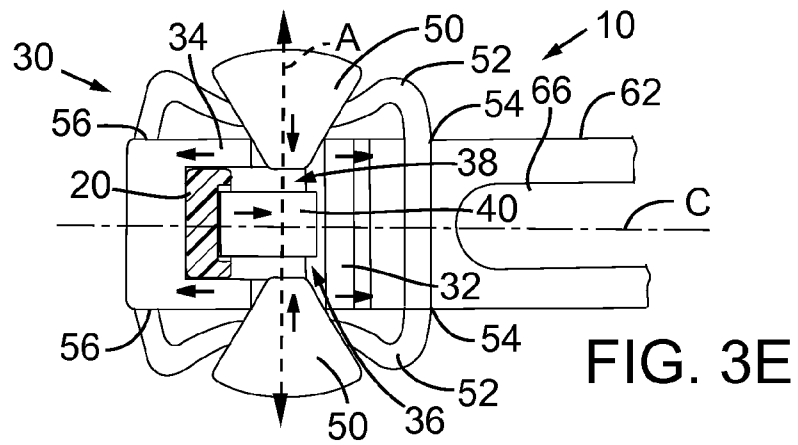
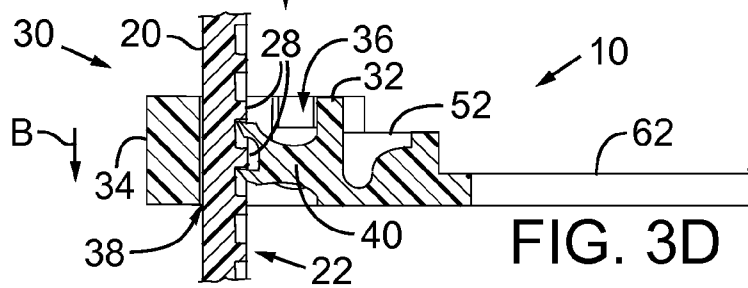
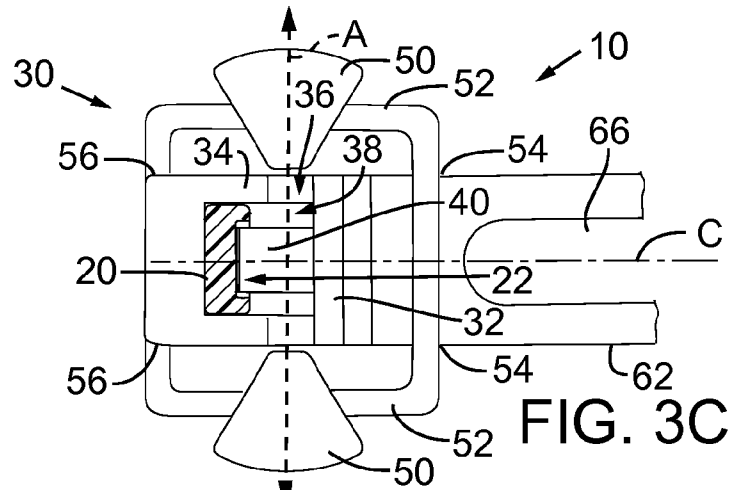
- 5 threading the first section of the strap through a first aperture in the packaging material
 until the pivot point is adjacent the first aperture in the packaging material;
 looping the first section of the strap around the item;
 threading the first section of the strap through a second aperture in the packaging
 material;
- 10 threading the first section of the strap through the aperture in the buckle; and
 pivoting the strap about the pivot point so that the second, more rigid section of the
 strap is flush against a surface of the packaging material.

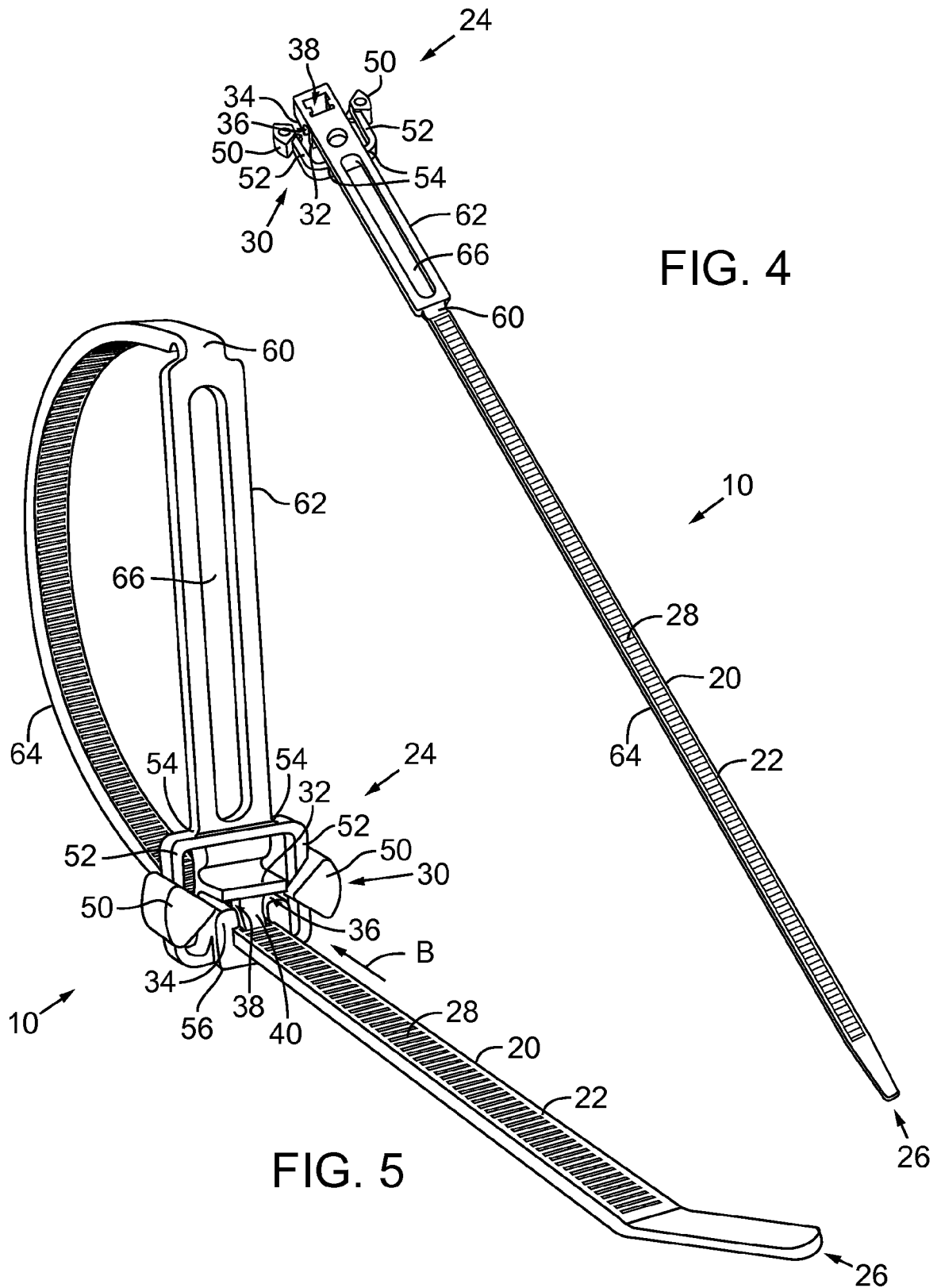
29. A fastener comprising:

- 15 a strap having a first end, a second end and a pivot point therebetween, the pivot point
 providing for pivotal movement of a first section of the strap in between the
 pivot point and the first end of the strap relative to a second section of the strap
 in between the pivot point and the second end of the strap;
- a plurality of spaced-apart teeth on a surface of the second section of the strap;
- 20 a buckle adjacent the first end, the buckle comprising:
 - first and second portions at least partially separated by a channel;
 - an aperture between the first and second portions for receiving the second
 section of the strap;
 - a pawl mounted on one of the first and second portions within the
 - 25 aperture;
 - wherein the first and second portions are movable relative to one another
 for selective engagement of the pawl and the spaced-apart teeth to
 prevent movement of the strap through the aperture in a release
 direction; and
- 30 a separating member adjacent the buckle and movable to engage the channel to cause
 the first and second portions to separate from one another, disengaging the
 pawl from the spaced-apart teeth and permitting movement of the strap through
 the aperture in the release direction.









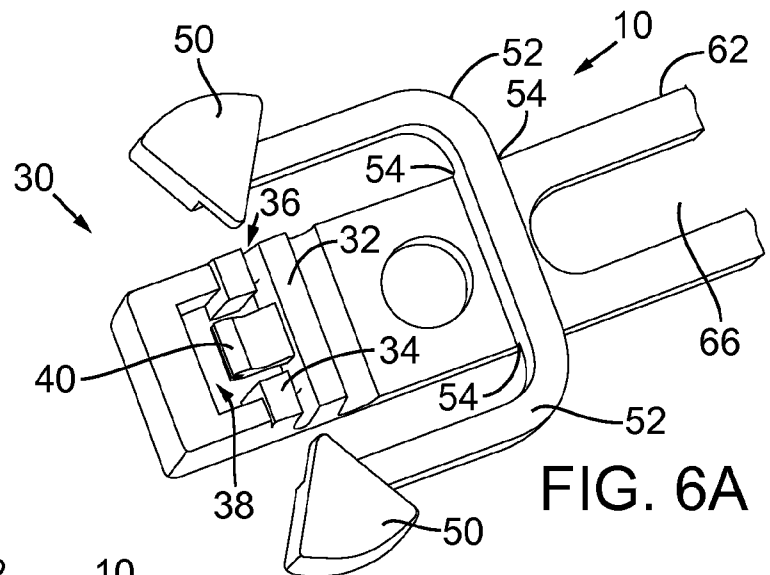


FIG. 6A

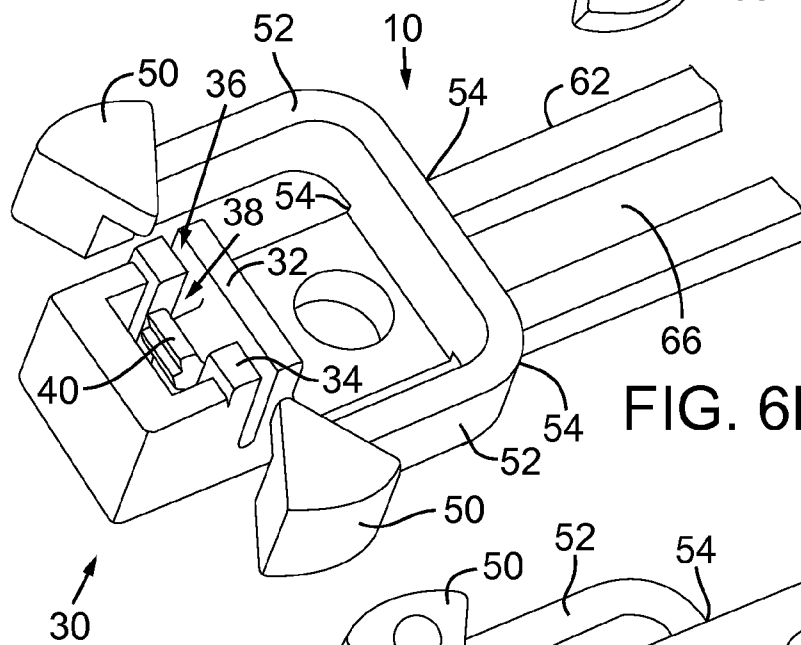


FIG. 6B

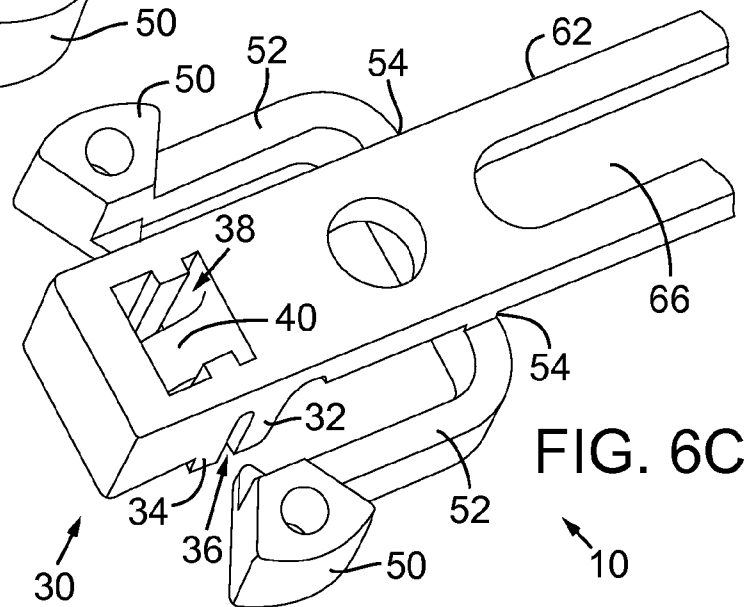
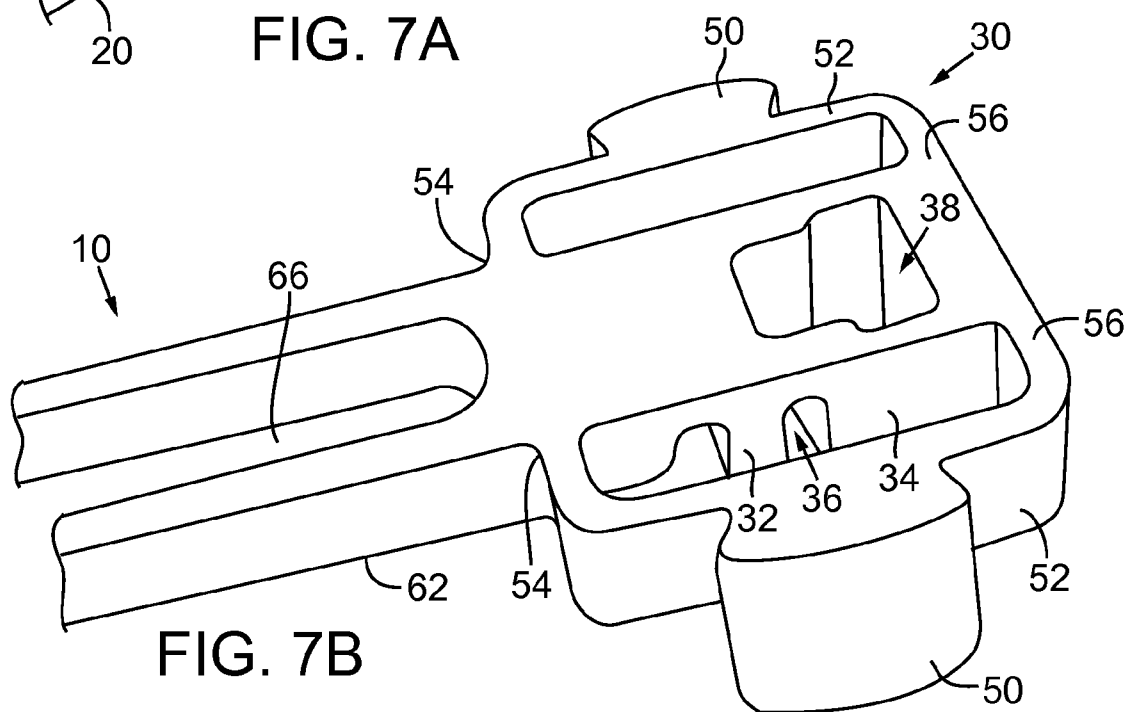
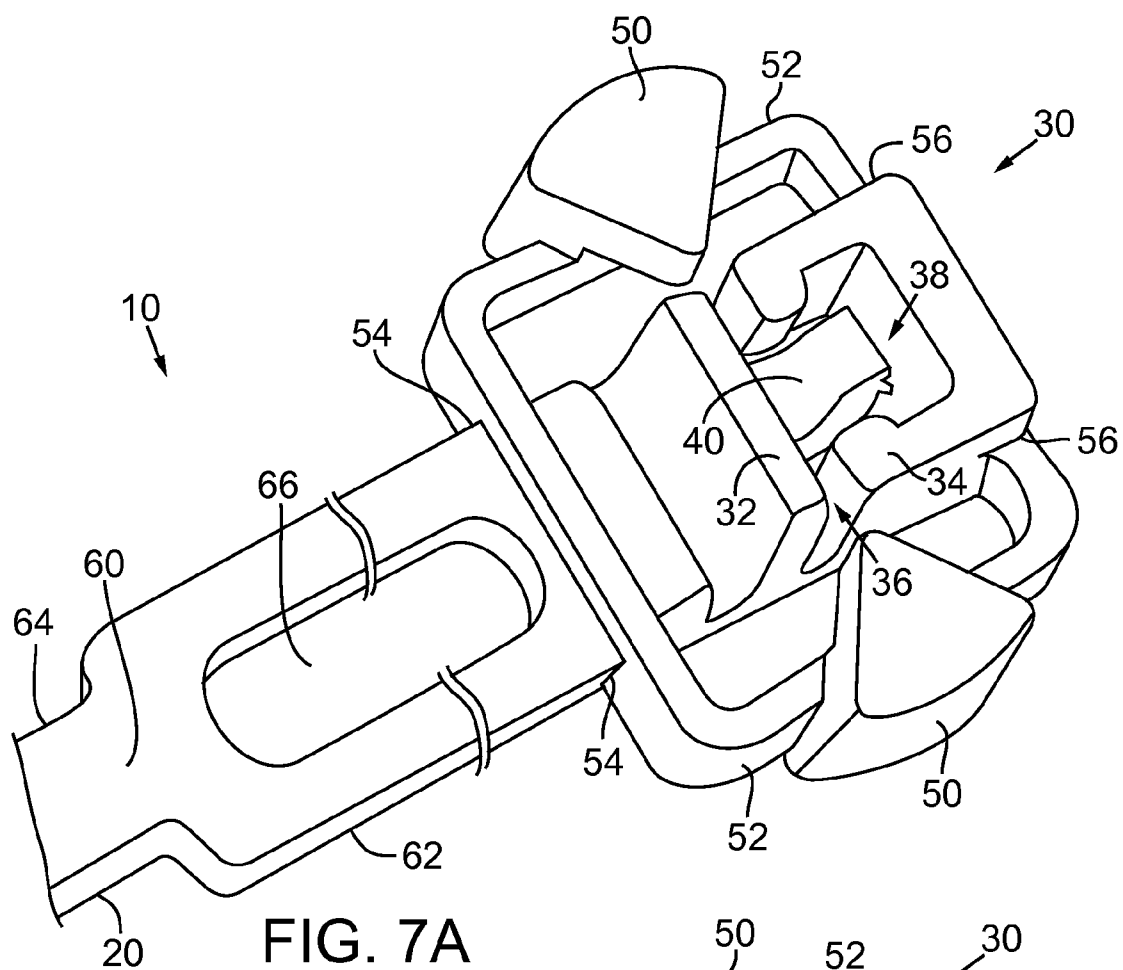
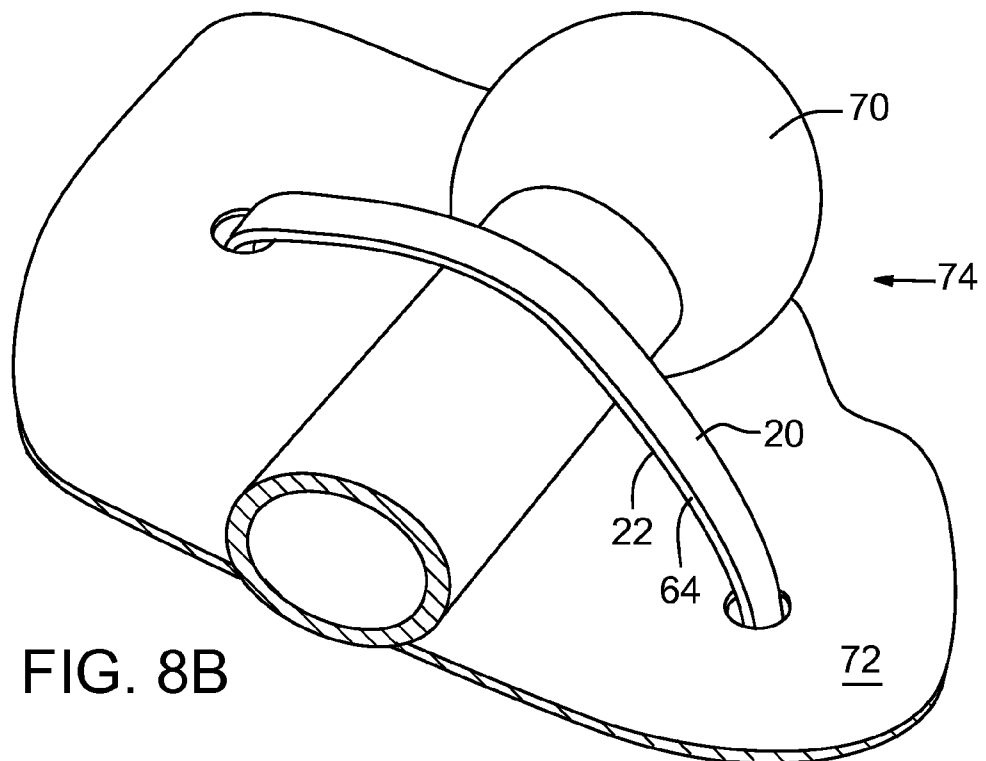
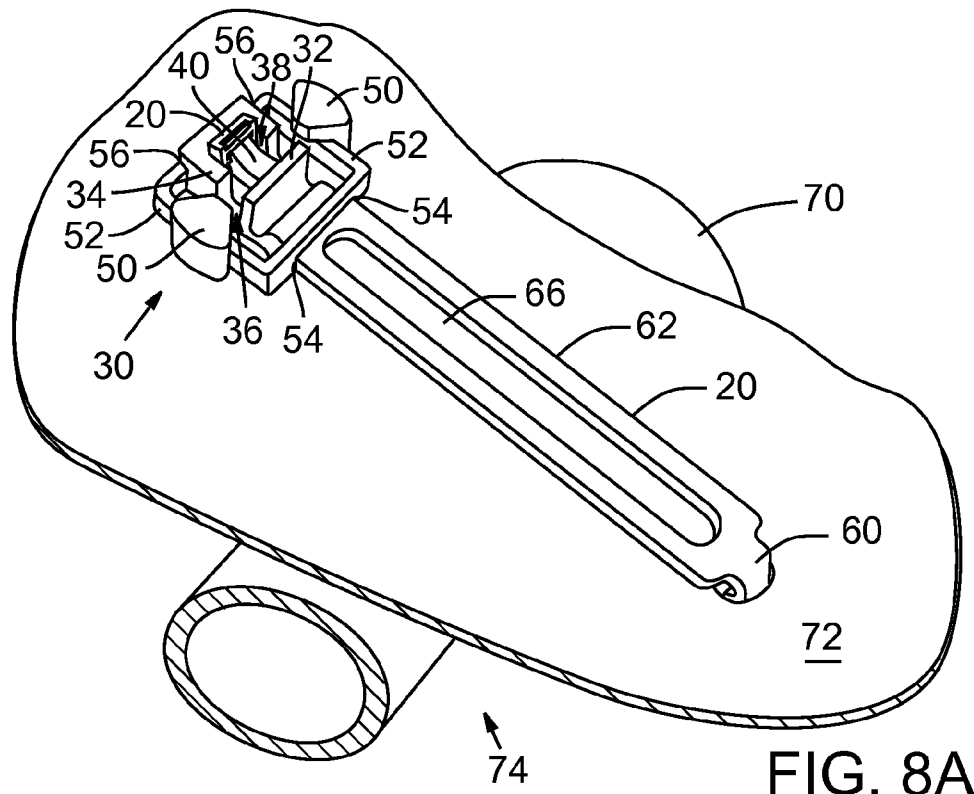


FIG. 6C





INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2008/072467

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A44B11/25; A44B11/26; B65D63/00; EC: B65D63/10B3P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI; EPODOC; PAJ; CNKI; CNPAT; FASTENER, TEETH; TOOTH+; DISENGAG+; PAWL; RATCHET; PUSH+; RELEAS+; UNLOCK???; BARB?;

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN1154416C(BUILMATEL CO. LTD.) 23 Jun. 2004(23.06.2004) see the description pags. 7-8, and figs. 1,5,8-9	1-8, 27
Y		9-12,17-25,29
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Y		9-12,17-25,29
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☐ Further documents are listed in the continuation of Box C.

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Date of the actual completion of the international search 12 Jun. 2009(12.06.2009)	Date of mailing of the international search report 02 Jul. 2009 (02.07.2009)
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer DENG Xuexin Telephone No. (86-10)62412943

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Continuation: A. CLASSIFICATION OF SUBJECT MATTER

A44B11/25 (2006.01) i

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